



TOWN OF NEWMARKET, NEW HAMPSHIRE

Agenda

Wednesday, March 2, 2022, 7:00 PM
Council Chambers

- 1. Pledge of Allegiance**
- 2. Public Forum**
- 3. Public Hearing**
 - a. 1. Progress of the CDBG-Covid project that provides funding to the municipality and service provider subapplicants for costs in preparing for, responding to, or recovering from Covid-19. Participating organizations include: Newmarket General Assistance, Newmarket Housing Authority, Newmarket Recreation Sunrise Sunset Activity Center, Newmarket Recreation Department Childcare and Newmarket Community Church.
 - b. 2. Progress of the Newmarket Housing Authority's upgrade project, 34 Gordon Avenue, that includes replacement piping and energy savings improvements. The majority of the 50 residential units are occupied by low and moderate income households.
- 4. Town Council to Consider Acceptance of Minutes**
 - a. February 16, 2022 Non-public Meeting Minutes
 - b. February 16, 2022 Meeting Minutes
Accept a Motion to Approve the February 16, 2022 Meeting Minutes.
- 5. Report of the Town Manager**
 - a. Town Manager's Report
 - b. Water & Wastewater Energy Audits
- 6. Committee Reports**
- 7. Old Business**
 - a. **Resolutions/Ordinances in the 2nd Reading**
 - i. **Resolution #2021/2022-24 - Tucker Well Project Award**
 - ii. **Resolution #2021/2022-25 - Tucker Well Dredge and Fill Permit**
- 8. New Business/Correspondence**

- a. **Town Council to Consider Nominations, Appointments and Elections**
- b. **Resolutions/Ordinances in the 1st Reading**
 - i. **Resolution #2021/2022-26 - Purchase of New UPS Devices for the Town**
 - ii. **Resolution #2021/2022-27 - New Road Watermain Replacement and Drainage Improvements Project Award**
 - iii. **Resolution # 2021/2022-28 - Bennett and Sewall Wells Improvements Project**
- c. Correspondence to the Town Council
- d. Closing Comments by Town Councilors
- e. Next Council Meeting
 - i. **March 16, 2022**

9. Adjournment

Visitor Orientation to the Town Council Meeting

Welcome to this evening's Council meeting. Please note that the purpose of the meeting is for the Council to accomplish its work within a qualitative time frame. Meetings are open to the public, but public participation is limited. If you wish to be heard by the Council, please note the "Public Forum" at the beginning of the meeting to speak to items on a meeting agenda and/or matters pertaining to the business of the Council. In addition, public hearings may be scheduled for public comment on specific matters.

Speakers must be residents of the Town of Newmarket, property owners in the Town of Newmarket, and/or designated representatives of recognized civic organizations or businesses located in the Town of Newmarket. When they are at the podium, speakers first need to recite their name and address for the record. Visitors should address their comments to the presiding officer and the Council as a body and not to any individual member.

Each speaker shall be provided a single opportunity for comment, limited to three (3) minutes. Public forum shall be limited to fifteen (15) minutes. Visitors should not expect a response to their comments or questions since the Council may not have discussed or taken a position on a matter. Public Forum is not a two-way dialogue between speaker(s), Councilors, and/or the Town Manager. The Chair will preserve strict order and decorum at all Town Council meetings. Outbursts from the public are not permitted.



Town Hall
186 Main Street
Newmarket, NH 03857

Tel: (603) 659-3617
Fax: (603) 659-8508

Founded December 15, 1727
Chartered January 1, 1991

TOWN OF NEWMARKET, NEW HAMPSHIRE

ATTACHMENTS:

Description	Upload Date	Type
Public Hearing Notice	2/16/2022	Cover Memo

Posted in the following 3 town posting places:

Town Hall

Library

Recreation Center

Signed: Wendy V. Chase Date: 2/17/2022

TOWN OF NEWMARKET
CDBG, CDBG-CV PUBLIC HEARINGS

The Newmarket Town Council will hold 2 Public Hearings on Wednesday, March 2, 2022 at 7:00pm at the Newmarket Town Council Chambers, 186 Main Street, Newmarket, New Hampshire. Community Development Block Grant (CDBG) funds are available to municipalities through the NH Community Development Finance Authority. Up to \$500,000 annually is available for Economic Development Projects, up to \$500,000 for Housing Projects, up to \$500,000 for Public Facility Projects, up to \$500,000 in Emergency Funds, up to \$25,000 per Planning Study grant. Up to \$500,000 was available in CDBG-Covid funds. All projects must directly benefit a majority of low- and moderate-income persons. The Public Hearings will update the public on, and take comment on, the following:

1. Progress of the CDBG-Covid project that provides funding to the municipality and service-provider subapplicants for costs in preparing for, responding to, or recovering from Covid-19. Participating organizations include: Newmarket General Assistance, Newmarket Housing Authority, Newmarket Recreation Sunrise Sunset Activity Center, Newmarket Recreation Department Childcare and Newmarket Community Church.
2. Progress of the Newmarket Housing Authority's upgrade project, 34 Gordon Avenue, that includes replacement piping and energy savings improvements. The majority of the 50 residential units are occupied by low and moderate income households.

For persons with special needs, provisions can be made by contacting the Town Manager's Office telephone (603-659-3617) or mail, at least five days prior to the public hearing.

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TOWN OF NEWMARKET, NEW HAMPSHIRE

TOWN COUNCIL REGULAR MEETING

February 16, 2022 7:00 PM

Council Chambers

Draft Minutes

6:30 PM Non-Public Session Pursuant to RSA 91-A:3,II(d) Consideration of the acquisition, sale or lease of real or personal property

Councilors present: Council Chair Toni Weinstein, Councilor Jonathan Kiper, Councilor Megan Brabec, Councilor Scott Blackstone, Councilor Katanna Conley and Councilor Brian Ward.

Staff present: Town Manager Stephen Fournier, Director of Planning and Community Development Diane Hardy, Police Chief Greg Jordan, and Wendy Chase, Recording Secretary.

Chair Weinstein convened the meeting at 7:06 PM and led the Pledge of Allegiance.

Councilor Conley made a motion to seal the February 16, 2022 Non-public Meeting Minutes, which was seconded by Councilor Brabec.

Motion was Passed by a vote of 6-0-0.

AGENDA

PUBLIC FORUM

Chair Weinstein opened the public forum at 7:07 PM.

Newmarket State Representative Ellen Read spoke on behalf of ReVision Energy. Ms. Read is a member of Newmarket's Energy and Environment Committee. She voiced concern over the lack of support ReVision Energy has received in regards to the Solarize Newmarket Project. She did point out that information was added to the town's website upon request from ReVision Energy, but nothing has been added to the weekly newsletter and other social media.

Town Manager Fournier said that he has received zero correspondence from ReVision Energy in terms of advertisement for the campaign.

Chair Weinstein said that she is the Council Representative to the Energy and Environment Committee and they met for the first time in months due to the fact that they did not have a quorum for the past 3 or 4 meetings because members have not been able to attend. She said that there was a representative from ReVision Energy at the last Committee meeting and that representative did not mention any concerns raised by Ms. Reed. Chair Weinstein asked that

ReVision Energy contact her directly to help with getting the word out about the solar project.

Chair Weinstein closed the public forum at 7:15 PM.

TOWN COUNCIL TO CONSIDER ACCEPTANCE OF MINUTES

February 2, 2022

Councilor Conley made a motion to Approve *the February 2, 2022 Meeting Minutes*, which was seconded by Councilor Brabec.

Motion was Passed by a vote of 6-0-0.

REPORT OF THE TOWN MANAGER

Proclamation to Planning & Community Development Director Diane Hardy

Chair Weinstein read a Proclamation to Planning and Community Development Director Diane Hardy highlighting her many accomplishments over the years and congratulated her on her upcoming retirement at the end of the month.

Town Manager Fournier thanked Diane for her commitment to the Town and her willingness to take on the projects assigned to her; some not as easy as others. He congratulated her and said that she will be missed.

Director Hardy gave a heartfelt speech and expressed gratitude to those she worked with over the years.

Town Manager's Report

Town Manager Fournier requested action from the Councilors on the proposed Town Warrant. He explained that the Municipal Budget Committee's recommendation is different than the Town Council's due to the increase of \$50,000 to the budget made by the Municipal Budget Committee. He will request the Finance Director to create a new budget line titled "lease payment" and put the \$50,000 there, and not withdraw from the Capital Reserve fund this year so it would be a "wash".

Councilor Ward made a motion that the Town Council recommends the Municipal Budget Committee's Budget, which was seconded by Councilor Conley.

Motion was passed by a vote of 6-0-0.

- **COVID-19 and Vaccination Update:** As of February 9, there are 13 active cases in the community, a decrease of 84% since the last report. We have had 1,576 cumulative cases, an increase of 73 cases since the last report. The Seacoast and Rockingham County have seen a 11.6% increase in new cases in the past week. This is down 4.2% from the previous report. There is a slight increase in the percentage vaccinated.
- **FY22 Budget Update:** At the end of January we are on target with our expenditures; we

are 58.3% through the fiscal year and have expended 59% of our operating budget. One area of concern is road salt; there is a 44% increase in salt costs. Currently we are \$25,000 over budget. Revenues are okay, but motor vehicle registrations are below what they should be, but we received more than anticipated revenues from the Room and Meals Tax.

- **Director of Planning and Community Development:** Interviews will be conducted in the coming week.
- **Non-public Session:** The Newmarket Community Development Corporation will be meeting with the Council in non-public session to discuss a potential development.

Councilor Blackstone inquired about the hybrid cruiser that was damaged in the crash and his concern on how long it will take to replace it.

Chief Jordan explained that he will be coming before the Council to request the purchase of a new cruiser (gas powered) to replace the damaged vehicle. He said that it is difficult to get vehicles manufactured and he found a dealership in MA that has a cruiser available. They will also be asking to order and purchase a hybrid model that would potentially be available in June.

Department Reports January 2022

Councilor Brabec reported on the Conservation Commission Meeting:

The Commissioners asked for an update on the Class A Trail at Neal Mill Road. Town Manager Fournier replied that the town's attorney is working on that. The Commission is looking into herbicides to deal with the invasives at Wiggin Farm. They also plan to organize a "work day" recruiting volunteers to help with that project.

Councilor Blackstone reported on the Planning Board Meeting:

The Board approved a scaled down version of the Seacoast Pool Plastering site plan. The Board will hold a Stormwater Management Meeting to discuss amendments to the regulations to comply with the State regulations.

COMMITTEE REPORTS

Councilor Blackstone said that he likes the community policing section of the Police Department's monthly report.

Councilor Weinstein agreed and mentioned two things in that section of the report: 1. The welfare check on an elderly resident where the officers were able to help them out with a power outage, and 2. Postal worker Kayla alerted her Postmaster who alerted the Police to do a welfare check on an elderly person who had fallen and was trapped for days. She also commented on the Fire Department report; the new fire truck will be here soon and noted that Bill LePage will be leaving to take a position in another town and she wished him well.

OLD BUSINESS

RESOLUTIONS/ORDINANCES IN THE 2ND READING

Resolution #2021/2022-23 - Creating an Advisory Committee on Racial Equity, Inclusion and Human Rights

Councilor Ward made a motion to Approve *Resolution #2021/2022-23 - Creating an Advisory Committee on Racial Equity Inclusion and Human Rights*, which was seconded by Councilor Conley.

Town Manager Fournier explained that the Committee is not a judiciary committee. Their charge is to review current town policies and see if any adjustments need to be made to them regarding racial equity and human rights. Members will include the Town Manager, Police Chief, Superintendent of Schools and 7 community members. Preference will be given to Newmarket Residents, but non-resident members will be allowed.

Councilor Ward commented that he thinks this Committee is a great idea and is glad to see more effort is being done toward racial equity.

Chair Weinstein said that she is glad that members can include non-residents because she can think of a couple of people that would be perfect to serve on this committee.

Motion was Passed by a vote of 6-0-0.

NEW BUSINESS/CORRESPONDENCE

Resolutions/Ordinances in the 1st Reading

Resolution #2021/2022-24 - Tucker Well Project Award

Chair Weinstein read Resolution #2021/2022-24 into the record.

Resolution #2021/2022-25 - Tucker Well Dredge and Fill Permit

Chair Weinstein read Resolution #2021/2022-25 into the record.

CORRESPONDENCE TO THE TOWN COUNCIL

There was no correspondence to the Town Council.

CLOSING COMMENTS BY TOWN COUNCILORS

Councilor Kiper commented that the Council should be made aware of the rising rental costs in Newmarket. The rents in some instances have nearly doubled in the past five years and the only antidote to help with rising rents is more housing.

Councilor Ward said it's harder and harder for young professionals to move into town and renters need protection to make sure the town stays viable to avoid the "silver wave" issue that's happening throughout the State.

Councilor Blackstone said that the Planning Board is forming a committee to address such issues.

Councilor Blackstone asked about the replacement of signage in town, particularly the Recreation Center and School. Town Manager Fournier said that Parks and Rec are getting new signage and hopefully the School will get something new.

Councilor Blackstone asked if it were possible to solicit volunteers to help build a new skateboard park. Town Manager Fournier said unfortunately that is not an option; it's too much of a liability.

Chair Weinstein asked why it's taking so long to get the Class A Trail at Neal Mill Road and the solar garden finalized. Town Manager Fournier said the solar garden is in negotiations. He said he will speak to the Attorney.

NEXT COUNCIL MEETING

March 2, 2022

ADJOURNMENT

Chair Weinstein adjourned the meeting at 8:06 PM without objection.

Respectfully submitted,
Wendy Chase, Recording Secretary



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Town Manager's 3/2/2022 Report	2/28/2022	Cover Memo



TOWN OF NEWMARKET, NEW HAMPSHIRE
OFFICE of the TOWN MANAGER

REPORT OF THE TOWN MANAGER

March 2, 2022

COVID-19 and Vaccination Update: As of February 24, there are seven active cases in the community, a decrease of 84% since the last report. We have had 1,622 (17% of the population) cumulative cases.

Our health region (Seacoast) and Rockingham County both have substantial levels of community transmission. The Seacoast Health Region has seen a 5.6% increase in new cases over the past week. This is down 6% from the previous report.

NH Department of Health and Human Services has changed their recommendations regarding masks. As the Omicron surge declines, population immunity increases, effective therapeutics are increasingly available, and there is decreasing risk from COVID-19, the NH Division of Public Health Services (DPHS) is no longer recommending universal face mask use, but rather recommends that decisions on face mask use be based on individual choice and informed by a person's own assessment and acceptance of COVID-19 risk (rather than universal requirements).

Face masks remain an effective prevention measure (see CDC science brief and recent MMWR publication); therefore, people who are severely immunocompromised or who desire additional protection for themselves, or another household member can choose to wear a face mask for their protection when in indoor public locations.

Face masks continue to be required under federal regulations in certain situation, including on public transportation (including school buses), and when entering a healthcare facility. Additionally, face masks should still be worn to shorten isolation and quarantine to 5 days (see isolation and quarantine guidance).

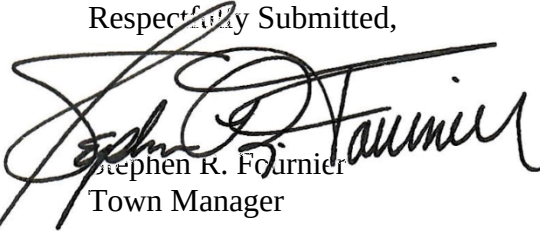
As for vaccinations, we had a slight increase in the percentage vaccinated.

	Pop.	At Least 1 Dose	% At least 1 Dose	Fully Vaccinated	%Fully Vaccinated
Newmarket	9,445	6,280	66.3%	5,662	59.9%

Town Election: Tuesday March 8 is Town Election Day. We need at last one councilor at the polls at all times. I sent out a sign-up sheet and the Town Clerk will continue to make sure it is filled out.

Wastewater Energy Audit: The Director of Environmental Services will be at the meeting with an energy audit presentation.

Respectfully Submitted,



Stephen R. Fournier
Town Manager



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ATTACHMENTS:

Description	Upload Date	Type
Draft Energy Report	2/24/2022	Cover Memo
Draft Water Energy Report	2/24/2022	Cover Memo
Audit Summary PowerPoint	2/24/2022	Cover Memo

ENERGY EVALUATION

Newmarket Wastewater Treatment Facility & Collection System Pump Stations

Town of Newmarket, New Hampshire



PROCESS ENERGY SERVICES, LLC

WATER ♦ WASTEWATER ♦ INDUSTRIAL

ENERGY EVALUATION

for the

TOWN OF NEWMARKET

WASTEWATER TREATMENT FACILITY

& COLLECTION SYSTEM PUMP STATIONS

December 2021

Newmarket, NH

Performed by:

Process Energy Services, LLC
2 Lafayette Rd.
Londonderry, New Hampshire 03053
(603) 537-1286

Supported by:

New Hampshire Department of Environmental Services
Eversource

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APPENDIX A: UTILITY RATE SCHEDULE

While the recommendations in this report have been reviewed for technical accuracy, Process Energy Services is not liable if the projected savings are not achieved. The recommendations are based on an analysis of conditions observed at the time of the evaluation, information provided by facility staff and estimated costs for equipment and labor based on similar projects. Actual savings and project costs will depend on many factors, including varying process flows and loads, recommendations implemented, seasonal variations in fuel costs and weather, and proper equipment operation. Before implementation of the measures presented in this report, Process Energy Services recommends a more detailed analysis to verify savings and project costs.

SECTION 1. EXECUTIVE SUMMARY

1.1 Overview

In 2016, the New Hampshire Department of Environmental Services (NHDES), the New Hampshire Office of Energy and Planning (NHOEP) and New Hampshire electric utilities secured funding to perform comprehensive and preliminary process energy evaluations at selected New Hampshire Wastewater Treatment Facilities. Due to the success of this initial program, NHDES Clean Water State Revolving Fund (CWSRF) provided funding to continue conducting energy audits at New Hampshire's wastewater treatment facilities (WWTFs). The NHDES CWSRF program is also providing loan forgiveness to encourage implementation of the energy audit findings. The loan forgiveness is in addition to any incentives offered by NHSaves.

Process Energy Services (PES) was selected as the consultant to perform the energy evaluations. PES specializes in water/wastewater system process energy evaluations throughout the U.S.

The evaluation tasks included the following:

- Provide an energy-related review of each facility process.
- Assemble energy, flow and equipment operational information based on plant process and field measurements to identify potential cost saving projects.
- Provide preliminary savings and cost data for the identified energy measures.

The recommendations included in this evaluation are based on site visits to review the facility process equipment with staff and collect operational data. Although the wastewater process was the primary focus of the evaluation, a review of the building heating systems was also performed.

1.2 Report Organization

As cost savings projects were developed, each measure was prioritized based on ease of implementation, cost effectiveness and ability for each project to support subsequent measures. The projects have been categorized as energy conservation measures (ECMs) for projects that require a capital investment, operational measures (OMs) for fast payback improvements (1 year or less), and energy management practices (EMPs) that are essential for a successful energy management program.

The report organization includes an Executive Summary to provide an overview of the recommended project savings and costs. Section 2 reviews energy management initiatives and benchmarking facility energy use. Section 3 reviews the collection system pump stations. Section 4 includes an energy related overview of each process at the wastewater plant and Section 5 includes a detailed review of each proposed measure.

The project evaluation summary table is presented in Table 1.1. A summary of the qualified measures and their associated savings is presented in Table 1.2.

Table 1.1: Project Evaluation Summary**2020 Baseline Electric Energy Costs**

Wastewater Plant	\$ 94,132
Creighton Street Station	\$ 30,945
Cedar Street Station	\$ 3,685
Packers Falls Station	\$ 1,512
Salmon Street Station	\$ 3,986
Wadleigh Falls Station	\$ 2,330
Bay Road Station	\$ 3,582
Total for WWTF & Pump Stations	\$ 140,172

2020 Baseline Propane/Fuel Energy Costs

WWTF Control Building (fuel oil)*	\$ 1,736
WWTF Dewatering Building (fuel oil)	\$ 4,718
WWTF Maintenance Building (propane)	\$ 5,755
Pump Station Generators (propane)	\$ 363
Total	\$ 12,572

* The Control Building 2020 data may be missing bills and should be verified

Projected Annual Cost and Savings Summary

	<u>Calculated Savings</u>	<u>Percent of Costs</u>
Electric Cost Savings	\$ 11,281	8 %
Fuel/Propane Savings	\$ 574	5 %
Net Annual Savings/Percent of Energy Costs	\$ 11,855	8%

Project Costs/Payback

Estimated Cost of Projects	\$ 12,600
Simple Payback	1.1 Years

Electric Energy Reduced Power Plant Emissions

In addition to the energy cost savings, reducing station energy use will also provide environmental benefits by reducing greenhouse gas emissions (GHG) that include CO₂, N₂O and CH₄. The information in this evaluation can be used by the Town to develop a GHG inventory plan in accordance with the EPA's Climate Leadership Program. Reduced power plant emission is based on 74,142 kWh annual savings.

Carbon Dioxide (1.37 lbs/kWh)	101,575	lbs/year
Sulfur Oxides (0.0035 lbs/kWh)	259	lbs/year
Nitrous Oxides (0.0010 lbs/kWh)	74	lbs/year

Emission unit source: U.S. EPA eGrid 2007 and U.S. EPA Office of Air Quality Planning & Standards (www.epa.gov/cleanenergy/energy-resources/egrid/faq.html).

Table 1.2: Recommended Cost Saving Measures

No	Cost Saving Measures	Annual Energy Savings (kWh)	First Year Annual Savings (\$)	Initial Cost (\$)	Simple Payback (yrs)
	ENERGY MANAGEMENT PRACTICES				
EMP 1	Benchmark Energy Use with Process Data	--	--	\$3,000	--
	Total for EMPs	--	--	--	--
	OPERATIONAL MEASURES				
OM 1	Creighton Street Electric Heat Thermostats	8,300	\$1,145	\$1,000	<1
OM 2	Creighton Street Ventilation System Cycling	21,836	\$3,750	\$3,000	<1
OM 3	Operate Plant with Primary Treatment (<i>staff initiative in 2021</i>)	18,315	\$2,527	--	--
OM 4	Cycle WAS Holding Tank Blower (<i>staff initiative in 2021</i>)	12,147	\$1,676	--	--
OM 5	Adjust Maintenance Building Thermostats	--	\$574	--	--
	Total for OMs	60,598	\$9,672	\$4,000	<1
	ENERGY CONSERVATION MEASURES				
ECM 1	Install VFDs for Zone A Mixers	13,544	\$2,183	\$5,600	2.6
	Total for ECMs	13,544	\$2,183	\$5,600	2.6
	WWTF Propane/Fuel Oil Energy and Cost Savings	--	\$574	--	--
	WWTF Electric Energy and Cost Savings	74,142	\$11,281	\$12,600	1.1
	Total	74,142	\$11,855	\$12,600	1.1

SECTION 2. ENERGY MANAGEMENT

2.1 Energy Management Program

Facility staff currently makes an effort to operate the facility as efficiently as possible. To help maintain a high level of facility efficiency, EMP #1 in Section 5 recommends benchmarking energy usage and costs with process data. This will help verify project savings and identify future energy saving improvements.

2.2 Benchmarking Facility Energy Use

Energy benchmarking can be accomplished using internal or external comparisons. Internal benchmarking allows an organization to evaluate facility energy use year to year to monitor facility efficiency changes. The results can be used within an organization to track performance over time, identify best practices, and to increase management's understanding of how to analyze and interpret energy data. The NHDES has set an internal benchmarking goal to reduce energy use for each audited wastewater facility by 33% compared to the baseline year energy use.

For external benchmarking, a facility can be compared to similar facilities. When process and energy use data is assembled, the information can be used to assess performance and motivate staff to investigate why performance is lower than expected or to confirm efficiency efforts by receiving a high performance rating relative to other facilities.

The benchmark data was compared to similar facilities in New Hampshire in Table 2.2 for both the kWh/lb BOD and the kWh/MG values.

Table 2.2: Benchmarking Data Compared to Similar NH WWTF Facilities

Plant	Total Annual Energy Usage (kWh)	Total Flow (MG)	Annual Average Daily BOD Removed (lb/day)	Annual Average kWh/lb BOD removed	Annual Average kWh/MG Treated
Hinsdale	138,735	91	211	1.80	1,525
Littleton	516,160	233	1,747	0.81	2,215
Sunapee	355,800	124	464	2.1	2,871
Rollinsford	100,591	33	228	1.21	3,048
Newmarket	552,400	162	1,128	1.3	3,409
Bristol	284,200	79.6	374	2.08	3,570
Jaffrey	975,536	231	958	2.79	4,223
Winchester	271,990	53	388	1.92	5,132
Wolfeboro	639,236	92.7	473	3.9	7,335
Henniker	337,500	45.9	132	7.01	7,576
Woodstock	317,301	37	408	2.13	8,641
Warner	151,914	17.1	144	2.89	8,884

It is challenging to compare facility energy use when each wastewater plant is unique and has site-specific challenges that may include land area constraints, plant hydraulic limitations, varying permit

requirements and odor control issues. Even though these issues can make it difficult to make direct comparisons with other plants, benchmarking is a valuable tool that helps facilities track energy saving progress and provides an incentive to reach higher levels of plant efficiency.

If the new identified measures in this report are implemented, annual facility WWTF energy use could be reduced to approximately 44,006 kWh (not including the Creighton Street Pump Station measures). The new benchmark values after implementing the proposed projects are summarized below.

Table 2.3: New Values after Energy Project Implementation

Plant	Total New Annual Energy Use (kWh)	2020 Annual Total Flow (MG)	2020 Annual Average Daily BOD Removed (lb/day)	Annual Average kWh/MG Treated	Annual Average kWh/lb BOD removed
Newmarket	508,394	162	1128	3,138	1.23

SECTION 3. COLLECTION SYSTEM PUMP STATIONS

3.1 General

The wastewater collection system was originally constructed in the 1960s. The system includes seven collection system pump stations with the Creighton Street Pump Station collecting wastewater from the entire service area before it is pumped to the wastewater treatment plant.

An overview of the pump stations and potential opportunities to reduce energy costs is discussed below.

3.2 Creighton Street Pump Station

The Creighton Street Pump Station serves as the primary influent pump station to the plant. Wastewater passes through a fine screen (reviewed in Section 4.1) and flows into two wet wells. Three pumps direct flow to the plant grit system or directly to the primary clarifier distribution box.



The construction of both buildings includes a poured concrete foundation with below grade levels for the screening and pump system. The above grade buildings include block walls with brick exterior and a concrete plank/membrane roof. The amount of wall/roof insulation is unknown.

Pump energy use was estimated using field measured power readings for each pump. With this data, the energy use for miscellaneous equipment (fine screen, electric heat, dehumidifier) at the station was estimated in Table 3.1.

Table 3.1: Creighton Street Pump Station 2020 Energy and Operational Data

Month	Pump #1	Pump #2	Pump #3	Total Pump Hours	Influent Monthly Flow (MG)	Estimated Pump Energy Use (kWh)	Estimated Energy Use (kWh) for Misc. Equipment	Total Energy Use (kWh)
Jan	57	84	93	235	17.37	10,335	10,103	20,438
Feb	0	87	103	190	14.55	8,351	12,463	20,814
Mar	0	97	111	208	15.93	9,136	7,577	16,713
Apr	0	110	142	252	19.24	11,089	12,625	23,714
May	0	88	99	187	14.43	8,243	13,276	21,519
Jun	0	67	75	142	10.70	6,258	154	6,412
Jul	0	65	78	144	10.96	6,325	543	6,868
Aug	50	43	55	148	10.35	6,507	-626	5,881
Sep	51	40	50	142	9.94	6,226	206	6,432
Oct	56	44	54	154	10.61	6,768	280	7,048
Nov	59	46	57	163	11.45	7,176	7,740	14,916
Dec	80	65	79	224	16.33	9,847	13,098	22,945
Total/Avg	353	837	998	1485	161.88	96,261	77,439	173,700

The amount of energy estimated for the miscellaneous energy use column is significant and is reviewed more at the end of this section.

3. COLLECTION SYSTEM PUMP STATIONS

The 2020 electric energy cost billing data for the station is summarized below.

Table 3.2: Creighton Street Pump Station 2020 Electric Energy Use and Costs

Month	Energy Use (kWh)	Demand (kW)	Demand Cost	Delivery (kWh) Cost	Monthly Fee	Energy Supply Cost	Total Delivery Cost	Total Cost
Jan	20,438	49	\$720	\$1,226	\$32	\$1,594	\$1,979	\$3,573
Feb	20,814	49	\$714	\$1,249	\$32	\$1,623	\$1,995	\$3,618
Mar	16,713	48	\$706	\$1,003	\$32	\$1,304	\$1,740	\$3,044
Apr	23,714	52	\$768	\$1,423	\$32	\$1,850	\$2,223	\$4,072
May	21,519	47	\$692	\$1,291	\$32	\$1,678	\$2,016	\$3,694
Jun	6,412	21	\$257	\$385	\$32	\$500	\$674	\$1,174
Jul	6,868	28	\$383	\$412	\$32	\$536	\$827	\$1,363
Aug	5,881	20	\$247	\$353	\$32	\$459	\$632	\$1,091
Sep	6,432	21	\$259	\$386	\$32	\$502	\$677	\$1,178
Oct	7,048	20	\$244	\$423	\$32	\$550	\$699	\$1,249
Nov	14,916	55	\$815	\$895	\$32	\$1,163	\$1,742	\$2,906
Dec	22,945	53	\$786	\$1,377	\$32	\$1,790	\$2,194	\$3,984
Totals	173,700	462.6	\$6,591	\$10,422	\$384	\$13,549	\$17,397	\$30,945

Pump Data

The influent pump system consists of Morris vertical dry pit submersible pumps installed in 1999. The pumps are rated for 1,300 gpm @ 96' TDH and equipped with 50 hp motors and VFDs.

The pumps take suction from two wetwells that are connected with a sluice gate valve. The lead pump is activated at 68" and shuts off at 62". The wetwell high-level setpoint is set for 85" and the low level setpoint is 10". The pumps discharge flow to the primary clarifier distribution box before it is directed to the primary clarifiers.



To evaluate pump efficiency, Process Energy Services installed a portable pressure transducer on the pump discharge and recorded kW on the power supply side of the VFD with a power meter. The existing flow meter on the pump discharge was used to collect flow data at three different VFD speeds.

3. COLLECTION SYSTEM PUMP STATIONS

Table 3.3: Creighton Street Pump System Test Data

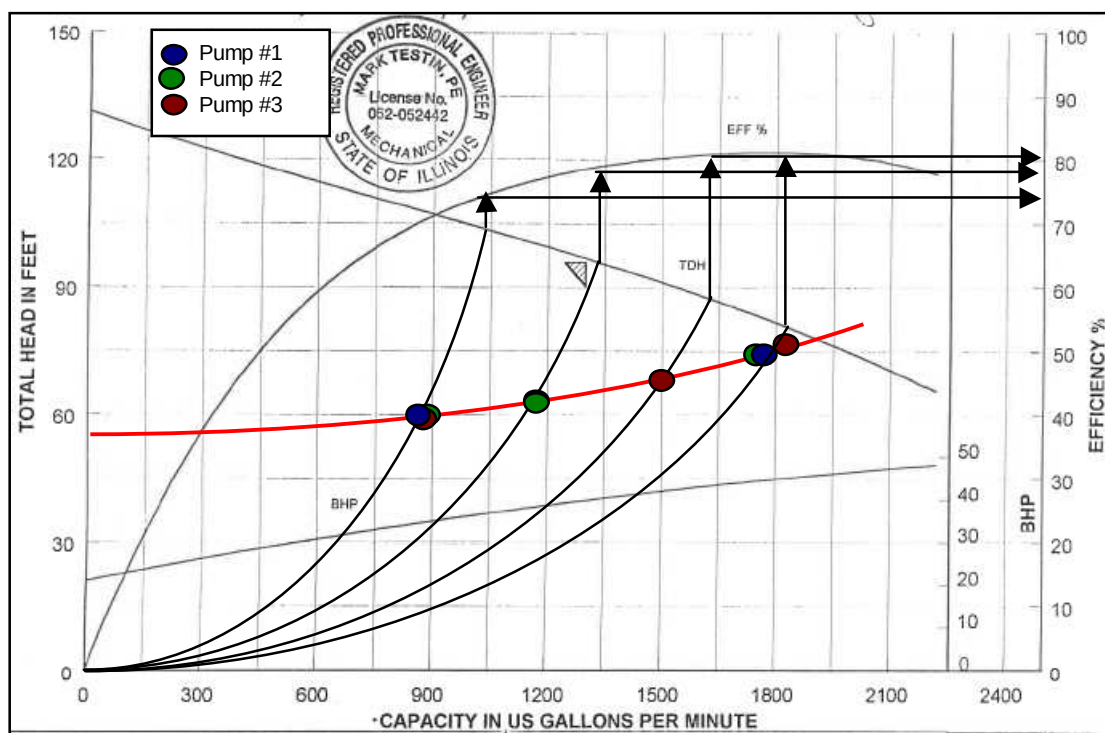
Pump	VFD Speed (Hz)	Flow (gpm)	Wetwell Level (in)	Discharge Pressure (psi)	TDH (ft)**	Power (KW)	Calculated Pump Efficiency*	Pump Curve Efficiency
Pump #1	45	819	56	26	58	17.2	62%	75%
	50	1,175	54	32	72	24.8	76%	77%
	60	1,744	64	34	77	44.1	68%	80%
Pump #2	45	827	60	26	58	17.4	62%	75%
	50	1,187	57	32	72	24.9	77%	77%
	60	1,795	60	34	77	44.0	71%	80%
Pump #3	45	843	65	26	58	17.5	63%	75%
	50	1,534	60	32	72	34.2	72%	80%
	60	1,823	62	34	77	45.9	69%	80%

*Pump efficiency calculated using the pump equation and an estimated motor efficiency of 86% and VFD efficiency of 97%

**TDH calculated using ~3' gauge height (temporary gauge only installed on Pump #1)

As shown in Table 3.3 the calculated efficiency values varied from as little as 0% to as much as 13%. This is based on comparing these efficiency values with the original curve values below.

Figure 3.1: Morris Pump Curve



3. COLLECTION SYSTEM PUMP STATIONS

The 2020 flow and pump run time data showed that the pumps averaged a flow rate of approximately 1,233 gpm which corresponds to a VFD speed of approximately 49 Hz in 2020 and average pump efficiency of 75%. Based on this data, it appears that the existing pumps are matched well to the influent flow.

Heating & Ventilation

As part of the last facility upgrade, new heating and ventilation equipment was installed for the Creighton Street Headworks. The equipment included a new exhaust fan (EF-7), supply fan (SF-2) and two explosion proof 15 kW electric heaters. Each electric heater included a wall-mounted thermostat.

The O&M Manual states that the supply and exhaust fan for this unoccupied space should be operated continuously to de-rate the space (Class I, Division II) per NFPA 820 requirements. Even with staff setting the thermostats below 50 degrees, this configuration has increased the energy use and cost for the station so significantly that the miscellaneous energy use column (primarily for the electric heaters) in Table 3.1 is almost as high as the pumping system energy use.

It appears that all the equipment in the Headworks is rated for Class 1, Division 1, which does not require continuous ventilation per NFPA 820. For these building spaces, the decision to ventilate the space is typically based on occupancy (activation with a light switch) or on a timer to periodically ventilate the space for a short duration to reduce harmful gas concentration and extend equipment life. OM #2 reviews the savings for cycling the ventilation rate to reduce heating system energy costs.



The Pump Building is separate from the Headworks Building and includes a below grade level for the pumps and above grade room for the electrical panels, controls and VFDs. Each level includes a 10 kW electric unit heater controlled with a high-low knob. These types of controls make it difficult to set a precise temperature to minimize heating costs. OM #1 reviews the energy savings for installing wall thermostats maintained at 45 degrees.

3.3 Bay Rd Pump Station

The Bay Road Pump Station is a suction lift station with a concrete wetwell. The station was originally built in the 1980s and upgraded in 2005. The site includes an old steel “can” chamber, a fiberglass enclosure for the pumps and an emergency generator building.

During the winter months, two plug-in heaters are used in the pump fiberglass enclosure and the generator building. Based on the miscellaneous energy use column in Table 3.4, the power used by the heaters was minimal.



Emergency power is provided with a 55 kW Onan diesel generator with 1500-watt block heater. During the site visit, the block heater temperature was measured to be 117 degrees. This is within the 100 to 120 degree range that is adequate for most generators.

Electric service for the station is provided on the Eversource “G” Rate Schedule. The 2020 station flow and electric billed energy use data is summarized below. A flow rate of 500 gpm was estimated based on the pump rating and the average measured pump power draw of 7.9 kW.

Table 3.4: Bay Road Pump Station 2020 Energy and Operational Data

Month	Pump #1	Pump #2	Total Pump Hours	Estimated Monthly Flow (MG)	Pump Energy Use (kWh)	Estimated Energy Use (kWh) for Misc. Equipment	Station Billed Energy Use (kWh)
Jan	55	133	188	5.6	1,486	1,226	2,712
Feb	35	122	156	4.7	1,236	1,801	3,037
Mar	77	308	385	11.5	3,041	250	3,291
Apr	53	138	191	5.7	1,511	711	2,222
May	32	108	140	4.2	1,108	374	1,482
Jun	23	82	105	3.1	827	86	913
Jul	24	58	82	2.5	647	101	748
Aug	20	46	66	2.0	517	69	586
Sep	20	39	59	1.8	466	239	705
Oct	23	42	65	2.0	515	359	874
Nov	20	36	56	1.7	444	518	962
Dec	53	89	142	4.3	1,123	1,057	2,180
Total/Avg	434	1,201	1636	49.1	12,921	6,791	19,712

The pump system consists of two Gorman Rupp T4A3-B suction lift pumps rated for 500 gpm @ 40’ TDH at 1430 RPM. Each pump includes a 10 hp motor and full voltage starter.

Based on the 2020 monthly demand charges in Table 3.5, for the last 6 months of the year one pump operated less than 30 minutes with minimal demand. However, during the first part of the year it appears that the lead pump was airbound often and the lag pump was activated more hours. Having two pumps operating longer than 30 minutes resulted in peak demand (kW) charges of \$400 and high pump consumption (kWh) costs. Air in suction lift pumps typically occurs if there is a leak in the suction line, debris in the impeller, air release line issues, or a plugged recirculation port. The maintenance performed in June 2020 appeared to correct this issue.

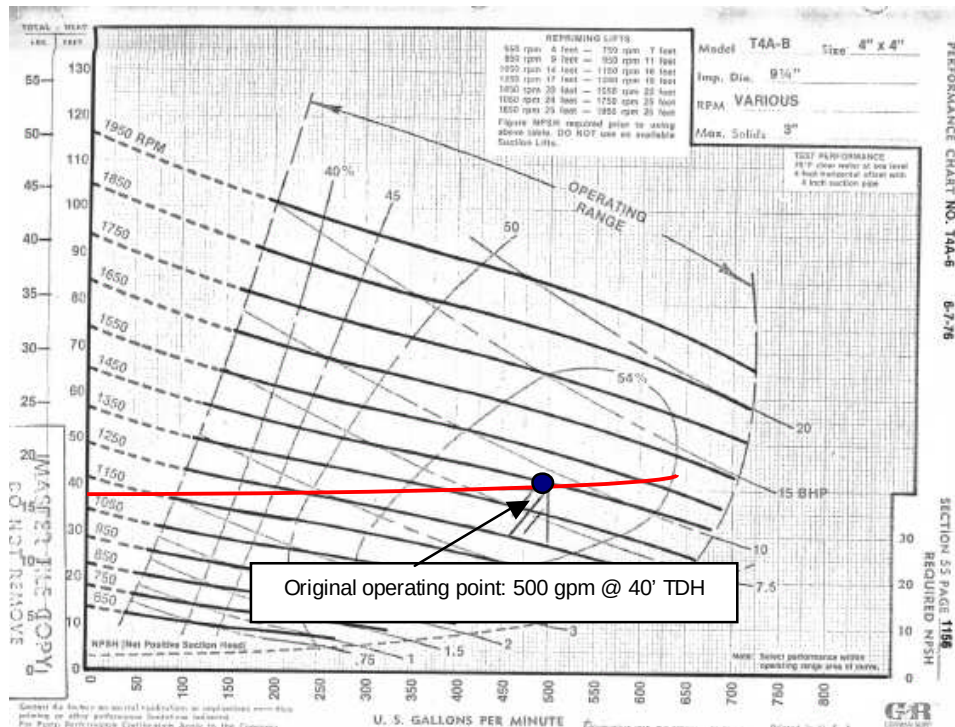
3. COLLECTION SYSTEM PUMP STATIONS

Table 3.5: Bay Road Pump Station 2020 Electric Energy Use and Costs

Month	Energy Use (kWh)	Demand (kW)	Demand Cost	Delivery (kWh) Cost	Monthly Fee	Energy Supply Cost	Total Delivery Cost	Total Cost
Jan	2,712	7.9	\$47	\$163	\$32	\$212	\$242	\$454
Feb	3,037	12	\$115	\$182	\$32	\$237	\$329	\$566
Mar	3,291	11.9	\$113	\$197	\$32	\$257	\$342	\$599
Apr	2,222	12.1	\$116	\$133	\$32	\$173	\$282	\$455
May	1,482	6.1	\$18	\$89	\$32	\$116	\$139	\$255
Jun	913	5.8	\$13	\$55	\$32	\$71	\$100	\$171
Jul	748	6	\$18	\$45	\$32	\$58	\$95	\$153
Aug	586	3.4	\$0	\$35	\$32	\$46	\$67	\$113
Sep	705	5.5	\$9	\$42	\$32	\$55	\$83	\$138
Oct	874	3.1	\$0	\$52	\$32	\$68	\$84	\$153
Nov	962	4.7	\$0	\$58	\$32	\$75	\$90	\$165
Dec	2,180	6.6	\$29	\$131	\$32	\$170	\$192	\$362
Totals	19,712	85.1	\$478	\$1,183	\$384	\$1,538	\$2,045	\$3,582

The original Gorman Rupp pump curve is shown below with an estimated system curve shown in red. Without a flow meter, pump efficiency could not be calculated and compared with the original 54% curve value shown below. However, monitoring pump run time and resolving suction line issues to avoid air-bound pumps will have the greatest impact on station energy costs in the future.

Figure 3.2: Gorman Rupp Pump Curve



3.4 Cedar Street Pump Station

The Cedar Street Pumping Station is a wet pit/dry pit station originally constructed in 1968. The wet pit is a single rectangular concrete wetwell and the dry pit is a below-grade concrete structure adjacent to the wetwell. The drywell includes an above grade brick/block entryway with access ladder. The station emergency generator building is constructed with a concrete slab, brick/block walls and membrane roof. The type and R-value of the roof and wall insulation is unknown.



The pump station equipment includes a 45 kW Kohler propane emergency generator, two vertical centrifugal pumps and controls/electrical panels. The pumps were replaced in 2000 with new Yeomans Model 4123 drypit submersible pumps rated for 500 gpm at 93 feet of total dynamic head (TDH). Both pumps include 25 hp motors and VFDs that ramp up to 58 Hz when each unit is activated.

Electric service for the station is provided on the Eversource “G” Rate Schedule. The 2020 station flow and electric billed energy use data is summarized below. A flow rate of 430 gpm was estimated based on the VFD speed and the average measured pump power draw of 12.3 kW.

Table 3.6: Cedar Street Pump Station 2020 Energy and Operational Data

Month	Pump #1	Pump #2	Total Pump Hours	Estimated Monthly Flow (MG)	Pump Energy Use (kWh)	Estimated Energy Use (kWh) for Misc. Equipment	Station Billed Energy Use (kWh)
Jan	47	46	93	2.4	1,140	1,355	2,495
Feb	35	33	68	1.7	833	1,905	2,738
Mar	57	25	82	2.1	1,014	1,471	2,485
Apr	56	53	109	2.8	1,336	1,619	2,955
May	39	42	81	2.1	995	1,262	2,257
Jun	27	25	52	1.3	635	335	970
Jul	26	22	48	1.2	590	339	929
Aug	22	20	42	1.1	515	374	889
Sep	26	23	49	1.3	600	473	1,073
Oct	29	28	57	1.5	695	332	1,027
Nov	19	18	37	0.9	451	897	1,348
Dec	40	34	74	1.9	906	1,494	2,400
Total/Avg	423	367	789	20.4	9,710	11,856	21,566

The column for miscellaneous energy use includes the generator block heater, a dehumidifier and plug-in electric space heater in the below grade pump chamber. The generator building does not include a space heater and uses the indirect heat from block heater to maintain a suitable building temperature.

Based on the auxiliary pump station equipment, the miscellaneous energy use is reasonable. The 2020 electric energy cost billing data for the station is summarized in Table 3.7.

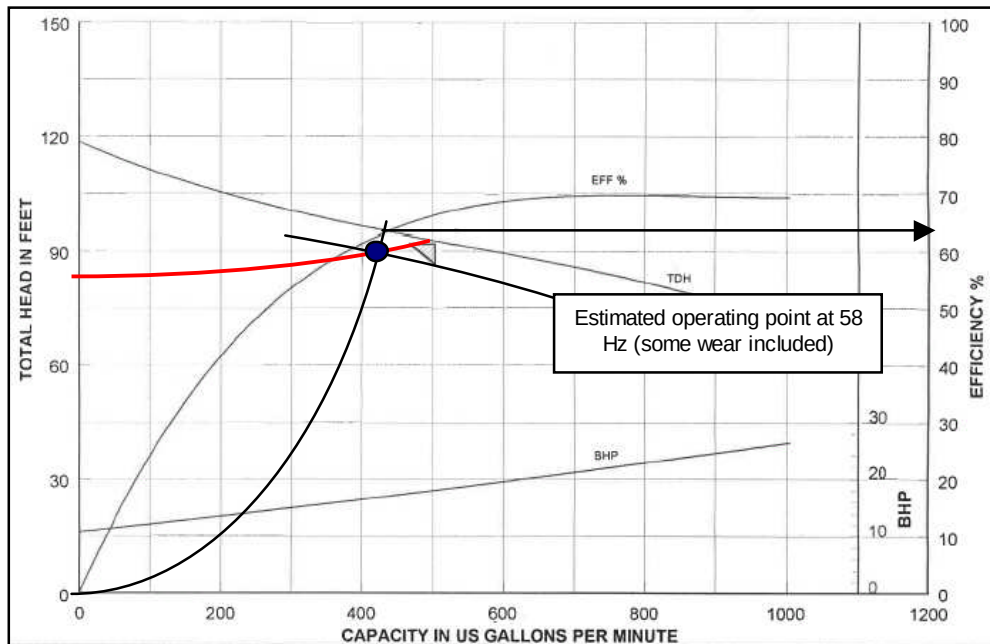
3. COLLECTION SYSTEM PUMP STATIONS

Table 3.7: Cedar Street Pump Station 2020 Electric Energy Use and Costs

Month	Energy Use (kWh)	Demand (kW)	Demand Cost	Delivery (kWh) Cost	Monthly Fee	Energy Supply Cost	Total Delivery Cost	Total Cost
Jan	2,495	6.4	\$23	\$150	\$32	\$195	\$205	\$399
Feb	2,738	7.8	\$46	\$164	\$32	\$214	\$242	\$456
Mar	2,485	8.4	\$56	\$149	\$32	\$194	\$237	\$431
Apr	2,955	8.6	\$59	\$177	\$32	\$230	\$268	\$499
May	2,257	10.6	\$92	\$135	\$32	\$176	\$259	\$435
Jun	970	4.8	\$0	\$58	\$32	\$76	\$90	\$166
Jul	929	4.2	\$0	\$56	\$32	\$72	\$88	\$160
Aug	889	3.7	\$0	\$53	\$32	\$69	\$85	\$155
Sep	1,073	4	\$0	\$64	\$32	\$84	\$96	\$180
Oct	1,027	4.5	\$0	\$62	\$32	\$80	\$94	\$174
Nov	1,348	7.6	\$47	\$81	\$32	\$105	\$160	\$265
Dec	2,400	5.2	\$4	\$144	\$32	\$187	\$180	\$367
Totals	21,566	75.8	\$325	\$1,294	\$384	\$1,682	\$2,003	\$3,685

Without a flow meter, pump efficiency could not be calculated and compared with the original 64% curve value shown below at the estimated flow. However, with an estimated \$1500 for pump system annual energy costs, the potential savings for incremental efficiency gains with pump rebuilds or replacements would not provide significant energy savings.

Figure 3.3: Yeomans Pump Curve



3.5 Salmon Pump Station

The Salmon Street Pumping Station was originally installed in 1976. A significant upgrade was performed in 1996 to convert the station from a wetpit/drypit system to a submersible system. At that time, the steel drywell was abandoned and a new submersible pump was installed in each of the two existing 4' concrete wetwell manholes. The Underwood Engineering Report indicated that the configuration has resulted in uneven flow distribution to each pump. However, this has not impacted energy use.



The station emergency generator building is constructed with a concrete slab, brick/block walls and membrane roof. The type and R-value of the roof and wall insulation is unknown.

The 38 kW Kohler propane emergency generator includes a 1000-watt block heater that was measured to be 98 degrees during the site visit. This is lower than the 100 to 120 degree range that is adequate for most generators. According to the recent Underwood Report, the pump system includes two full speed Sulzer submersible pumps rated for 300 gpm @ 36' TDH. However, according to data provided by staff, there are three pumps. The data indicates that Pump #1 is rated for 878 gpm @ 46' TDH with 6.2 hp motors (this is not correct based on the flow/head) and Pump #2 is listed as the same flow/head but with a 12.1 hp motor. Pump #3 is listed as having a 920 gpm @ 46' TDH with a 9.4 hp motor (also appears to be low).

Electric service for the station is provided on the Eversource "G" Rate Schedule. The 2020 station flow and electric billed energy use data is summarized below. A flow rate of 300 gpm was estimated based on the Underwood Report data. The pump power draw was measured to be 5.4 kW, but based on the energy use data, the average pump power appears to be closer to 2.6 kW.

Table 3.8: Pump Station 2020 Energy and Operational Data

Month	Pump #1	Pump #2	Total Pump Hours	Estimated Monthly Flow (MG)	Pump Energy Use (kWh)	Estimated Energy Use (kWh) for Misc. Equipment	Station Billed Energy Use (kWh)
Jan	531	163	694	12.5	1,804	1,050	2,854
Feb	409	132	541	9.7	1,408	1,811	3,219
Mar	537	108	645	11.6	1,677	1,331	3,008
Apr	472	206	678	12.2	1,764	1,434	3,198
May	478	125	603	10.9	1,568	761	2,329
Jun	312	107	419	7.5	1,088	238	1,326
Jul	238	112	350	6.3	909	34	943
Aug	289	95	384	6.9	998	167	1,165
Sep	219	161	380	6.8	988	267	1,255
Oct	246	190	436	7.8	1,134	258	1,392
Nov	165	168	333	6.0	865	1,089	1,954
Dec	233	272	505	9.1	1,312	1,527	2,839
Total/Avg	4,128	1,840	5967	107.4	15,515	9,967	25,482

3. COLLECTION SYSTEM PUMP STATIONS

The column for miscellaneous energy use includes the generator block heater. The 2020 electric energy cost billing data for the station is summarized below.

Table 3.9: Pump Station 2020 Electric Energy Use and Costs

Month	Energy Use (kWh)	Demand (kW)	Demand Cost	Delivery (kWh) Cost	Monthly Fee	Energy Supply Cost	Total Delivery Cost	Total Cost
Jan	2,854	5.3	\$5	\$171	\$32	\$223	\$208	\$431
Feb	3,219	5.2	\$3	\$193	\$32	\$251	\$228	\$479
Mar	3,008	5.4	\$7	\$180	\$32	\$235	\$219	\$454
Apr	3,198	7.2	\$36	\$192	\$32	\$249	\$260	\$509
May	2,329	4.9	\$0	\$140	\$32	\$182	\$172	\$353
Jun	1,326	5.9	\$15	\$80	\$32	\$103	\$126	\$230
Jul	943	6.1	\$20	\$57	\$32	\$74	\$108	\$182
Aug	1,165	3.4	\$0	\$70	\$32	\$91	\$102	\$193
Sep	1,255	4.7	\$0	\$75	\$32	\$98	\$107	\$205
Oct	1,392	2.6	\$0	\$84	\$32	\$109	\$116	\$224
Nov	1,954	4.2	\$0	\$117	\$32	\$152	\$149	\$302
Dec	2,839	4.4	\$0	\$170	\$32	\$221	\$202	\$424
Totals	25,482	59.3	\$85	\$1,529	\$384	\$1,988	\$1,998	\$3,986

Without a flow meter, pump efficiency could not be calculated (the pump curve was also not available). However, with an estimated \$2,100 for pump system annual energy costs, the potential savings for incremental efficiency gains with pump rebuilds or replacements may not provide much savings.

3.6 Packers Falls Pump Station

The Packers Falls Road Pumping Station is located next to the abandoned Newmarket Water Treatment Facility. The station was originally constructed in 1968 as a below-grade concrete wetpit/drypit station. The station emergency generator building is constructed with a concrete slab, brick/block walls and membrane roof. The type and R-value of the roof and wall insulation is unknown.

In 2000, a wood-framed building with vinyl siding was constructed over the top of the pre-existing two-level concrete drywell. The walls are un-insulated, but there may be foam board insulation on the membrane roof.



The 45 kW Kohler propane emergency generator includes a 1500-watt block heater that was measured to be 102 degrees during the site visit. This is within the 100 to 120 degree range that is adequate for most generators. The pump system includes two full speed Yeoman dry-pit submersible pumps rated for 350 gpm @ 30' TDH. The pumps are equipped with 7.5 hp motors and VFDs that are operated at full speed (60 Hz).

Electric service for the station is provided on the Eversource "G" Rate Schedule. The 2020 station flow and electric billed energy use data is summarized below. A flow rate of 300 gpm was estimated based on the size of the pump and the average measured pump power draw for both pumps was 4.5 kW.

Table 3.10: Packers Falls 2020 Energy and Operational Data

Month	Pump #1	Pump #2	Total Pump Hours	Estimated Monthly Flow (MG)	Pump Energy Use (kWh)	Estimated Energy Use (kWh) for Misc. Equipment	Station Billed Energy Use (kWh)
Jan	19	21	39	0.7	178	330	508
Feb	16	13	29	0.5	128	546	674
Mar	19	18	37	0.7	166	1,126	1,292
Apr	25	25	51	0.9	228	1,157	1,385
May	15	15	30	0.5	133	495	628
Jun	7	8	15	0.3	66	177	243
Jul	6	6	12	0.2	55	160	215
Aug	4	4	9	0.2	40	125	165
Sep	5	5	10	0.2	45	210	255
Oct	5	6	11	0.2	49	272	321
Nov	4	4	7	0.1	34	947	981
Dec	12	13	25	0.5	115	1,390	1,505
Total/Avg	138	137	275	4.9	1,237	6,935	8,172

With the exception of a few months, the column for miscellaneous energy use was very low and included the generator block heater, a dehumidifier and for a small plug-in heater used in the below grade pump room. The generator building is heated indirectly from the block heater.

3. COLLECTION SYSTEM PUMP STATIONS

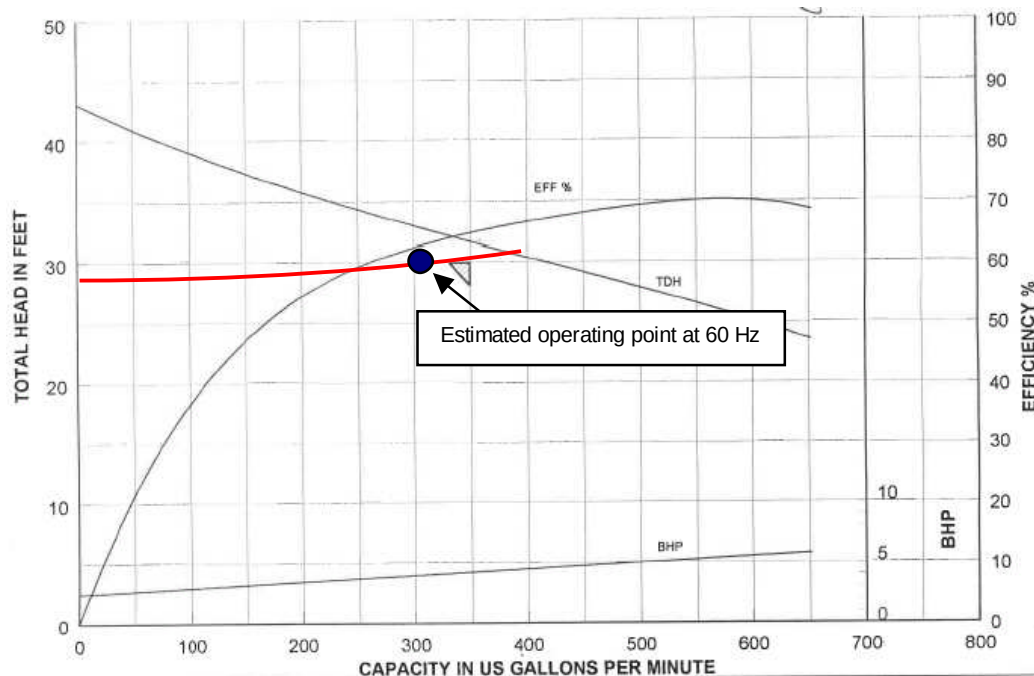
The 2020 electric energy cost billing data for the station is summarized below.

Table 3.11: Packers Falls 2020 Electric Energy Use and Costs

Month	Energy Use (kWh)	Demand (kW)	Demand Cost	Delivery (kWh) Cost	Monthly Fee	Energy Supply Cost	Total Delivery Cost	Total Cost
Jan	508	1.6	\$0	\$30	\$32	\$40	\$62	\$102
Feb	674	3.6	\$0	\$40	\$32	\$53	\$72	\$125
Mar	1,292	3.3	\$0	\$78	\$32	\$101	\$110	\$210
Apr	1,385	3.1	\$0	\$83	\$32	\$108	\$115	\$223
May	628	2.7	\$0	\$38	\$32	\$49	\$70	\$119
Jun	243	1.4	\$0	\$15	\$32	\$19	\$47	\$66
Jul	215	1.1	\$0	\$13	\$32	\$17	\$45	\$62
Aug	165	1	\$0	\$10	\$32	\$13	\$42	\$55
Sep	255	1.1	\$0	\$15	\$32	\$20	\$47	\$67
Oct	321	1.3	\$0	\$19	\$32	\$25	\$51	\$76
Nov	981	2.7	\$0	\$59	\$32	\$77	\$91	\$167
Dec	1,505	2.9	\$0	\$90	\$32	\$117	\$122	\$240
Totals	8,172	25.8	\$0	\$490	\$384	\$637	\$874	\$1,512

The concrete wetwell was originally sized to accommodate the backwash water flows from the water treatment plant. Staff believes that the size of the existing pumps is larger than needed now that the plant has been abandoned. This appears to be the case, however, with the low pump run time the pump system energy costs were less than \$200 in 2020. The original curve for the Yeomans pump is shown below. Based on minimal energy use, a potential reduction in pump efficiency would not impact energy costs significantly.

Figure 3.4: Yeomans Pump Curve



3.7 Wadleigh Falls Road Pump Station

The Wadleigh Falls Pump Station was constructed in 2005 and consists of a Dakota/ESCO package station with two suction lift pumps in a fiberglass enclosure and freestanding electrical/control panel.

The station is equipped with a 20 kW Generac propane emergency generator in a separate enclosure. A review of the 1.5 kW generator block heater revealed it was operating at a reasonable 90 degrees F. Other auxiliary equipment includes a small 200-watt panel heater and two strip heaters in the pump enclosure controlled with high-low knobs. A plug-in electric heater with high-low knob is also used in the pump enclosure.



Electric service for the station is provided on the Eversource “G” Rate Schedule. The 2020 station flow and electric billed energy use data is summarized below. A flow rate of 120 gpm was estimated based on the size of the pump and the average measured pump power draw for both pumps was 1.8 kW.

Table 3.12: Wadleigh Falls 2020 Energy and Operational Data

Month	Pump #1	Pump #2	Total Pump Hours	Estimated Monthly Flow (MG)	Pump Energy Use (kWh)	Estimated Energy Use (kWh) for Misc. Equipment	Station Billed Energy Use (kWh)
Jan	11	14	25	0.2	1,804	1,050	2,854
Feb	9	12	21	0.1	1,408	1,811	3,219
Mar	11	12	23	0.2	1,677	1,331	3,008
Apr	12	12	24	0.2	1,764	1,434	3,198
May	11	77	89	0.6	1,568	761	2,329
Jun	10	13	24	0.2	1,088	238	1,326
Jul	10	14	24	0.2	909	34	943
Aug	9	12	21	0.1	998	167	1,165
Sep	11	15	26	0.2	988	267	1,255
Oct	14	57	71	0.5	1,134	258	1,392
Nov	8	15	23	0.2	865	1,089	1,954
Dec	13	18	31	0.2	1,312	1,527	2,839
Total/Avg	130	271	401	2.9	15,515	9,967	25,482

The column for miscellaneous energy use includes the generator block heater, the panel heaters and the pump room portable electric heater. Although the energy use for these heaters is reasonable, installing thermostats in place of the high low knobs would give staff the ability to set a more precise setting.

The 2020 electric energy cost billing data for the station is summarized in Table 3.13.

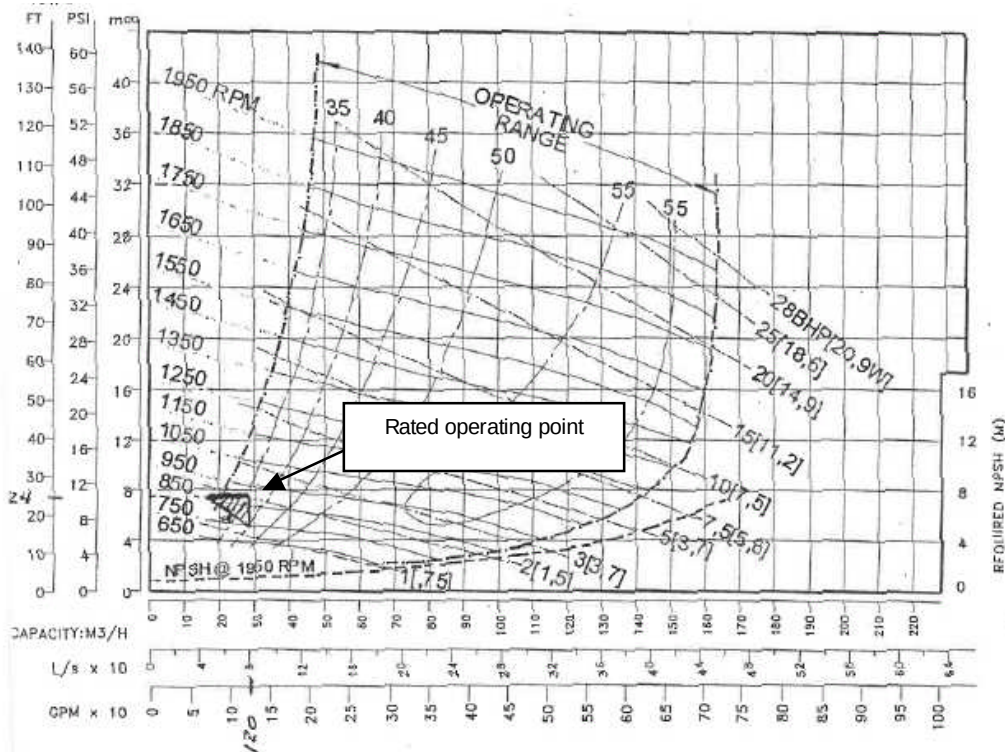
3. COLLECTION SYSTEM PUMP STATIONS

Table 3.13: Wadleigh Falls 2020 Electric Energy Use and Costs

Month	Energy Use (kWh)	Demand (kW)	Demand Cost	Delivery (kWh) Cost	Monthly Fee	Energy Supply Cost	Total Delivery Cost	Total Cost
Jan	1,956	3.5	\$0	\$117	\$32	\$153	\$149	\$302
Feb	2,154	3.5	\$0	\$129	\$32	\$168	\$161	\$329
Mar	1,904	3.3	\$0	\$114	\$32	\$149	\$146	\$295
Apr	1,918	3.2	\$0	\$115	\$32	\$150	\$147	\$297
May	987	3.2	\$0	\$59	\$32	\$77	\$91	\$168
Jun	331	1.8	\$0	\$20	\$32	\$26	\$52	\$78
Jul	275	1.5	\$0	\$17	\$32	\$21	\$49	\$70
Aug	243	1.5	\$0	\$15	\$32	\$19	\$47	\$66
Sep	521	3	\$0	\$31	\$32	\$41	\$63	\$104
Oct	598	1.5	\$0	\$36	\$32	\$47	\$68	\$115
Nov	1,342	3.4	\$0	\$81	\$32	\$105	\$113	\$217
Dec	1,874	3.2	\$0	\$112	\$32	\$146	\$144	\$291
Totals	14,103	32.6	\$0	\$846	\$384	\$1,100	\$1,230	\$2,330

The pump system includes two Dakota/ESCO Model LP-4 self-priming suction lift pumps with 3 hp motors. Each pump is rated for 120 gpm @ 24' TDH operating at a 35% pump efficiency. As shown on the manufacturer's performance curve below, the pumps are oversized and have a belt/sheave configuration to reduce the RPMs to a low level. However, a review of other suction lift pump manufacturers revealed that this efficiency is typical at these flow and head contions.

Figure 3.5: Dakota/ESCO Pump Curve



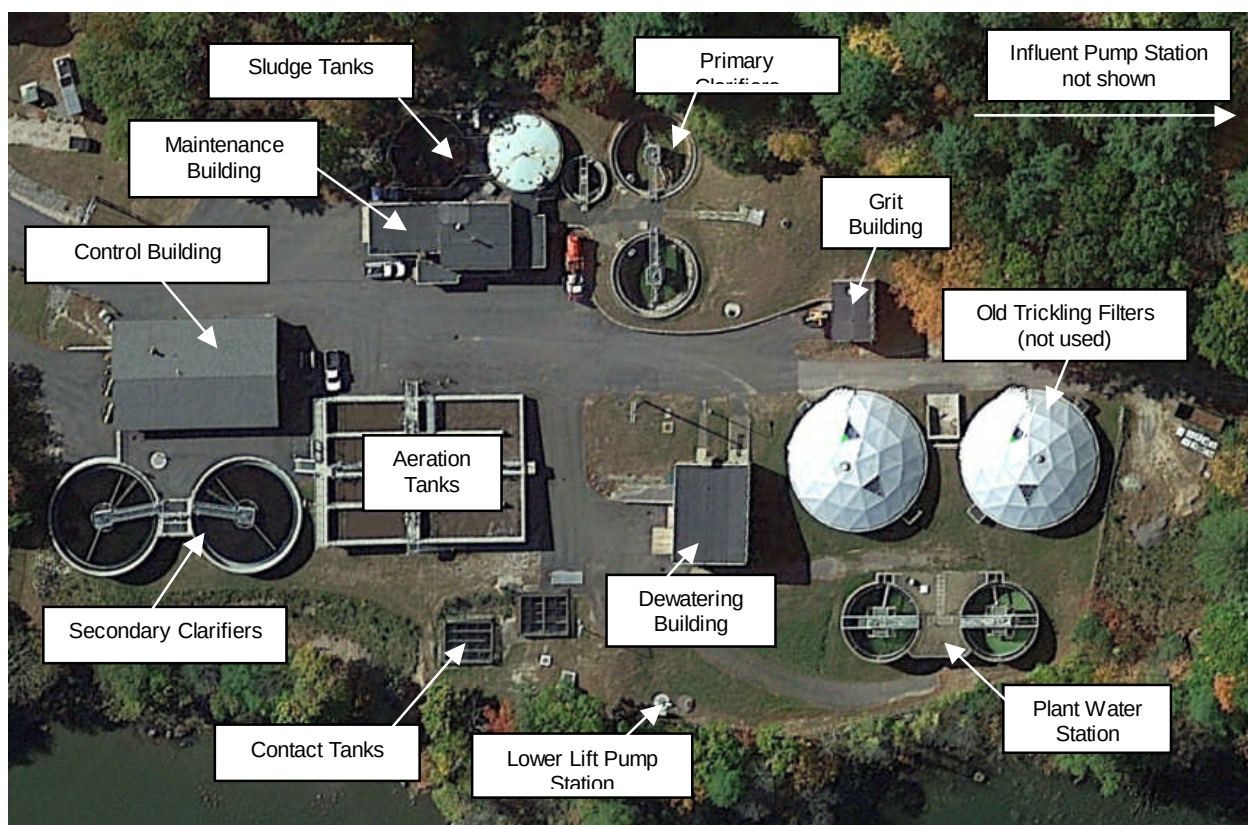
SECTION 4. WASTEWATER TREATMENT PLANT

4.1 General

The Newmarket WWTF is a biological nutrient removal (BNR) activated sludge plant designed for an average daily plant flow of 0.85 million gallons per day (MGD).

Influent flow to the WWTF comes from the Creighton Street Pump Station where a rotating fine screen provides preliminary treatment before being pumped to two vortex grit separators or bypassed directly to the primaries. The flow is directed to two primary clarifiers and then to the biological nutrient removal (BNR) process that includes anoxic, anaerobic and aerated zones. From the BNR process, the mixed liquor flows to the secondary clarifiers for final settling. Return activated sludge pumps draw sludge from the secondary clarifiers and returns the flow to the aeration tanks. Effluent from the secondary clarifiers flows by gravity through the chlorine contact tank where it is disinfected before being discharged to the Lamprey River.

Figure 4.1 Newmarket WWTF Site



Primary and waste activated sludge is pumped from the process and held in two aerated sludge storage tanks before the sludge is dewatered with an inclined rotary screw press. The sludge cake is taken off-site for landfill disposal.

4.2 WWTF Baseline Energy Use

The Wastewater Plant is billed on the Eversource “G” Rate Schedule. This rate schedule includes a monthly service fee and various individual charges based on the monthly kWh energy consumption and a demand charge for the highest peak kW registered during the month. The demand shown below is higher than the billed demand value since the “G” Rate does not charge for the first 5 kW of demand.

Table 4.1: WWTF 2020 Electric Energy Use and Costs

Month	Energy Use (kWh)	Demand (kW)	Demand Cost	Delivery (kWh) Cost	Monthly Fee	Energy Supply Cost	Total Delivery Cost	Total Cost
Jan	56,800	102	\$1,591	\$3,408	\$32	\$4,430	\$5,031	\$9,462
Feb	59,800	104	\$1,624	\$3,588	\$32	\$4,664	\$5,244	\$9,908
Mar	48,600	107	\$1,663	\$2,916	\$32	\$3,791	\$4,611	\$8,402
Apr	47,200	85	\$1,303	\$2,832	\$32	\$3,682	\$4,167	\$7,849
May	45,200	91	\$1,401	\$2,712	\$32	\$3,526	\$4,145	\$7,671
Jun	38,000	86	\$1,333	\$2,280	\$32	\$2,964	\$3,645	\$6,609
Jul	41,000	80	\$1,343	\$2,460	\$32	\$3,198	\$3,835	\$7,033
Aug	37,000	83	\$1,393	\$2,220	\$32	\$2,886	\$3,645	\$6,531
Sep	38,800	79	\$1,335	\$2,328	\$32	\$3,026	\$3,695	\$6,722
Oct	43,000	85	\$1,432	\$2,580	\$32	\$3,354	\$4,044	\$7,398
Nov	43,400	84	\$1,422	\$2,604	\$32	\$3,385	\$4,058	\$7,443
Dec	53,600	98	\$1,677	\$3,216	\$32	\$4,181	\$4,925	\$9,105
Totals	552,400	1,084	\$17,517	\$33,144	\$384	\$43,087	\$51,045	\$94,132

Fuel Use

A summary of 2020 fuel oil and propane use and cost for the WWTF is summarized below.

Table 4.2: WWTF 2020 Fuel Oil/Propane Use and Costs

Building	Fuel Oil (gal)	Total Cost	2020 Unit Cost
WWTF Control Building	1,025	\$1,736	\$1.69
WWTF Dewatering Building	2,360	\$4,718	\$1.99

Building	Propane (gal)	Total Cost	2020 Unit Cost
WWTF Maintenance Building	3,187	\$5,755	\$1.81

4.3 Plant Energy Balance

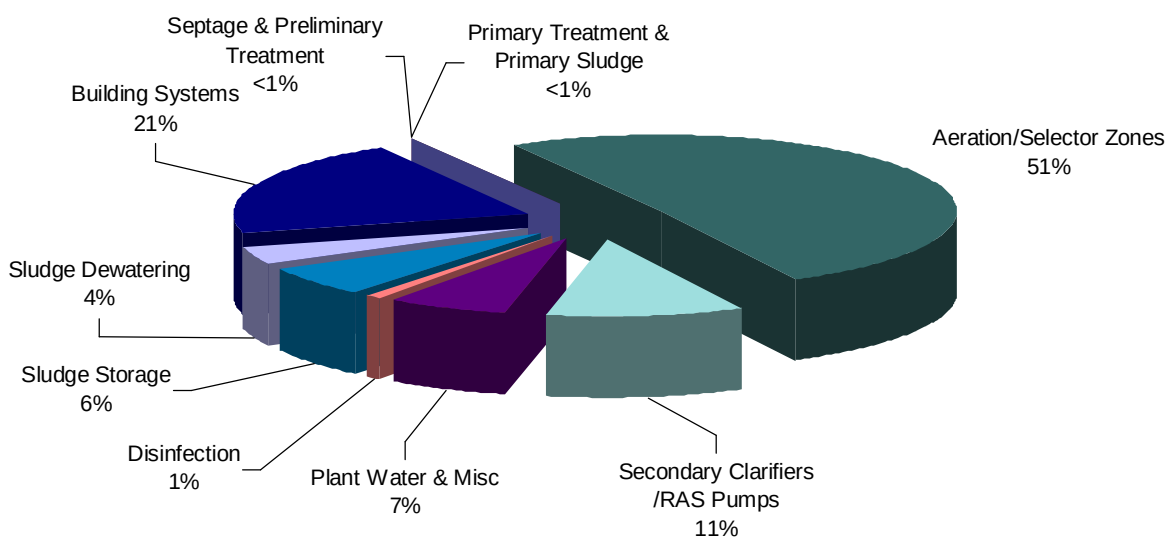
Using 2020 plant data, kW measurements and discussions with plant staff, a breakdown of facility electrical energy use was estimated in Table 4.3.

Table 4.3: WWTF Energy Use Breakdown

Plant System	Baseline Annual Use (kWh)	Percent of Total
Septage	0	0%
Preliminary Treatment	0	0%
Influent Pumping	0	0%
Primary Treatment & Primary Sludge	584	0%
Intermediate Pumping	0	0%
Aeration	277,696	51%
Advanced Treatment	0	0%
Final Clarifiers/RAS Pumps	59,510	11%
Disinfection & Post Aeration	4,574	1%
Effluent Pumping	0	0%
Sludge Storage	33,827	6%
Anaerobic Digestion	0	0%
Sludge Dewatering	20,697	4%
Sludge Composting/Incineration	0	0%
Odor Control	0	0%
Plant Water & Miscellaneous Process Equipment	37,469	7%
WWTF Building Systems	113,732	21%
Annual Total	548,089	100%
Annual Electric Use from 2020 Bills	552,400	--

The energy use breakdown is illustrated below.

Figure 4.2: Energy Use Breakdown



A summary of each treatment process follows this section.

4.4 Preliminary Treatment

Screening System

As reviewed in Section 3.2, the Creighton Street Pump Station serves as the primary influent pump station to the WWTF and includes a screening/auger system. The Huber fine screen removes solids and debris with a rotating rake and cleaning comb before it is transported with a screw conveyor to a solids receptacle. The screen drive includes a two horsepower motor and is designed to operate based on differential level across the screen (current mode) or with a timed operation. The collected solids are washed with a spray system using a control valve activated during the cycle. Energy use for the system is minimal.

Grit System

After the screening operation, the three Creighton Street pumps transfer flow to the WWTF Grit Building where the wastewater can be directed to the two grit removal units or bypassed directly to the primary clarifier bypass manhole.

The Eutek “teacup/decanter” grit removal system was updated during the 1999 facility upgrade. Grit separation is performed through vortex solids separation using centrifugal force. The two teacup units are each 56” in diameter and both designed for an average flow of 0.80 MGD and a peak flow of 2.0 MGD. The system is hydraulic with no moving parts. The only electrical components include solenoid valves that provide plant water for the underflow and fluidizing water lines. A self-dumping decanter is located under the teacup units. The unit includes an overflow weir, 3” overflow line, drain screen and locking lever used to release the bucket to dump the grit.



Although the system equipment has no energy using equipment, the design creates higher head that increases influent pumping energy costs. In addition to the ~8’ elevation difference between the influent channel and the teacup flow intake, the O&M Manual includes an estimated 2’ of pumping frictional head required for average flow and 7.5’ of head at peak flow to create the centrifugal force within the teacup unit.

The system was used for the majority of 2020 when the primary clarifiers were not in use, but with the primary clarifiers on-line in 2021, the grit system has been off line. The 12’ of head associated with the system is equivalent to approximately 6,126 kWh or \$845 in annual pumping energy costs that are now saved without the system on-line.

Table 4.4: Preliminary Treatment System Energy Use Baseline

Equipment	Motor Hp	Power Draw (kW)	Annual Hours	Energy Use (kWh)
Rotary Screen	2.00	0.75	1000	750 (at PS)
Grit System	0.00	0	0	0
Total				750

4.5 Primary Treatment

Influent flow is conveyed to the primary bypass manhole followed by the primary distribution structure, which distributes influent flow to one of the two primary clarifiers.

The circular clarifiers are manufactured by ClearStream Environmental Inc. and are designed to remove approximately 50 - 70% of suspended solids and 25 - 40% BOD. Each clarifier has a diameter of 35' and a 7.5' sidewater depth. The ½ hp clarifier drive motors include VFDs that are set manually at the motor control center.



In 2020, the primaries were only used for approximately two months. However, in 2021 one of the clarifiers was on-line for all 12 months.

From an energy perspective, the primary treatment process can be a key system to reduce energy costs in a wastewater plant. The higher the BOD removal efficiency of the clarifiers, the lower the energy needed for the high-energy biological process. In addition to reducing aeration system energy, higher primary BOD removal levels also increase the primary to secondary sludge ratio, which can improve dewatering solids.

Primary sludge is pumped from the clarifier sludge hopper to one of the sludge storage tanks with two Penn Valley double-disc pumps located in the Maintenance Building. Each pump has a maximum rated flow of 75 gpm and includes a 5 hp motor and VFD.

The baseline system energy use is estimated below.

Table 4.5: Primary System Energy Use Baseline

Equipment	Motor Hp	Power Draw (kW)	Annual Hours	Energy Use (kWh)	Estimated Current Hours	Energy Use (kWh)
Primary Clarifier #1	0.5	0.3	789	206	8760	2,287
Primary Clarifier #2	0.5	0.3	786	205	8760	2,287
Primary Sludge Pump #1	5.0	2.6	0	0	2500	6,528
Primary Sludge Pump #2	5.0	2.6	66	172	2500	6,528
Total				584		17,269

As discussed, the primary clarifiers were not operated in 2020 but are currently on line in 2021. The additional run time shown above increased the annual energy use for this system by approximately 16,685 kWh. However, with a typical 30% BOD removal expected with the primary clarifiers on line, the aeration system blower energy use was estimated to be 35,000 kWh for annual net energy savings of 18,315 kWh and cost savings of \$2,500. Since this impacted the 2020 baseline, it was included in Section 5.0 as an existing facility energy measure (OM #3).

4.6 Aeration System

Primary clarifier effluent flows to the common aeration tank influent channel and splitting structure to distribute flow to the two aeration basins. Each basin is 15 ft wide and 180 ft long with an 18 ft sidewater depth.

The aeration tank system is designed to provide biological nutrient removal using the Four-Stage Bardenpho process that was installed as part of the 2017 upgrade. The system is designed to achieve the seasonal effluent total nitrogen (TN) limits. The aeration tanks utilize internal submerged concrete selector/baffle walls to separate the various stages of the Bardenpho process. In 2020, the facility operated two tanks in parallel for 9 out of 12 months. During the summer months, staff indicated that one aeration basin works best for total nitrogen removal. For these 3 months, approximately 150 scfm is maintained in the two aerobic zones for the off-line aeration basin (based on observed SCADA airflow values). Some blower energy savings could be realized if the air was cycled on and off for the off-line basin during these three months.



For the Four-Stage Bardenpho process, primary clarifier effluent and recycled activated sludge (RAS) are introduced into Anoxic Zone “A” before flowing to Anoxic Zone “B”. Each of the anoxic zones includes a submersible mixer to keep solids suspended. After the anoxic zones, the flow exits into two aerobic zones (Zones “C” & “D”). Recycled nitrified mixed liquor from the end of the Aerobic Zone (“D”) is pumped back to Zone “A” with an internal recycle pump to maintain anoxic conditions and to drive the denitrification process.

The submersible mixers can be operated remotely from the operator terminal or SCADA system. The system includes 2.8 hp mixers in Zone “A” and 1.7 hp mixers in Zones “B” and “E”. In auto mode the submersible mixers run continuously at a constant speed. The operator terminal/SCADA system displays the status of each mixer.

Many wastewater facilities with selector zones have oversized mixers. One of the key parameters that impacts sizing is the standard that is used to determine mixer size. M&E recommends 0.75 to 1.5 hp/1000 ft³ and WEF MOP 8 recommends 0.50 to 0.75hp/1000 ft³. However, manufacturers have found that their units can provide adequate mixing at 0.22 hp/1000 ft³. To determine if the mixers are “right sized” for the application, the volume of each zone and the 0.22 hp/1000 ft³ sizing guideline was compared below.

Table 4.6: Horsepower Mixing Criteria Versus Actual Horsepower

Parameter	O&M Manual Dimensions	Tank Volume	Mixing Horsepower Criteria (0.22 hp/1000 ft ³)	Actual Installed Mixer Horsepower
Zone A	18 x 12.5 x 15	3,375 ft ³	0.8	2.8
Zone B	18 x 26 x 15	7,020 ft ³	1.5	1.7
Zone E	18 x 30 x 15	8,100 ft ³	1.8	1.7

As shown above, the mixers for Zone “B” and “E” are close to this sizing criterion. However, the hp/kW for Zone “A” mixer could be reduced. The potential savings for installing a VFD for these mixers is reviewed in ECM #1.

The nitrate recycle pumps (IRP-1 and IRP-2) direct nitrified flow at a high rate from the last aerobic zone to the first anoxic zone. In this zone, nitrates and BOD are present, allowing for denitrification of the nitrates to nitrogen gas. The rate of the internal recycle pump can be varied by adjusting pump speed manually, or by pacing the pump using ORP values or effluent flow rates. During the site visit, the SCADA system showed the on-line recycle pump operating at 65% speed.

Diffused Air System & Controls

The aeration supply system consists of three Atlas Copco rotary screw blowers, a fine bubble aeration system, and a dissolved oxygen (DO) control system. The blowers are equally sized (50 HP, 657 inlet cubic feet per minute @ 10 psig) and operated with a VFD controlled by discharge header pressure. The SCADA minimum VFD speed is set at 33% and the maximum speed at 90%.

Air is distributed throughout the aeration tanks using Sanitaire Silver Series II 9-inch EPDM membrane disks. The system is designed to provide 600 SCFM during average conditions and 1,200 SCFM under maximum day conditions.

Airflow is modulated using thermal mass type air flow meters and motor operated valves located on each drop leg to Zones “C” and Zone “D” (four total). Airflow is controlled to maintain a dissolved oxygen setpoint measured by an optical DO probe in each aeration zone. The system automatically adjusts the valves for each aerobic zone to maintain the DO setpoint value. According to the facility O&M Manual, the first aerobic zone (Zone “C”) generally requires DO concentrations of approximately 2.0 to 2.5 mg/l to obtain proper BOD removal and the second aerobic zone (Zone “D”) should be close to 2.0 mg/l to obtain proper nitrification. The manual indicates that if ammonia sampling shows complete nitrification, the DO control setpoint for the Zone “D” can be reduced to 1.5 to 2.0 mg/l to reduce excessive oxygen being returned to the primary anoxic zones and the post anoxic zones. During the site visit, the DO setpoints were set at the recommended 2.5 mg/l for Zone “C” and 1.5 mg/l for Zone “D”.

The system uses a cascade control loop to vary the speed of the active blower(s) to maintain a header pressure setpoint and a continuous range of airflow to the aeration basins. This ‘most open valve’ control strategy is used to minimize system head loss. In this mode, the PLC automatically adjusts the header pressure up and down based on the most opened air control valve's position. The PLC compares all air control valves that are in Auto mode and selects the most open valve and uses that valve's position to compare to the high most opened valve and the low most opened valve setpoint.

Aeration System Model Development

To evaluate the existing aeration system efficiency, a model was developed using average monthly process load demands. The model was balanced by adjusting parameters that included the diffuser oxygen transfer efficiency and dissolved oxygen levels. For the baseline model, the process parameters in Table 4.7 were used.

Table 4.7: Model Process Parameters

Parameter	Process Value	Notes
Beta Value	0.95	Standard design value
Alpha	0.55	Fine Bubble Design Guide
Theta	1.024	Standard design value
SOTE	33%	Estimated to be ~2% per foot for ~17' diffuser depth
Avg. Discharge Pressure	9.5 psi	Average blower discharge pressure
Motor/VFD Efficiency	90%	Estimated efficiency
O ₂ Required for BOD	1.1 lb of O ₂ /lb	Standard design value
O ₂ Required for N	4.57 lb of O ₂ /lb	Design value
Average DO	2.5 mg/l to 3.5 mg/l	Estimated

The 2020 aeration system process loads are summarized in Table 4.8. The Primary BOD effluent is the same as the influent BOD since the primaries were off line during the year. The influent and effluent TKN data is estimated based on typical municipal values and full nitrification.

Table 4.8: 2020 Process Data Used for Aeration Baseline Load

2020 Month	Average Total Daily Flow (MGD)	Influent BOD (mg/l)	Primary Effluent BOD (mg/l)	Final BOD (mg/l)	Primary Effluent TKN (mg/l)	Final Effluent TKN (mg/l)
Jan	0.56	295	295	6	35	3.0
Feb	0.50	294	294	10	35	3.0
Mar	0.51	338	338	11	35	3.0
Apr	0.64	271	271	6	35	3.0
May	0.47	306	306	4	35	3.0
Jun	0.36	306	306	5	35	3.0
Jul	0.35	408	408	8	35	3.0
Aug	0.33	344	344	8	35	3.0
Sep	0.33	336	336	6	35	3.0
Oct	0.34	334	334	5	35	3.0
Nov	0.38	377	377	4	35	3.0
Dec	0.53	226	226	6	35	3.0
Average	0.44	320	320	6.6	35	3.0

The corresponding aeration system flow and process loads are summarized in Table 4.9. This data was used to estimate blower system energy use for the baseline year.

Table 4.9: Baseline Aeration System Energy Use

2020 Month	Average Daily Flow (MGD)	OTR (lbs/day)	SOTR (lbs/day)	Estimated Dissolved Oxygen Level (mg/l)	Aeration Air flow (scfm)	Off-line Tank (scfm)	Power Draw (kW)	Calculated Blower Energy Use (kWh)
Jan	0.56	1,759	4,578	2.5	568	--	23	16,667
Feb	0.50	1,551	4,156	2.5	515	--	21	15,263
Mar	0.51	1,756	4,579	2.5	568	--	23	16,670
Apr	0.64	1,889	4,869	2.5	604	--	24	17,633
May	0.47	1,525	4,042	2.5	501	--	26	18,905
Jun	0.36	1,165	3,106	2.5	385	--	22	15,795
Jul	0.35	1,407	3,792	2.5	470	150	25	18,075
Aug	0.33	1,159	3,757	3.5	466	150	19	13,940
Sep	0.33	1,144	3,724	3.5	462	150	19	13,829
Oct	0.34	1,176	3,703	3.5	459	--	19	13,758
Nov	0.38	1,447	4,480	3.5	555	--	22	16,340
Dec	0.53	1,375	4,170	3.5	517	--	21	15,311
Total /Avg	0.44	1,446	4,080	2.92	506	150	22	192,186

A summary of system equipment and estimated annual energy use is shown below using run time supplied by staff for 2020.

Table 4.10: Aeration System Estimated Annual Energy Use

Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
Zone 1A Mixer	2.8	1.7	8743	14,610
Zone 1B Mixer	1.7	1.0	8745	8,872
Zone 1E Mixer	1.7	1.0	8742	8,869
Zone 2A Mixer	2.8	1.7	8187	13,681
Zone 2B Mixer	1.7	1.0	8141	8,260
Zone 2E Mixer	1.7	1.0	8066	8,183
IR Pump #1	2.8	1.3	8736	10,949
IR Pump #2	2.8	1.3	6404	8,026
Blower #1	50.0	22.4	3,468	77,683
Blower #2	50.0	22.4	2,715	60,816
Blower #3	50.0	22.4	2,578	57,747
Total				277,696

The system includes efficient features and the low dissolved oxygen setpoints have minimized system energy use.

4.7 Secondary Clarifiers & Sludge Pumps

After the aeration process, flow is directed to one of the two available secondary clarifiers. The clarifiers are 50' in diameter with a sidewall height of 15'. The on-line clarifier uses a 0.50 hp drive that operates continuously to collect the settled sludge.

A portion of the sludge settled is returned to the aeration tank influent channel with one of three available return activated sludge (RAS) pumps. The RAS pumps are KSB centrifugal units with a maximum rating of 625 gpm @ 33.5' TDH. The pumps are equipped with 10 hp motors and VFDs that are adjusted as required.



The RAS is pumped to a common discharge header, which has individual discharge pipes to the two aeration tanks. Each RAS discharge line is equipped with a magnetic flow meter and a modulating control valve that provides monitoring and control of RAS flow to each aeration tank and balancing of combined RAS flows from each clarifier.

The RAS pumps can be operated in “effluent” or “continuous” mode. In effluent mode, the RAS pump speed is automatically controlled based on percentage of the effluent flow. For the continuous mode, the pumps are automatically adjusted based on a desired flowrate selected by the operator. During the site visit, the pumps were set up to operate in continuous mode at a flow rate of 190 gpm. Only one aeration tank and one clarifier were operating at the time. However, the control valve used for balancing was set at 47% open instead of 100%. Although the head loss across the valve may not be significant, the valve position is not consistent with the O&M Manual description that indicates the valve should be 100% open when one tank is used.

The waste activated sludge is pumped from the return/waste sludge well in the bottom of the secondary clarifier with one of two available waste activated sludge pumps. Each Penn Valley double disc pump is rated for 75 gpm and is equipped with 5 hp motor and VFDs.

Annual estimated energy use for the RAS pumps and clarifiers is shown below.

Table 4.11: Clarifiers & RAS Pump Energy Use Baseline

Equipment	Motor Hp	Power Draw (kW)	Annual Hours	Energy Use (kWh)
Clarifier #1 Drive	0.50	0.3	6549	1,710
Clarifier #2 Drive	0.50	0.3	8570	2,238
Scum Pump	2.00	1.0	57	60
RAS Pump #1	10.00	3.0	7233	21,583
RAS Pump #2	10.00	3.0	3809	11,366
RAS Pump #3	10.00	3.0	4087	12,196
WAS Pump #1	5.00	2.6	1989	5,193
WAS Pump #2	5.00	2.6	1978	5,165
Total				59,510

4.8 Sludge Thickening/Holding

The facility includes two aerated sludge storage tanks. Each tank has a capacity of 70,000 gallons and receives flow from either the primary sludge pumps or the waste activated sludge pumps. Tank #1 is uncovered and is typically used for the waste activated sludge (WAS) and Tank #2 includes a dome cover and is used for primary sludge which can be more odorous.

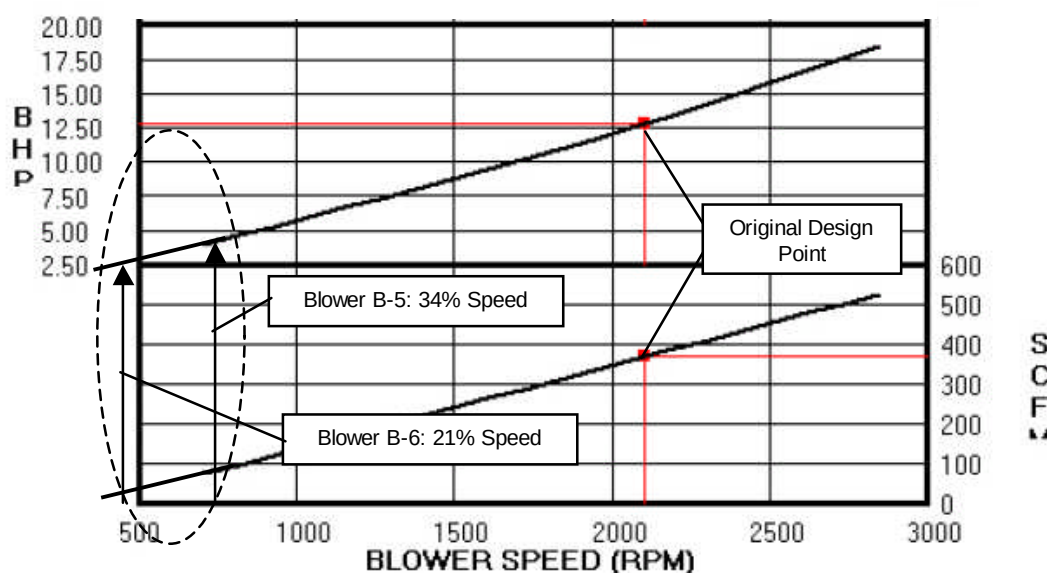
The tanks include fine bubble diffusers to keep solids suspended and to prevent anaerobic conditions. According to the O&M Manual, the system is designed to provide 40 standard cubic feet per minute (SCFM) of air per 1,000 cubic feet of sludge to adequately mix the sludge. Two Howden Model EAX2-100-56 positive displacement blowers (B-5, B-6) are located in exterior enclosures and rated for 385 cfm each. The blowers include 20 hp motors and VFDs that are adjusted manually.



In 2020, even though the facility primary clarifiers were off line, both tanks were used for the waste activated sludge with the exception of August & September. When the primary clarifiers were brought on-line in 2021, Tank #1 was still used for the waste activated sludge with the blower operated at 34% speed and Tank #2 was used for the primary sludge with a blower VFD speed of 21%. As shown on the blower curve below, the blowers are being operated at a very low capacity.

The blower control system also includes a timer mode with on/off cycling points. In 2021, to further optimize the system, staff began cycling the WAS tank blower 30 minutes on and off. This action reduced blower energy use/cost by 12,000 kWh or \$1700 annually. Since this staff initiative reduced the 2020 baseline energy use, it has been included in the report as OM #4.

Figure 4.3: Howden Blower Curve



Staff has done an excellent job optimizing the blower system operation to minimize energy use. The 2020 baseline system energy use is estimated below.

Table 4.12: Sludge Holding Tank Blower Energy Use Baseline

Equipment	Motor Hp	Power Draw (kW)	Annual Hours	Energy Use (kWh)
Sludge Blower #5 (#1)	20.00	2.8	8676	24,293
Sludge Blower #6 (#2)	20.00	1.4	6810	9,534
Total				33,827

4.9 Dewatering System

The solids handling system was designed to dewater a blend of primary and secondary sludge stored in the sludge storage tanks. Sludge is withdrawn from the storage tanks using one of two available sludge dewatering pumps. The sludge passes through a grinder and is blended and conditioned with polymer before it is directed to the screw press.



The Huber Model RoS3 Q620 inclined dewatering screw press is designed to handle sludge feed rates ranging from 1% - 4% feed solids, with solids capture rates of > 95% solids. The dewatered sludge cake (approximately 18 - 28% solids) is discharged to two shaftless screw conveyors before being deposited into a roll-off container for trucking off-site. The plant currently operates the dewatering system approximately 50 hours/week at a flowrate of 40 to 45 gpm.

The screw press is controlled automatically by the dewatering control panel based on the user selected flow set point, operating inlet pressures, and screw press rotational speed. The screw press will vary inlet pressures and speed to maintain the operator setpoints. A summary of system equipment and estimated energy use is provided below.

Table 4.13: Sludge Dewatering System Annual Energy Use

Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
Dewater Sludge Pump #1	5	1.0	703	703
Dewater Sludge Pump #2	5	1.0	1856	1,856
Dewater Sludge Pump #3	5	1.0	26	26
Dewater Grinder	3	0.8	2436	1,949
Huber Press	3	1.6	2731	4,278
Sludge Conveyor #1	5	2.0	2779	5,558
Sludge Conveyor #2	5	2.0	2829	5,658
Polymer Pump System	0.5	0.3	2563	669
Total				20,697

4.10 Disinfection

The secondary clarifier effluent is treated for disinfection using two sodium hypochlorite peristaltic feed pumps located in the chlorination room of the Dewatering Building. After sodium hypochlorite has been introduced, the secondary effluent flow is directed to two chlorine contact tanks. To reduce the chlorine residual, sodium bisulfite is introduced with two peristaltic feed pumps upstream of the parshall flume.

The pumps are fractional horsepower and have minimal energy use. Staff has made an effort to minimize the plant water used for chemical carrier water to a flow of 1 to 2 gpm.

Table 4.14: Disinfection System Annual Energy Use

Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
Hypo Pump #1	0.50	0.3	4380	1,144
Hypo Pump #2	0.50	0.3	4380	1,144
Bisulfite Pump #1	0.50	0.3	4380	1,144
Bisulfite Pump #2	0.50	0.3	4380	1,144
Total				4,574

4.11 Lower Lift Pump Station

The lower lift pump station is located by the contact tanks and consists of a below grade wetwell with two KSB submersible non-clog pumps with 15 hp motors.

The station collects various flows from the treatment process that includes dewatering filtrate and sanitary septic flow throughout the plant site. The pumps are activated with a level transducer to pump flow to the primary bypass manhole at the beginning of the treatment process. Estimated pump system energy use based on 2020 run time is shown below (kW not directly measured during site visit).



Table 4.15: Lower Lift Pump System Annual Energy Use

Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
Lower Lift Station Pump #1	15	7.8	998	7,817
Lower Lift Station Pump #2	15	7.8	1619	12,682
Total				20,499

Due to site elevations and the volume of dewatering filtrate, the head and flow for this station is unavoidable. The best option to maintain system efficiency is to track run time on a routine basis as recommended in EMP #1.

4.12 Plant Water System

The plant water system supplies disinfected secondary effluent flow for general plant use. The flow is supplied for spray water systems, carrier water for the hypochlorite and bisulfite systems, and washdown water. The system is located in the old secondary clarifier building room.



The skid mounted “Tigerflow” system includes a suction basket strainer and three multi-stage vertical centrifugal pumps with 10 hp motors and VFDs. The system is designed to provide 190 gpm at a discharge pressure of approximately 90 psi with two pumps operating. Each individual pump is sized for 95 gpm. A 132-gallon hydro-pneumatic tank maintains system pressure between pump cycles during low flow conditions. The SCADA system control screen is programmed to activate the lead pump at 68 psi and shut off the pump at 80 psi. During the site visit, the lead pump was off with a system pressure of 76 psi.

The system is approximately 3 years old and appears to be operating efficiently. The pump run time shown on SCADA is identical for all three pumps, which is an indication that pump performance has been maintained. To insure continued system efficiency, the integrity of the site plant water piping should be checked periodically by shutting off all end uses and monitoring system pressure. Monitoring pump run time monthly can also help identify excessive plant water use and pump wear.

The estimated system energy use based on 2020 run time is summarized below (kW was not directly measured during site visit).

Table 4.16: Plant Water System Estimated Annual Energy Use

Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
PW Pump #1	10	3.0	1669	4,980
PW Pump #2	10	3.0	1981	5,911
PW Pump #3	10	3.0	1662	4,959
Total				15,850

4.13 Building Heating & Ventilation Systems

The site has six heated buildings that include:

- The Control Building
- Dewatering Building
- Maintenance Building
- Plant Water Room
- Grit Building.

An overview of the building heating and ventilation systems is provided below.

Control Building

The Control Building is heated with two hydronic oil fired boilers. Hot water is circulated through heating coils in cabinet unit heaters, wall mounted unit heaters, fin tube radiators, and heating/ventilation units. The boiler includes a reset controller that adjusts the hot water temperature based on the outside temperature.



The upper level of the Control Building is heated using a split system air handling unit (AHU-1) in the mechanical room. Heat reaches the upper level of the building through ductwork and ceiling registers. Supplemental heat for individual rooms in the upper level is provided using cabinet unit heaters, a unit heater in the stairwell, and fin tube radiators in other areas. The heat control for these individual units is controlled by room thermostats. Exhaust Fan EF-2 operates when AHU-1 operates. Cooling is provided with a coil in AHU-1 and a pad-mounted condensing unit. The room temperature is scheduled with a 7-day programmable control and a thermostat in the lab.

The lower level of the Control Building is heated using heating and ventilation units located in the pump room (HV-1) and blower room (HV-4).

HV-1 is located in the lower level pump room, and operates continuously to provide heating and ventilation to the lower level of the building. When the outside air temperature is below 50°F and one (1) blower is operating, the unit provides three air changes per hour and 1,200 cfm, to the space. When the outside air temperature is below 50°F and two blowers are operating, the unit provides 1,750 cfm to the space. When the outside air temperature is above 50°F and one blower is operating, the unit provides six air changes per hour, 2,400 cfm, to the space. At all times, HV-1 provides heat to maintain the blower room at a minimum of 50°F.

HV-4 is located in the lower level blower room, and operates continuously to provide heating and ventilation to the pump room of the Control Building. The unit maintains the pump room at a minimum of 60°. When outside air temperature is below 50°F, the unit provides three air changes, 1,200 cfm, to the pump room. When the outside air is above 50°F, the unit provides six air changes, 2,400 cfm, to the pump room. According to the O&M Manual, HV-4 is set-up to maintain the pump room at a minimum of 60°F.

When the outside air temperature is below 50°F and one blower is operating, the Exhaust Fan (EF-1) operates to exhaust 1,200 cfm from the lower level of the building. When the outside air temperature is below 50°F and two blowers are operating, the airflow is 1,750 cfm. When the outside air temperature is above 50°F and one blower is operating, the fan exhausts 2,400 cfm from the space. When the outside air temperature is above 50°F and two (2) blowers are operating, fan operates at full speed to exhaust 3,500 cfm from the lower level. The O&M Manual indicates that these ventilation rates de-rate the space to an unclassified rating in accordance with NFPA 820. Independent heaters in each space include zone valves that open and close to maintain the heating thermostat setpoint.

The electrical room air conditioning is served by a dedicated ductless split air conditioning and heat pump which is controlled by a local thermostat in the electrical room

According to the data provided, in 2020 the Control Building used 1,025 gallons of fuel at a cost of \$1,736. This does not appear to be accurate based on the 2019 fuel use of 2153 gallons at a cost of \$5,187 and the high ventilation rates through the building.

Dewatering Building

The Dewatering Building is heated with an oil-fired boiler that distributes hot water through unit heaters and air handlers in the building.

The lower level of the building uses heating and ventilation (HV) #2. This unit serves the chlorination and dechlorination rooms and is controlled with a wall mounted thermostat. According to the O&M Manual, the area is exhausted at constant rates by two continuously operating exhaust fans when HV-2 is operational.



The garage-loading bay is heated with heating unit UH-3 controlled with a wall-mounted thermostat in the loading bay. The area includes a supply fan (SF-1) and exhaust fan (EF-5) which are set up to operate continuously. To reduce energy use, the fans are equipped with adjustable repeat cycle timers for manual summer and winter ON/OFF adjustment. If the garage door is closed (winter), the repeat cycle timer must be turned ON to maintain adequate space classification per NFPA 820 requirements.

The upper level of the Dewatering Building is heated using HV-3 located in the dewatering room. The unit operates continuously to provide six (6) air changes per hour using an automatically adjusted mixture of outside air and re-circulated air depending on the outside air temperature and occupancy. When the dewatering room is occupied, the outside air damper will open fully and return air damper will close, to provide 100 percent outside air to the space. When the dewatering room is unoccupied, the outside damper will close and the return air damper will open to re-circulate 75 percent of the air to the space. Recirculation air control is modulated via a motor actuated damper located on the mixing box intake. The room temperature is maintained with a wall thermostat. The dewatering room is exhausted with a wall mounted exhaust fan (EF-6), which operates when HV-3 is operating at 100%. EF-6 does not operate when HV- 3 is operating in the unoccupied mode, at which point air is exhausted via the gravity damper on EF-6.

The Dewatering Building fuel oil use/cost in 2020 was 2,360 gallons and \$4,718, which is high due to the ventilation system operation. Most New Hampshire wastewater facilities make the decision to operate the ventilation systems for the dewatering process and hypochlorite/bisulfite areas only when the space is

occupied or when the dewatering system is being operated to avoid excessive heating costs. However, even with the high ventilation rates, adjusting the thermostats from the existing 52 to 53 degrees down to 50 degrees or less can help decrease fuel use for this unoccupied building.

Grit Building & Plant Water Room

The Grit Building is heated with two 5 kW electric unit heaters controlled by wall thermostats set at 40 degrees. The building has an exhaust fan that is activated manually with a wall switch. The low thermostat setpoint and no continuous ventilation helps minimize system energy use.



The plant water room is located between the old secondary clarifiers. The 15 ft ceilings and concrete walls with no insulation makes this a challenging room to heat. Two 5 kW electric unit heaters are wall mounted on opposite sides of the room. Each heater is controlled with a wall thermostat set at 50 degrees. If the thermostats can be set slightly lower to 45 degrees, heater energy use could be reduced by approximately 10%.

Maintenance Building

The Maintenance Building heating and ventilation systems include a central propane-fired hydronic boiler that circulates hot water throughout the building. The hot water is circulated through heating coils and wall mounted radiation units that use individual thermostats to maintain temperature.

The basement pump room is heated with heating and ventilation unit (HV-M1). According to the O&M Manual, the unit fan operates continuously providing 100% outside air during occupied periods and 75% recirculation air (6 air changes per hour) during unoccupied periods based on operation of the pump room basement light switch. Recirculation air control is modulated with a motor actuated damper located on the mixing box intake. The thermostat for the unit is located in the Maintenance Building lab. Heat reaches the upper level of the building through ductwork and registers in the floor.

The propane use/cost in 2020 was 3,187 gallons and \$5,755. The energy use is high for this size building due to the ventilation system operation. Most New Hampshire wastewater facilities operate the ventilation systems for pump rooms only occasionally to avoid excessive heating costs. However, if the high ventilation rate is maintained, adjusting the thermostats from ~55 degrees to 50 degrees for this unoccupied building will help decrease building fuel use. The savings for this adjustment is reviewed in OM #5.

The electrical room is heated and cooled using a dedicated ductless split air conditioning and heating unit. The thermostat setting was observed to be 67 degrees during the site visit. Setting the A/C thermostat level at 75 degrees will help reduce system energy use while still maintaining a suitable environment for the electrical systems.

SECTION 5. RECOMMENDED MEASURES

This section describes the proposed energy management practices (EMPs), operational measures (OMs), and energy conservation measures (ECMs) discussed in the report. The measures are interactive in the order they are listed. All project costs and savings figures are preliminary and should be verified before proceeding with each project.

5.1 Energy Management Practices

Energy management practices cannot be justified based on quantifiable energy savings, but are considered to be good energy efficient practices that will provide long-term benefits.

5.1.1 EMP #1 Benchmark Energy Use and Process Data

Description

An effective energy management program provides a systematic approach to reducing facility energy use and costs. A successful program is structured to provide an on-going process that can be used to continually evaluate new projects, track savings and encourage efforts within the organization to improve efficiency.

For the Newmarket Wastewater Facility and wastewater pump stations, we recommend collecting the following data:

- Record electric energy use/kW monthly. Benchmark this data with flow and process loads as discussed.
- Install a kWh meter for the aeration system blowers, which represents over 36% of the plant's energy use and track the data monthly. This will help identify potential issues before they impact energy costs.
- Continue tracking equipment run time and compare with monthly energy use
- Record fuel oil/propane use monthly (estimates based on tank level is adequate).
- For the pump stations, compare monthly energy use with equipment hours, flows and thermostat settings.

Calculations

This measure is an important part of a successful efficiency program to insure savings for the energy projects are realized.

Preliminary Cost Estimate

Cost is expected to be approximately \$3,000 for the recommended aeration system electric submeter with enough CTs for the three blowers.

5.2 Operational Measures

Operational measures are low cost improvements that can be made without a substantial capital investment and typically pay for themselves in less than one year.

5.2.1 OM #1 Creighton Street Electric Heat Adjustments

Description

The Creighton Street Headworks Building thermostats are maintained at approximately 50 degrees. The Creighton Pump Building electric heaters have high/low knobs typically maintained at the low setting (estimated to be ~55 degrees). This measure reviews the potential energy savings for installing wall thermostats in place of the high-low knobs for the heaters in the Pump Building and maintaining the Headworks and Pump Building thermostats at 45 degrees.

Savings

The pump station baseline heating system energy use has been estimated below using 2020 electric bills, pump run time and power measurements.

Table 5.1: Creighton Street Pump Station Baseline Energy Use

Month	2020 Pump Hours	Influent Monthly Flow (MG)	2020 Billed Energy Use (kWh)	Estimated Pump Energy Use (kWh)	Estimated Energy Use (kWh) for Misc. Equipment	Estimated Energy Use (kWh) for Heat	2020 Electrical Demand (kW)
Jan	235	17.37	20,438	10,335	10,103	9,000	49
Feb	190	14.55	20,814	8,351	12,463	11,500	49
Mar	208	15.93	16,713	9,136	7,577	6,500	48
Apr	252	19.24	23,714	11,089	12,625	11,500	52
May	187	14.43	21,519	8,243	13,276	12,000	47
Jun	142	10.70	6,412	6,258	154	--	21
Jul	144	10.96	6,868	6,325	543	--	28
Aug	148	10.35	5,881	6,507	-626	--	20
Sep	142	9.94	6,432	6,226	206	--	21
Oct	154	10.61	7,048	6,768	280	--	20
Nov	163	11.45	14,916	7,176	7,740	6,800	55
Dec	224	16.33	22,945	9,847	13,098	12,000	53
Total/Avg	1485	161.88	173,700	96,261	77,439	69,300	462.6

Although the electric heat column seems high, the O&M Manual indicates that the Headworks Building is continuously ventilated with a supply and exhaust fan. The rated airflow of the ventilation units is unknown, but estimated to be approximately 1,500 cfm. The electric heaters are also large units with two 15 kW heaters in the Headworks Building and two 10 kW heaters in the Pump Building.

5. RECOMMENDED MEASURES

Applying the relationship of 2% cost savings for every one degree of temperature reduction was used to estimate energy savings below.

Table 5.2: Baseline Annual Energy Use & Savings

Station	2020 Annual Energy Use (kWh)	Misc. Electric Use (kWh)	Estimated Electric Heat (kWh)	Existing Temp	Proposed Temp	Percent Savings	Annual Electric Savings (kWh)
Creighton Pump Bldg	173,700	96,261	14,000	55	45	20%	2,800
Creighton Headworks			55,000	50	45	10%	5,500
Total Electric Savings							8,300

Preliminary Cost Estimate

Cost is expected to be less than \$1,000 for installing thermostats in place of the high/low knobs for the Pump Building.

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Energy (kWh) Savings	8,300 kWh	\$0.138/kWh	\$ 1,145
Annual Demand (kW) Savings	0 kW	\$16.37/kW	\$ 0
Total Energy Cost Savings			\$ 1,145
Project Cost			\$ 1,000
Simple Payback			<1 Year

5.2.2 OM #2 Creighton Street Ventilation System Cycling

Description

The Creighton Street Pump Station Headworks includes a supply and exhaust ventilation system that operates continuously. The O&M Manual indicates that continuous ventilation is necessary to de-rate the space (Class I, Division II) per NFPA 820 requirements. However, it appears that all the equipment in the headworks area is rated for Class 1, Division 1, which does not require continuous ventilation.

This measure recommends ventilating the space based on occupancy (with a light switch) and with a timer to periodically ventilate the space for a short duration to reduce harmful gas concentration and extend equipment life. Cycling the ventilation systems intermittently will reduce excessive heating costs. An activation cycle of 3 every 30 minutes has been used to calculate annual energy savings for this measure.

Savings

OM #1 estimated the electric heating energy use to be 55,000 for the Headworks Building and 14,000 kWh for the Pump Building. For the Headworks Building electric heaters, the energy savings that could be realized by reducing the ventilation rate is calculated based on the assumption that OM #1 has already been implemented and the setpoint temperature is now 45 degrees. This will avoid “double counting” the savings.

Using the relationship between airflow and seasonal temperature variations, the savings for reducing the ventilation rate by 90% (new proposed ventilation rate cycled 3 minutes out of every 30 minutes) is shown below. The 1,500 cfm value is an estimated airflow rate at this time and will need to be verified.

Table 5.3: Headworks Ventilation System Energy Savings

Month	New Inside Temp	Avg Outside Temp	Headworks Exhaust CFM	Sensible heat Loss (MMBtu)	Savings after cycling 3 min every 30 min	Energy Savings (kWh)
Jan	45	28	1,500	20	18	5,303
Feb	45	27	1,500	21	19	5,615
Mar	45	33	1,500	14	13	3,743
Apr	45	45	1,500	0	0	0
May	45	54	1,500	0	0	0
Jun	45	63	1,500	0	0	0
Jul	45	70	1,500	0	0	0
Aug	45	67	1,500	0	0	0
Sep	45	61	1,500	0	0	0
Oct	45	50	1,500	0	0	0
Nov	45	41	1,500	5	4	1,248
Dec	45	26	1,500	22	20	5,927
				83	75	21,836

5. RECOMMENDED MEASURES

In addition to the 21,836 kWh in energy savings, this measure also recommends taking one electric heater off line in the Headworks and the lower level electric heater in the Pump Building. This is expected to reduce demand charges by approximately 45 kW (15 kW + 10 kW) * 30% coincidental demand * 6 months.

Preliminary Cost Estimate

Cost is expected to be less than \$3,000 for installing adjustable cycle timers for the ventilation systems.

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Energy (kWh) Savings	21,836 kWh	\$0.138/kWh	\$ 3,013
Annual Demand (kW) Savings	45 kW	\$16.37/kW	\$ 737
Total Energy Cost Savings			\$ 3,750
Project Cost			\$ 3,000
Simple Payback			<1 Year

5.2.3 OM #3 Operate Plant with Primary Treatment (2021 facility initiative)

Description

In 2020, the primaries were only used for approximately two months. However, in 2021 one of the clarifiers was on-line for all 12 months. The energy savings for this existing operational adjustment is presented below.

From an energy perspective, the primary treatment process can be one of the most important systems in a wastewater plant. The higher the BOD removal efficiency of the primary clarifiers, the lower the energy needed for the high-energy biological process. In addition to reducing aeration system energy, higher primary BOD removal levels also increase the primary to secondary sludge ratio, which can improve dewatering solids.

Savings

As shown below, the primary system energy use increased after the clarifiers were placed on line for the entire year in 2021.

Table 5.4: Primary System Energy Use Baseline

Equipment	Motor Hp	Power Draw (kW)	Annual Hours	Energy Use (kWh)	Estimated 2021Hours	Energy Use (kWh)
Primary Clarifier #1	0.5	0.3	789	206	8760	2,287
Primary Clarifier #2	0.5	0.3	786	205	8760	2,287
Primary Sludge Pump #1	5.0	2.6	0	0	2500	6,528
Primary Sludge Pump #2	5.0	2.6	66	172	2500	6,528
Total				584		17,269

The additional run time shown above increased the annual energy use for this system by approximately 16,685 kWh. However, with a typical 30% BOD removal expected with the primary clarifiers on line, the adjusted aeration system blower energy use (using the aeration model discussed in Section 4.6) was estimated to be 35,000 kWh for a net savings of 18,315 kWh.

Preliminary Cost Estimate

Cost for the measure was minimal.

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Energy (kWh) Savings	18,315 kWh	\$0.138/kWh	\$ 2,527
Annual Demand (kW) Savings	0 kW	\$16.37/kW	\$ 0
Total Energy Cost Savings			\$ 2,527
Project Cost			Minimal
Simple Payback			Immediate

5.2.4 OM #4 Cycle WAS Holding Tank Blower (2021 facility initiative)

Description

The facility includes two aerated sludge storage tanks. Tank #1 is uncovered and is typically used for the waste activated sludge (WAS) and Tank #2 includes a dome cover and is used for primary sludge.

The tanks include fine bubble diffusers to keep solids suspended and to prevent anaerobic conditions. Two positive displacement blowers with 20 hp motors and VFDs are adjusted manually.

In 2020, even though the facility primary clarifiers were off line, both tanks were used for the waste activated sludge with the exception of August & September. When the primary clarifiers were brought on-line in 2021, Tank #1 was still used for the waste activated sludge with the blower operated at 34% speed and Tank #2 was used for the primary sludge with a blower VFD speed of 21%.

The blower control system also includes a timer mode with on/off cycling points. In 2021, to further optimize the system, staff began cycling the WAS tank blower 30 minutes on and 30 minutes off.

Savings

The blower cycling has reduced equipment energy use as follows:

Baseline Blower #5 energy use: 2.8 kW * 8876 hours = 24,293

Cycling the blowers on/off every 30 minutes: 24,293 kWh * 50% = 12,147 kWh

Preliminary Cost Estimate

There was no cost for the measure.

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Energy (kWh) Savings	12,147 kWh	\$0.138/kWh	\$ 1,676
Annual Demand (kW) Savings	0 kW	\$16.37/kW	\$ 0
Total Energy Cost Savings			\$ 1,676
Project Cost			Minimal
Simple Payback			Immediate

5.2.5 OM #5 Adjust Maintenance Building Thermostat Settings

Description

The Maintenance Building heating and ventilation systems include a central propane-fired hydronic boiler that circulates hot water throughout the building. The hot water is circulated through heating coils and wall mounted radiation units that use individual thermostats to maintain temperature.

The basement pump room is heated with heating and ventilation unit (HV-M1). According to the O&M Manual, the unit fan operates continuously providing 100% outside air during occupied periods and 75% recirculation air (6 air changes per hour) during unoccupied periods based on operation of the pump room basement light switch.

The energy use is high for this size building due to the ventilation system operation. Most New Hampshire wastewater facilities operate the ventilation systems for sludge pump rooms only occasionally to avoid excessive heating costs. However, if the high ventilation rate is maintained, adjusting the thermostats from ~55 degrees to 50 degrees for this unoccupied building will help decrease building fuel use.

Savings Calculation

The propane use/cost in 2020 was 3,187 gallons and \$5,755

The relationship of 2% cost savings for every one degree of temperature reduction was used to estimate savings below.

Baseline Propane Use: 3,187 gallons * (55 degrees – 50 degrees) * 2% = 319 gallons

Preliminary Cost Estimate

Cost is expected to be minimal.

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Propane Savings	319 gallons	\$1.80/gallon	\$ 574
Total Energy Cost Savings			\$ 574
Project Cost			Minimal
Simple Payback			Immediate

5.3 Energy Conservation Measures

The recommendations discussed in this section are categorized as energy conservation measures, or “ECMs”, for projects that require a larger capital investment with simple paybacks exceeding one year.

5.3.1 ECM #1 Install VFDs for Zone “A” Mixers

Description

The submersible mixers can be operated remotely from the operator terminal or SCADA system. The aeration tank anoxic zones system includes 2.8 hp KSB submersible mixers in Zone “A” and 1.7 hp mixers in Zones “B” and “E”. The mixers do not have VFDs and operate at full speed.

To determine if the mixers had been “right sized” for the application, the volume of each zone was reviewed and compared with the 0.22 hp/1000 ft³ sizing guideline discussed in Section 4.6. This data is summarized below.

Table 5.5: Horsepower Mixing Criteria Versus Actual Horsepower

Parameter	O&M Manual Dimensions	Tank Volume	Mixing Horsepower Criteria (0.22 hp/1000 ft ³)	Actual Installed Mixer Horsepower
Zone A	18 x 12.5 x 15	3,375 ft ³	0.8	2.8
Zone B	18 x 26 x 15	7,020 ft ³	1.5	1.7
Zone E	18 x 30 x 15	8,100 ft ³	1.8	1.7

As shown above, the mixers for Zone “B” and “E” are close to the sizing guideline. However, the horsepower for the Zone “A” mixer could be reduced by approximately 50% with the application of a VFD. The baseline energy use for the 2.8 hp mixers was estimated to be 1.7 kW (2.8 hp * .746 * ~80% load).

Savings

Based on mixer power measurements at other wastewater plants, a proportional 1:1 speed versus power relationship was used to estimate savings.

The baseline power draw was estimated to be 1.7 kW. Installing a VFD set at 30 Hz speed setting would yield a new power value of 0.85 kW. After including a VFD efficiency of 97%, the adjusted power would be approximately 0.9 kW. Potential savings are calculated below using the 2020 mixer hours.

Tank 1 Zone A Mixer: 1.7 kW – 0.9 kW * 8743 hours = 6,994 kWh

Tank 2 Zone A Mixer: 1.7 kW – 0.9 kW * 8187 hours = 6,550 kWh

Energy savings: 13,544 kWh

Demand savings: 1.7 kW – 0.9 kW * 2 mixers * 12 months = 19.2 kW

5. RECOMMENDED MEASURES

Preliminary Cost Estimate

The cost for the proposed system improvements is estimated below.

Item N°	Description	Qty	Unit	Equipment Cost	Labor Cost	Total
1	3 hp VFD	2	EA	\$800	\$2,000	\$5,600
			Total			\$5,600

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Energy Savings	13,544 kWh	\$0.138/kWh	\$ 1,869
Annual Demand Savings	19.2 kW	\$16.37/kW	\$ 314
Total Energy Cost Savings			\$ 2,183
Project Cost			\$ 5,600
Simple Payback			2.6 years

APPENDIX A: UTILITY RATE SCHEDULE

GENERAL DELIVERY SERVICE RATE G

AVAILABILITY

Subject to the Terms and Conditions of the Tariff of which it is a part, this rate is for Delivery Service for any use. It is available to (1) those Customers at existing delivery points who were receiving service hereunder on General Service Rate G on January 1, 1983, and who have continuously received service under that rate and this successor since that date, and (2) all other Customers whose loads as defined for billing purposes do not exceed 100 kilowatts. Service rendered hereunder shall exclude all backup and standby service provided under Backup Delivery Service Rate B.

Customers taking service under this rate shall provide any necessary transforming and regulating devices on the Customer's side of the meter. Controlled electric service for thermal storage devices is available under Load Controlled Service Rate LCS and outdoor area lighting is available under Outdoor Lighting Delivery Service Rate OL.

CHARACTER OF SERVICE

Delivery Service supplied under this rate will be 60 hertz, alternating current, either (a) single-phase, normally three-wire at a nominal voltage of 120/240 volts, or (b) three-phase, normally at a nominal voltage of 120/208 or 277/480 volts. Three-phase, three-wire service at a nominal voltage of 240, 480 or 600 volts is available only to those Customers at existing locations who were receiving such service on February 1, 1986, and who have continuously received such service since that date. In underground secondary network areas, Delivery Service will be supplied only at a nominal voltage of 120/208 volts.

RATE PER MONTH

	<u>Single-Phase Service</u>	<u>Three-Phase Service</u>
Customer Charge	\$14.89 per month	\$29.76 per month
Customer's Load Charges:	<u>Per Kilowatt of Customer Load in Excess of 5.0 Kilowatts</u>	
Distribution Charge	\$8.72	
Transmission Charge	\$5.26	
Stranded Cost Recovery	\$0.96	

Issued: February 1, 2019

Issued by: /s/ William J. Quinlan
William J. Quinlan

Effective: February 1, 2019

Title: President and Chief Operating Officer

Energy Charges:

Per Kilowatt-Hour

Distribution Charges:

First 500 kilowatt-hours	6.986¢
Next 1,000 kilowatt-hours	1.731¢
All additional kilowatt-hours	0.612¢

Transmission Charge

First 500 kilowatt-hours	1.900¢
Next 1,000 kilowatt-hours	0.715¢
All additional kilowatt-hours	0.383¢

Stranded Cost Recovery	1.069¢
------------------------------	--------

WATER HEATING - UNCONTROLLED

Uncontrolled water heating service is available under this rate when such service is supplied to approved water heaters equipped with either (a) two thermostatically-operated heating elements, each with a rating of no more than 5,500 watts, so connected or interlocked that they cannot operate simultaneously, or (b) a single thermostatically-operated heating element with a rating of no more than 5,500 watts. The heating elements or element shall be connected by means of an approved circuit to a separate water heating meter. Service measured by this meter will be billed monthly as follows:

Meter Charge \$4.47 per month

Energy Charges:

Distribution Charge	2.030¢ per kilowatt-hour
Transmission Charge	1.578¢ per kilowatt-hour
Stranded Cost Recovery	1.338¢ per kilowatt-hour

WATER HEATING - CONTROLLED

Controlled off-peak water heating is available under this rate for a limited period of time at those locations which were receiving controlled off-peak water heating service hereunder on Customer Choice Date and which have continuously received such service hereunder since that

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William J. Quinlan

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Title: President and Chief Operating Officer

date. Service under this rate at such locations shall continue to be available only for the remaining life of the presently-installed water heating equipment. No replacement water heaters shall be permitted to be installed for service under this rate at locations which otherwise would qualify for this service.

For those locations which qualify under the preceding paragraph, controlled off-peak water heating service is available under this rate when such service is supplied to approved storage type electric water heaters having an off-peak heating element with a rating of no more than 1,000 watts, or 20 watts per gallon of tank capacity, whichever is greater. The off-peak element shall be connected by means of an approved circuit to a separate water heating meter. Electricity used will be billed monthly as follows:

Meter Charge.....\$7.88 per month

Energy Charges:

Distribution Charge..... 0.120¢ per kilowatt-hour

Transmission Charge 1.578¢ per kilowatt-hour

Stranded Cost Recovery 0.790¢ per kilowatt-hour

SPACE HEATING SERVICE

Space heating service is available under this rate at those locations which were receiving space heating service under the Transitional Space Heating Service Rate TSH prior to Customer Choice Date and which have continuously received such service since that date. Customers at such locations who have elected this rate shall have the electricity for such service billed separately on a monthly basis as follows:

Meter Charge.....\$2.98 per month

Energy Charges:

Distribution Charge..... 3.426¢ per kilowatt-hour

Transmission Charge 1.900¢ per kilowatt-hour

Stranded Cost Recovery 1.666¢ per kilowatt-hour

Space heating equipment served under this rate, including heat pumps and associated air circulating equipment, shall be wired by means of approved circuits to permit measurement of such equipment's additional demand and energy use.

Issued: February 1, 2019

Issued by: /s/ William J. Quinlan
William J. Quinlan

Effective: February 1, 2019

Title: President and Chief Operating Officer

Customers taking space heating service under this rate at locations where the regular power and lighting service is delivered at primary voltage level or above shall be required to provide at the Customers' expense suitable transforming, controlling and regulating apparatus, acceptable to and approved by the Company, for the space heating service in the same manner as for the power and lighting service, so that deliveries of all electric service may be made by the Company at the same voltage level.

CUSTOMER'S LOAD

Customer's load is defined as the greatest rate of taking Delivery Service in kilowatts for any thirty (30) minute interval during the current monthly billing period.

Customer's load shall be measured whenever (a) such load is known or estimated to be 5.0 kilowatts or more, or (b) the Customer's use of service is 750 kilowatt-hours or more per month for three (3) consecutive months. However, any Customer's load may be measured at the Company's option. When measured, Customer's load shall be determined to the nearest one-tenth (0.1) kilowatt for billing purposes.

SERVICE CHARGE

When the Company establishes or re-establishes a Delivery Service account for a Customer at a meter location, the Company will be entitled to assess a service charge in addition to all other charges under this rate. The service charge will be \$14.00 if the Company does not have to send an employee to the meter location to establish or re-establish Delivery Service. When it is necessary for the Company to send an employee to the meter location to establish or re-establish Delivery Service, the service charge will be \$35.00. When it is necessary for the Company to send an employee to the meter location outside of normal working hours to establish or re-establish Delivery Service, the service charge will be \$70.00. The Company will be entitled to assess an \$18.00 service charge when it is necessary to send an employee to the Customer location to collect a delinquent bill. This charge shall apply regardless of any action taken by the Company including accepting a payment, making a deferred payment arrangement or leaving a collection notice at the Customer's premises.

Short-term, seasonal or transient Customers who take service at temporary locations shall pay for the cost of installing and removing the necessary poles, wires, transformers, cable and other equipment in addition to the foregoing service charge.

Issued: March 24, 2016

Issued by: William J. Quinlan

Effective: May 1, 2016

Title: President and Chief Operating Officer



PROCESS ENERGY SERVICES, LLC

WATER ♦ WASTEWATER ♦ INDUSTRIAL

ENERGY EVALUATION

Water System Well & Booster Pump Stations Town of Newmarket, New Hampshire



PROCESS ENERGY SERVICES, LLC

WATER ♦ WASTEWATER ♦ INDUSTRIAL

ENERGY EVALUATION

for the

NEWMARKET WATER SYSTEM

November 2021

Newmarket, NH

Performed by:

Process Energy Services, LLC
2 Lafayette Rd.
Londonderry, New Hampshire 03053
(603) 537-1286

Supported by:

New Hampshire Department of Environmental Services
Eversource

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APPENDIX A: ELECTRIC RATE SCHEDULE

APPENDIX B: PRODUCT DATA SHEET

While the recommendations in this report have been reviewed for technical accuracy, Process Energy Services is not liable if the projected savings are not achieved. The recommendations are based on an analysis of conditions observed at the time of the evaluation, information provided by facility staff and estimated costs for equipment and labor based on similar projects. Actual savings and project costs will depend on many factors, including varying process flows and loads, recommendations implemented, seasonal variations in fuel costs and weather, and proper equipment operation. Before implementation of the measures presented in this report, Process Energy Services recommends a more detailed analysis to verify savings and project costs.

SECTION 1. EXECUTIVE SUMMARY

1.1 Overview

In 2016, the New Hampshire Department of Environmental Services (NHDES), the New Hampshire Office of Energy and Planning (NHOEP) and New Hampshire electric utilities secured funding to perform comprehensive and preliminary process energy evaluations at selected New Hampshire Wastewater Treatment Facilities. Due to the success of this initial program, NHDES Clean Water State Revolving Fund (CWSRF) provided funding to continue conducting energy audits at New Hampshire's water and wastewater treatment facilities and pump stations.

Based on the Town's interest, the Newmarket Water System was selected for an energy evaluation. Process Energy Services (PES) was selected as the consultant to perform the energy audit. PES specializes in water/wastewater system process energy work and has performed evaluations throughout New England.

1.2 Report Organization

As cost savings projects were developed, each measure was prioritized based on ease of implementation, cost effectiveness and ability for each project to support subsequent measures. The projects have been categorized as energy conservation measures (ECMs) for projects that require a capital investment, and operational measures (OMs) for fast payback improvements (1 year or less).

The report organization includes an Executive Summary to provide an overview of the recommended project savings and costs. Section 2 reviews energy management initiatives and benchmarking facility energy use. Section 3 contains an energy related overview of the water system, and Section 4 includes a detailed review of each proposed measure.

1.3 Evaluation Approach

Once potential energy savings are identified, there are often multiple ways to improve equipment operation to realize the projected energy savings. Process Energy Services makes an effort to select the simplest, lowest cost solution for municipalities to ensure the projects are cost effective and potentially qualify for utility incentives. Whenever possible, the use of variable frequency drives, instrumentation and controls are recommended to reduce equipment capacity instead of permanently downsizing equipment.

1. EXECUTIVE SUMMARY

A summary of the qualified measures and their associated savings is presented in Table 1.1 and the project evaluation summary table is presented in Table 1.2.

Table 1.1: Recommended Cost Saving Projects

No	Cost Saving Measures	Annual Energy Savings (kWh)	First Year Annual Savings (\$)	Initial Cost (\$)	Simple Payback (yrs)
	ENERGY MANAGEMENT PRACTICES				
EMP 1	Benchmark Energy Use with Operational Data	--	--	--	--
	Total for EMPs	--	--	--	--
	OPERATIONAL MEASURES				
OM 1	Sewell Well Impeller Clearance Adjustment	7,183	\$1,755	\$1,000	<1
OM 2	Investigate Macintosh Well Propane Vaporizer	9,600	\$1,430	\$500	<1
OM 3	Install Wall Thermostat for Folsom Booster Electric Heater	2,100	\$313	\$300	<1
	Total for OMs	18,883	\$3,498	\$1,800	<1
	ENERGY CONSERVATION MEASURES				
ECM 1	Bennett Well Pump Replacement	10,057	\$2,575	\$28,000	10.9
ECM 2	Replace Electric Heaters with Heat Pumps	12,050	\$2,272	\$19,000	8.4
	Total for ECMs	22,107	\$4,847	\$47,000	9.7
	Electric Energy Cost Savings	40,990	\$8,345	\$48,800	5.8
	Total	40,990	\$8,345	\$48,800	5.8

Eversource may be able to provide incentives for qualified measures in Table 1.1. The energy efficiency program information can be found at www.NHSaves.com.

Table 1.2: Project Evaluation Summary

2020 Baseline Annual Electric Energy Costs

Sewell Well	\$ 17,602
Bennett Well	\$ 13,692
Macintosh Well	\$ 10,675
Treatment Building	\$ --
Folsom Booster	\$ 3,255
Old Water Plant	\$ 3,137
Great Hill Tank	\$ 336
Total System Annual Electric Costs	\$ 48,698

2020 Baseline Propane Energy Costs

Old Water Plant Propane (estimated)	\$ 2,000
Emergency Generator Propane (estimated)	\$ 200
Total Annual Fuel Costs	\$ 2,200

Projected Annual Cost and Savings Summary

	<u>Calculated Savings</u>	<u>Percent of Costs</u>
Electric Cost Savings	\$ 8,345	17 %
Propane Savings	\$ 0	0 %
Net Annual Savings/Percent of Energy Costs	\$ 8,345	16%

Project Costs/Payback

Estimated Cost of Projects	\$48,800
Simple Payback	5.8 Years

Electric Energy Reduced Power Plant Emissions

In addition to the energy cost savings, reducing facility energy use will also provide environmental benefits by reducing greenhouse gas emissions (GHG) that include CO₂, N₂O and CH₄. The information in this evaluation can be used by the Town to develop a GHG inventory plan in accordance with the EPA's Climate Leadership Program. Reduced power plant emission is based on 40,990 kWh annual savings.

Carbon Dioxide (1.37 lbs/kWh)	56,156	lbs/year
Sulfur Oxides (0.0035 lbs/kWh)	143	lbs/year
Nitrous Oxides (0.0010 lbs/kWh)	41	lbs/year

Emission unit source: U.S. EPA eGrid 2007 and U.S. EPA Office of Air Quality Planning & Standards (www.epa.gov/cleanenergy/energy-resources/egrid/faq.html).

SECTION 2. ENERGY MANAGEMENT

2.1 Energy Management Program

An effective energy management program provides a systematic approach to reducing facility energy use and costs. A successful program is structured to provide an on-going process that can be used to continually evaluate new projects, track savings and encourage efforts within the organization to improve efficiency.

The EPA 2008 Energy Management Guidebook for Water and Wastewater Utilities presents a management system approach for water and wastewater utilities for energy conservation. Based on the successful Plan-Do-Check-Act process, the guidebook provides information on establishing and prioritizing energy conservation targets (Plan), implementing specific practices to meet these targets (Do), monitoring and measuring energy performance improvements and cost savings (Check), and periodically reviewing progress and making adjustments to energy programs (Act).

For the Newmarket Well/Booster pumps and buildings, EMP #1 reviews the benefits of collecting the following data to help evaluate existing system efficiency and identify new energy savings opportunities.

- Track electric use/costs monthly.
- Track booster pump hours.
- Benchmark monthly energy use with station flow and note thermostat settings.

Collecting this additional data on a regular basis is useful to verify savings of the proposed measures and determine when pump upgrades or heating system improvements can be justified.

2.2 Benchmarking Facility Energy Use

Energy benchmarking can be accomplished using internal or external comparisons. Internal benchmarking allows an organization to evaluate facility energy use year to year to monitor facility efficiency changes. The results can be used within an organization to track performance over time, identify best practices and increase management's understanding of how to analyze and interpret energy data.

For external benchmarking, a facility can be compared to similar regional facilities. When process and energy use data is assembled, the information can be used to assess performance and encourage staff to investigate why performance is lower than expected, or to confirm efficiency efforts by receiving a high performance rating relative to other facilities.

The benchmarking data for the Newmarket Water System is compared in Table 2.1 with other New Hampshire Water Systems. This simple comparison does not account for elevation differences or the type of heating system (electric, propane, fuel oil or natural gas), but helps encourage staff to evaluate system energy use in more detail to determine why system benchmark data is higher or lower compared to other New Hampshire communities.

As shown in Table 2.1, the kWh/MG for the Newmarket Water System compares well with other small New Hampshire groundwater type systems.

2. ENERGY MANAGEMENT

Table 2.1: NH Water System Benchmarking Data

Water System	Total Annual System Energy Usage (kWh)	Annual System Flow (MG)	Annual kWh/MG	Type of System
Georges Mills System (2020)	56,766	11.7	4,852	Wells / 1 Zone
Town of Enfield	86,757	25.4	3,416	Wells / 1 Zone
Town of Lincoln	757,615	200.8	3,773	Surface Water Treatment /Well/ 3 Zones
Town of Whitefield	230,944	74.8	3,087	Wells / 3 Zones
Warner Village Water District	48,342	18.9	2,557	Wells / 1 Zone
Town of Peterborough	544,915	214.4	2,541	Wells / 2 Zones
Town of Woodstock	323,161	133.6	2,419	Wells/1 Zone
Hooksett Village	263,431	121.8	2,163	Wells/2 Zones
Milford	557,280	261	2,137	Wells/2 Zones
North Conway (NCWP)	604,458	283.5	2,132	Wells / 3 Zones
Conway Village (CVFD)	180,023	90.3	1,994	Wells/1 Zone
Newmarket	270,836	138.0	1,961	Wells / 2 Zones
Town of Jaffrey	295,117	151.8	1,944	Wells / 2 Zones
City of Lebanon	1,048,409	544.1	1,927	Surface Water Treatment /4 Zones
Town of Colebrook	229,741	122.0	1,883	Wells / 1 Zone
Plymouth (PVW&SD)	259,090	139.9	1,852	Wells / 2 Zones
Salem Water	1,438,353	779	1,846	Surface Water Treatment/3 zones
Antrim/Bennington System	87,792	50.8	1,728	Wells / 2 Zones
Town of Bristol	146,271	95.3	1,535	Wells/2 Zones
City of Rochester	1,058,854	745.4	1,432	Surface Water / Well/ 4 Zones
Town of Hanover	427,289	298.3	1,407	Surface Water Treatment / 3 Zones
Winchester Water Department	159,812	114.6	1,394	Wells / 1 Zone
City of Concord	1,540,339	1,546	996	Surface Water Treatment/3 zones
Sunapee Water System (2020)	49,282	51.1	964	Surface Water Treatment / 1 Zone
*City of Keene	695,226	752.3	924	Surface Water Treatment/ Wells/5 Zones
*City of Claremont	210,455	326.0	646	Surface Water Treatment/3 zones
*Town of Gorham	29,578	106.9	277	Surface Water Treatment/ Wells/2 Zones
*Town Of Wolfeboro	37,056	142.4	260	Surface Water Treatment / 2 Zones

*These water systems benefit from no raw water pumping.

If the identified measures in Table 1.1 are implemented, annual system electric energy use for the Newmarket Water System could be reduced by approximately 40,990 kWh. The new kWh/MG benchmark value, after implementing the proposed projects, is summarized below.

Table 2.2: New Potential Benchmark Value after Energy Project Implementation

System	Total Annual Energy Usage (kWh)	Total Annual Flow Pumped (MG)	Annual kWh/MG	Total New Energy Cost	Annual Energy Cost/MG
Newmarket	229,846	138	1,666	\$40,353	\$292

The projected 15% energy kWh savings will continue progress towards improving water system efficiency and reduce the system benchmark value.

A review of the water pumping systems, along with supporting data for the recommended improvements identified by Process Energy Services, has been presented in Section 3.

SECTION 3. WATER SYSTEM

3.1 Overview

The Newmarket Water System provides domestic water and fire protection to approximately 1,950 service connections serving an estimated population of approximately 5,030 people. The reported average daily production for 2020 was approximately 378,000 gallons per day (gpd).

The water system currently includes two gravel packed wells (Bennett and Sewell Wells) and a bedrock well (Macintosh Well) that has been off-line since June 2020. The Macintosh Well was previously paired with a blending facility last year but was taken off line when the new water treatment facility construction began in 2021 to replace the blending facility. The new water treatment plant will treat flow from the Macintosh Well and the new Tucker Well.

The distribution system consists of approximately 30 miles of water mains; a 750,000-gallon water storage tank and booster pump station. The water system serves the downtown area, north along NH Rte. 108 to the Durham town line, east along Bay Street before Stevens Drive, south along NH Rte. 108 to the Newfields town line, and west along NH Rte. 152 past Lee Hook Road. Water main replacements on Bay Road and South Main Street and a water main extension to the Moody Point small community water system have been recently constructed. All services have automatic meter reading with backflow devices and are read monthly.

In 2021, a primary water supply line section from Grant Road to Railroad Street was replaced. The 3,300 ft of 6" piping was a hydraulic bottleneck for supplying the majority of the distribution system from the Sewell and Bennett Wells. The new 12" pipe has decreased line pressure at the wells from approximately 84 psi to 76 psi, which reduced pumping energy costs by approximately \$3,000 annually.

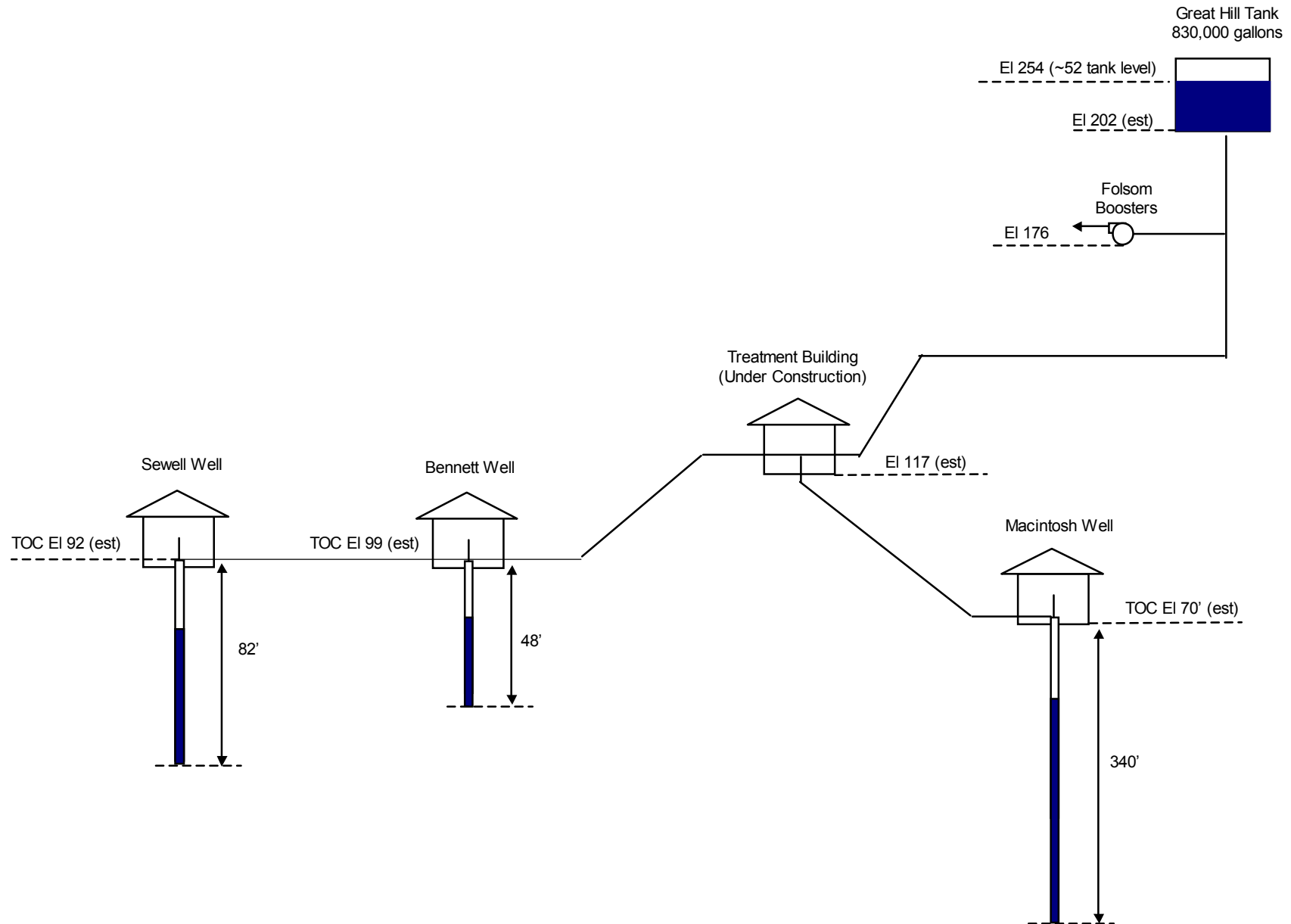
A summary of the system 2020 electric energy costs is shown below.

Table 3.1: 2020 Newmarket Water System Energy Use and Costs

Facility	Annual Electric Energy Use (kWh)	Annual Electric Cost
Sewell Well	96,178	\$17,602
Bennett Well	77,602	\$13,692
Macintosh Well	54,584	\$10,675
Treatment Building	--	--
Folsom Booster Station	22,112	\$3,255
Old Water Plant	19,400	\$3,137
Great Hill Tank	960	\$336
Total	270,836	\$48,698

A simple schematic of the water system with tank elevations is shown in Figure 3.1.

Figure 3.1: Newmarket Water System Schematic



3.2 Non-Revenue Water

Water loss control represents the efforts of water utilities to provide accountability in their operation by reliably auditing their water supplies and implementing controls to minimize system losses. Utilities incur real losses from pipeline leakage and apparent losses when customer water consumption is not properly measured or billed.

Losses in utilities include the physical escape of water from the pressurized piping system as leakage (real losses). Losses also occur due to inaccurate metering of customer consumption, theft of service, and the utility's own errant billing and accounting practices; all of which are collectively known as apparent losses. Non-revenue Water (NRW) includes the real plus apparent losses, along with unbilled authorized consumption, which represents water used in miscellaneous activities such as hydrant flushing.

The Town has made efforts in the past to identify and repair system leakage. The historical data provided by staff shows the energy and chemical savings after reducing their water loss from 29% to less than 5% in 2014. This low water loss has been typical for the last 5 years.

Table 3.2: Historical Water Production & Non Revenue Water

Month	Water Billed (MG)	Water Pumped (MG)	Water Loss %	Water Loss Operating Costs				Annual Cost Savings
				Electrical Energy	Caustic Chemical	Calcium Chlorite	Total	
2006	121.50	168.00	27.7%	\$5,208	\$3,499	\$401	\$9,108	--
2007	126.40	174.10	27.4%	\$5,339	\$3,588	\$411	\$9,338	--
2008	120.90	150.60	19.7%	\$3,329	\$2,237	\$256	\$5,822	--
2009	117.00	164.50	28.9%	\$5,315	\$3,572	\$409	\$9,296	--
2010	122.00	162.80	25.1%	\$4,579	\$3,077	\$353	\$8,009	--
2011	129.70	143.10	9.4%	\$1,498	\$1,006	\$115	\$2,619	\$6,628
2012	134.10	149.50	10.3%	\$1,723	\$1,158	\$133	\$3,014	\$6,234
2013	130.50	136.90	4.7%	\$707	\$475	\$54	\$1,236	\$8,011
2014	131.20	137.60	4.7%	\$719	\$483	\$55	\$1,257	\$7,990
							Total	\$28,862

The 2020 pumped water, compared to water delivered to the system, is shown in Table 3.3. This can be compared to the NHDES water conservation goal of 15% that many NH water systems are still working towards.

Table 3.3: 2020 Water Production & Non Revenue Water

2020	Water Pumped (Gallons)	Quarterly Water Pumped (Gallons)	Water Billed (100 CF)	Total Billed Gallons	Pumped Minus Billed Gal	Pumped Minus Billed (CF)
January	10,680,250		40,113			
February	9,718,871		0			
March	10,353,838	30,752,959	40,113	30,084,750	668,209	891
April	10,430,795		42,958			
May	12,735,834		4,469			
June	13,831,719	36,998,348	47,427	35,570,250	1,428,098	1,904
July	13,344,618		48,623			
August	13,292,356		0			
September	11,378,822	38,015,796	48,623	36,467,250	1,548,546	2,065
October	10,880,893		42,715			
November	10,624,624		0			
December	10,855,621	32,361,138	42,715	32,036,250	324,888	433
Totals	--	138,128,241	--	134,158,500	3,969,741	2.9%
Pump Station Energy Benchmark						1,961 kWh/MG
Annual Energy Cost of NRW (using \$0.15/kWh)						\$1,168

There are other economical and environmental benefits that come with the reduction of water loss that are not included in this report. More information on water loss audits can be found at the following site: <https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control>.

3.3 Sewall Well

The Sewall Well Pump Station is located on Wadleigh Falls Road and was constructed in 1986. The well is currently operated in parallel with the Bennett Well for 10 to 15 hours/day to supply the distribution system and maintain level in the Great Hill Tank. The wells are activated at a tank level of 52' and shut off at 56'. The well is 82 feet deep and was originally rated for 260 gallons per minute (gpm).



The site includes a building for the well head/motor, electrical controls and chemical systems. The building construction includes a concrete slab, block walls and wood framed roof with asphalt shingles. The amount of wall and ceiling insulation is unknown. The building structure is scheduled to be replaced during the next system upgrade.

An Olympian 65 kW emergency propane generator is mounted in a separate outdoor enclosure. A review of the 1500-watt block heater temperature indicated a temperature of 90 degrees, which is lower than a typical range of 100 to 120 degrees. The station includes chemical storage and pumps for corrosion control (25% caustic soda and blended phosphate), and a calcium hypochlorite tablet chlorinator for disinfection. The building is heated with a 10 kW electric space heater controlled with a wall thermostat that was observed to be set at 45 degrees.

Electric service for the station is provided on the Eversource "G" Rate Schedule. The 2020 station flow, well pump run time and electric billed energy use data is summarized below. Pump energy use was estimated using the well pump power draw measured during the site visit. The miscellaneous energy use is primarily for the electric unit space heater and generator block heater.

Table 3.4: Sewall Well 2020 Energy & Operating Data

2020 Month	Energy Use (kWh)	Actual Demand (kW)	Well Hours	Pump Energy Use (kWh)	Misc. Energy Use (kWh)	Total Flow (MG)	Average Flow (gpm)
Jan	6,062	21.6	277	3,872	2,190	3.47	209
Feb	6,620	20.8	256	3,583	3,037	3.22	210
Mar	5,183	23.4	277	3,875	1,308	3.46	208
Apr	5,370	19.3	270	3,781	1,589	3.40	210
May	5,829	21.2	329	4,611	1,218	4.15	210
Jun	5,979	18.0	367	5,144	835	4.82	218
Jul	10,692	22.4	495	9,354	1,338	7.87	265
Aug	10,485	25.9	493	9,312	1,173	7.84	265
Sep	9,864	29.3	424	8,004	1,860	6.69	263
Oct	9,352	28.3	403	7,617	1,735	6.41	265
Nov	9,163	29.5	389	7,360	1,803	6.18	264
Dec	11,579	28.4	403	7,611	3,968	6.40	265
Totals/Avg	96,178	288.1	4382	74,124	22,054	63.89	238

The consistent high miscellaneous energy use column typically indicates excessive block heater energy use. There was higher energy use in Dec/Jan and Feb indicating that the electric heat also contributed to

this energy use. Although the block heater site measurement in 2021 showed a reasonable 90 degrees, the heater thermostat setting may have been higher in 2020. The billed electric energy costs are shown below.

Table 3.5: Sewell Well 2020 Energy Costs

2020 Month	Billed Energy Use (kWh)	Demand (kW)	Demand Cost	KWh Cost	Monthly Fee	Supply Cost	Delivery Cost	Total Bill
Jan	6,062	21.6	\$254	\$364	\$32	\$518	\$650	\$1,168
Feb	6,620	20.8	\$242	\$397	\$32	\$566	\$671	\$1,237
Mar	5,183	23.4	\$282	\$311	\$32	\$443	\$625	\$1,068
Apr	5,370	19.3	\$219	\$322	\$32	\$459	\$573	\$1,033
May	5,829	21.2	\$248	\$350	\$32	\$498	\$630	\$1,128
Jun	5,979	18.0	\$199	\$359	\$32	\$511	\$590	\$1,101
Jul	10,692	22.4	\$285	\$642	\$32	\$914	\$958	\$1,873
Aug	10,485	25.9	\$342	\$629	\$32	\$897	\$1,003	\$1,900
Sep	9,864	29.3	\$398	\$592	\$32	\$844	\$1,022	\$1,865
Oct	9,352	28.3	\$381	\$561	\$32	\$800	\$975	\$1,774
Nov	9,163	29.5	\$401	\$550	\$32	\$784	\$983	\$1,766
Dec	11,579	28.4	\$383	\$695	\$32	\$990	\$1,110	\$2,100
Totals	96,178	288.1	\$3,635	\$5,771	\$384	\$8,225	\$9,790	\$18,015

Well Pump

The Sewell Well pump was installed in 1986. The pump is a Worthington Model 8M-28 12 stage vertical turbine pump originally rated for 275 gpm @ 370' TDH. The pump is equipped with a 40 hp U.S. premium efficiency motor with VFD.

During the site visit, staff operated the well pump while discharge pressure, flow and power draw were recorded. This data was used to calculate pump efficiency and determine the pump kWh/MG below for three VFD speeds.

Table 3.6: Well Pump Measurements & Efficiency Calculations

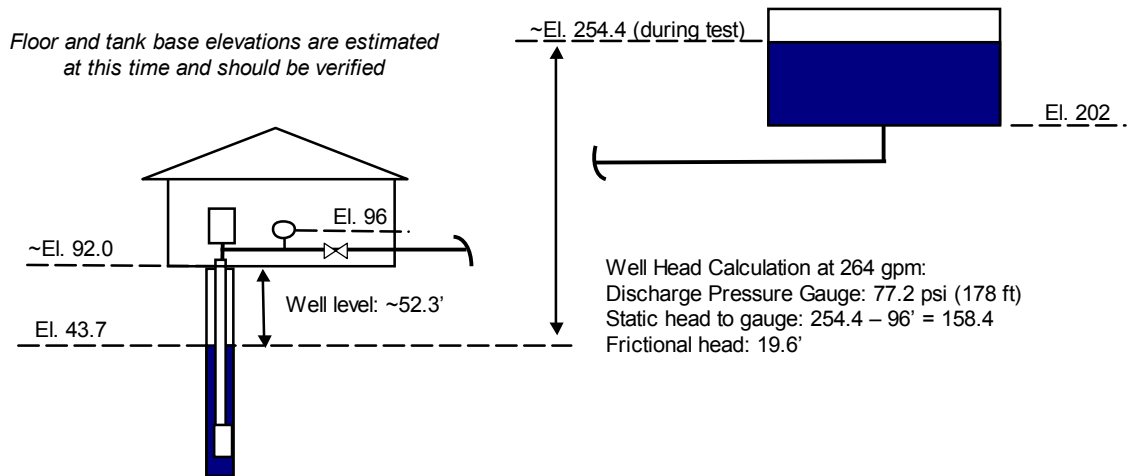
Pump	VFD Speed (Hz)	Flow (gpm)	Discharge Pressure (psi)	Distance to Well Water Level (ft)	TDH (ft)	Power (kW)	Calculated Pump Efficiency	Pump Curve Efficiency	KWh/MG
Sewell Well	46.0	198	75.2	53.6	229	13.6	69%	75%	1145
	49.3	264	77.2	52.3	233	18.9	67%	76%	1196
	55.0	354	81.2	58.9	248	28.2	64%	67%	1328

TDH = Discharge pressure * 2.31 + water level + 2' gauge height
 94.2% nameplate motor efficiency and 97% VFD efficiency

The typical well VFD speed of 49.3 Hz operates the pump efficiently with a benchmark value of 1,196 kWh/MG. The 46 Hz VFD speed has a slightly lower kWh/MG value, but not enough to justify reducing the well capacity.

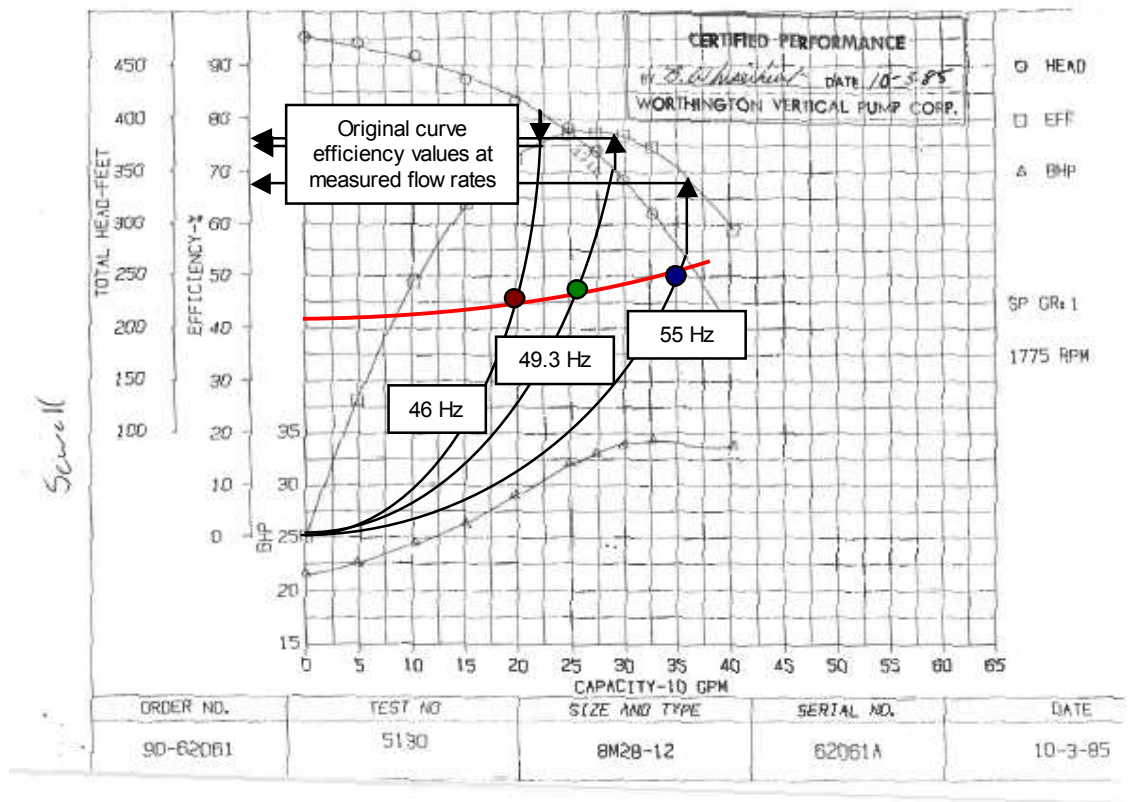
A simple representation of the well system elevations is shown in Figure 3.2.

Figure 3.2: Sewell Well Elevations and Sample Head Calculation



The operating point was plotted on the original pump curve in Figure 3.3. The system curve matched well with the operating points and the calculated static head based on the storage tank/well elevations.

Figure 3.3: Sewell Well Pump Curve



Potential Energy Saving Measures

The slightly lower pump efficiency calculated in Table 3.6 does not justify a pump rebuild or replacement based solely on energy savings. However, with a hollow shaft motor the opportunity exists to bring the pump impeller clearance closer to spec using the adjustment nut on top of the motor. OM #1 reviews the energy savings that could potentially be realized by making this adjustment.

The potential savings for installing a heat pump is reviewed in ECM #2. Although a propane unit heater could be installed as a cost effective upgrade to reduce electric heating costs, the heat pump will also provide dehumidification to reduce pipe condensation.

3.4 Bennett Well

The Bennett Well Pump Station is also located on Wadleigh Falls Road and was constructed in 1974. The well is operated in parallel with the Sewell Well for 10 to 15 hours/day. The pump is activated at a tank level of 52' and shut off at 56'. The well is 48 feet deep and was originally rated for 230 gallons per minute (gpm). The station includes chemical storage and pumps for corrosion control (25% caustic soda and blended phosphate), and calcium hypochlorite tablet chlorinator for disinfection.



The site building includes the original structure and entryway addition for the caustic chemical storage. The construction includes a concrete slab, block walls and wood framed roof with asphalt shingles. The amount of wall and ceiling insulation is unknown. Staff indicated that the block wall cavities are filled with stone. The building structure is scheduled to be replaced during the next system upgrade.

An Olympian 80 kW emergency propane generator is mounted in a separate outdoor enclosure. A review of the 1500-watt block heater temperature indicated a temperature of 115 degrees, which is within a typical range of 100 to 120 degrees. The building is heated with a 3 kW electric space heater that is controlled with a high/low knob.

Electric service for the station is provided on the Eversource "G" Rate Schedule. The 2020 station flow, well pump run time and electric billed energy use data is summarized below. Pump energy use was estimated using the well pump power draw measured during the site visit. The miscellaneous energy use is primarily for the electric unit space heater and generator block heater.

Table 3.7: Bennett Well 2020 Energy & Operating Data

2020 Month	Energy Use (kWh)	Actual Demand (kW)	Billed Demand (kW)	Well Hours	Pump Energy Use (kWh)	Misc. Energy Use (kWh)	Total Flow (MG)	Average Flow (gpm)
Jan	6,251	16.6	11.6	277	2,601	3,650	2.32	140
Feb	6,369	16.6	11.6	256	2,405	3,964	2.14	139
Mar	4,888	16.5	11.5	276	2,593	2,295	2.29	138
Apr	4,269	14.5	9.5	270	2,539	1,730	2.26	139
May	4,394	17.0	12.0	329	3,095	1,299	2.76	140
Jun	4,423	13.4	8.4	368	3,456	967	3.30	149
Jul	7,595	16.1	11.1	495	6,483	1,112	5.48	184
Aug	7,475	17.9	12.9	493	6,457	1,018	5.46	184
Sep	6,941	20.0	15.0	424	5,550	1,391	4.69	184
Oct	7,208	19.9	14.9	404	5,288	1,920	4.47	185
Nov	7,247	20.6	15.6	389	5,095	2,152	4.45	191
Dec	10,542	21.4	16.4	403	5,274	5,268	4.46	185
Totals/Avg	77,602	210.5	150.5	4382	50,837	26,765	44.06	163

The billed electric energy costs are shown below. The electric heaters contributed to higher kWh and demand cost in the winter months.

Table 3.8: Bennett Well 2020 Energy Costs

2020 Month	Billed Energy Use (kWh)	Billed Demand (kW)	Demand Cost	KWh Cost	Monthly Fee	Supply Cost	Delivery Cost	Total Bill
Jan	6,251	11.6	\$190	\$375	\$32	\$488	\$597	\$1,085
Feb	6,369	11.6	\$190	\$382	\$32	\$497	\$604	\$1,101
Mar	4,888	11.5	\$188	\$293	\$32	\$381	\$514	\$895
Apr	4,269	9.5	\$156	\$256	\$32	\$333	\$444	\$777
May	4,394	12.0	\$196	\$264	\$32	\$343	\$492	\$835
Jun	4,423	8.4	\$138	\$265	\$32	\$345	\$435	\$780
Jul	7,595	11.1	\$199	\$456	\$32	\$592	\$687	\$1,279
Aug	7,475	12.9	\$232	\$449	\$32	\$583	\$712	\$1,295
Sep	6,941	15.0	\$269	\$416	\$32	\$541	\$718	\$1,259
Oct	7,208	14.9	\$267	\$432	\$32	\$562	\$732	\$1,294
Nov	7,247	15.6	\$280	\$435	\$32	\$565	\$747	\$1,312
Dec	10,542	16.4	\$294	\$633	\$32	\$822	\$959	\$1,781
Totals	77,602	150.5	\$2,599	\$4,656	\$384	\$6,053	\$7,640	\$13,692

Well Pump

The Bennett Well pump was installed in 1997. The pump is a Goulds Model 9WAHC 7 stage vertical turbine pump originally rated for 250 gpm @ 264' TDH. The pump is equipped with a 25 hp U.S. premium efficiency motor with VFD.

During the site visit, staff operated the well pump while discharge pressure, flow and power draw were recorded. This data was used to calculate pump efficiency and determine the pump kWh/MG below for three VFD speeds.

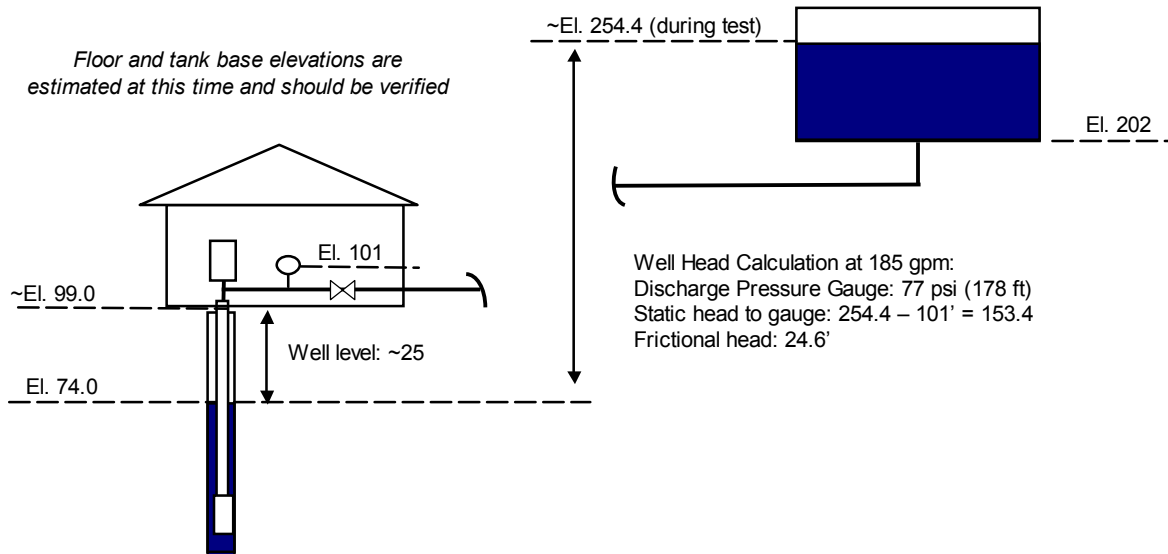
Table 3.9: Well Pump Measurements & Efficiency Calculations

Pump	VFD Speed (Hz)	Flow (gpm)	Discharge Pressure (psi)	Distance to Well Water Level (ft)	TDH (ft)	Power (kW)	Calculated Pump Efficiency	Pump Curve Efficiency	kWh/MG
Bennett Well	50.0	137	73	24	195	9.1	61%	80%	1,107
	54.5	185	76	25	203	13.1	59%	84%	1,180
	56.0	198	78	25	207	14.3	59%	84%	1,203

TDH = Discharge pressure * 2.31 + water level + 2' gauge height
93.6% nameplate motor efficiency and 97% VFD efficiency

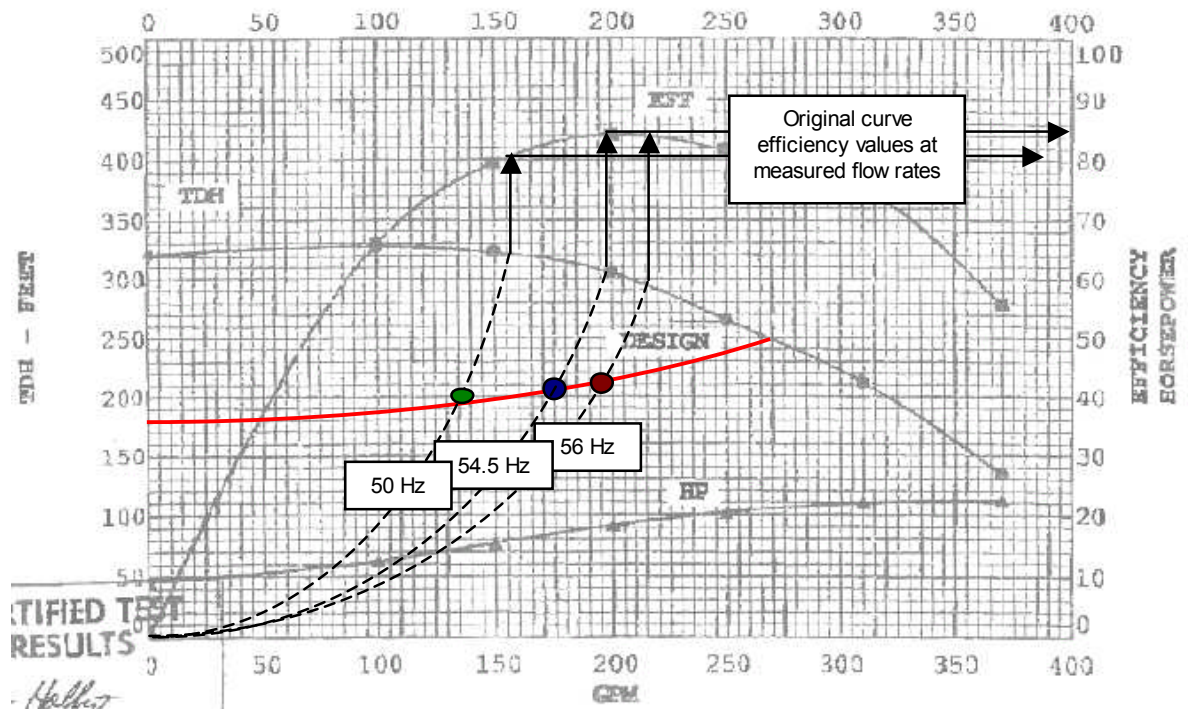
A simple representation of the well system elevations is shown in Figure 3.4 with a sample pump head calculation.

Figure 3.4: Bennett Well Elevations and Sample Head Calculation



The test data points are plotted on the original pump curve in Figure 3.5. The system curve matched well with the operating points and the static head based on the storage tank/well elevations.

Figure 3.5: Well Pump Curve



Potential Pump System Energy Savings Strategies

The pump efficiency has degraded to the point where a pump rebuild or replacement should be considered. Installing a new unit is reviewed in ECM #1.

The potential savings for installing a heat pump is reviewed in ECM #2. Although a propane unit heater could be installed as a cost effective upgrade to reduce electric heating costs, the heat pump will also provide dehumidification to reduce pipe condensation.

3.5 Macintosh Well

The Macintosh Well site is located within the Piscassic River watershed on the south side of the river. The 340' deep bedrock well was developed and put online in 2017 with a permitted yield of 300 gpm. The well water contains elevated levels of chloride, manganese and total dissolved solids (TDS) and was previously used with a blending facility that combined the flow with water from the Bennett and Sewall Wells before distribution.



In June 2020, the submersible well pump was taken off line when construction began on a new water treatment plant to replace the blending facility. The new plant will treat flow from the Macintosh Well and the new Tucker Well.

The Macintosh Well site includes a building for the well head/motor and electrical controls. The 60 kW emergency propane generator is mounted in a separate outdoor enclosure. The building construction includes a concrete slab and a prefabricated concrete building with membrane roof. The amount of wall and ceiling insulation is unknown. The building is heated with a 5 kW electric unit heater controlled with a high-low knob.

Electric service for the station is provided on the Eversource "G" Rate Schedule. The 2020 station flow and electric billed energy use data is summarized below. The well run time is based on Town data and the pump energy use was estimated based on a power draw of 23 kW pumping an average flow of 305 gpm.

Table 3.10: Macintosh Well 2020 Energy & Operating Data

2020 Month	Energy Use (kWh)	Actual Demand (kW)	Billed Demand (kW)	Well Hours	Pump Energy Use (kWh)	Misc. Energy Use (kWh)	Total Flow (MG)	Average Flow (gpm)
Jan	7,381	27.3	22.3	269	6,185	1,196	4.89	303
Feb	8,014	27.6	22.6	238	5,472	2,542	4.36	305
Mar	6,603	26.9	21.9	257	5,920	683	4.61	298
Apr	7,265	26.9	21.9	263	6,040	1,225	4.77	303
May	8,387	27.1	22.1	320	7,360	1,027	5.83	304
Jun	8,938	31.7	26.7	303	6,958	1,981	5.72	315
Jul	2,355	31.7	26.7	0	0	2,355	0.00	0
Aug	661	1.6	0.0	0	0	661	0.00	0
Sep	812	6.6	1.6	0	0	812	0.00	0
Oct	1,004	2.3	0.0	0	0	1,004	0.00	0
Nov	1,264	3.0	0.0	0	0	1,264	0.00	0
Dec	1,900	3.3	0.0	0	0	1,900	0.00	0
Totals/Avg	54,584	216.0	165.8	1649	37,934	16,650	30.18	305

The majority of the miscellaneous energy use is for the 5 kW electric unit heater, the generator block heater and a propane vaporizer.

The station propane tank system includes a Torrex electric vaporizer. Based on manufacturer's data the unit has a power draw of approximately 3 kW when activated. A vaporizer is typically used to increase propane vaporization from a liquid to a gas to fully utilize the tank capacity and provide full flow during low temperatures. In some cases, a larger propane tank will permit proper equipment operation without a vaporizer. Using a vaporizer is rarely required for a 60 kW generator (based on observations at other NH water/WW pump station) and should be reviewed in more detail with the propane supplier to determine if it is necessary. The potential savings for eliminating the vaporizer is reviewed in OM #2.

The pump station billed electric energy costs are shown below.

Table 3.11: Macintosh Well 2020 Energy Costs

2020 Month	Billed Energy Use (kWh)	Billed Demand (kW)	Demand Cost	KWh Cost	Monthly Fee	Supply Cost	Delivery Cost	Total Bill
Jan	7,381	22.3	\$365	\$443	\$32	\$576	\$840	\$1,416
Feb	8,014	22.6	\$370	\$481	\$32	\$625	\$883	\$1,508
Mar	6,603	21.9	\$359	\$396	\$32	\$515	\$787	\$1,302
Apr	7,265	21.9	\$359	\$436	\$32	\$567	\$826	\$1,393
May	8,387	22.1	\$362	\$503	\$32	\$654	\$897	\$1,551
Jun	8,938	26.7	\$437	\$536	\$32	\$697	\$1,005	\$1,703
Jul	2,355	26.7	\$479	\$141	\$32	\$184	\$653	\$836
Aug	661	0.0	\$0	\$40	\$32	\$52	\$72	\$123
Sep	812	1.6	\$29	\$49	\$32	\$63	\$109	\$173
Oct	1,004	0.0	\$0	\$60	\$32	\$78	\$92	\$171
Nov	1,264	0.0	\$0	\$76	\$32	\$99	\$108	\$206
Dec	1,900	0.0	\$0	\$114	\$32	\$148	\$146	\$294
Totals	54,584	165.8	\$2,759	\$3,275	\$384	\$4,258	\$6,418	\$10,675

Well Pump

The existing submersible well pump has been removed and staff indicated that a new well pump/motor will be installed by November 2021.

3.6 Folsom Drive Booster Pump Station

The Folsom Drive Pump Station was constructed in 1984 and includes two booster pumps to increase water pressure from the main distribution zone for 42 homes on Folsom Drive. The station consists of below grade concrete room with a wood frame/asphalt shingled roof. The concrete walls are covered with rigid insulation and cement board. The type and amount of ceiling insulation is unknown. The station is heated with a 5' electric (~ 3 kW) baseboard heater equipped with a high-low knob.



Emergency power is provided with a Kohler 30 kW propane generator equipped with a 1500-watt block heater. During the site visit, the block heater temperature was measured to be 136 degrees, which is higher than the 100 to 120 degrees recommended to minimize block heater energy use. OM #1 reviews the savings for reducing the thermostat setting.

The two Berkeley centrifugal pumps are equipped with 7.5 Baldor motors and VFDs. A 119-gallon hydro pneumatic tank maintains system pressure when the pumps are off. The pump control system is programmed to activate the lead pump at 75 psi and shut off the unit at 85 psi. The pumps are maintained at a set speed of 80% (47 Hz) when activated.

Electric service for the station is provided on the Eversource "G" Rate Schedule. The 2020 station electric billed energy use data is summarized below. The Town does not track pump run time and the station is not equipped with a flow meter. To estimate pump energy use, a sample power draw of 1.4 kW was measured during pump operation. The pump run time was estimated based on seasonal changes in energy use, which corresponds to electric heat, and higher generator block heater energy use. Based on this data, the pumps were estimated to operate approximately 300 hours/month.

Table 3.12: Folsom Drive Booster 2020 Energy and Operational Data

Month	Pump #1	Pump #2	Total Pump Hours	Pump Energy Use (kWh)	Estimated Energy Use (kWh) for Misc. Equipment	Station Billed Energy Use (kWh)
Jan	150	150	300	420	1,902	2,322
Feb	150	150	300	420	2,052	2,472
Mar	150	150	300	420	1,795	2,215
Apr	150	150	300	420	1,839	2,259
May	150	150	300	420	1,952	2,372
Jun	150	150	300	420	1,546	1,966
Jul	150	150	300	420	999	1,419
Aug	150	150	300	420	782	1,202
Sep	150	150	300	420	895	1,315
Oct	150	150	300	420	1,031	1,451
Nov	150	150	300	420	970	1,390
Dec	150	150	300	420	1,309	1,729
Total/Avg	1800	1800	3600	5,040	17,072	22,112

As shown in Table 3.12, the estimated energy use for the miscellaneous equipment is 77% of the station energy use. Based on this, the highest priority is to minimize the operation of the generator block heater

(discussed above) and the electric baseboard heater. OM #3 recommends installing a wall thermostat in place of the high/low knob with a setting of 45 degrees.

The 2020 electric energy cost billing data for the station is summarized below. With the station demand consistently below 5 kW, there were no demand charges in 2020.

Table 3.13: Folsom Drive Booster 2020 Electric Energy Use and Costs

Month	Energy Use (kWh)	Demand (kW)	Demand Cost	Delivery (kWh) Cost	Monthly Fee	Energy Supply Cost	Total Delivery Cost	Total Cost
Jan	2,322	4.1	\$0	\$139	\$17	\$181	\$156	\$337
Feb	2,472	4.0	\$0	\$148	\$17	\$193	\$165	\$358
Mar	2,215	3.9	\$0	\$133	\$17	\$173	\$150	\$323
Apr	2,259	3.5	\$0	\$136	\$17	\$176	\$153	\$329
May	2,372	3.5	\$0	\$142	\$17	\$185	\$159	\$344
Jun	1,966	3.4	\$0	\$118	\$17	\$153	\$135	\$288
Jul	1,419	3.1	\$0	\$85	\$17	\$111	\$102	\$213
Aug	1,202	2.1	\$0	\$72	\$17	\$94	\$89	\$183
Sep	1,315	2.3	\$0	\$79	\$17	\$103	\$96	\$198
Oct	1,451	2.3	\$0	\$87	\$17	\$113	\$104	\$217
Nov	1,390	2.4	\$0	\$83	\$17	\$108	\$100	\$209
Dec	1,729	2.9	\$0	\$104	\$17	\$135	\$121	\$256
Totals	22,112	37.5	\$0	\$1,327	\$204	\$1,725	\$1,531	\$3,255

In addition to electric energy, the facility uses propane for the emergency generator. Billing data was not available, but use and cost is assumed to be minimal.

Without a flow meter, pump efficiency could not be calculated. However, the estimated 5,040 kWh in pumping energy is less than \$650 in annual energy costs and makes pump efficiency a lower priority to reduce station energy costs.

3.7 Old Water Plant

The Town of Newmarket water system includes a surface water treatment facility that draws water from the Follett's Brook and the Piscassic River. The facility was operated until 1991 when the decision was made to shut down the plant due to source water and process limitations, which made the production of quality drinking water difficult and inconsistent. The 1.0 million gallons/day facility was used occasionally when needed between 1991 and 2005, but was permanently shut down in 2005.



The Town's master plan section on water resources has stated that, based on past evaluations, it is not economically feasible to upgrade the existing facility

Table 3.14: Old Water Plant 2020 Electric Energy Use and Costs

Month	Energy Use (kWh)	Demand (kW)	Demand Cost	Delivery (kWh) Cost	Monthly Fee	Energy Supply Cost	Total Delivery Cost	Total Cost
Jan	2,000	4.0	\$0	\$120	\$32	\$156	\$152	\$308
Feb	2,400	4.8	\$0	\$144	\$32	\$187	\$176	\$363
Mar	1,800	4.6	\$0	\$108	\$32	\$140	\$140	\$280
Apr	1,400	3.0	\$0	\$84	\$32	\$109	\$116	\$225
May	1,200	2.8	\$0	\$72	\$32	\$94	\$104	\$198
Jun	1,200	5.0	\$0	\$72	\$32	\$94	\$104	\$198
Jul	1,400	2.8	\$0	\$84	\$32	\$109	\$116	\$225
Aug	1,200	2.8	\$0	\$72	\$32	\$94	\$104	\$198
Sep	1,200	3.6	\$0	\$72	\$32	\$94	\$104	\$198
Oct	1,000	2.2	\$0	\$60	\$32	\$78	\$92	\$170
Nov	1,200	2.6	\$0	\$72	\$32	\$94	\$104	\$198
Dec	3,400	9.6	\$75	\$204	\$32	\$265	\$311	\$577
Totals	19,400	47.8	\$75	\$1,164	\$384	\$1,513	\$1,623	\$3,137

A walk through of the water plant revealed that the plant boiler, lighting and an electric water heater appeared to be the only equipment operating. As shown in Table 3.14, the plant still had a consistent power draw during the year, which most likely was for the water heater in the summer months and the boiler circulator pumps during the cold weather months.

During the site visit, water department staff shut off the breaker to the electric hot water tank, which is expected to save approximately 500 kWh/month. A more detailed review of the plant equipment should be done to determine if there are other miscellaneous loads that could be shut off at the breaker.

2020 annual propane use/cost was not available and was estimated to be approximately \$2,000 to maintain enough heat to protect the facility water piping from freezing.

3.8 Storage Tank

The Town of Newmarket operates and maintains a 750,000-gallon welded steel elevated water storage tank on Great Hill. The tank normalizes water demands in the distribution system and provides adequate fire flows. Previous engineering studies indicate the tank's usable storage to be 228,600 gallons when accounting for fire flow and providing adequate system pressure. The tank site includes an electrical panel for level controls equipped with a small 200-watt panel heater.



The tank site is shared with a cell phone company, which maintains a separate electric service and the Newmarket Police Department (NPD) radio equipment in a small building. The Water Department tank controls and NPD building is served with one electrical service. A small propane Kohler generator (no block heater) is also available for emergency power. Based on 2020/2021 energy use data shown below, it appears that energy use has increased significantly. We recommend reviewing the equipment in the NPD building to determine what has caused the higher energy use in 2021.

Table 3.15: Tank 2020 Energy & Cost Data

2020	Energy Use (kWh)	Total Cost
Jan	41	\$23
Feb	50	\$24
Mar	45	\$23
Apr	46	\$23
May	50	\$24
Jun	44	\$23
Jul	50	\$24
Aug	43	\$23
Sep	46	\$23
Oct	49	\$24
Nov	44	\$23
Dec	452	\$79
Totals	960	\$336
2021	Energy Use (kWh)	Total Cost
Jan	1035	\$160
Feb	1031	\$159
Mar	1,038	\$160
Apr	1,193	\$182
May	981	\$152
Jun	1,110	\$170
Jul	1,129	\$173
Aug	1,006	\$156
		\$1,968

SECTION 4. RECOMMENDED MEASURES

This section describes the proposed energy management practices (EMPs), operational measures (OMs), and energy conservation measures (ECMs) discussed in the report. The measures are interactive in the order they are listed. All project costs and savings figures are preliminary and should be verified before proceeding with each project.

4.1 Energy Management Practices

Energy management practices (EMPs) cannot be justified based on quantifiable energy savings, but are considered to be good energy efficient practices that will provide long-term benefits.

4.1.1 EMP #1 Benchmark Energy Use with Operational Data

Description

An effective energy management program provides a systematic approach to reducing facility energy use and costs. A successful program is structured to provide an on-going process that can be used to continually evaluate new projects, track savings and encourage efforts within the organization to improve efficiency.

For the Newmarket Well Pumps/Buildings, collecting the following data will help evaluate existing system efficiency and identify new energy savings opportunities.

- Track electric and propane use/costs monthly.
- Track booster pump hours.
- Benchmark monthly energy use with flows and thermostat settings.

Calculations

This measure is an important part of a successful efficiency program to ensure savings for the energy projects are realized.

Preliminary Cost Estimate

Cost is expected to be minimal for this measure.

4.2 Operational Measures

Operational measures (OMs) are low cost improvements that can be made without a substantial capital investment and typically pay for themselves in less than one year.

4.2.1 OM #1 Sewell Well Impeller Adjustment

Description

The Sewell Well pump is a Worthington Model 8M-28 12 stage vertical turbine pump originally rated for 275 gpm @ 370' TDH. The pump is equipped with a 40 hp U.S. premium efficient motor with VFD.

During the site visit, staff operated the well pump while discharge pressure, flow and power draw were recorded. This data was used to calculate pump efficiency and determine the pump kWh/MG below for three VFD speeds.

Table 4.1: Sewell Well Pump Measurements & Efficiency Calculations

Pump	VFD Speed (Hz)	Flow (gpm)	Discharge Pressure (psi)	Distance to Well Water Level (ft)	TDH (ft)	Power (kW)	Calculated Pump Efficiency	Pump Curve Efficiency	KWh/MG
Sewell Well	46.0	198	75.2	53.6	229	13.6	69%	75%	1145
	49.3	264	77.2	52.3	233	18.9	67%	76%	1196
	55.0	354	81.2	58.9	248	28.2	64%	67%	1328

TDH = Discharge pressure * 2.31 + water level + 2' gauge height
94.2% nameplate motor efficiency and 97% VFD efficiency

The slightly lower pump efficiency calculated in Table 4.1 does not justify a rebuild. However, with the pump equipped with a hollow shaft motor, the opportunity exists to bring the impeller clearance back to spec using the adjustment nut on top of the motor. This reviews the energy savings that could be potentially realized by making this adjustment and increasing the efficiency to an estimated 72% efficiency.

Savings Calculations

For the first 6 months, the well was operated at 46 Hz (based on the flow data) and was ramped up to 49.3 Hz for the last 6 months. Although the expectation is for the well to be operated at 49.3 Hz in 2022, the savings have been calculated based on the 2020 flow data.

Baseline Energy/Flow Data

2020 hours at 198 gpm: 1,776 hours
Power draw: 13.6 kW
Pump system energy use: 24,154 kWh

$$\text{Existing pump efficiency} = \frac{198 \text{ gpm} * 229' * .746}{3960 * 13.6 \text{ kW} * 94.2\% * 97\%} = 69\%$$

4. RECOMMENDED MEASURES

2020 hours at 264 gpm: 2,606 hours

Power draw: 18.9 kW

Pump system energy use: 49,253 kWh

$$\text{Existing pump efficiency} = \frac{264 \text{ gpm} * 233' * .746}{3960 * 18.9 \text{ kW} * 94.2\% * 97\%} = 67\%$$

Baseline pump energy use: 24,866 kWh + 49,257 kWh = 74,124 kWh

Improved System Energy Use

$$\text{New pump kW} = \frac{198 \text{ gpm} * 230' * .746}{3960 * 72\% * 94.2\%} = 12.6 \text{ kW}$$

$$\text{New pump kW} = \frac{264 \text{ gpm} * 233' * .746}{3960 * 72\% * 94.2\%} = 17.1 \text{ kW}$$

New pump energy use: (12.6 kW * 1,776 hours) + (17.1 kW * 2,606 hours) = 66,941 kWh

Annual energy savings: 74,124 kWh – 66,941 kWh = 7,183 kWh

Annual demand savings: (32.5 kW – 29.7 kW) = 2.8 kW * 12 months = 33.6 kW

Preliminary Cost Estimate

The technique for adjusting impeller clearance can be done in-house with guidance from the manufacturer. However, if staff would prefer using a well installer, the cost is expected to be less than \$1,000.

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Energy Savings	7,183 kWh	\$0.149/kWh	\$ 1070
Annual Demand Savings	33.6 kW	\$20.40/kW	\$ 685
Total Energy Cost Savings			\$ 1,755
Project Cost			\$ 1,000
Simple Payback			<1 year

4.2.2 OM #2 Investigate Macintosh Propane Vaporizer

Description

The Macintosh Well Pump Station propane tank system includes a Torrex electric vaporizer. Based on manufacturer's data, the electric unit has a power draw of approximately 3 kW when activated.

A vaporizer is typically used to increase propane vaporization from a liquid to a gas to fully utilize the tank capacity and provide full flow during low temperatures. In some cases, a larger propane tank will permit proper equipment operation without a vaporizer. Using a vaporizer is rarely required for a 60 kW generator (based on observations at other NH water/WW pump station) and should be reviewed in more detail with the propane supplier to determine if it is necessary.

Savings Calculations

Based on 2020 energy use, the vaporizer appears to use approximately 800 kWh monthly. If the unit can be eliminated, 9,600 kWh annually could potentially be saved.

Preliminary Cost Estimate

The cost for removing the vaporizer is expected to be less than \$500.

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Energy (kWh) Savings	9,600 kWh	\$0.149/kWh	\$ 1,430
Annual Demand (kW) Savings	0 kW	\$20.40/kW	\$ 0
Total Energy Cost Savings			\$ 1,430
Project Cost			\$ 500
Simple Payback			< 1 year

4.2.3 OM #3 Install Folsom Booster Wall Thermostat for Electric Heater**Description**

The Folsom Drive Booster Pump Station is heated with a 3.5 kW electric strip heater. The heater thermostat setting is controlled with a high/low knob (60 degree average setting estimated).

This measure reviews the savings for installing a wall thermostat to maintain the electric heater thermostat between 45 and 50 degrees.

Savings

A 2% heating cost savings for every one-degree temperature reduction was used to calculate the savings below.

Annual heater energy use: 7,000 kWh

Savings: 7,000 kWh * (60 degrees – 45 degrees) * 2% = 2,100 kWh

Preliminary Cost Estimate

The cost for installing a wall thermostat is estimated to be \$300.

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Energy (kWh) Savings	2,100 kWh	\$0.149/kWh	\$ 313
Annual Demand (kW) Savings	0 kW	\$20.40/kW	\$ 0
Total Energy Cost Savings			\$ 313
Project Cost			\$ 300
Simple Payback			< 1 year

4.3 Energy Conservation Measures

The recommendations discussed in this section are categorized as energy conservation measures or “ECMs” for projects that require a larger capital investment with simple paybacks exceeding one year.

4.3.1 ECM #1 Bennett Well Pump Replacement

Description

The Bennett Well pump was installed in 1997. The pump is a Goulds Model 9WAHC 7 stage vertical turbine pump originally rated for 250 gpm @ 264’ TDH. The pump is equipped with a 25 hp U.S. premium efficiency motor with VFD.

During the site visit, staff operated the well pump while discharge pressure, flow and power draw were recorded. This data was used to calculate pump efficiency and determine the pump kWh/MG below for three VFD speeds.

Table 4.2: Bennett Well Pump Measurements & Efficiency Calculations

Pump	VFD Speed (Hz)	Flow (gpm)	Discharge Pressure (psi)	Distance to Well Water Level (ft)	TDH (ft)	Power (kW)	Calculated Pump Efficiency	Pump Curve Efficiency	KWh/MG
Bennett Well	50.0	137	73	24	195	9.1	61%	80%	1,107
	54.5	185	76	25	203	13.1	59%	84%	1,180
	56.0	198	78	25	207	14.3	59%	84%	1,203

TDH = Discharge pressure * 2.31 + water level +2’ gauge height
93.6% nameplate motor efficiency and 97% VFD efficiency

The low efficiency and age of the pump justifies replacing the pump with a new unit. This measure reviews the energy savings that could be realized with a new pump using the existing motor and VFD. The savings have been calculated based on a 75% efficiency value.

Savings Calculations

For the first 6 months, the well was operated close to 50 Hz (based on the flow data) and was ramped up to 54.5 Hz for the last 6 months. Although the expectation is for the well to be operated at 54.5 Hz in 2022, the savings have been calculated based on the 2020 flow data.

Baseline Energy/Flow Data

2020 hours at 137 gpm: 1,775 hours
Power draw: 9.1 kW
Pump system energy use: 16,153 kWh

2020 hours at 185 gpm: 2,607 hours
Power draw: 13.1 kW

4. RECOMMENDED MEASURES

Pump system energy use: 34,152 kWh

Baseline pump energy use: 16,153 kWh + 34,152 kWh = 50,305 kWh

Improved System Energy Use

$$\text{New pump kW} = \frac{137 \text{ gpm} * 195' * .746}{3960 * 75\% * 93.6\% * 97\%} = 7.4 \text{ kW}$$

$$\text{New pump kW} = \frac{185 \text{ gpm} * 203' * .746}{3960 * 75\% * 93.6\% * 97\%} = 10.4 \text{ kW}$$

New pump energy use: (7.4 kW * 1,775 hours) + (10.4 kW * 2,607 hours) = 40,248 kWh

Annual energy savings: 50,305 kWh – 40,248 kWh = 10,057 kWh

Annual demand savings: (22.2 kW – 17.8 kW) = 4.4 kW * 12 months = 52.8 kW

Preliminary Cost Estimate

The cost for this project is estimated below.

Item N°	Description	Qty	Unit	Equipment Cost	Labor Cost	Total
1	Well Pump (using existing motor)	1	EA	\$18,000	\$10,000	\$28,000
			Total			\$28,000

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Energy Savings	10,057 kWh	\$0.149/kWh	\$ 1,498
Annual Demand Savings	52.8 kW	\$20.40/kW	\$ 1,077
Total Energy Cost Savings			\$ 2,575
Project Cost			\$ 28,000
Simple Payback			10.9 years

4.3.2 ECM #2 Replace Electric Heaters with Heat Pumps

Description

Electric unit heaters are used for space heating in the well buildings. The estimated existing unit heater energy use at the Sewell and Bennett Pump Station is shown in Table 4.3 based on the miscellaneous energy use calculated at each station.

Table 4.3: Pump Station Baseline Electric Heat Energy Use Estimate

2020 Month	Sewell PS			Bennett PS		
	Total Energy Use (kWh)	Misc. Energy Use (kWh)	Estimated Heat Energy Use (kWh)	Total Energy Use (kWh)	Misc. Energy Use (kWh)	Estimated Heat Energy Use (kWh)
Jan	6,062	2,190	1,000	6,251	3,650	2,500
Feb	6,620	3,037	2,000	6,369	3,964	3,000
Mar	5,183	1,308	500	4,888	2,295	1,500
Apr	5,370	1,589	600	4,269	1,730	1,000
May	5,829	1,218	500	4,394	1,299	500
Jun	5,979	835	--	4,423	967	--
Jul	10,692	1,338	--	7,595	1,112	--
Aug	10,485	1,173	500	7,475	1,018	--
Sep	9,864	1,860	700	6,941	1,391	500
Oct	9,352	1,735	700	7,208	1,920	800
Nov	9,163	1,803	700	7,247	2,152	1,100
Dec	11,579	3,968	2,000	10,542	5,268	4,000
Totals	96,178	22,054	9,200	77,602	26,765	14,900

This measure recommends replacing the electric unit heaters with single zone heat pump systems. The existing heaters include a 10 kW unit at the Sewell Well Station and a 3 kW unit at the Bennett Well Pump Station.

Savings

For the proposed air source heat pumps, a 50% heating system energy reduction was estimated based on U.S. DOE Guideline.

Annual Energy Savings: $(9,200 \text{ kWh} + 14,900 \text{ kWh}) * 50\% = 12,050 \text{ kWh}$

Annual Demand Savings: $\text{Total } 13 \text{ kW} * 30\% \text{ Coincident kW} = 3.9 \text{ kW} * 6 \text{ months} = 23.4 \text{ kW}$

4. RECOMMENDED MEASURES

Preliminary Cost Estimate

The cost for this project is estimated below. A sample product data sheet is included in Appendix B.

Item N°	Description	Qty	Unit	Equipment Cost	Labor Cost	Total
1	1.5 Ton Heat Pump	2	EA	\$3,500	\$4,000	\$15,000
2	New Thermostat Controls	2	EA	\$500	\$500	\$2,000
3	Electrical	2	EA	\$500	\$500	\$2,000
			Total			\$19,000

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below.

Annual Energy (kWh) Savings	12,050 kWh	\$0.149/kWh	\$ 1,795
Annual Demand (kW) Savings (6 months)	23.4 kW	\$20.40/kW	\$ 477
Total Energy Cost Savings			\$ 2,272
Project Cost			\$ 19,000
Simple Payback			8.4 years

APPENDIX A: ELECTRIC RATE SCHEDULE

GENERAL DELIVERY SERVICE RATE G

AVAILABILITY

Subject to the Terms and Conditions of the Tariff of which it is a part, this rate is for Delivery Service for any use. It is available to (1) those Customers at existing delivery points who were receiving service hereunder on General Service Rate G on January 1, 1983, and who have continuously received service under that rate and this successor since that date, and (2) all other Customers whose loads as defined for billing purposes do not exceed 100 kilowatts. Service rendered hereunder shall exclude all backup and standby service provided under Backup Delivery Service Rate B.

Customers taking service under this rate shall provide any necessary transforming and regulating devices on the Customer's side of the meter. Controlled electric service for thermal storage devices is available under Load Controlled Service Rate LCS and outdoor area lighting is available under Outdoor Lighting Delivery Service Rate OL.

CHARACTER OF SERVICE

Delivery Service supplied under this rate will be 60 hertz, alternating current, either (a) single-phase, normally three-wire at a nominal voltage of 120/240 volts, or (b) three-phase, normally at a nominal voltage of 120/208 or 277/480 volts. Three-phase, three-wire service at a nominal voltage of 240, 480 or 600 volts is available only to those Customers at existing locations who were receiving such service on February 1, 1986, and who have continuously received such service since that date. In underground secondary network areas, Delivery Service will be supplied only at a nominal voltage of 120/208 volts.

RATE PER MONTH

	<u>Single-Phase Service</u>	<u>Three-Phase Service</u>
Customer Charge	\$14.89 per month	\$29.76 per month
Customer's Load Charges:	<u>Per Kilowatt of Customer Load in Excess of 5.0 Kilowatts</u>	
Distribution Charge	\$8.72	
Transmission Charge	\$5.26	
Stranded Cost Recovery	\$0.96	

Issued: February 1, 2019

Issued by: /s/ William J. Quinlan
William J. Quinlan

Effective: February 1, 2019

Title: President and Chief Operating Officer

Energy Charges:

Per Kilowatt-Hour

Distribution Charges:

First 500 kilowatt-hours	6.986¢
Next 1,000 kilowatt-hours	1.731¢
All additional kilowatt-hours	0.612¢

Transmission Charge

First 500 kilowatt-hours	1.900¢
Next 1,000 kilowatt-hours	0.715¢
All additional kilowatt-hours	0.383¢

Stranded Cost Recovery	1.069¢
------------------------------	--------

WATER HEATING - UNCONTROLLED

Uncontrolled water heating service is available under this rate when such service is supplied to approved water heaters equipped with either (a) two thermostatically-operated heating elements, each with a rating of no more than 5,500 watts, so connected or interlocked that they cannot operate simultaneously, or (b) a single thermostatically-operated heating element with a rating of no more than 5,500 watts. The heating elements or element shall be connected by means of an approved circuit to a separate water heating meter. Service measured by this meter will be billed monthly as follows:

Meter Charge \$4.47 per month

Energy Charges:

Distribution Charge	2.030¢ per kilowatt-hour
Transmission Charge	1.578¢ per kilowatt-hour
Stranded Cost Recovery	1.338¢ per kilowatt-hour

WATER HEATING - CONTROLLED

Controlled off-peak water heating is available under this rate for a limited period of time at those locations which were receiving controlled off-peak water heating service hereunder on Customer Choice Date and which have continuously received such service hereunder since that

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Title: President and Chief Operating Officer

date. Service under this rate at such locations shall continue to be available only for the remaining life of the presently-installed water heating equipment. No replacement water heaters shall be permitted to be installed for service under this rate at locations which otherwise would qualify for this service.

For those locations which qualify under the preceding paragraph, controlled off-peak water heating service is available under this rate when such service is supplied to approved storage type electric water heaters having an off-peak heating element with a rating of no more than 1,000 watts, or 20 watts per gallon of tank capacity, whichever is greater. The off-peak element shall be connected by means of an approved circuit to a separate water heating meter. Electricity used will be billed monthly as follows:

Meter Charge.....\$7.88 per month

Energy Charges:

Distribution Charge..... 0.120¢ per kilowatt-hour

Transmission Charge 1.578¢ per kilowatt-hour

Stranded Cost Recovery 0.790¢ per kilowatt-hour

SPACE HEATING SERVICE

Space heating service is available under this rate at those locations which were receiving space heating service under the Transitional Space Heating Service Rate TSH prior to Customer Choice Date and which have continuously received such service since that date. Customers at such locations who have elected this rate shall have the electricity for such service billed separately on a monthly basis as follows:

Meter Charge.....\$2.98 per month

Energy Charges:

Distribution Charge..... 3.426¢ per kilowatt-hour

Transmission Charge 1.900¢ per kilowatt-hour

Stranded Cost Recovery 1.666¢ per kilowatt-hour

Space heating equipment served under this rate, including heat pumps and associated air circulating equipment, shall be wired by means of approved circuits to permit measurement of such equipment's additional demand and energy use.

Issued: February 1, 2019

Issued by: /s/ William J. Quinlan
William J. Quinlan

Effective: February 1, 2019

Title: President and Chief Operating Officer

Customers taking space heating service under this rate at locations where the regular power and lighting service is delivered at primary voltage level or above shall be required to provide at the Customers' expense suitable transforming, controlling and regulating apparatus, acceptable to and approved by the Company, for the space heating service in the same manner as for the power and lighting service, so that deliveries of all electric service may be made by the Company at the same voltage level.

CUSTOMER'S LOAD

Customer's load is defined as the greatest rate of taking Delivery Service in kilowatts for any thirty (30) minute interval during the current monthly billing period.

Customer's load shall be measured whenever (a) such load is known or estimated to be 5.0 kilowatts or more, or (b) the Customer's use of service is 750 kilowatt-hours or more per month for three (3) consecutive months. However, any Customer's load may be measured at the Company's option. When measured, Customer's load shall be determined to the nearest one-tenth (0.1) kilowatt for billing purposes.

SERVICE CHARGE

When the Company establishes or re-establishes a Delivery Service account for a Customer at a meter location, the Company will be entitled to assess a service charge in addition to all other charges under this rate. The service charge will be \$14.00 if the Company does not have to send an employee to the meter location to establish or re-establish Delivery Service. When it is necessary for the Company to send an employee to the meter location to establish or re-establish Delivery Service, the service charge will be \$35.00. When it is necessary for the Company to send an employee to the meter location outside of normal working hours to establish or re-establish Delivery Service, the service charge will be \$70.00. The Company will be entitled to assess an \$18.00 service charge when it is necessary to send an employee to the Customer location to collect a delinquent bill. This charge shall apply regardless of any action taken by the Company including accepting a payment, making a deferred payment arrangement or leaving a collection notice at the Customer's premises.

Short-term, seasonal or transient Customers who take service at temporary locations shall pay for the cost of installing and removing the necessary poles, wires, transformers, cable and other equipment in addition to the foregoing service charge.

Issued: March 24, 2016

Issued by: William J. Quinlan

Effective: May 1, 2016

Title: President and Chief Operating Officer

APPENDIX B: PRODUCT DATA SHEETS



1.5 Ton 15 SEER AirQuest Heat Pump System

By: AirQuest Model: NXH618GKA / FEM4X1800BL ID: 29064

BE THE FIRST TO REVIEW THIS PRODUCT Availability: Ships in 2-4 Business Days

AIRQUEST
Manufactured by Carrier

AIRQUEST CERTIFIED

10483623

Suggested Retail **\$3,120.00**

As Low As **\$2,573.00**

As low as
\$118.72 / MONTH

FREE SHIPPING

Configuration: Dedicated Upflow, Dedicated Horizontal, Dedicated Downflow [What's this?](#)

Required Fields *		
	Heat Pump * 1x 1.5 Ton 16 SEER AirQuest Heat Pump Condenser VIEW ITEM	+ \$1,901.00
	Air Handler * 1x 1.5 Ton Multi-Positional AirQuest Air Handler VIEW ITEM	+ \$672.00



PROCESS ENERGY SERVICES, LLC

WATER ♦ WASTEWATER ♦ INDUSTRIAL

Newmarket Energy Audits Water & Wastewater Systems

Steve Bolles
Process Energy Services, LLC
603-537-1286
sabolles@processenergy.com

Energy Audits for Newmarket Water/WW Systems

Overview of Process Energy Audit Sections

Both reports include the following sections:

- 1.0 Executive Summary
- 2.0 Energy Management (benchmarking Newmarket Water & WW Systems with other NH facilities)
- 3.0 Review of system pump stations

Water System Report:

- 4.0 Summary of recommended energy saving measures

Wastewater Report:

- 4.0 Review of wastewater plant systems
 - 5.0 Summary of recommended energy saving measures
-

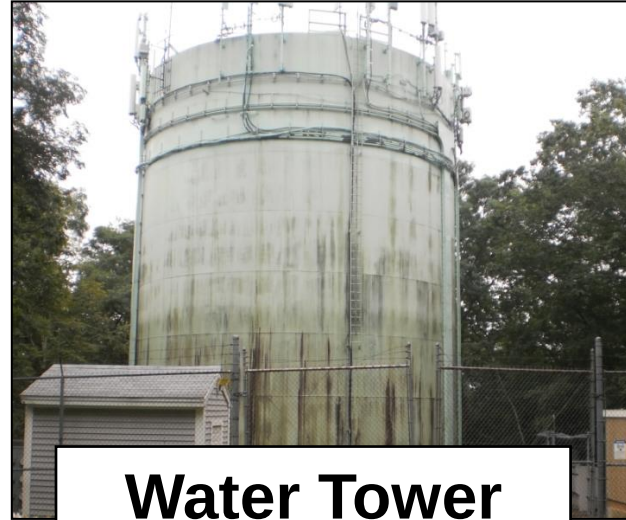
Types of Energy Measures Identified

- **Energy Management Measures (EMPs):** for tracking energy use and benchmarking
- **Operational Measures (OMs):** fast payback measures that typically pay for themselves in less than 1 year.
- **Energy Conservation Measures (ECMs):** energy saving measures with a simple payback longer than 1 year.

Newmarket Water System



Folsom Booster



Water Tower



Bennett Well



Sewell Well



Macintosh Well

Existing Staff Energy Saving Initiatives

- Significant progress reducing system water loss since 2006 (now less than 5%). The energy and chemical savings tracked over a four year period was over \$28,000
- In 2021, the town replaced 3,300 feet of 6" pipe that was creating a system flow "bottleneck". The lower pressure is expected to reduce pump energy costs by \$3,000 annually.
- Staff currently operates wells efficiently with VFD settings that optimize pump efficiency.



Starting Point: Existing baseline energy use/costs

Table 3.1: 2020 Newmarket Water System Energy Use and Costs

Facility	Annual Electric Energy Use (kWh)	Annual Electric Cost
Sewell Well	96,178	\$17,602
Bennett Well	77,602	\$13,692
Macintosh Well	54,584	\$10,675
Treatment Building (Blending Facility)	--	--
Folsom Booster Station	22,112	\$3,255
Old Water Plant (Packers Falls Rd)	19,400	\$3,137
Great Hill Tank	960	\$336
Total	270,836	\$48,698

Water System Benchmarking

Table 2.1: NH Water System Benchmarking Data

Water System	Total Annual System Energy Usage (kWh)	Annual System Flow (MG)	Annual kWh/MG	Type
Georges Mills System (2020)	56,766	11.7	4,852	W
Town of Enfield	86,757	25.4	3,416	W
Town of Lincoln	757,615	200.8	3,773	Surface Water Treatment / Well/ 3 Zones
Town of Whitefield	230,944	74.8	3,087	Wells / 3 Zones
Warner Village Water District	48,342	18.9	2,557	Wells / 1 Zone
Town of Peterborough	544,915	214.4	2,541	Wells / 2 Zones
Town of Woodstock	323,161	133.6	2,419	Wells/1 Zone
Hooksett Village	263,431	121.8	2,163	Wells/2 Zones
Milford	557,280	261	2,137	Wells/2 Zones
North Conway (NCWP)	604,468	283.5	2,132	Wells / 3 Zones
Conway Village (CVFD)	180,023	90.3	1,994	Wells/1 Zone
Newmarket	270,836	138.0	1,961	Wells / 2 Zones
Town of Jaffrey	295,117	151.8	1,944	Wells / 2 Zones
City of Lebanon	1,048,409	544.1	1,927	Surface W
Town of Colebrook	229,741	122.0	1,883	W
Plymouth (PW&SD)	259,090	139.9	1,852	W
Salem Water	1,438,353	779	1,846	Surface W
Andrim/Bennington System	87,792	50.8	1,728	Wells / 2 Zones
Town of Bristol	146,271	95.3	1,535	Wells/2 Zones
City of Rochester	1,058,854	745.4	1,432	Surface Water / Well/ 4 Zones
Town of Hanover	475,888	330.8	1,437	Surface Water / Well/ 4 Zones
Winchester Water Department	15,000	10.0	1,500	W
City of Concord	1,500,000	1,000.0	1,500	W
Sunapee Water System (2020)	4,000,000	2,666.7	1,500	W
*City of Keene	60,000	40.0	1,500	W
*City of Claremont	20,000	13.3	1,500	W
*Town of Gorham	20,000	13.3	1,500	W
*Town Of Wolfeboro	30,000	20.0	1,500	W

Newmarket water system benchmark value compared to other NH Water Systems

New benchmark value after completing the measures

Table 2.2: New Potential Benchmark Value after Energy Project Implementation

System	Total Annual Energy Usage (kWh)	Total Annual Flow Pumped (MG)	Annual kWh/MG	Total New Energy Cost	Annual Energy Cost/MG
Newmarket	229,846	138	1,666	\$40,353	\$292

The projected 15% energy kWh savings will continue progress towards improving water system efficiency and reduce the system benchmark value.

*These water systems benefit from no raw

Summary of Water System Measures

No	Cost Saving Measures	Annual Energy Savings (kWh)	First Year Annual Savings (\$)	Initial Cost (\$)	Simple Payback (yrs)
	ENERGY MANAGEMENT PRACTICES				
EMP 1	Benchmark Energy Use with Operational Data	--	--	--	--
	Total for EMPs	--	--	--	--
	OPERATIONAL MEASURES				
OM 1	Sewell Well Impeller Clearance Adjustment	7,183	\$1,755	\$1,000	<1
OM 2	Investigate Macintosh Well Propane Vaporizer	9,600	\$1,430	\$500	<1
OM 3	Install Wall Thermostat for Folsom Booster Electric Heater	2,100	\$313	\$300	<1
	Total for OMs	18,883	\$3,498	\$1,800	<1
	ENERGY CONSERVATION MEASURES				
ECM 1	Bennett Well Pump Replacement	10,057	\$2,575	\$28,000	10.9
ECM 2	Replace Electric Heaters with Heat Pumps	12,050	\$2,272	\$19,000	8.4
	Total for ECMs	22,107	\$4,847	\$47,000	9.7
	Electric Energy Cost Savings	40,990	\$8,345	\$48,800	5.8
	Total	40,990	\$8,345	\$48,800	5.8

The proposed measures are expected to reduce system energy costs by \$8,345 annually which is 16% of the 2020 electric energy costs

Water System Energy Measures Identified

OM #1: Adjust Sewell Well Impeller

(Adjusting motor top nut to decrease impeller clearance)

Annual energy savings:	7,183 kWh
Cost Savings:	\$1,755
Cost:	\$1,000
Simple Payback:	< 1 year

OM #2: Investigate Macintosh Propane Vaporizer

(vaporizer may not be needed for generator size)

Annual energy savings:	9,600 kWh
Cost Savings:	\$1,430
Cost:	\$500
Simple Payback:	< 1 year

Water System Energy Measures Identified

OM #3: Folsom Booster Wall Thermostat

(install wall thermostat maintained at 45 degrees)

Annual energy savings: 2,100 kWh

Cost Savings: \$ 313

Cost: \$ 300

Simple Payback: < 1 year

ECM #1: Bennett Well Pump Replacement

(replace well pump)

Annual energy savings: 10,057 kWh

Cost Savings: \$2,575

Cost: \$28,000

Simple Payback: 10.9 years

Water System Energy Measures Identified

ECM #2: Install Heat Pumps

(replace existing electric heaters at stations)

Annual energy savings: 12,050 kWh

Cost Savings: \$ 2,272

Cost: \$ 19,000

Simple Payback: 8.4 years

Wastewater Collection System Pump Stations and Treatment Plant

Wastewater Plant & Pump Station Baseline Costs

The collection system includes five small pump stations and the large Creighton Pump Station that pumps all the wastewater flow to the plant.

2020 Baseline Electric Energy Costs

Wastewater Plant	\$ 94,132
Creighton Street Station	\$ 30,945
Cedar Street Station	\$ 3,685
Packers Falls Station	\$ 1,512
Salmon Street Station	\$ 3,986
Wadleigh Falls Station	\$ 2,330
Bay Road Station	\$ 3,582
Total for WWTF & Pump Stations	\$ 140,172

Small stations
had minimal
energy use/cost

Creighton Pump Station

Month	Total Pump Hours	Estimated Pump Energy Use (kWh)	Estimated Energy Use (kWh) for Misc. Equipment	Total Energy Use (kWh)
Jan	235	10,335	10,103	20,438
Feb	190	8,351	12,463	20,814
Mar	208	9,136	7,577	16,713
Apr	252	11,089	12,625	23,714
May	187	8,243	13,276	21,519
Jun	142	6,258	154	6,412
Jul	144	6,325	543	6,868
Aug	148	6,507	-626	5,881
Sep	142	6,226	206	6,432
Oct	154	6,768	280	7,048
Nov	163	7,176	7,740	14,916
Dec	224	9,847	13,098	22,945
Total	1485	96,261	77,439	173,700



2020 annual energy use for the pump system was 96,261 kWh and HVAC/Miscellaneous Equipment was 77,439 kWh.

Creighton Street HVAC Systems provided the best opportunity to reduce station energy costs

OM #1: Creighton Street Electric Heat Adjustments

(install wall thermostats maintained at 45 degrees)

Annual energy savings: 8,300 kWh

Cost Savings: \$1,145

Cost: \$1,000

Simple Payback: < 1 year

OM #2: Creighton Street Ventilation Adjustments

(cycle continuous ventilation with on/off timer)

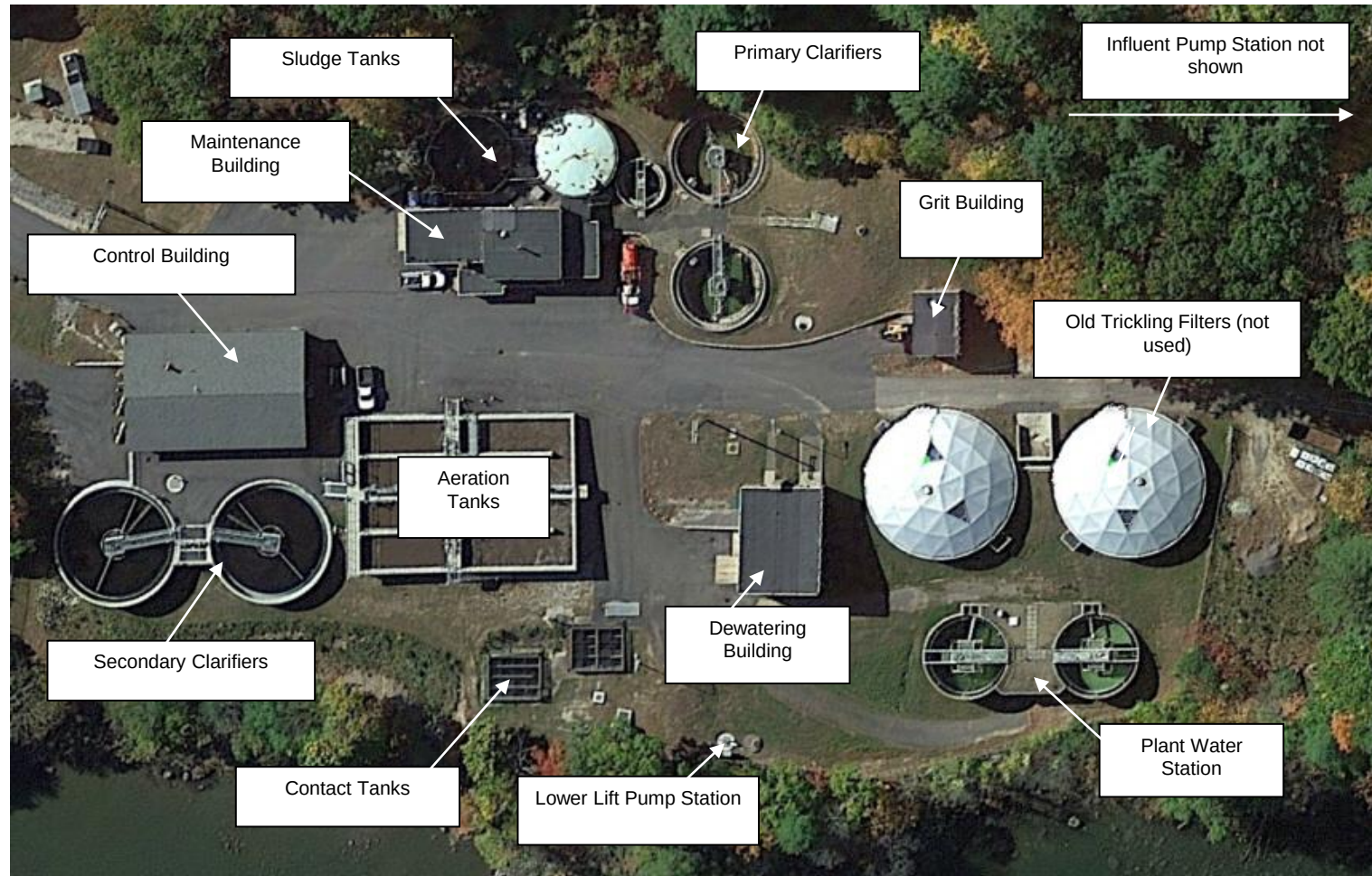
Annual energy savings: 21,836 kWh

Cost Savings: \$3,750

Cost: \$3,000

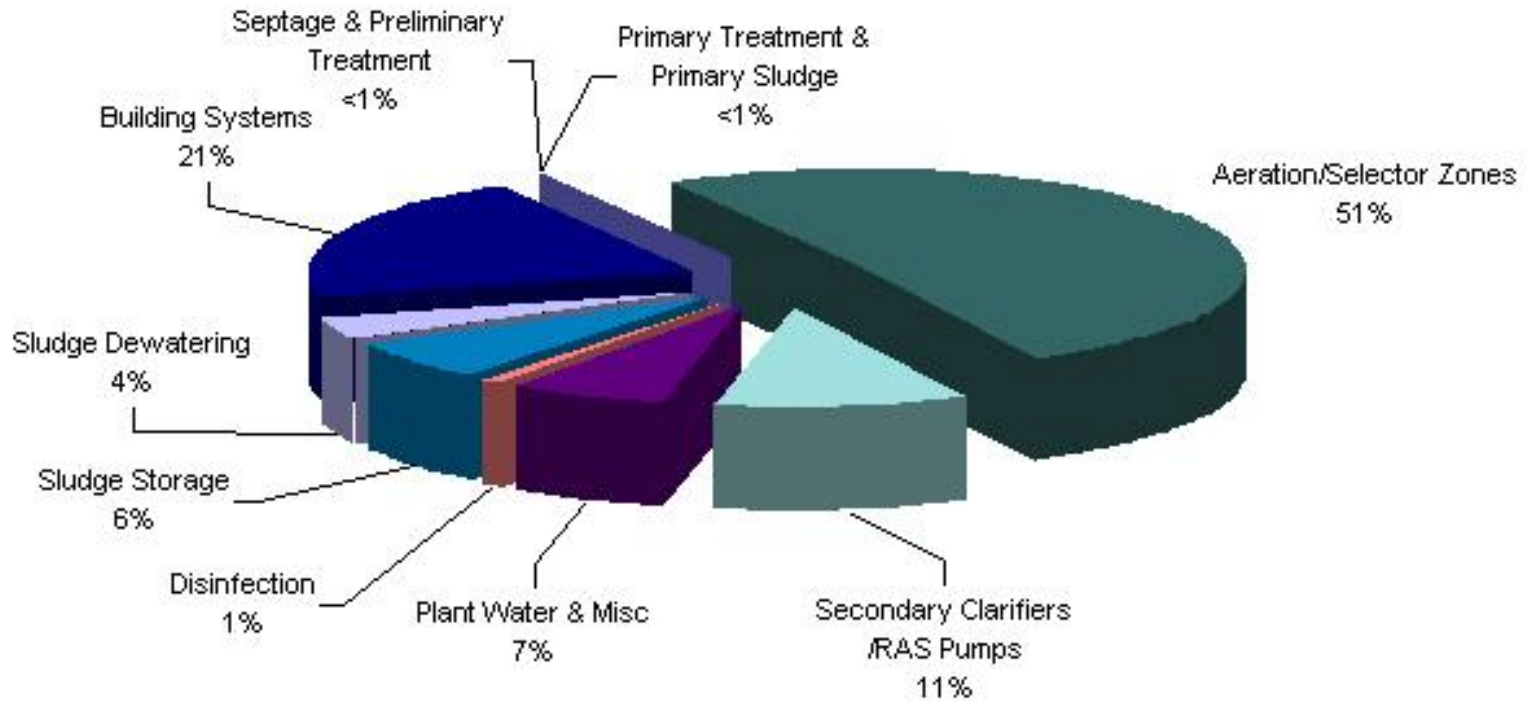
Simple Payback: < 1 year

Wastewater Plant



Wastewater Plant Energy Breakdown

Figure 4.2: Energy Use Breakdown



The aeration/selector zones represent ~50% of plant energy use.

Wastewater System Benchmarking

Table 2.2: Benchmarking Data Compared to Similar NH WWTF Facilities

Plant	Total Annual Energy Usage (kWh)	Total Flow (MG)	Annual Average Daily BOD Removed (lb/day)	Annual Average kWh/lb BOD removed	Annual Average kWh/MG Treated
Hinsdale	138,735	91	211	1.80	1,525
Littleton	516,160	233	1,747	0.81	2,215
Sunapee	355,800	124	464	2.1	2,871
Rollinsford	100,591	33	228	1.21	3,048
Newmarket	552,400	162	1,128	1.3	3,409
Bristol	284,200	79.6	374	2.88	3,570
Jaffrey	975,536	231	958	2.79	4,223
Winchester	271,990	53	388	1.92	5,115
Wolfeboro	639,236	92.7	473	3.9	7,338
Henniker	337,500	45.9	132	7.01	7,541
Woodstock	317,301	37	408	2.13	8,641
Warner	151,914	17.1	144	2.89	8,884

Newmarket WWTF benchmark values compared to other similar size NH Plants

New benchmark values after completing the measures

Table 2.3: New Values after Energy Project Implementation

Plant	Total New Annual Energy Use (kWh)	2020 Annual Total Flow (MG)	2020 Annual Average Daily BOD Removed (lb/day)	Annual Average kWh/MG Treated	Annual Average kWh/lb BOD removed
Newmarket	508,394	162	1128	3,138	1.23

Summary of Measures

No	Cost Saving Measures	Annual Energy Savings (kWh)	First Year Annual Savings (\$)	Initial Cost (\$)	Simple Payback (yrs)
	ENERGY MANAGEMENT PRACTICES				
EMP 1	Benchmark Energy Use with Process Data	--	--	\$3,000	--
	Total for EMPs	--	--	--	--
	OPERATIONAL MEASURES				
OM 1	Creighton Street Electric Heat Thermostats	8,300	\$1,145	\$1,000	<1
OM 2	Creighton Street Ventilation System Cycling	21,836	\$3,750	\$3,000	<1
OM 3	Operate Plant with Primary Treatment (<i>staff initiative in 2021</i>)	18,315	\$2,527	--	--
OM 4	Cycle WAS Holding Tank Blower (<i>staff initiative in 2021</i>)	12,147	\$1,676	--	--
OM 5	Adjust Maintenance Building Thermostats	--	\$574	--	--
	Total for OMs	60,598	\$9,672	\$4,000	<1
	ENERGY CONSERVATION MEASURES				
ECM 1	Install VFDs for Zone A Mixers	13,544	\$2,183	\$5,600	2.6
	Total for ECMs	13,544	\$2,183	\$5,600	2.6
	WWTF Propane/Fuel Oil Energy and Cost Savings	--	\$574	--	--
	WWTF Electric Energy and Cost Savings	74,142	\$11,281	\$12,600	1.1
	Total	74,142	\$11,855	\$12,600	1.1

The proposed cost saving measures are expected to reduce system energy costs by \$12,600 annually which is 8% of the 2020 electric energy costs

WWTF Energy Measures Identified

OM #3: Operate Primary Clarifiers (staff initiative)

(2021 savings for reducing high energy aeration system load)

Annual energy savings: 18,315 kWh

Cost Savings: \$2,527

Cost: Minimal

Simple Payback: Immediate

OM #4: Cycle WAS Blower (staff initiative)

(cycling WAS blower 30 min on/off in 2021)

Annual energy savings: 12,147 kWh

Cost Savings: \$1,676

Cost: Minimal

Simple Payback: Immediate

WWTF Energy Measures Identified

OM #5: Reduce Maintenance Building Thermostats

(High ventilation rates make this building expensive to heat)

Annual energy savings: 319 gallons of propane

Cost Savings: \$574

Cost: Minimal

Simple Payback: Immediate

ECM #1: Anoxic Zone”A” Mixer VFDs

(Mixers for Zone A can be downsized with a VFD)

Annual energy savings: 13,544 kWh

Cost Savings: \$2,183

Cost: \$5,600

Simple Payback: 2.6 years

Summary

- The Newmarket Water and Wastewater Systems are operated very efficiently based on the benchmarking data.
 - Staff “energy related” capabilities are exceptional compared to other municipalities (data collection, fine tuning equipment operation, interested in improving system efficiency).
 - The proposed energy saving measures will help optimize equipment operation, reduce energy costs and improve benchmarking values.
-



Town Hall
186 Main Street
Newmarket, NH 03857

Tel: (603) 659-3617
Fax: (603) 659-8508

Founded December 15, 1727
Chartered January 1, 1991

TOWN OF NEWMARKET, NEW HAMPSHIRE

STAFF REPORT

DATE: March2, 2022

TITLE: Resolution #2021/2022-24 - Tucker Well Project Award

PREPARED BY: Sean T. Greig Environmental Services Director

TOWN MANAGER'S COMMENTS - RECOMMENDATION:

I recommend passage of this resolution.

BACKGROUND:

The Tucker Well Project is part of the water infrastructure projects to improve the water system's water capacity and distribution piping. The Town received bids from Hampstead Area Water Services, N. Granese and Sons, APEX Construction, and DeFelice. Hampstead Area Water Services submitted the lowest bid of \$1,969,674.00. Wright-Pierce evaluated the bids and recommends that the Town award the project to Hampstead Area Water Services for the sum of \$1,969,674.00. I recommend that the project carry \$195,000 for contingencies.

DISCUSSION:

Does the Town Council authorize the Town Manager to award the Tucker Well Project to Hampstead Area Water Services for the sum of \$1,969,674.00, and for the Project to have \$195,000 set aside for contingencies.

FISCAL IMPACT:

The Tucker Well project is funded with the Rural Development Funds.

RECOMMENDATION:

I recommend that the Town Council authorize the Town Manager to award the Tucker Well Project to Hampstead Area Water Services for the sum of \$1,969,674.00, and for the Project to have \$195,000 set aside for contingencies.

ATTACHMENTS:

Description	Upload Date	Type
Tucker Well Award Recommendation	2/4/2022	Cover Memo
Tucker Well Bid Tab	2/4/2022	Cover Memo
Tucker Well Construction Award	2/7/2022	Cover Memo
Resolution #2021/2022-24 Tucker Well Award	2/8/2022	Cover Memo

February 3, 2022

W-P Project No. 14208

Sean Greig, Environmental Services Director
Town of Newmarket
8 Young Lane
Newmarket, NH 03857

RE: Tucker Well Improvements
Construction Contract Award Recommendation

Dear Mr. Greig:

We have completed our review of the bids that were received on January 26, 2022, for the Tucker Well Improvements project. This letter represents a summary of our findings.

Four bids were received and reviewed. A tabulation of the bids is attached. The bids were evaluated based on award to the lowest bidder of the base bid. Hampstead Area Water Services, Co. (HAWSCO) of Atkinson, NH submitted the low bid. The second lowest bidder, N. Granese and Sons, Inc., was approximately 24% higher than the low bid and the third lowest bidder, Apex Construction, Inc., was approximately 55% higher than the low bid. These bids indicate competitive pricing and reasonable bid for the type of work involved. However, based on the percentage difference between the bids received, we recommend that the Town plan to retain the full amount of contingency allowed by the funding agency.

In reviewing HAWSCO's bid package, no mathematical errors were found. HAWSCO's bid package included minor deficiencies that are not thought to prevent the creation of a binding contract. HAWSCO's list of past and present projects includes several projects that are similar in nature to the Town's well station and water main project, including the construction of several new pump stations completed for the Towns of Plaistow, NH, Atkinson, NH, and Derry, NH.

We have contacted HAWSCO's references on recently completed projects and have received feedback on their previous work from one reference to date. The reference says that HAWSCO produces quality work, is reasonable with change orders, and maintains schedule. We encourage the Town to retain full time construction inspection services to reduce the potential for issues in scope and schedule changes.

Based on our review of the Bidding Documents and contact with HAWSCO's project references, we recommend that the Town award the construction contract to HAWSCO as the lowest responsible and responsive bidder for the project base bid for the amount of \$1,969,674.00.

Please note that the Contract cannot be awarded until Rural Development (RD) has reviewed the bid results and required documentation. Once they determine that award documentation is satisfactory, they



will issue a letter authorizing award of the Contract. Once you receive approval to award the Contract, we will prepare the Notice of Award for signature. Upon receipt of the signed notices, we will mail them to HAWSCO and schedule a preconstruction meeting.

In order to receive authorization to award the project, the following documentation must be provided to us to include in the Request to Award packages to be submitted to RD:

1. A letter from the Town stating intent to award the project to HAWSCO (a sample is attached).

Once we receive these items from you, we will make a formal request to RD to obtain authorization to award this project.

Sincerely,
WRIGHT-PIERCE

Dylan B. Thisse, P.E.
Project Manager

Daniel Saulnier, P.E.
Lead Project Engineer

Enclosures: Sample letter of award
CC: April Marsh- Wright-Pierce

February X, 2022

Mr. Charlie Lanza, General Manager
Hampstead Area Water Services, Co.
54 Sawyer Ave
Atkinson, NH 03811

Subject: Tucker Well Improvements, Newmarket, NH
Notice of Intent to Award

Mr. Lanza:

It is the intention of the Town of Newmarket, NH to award a contract for the above referenced project to HAWSCO on the basis of the Base Bid in the amount of \$1,969,674.00 as received on January 26, 2022. Award of this contract is contingent upon review and approval by Rural Development of your bid, as well as approval to award the contract.

Please feel free to contact myself or Dylan Thisse of Wright-Pierce, if you have any questions regarding this notice.

Very truly yours,

TOWN OF NEWMARKET, NEW HAMPSHIRE

Steve Fournier
Town Manager

cc: Sean Greig, Town of Newmarket
Jonathan Harries, Rural Development
Daniel Saulnier, Wright-Pierce
Dylan Thisse, Wright-Pierce

**BID TABULATION**

Project Name: TUCKER WELL IMPROVEMENTS

Issuing Office: 230 Commerce Way, Suite 302, Portsmouth, NH 03801 Tel: (603) 430-3728

Project No.: 14208

Location: NEWMARKET, NH

Bid Date: 01/26/2022

ENG/PM: DAN SAULNIER/DYLAN THISSE/APRIL MARSH

Engineers Estimate: \$

				BIDDER'S NAME							
				HAWSCO		N Granese and Sons		Apex		DeFelice	
				UNIT AMT	BID	UNIT AMT	BID	UNIT AMT	BID	UNIT AMT	BID
BID QUANTITIES											
Item		Qty.	UNIT								
BASE BID											
1	Mobilization/Demobilization	1	LS	\$75,000.00	\$75,000.00	\$40,000.00	\$40,000.00	\$50,000.00	\$50,000.00	\$165,000.00	\$165,000.00
2	Temporary Field Office	1	LS	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$50,000.00	\$50,000.00	\$65,000.00	\$65,000.00
3	Allowance: Uniformed Police Officer for Traffic Control	1	Allowance	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00
4	Flaggers for Traffic Control	600	HRS*	\$45.00	\$27,000.00	\$30.00	\$18,000.00	\$60.00	\$36,000.00	\$55.00	\$33,000.00
5	Traffic Regulation and Control	1	LS	\$2,500.00	\$2,500.00	\$2,500.00	\$2,500.00	\$10,000.00	\$10,000.00	\$25,000.00	\$25,000.00
6	Erosion and Sedimentation Control	1	LS	\$12,000.00	\$12,000.00	\$25,000.00	\$25,000.00	\$25,000.00	\$25,000.00	\$32,500.00	\$32,500.00
7	Development and Monitoring of SWPPP	1	LS	\$2,500.00	\$2,500.00	\$5,000.00	\$5,000.00	\$20,000.00	\$20,000.00	\$15,000.00	\$15,000.00
8	As-Built Survey	1	LS	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$10,000.00	\$10,000.00	\$7,500.00	\$7,500.00
9	Tucker Well Station	1	LS	\$330,174.00	\$330,174.00	\$400,000.00	\$400,000.00	\$1,160,000.00	\$1,160,000.00	\$1,250,000.00	\$1,250,000.00
10	Allowance: Applications Engineering Services Supplier	1	Allowance	\$50,000.00	\$50,000.00	\$50,000.00	\$50,000.00	\$50,000.00	\$50,000.00	\$50,000.00	\$50,000.00
11	Allowance: Utility Back Charges	1	Allowance	\$175,000.00	\$175,000.00	\$175,000.00	\$175,000.00	\$175,000.00	\$175,000.00	\$175,000.00	\$175,000.00
12	Underground Electric Service	1,100	LF	\$60.00	\$66,000.00	\$210.00	\$231,000.00	\$59.09	\$64,999.00	\$250.00	\$275,000.00
13	Tucker Well Gravel Access Drive Extension	1	LS	\$40,000.00	\$40,000.00	\$10,000.00	\$10,000.00	\$65,000.00	\$65,000.00	\$250,000.00	\$250,000.00
14	Tucker Well Gravel Access Drive Extension in Wetlands (STA 3+27 to STA 4+45)	1	LS	\$15,000.00	\$15,000.00	\$12,000.00	\$12,000.00	\$25,000.00	\$25,000.00	\$25,000.00	\$25,000.00
15	Single Leaf Pipe Gate	1	LS	\$7,500.00	\$7,500.00	\$3,500.00	\$3,500.00	\$16,000.00	\$16,000.00	\$7,500.00	\$7,500.00
16	Loaming and Seeding	6,000	SY*	\$5.00	\$30,000.00	\$3.00	\$18,000.00	\$6.67	\$40,020.00	\$10.00	\$60,000.00
17	Drainage	1	LS	\$7,500.00	\$7,500.00	\$25,000.00	\$25,000.00	\$15,000.00	\$15,000.00	\$50,000.00	\$50,000.00
18	Drainage within Wetlands	1	LS	\$6,000.00	\$6,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$25,000.00	\$25,000.00
19	Furnish and Install Rip Rap	330	CY*	\$40.00	\$13,200.00	\$100.00	\$33,000.00	\$50.00	\$16,500.00	\$170.00	\$56,100.00
20	Test Pit Excavation and Backfill	25	CY*	\$200.00	\$5,000.00	\$10.00	\$250.00	\$320.00	\$8,000.00	\$25.00	\$625.00
21	Excavation and Disposal of Unsuitable Material and Replacement Backfill	250	CY*	\$40.00	\$10,000.00	\$30.00	\$7,500.00	\$40.00	\$10,000.00	\$1.00	\$250.00
22	Clearing and Grubbing	3,500	SY*	\$4.00	\$14,000.00	\$0.01	\$35.00	\$5.00	\$17,500.00	\$12.00	\$42,000.00
23	Remove Trees Greater than 8-inches Diameter	20	EA*	\$250.00	\$5,000.00	\$50.00	\$1,000.00	\$500.00	\$10,000.00	\$1,000.00	\$20,000.00
24	Ledge Excavation and Disposal	1,250	CY*	\$100.00	\$125,000.00	\$0.01	\$12.50	\$100.00	\$125,000.00	\$75.00	\$93,750.00
25	10-inch Water Main and Fittings	7,200	LF	\$95.00	\$684,000.00	\$151.00	\$1,087,200.00	\$110.00	\$792,000.00	\$125.00	\$900,000.00
26	Dewatering	1	Allowance	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00
27	10-inch Gate Valves	8	EA	\$3,500.00	\$28,000.00	\$2,400.00	\$19,200.00	\$2,000.00	\$16,000.00	\$8,500.00	\$68,000.00
28	Hydrant Assemblies	5	EA	\$7,000.00	\$35,000.00	\$8,700.00	\$43,500.00	\$4,000.00	\$20,000.00	\$9,500.00	\$47,500.00
29	Pipe Trench Insulation	60	LF*	\$30.00	\$1,800.00	\$20.00	\$1,200.00	\$40.00	\$2,400.00	\$8.50	\$510.00
30	Cleaning, Testing, and Disinfecting Buried Water Main	7,250	LF	\$2.00	\$14,500.00	\$2.00	\$14,500.00	\$2.00	\$14,500.00	\$2.00	\$14,500.00

Location: NEWMARKET, NH

Bid Date: 01/26/2022

ENG/PM: DAN SAULNIER/DYLAN THISSE/APRIL MARSH

Engineers Estimate: \$

				BIDDER'S NAME							
				HAWSCO		N Granese and Sons		Apex		DeFelice	
				UNIT AMT	BID	UNIT AMT	BID	UNIT AMT	BID	UNIT AMT	BID
31	Well Pump and Appurtenances	1	LS	\$75,000.00	\$75,000.00	\$69,000.00	\$69,000.00	\$65,000.00	\$65,000.00	\$95,000.00	\$95,000.00
32	Raw Water Sampling Station	1	EA	\$7,500.00	\$7,500.00	\$6,200.00	\$6,200.00	\$12,000.00	\$12,000.00	\$12,500.00	\$12,500.00
33	Trench Surface Gravel	1,400	CY*	\$22.00	\$30,800.00	\$40.00	\$56,000.00	\$30.00	\$42,000.00	\$0.01	\$14.00
34	Gravel for Pull-Off Areas	100	CY*	\$22.00	\$2,200.00	\$40.00	\$4,000.00	\$30.00	\$3,000.00	\$10.00	\$1,000.00
35	Initial Trench Pavement (19 mm)	90	Ton*	\$150.00	\$13,500.00	\$200.00	\$18,000.00	\$300.00	\$27,000.00	\$70.00	\$6,300.00
36	Final Trench Pavement (12.5 mm)	60	Ton*	\$150.00	\$9,000.00	\$200.00	\$12,000.00	\$300.00	\$18,000.00	\$200.00	\$12,000.00
TOTAL BASE BID AMOUNT ITEMS (1 THROUGH 36)					\$1,969,674.00		\$2,447,597.50		\$3,050,919.00		\$3,910,549.00

*Apex's bid: Mathematical errors identified for Items 12 and 16. Total base bid amount shown in submitted bid was \$3,050,900.

CHARTERED JANUARY 1, 1991

FOUNDED DECEMBER 15, 1727



**TOWN OF NEWMARKET, NEW HAMPSHIRE
By the Newmarket Town Council**

Resolution #2021/2022 - 24
Tucker Well Construction Project Award

- WHEREAS:** The Town is developing the Tucker well to increase its water supply; and
- WHEREAS:** Hampstead Area Water Services Company submitted the lowest bid of \$1,969,674.00; and
- WHEREAS:** The Tucker Well Project will be funded out of the Rural Development monies for water projects.

NOW, THEREFORE, BE IT RESOLVED BY THE NEWMARKET TOWN COUNCIL THAT:

The Town Council authorizes the Town Manager to award the Tucker Well Project to Hampstead Area Water Services Company for \$1,969,674.00 with \$195,000 for contingencies.

First Reading: February 16, 2022

Second Reading: March 2, 2022

Approval: March 2, 2022

VOTING RECORD			
Date of Vote:	YES	NO	ABSTAIN
Councilor Conley			
Councilor Ward			
Councilor Blackstone			
Councilor Brabec			
Councilor Kiper			
Vice Chair Sanders			
Chair Weinstein			
Total Votes:			
Resolution: Does Does Not pass.			

Approved: _____
Toni Weinstein, Chair Town Council

A True Copy Attest: _____
Terri Littlefield, Town Clerk

CHARTERED JANUARY 1, 1991

FOUNDED DECEMBER 15, 1727



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Vice Chair Sanders			
Chair Weinstein			
Total Votes:			
Resolution: Does Does Not pass.			

Approved: _____
Toni Weinstein, Chair Town Council

A True Copy Attest: _____
Terri Littlefield, Town Clerk



Town Hall
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Newmarket, NH 03857

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Founded December 15, 1727
Chartered January 1, 1991

TOWN OF NEWMARKET, NEW HAMPSHIRE

STAFF REPORT

DATE: March2, 2022

TITLE: Resolution #2021/2022-25 - Tucker Well Dredge and Fill Permit

PREPARED BY: Sean T. Greig Environmental Services Director

TOWN MANAGER'S COMMENTS - RECOMMENDATION:

I recommend passage of this resolution.

BACKGROUND:

The Town of Newmarket is in the process of constructing the Tucker Well to increase the Town of Newmarket's water supply. The project is funded through Rural Development. As part of the project, the Town needs to dredge and fill approximately 2,820 SF permanent and 920 SF temporary of wet meadow wetland to be able to access and maintain the Tucker Well wellhead. New Hampshire Department of Environmental Services has approved the dredge and fill and the Town is required to make a one-time payment into the Aquatic Resource Fund of \$16,678.15. Rural Development will not allow the Town to use Rural Development Funds for this one-time payment. I recommend that the Town Council approve \$7,594.75 from the Water Impact Fees and \$9,083.40 from the Water Capital Reserve Funds to cover the one-time payment of \$16,678.15.

DISCUSSION:

Does the Town Council want to authorize \$7,594.75 from the Water Impact Fees and \$9,083.40 from the Water Capital Reserve Funds to cover the one-time payment of \$16,678.15 to the Aquatic Resource Fund.

FISCAL IMPACT:

The current balances for the Water Impact Fees and Water Capital Reserve are \$7,594.75 and \$738,602.67 respectively.

RECOMMENDATION:

I recommend that the Town Council want to authorize \$7,594.75 from the Water Impact Fees and \$9,083.40

from the Water Capital Reserve Funds to cover the one-time payment of \$16,678.15 to the Aquatic Resource Fund.

ATTACHMENTS:

Description	Upload Date	Type
Tucker Well Dredge and Fill Permit	2/2/2022	Cover Memo
Resolution 20212022-25 -Tucker Well Dredge and Fill Permit	2/8/2022	Cover Memo



The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner



December 22, 2021

TOWN OF NEWMARKET
C/O SEAN GREIG (ENVIRONMENTAL SERVICES DIR-WATER/WASTEWATER-NEWMARKET, NH)
8 YOUNG LN
NEWMARKET NH 03857

Re: Approved Standard Dredge and Fill Wetlands Permit Application – Required Payment to Aquatic Resource Mitigation Fund (RSA 482-A)
NHDES File Number: 2021-03463
Subject Property: Multiple-ROW, Newmarket Tax Map #R4, Lot #50-1, 41, 24

Dear Applicant:

On December 22, 2021, the New Hampshire Department of Environmental Services (NHDES) Wetlands Bureau approved the above-referenced Standard Dredge and Fill Wetlands Permit Application to dredge and fill a total of 3,790 square feet (SF), 2,820 SF permanent and 970 SF temporary, of palustrine wet meadow wetland for improvements to the Town of Newmarket's drinking water capacity of a well site, known as the Tucker Well, with construction of an access road, installation of a 15 inch RCP culvert, and trench pipe installation. Compensatory mitigation is provided for permanent impacts within a Priority Resource Area, a floodplain wetland contiguous to a tier 3 watercourse, as a one-time payment into the Aquatic Resource Mitigation (ARM) Fund of \$16,678.15.

This approval is contingent on the following conditions being met:

1. In accordance with Env-Wt 307.16, all work shall be done in accordance with the plans by the Wright-Pierce dated October 2021 and received by the NH Department of Environmental Services (NHDES) on November 15, 2021.
2. In accordance with Env-Wt 307.07, all development activities associated with any project shall be conducted in compliance with applicable requirements of RSA 483-B and Env-Wq 1400 during and after construction.
3. In accordance with Env-Wt 307.03(b), all work shall be conducted so as to minimize erosion, sedimentation and turbidity in surface waters and wetlands.
4. In accordance with Env-Wt 307.03(c)(1), water quality control measures shall be selected and implemented based on the size and nature of the project and the physical characteristics of the site.
5. In accordance with Env-Wt 307.03(c)(2), water quality control measures shall be comprised of wildlife-friendly erosion control materials if erosion control blankets are utilized; a protected species or habitat has been documented; the proposed work is in or adjacent to a priority resource area (PRA); if specifically requested by Natural Heritage Bureau of the NH DNCR (NHB) or NH Fish and Game Department (NHF&G); or any if combination of the above conditions apply.
6. In accordance with Env-Wt 307.12(f), if any temporary impact area that is stabilized with seeding or plantings does not have at least 75% successful establishment of wetlands vegetation after 2 growing seasons, the area shall be replanted or reseeded, as applicable.
7. In accordance with Env-Wt 307.12(d), mulch used within an area being restored shall be natural straw or equivalent non-toxic, non-seed-bearing organic material.
8. In accordance with Env-Wt 307.12(g), a temporary impact area restored by seeding or plantings shall not be deemed successful if the area is invaded by nuisance species such as common reed or purple loosestrife during the first full growing season following the completion of construction; and a remediation plan shall be submitted to the department

www.des.nh.gov

29 Hazen Drive • PO Box 95 • Concord, NH 03302-0095
NHDES Main Line: (603) 271-3503 • Subsurface Fax: (603) 271-6683 • Wetlands Fax: (603) 271-6588
TDD Access: Relay NH 1 (800) 735-2964

that proposes measures to be taken to eradicate nuisance species during this same period.

9. In accordance with Env-Wt 307.12(a), within 3 days of final grading or temporary suspension of work in an area that is in or adjacent to surface waters, all exposed soil areas shall be stabilized by seeding and mulching, if during the growing season; or mulching with tackifiers on slopes less than 3:1 or netting and pinning on slopes steeper than 3:1 if not within the growing season.

10. Restoration of all temporary impacts shall meet all of the conditions listed in Rule Env-Wt 303.07(a) through (i).

11. In accordance with Env-Wt 307.03(g)(1), the person in charge of construction equipment shall inspect such equipment for leaking fuel, oil, and hydraulic fluid each day prior to entering surface waters or wetlands or operating in an area where such fluids could reach groundwater, surface waters, or wetlands.

12. Equipment shall be staged and refueled outside of jurisdictional areas (unless allowed) per Rule Env-Wt 307.15 and Env-Wt 307.03(h).

MITIGATION

13. In accordance with Env-Wt The permit is contingent on submittal of a check in the amount of \$16,678.15 to the Aquatic Resource Mitigation Fund by the applicant as calculated per Env-Wt 803.07 and RSA 482-A:30.

14. In accordance with Env-Wt 807.01(b), the payment shall be received by NHDES within 120 days from the approval decision or NHDES will deny the application.

This approval is based on the following findings:

1. This is classified as a major impact project per Rule Env-Wt 408, for a project located within a priority resource area and not subject to a lower classification under Env-Wt 407.02 or qualify for a project type exception under Env-Wt 407.04.

2. Per Rule Env-Wt 313.01(a)(5), and as required by RSA 482-A:11, II, this permit for work to dredge or fill will not 'infringe on the property rights or unreasonably affect the value or enjoyment of property of abutting owners' based on documentation that the proposed dredge and fill activity will be located entirely within the boundary of the applicant's property interest and will not result in any observable change in off-site surface water levels or flows.

3. Per Rule Env-Wt 306.05, the applicant has addressed all of the required planning items that are used to determine the appropriate impact classification of a project and the type of approval required.

4. Per Rule Env-Wt 313.01(a)(1)(a), the applicant has met the requirements of Env-Wt 311.10 regarding functional assessments.

5. Per Rule Env-Wt 313.01(a)(2), all applicable conditions specified in Env-Wt 307 have been met.

6. Per Rule Env-Wt 313.03(a), the applicant has demonstrated that potential impacts to jurisdictional areas have been avoided to the maximum extent practicable and that any unavoidable impacts have been minimized.

7. The applicant has demonstrated specifically that each factor listed in Env-Wt 313.03(b) has been considered in the design of the proposed major project.

8. Per Rule Env-Wt 202.01(b) and as required by RSA 482-A:8, NHDES finds that the requirements for a public hearing do not apply as the project will not have a significant environmental impact, as defined in Env-Wt 104.19, on the resources protected by RSA 482-A, or, is not of substantial public interest, as defined in Env-Wt 104.32.

9. Per Rule Env-Wt 801.03(b), the applicant is offering an in-lieu mitigation payment as specified in RSA 482-A:30 for permanent wetland impacts, as permittee-responsible compensatory mitigation is not practicable or appropriate for the applicant's project.

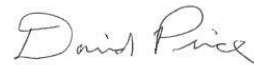
Pursuant to RSA 482-A:28, **this approval is contingent on receipt of a one-time in-lieu mitigation payment of \$16,678.15 to the NHDES Aquatic Resource Mitigation (ARM) Fund.** NHDES recommends delaying payment until after the 30-day reconsideration period ending January 21, 2022. In accordance with Env-Wt 803.11(c)(2) and Env-Wt 807.01(b), if NHDES has not received the in-lieu mitigation payment within 120 days of this letter, or by April 21, 2022, NHDES will deny the application. Please include a copy of this letter with the payment.

In accordance with RSA 482-A:10, RSA 21-O:14, and Rules Env-WtC 100-200, **any person aggrieved by this decision may file a Notice of Appeal directly with the NH Wetlands Council (Council) within 30 days of the decision date, December**

22, 2021. Every ground claiming the decision is unlawful or unreasonable must be fully set forth in the Notice of Appeal. Only the grounds set forth in the Notice of Appeal are considered by the Council. Information about the Council, including Council Rules, is available at <https://nhec.nh.gov/wetlands/index.htm>. For appeal related issues, contact the Council Appeals Clerk at (603) 271-6072.

If you have any questions, please contact me directly at David.Price@des.nh.gov or (603) 559-1514.

Sincerely,

A handwritten signature in cursive script that reads "David Price".

David Price
East Region Supervisor, Wetlands Bureau
Land Resources Management, Water Division

cc: Municipal Clerk/Conservation Commission
Local River Advisory Committee
Wright-Pierce

CHARTERED JANUARY 1, 1991

FOUNDED DECEMBER 15, 1727



**TOWN OF NEWMARKET, NEW HAMPSHIRE
By the Newmarket Town Council**

Resolution #2021/2022 - 25
Tucker Well Dredge and Fill Permit

- WHEREAS:** The Town is developing the Tucker well to increase its water supply; and
- WHEREAS:** The Town has been approved for a dredge and fill permit to install access to the Tucker Wellhead; and
- WHEREAS:** The Town is required to make a one-time payment into the Aquatic Resource Fund of \$16,678.15.

NOW, THEREFORE, BE IT RESOLVED BY THE NEWMARKET TOWN COUNCIL THAT:

The Town authorize \$7,594.75 from the Water Impact Fees and \$9,083.40 from the Water Capital reserve Funds for the one-time payment of \$16,678.15 to the Aquatic Resource Fund.

First Reading: February 16, 2022

Second Reading: March 2, 2022

Approval: March 2, 2022

VOTING RECORD			
Date of Vote:	YES	NO	ABSTAIN
Councilor Conley			
Councilor Ward			
Councilor Blackstone			
Councilor Brabec			
Councilor Kiper			
Vice Chair Sanders			
Chair Weinstein			
Total Votes:			
Resolution: Does Does Not pass.			

Approved: _____
Toni Weinstein, Chair Town Council

A True Copy Attest: _____
Terri Littlefield, Town Clerk



Town Hall
186 Main Street
Newmarket, NH 03857

Tel: (603) 659-3617
Fax: (603) 659-8508

Founded December 15, 1727
Chartered January 1, 1991

TOWN OF NEWMARKET, NEW HAMPSHIRE

STAFF REPORT

DATE: March2, 2022

TITLE: Resolution #2021/2022-26 - Purchase of New UPS Devices for the Town

PREPARED BY: William Tappan, Finance Director

TOWN MANAGER'S COMMENTS - RECOMMENDATION:

I recommend passage of this resolution.

BACKGROUND:

The current Uninterruptible Power Supply (UPS) devices at the Department of Public Works (DPW) Data Center and the Police Department (PD) Intermediate Distribution Facility (IDF) are at end of life and need to be replaced. One of the two UPS devices at DPW has ceased functioning and the UPS at the PD is no longer stable and needing replacement to ensure operational continuity for the PD and Dispatch.

The purpose of the UPS devices is to maintain power to critical computing and telecommunications systems in the event of a power disruption from the electrical power grid. The UPS provides immediate continuous power to the systems during the gap between when the grid power ceases and power from backup generators begins.

DISCUSSION:

In order to get prices for the UPS replacement, requests for quotations were sent to three different IT vendors: CDW-G, shi, and BBN (see attachments). The first two vendors are large national IT system wholesalers and Back Bay is the town's provider of networking and end user support. Each vendor was provided with the same system type so the comparisons would be equivalent and cost would be the only differentiator.

FISCAL IMPACT:

The table below provides the vendor comparisons.

Vendor	Equipment	Price
CDW-G	Eaton PPX 3000 VA Tower/Rack Mountable UPS, Eaton Gigabit	\$2,481.76 x 2 = \$4,963.52

	Network Card – multicolor	
Shi	Same as above	\$2,418.00 x 2 = \$4,836.00
Back Bay Newtworks	Same as above	\$1,999 x 2 = \$3,998.00

RECOMMENDATION:

I recommend the Town Council approve the quotation from Back Bay Networks as it is the best lowest price for the same equipment.

ATTACHMENTS:

Description	Upload Date	Type
Resolution #2021/2022-26 - Purchase New UPS Devices for the Town	2/14/2022	Cover Memo
UPS Device Quotes	2/14/2022	Cover Memo

CHARTERED JANUARY 1, 1991

FOUNDED DECEMBER 15, 1727



TOWN OF NEWMARKET, NEW HAMPSHIRE
By the Newmarket Town Council

Resolution 2021/2022-26

Resolution Appropriating \$4,000 from the Technology Capital Reserve Fund to Purchase new UPS devices for the Town

WHEREAS: the Town's current Uninterruptible Power Supply (UPS) devices located at the Police Department and the Department of Public Works provide interim power in the event of an interruption of electric power to their respective buildings and prior to the generators starting to produce power; and

WHEREAS: the Town's current UPS devices are at end of life, one of two at DPW has ceased functioning and the one at the PD has been experiencing significant problems in recent months; and

WHEREAS: the Director of Finance & Administration is proposing the Council consider replacing the noted UPS devices and network cards to significantly enhance operational continuity; and

WHEREAS: the Technology Capital Reserve Fund has a balance of \$24,818,

NOW, THEREFORE, BE IT RESOLVED: that the Newmarket Town Council does hereby approve the expenditure of not more than \$4,000 from the Technology Capital Reserve Fund for the purchase of new UPS devices and network cards.

First Reading: March 2, 2022

Second Reading: March 16, 2022

Approval: March 16, 2022

VOTING RECORD			
Date of Vote:	YES	NO	ABSTAIN
Councilor Conley			
Councilor Ward			
Councilor Blackstone			
Councilor Brabec			
Councilor Kiper			
Vice Chair Sanders			
Chair Weinstein			
Total Votes:			
Resolution: Does Does Not pass.			

Approved: _____
Toni Weinstein, Chair Town Council

A True Copy Attest: _____
Terri Littlefield, Town Clerk



Back Bay Networks
800 Central Ave.
Dover, NH - New Hampshire 03820
P: 6036925100
W: www.bbnnh.com

UPS Battery Replacement

Prepared For:

Name: William Tappan
Company: Town of Newmarket
Address: 70 Exeter Street
Newmarket, NH 03857
Phone: (603) 491-8247
Email: wtappan@newmarketnh.gov

Quote Information:

Quote #: 003706
Created: 01/14/2022
Expires: 02/11/2022
Rep: Steve Gagnon
Email: sgagnon@bbnnh.com
Phone:

Products	Item	Price	Qty	Ext. Price
Police UPS Battery			0	
Eaton 5PX 3000 VA Tower/Rack Mountable UPS - 2U Rack/Tower - 4 Minute Stand-by - 110 V AC Input - 132 V AC Output - 6 x NEMA 5-20R, 1 x NEMA L5 -30R	5PX3000RT2U	\$1,709.00	1	\$1,709.00
Eaton Gigabit Network Card - Multicolor	NETWORK-M2	\$290.00	1	\$290.00
Police Subtotal			2	\$1,999.00
Products Subtotal				\$1,999.00

Recap	Amount
Products	\$1,999.00
Total	\$1,999.00

Taxes, shipping, handling and other fees may apply. We reserve the right to cancel orders arising from pricing or other errors. Unless otherwise noted, installation labor is not included

Signature

Date



Back Bay Networks
800 Central Ave.
Dover, NH - New Hampshire 03820
P: 6036925100
W: www.bbnnh.com

UPS Battery Replacement

Prepared For:

Name: William Tappan
Company: Town of Newmarket
Address: 186 Main Street
Newmarket, NH 03857
Phone: (603) 491-8247
Email: wtappan@newmarketnh.gov

Quote Information:

Quote #: 003696
Created: 01/14/2022
Expires: 02/09/2022
Rep: Steve Gagnon
Email: sgagnon@bbnnh.com
Phone:

Products	Item	Price	Qty	Ext. Price
DPW UPS Battery			0	
Eaton 5PX 3000 VA Tower/Rack Mountable UPS - 2U Rack/Tower - 4 Minute Stand-by - 110 V AC Input - 132 V AC Output - 6 x NEMA 5-20R, 1 x NEMA L5 -30R	5PX3000RT2U	\$1,709.00	1	\$1,709.00
Eaton Gigabit Network Card - Multicolor	NETWORK-M2	\$290.00	1	\$290.00
DPW Subtotal			2	\$1,999.00
Products Subtotal				\$1,999.00

Recap	Amount
Products	\$1,999.00
Total	\$1,999.00

Taxes, shipping, handling and other fees may apply. We reserve the right to cancel orders arising from pricing or other errors. Unless otherwise noted, installation labor is not included

Signature

Date

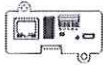


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ADD ITEM TO CART

Enter CDW# or MFG#

ITEM	AVAILABILITY	PRICE	QUANTITY	ITEM TOTAL
 Eaton INDGW-M2 - remote management adapter MFG Part: INDGW-M2 CDW Part: 5923370 UNSPSC:	11-13+ Days Orders placed today will ship within 11-13 days	\$464.00 \$398.99 Advertised Price	1	\$398.99
Top Recommendations				
 Eaton 5PX 3000 2U Rack/Tower LCD MFG Part: 5PX3000IRT2U CDW Part: 2350760 UNSPSC:	In Stock Orders placed today ship tomorrow by a CDW partner	\$2,396.00 \$2,082.77 Advertised Price	1	\$2,082.77
Top Recommendations				

Order Summary

Subtotal: \$2,481.76

Tax and Shipping calculated at checkout.

Lease Option Pricing \$73.21 / Month



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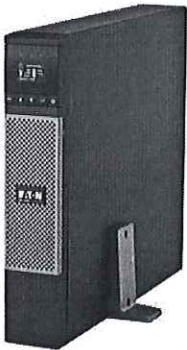
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 Empty Cart

* ** Save as Quote

 Check Out

Subtotal: **\$2,418.00**



Eaton 5PX 3000 - UPS (rack-mountable)

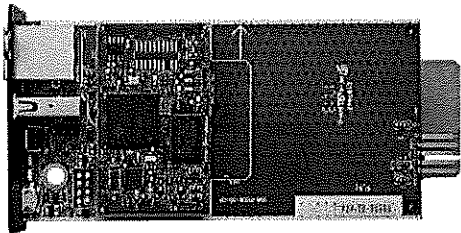
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Low Stock

	1	
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Acknowledge

\$2,081.00 each **\$2,081.00**



Eaton Network Card-M2

View All Details ▲

In Stock

⌵	1	⌶
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\$337.00 each **\$337.00**

Subtotal: \$2,418.00

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Acknowledge



Town Hall
186 Main Street
Newmarket, NH 03857

Tel: (603) 659-3617
Fax: (603) 659-8508

Founded December 15, 1727
Chartered January 1, 1991

TOWN OF NEWMARKET, NEW HAMPSHIRE

STAFF REPORT

DATE: March2, 2022

TITLE: Resolution #2021/2022-27 - New Road Watermain Replacement and Drainage Improvements Project Award

PREPARED BY: Sean T. Greig Environmental Services Director

TOWN MANAGER'S COMMENTS - RECOMMENDATION:

I recommend passage of this resolution.

BACKGROUND:

The Town received bids for the New Road Watermain and Drainage Improvements Project on February 2, 2022 from Granese and Sons and North East Earth Mechanics. The project will consist of improving the New Road drainage collection system in the area of Center Street and Young Lane, and creating a new discharge to the Lamprey River. A new watermain will be installed at the same time. Granese and Sons submitted the lowest bid of \$1,898,738.50. The cost for the drainage and water are \$1,209,976.50 and \$688,762.00 respectively. I recommend that the project carry \$90,000 in contingencies. The water improvements will be funded by a \$500,000 Community Development Block Grant and Rural Development Funds. The drainage improvements will be funded by \$1,000,000 State Revolving Loan with 10% forgiveness and ARPA grant funds.

DISCUSSION:

Does the Town Council want to authorize the Town Manager to award the New Road Watermain and Drainage Improvements Project to Granese and Sons for the sum of \$1,898,738.50.

FISCAL IMPACT:

The watermain portion of the project will be funded by a \$500,000 CDBG grant and Rural Development funds. The New Road drainage improvements will be fund by an SRF \$1,000,000 loan with 10% loan forgiveness and ARPA grant funds. The SRF loan is a 20-year loan that will be a yearly payment that will be budgeted in the Town budget.

RECOMMENDATION:

I recommend that the Town Council authorize the Town Manager to award the New Road Watermain and

Drainage Improvements Project to Granese and Sons for the sum of \$1,898,738.50.

ATTACHMENTS:

Description	Upload Date	Type
Resolution # 2021/2022-27 - New Road Watermain Replacement & Drainage Improvements	2/22/2022	Cover Memo
New Road Recommendation	2/15/2022	Cover Memo
New Road Summary of Bids	2/15/2022	Cover Memo



TOWN OF NEWMARKET, NEW HAMPSHIRE
By the Newmarket Town Council

Resolution #2021/2022 - 27

New Road Watermain and Drainage Improvements Project

- WHEREAS:** The Town has secured funding from Community Development Block Grant, Rural Development, and the State Revolving Loan Fund for the project; and
- WHEREAS:** Granese and Sons submitted the lowest bid of \$688,762.00 for water and \$1,209,976.50 for drainage for a total sum of \$1,898,738.50 for the New Road Watermain and Drainage Improvements Project; and
- WHEREAS:** The Community Development Block Grant and Rural Development funds will be used for the watermain replacement, and the State Revolving funds the ARPA funds will be used for the drainage portion of the project.

NOW, THEREFORE, BE IT RESOLVED BY THE NEWMARKET TOWN COUNCIL THAT:

The Town Manager is authorized to Award the New Road Watermain and Drainage Improvements Project to Granese and Sons for \$1,898,378.50. The Town Council authorizes the following budget for the New Road Watermain and Drainage Improvements Project:

	Water	Drainage
Construction	\$688,762.00	\$1,209,976.50
Contingency	\$45,000.00	\$65,000.00
Construction Engineering	\$101,200.00	\$121,200.00
	834,962.00	\$1,396,176.50

First Reading: March 2, 2022

Second Reading: March 16, 2022

Approval: March 16, 2022

VOTING RECORD			
Date of Vote:	YES	NO	ABSTAIN
Councilor Conley			
Councilor Ward			
Councilor Blackstone			
Councilor Brabec			
Councilor Kiper			
Vice Chair Sanders			
Chair Weinstein			
Total Votes:			
Resolution: Does Does Not pass.			

Approved: _____
Toni Weinstein, Chair Town Council

A True Copy Attest: _____
Terri Littlefield, Town Clerk

February 14, 2022

2045.21

Mr. Sean Greig
Town of Newmarket
186 Main Street
Newmarket, NH 03857

Re: Recommendation of Contract Award
New Road Water and Stormwater Improvements
NHDES CWSRF D2021-0705

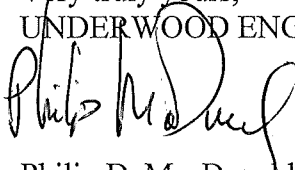
Dear Mr. Grieg:

We have reviewed the bids received on February 2, 2022, for the referenced project. Two (2) bids were received. The lowest bidder is N. Granese & Sons, Inc. of Salem, MA. A Summary of Bids received is attached.

N. Granese & Sons is currently involved in water and sewer projects in Dover, Newmarket, Haverhill, and Gloucester. Underwood Engineers is providing construction oversight in Dover. Granese's working relationship with the City of Dover has been complimentary. We also understand that Granese is in good standing concerning work in Newmarket. Granese references indicate that Granese is a top-rated utility contractor, and that they keep work areas neat and interact well with businesses and property owners. We find that their work is completed satisfactory and on time.

Based on a review of recent work completed by Granese & Sons, including work in progress, we recommend award of the Contract to N. Granese & Sons, the lowest responsible bidder for the **contract amount of \$1,898,378.50**, pending funding approval from NHDES, RD, and CDBG. We understand that funding is not available for add Alt #1. Please let us know if this may change.

Very truly yours,
UNDERWOOD ENGINEERS, INC.



Philip D. MacDonald, P.E.
Project Manager

Summary of Bids

Project: New Road Improvements, Newmarket, New Hampshire
Bids Received: February 2, 2022

				Engineers Opinion of Cost		N. Granese & Sons		NE Earth Mechanics	
BID ITEM	EST. QUANT.	UNITS	ITEM DESCRIPTION	Unit Price	Item Total	Unit Price	Item Total	Unit Price	Item Total
SCHEDULE 1: WATER IMPROVEMENTS									
202.43	50	LF**	Removal of AC Pipe (0-24" Dia.):	\$ 60.00	\$ 3,000.00	\$ 25.00	\$ 1,250.00	\$ 100.00	\$ 5,000.00
206.19	100	CY**	Common Structure Excavation - Exploratory:	\$ 50.00	\$ 5,000.00	\$ 0.01	\$ 1.00	\$ 50.00	\$ 5,000.00
206.2W	100	CY**	Rock Structure Excavation (Water):	\$ 140.00	\$ 14,000.00	\$ 0.01	\$ 1.00	\$ 125.00	\$ 12,500.00
611.05208	1080	LF	8" Ductile Cement Lined Water Main, CL52:	\$ 130.00	\$ 140,400.00	\$ 135.00	\$ 145,800.00	\$ 150.00	\$ 162,000.00
611.05210	1130	LF	10" Ductile Cement Lined Water Main, CL52:	\$ 150.00	\$ 169,500.00	\$ 145.00	\$ 163,850.00	\$ 160.00	\$ 180,800.00
611.81A	3	EA.	Hydrant Assemblies:	\$ 15,000.00	\$ 45,000.00	\$ 8,000.00	\$ 24,000.00	\$ 10,000.00	\$ 30,000.00
611.50007	500	LF	3/4" Copper Water Service Pipe:	\$ 120.00	\$ 60,000.00	\$ 10.00	\$ 5,000.00	\$ 75.00	\$ 37,500.00
611.50020	60	LF	2" PE Water Service Pipe:	\$ 130.00	\$ 7,800.00	\$ 30.00	\$ 1,800.00	\$ 75.00	\$ 4,500.00
611.51007	28	EA.	3/4" Corporation:	\$ 1,600.00	\$ 44,800.00	\$ 1,800.00	\$ 50,400.00	\$ 1,000.00	\$ 28,000.00
611.51020	2	EA.	2" Corporation: _____	\$ 1,800.00	\$ 3,600.00	\$ 5,000.00	\$ 10,000.00	\$ 2,000.00	\$ 4,000.00
611.52007	28	EA.	3/4" Curb Stop:	\$ 1,200.00	\$ 33,600.00	\$ 250.00	\$ 7,000.00	\$ 250.00	\$ 7,000.00
611.52020	2	EA.	2" Curb Stop: _____	\$ 1,400.00	\$ 2,800.00	\$ 700.00	\$ 1,400.00	\$ 1,000.00	\$ 2,000.00
611.71008	4	EA.	8" Gate Valve w/ Box:	\$ 2,400.00	\$ 9,600.00	\$ 6,000.00	\$ 24,000.00	\$ 1,700.00	\$ 6,800.00
611.71010	3	EA.	10" Gate Valve w/ Box:	\$ 2,800.00	\$ 8,400.00	\$ 8,000.00	\$ 24,000.00	\$ 2,500.00	\$ 7,500.00
611.93	4	EA.	Remove Gate Valve and Valve Box (Outside Excavation	\$ 500.00	\$ 2,000.00	\$ 150.00	\$ 600.00	\$ 1,000.00	\$ 4,000.00
612.546	50	LF	Replace and/or Realign Existing 4" or 6" Sewer Service:	\$ 150.00	\$ 7,500.00	\$ 120.00	\$ 6,000.00	\$ 100.00	\$ 5,000.00
Schedule 1 Total				\$ 557,000.00		465,102.00		\$ 501,600.00	

SCHEDULE 2: DRAINAGE & ROADWAY IMPROVEMENTS									
201.1	0.1	Acre	Clearing and Grubbing:	\$50,000.00	\$5,000.00	\$25,000.00	\$ 2,500.00	\$30,000.00	\$ 3,000.00
201.21	8	EA.	Removing small trees:	\$800.00	\$6,400.00	\$100.00	\$ 800.00	\$300.00	\$ 2,400.00
201.22	4	EA.	Removing large trees:	\$2,000.00	\$8,000.00	\$350.00	\$ 1,400.00	\$1,000.00	\$ 4,000.00
201.4	1	EA.	Removing Stumps:	\$800.00	\$800.00	\$250.00	\$ 250.00	\$250.00	\$ 250.00
203.4	50	CY**	Muck/Unsuitable Material Excavation:	\$40.00	\$2,000.00	\$30.00	\$ 1,500.00	\$40.00	\$ 2,000.00
203.6	43	CY	Embankment In Place (F):	\$25.00	\$1,075.00	\$30.00	\$ 1,290.00	\$60.00	\$ 2,580.00
206.1	50	CY**	Common Structure Excavation (where directed):	\$80.00	\$4,000.00	\$25.00	\$ 1,250.00	\$50.00	\$ 2,500.00
206.2D	150	CY**	Rock Structure Excavation (Drainage):	\$140.00	\$21,000.00	\$0.01	\$ 1.50	\$125.00	\$ 18,750.00
585.2	90	CY	Stone fill, Class B:	\$100.00	\$9,000.00	\$50.00	\$ 4,500.00	\$60.00	\$ 5,400.00
585.3	50	CY	Stone fill, Class C:	\$80.00	\$4,000.00	\$50.00	\$ 2,500.00	\$60.00	\$ 3,000.00
585.31	70	CY	Stone fill, Class C (Modified):	\$100.00	\$7,000.00	\$50.00	\$ 3,500.00	\$60.00	\$ 4,200.00
593.211	100	SY	Class 1, Non-Woven Geotextile (Separation):	\$4.00	\$400.00	\$30.00	\$ 3,000.00	\$3.50	\$ 350.00
593.320	100	SY	Class 2, Geotextile (Stabilization):	\$4.00	\$400.00	\$30.00	\$ 3,000.00	\$5.00	\$ 500.00
593.411	200	SY	Class 1, Non-Woven Geotextile (Permanent Erosion Control):	\$6.00	\$1,200.00	\$30.00	\$ 6,000.00	\$3.50	\$ 700.00
603.0001	1000	LF	Video Inspection (where directed):	\$4.00	\$4,000.00	\$3.00	\$ 3,000.00	\$2.00	\$ 2,000.00
603.00324	540	LF	24" Reinforced Concrete Pipe, 3000D	\$200.00	\$108,000.00	\$300.00	\$ 162,000.00	\$200.00	\$ 108,000.00
603.33215	1	EA.	15" PE End Section:	\$500.00	\$500.00	\$500.00	\$ 500.00	\$350.00	\$ 350.00
603.6	40	LF	Relaying Drainage Pipe (0-24" Dia.):	\$70.00	\$2,800.00	\$150.00	\$ 6,000.00	\$100.00	\$ 4,000.00
603.82206	50	LF	6" PE Pipe (Smooth Interior):	\$50.00	\$2,500.00	\$90.00	\$ 4,500.00	\$85.00	\$ 4,250.00
603.822T6	2	EA.	Inserta Tee or Main Dia. x 6" Tee Fitting for 6" PE Drain:	\$500.00	\$1,000.00	\$1,500.00	\$ 3,000.00	\$200.00	\$ 400.00
603.82212	680	LF	12" PE Pipe (Smooth Interior):	\$80.00	\$54,400.00	\$100.00	\$ 68,000.00	\$85.00	\$ 57,800.00
603.82215	120	LF	15" PE Pipe (Smooth Interior):	\$100.00	\$12,000.00	\$110.00	\$ 13,200.00	\$90.00	\$ 10,800.00
603.82218	1180	LF	18" PE Pipe (Smooth Interior):	\$140.00	\$165,200.00	\$150.00	\$ 177,000.00	\$95.00	\$ 112,100.00
603.82224	230	LF	24" PE Pipe (Smooth Interior):	\$180.00	\$41,400.00	\$300.00	\$ 69,000.00	\$110.00	\$ 25,300.00
604.0007	9	EA.	Polyethylene Liners:	\$200.00	\$1,800.00	\$250.00	\$ 2,250.00	\$350.00	\$ 3,150.00
604.0008	5	EA.	Catch Basin Hoods (12" to 18" diameter outlet pipe):	\$500.00	\$2,500.00	\$800.00	\$ 4,000.00	\$500.00	\$ 2,500.00
604.124	11	UNIT	Catch Basin, 4' Dia. Type B:	\$4,500.00	\$49,500.00	\$6,000.00	\$ 66,000.00	\$6,500.00	\$ 71,500.00
604.194	1	UNIT	Catch Basin, 4' Dia. w/B-Hive Grate:	\$4,500.00	\$4,500.00	\$6,300.00	\$ 6,300.00	\$6,900.00	\$ 6,900.00
604.292	1	EA.	Drop Inlet, 2' Dia. w/Bee Hive Grate:	\$2,200.00	\$2,200.00	\$6,000.00	\$ 6,000.00	\$5,600.00	\$ 5,600.00
604.324	16	UNIT	Drain Manhole (4' Dia.):	\$4,000.00	\$64,000.00	\$7,000.00	\$ 112,000.00	\$8,500.00	\$ 136,000.00
604.325	1	UNIT	Drain Manhole (5' Dia.):	\$6,200.00	\$6,200.00	\$8,000.00	\$ 8,000.00	\$9,800.00	\$ 9,800.00
604.39WQ	1	UNIT	Water Quality Unit (2500 gal.):	\$16,000.00	\$16,000.00	\$35,000.00	\$ 35,000.00	\$35,000.00	\$ 35,000.00
605.418	45	LF	18" Perforated PVC (Schedule 40) Pipe:	\$200.00	\$9,000.00	\$300.00	\$ 13,500.00	\$350.00	\$ 15,750.00
605.7	4	EA.	Underdrain Cleanout Structure:	\$500.00	\$2,000.00	\$1,800.00	\$ 7,200.00	\$450.00	\$ 1,800.00
605.82251	400	LF	24" Aggregate Underdrain, Type 2 w/6 Perf. PE Pipe:	\$50.00	\$20,000.00	\$90.00	\$ 36,000.00	\$50.00	\$ 20,000.00
606.120	132	LF	Beam Guardrail, Standard Section, Steel Post:	\$50.00	\$6,600.00	\$25.00	\$ 3,300.00	\$37.50	\$ 4,950.00
606.1255	2	UNIT	Beam Guardrail, 25'EAGRT - Steel Post:	\$3,000.00	\$6,000.00	\$2,500.00	\$ 5,000.00	\$3,500.00	\$ 7,000.00
606.91	24	LF	Resetting or Setting Guardrail:	\$30.00	\$720.00	\$20.00	\$ 480.00	\$20.00	\$ 480.00
612.61508	60	LF	8" PVC Sewer (where directed):	\$120.00	\$7,200.00	\$180.00	\$ 10,800.00	\$175.00	\$ 10,500.00
621.31	6	EA.	Single Delineator with Post:	\$100.00	\$600.00	\$125.00	\$ 750.00	\$50.00	\$ 300.00
645.533	9	EA.	Inlet Filter Basket: _____	\$100.00	\$900.00	\$60.00	\$ 540.00	\$150.00	\$ 1,350.00
645.81	1	UNIT	Gravel Wetland: _____	\$50,000.00	\$50,000.00	\$80,000.00	\$ 80,000.00	\$80,000.00	\$ 80,000.00
645.82	1	UNIT	Bio-Retention Area:	\$25,000.00	\$25,000.00	\$25,000.00	\$ 25,000.00	\$30,000.00	\$ 30,000.00
900.1	7	UNIT	Rein. Con. PC-1 Headwall (12" to 18" dia. Pipe):	\$3,000.00	\$21,000.00	\$2,000.00	\$14,000.00	\$2,000.00	\$14,000.00
Schedule 2 Total				\$757,795.00		\$973,811.50		\$831,210.00	

SCHEDULE 3: COMMON ITEMS									
203.1	2500	CY	Common Excavation (F):	\$20.00	\$50,000.00	\$5.00	\$ 12,500.00	\$20.00	\$ 50,000.00
214	1	UNIT	Fine Grade: _____	\$20,000.00	\$20,000.00	\$15,000.00	\$ 15,000.00	\$20,000.00	\$ 20,000.00
304.2	100	CY**	Additional Gravel (where directed):	\$32.00	\$3,200.00	\$45.00	\$ 4,500.00	\$40.00	\$ 4,000.00
304.3	100	CY**	Crushed Gravel (where directed):	\$35.00	\$3,500.00	\$45.00	\$ 4,500.00	\$40.00	\$ 4,000.00
304.4	100	CY**	Crushed Stone, Fine Gradation:	\$38.00	\$3,800.00	\$45.00	\$ 4,500.00	\$40.00	\$ 4,000.00
306.108	4600	SY	Reclaimed Stabilized Base, Processed in Place (8" Depth):	\$3.50	\$16,100.00	\$4.00	\$ 18,400.00	\$5.00	\$ 23,000.00
306.208	1310	SY	Reclaimed Stabilized Base, Remove & Rehandle (8" Depth):	\$15.00	\$19,650.00	\$6.00	\$ 7,860.00	\$14.00	\$ 18,340.00
306.36	550	TON	Stone for Reclaimed Stabilized Base:	\$32.00	\$17,600.00	\$40.00	\$ 22,000.00	\$30.00	\$ 16,500.00
403.11A	800	TON	Hot Bit. Pavement - Machine Method (Binder):	\$92.00	\$73,600.00	\$83.00	\$ 66,400.00	\$92.00	\$ 73,600.00
403.11B	500	TON	Hot Bit. Pavement - Machine Method (Wearing Course):	\$102.00	\$51,000.00	\$88.00	\$ 44,000.00	\$98.00	\$ 49,000.00
403.12	100	TON	Hot Bit. Pavement - Hand Method:	\$180.00	\$18,000.00	\$160.00	\$ 16,000.00	\$140.00	\$ 14,000.00
403.99	50	Ton**	Temporary Bit. Pavement (where directed):	\$150.00	\$7,500.00	\$215.00	\$ 10,750.00	\$150.00	\$ 7,500.00
417	400	SY	Cold planing bituminous surfaces:	\$15.00	\$6,000.00	\$15.00	\$ 6,000.00	\$13.00	\$ 5,200.00
618.6	1	Allow	Uniformed Officers:	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$ 10,000.00
618.7	1200	Allow	Uniformed Flaggers:	\$40.00	\$48,000.00	\$43.00	\$ 51,600.00	\$45.00	\$ 54,000.00
619.1	1	UNIT	Maintenance of Traffic:	\$40,000.00	\$40,000.00	\$25,000.00	\$ 25,000.00	\$100,000.00	\$ 100,000.00
628.2	700	LF	Sawed Bituminous Pavement:	\$4.00	\$2,800.00	\$1.00	\$ 700.00	\$1.50	\$ 1,050.00
632.0104	4400	LF	Retroreflective Paint Pavement Marking, Single Solid Line, 4	\$0.60	\$2,640.00	\$1.00	\$ 4,400.00	\$1.00	\$ 4,400.00
632.3118	75	LF	Retroreflective Thermoplastic Pavement Marking, Single Solid	\$30.00	\$2,250.00	\$30.00	\$ 2,250.00	\$25.00	\$ 1,875.00
645.531	500	LF	Silt fence:	\$4.00	\$2,000.00	\$5.00	\$ 2,500.00	\$5.00	\$ 2,500.00
645.9	5.5	UNIT	Silt Boom: _____	\$1,600.00	\$8,800.00	\$250.00	\$ 1,375.00	\$850.00	\$ 4,675.00
646.512	788	SY	Turf establishment with mulch, tackifiers and loam (F):	\$10.00	\$7,890.00	\$5.00	\$ 3,940.00	\$15.00	\$ 11,820.00
645.7	1	UNIT	Stormwater Pollution Prevention Plan:	\$10,000.00	\$10,000.00	\$7,500.00	\$ 7,500.00	\$3,000.00	\$ 3,000.00
645.72	30	HR	Monitoring SWPPP and Erosion and Sediment Controls:	\$75.00	\$2,250.00	\$90.00	\$ 2,700.00	\$90.00	\$ 2,700.00
651.001	3	EA	Evergreen Tree (6'-8' Height):	\$1,000.00	\$3,000.00	\$1,200.00	\$ 3,600.00	\$350.00	\$ 1,050.00
652.002	3	EA	Deciduous Tree (2-1/2"-3" caliper):	\$1,200.00	\$3,600.00	\$1,200.00	\$ 3,600.00	\$725.00	\$ 2,175.00
653.003	20	EA	Shrub (18"-24" Height	\$300.00	\$6,000.00	\$200.00	\$ 4,000.00	\$75.00	\$ 1,500.00
670.0661	9	EA	Remove and Re-set Single Mailbox Assembly:	\$250.00	\$2,250.00	\$250.00	\$ 2,250.00	\$125.00	\$ 1,125.00
692	1	UNIT	Mobilization :	\$90,000.00	\$90,000.00	\$72,000.00	\$ 72,000.00	\$90,000.00	\$ 90,000.00
6C	1	Allow	Archeological Monitoring and Delays :	\$5,000.00	\$5,000.00	\$5,000.00	\$ 5,000.00	\$5,000.00	\$ 5,000.00
912	1	LS	R&R Landscaping:	\$10,000.00	\$10,000.00	\$15,000.00	\$ 15,000.00	\$147,000.00	\$ 147,000.00
1010.2	1	Allow	Asphalt Cement Adjustment:	\$20,000.00	\$20,000.00	\$10,000.00	\$10,000.00	\$10,000.00	\$ 10,000.00
Schedule 3 Total				\$566,430.00		\$459,825.00		\$743,010.00	
Total Construction (Add Schedules 1 to 3)				\$1,881,225.00		\$1,898,738.50		\$2,075,820.00	

ADD ALTERNATE 1 (Granite Curb and Bituminous Sidewalk)									
608.12	440 SY	Bituminous Sidewalk (F), 2" Depth	\$25.00	\$11,000.00	\$45.00	\$ 19,800.00	\$55.00	\$ 24,200.00	
609.01	780 LF	Straight Granite Curb	\$40.00	\$31,200.00	\$75.00	\$58,500.00	\$55.00	\$42,900.00	
Total				\$42,200.00		\$78,300.00		\$67,100.00	



Town Hall
186 Main Street
Newmarket, NH 03857

Tel: (603) 659-3617
Fax: (603) 659-8508

Founded December 15, 1727
Chartered January 1, 1991

TOWN OF NEWMARKET, NEW HAMPSHIRE

STAFF REPORT

DATE: March2, 2022

TITLE: Resolution # 2021/2022-28 - Bennett and Sewall Wells Improvements Project

PREPARED BY: Sean T. Greig Environmental Services Director

TOWN MANAGER'S COMMENTS - RECOMMENDATION:

I recommend passage of this resolution.

BACKGROUND:

The Water Department received bids to make improvements to the Bennett and Sewall wells from North East Earth Mechanics, Penta Corporation, Apex Construction, Sherbon Consolidated, and Defelice Corporation. Due to the Rural Development funds running out, the Bennett Well improvements were bid as a bid alternate. This allows the Town to receive a price and the Town will be able to award the Bennett Well project at a later date if the funds are available. North East Earth Mechanics submitted the lowest bid of \$997,667.50 for Sewall well and \$1,087,667.50 for Bennett well. The project will install new electrical equipment, pumps, metering equipment, chemical equipment and bulk storage, and a new back-up power generator. Underwood Engineers has performed the preliminary and design engineering for the Bennett and Sewall Wells Project. Rural Development has approved Underwood Engineers to perform the project construction engineering for \$178,454.00. The Bennett and Sewall Wells Project will be funded by Rural Development. Project budget is as follows:

Construction (Sewall)	\$997,667.50
Contingency	\$99,700
Construction Engineering	\$178,454.00
Total	\$1,275,821.50

DISCUSSION:

Does the Town Council want to authorize the Town Manager to award the Bennett and Sewall Wells Project construction engineering to Underwood Engineers for \$178,454.00 and the construction contract to North East Earth Mechanics for \$997,667.50 with a total budget for construction, contingency, and construction engineering of \$1,275,821.50 for the Sewall Well improvements.

FISCAL IMPACT:

The Bennett and Sewall Wells Projects will expenses will be paid out of the Rural Development funds for the water projects.

RECOMMENDATION:

I recommend that the Town Council authorize the Town Manager to award the Bennett and Sewall Wells Project construction engineering to Underwood Engineers for \$178,454.00 and the construction contract to North East Earth Mechanics for the sum of \$997,667.50 with a total budget for construction, contingency, and construction engineering of \$1,275,821.50 for the Sewall well improvements.

ATTACHMENTS:

Description	Upload Date	Type
Resolution # 2021/2022-28 - Bennett & Sewall Wells Improvements	2/22/2022	Cover Memo
Bennett & Sewall Well Bid Tab	2/17/2022	Cover Memo
Bennett & Sewall Wells NEEM Award Letter	2/17/2022	Cover Memo
Construction Engineering Contract	2/22/2022	Cover Memo



**TOWN OF NEWMARKET, NEW HAMPSHIRE
By the Newmarket Town Council**

Resolution #2021/2022 - 28

Bennett and Sewall Wells Improvements Project

WHEREAS: The Town has secured funding from Rural Development for the Bennett and Sewall Wells Project; and

WHEREAS: North East Earth Mechanics submitted the lowest bid of \$997,667.50 for the Sewall Well improvements; and

WHEREAS: Underwood Engineers has performed the preliminary and final engineering, and has been approved to perform the construction engineering for \$178,454.00.

NOW, THEREFORE, BE IT RESOLVED BY THE NEWMARKET TOWN COUNCIL THAT:

The Town Manager is authorized to Award the Sewall Well construction portion of the Bennett and Sewall wells project to North East Earth Mechanics for \$997,667.50, and authorize the Town manager to enter into an agreement with Underwood Engineers to perform the construction engineering for \$178,454.00. The Town Council authorizes the following budget for the Bennett and Sewall Wells Project:

Construction (Sewall)	\$997,667.50
Contingency	\$99,700
Construction Engineering	\$178,454.00
Total	\$1,275,821.50

First Reading: March 2, 2022

Second Reading: March 16, 2022

Approval: March 16, 2022

VOTING RECORD			
Date of Vote:	YES	NO	ABSTAIN
Councilor Conley			
Councilor Ward			
Councilor Blackstone			
Councilor Brabec			
Councilor Kiper			
Vice Chair Sanders			
Chair Weinstein			
Total Votes:			
Resolution: Does Does Not pass.			

Approved: _____
Toni Weinstein, Chair Town Council

A True Copy Attest: _____
Terri Littlefield, Town Clerk

BID TABULATION - TOWN OF NEWMARKET
Bid Opening January 26, 2022 at 1:30 pm
2517 - BENNETT & SEWALL PUMPING STATION UPGRADES

BID ITEM	BASE BID	NorthEast Earth Mechanics, LLC	Penta Corporation	Apex Construction, Inc.	Scherbon Consolidated, Inc.	DeFelice Corporation
		COST	COST	COST	COST	COST
1	Sewall Pumping Station Improvements	\$ 958,500.00	\$ 1,105,000.00	\$ 1,110,000.50	\$ 1,199,000.00	\$ 2,650,000.00
2	Asbestos Testing, Removal, Handling & Disposal Allowance	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00
3	Utility Allowance	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00
4	SCADA Programming & Installation Allowance	\$ 9,167.50	\$ 9,167.50	\$ 9,167.50	\$ 9,167.50	\$ 9,167.50
5	Materials Testing Allowance	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00
TOTAL BASE BID PRICE (sum of items 1-5)		\$ 997,667.50	\$ 1,144,167.50	\$ 1,149,168.00	\$ 1,238,167.50	\$ 2,689,167.50

BID ITEM	ADDITIVE ALTERNATE 1 - BENNETT PUMPING STATION IMPROVEMENTS & ALLOWANCES	Northeast Earth Mechanics, Inc.	Penta Corporation	Apex Construction, Inc.	Scherbon Consolidated, Inc.	DeFelice Corporation
		COST	COST	COST	COST	COST
6	Bennett Pumping Station Improvements	\$ 1,048,500.00	\$ 1,308,000.00	\$ 1,210,000.50	\$ 1,289,000.00	\$ 2,350,000.00
7	Asbestos Testing, Removal, Handling & Disposal Allowance	\$ 5,000.0	\$ 5,000.0	\$ 5,000.0	\$ 5,000.0	\$ 5,000.0
8	Utility Allowance	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00	\$ 20,000.00
9	SCADA Programming & Installation Allowance	\$ 9,167.50	\$ 9,167.50	\$ 9,167.50	\$ 9,167.50	\$ 9,167.50
10	Materials Testing Allowance	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00
TOTAL ADD ALT #1 (sum of items 6-10)		\$ 1,087,667.50	\$ 1,347,167.50	\$ 1,249,168.00	\$ 1,328,167.50	\$ 2,389,167.50
TOTAL BASE BID + ADD ALT 1		\$ 2,085,335.00	\$ 2,491,335.00	\$ 2,398,336.00	\$ 2,566,335.00	\$ 5,078,335.00

Addendum #1 Acknowledgement	X	X	X	X	X
Bid Bond	X	X	X	X	X
RD Paperwork	X	X	X	X	X
Experience Statement	X	X	X	X	X

Notes :

THE INFORMATION IN THE ABOVE TABULATION IS A TRUE AND ACCURATE REFLECTION OF THE BIDS AFTER REVIEW BY THE ENGINEER

Bids Tabulated By:



ENGINEER

1/27/2022

DATE:

Bids Checked By:



ENGINEER

2/8/2022

DATE:

2517.21

February 9, 2022

Mr. Sean Greig
Town of Newmarket, Environmental Services
8 Young Lane
Newmarket, NH 03827

***Re: Recommendation of Contract Award
Bennett & Sewall Pumping Station Improvements
Newmarket, New Hampshire***

Dear Mr. Greig:

We have reviewed the bids for the referenced project received on January 26, 2022. The lowest bidder is NorthEast Earth Mechanics, LLC of Pittsfield, New Hampshire with a Total Bid Price of **\$2,085,335.00**. The Sewell Pumping Station Base Bid (Basis of Award) is in the amount of **\$997,667.50**. The Bennett Pumping Station Additive Alternate 1 is in the amount of **\$1,087,667.50**. The signed Bid Tabulation is attached.

We have reviewed letters from their bank and bonding agency and conducted telephone interviews with three references from their current and previous experience. Based on these positive findings, we recommend that the Town of Newmarket award the above referenced project to NorthEast Earth Mechanics, LLC in the Base Bid Amount of **\$997,667.50** as the lowest responsive and responsible bidder. In support of this recommendation, we have attached copies of the following information:

1. Signed Bid Tabulation
2. Northeast Earth Mechanics Bid, Bid Bond, and Compliance Statements
3. Letters from Northeast Earth Mechanics Bank and Bonding Agency included in Bid
4. Reference Interviews

Please note the Contract cannot be awarded until USDA Rural Development has reviewed the bid results and all required information. Once USDA RD determines that everything is satisfactory, they will issue a letter authorizing award of the Contract. Once you receive approval to award the Contract from USDA RD, we will then schedule for the contracts to be signed.

We will proceed to make a formal request to USDA RD to obtain authorization for the Town to award this project.

Page 2
Mr. Sean Greig
February 9, 2022

Please call me at 230-9898 if you have any questions.
Very truly yours,

UNDERWOOD ENGINEERS, INC.



Devon W. Smith, P.E.
Project Manager

Encl.

cc:



**AGREEMENT
BETWEEN OWNER AND ENGINEER
FOR PROFESSIONAL SERVICES**

THIS IS AN AGREEMENT effective as of _____ (“Effective Date”) between
Town of Newmarket, New Hampshire (“Owner”) and
Underwood Engineers, Inc. (“Engineer”).

Owner's Project, of which Engineer's services under this Agreement are a part, is generally identified as follows:

Bennett and Sewall Pump Station Upgrades – Construction Phase

Other terms used in this Agreement are defined in Article 7.

Engineer's services under this Agreement are generally identified as follows:

Construction Phase Engineering Services for demolition and reconstruction of the existing Bennett and Sewall Pump Stations

Owner and Engineer further agree as follows:

ARTICLE 1 – SERVICES OF ENGINEER

1.01 Scope

- A. Engineer shall provide, or cause to be provided, the services set forth herein and in Exhibit A.

ARTICLE 2 – OWNER’S RESPONSIBILITIES

2.01 General

- A. Owner shall have the responsibilities set forth herein and in Exhibit B.
- B. Owner shall pay Engineer as set forth in Article 4 and Exhibit C.
- C. Owner shall be responsible for all requirements and instructions that it furnishes to Engineer pursuant to this Agreement, and for the accuracy and completeness of all programs, reports, data, and other information furnished by Owner to Engineer pursuant to this Agreement. Engineer may use and rely upon such requirements, programs, instructions, reports, data, and information in performing or furnishing services under this Agreement, subject to any express limitations or reservations applicable to the furnished items.
- D. Owner shall give prompt written notice to Engineer whenever Owner observes or otherwise becomes aware of:
 - 1. any development that affects the scope or time of performance of Engineer’s services;
 - 2. the presence at the Site of any Constituent of Concern; or

3. any relevant, material defect or nonconformance in: (a) Engineer's services, (b) the Work, (c) the performance of any Constructor, or (d) Owner's performance of its responsibilities under this Agreement.

ARTICLE 3 – SCHEDULE FOR RENDERING SERVICES

3.01 *Commencement*

- A. Engineer is authorized to begin rendering services as of the Effective Date.

3.02 *Time for Completion*

- A. Engineer shall complete its obligations within a reasonable time. Specific periods of time for rendering services, or specific dates by which services are to be completed, are provided in Exhibit A, and are hereby agreed to be reasonable.
- B. If, through no fault of Engineer, such periods of time or dates are changed, or the orderly and continuous progress of Engineer's services is impaired, or Engineer's services are delayed or suspended, then the time for completion of Engineer's services, and the rates and amounts of Engineer's compensation, shall be adjusted equitably.
- C. If Owner authorizes changes in the scope, extent, or character of the Project or Engineer's services, then the time for completion of Engineer's services, and the rates and amounts of Engineer's compensation, shall be adjusted equitably.
- D. Owner shall make decisions and carry out its other responsibilities in a timely manner so as not to delay the Engineer's performance of its services.
- E. If Engineer fails, through its own fault, to complete the performance required in this Agreement within the time set forth, as duly adjusted, then Owner shall be entitled, as its sole remedy, to the recovery of direct damages, if any, resulting from such failure.

ARTICLE 4 – INVOICES AND PAYMENTS

4.01 *Invoices*

- A. *Preparation and Submittal of Invoices:* Engineer shall prepare invoices in accordance with its standard invoicing practices and the terms of Exhibit C. Engineer shall submit its invoices to Owner on a monthly basis. Invoices are due and payable within 30 days of receipt. **Invoices will include a breakdown of services provided.**

4.02 *Payments*

- A. *Application to Interest and Principal:* Payment will be credited first to any interest owed to Engineer and then to principal.
- B. *Failure to Pay:* If Owner fails to make any payment due Engineer for services and expenses within 30 days after receipt of Engineer's invoice, then:
 1. amounts due Engineer will be increased at the rate of 1.0% per month (or the maximum rate of interest permitted by law, if less) from said thirtieth day; and

2. Engineer may, after giving seven days written notice to Owner, suspend services under this Agreement until Owner has paid in full all amounts due for services, expenses, and other related charges. Owner waives any and all claims against Engineer for any such suspension.
- C. *Disputed Invoices:* If Owner disputes an invoice, either as to amount or entitlement, then Owner shall promptly advise Engineer in writing of the specific basis for doing so, may withhold only that portion so disputed, and must pay the undisputed portion subject to the terms of Paragraph 4.01.
- D. *Sales or Use Taxes:* If after the Effective Date any governmental entity takes a legislative action that imposes additional sales or use taxes on Engineer's services or compensation under this Agreement, then Engineer may invoice such additional sales or use taxes for reimbursement by Owner. Owner shall reimburse Engineer for the cost of such invoiced additional sales or use taxes; such reimbursement shall be in addition to the compensation to which Engineer is entitled under the terms of Exhibit C.

ARTICLE 5 – OPINIONS OF COST

5.01 *Opinions of Probable Construction Cost*

- A. Engineer's opinions (if any) of probable Construction Cost are to be made on the basis of Engineer's experience, qualifications, and general familiarity with the construction industry. However, because Engineer has no control over the cost of labor, materials, equipment, or services furnished by others, or over contractors' methods of determining prices, or over competitive bidding or market conditions, Engineer cannot and does not guarantee that proposals, bids, or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by Engineer. If Owner requires greater assurance as to probable Construction Cost, then Owner agrees to obtain an independent cost estimate.
- B. **Opinions of Probable Cost and any revisions thereof should reflect compliance with American Iron & Steel requirements mandated by Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A – Agricultural, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference.**

5.02 *Designing to Construction Cost Limit*

- A. If a Construction Cost limit is established between Owner and Engineer, such Construction Cost limit and a statement of Engineer's rights and responsibilities with respect thereto will be specifically set forth in Exhibit F to this Agreement.

5.03 *Opinions of Total Project Costs*

- A. The services, if any, of Engineer with respect to Total Project Costs shall be limited to assisting the Owner in tabulating the various categories that comprise Total Project Costs. Engineer assumes no responsibility for the accuracy of any opinions of Total Project Costs.

- B. **Opinions of Total Project Costs and any revisions thereof should reflect compliance with American Iron & Steel requirements mandated by Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A – Agricultural, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference.**

ARTICLE 6 – GENERAL CONSIDERATIONS

6.01 *Standards of Performance*

- A. *Standard of Care:* The standard of care for all professional engineering and related services performed or furnished by Engineer under this Agreement will be the care and skill ordinarily used by members of the subject profession practicing under similar circumstances at the same time and in the same locality. Engineer makes no warranties, express or implied, under this Agreement or otherwise, in connection with any services performed or furnished by Engineer.
- B. *Technical Accuracy:* Owner shall not be responsible for discovering deficiencies in the technical accuracy of Engineer's services. Engineer shall correct deficiencies in technical accuracy without additional compensation, unless such corrective action is directly attributable to deficiencies in Owner-furnished information.
- C. *Consultants:* Engineer may retain such Consultants as Engineer deems necessary to assist in the performance or furnishing of the services, subject to reasonable, timely, and substantive objections by Owner.
- D. *Reliance on Others:* Subject to the standard of care set forth in Paragraph 6.01.A, Engineer and its Consultants may use or rely upon design elements and information ordinarily or customarily furnished by others, including, but not limited to, specialty contractors, manufacturers, suppliers, and the publishers of technical standards.
- E. *Compliance with Laws and Regulations, and Policies and Procedures:*
 - 1. Engineer and Owner shall comply with applicable Laws and Regulations.
 - 2. Engineer shall comply with any and all policies, procedures, and instructions of Owner that are applicable to Engineer's performance of services under this Agreement and that Owner provides to Engineer in writing, subject to the standard of care set forth in Paragraph 6.01.A, and to the extent compliance is not inconsistent with professional practice requirements.
 - 3. This Agreement is based on Laws and Regulations and Owner-provided written policies and procedures as of the Effective Date. The following may be the basis for modifications to Owner's responsibilities or to Engineer's scope of services, times of performance, or compensation:
 - a. changes after the Effective Date to Laws and Regulations;
 - b. the receipt by Engineer after the Effective Date of Owner-provided written policies and procedures;

- c. changes after the Effective Date to Owner-provided written policies or procedures.
- F. Engineer shall not be required to sign any document, no matter by whom requested, that would result in the Engineer having to certify, guarantee, or warrant the existence of conditions whose existence the Engineer cannot ascertain. Owner agrees not to make resolution of any dispute with the Engineer or payment of any amount due to the Engineer in any way contingent upon the Engineer signing any such document.
- G. The general conditions for any construction contract documents prepared hereunder are to be EJCDC® C-700 "Standard General Conditions of the Construction Contract" (2013 Edition), prepared by the Engineers Joint Contract Documents Committee, unless expressly indicated otherwise in Exhibit J or elsewhere in this Agreement.
- H. Engineer shall not at any time supervise, direct, control, or have authority over any Constructor's work, nor shall Engineer have authority over or be responsible for the means, methods, techniques, sequences, or procedures of construction selected or used by any Constructor, or the safety precautions and programs incident thereto, for security or safety at the Site, nor for any failure of a Constructor to comply with Laws and Regulations applicable to that Constructor's furnishing and performing of its work. Engineer shall not be responsible for the acts or omissions of any Constructor.
- I. Engineer neither guarantees the performance of any Constructor nor assumes responsibility for any Constructor's, failure to furnish and perform the Work in accordance with the Construction Contract Documents.
- J. Engineer shall not be responsible for any decision made regarding the Construction Contract Documents, or any application, interpretation, clarification, or modification of the Construction Contract Documents, other than those made by Engineer or its Consultants.
- K. Engineer is not required to provide and does not have any responsibility for surety bonding or insurance-related advice, recommendations, counseling, or research, or enforcement of construction insurance or surety bonding requirements.
- L. Engineer's services do not include providing legal advice or representation.
- M. Engineer's services do not include (1) serving as a "municipal advisor" for purposes of the registration requirements of Section 975 of the Dodd-Frank Wall Street Reform and Consumer Protection Act (2010) or the municipal advisor registration rules issued by the Securities and Exchange Commission, or (2) advising Owner, or any municipal entity or other person or entity, regarding municipal financial products or the issuance of municipal securities, including advice with respect to the structure, timing, terms, or other similar matters concerning such products or issuances.
- N. While at the Site, Engineer, its Consultants, and their employees and representatives shall comply with the applicable requirements of Contractor's and Owner's safety programs of which Engineer has been informed in writing.

6.02 *Design Without Construction Phase Services*

- A. Engineer shall be responsible only for those Construction Phase services expressly required of Engineer in Exhibit A, Paragraph A1.05. With the exception of such expressly required services, Engineer shall have no design, Shop Drawing review, or other obligations during construction, and Owner assumes all responsibility for the application and interpretation of the Construction Contract Documents, review and response to Contractor claims, Construction Contract administration, processing of Change Orders and submittals, revisions to the Construction Contract Documents during construction, construction observation and review, review of Contractor's payment applications, and all other necessary Construction Phase administrative, engineering, and professional services. Owner waives all claims against the Engineer that may be connected in any way to Construction Phase administrative, engineering, or professional services except for those services that are expressly required of Engineer in Exhibit A.

6.03 *Use of Documents*

- A. All Documents are instruments of service, and Engineer shall retain an ownership and property interest therein (including the copyright and the right of reuse at the discretion of the Engineer) whether or not the Project is completed.
- B. If Engineer is required to prepare or furnish Drawings or Specifications under this Agreement, Engineer shall deliver to Owner at least one original printed record version of such Drawings and Specifications, signed and sealed according to applicable Laws and Regulations.
- C. Owner may make and retain copies of Documents for information and reference in connection with the use of the Documents on the Project. Engineer grants Owner a limited license to use the Documents on the Project, extensions of the Project, and for related uses of the Owner, subject to receipt by Engineer of full payment due and owing for all services relating to preparation of the Documents, and subject to the following limitations: (1) Owner acknowledges that such Documents are not intended or represented to be suitable for use on the Project unless completed by Engineer, or for use or reuse by Owner or others on extensions of the Project, on any other project, or for any other use or purpose, without written verification or adaptation by Engineer; (2) any such use or reuse, or any modification of the Documents, without written verification, completion, or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Owner's sole risk and without liability or legal exposure to Engineer or to its officers, directors, members, partners, agents, employees, and Consultants; (3) Owner shall indemnify and hold harmless Engineer and its officers, directors, members, partners, agents, employees, and Consultants from all claims, damages, losses, and expenses, including attorneys' fees, arising out of or resulting from any use, reuse, or modification of the Documents without written verification, completion, or adaptation by Engineer; and (4) such limited license to Owner shall not create any rights in third parties.
- D. If Engineer at Owner's request verifies the suitability of the Documents, completes them, or adapts them for extensions of the Project or for any other purpose, then Owner shall compensate Engineer at rates or in an amount to be agreed upon by Owner and Engineer.

6.04 *Electronic Transmittals*

- A. Owner and Engineer may transmit, and shall accept, Project-related correspondence, Documents, text, data, drawings, information, and graphics, in electronic media or digital format, either directly, or through access to a secure Project website, in accordance with a mutually agreeable protocol.
- B. If this Agreement does not establish protocols for electronic or digital transmittals, then Owner and Engineer ~~shall~~ **may** jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

6.05 *Insurance*

- A. Engineer shall procure and maintain insurance as set forth in Exhibit G. Engineer shall cause Owner to be listed as an additional insured on any applicable general liability insurance policy carried by Engineer.
- B. Owner shall procure and maintain insurance as set forth in Exhibit G. Owner shall cause Engineer and its Consultants to be listed as additional insureds on any general liability policies carried by Owner, which are applicable to the Project.
- C. Owner shall require Contractor to purchase and maintain policies of insurance covering workers' compensation, general liability, motor vehicle damage and injuries, and other insurance necessary to protect Owner's and Engineer's interests in the Project. Owner shall require Contractor to cause Engineer and its Consultants to be listed as additional insureds with respect to such liability insurance purchased and maintained by Contractor for the Project.
- D. Owner and Engineer shall each deliver to the other certificates of insurance evidencing the coverages indicated in Exhibit G. Such certificates shall be furnished prior to commencement of Engineer's services and at renewals thereafter during the life of the Agreement.
- E. All policies of property insurance relating to the Project, including but not limited to any builder's risk policy, shall allow for waiver of subrogation rights and contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insured thereunder or against Engineer or its Consultants. Owner and Engineer waive all rights against each other, Contractor, the Consultants, and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by any builder's risk policy and any other property insurance relating to the Project. Owner and Engineer shall take appropriate measures in other Project-related contracts to secure waivers of rights consistent with those set forth in this paragraph.

- F. All policies of insurance shall contain a provision or endorsement that the coverage afforded will not be canceled or reduced in limits by endorsement, and that renewal will not be refused, until at least 10 days prior written notice has been given to the primary insured. Upon receipt of such notice, the receiving party shall promptly forward a copy of the notice to the other party to this Agreement.
- G. At any time, Owner may request that Engineer or its Consultants, at Owner's sole expense, provide additional insurance coverage, increased limits, or revised deductibles that are more protective than those specified in Exhibit G. If so requested by Owner, and if commercially available, Engineer shall obtain and shall require its Consultants to obtain such additional insurance coverage, different limits, or revised deductibles for such periods of time as requested by Owner, and Exhibit G will be supplemented to incorporate these requirements.

6.06 *Suspension and Termination*

A. *Suspension:*

- 1. *By Owner:* Owner may suspend the Project for up to 90 days upon seven days written notice to Engineer.
- 2. *By Engineer:* Engineer may, after giving seven days written notice to Owner, suspend services under this Agreement if Owner has failed to pay Engineer for invoiced services and expenses, as set forth in Paragraph 4.02.B, or in response to the presence of Constituents of Concern at the Site, as set forth in Paragraph 6.10.D.

B. *Termination:* The obligation to provide further services under this Agreement may be terminated:

- 1. For cause,
 - a. by either party upon 30 days written notice in the event of substantial failure by the other party to perform in accordance with the terms hereof through no fault of the terminating party.
 - b. by Engineer:
 - 1) upon seven days written notice if Owner demands that Engineer furnish or perform services contrary to Engineer's responsibilities as a licensed professional; or
 - 2) upon seven days written notice if the Engineer's services for the Project are delayed or suspended for more than 90 days for reasons beyond Engineer's control, or as the result of the presence at the Site of undisclosed Constituents of Concern, as set forth in Paragraph 6.10.D.
 - 3) Engineer shall have no liability to Owner on account of such termination.
 - c. Notwithstanding the foregoing, this Agreement will not terminate under Paragraph 6.06.B.1.a if the party receiving such notice begins, within seven days of

receipt of such notice, to correct its substantial failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt thereof; provided, however, that if and to the extent such substantial failure cannot be reasonably cured within such 30 day period, and if such party has diligently attempted to cure the same and thereafter continues diligently to cure the same, then the cure period provided for herein shall extend up to, but in no case more than, 60 days after the date of receipt of the notice.

2. For convenience, by Owner effective upon Engineer's receipt of notice from Owner.
- C. *Effective Date of Termination:* The terminating party under Paragraph 6.06.B may set the effective date of termination at a time up to 30 days later than otherwise provided to allow Engineer to demobilize personnel and equipment from the Site, to complete tasks whose value would otherwise be lost, to prepare notes as to the status of completed and uncompleted tasks, and to assemble Project materials in orderly files.
- D. *Payments Upon Termination:*
1. In the event of any termination under Paragraph 6.06, Engineer will be entitled to invoice Owner and to receive full payment for all services performed or furnished in accordance with this Agreement and all Reimbursable Expenses incurred through the effective date of termination. Upon making such payment, Owner shall have the limited right to the use of Documents, at Owner's sole risk, subject to the provisions of Paragraph 6.03.
 2. In the event of termination by Owner for convenience or by Engineer for cause, Engineer shall be entitled, in addition to invoicing for those items identified in Paragraph 6.06.D.1, to invoice Owner and receive payment of a reasonable amount for services and expenses directly attributable to termination, both before and after the effective date of termination, such as reassignment of personnel, costs of terminating contracts with Engineer's Consultants, and other related close-out costs, using methods and rates for Additional Services as set forth in Exhibit C.

6.07 *Controlling Law*

- A. This Agreement is to be governed by the Laws and Regulations of the state in which the Project is located.

6.08 *Successors, Assigns, and Beneficiaries*

- A. Owner and Engineer are hereby bound and the successors, executors, administrators, and legal representatives of Owner and Engineer (and to the extent permitted by Paragraph 6.08.B the assigns of Owner and Engineer) are hereby bound to the other party to this Agreement and to the successors, executors, administrators and legal representatives (and said assigns) of such other party, in respect of all covenants, agreements, and obligations of this Agreement.
- B. Neither Owner nor Engineer may assign, sublet, or transfer any rights under or interest (including, but without limitation, money that is due or may become due) in this Agreement without the written consent of the other party, except to the extent that any

assignment, subletting, or transfer is mandated by law. Unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under this Agreement.

- C. Unless expressly provided otherwise in this Agreement:
 - 1. Nothing in this Agreement shall be construed to create, impose, or give rise to any duty owed by Owner or Engineer to any Constructor, other third-party individual or entity, or to any surety for or employee of any of them.
 - 2. All duties and responsibilities undertaken pursuant to this Agreement will be for the sole and exclusive benefit of Owner and Engineer and not for the benefit of any other party.
 - 3. Owner agrees that the substance of the provisions of this Paragraph 6.08.C shall appear in the Construction Contract Documents.

6.09 *Dispute Resolution*

- A. Owner and Engineer agree to negotiate all disputes between them in good faith for a period of 30 days from the date of notice prior to invoking the procedures of Exhibit H or other provisions of this Agreement, or exercising their rights at law.
- B. If the parties fail to resolve a dispute through negotiation under Paragraph 6.09.A, then either or both may invoke the procedures of Exhibit H. If Exhibit H is not included, or if no dispute resolution method is specified in Exhibit H, then the parties may exercise their rights at law.

6.10 *Environmental Condition of Site*

- A. Owner represents to Engineer that as of the Effective Date to the best of Owner's knowledge no Constituents of Concern, other than those disclosed in writing to Engineer, exist at or adjacent to the Site.
- B. If Engineer encounters or learns of an undisclosed Constituent of Concern at the Site, then Engineer shall notify (1) Owner and (2) appropriate governmental officials if Engineer reasonably concludes that doing so is required by applicable Laws or Regulations.
- C. It is acknowledged by both parties that Engineer's scope of services does not include any services related to unknown or undisclosed Constituents of Concern. If Engineer or any other party encounters, uncovers, or reveals an undisclosed Constituent of Concern, then Owner shall promptly determine whether to retain a qualified expert to evaluate such condition or take any necessary corrective action.
- D. If investigative or remedial action, or other professional services, are necessary with respect to undisclosed Constituents of Concern, or if investigative or remedial action beyond that reasonably contemplated is needed to address a disclosed or known Constituent of Concern, then Engineer may, at its option and without liability for consequential or any other damages, suspend performance of services on the portion of the Project affected thereby until such portion of the Project is no longer affected.

- E. If the presence at the Site of undisclosed Constituents of Concern adversely affects the performance of Engineer's services under this Agreement, then the Engineer shall have the option of (1) accepting an equitable adjustment in its compensation or in the time of completion, or both; or (2) terminating this Agreement for cause on seven days notice.
- F. Owner acknowledges that Engineer is performing professional services for Owner and that Engineer is not and shall not be required to become an "owner," "arranger," "operator," "generator," or "transporter" of hazardous substances, as defined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, which are or may be encountered at or near the Site in connection with Engineer's activities under this Agreement.

6.11 *Indemnification and Mutual Waiver*

- A. *Indemnification by Engineer:* To the fullest extent permitted by Laws and Regulations, Engineer shall indemnify and hold harmless Owner, and Owner's officers, directors, members, partners, agents, consultants, and employees, from losses, damages, and judgments (including reasonable consultants' and attorneys' fees and expenses) arising from third-party claims or actions relating to the Project, provided that any such claim, action, loss, damages, or judgment is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Engineer or Engineer's officers, directors, members, partners, agents, employees, or Consultants. **This indemnification provision is subject to and limited by the provisions, if any, agreed to by Owner and Engineer in Exhibit I, "Limitations of Liability."**
- B. *Indemnification by Owner:* Owner shall indemnify and hold harmless Engineer and its officers, directors, members, partners, agents, employees, and Consultants as required by Laws and Regulations **and to the extent (if any) required in Exhibit I, "Limitations of Liability."**
- C. *Environmental Indemnification:* To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Engineer and its officers, directors, members, partners, agents, employees, and Consultants from all claims, costs, losses, damages, actions, and judgments (including reasonable consultants' and attorneys fees and expenses) caused by, arising out of, relating to, or resulting from a Constituent of Concern at, on, or under the Site, provided that (1) any such claim, cost, loss, damages, action, or judgment is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, and (2) nothing in this paragraph shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence or willful misconduct.
- D. *No Defense Obligation:* The indemnification commitments in this Agreement do not include a defense obligation by the indemnitor unless such obligation is expressly stated.
- E. *Percentage Share of Negligence:* To the fullest extent permitted by Laws and Regulations, a party's total liability to the other party and anyone claiming by, through, or under the other party for any cost, loss, or damages caused in part by the negligence of the party

and in part by the negligence of the other party or any other negligent entity or individual, shall not exceed the percentage share that the party's negligence bears to the total negligence of Owner, Engineer, and all other negligent entities and individuals.

- F. *Mutual Waiver:* To the fullest extent permitted by Laws and Regulations, Owner and Engineer waive against each other, and the other's employees, officers, directors, members, agents, insurers, partners, and consultants, any and all claims for or entitlement to special, incidental, indirect, or consequential damages arising out of, resulting from, or in any way related to this Agreement or the Project, from any cause or causes.

6.12 *Records Retention*

- A. Engineer shall maintain on file in legible form, for a period of five years following completion or termination of its services, all Documents, records (including cost records), and design calculations related to Engineer's services or pertinent to Engineer's performance under this Agreement. Upon Owner's request, Engineer shall provide a copy of any such item to Owner at cost.

6.13 *Miscellaneous Provisions*

- A. *Notices:* Any notice required under this Agreement will be in writing, addressed to the appropriate party at its address on the signature page and given personally, by registered or certified mail postage prepaid, or by a commercial courier service. All notices shall be effective upon the date of receipt.
- B. *Survival:* All express representations, waivers, indemnifications, and limitations of liability included in this Agreement will survive its completion or termination for any reason.
- C. *Severability:* Any provision or part of the Agreement held to be void or unenforceable under any Laws or Regulations shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Engineer, which agree that the Agreement shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- D. *Waiver:* A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Agreement.
- E. *Accrual of Claims:* To the fullest extent permitted by Laws and Regulations, all causes of action arising under this Agreement shall be deemed to have accrued, and all statutory periods of limitation shall commence, no later than the date of Substantial Completion.

ARTICLE 7 – DEFINITIONS

7.01 *Defined Terms*

- A. Wherever used in this Agreement (including the Exhibits hereto) terms (including the singular and plural forms) printed with initial capital letters have the meanings indicated in the text above, in the exhibits, or in the following definitions:

1. *Addenda*—Written or graphic instruments issued prior to the opening of bids which clarify, correct, or change the bidding requirements or the proposed Construction Contract Documents.
2. *Additional Services*—The services to be performed for or furnished to Owner by Engineer in accordance with Part 2 of Exhibit A of this Agreement.
3. *Agreement*—This written contract for professional services between Owner and Engineer, including all exhibits identified in Paragraph 8.01 and any duly executed amendments.
4. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Construction Contract.
5. *Basic Services*—The services to be performed for or furnished to Owner by Engineer in accordance with Part 1 of Exhibit A of this Agreement.
6. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Construction Contract Price or the Construction Contract Times, or other revision to the Construction Contract, issued on or after the effective date of the Construction Contract.
7. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth in the Construction Contract, seeking an adjustment in Construction Contract Price or Construction Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Construction Contract Documents or the acceptability of Work under the Construction Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Construction Contract.
8. *Constituent of Concern*—Asbestos, petroleum, radioactive material, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, State, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
9. *Construction Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
10. *Construction Contract Documents*—Those items designated as “Contract Documents” in the Construction Contract, and which together comprise the Construction Contract.

11. *Construction Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Construction Contract Documents.
12. *Construction Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve milestones, if any, in the Construction Contract; (b) achieve Substantial Completion; and (c) complete the Work.
13. *Construction Cost*—The cost to Owner of the construction of those portions of the entire Project designed or specified by or for Engineer under this Agreement, including construction labor, services, materials, equipment, insurance, and bonding costs, and allowances for contingencies. Construction Cost does not include costs of services of Engineer or other design professionals and consultants; cost of land or rights-of-way, or compensation for damages to property; Owner's costs for legal, accounting, insurance counseling, or auditing services; interest or financing charges incurred in connection with the Project; or the cost of other services to be provided by others to Owner. Construction Cost is one of the items comprising Total Project Costs.
14. *Constructor*—Any person or entity (not including the Engineer, its employees, agents, representatives, and Consultants), performing or supporting construction activities relating to the Project, including but not limited to Contractors, Subcontractors, Suppliers, Owner's work forces, utility companies, other contractors, construction managers, testing firms, shippers, and truckers, and the employees, agents, and representatives of any or all of them.
15. *Consultants*—Individuals or entities having a contract with Engineer to furnish services with respect to this Project as Engineer's independent professional associates and consultants; subcontractors; or vendors.
16. *Contractor*—The entity or individual with which Owner enters into a Construction Contract.
17. *Documents*—Data, reports, Drawings, Specifications, Record Drawings, building information models, civil integrated management models, and other deliverables, whether in printed or electronic format, provided or furnished in appropriate phases by Engineer to Owner pursuant to this Agreement.
18. *Drawings*—That part of the Construction Contract Documents that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date*—The date indicated in this Agreement on which it becomes effective, but if no such date is indicated, the date on which this Agreement is signed and delivered by the last of the parties to sign and deliver.
20. *Engineer*—The individual or entity named as such in this Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Construction Contract Price or the Construction Contract Times.

22. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
23. *Owner*—The individual or entity named as such in this Agreement and for which Engineer's services are to be performed. Unless indicated otherwise, this is the same individual or entity that will enter into any Construction Contracts concerning the Project.
24. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the services to be performed or furnished by Engineer under this Agreement are a part.
25. *Record Drawings*—Drawings depicting the completed Project, or a specific portion of the completed Project, prepared by Engineer ~~as an Additional Service~~ and based on Contractor's record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications, as delivered to Engineer and annotated by Contractor to show changes made during construction.
26. *Reimbursable Expenses*—The expenses incurred directly by Engineer in connection with the performing or furnishing of Basic Services and Additional Services for the Project.
27. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site during the Construction Phase. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative. The duties and responsibilities of the Resident Project Representative, if any, are as set forth in Exhibit D.
28. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
29. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Construction Contract Documents.
30. *Site*—Lands or areas to be indicated in the Construction Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
31. *Specifications*—The part of the Construction Contract Documents that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

32. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
33. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Construction Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
34. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
35. *Total Project Costs*—The total cost of planning, studying, designing, constructing, testing, commissioning, and start-up of the Project, including Construction Cost and all other Project labor, services, materials, equipment, insurance, and bonding costs, allowances for contingencies, and the total costs of services of Engineer or other design professionals and consultants, together with such other Project-related costs that Owner furnishes for inclusion, including but not limited to cost of land, rights-of-way, compensation for damages to properties, Owner’s costs for legal, accounting, insurance counseling, and auditing services, interest and financing charges incurred in connection with the Project, and the cost of other services to be provided by others to Owner.
36. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Construction Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Construction Contract Documents.
37. *Work Change Directive*—A written directive to Contractor issued on or after the effective date of the Construction Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.
38. ***Agency* – The Rural Utilities Service or any designated representative of Rural Utilities Service, including USDA, Rural Development**

B. *Day*:

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

ARTICLE 8 – EXHIBITS AND SPECIAL PROVISIONS

8.01 *Exhibits Included*:

- A. Exhibit A, Engineer’s Services.

- B. Exhibit B, Owner's Responsibilities.
- C. Exhibit C, Payments to Engineer for Services and Reimbursable Expenses.
- D. Exhibit D, Duties, Responsibilities and Limitations of Authority of Resident Project Representative.
- E. Exhibit E, Notice of Acceptability of Work.
- ~~F. Exhibit F, Construction Cost Limit.~~ **(NOT USED)**
- G. Exhibit G, Insurance.
- H. Exhibit H, Dispute Resolution.
- I. Exhibit I, Limitations of Liability.
- J. Exhibit J, Special Provisions.
- K. Exhibit K, Amendment to Owner-Engineer Agreement.

8.02 *Total Agreement*

- A. This Agreement, (together with the exhibits included above) constitutes the entire agreement between Owner and Engineer and supersedes all prior written or oral understandings. This Agreement may only be amended, supplemented, modified, or canceled by a written instrument duly executed by both parties. Amendments should be based whenever possible on the format of Exhibit K to this Agreement.

8.03 *Designated Representatives*

- A. With the execution of this Agreement, Engineer and Owner shall designate specific individuals to act as Engineer's and Owner's representatives with respect to the services to be performed or furnished by Engineer and responsibilities of Owner under this Agreement. Such an individual shall have authority to transmit instructions, receive information, and render decisions relative to this Agreement on behalf of the respective party whom the individual represents.

8.04 *Engineer's Certifications*

- A. Engineer certifies that it has not engaged in corrupt, fraudulent, or coercive practices in competing for or in executing the Agreement. For the purposes of this Paragraph 8.04:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the selection process or in the Agreement execution;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the selection process or the execution of the Agreement to the detriment of Owner, or (b) to deprive Owner of the benefits of free and open competition;

3. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the selection process or affect the execution of the Agreement.

8.05 **Federal Requirements**

- A. **Agency Concurrence.** Signature of a duly authorized representative of the Agency in the space provided on the signature page of EJCDC form E-500 hereof does not constitute a commitment to provide financial assistance or payments hereunder but does signify that this Agreement conforms to Agency's applicable requirements. This Agreement shall not be effective unless the Funding Agency's designated representative concurs. No amendment to this Agreement shall be effective unless the Funding Agency's designated representative concurs.
- B. **Audit and Access to Records.** Owner, Agency, the Comptroller General of the United States, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Engineer which are pertinent to the Agreement, for the purpose of making audits, examinations, excerpts, and transcriptions. Engineer shall maintain all required records for three years after final payment is made and all other pending matters are closed.
- C. **Restrictions on Lobbying.** Engineer and each Consultant shall comply with "Restrictions on Lobbying" if they are recipients of engineering services contracts and subcontracts that exceed \$100,000 at any tier. If applicable, Engineer must complete a certification form on lobbying activities related to a specific Federal loan or grant that is a funding source for this Agreement. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other applicable award. Each tier shall disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Certifications and disclosures are forwarded from tier to tier up to the Owner. Necessary certification and disclosure forms shall be provided by Owner.
- D. **Suspension and Debarment.** Engineer certifies, by signing this Agreement, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any Federal department or agency. Engineer will not contract with any Consultant for this project if it or its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. Necessary certification forms shall be provided by the Owner. The Engineer will complete and submit a form AD-1048, "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – lower tier transactions," to the Owner who will forward it the USDA, Rural Development processing office.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement, the Effective Date of which is indicated on page 1.

Owner: Town of Newmarket, NH

Engineer: Underwood Engineers, Inc

By: _____
Print name: Stephen Fournier
Title: Town Manager
Date Signed: _____

By: _____
Print name: Keith A. Pratt, P.E.
Title: President
Date Signed: _____

By: _____
Print name: David J. Mercier, P.E.
Title: Vice President
Date Signed: _____

Engineer License or Firm's Certificate No. (if required)

State of _____

Address for Owner's receipt of notices:

186 Main Street
Newmarket, NH 03857
Designated Representative (Paragraph 8.03.A):
Stephen Fournier
Title: Town Manager
Phone Number: 603-659-3617
E-Mail Address: sfournier@newmarketnh.gov

Address for Engineer's receipt of notices:

25 Vaughan Mall
Portsmouth, NH 03801
Designated Representative (Paragraph 8.03.A):
David J Mercier, P.E.
Title: Vice President
Phone Number: 603-230-9898
E-Mail Address: dmercier@underwoodengineers.com

ENGINEER AGREEMENT CERTIFICATION

PROJECT NAME: _____

The Engineer and Owner hereby concur in the Funding Agency acceptable revisions to E-500 identified in RUS Bulletin 1780-26. In addition, Engineer certifies to the following:

All modifications to E-500 have been made in accordance the terms of the license agreement, which states in part that the Engineer “must plainly show all changes to the Standard EJCDC Text, using ‘Track Changes’ (redline/strikeout), highlighting, or other means of clearly indicating additions and deletions.” Such other means may include attachments indicating changes (e.g. Supplementary Conditions modifying the General Conditions).

SUMMARY OF ENGINEERING FEES

Note that the fees indicated on this table are only a summary and if there is a conflict with any provision of Exhibit C, the provisions there overrule the values on this table. Fees shown in will not be exceeded without the concurrence of the Agency.

Basic Services	\$ _____
Resident Project Observation	\$ _____
Additional Services	\$ _____
TOTAL:	\$ _____

Any adjustments to engineering fees or changes to maximum estimated values must be approved by the Agency and must include a table of what specific category or categories of fees are being changed, what fees were before and after the change, and the resulting total fee.

Engineer _____ Date _____

Name and Title

Owner _____ Date _____

Name and Title

Agency Concurrence:

As lender or insurer of funds to defray the costs of this Contract, and without liability for any payments thereunder, the Agency hereby concurs in the form, content, and execution of this Agreement.

Agency Representative Date _____

Name and Title

This is **EXHIBIT A**, consisting of eleven (11) pages, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

Engineer's Services

Article 1 of the Agreement is supplemented to include the following agreement of the parties.

Engineer shall provide Basic and Additional Services as set forth below.

PART 1 – BASIC SERVICES

A1.01 Study and Report Phase

A. **NOT INCLUDED**

A1.02 Preliminary Design Phase

A. **NOT INCLUDED**

A1.03 Final Design Phase

A. **NOT INCLUDED**

A1.04 Bidding or Negotiating Phase

A. **NOT INCLUDED**

A1.05 Construction Phase

- A. Upon successful completion of the Bidding and Negotiating Phase, and upon written authorization from Owner, Engineer shall:
1. *General Administration of Construction Contract:* Consult with Owner and act as Owner's representative as provided in the Construction Contract. The extent and limitations of the duties, responsibilities, and authority of Engineer shall be as assigned in EJCDC® C-700, Standard General Conditions of the Construction Contract (2013 Edition), prepared by the Engineers Joint Contract Documents Committee, or other construction general conditions specified in this Agreement. If Owner, or Owner and Contractor, modify the duties, responsibilities, and authority of Engineer in the Construction Contract, or modify other terms of the Construction Contract having a direct bearing on Engineer, then Owner shall compensate Engineer for any related increases in the cost to provide Construction Phase services. Engineer shall not be required to furnish or perform services contrary to Engineer's responsibilities as a licensed professional. All of Owner's instructions to Contractor will be issued through Engineer, which shall have authority to act on behalf of Owner in dealings with Contractor to the extent provided in this Agreement and the Construction Contract except as otherwise provided in writing.

2. *Resident Project Representative (RPR):* Provide the services of an RPR at the Site to assist the Engineer and to provide more extensive observation of Contractor's work. Duties, responsibilities, and authority of the RPR are as set forth in Exhibit D. The furnishing of such RPR's services will not limit, extend, or modify Engineer's responsibilities or authority except as expressly set forth in Exhibit D. ***[If Engineer will not be providing the services of an RPR, then delete this Paragraph 2 by inserting the word "DELETED" after the paragraph title, and do not include Exhibit D as part of the Agreement.]***
3. *Selection of Independent Testing Laboratory:* Assist Owner in the selection of an independent testing laboratory to perform the services identified in Exhibit B, Paragraph B2.01.
4. *Pre-Construction Conference:* Participate in **and chair** a pre-construction conference prior to commencement of Work at the Site.
5. *Electronic Transmittal Protocols:* If the Construction Contract Documents do not specify protocols for the transmittal of Project-related correspondence, documents, text, data, drawings, information, and graphics, in electronic media or digital format, either directly, or through access to a secure Project website, then together with Owner and Contractor jointly develop such protocols for transmittals between and among Owner, Contractor, and Engineer during the Construction Phase and Post-Construction Phase.
6. *Original Documents:* ~~If requested by Owner to do so, m-~~ **Maintain** and safeguard during the Construction Phase at least one original printed record version of the Construction Contract Documents, including Drawings and Specifications signed and sealed by Engineer and other design professionals in accordance with applicable Laws and Regulations. Throughout the Construction Phase, make such original printed record version of the Construction Contract Documents available to Contractor and Owner for review.
7. *Schedules:* Receive, review, and determine the acceptability of any and all schedules that Contractor is required to submit to Engineer, including the Progress Schedule, Schedule of Submittals, and Schedule of Values.
8. *Baselines and Benchmarks:* As appropriate, establish baselines and benchmarks for locating the Work which in Engineer's judgment are necessary to enable Contractor to proceed.
9. *Visits to Site and Observation of Construction:* In connection with observations of Contractor's Work while it is in progress:
 - a. Make visits to the Site at intervals appropriate to the various stages of construction, as Engineer deems necessary, to observe as an experienced and qualified design professional the progress of Contractor's executed Work. Such visits and observations by Engineer, and the Resident Project Representative, if any, are not intended to be exhaustive or to extend to every aspect of the Work or to involve detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in this Agreement and the Construction Contract Documents, but rather are to be limited to spot checking, selective sampling, and similar methods of general observation of the Work based on Engineer's exercise of professional

Exhibit A – Engineer's Services

EJCDC® E-500, Agreement Between Owner and Engineer for Professional Services.

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judgment, as assisted by the Resident Project Representative, if any. Based on information obtained during such visits and observations, Engineer will determine in general if the Work is proceeding in accordance with the Construction Contract Documents, and Engineer shall keep Owner informed of the progress of the Work.

- b. The purpose of Engineer's visits to the Site, and representation by the Resident Project Representative, if any, at the Site, will be to enable Engineer to better carry out the duties and responsibilities assigned to and undertaken by Engineer during the Construction Phase, and, in addition, by the exercise of Engineer's efforts as an experienced and qualified design professional, to provide for Owner a greater degree of confidence that the completed Work will conform in general to the Construction Contract Documents and that Contractor has implemented and maintained the integrity of the design concept of the completed Project as a functioning whole as indicated in the Construction Contract Documents. Engineer shall not, during such visits or as a result of such observations of the Work, supervise, direct, or have control over the Work, nor shall Engineer have authority over or responsibility for the means, methods, techniques, sequences, or procedures of construction selected or used by any Constructor, for security or safety at the Site, for safety precautions and programs incident to any Constructor's work in progress, for the coordination of the Constructors' work or schedules, nor for any failure of any Constructor to comply with Laws and Regulations applicable to furnishing and performing of its work. Accordingly, Engineer neither guarantees the performance of any Constructor nor assumes responsibility for any Constructor's failure to furnish or perform the Work, or any portion of the Work, in accordance with the Construction Contract Documents.
 - c. **The visits described in Article A1.05.A.9.a shall be at least monthly and the Engineer shall document all visits to the project with copies furnished to the Owner and Agency.**
- 10. *Defective Work:* Reject Work if, on the basis of Engineer's observations, Engineer believes that such Work is defective under the terms and standards set forth in the Construction Contract Documents. Provide recommendations to Owner regarding whether Contractor should correct such Work or remove and replace such Work, or whether Owner should consider accepting such Work as provided in the Construction Contract Documents.
 - 11. *Compatibility with Design Concept:* If Engineer has express knowledge that a specific part of the Work that is not defective under the terms and standards set forth in the Construction Contract Documents is nonetheless not compatible with the design concept of the completed Project as a functioning whole, then inform Owner of such incompatibility, and provide recommendations for addressing such Work.
 - 12. *Clarifications and Interpretations:* Accept from Contractor and Owner submittal of all matters in question concerning the requirements of the Construction Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Construction Contract Documents. With reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Construction Contract Documents.

13. *Non-reviewable Matters:* If a submitted matter in question concerns the Engineer's performance of its duties and obligations, or terms and conditions of the Construction Contract Documents that do not involve (1) the performance or acceptability of the Work under the Construction Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer will not provide a decision or interpretation.
14. *Field Orders:* Subject to any limitations in the Construction Contract Documents, Engineer may prepare and issue Field Orders requiring minor changes in the Work.
15. *Change Orders and Work Change Directives:* Recommend Change Orders and Work Change Directives to Owner, as appropriate, and prepare Change Orders and Work Change Directives as required.
16. *Differing Site Conditions:* Respond to any notice from Contractor of differing site conditions, including conditions relating to underground facilities such as utilities, and hazardous environmental conditions. Promptly conduct reviews and prepare findings, conclusions, and recommendations for Owner's use.
17. *Shop Drawings, Samples, and Other Submittals:* **Review and approve or take other appropriate action with respect to Shop Drawings, Samples, and other required Contractor submittals, including Applications for Payment, to ensure compliance with AIS. Any iron and steel products included in any submittal by the General Contractor, must include a Manufacturers' Certification letter to verify the products were produced in the United States. Copies of Manufacturers' Certifications must be kept in the Engineer's project file and on-site during construction. In the event the Engineer requires an item to be sole-source, the Engineer must furnish the Manufacturers Certification to the Contractor for said item.** Review and approve or take other appropriate action with respect to Shop Drawings, Samples, and other required Contractor submittals, but only for conformance with the information given in the Construction Contract Documents and compatibility with the design concept of the completed Project as a functioning whole as indicated by the Construction Contract Documents. Such reviews and approvals or other action will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions and programs incident thereto. Engineer shall meet any Contractor's submittal schedule that Engineer has accepted.
18. *Substitutes and "Or-equal":* Evaluate and determine the acceptability of substitute or "or-equal" materials and equipment proposed by Contractor, but subject to the provisions of Paragraph A2.02.A.2 of this Exhibit A. **Review of substitutes and "or equals" shall be in accordance with the General Conditions of the Contract and applicable Agency regulations. Prior to approval of any substitute "or equal" review Manufacturers' Certifications provided by the Contractor to verify the product(s) meet AIS requirements. Manufacturers' Certifications must be kept in the Engineer's project file and on-site during construction to ensure compliance with AIS.**
19. *Inspections and Tests:*

- a. Receive and review all certificates of inspections, tests, and approvals required by Laws and Regulations or the Construction Contract Documents. Engineer's review of such certificates will be for the purpose of determining that the results certified indicate compliance with the Construction Contract Documents and will not constitute an independent evaluation that the content or procedures of such inspections, tests, or approvals comply with the requirements of the Construction Contract Documents. Engineer shall be entitled to rely on the results of such inspections and tests.
 - b. As deemed reasonably necessary, request that Contractor uncover Work that is to be inspected, tested, or approved.
 - c. Pursuant to the terms of the Construction Contract, require special inspections or testing of the Work, whether or not the Work is fabricated, installed, or completed.
 - d. **Receive and review all Manufacturers' Certifications for materials required to comply with AIS. Manufacturers' Certifications must be kept in the Engineer's project file and on-site during construction.**
20. *Change Proposals and Claims:* (a) Review and respond to Change Proposals. Review each duly submitted Change Proposal from Contractor and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer will not resolve the Change Proposal. (b) Provide information or data to Owner regarding engineering or technical matters pertaining to Claims. **Review Change Proposals to ensure compliance with AIS.**
21. *Applications for Payment:* Based on Engineer's observations as an experienced and qualified design professional and on review of Applications for Payment and accompanying supporting documentation:
- a. Determine the amounts that Engineer recommends Contractor be paid. Recommend reductions in payment (set-offs) based on the provisions for set-offs stated in the Construction Contract. Such recommendations of payment will be in writing and will constitute Engineer's representation to Owner, based on such observations and review, that, to the best of Engineer's knowledge, information and belief, Contractor's Work has progressed to the point indicated, the Work is generally in accordance with the Construction Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Construction Contract Documents, and to any other qualifications stated in the recommendation), and the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work. In the case of unit price Work, Engineer's recommendations of payment will include final determinations of quantities and classifications of the Work (subject to any subsequent adjustments allowed by the Construction Contract Documents).

- b. By recommending payment, Engineer shall not thereby be deemed to have represented that observations made by Engineer to check the quality or quantity of Contractor's Work as it is performed and furnished have been exhaustive, extended to every aspect of Contractor's Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in this Agreement. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment including final payment will impose on Engineer responsibility to supervise, direct, or control the Work, or for the means, methods, techniques, sequences, or procedures of construction or safety precautions or programs incident thereto, or Contractor's compliance with Laws and Regulations applicable to Contractor's furnishing and performing the Work. It will also not impose responsibility on Engineer to make any examination to ascertain how or for what purposes Contractor has used the money paid to Contractor by Owner; to determine that title to any portion of the Work, including materials or equipment, has passed to Owner free and clear of any liens, claims, security interests, or encumbrances; or that there may not be other matters at issue between Owner and Contractor that might affect the amount that should be paid.
22. *Contractor's Completion Documents:* Receive from Contractor, review, and transmit to Owner maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance required by the Construction Contract Documents, certificates of inspection, tests and approvals, and Shop Drawings, Samples, and other data approved as provided under Paragraph A1.05.A.17. ~~Receive from Contractor, review, and transmit to Owner the annotated record documents which are to be assembled by Contractor in accordance with the Construction Contract Documents to obtain final payment. The extent of Engineer's review of record documents shall be to check that Contractor has submitted all pages.~~ **Receive from Contractor and review the annotated record documents which are to be assembled by Contractor in accordance with the construction Contract Documents to obtain final payment. The Engineer shall prepare Record Drawings and furnish such Record Drawings to Owner.**
23. *Substantial Completion:* Promptly after notice from Contractor that Contractor considers the entire Work ready for its intended use, in company with Owner and Contractor, visit the Site to review the Work and determine the status of completion. Follow the procedures in the Construction Contract regarding the preliminary certificate of Substantial Completion, punch list of items to be completed, Owner's objections, notice to Contractor, and issuance of a final certificate of Substantial Completion. Assist Owner regarding any remaining engineering or technical matters affecting Owner's use or occupancy of the Work following Substantial Completion.
24. *Other Tasks:* Perform or provide the following other Construction Phase tasks or deliverables: Engineer will assist Owner with the preparation of monthly project budget reports/disbursement requests to Rural Development.
- a. **Upon Substantial Completion, the Engineer shall provide a copy of the Certificate of Substantial Completion to the Agency.**
25. *Final Notice of Acceptability of the Work:* Conduct a final visit to the Project to determine if the Work is complete and acceptable so that Engineer may recommend, in

writing, final payment to Contractor. Accompanying the recommendation for final payment, Engineer shall also provide a notice to Owner and Contractor in the form attached hereto as Exhibit E ("Notice of Acceptability of Work") that the Work is acceptable (subject to the provisions of the Notice and Paragraph A1.05.A.21.b) to the best of Engineer's knowledge, information, and belief, and based on the extent of the services provided by Engineer under this Agreement.

- a. **Obtain the Contractors' Certification letter and copies of Manufacturers' Certifications from the Contractor for all American Iron and Steel products used in the project. Upon Substantial Completion, provide copies of Contractors' and Manufacturers' Certifications to the Owner and a copy of Contractor's Certification to the Agency.**

26. *Standards for Certain Construction-Phase Decisions:* Engineer will render decisions regarding the requirements of the Construction Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth in the Construction Contract for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

- B. *Duration of Construction Phase:* The Construction Phase will commence with the execution of the first Construction Contract for the Project or any part thereof and will terminate upon written recommendation by Engineer for final payment to Contractors. If the Project involves more than one prime contract as indicated in Paragraph A1.03.D, then Construction Phase services may be rendered at different times in respect to the separate contracts. Subject to the provisions of Article 3, Engineer shall be entitled to an equitable increase in compensation if Construction Phase services (including Resident Project Representative services, if any) are required after the original date for completion and readiness for final payment of Contractor as set forth in the Construction Contract.

A1.06 *Post-Construction Phase*

- A. Upon written authorization from Owner during the Post-Construction Phase, Engineer shall:
 1. Together with Owner, visit the Project to observe any apparent defects in the Work, make recommendations as to replacement or correction of defective Work, if any, or the need to repair of any damage to the Site or adjacent areas, and assist Owner in consultations and discussions with Contractor concerning correction of any such defective Work and any needed repairs.
 2. Together with Owner, visit the Project within one month before the end of the Construction Contract's correction period to ascertain whether any portion of the Work or the repair of any damage to the Site or adjacent areas is defective and therefore subject to correction by Contractor.
 3. Perform or provide the following other Post-Construction Phase tasks or deliverables:
NA

- B. The Post-Construction Phase services may commence during the Construction Phase and, if not otherwise modified in this Exhibit A, will terminate twelve months after the commencement of the Construction Contract's correction period.

PART 2 – ADDITIONAL SERVICES

A2.01 *Additional Services Requiring Owner's Written Authorization*

- A. If authorized in writing by Owner, Engineer shall provide Additional Services of the types listed below. These services are not included as part of Basic Services and will be paid for by Owner as indicated in Exhibit C.
1. Preparation of applications and supporting documents (in addition to those furnished under Basic Services) for private or governmental grants, loans, or advances in connection with the Project; preparation or review of environmental assessments and impact statements **not including preparation of the Environmental Report defined under Basic Services**; review and evaluation of the effects on the design requirements for the Project of any such statements and documents prepared by others; and assistance in obtaining approvals of authorities having jurisdiction over the anticipated environmental impact of the Project.
 2. Services to make measured drawings of existing conditions or facilities, to conduct tests or investigations of existing conditions or facilities, or to verify the accuracy of drawings or other information furnished by Owner or others.
 3. Services resulting from significant changes in the scope, extent, or character of the portions of the Project designed or specified by Engineer, or the Project's design requirements, including, but not limited to, changes in size, complexity, Owner's schedule, character of construction, or method of financing; and revising previously accepted studies, reports, Drawings, Specifications, or Construction Contract Documents when such revisions are required by changes in Laws and Regulations enacted subsequent to the Effective Date or are due to any other causes beyond Engineer's control.
 4. Services resulting from Owner's request to evaluate additional Study and Report Phase alternative solutions beyond those agreed to in Paragraph A1.01.A.1 and 2 **but only if the Owner's request is made after completion of the Study and Report Phase**.
 5. Services required as a result of Owner's providing incomplete or incorrect Project information to Engineer.
 6. Providing renderings or models for Owner's use, including services in support of building information modeling or civil integrated management.
 7. Undertaking investigations and studies including, but not limited to:
 - a. detailed consideration of operations, maintenance, and overhead expenses;
 - b. the preparation of feasibility studies (such as those that include projections of output capacity, utility project rates, project market demand, or project revenues)

and cash flow analyses, provided that such services are based on the engineering and technical aspects of the Project, and do not include rendering advice regarding municipal financial products or the issuance of municipal securities;

- c. preparation of appraisals;
 - d. evaluating processes available for licensing, and assisting Owner in obtaining process licensing;
 - e. detailed quantity surveys of materials, equipment, and labor; and
 - f. audits or inventories required in connection with construction performed or furnished by Owner.
- 8. Furnishing services of Consultants for other than Basic Services.
 - 9. Providing data or services of the types described in Exhibit B, when Owner retains Engineer to provide such data or services instead of Owner furnishing the same.
 - 10. Providing the following services:
 - a. Services attributable to more prime construction contracts than specified in Paragraph A1.03.D.
 - b. Services to arrange for performance of construction services for Owner by contractors other than the principal prime Contractor, and administering Owner's contract for such services.
 - 11. Services during out-of-town travel required of Engineer, other than for visits to the Site or Owner's office as required in Basic Services (Part 1 of Exhibit A).
 - 12. Preparing for, coordinating with, participating in and responding to structured independent review processes, including, but not limited to, construction management, cost estimating, project peer review, value engineering, and constructibility review requested by Owner; and performing or furnishing services required to revise studies, reports, Drawings, Specifications, or other documents as a result of such review processes.
 - 13. Preparing additional bidding-related documents (or requests for proposals or other construction procurement documents) or Construction Contract Documents for alternate bids or cost estimates requested by Owner for the Work or a portion thereof.
 - 14. Assistance in connection with bid protests, rebidding, or renegotiating contracts for construction, materials, equipment, or services, except when such assistance is required to complete services required by Paragraph 5.02.A and Exhibit F.
 - 15. Preparing conformed Construction Contract Documents that incorporate and integrate the content of all Addenda and any amendments negotiated by Owner and Contractor.
 - 16. Providing Construction Phase services beyond the original date for completion and readiness for final payment of Contractor, but only if such services increase the total

Exhibit A – Engineer's Services

EJCDC® E-500, Agreement Between Owner and Engineer for Professional Services.

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quantity of services to be performed in the Construction Phase, rather than merely shifting performance of such services to a later date.

~~17. Preparing Record Drawings, and furnishing such Record Drawings to Owner. DELETED~~

18. Supplementing Record Drawings with information regarding the completed Project, Site, and immediately adjacent areas obtained from field observations, Owner, utility companies, and other reliable sources.
19. Conducting surveys, investigations, and field measurements to verify the accuracy of Record Drawing content obtained from Contractor, Owner, utility companies, and other sources; revise and supplement Record Drawings as needed.
20. Preparation of operation, maintenance, and staffing manuals.
21. Protracted or extensive assistance in refining and adjusting of Project equipment and systems (such as initial startup, testing, and balancing).
22. Assistance to Owner in training Owner's staff to operate and maintain Project equipment and systems.
23. Assistance to Owner in developing systems and procedures for (a) control of the operation and maintenance of Project equipment and systems, and (b) related recordkeeping.
24. Preparing to serve or serving as a consultant or witness for Owner in any litigation, arbitration, lien or bond claim, or other legal or administrative proceeding involving the Project.
25. Overtime work requiring higher than regular rates.
26. Providing construction surveys and staking to enable Contractor to perform its work other than as required under Paragraph A1.05.A.8; any type of property surveys or related engineering services needed for the transfer of interests in real property; and providing other special field surveys.
27. Providing more extensive services required to enable Engineer to issue notices or certifications requested by Owner.
28. Extensive services required during any correction period, or with respect to monitoring Contractor's compliance with warranties and guarantees called for in the Construction Contract (except as agreed to under Basic Services).
29. Other additional services performed or furnished by Engineer not otherwise provided for in this Agreement.

A2.02 Additional Services Not Requiring Owner's Written Authorization

- A. Engineer shall advise Owner that Engineer is commencing to perform or furnish the Additional Services of the types listed below. For such Additional Services, Engineer need not request or obtain specific advance written authorization from Owner. Engineer shall cease

Exhibit A – Engineer's Services

EJCDC® E-500, Agreement Between Owner and Engineer for Professional Services.

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performing or furnishing such Additional Services upon receipt of written notice to cease from Owner.

1. Services in connection with Work Change Directives and Change Orders to reflect changes requested by Owner.
2. ~~Services in making revisions to Drawings and Specifications occasioned by the acceptance of substitute materials or equipment other than "or equal" items; services after the award of the Construction Contract in evaluating and determining the acceptability of a proposed "or equal" or substitution which is found to be inappropriate for the Project; evaluation and determination of an excessive number of proposed "or equals" or substitutions, whether proposed before or after award of the Construction Contract.~~ **Services in making revisions to Drawings and Specifications occasioned by the acceptance of substitute materials or equipment other than "or equal" items; evaluation and determination of an excessive number of proposed "or equals" or substitutions, whether proposed before or after award of the construction Contract.**
3. Services resulting from significant delays, changes, or price increases occurring as a direct or indirect result of materials, equipment, or energy shortages.
4. Additional or extended services arising from (a) the presence at the Site of any Constituent of Concern or items of historical or cultural significance, (b) emergencies or acts of God endangering the Work, (c) damage to the Work by fire or other causes during construction, (d) a significant amount of defective, neglected, or delayed Work, (e) acceleration of the progress schedule involving services beyond normal working hours, or (f) default by Contractor.
5. Services (other than Basic Services during the Post-Construction Phase) in connection with any partial utilization of the Work by Owner prior to Substantial Completion.
6. Evaluating unreasonable or frivolous requests for interpretation or information (RFIs), Change Proposals, or other demands from Contractor or others in connection with the Work, or an excessive number of RFIs, Change Proposals, or demands.
7. Reviewing a Shop Drawing or other Contractor submittal more than three times, as a result of repeated inadequate submissions by Contractor.
8. While at the Site, compliance by Engineer and its staff with those terms of Owner's or Contractor's safety program provided to Engineer subsequent to the Effective Date that exceed those normally required of engineering personnel by federal, State, or local safety authorities for similar construction sites.

Appendix 1 to Exhibit A (4 Pages)
Engineering – Construction Phase Services

NEWMARKET DEPARTMENT OF ENVIRONMENTAL SERVICES
WATER DIVISION
NEWMARKET, NEW HAMPSHIRE
BENNETT AND SEWELL PUMPING STATION IMPROVEMENTS

February 17, 2022

BACKGROUND/PURPOSE:

The Town of Newmarket through its Department of Environmental Services – Water Division is implementing improvements to its water supply, treatment, and distribution system. Part of this program involves the demolition and replacement of the Bennett and Sewell Pumping Stations. These stations have reached the end of their design life and require improvements to the chemical feed and climate control facilities to be compliant with current codes and regulations as well as energy conservation requirements.

The project includes the following improvements at both stations:

- CMU reconstruction of the pumping station building on an expanded foundation
- Process piping improvements
- Chemical feed improvements
- Yard piping and valves
- Fire Suppression System
- New exterior generator and enclosure
- 1,000 gallon above ground LPG tank
- Electrical system improvements
- Minor site improvements
- SCADA improvements and programming provided through the Town's SCADA Contractor, Electrical Installations, Inc.

In addition to the above, work at the Sewell Pumping Station will include paving. Note: This contract is to provide construction phase services for the award of the Base Bid only which is the Sewell Pumping Station Upgrade.

Work at the Bennett Pumping Station, if awarded as an additive alternate at a later date, will include well cleaning and replacement of the existing well pump and motor. An amendment to this engineering construction phase contract will be processed if this additive alternate is awarded

It is the intent of the Town to award the Sewell Pumping Station Improvements (Base Bid). If funding is available, the Town will award the Bennett Pumping Station Improvements. The Bennett improvements will be performed after completion and start-up of the Sewell Pumping Station Improvements.

The purpose of this Scope of Services is to provide Construction Phase professional engineering services during construction of the Sewell Pump Station. Should the Bennett pump station be awarded this contract shall be amended to provide professional engineering services for Bennett pump station.

It is important to note this project will be funded by a USDA Rural Development (RD) Loan and Grant package. American Iron and Steel (AIS) requirements are part of this contract. Prevailing wages (Davis Bacon) are not included.

To date Underwood engineers has completed the design and bidding for the Sewell (Base Bid) and Bennett (Additive Alternate 1) Pumping Station Improvements. The following describes the proposed Scope of Services to accomplish the Construction Phase Engineering Services for the construction of these improvements:

SCOPE OF SERVICES:

The following Scope of Services will be provided by Underwood Engineers (UE) relative to construction of the Sewell Pumping Station Improvements:

Construction Phase Engineering

Task 1 – Construction Administration Service

Underwood Engineers will provide construction services including construction administration and project closeout. Services include the following:

- Conduct pre-construction meeting and prepare minutes.
- Review shop drawing submittals for products proposed for installation on the project.
- Submit revised floor drain registration.
- Review requests for information (RFIs) from the Contractor during construction and issue Engineer's Supplemental Information (ESI) documents as appropriate to respond to questions and provide clarifications
- Conduct monthly progress meetings with the contractor, owner, and USDA RD regarding construction related issues and prepare minutes. A total of eight (8) meetings are budgeted.
- Review and process up to eight (8) pay requisitions.
- Review, prepare and process change orders for the project as appropriate.
- Conduct a Substantial Completion walk through when notified by Contractor that the work is substantially complete. Prepare the Certificate of Substantial Completion including the Substantial Completion Punch List.
- Conduct a final completion walk through upon completion of the Substantial Completion Punch List
- Prepare and process required final completion inspection documentation and project closeout documents.
- Prepare DWSRF ARPA Water System Sustainability Grant application for Energy Audit Findings Implementation Grant
- Research the need for and design a Fire Suppression System for Hazardous Material

Task 2 – Resident Project Representative

RPR services include the following:

- Perform observation during construction using a senior resident Engineer approved by USDA Rural Development. It is noted we are not proposing to provide full time RPR for the entire 270 calendar days (193 working days based on 5 days per week) allowed by the construction contract to achieve Final Completion. Rather, we have allocated the RPR time based on our experience with projects of a similar scope. This will result in minimizing the cost of the RPR while assuring Newmarket of adequate construction observation of the project
- Observe construction activities for compliance with the contract documents, approved shop drawings and associated change orders.
- Field measure quantities of work performed/installed.
- Prepare daily field reports.
- Attend monthly progress meetings.
- Review progress payments based on field measured quantities.
- Prepare punch list items at substantial and final completion and monitor progress on completion of these items.
- Resident engineering services – 652 hours are budgeted over the 270 day period of construction to achieve substantial and final completion. UE will use our professional judgement regarding the appropriate times for the RPR to be on-site based on the Contractor's schedule and stage of construction. Notwithstanding, the intent is to be on-site when work is being performed.

Task 3 – Start-up Services

Underwood Engineers will provide supervision of initial startup and operation and for services during the twelve (12) month correction period. Services include the following:

- Provide a project engineer to observe start-up activities to confirm that new equipment is installed and operating as intended by the manufacturer, and that operator training of Water Division staff has been provided on new major equipment.
- Compile start-up certification forms and obtain signatures from equipment manufacturer's representatives that warranties are in full effect before the Town of Newmarket takes ownership.
- Assist with troubleshooting issues and notify the Contractor of corrective actions needed.

Task 4 - Operations and Maintenance Manuals

- Review manufacturer's O&M manual submittals for each piece of major equipment.
- Compile an overall site-specific O&M manual for the upgrade.
- Respond to review comments by Newmarket and issue site specific manual in final form.
- UE will submit two (2) site specific hard copy manuals to Newmarket. UE will also provide an electronic copy to Newmarket.

Task 5 - Record Drawings

Underwood Engineers will complete record drawings based on field observations, Engineer's Supplemental Information (ESI) documents, change orders, and red-lines provided by the Contractor. Services include the following:

- Prepare record drawings for the project based on red-line drawings provided by the Contractor and the project RPR
- Provide two (2) hard copies of the project record drawings and one (1) digital copy (PDF) to Newmarket.

Task 6 - Funding Assistance

Underwood will prepare/conduct the following relative to the Town's funding:

- Prepare USDA RD Monthly Budget Reports (up to 10)
- AIS Compliance checks
- Fiscal Sustainability Plan assistance (up to 16 hrs)

WORK NOT INCLUDED

- Permitting
- Design modifications due to changes in project scope
- Third party testing

This is **EXHIBIT B**, consisting of four (4) pages, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

Owner's Responsibilities

Article 2 of the Agreement is supplemented to include the following agreement of the parties.

B2.01 In addition to other responsibilities of Owner as set forth in this Agreement, Owner shall at its expense:

- A. Provide Engineer with all criteria and full information as to Owner's requirements for the Project, including design objectives and constraints, space, capacity and performance requirements, flexibility, and expandability, and any budgetary limitations.
- B. Give instructions to Engineer regarding Owner's procurement of construction services (including instructions regarding advertisements for bids, instructions to bidders, and requests for proposals, as applicable), Owner's construction contract practices and requirements, insurance and bonding requirements, electronic transmittals during construction, and other information necessary for the finalization of Owner's bidding-related documents (or requests for proposals or other construction procurement documents), and Construction Contract Documents. Furnish copies (or give specific directions requesting Engineer to use copies already in Engineer's possession) of all design and construction standards, Owner's standard forms, general conditions (if other than EJCDC® C-700, Standard General Conditions of the Construction Contract, 2013 Edition), supplementary conditions, text, and related documents and content for Engineer to include in the draft bidding-related documents (or requests for proposals or other construction procurement documents), and draft Construction Contract Documents, when applicable. Owner shall have responsibility for the final content of (1) such bidding-related documents (or requests for proposals or other construction procurement documents), and (2) those portions of any Construction Contract other than the design (as set forth in the Drawings, Specifications, or otherwise), and other engineering or technical matters; and Owner shall seek the advice of Owner's legal counsel, risk managers, and insurance advisors with respect to the drafting and content of such documents.
- C. Furnish to Engineer any other available information pertinent to the Project including reports and data relative to previous designs, construction, or investigation at or adjacent to the Site.
- D. Following Engineer's assessment of initially-available Project information and data and upon Engineer's request, obtain, furnish, or otherwise make available (if necessary through title searches, or retention of specialists or consultants) such additional Project-related information and data as is reasonably required to enable Engineer to complete its Basic and Additional Services. Such additional information or data would generally include the following:
 - 1. Property descriptions.
 - 2. Zoning, deed, and other land use restrictions.

3. Utility and topographic mapping and surveys.
 4. Property, boundary, easement, right-of-way, and other special surveys or data, including establishing relevant reference points.
 5. Explorations and tests of subsurface conditions at or adjacent to the Site; geotechnical reports and investigations; drawings of physical conditions relating to existing surface or subsurface structures at the Site; hydrographic surveys, laboratory tests and inspections of samples, materials, and equipment; with appropriate professional interpretation of such information or data.
 6. Environmental assessments, audits, investigations, and impact statements, and other relevant environmental, historical, or cultural studies relevant to the Project, the Site, and adjacent areas.
 7. Data or consultations as required for the Project but not otherwise identified in this Agreement.
- E. Arrange for safe access to and make all provisions for Engineer to enter upon public and private property as required for Engineer to perform services under the Agreement.
- F. Recognizing and acknowledging that Engineer's services and expertise do not include the following services, provide, as required for the Project:
1. Accounting, bond and financial advisory (including, if applicable, "municipal advisor" services as described in Section 975 of the Dodd-Frank Wall Street Reform and Consumer Protection Act (2010) and the municipal advisor registration rules issued by the Securities and Exchange Commission), independent cost estimating, and insurance counseling services.
 2. Legal services with regard to issues pertaining to the Project as Owner requires, Contractor raises, or Engineer reasonably requests.
 3. Such auditing services as Owner requires to ascertain how or for what purpose Contractor has used the money paid.
- G. Provide the services of an independent testing laboratory to perform all inspections, tests, and approvals of samples, materials, and equipment required by the Construction Contract Documents (other than those required to be furnished or arranged by Contractor), or to evaluate the performance of materials, equipment, and facilities of Owner, prior to their incorporation into the Work with appropriate professional interpretation thereof. Provide Engineer with the findings and reports generated by testing laboratories, including findings and reports obtained from or through Contractor.
- H. Provide reviews, approvals, and permits from all governmental authorities having jurisdiction to approve all phases of the Project designed or specified by Engineer and such reviews, approvals, and consents from others as may be necessary for completion of each phase of the Project.

- I. Advise Engineer of the identity and scope of services of any independent consultants employed by Owner to perform or furnish services in regard to the Project, including, but not limited to, cost estimating, project peer review, value engineering, and constructibility review.
- J. If Owner designates a construction manager or an individual or entity other than, or in addition to, Engineer to represent Owner at the Site, define and set forth as an attachment to this Exhibit B the duties, responsibilities, and limitations of authority of such other party and the relation thereof to the duties, responsibilities, and authority of Engineer.
- K. If more than one prime contract is to be awarded for the Work designed or specified by Engineer, then designate a person or entity to have authority and responsibility for coordinating the activities among the various prime Contractors, and define and set forth the duties, responsibilities, and limitations of authority of such individual or entity and the relation thereof to the duties, responsibilities, and authority of Engineer as an attachment to this Exhibit B that is to be mutually agreed upon and made a part of this Agreement before such services begin.
- L. Inform Engineer in writing of any specific requirements of safety or security programs that are applicable to Engineer, as a visitor to the Site.
- M. Examine all alternative solutions, studies, reports, sketches, Drawings, Specifications, proposals, and other documents presented by Engineer (including obtaining advice of an attorney, risk manager, insurance counselor, financial/municipal advisor, and other advisors or consultants as Owner deems appropriate with respect to such examination) and render in writing timely decisions pertaining thereto.
- N. Inform Engineer regarding any need for assistance in evaluating the possible use of Project Strategies, Technologies, and Techniques, as defined in Exhibit A.
- O. Advise Engineer as to whether Engineer's assistance is requested in identifying opportunities for enhancing the sustainability of the Project.
- P. Place and pay for advertisement for Bids in appropriate publications.
- Q. Furnish to Engineer data as to Owner's anticipated costs for services to be provided by others (including, but not limited to, accounting, bond and financial, independent cost estimating, insurance counseling, and legal advice) for Owner so that Engineer may assist Owner in collating the various cost categories which comprise Total Project Costs.
- R. Attend and participate in the pre-bid conference, bid opening, pre-construction conferences, construction progress and other job related meetings, and Site visits to determine Substantial Completion and readiness of the completed Work for final payment.
- S. Authorize Engineer to provide Additional Services as set forth in Part 2 of Exhibit A of the Agreement, as required.
- T. Perform or provide the following: **NONE**

Exhibit B – Owner's Responsibilities

EJCDC® E-500, Agreement Between Owner and Engineer for Professional Services.

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B.2.02 Owners are ultimately responsible for compliance with Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference and will be responsible for the following:

- A. Sign loan resolutions, grant agreements and letters of intent to meet conditions which include American Iron and Steel language, accepting American Iron and Steel requirements in those documents and in the letter of conditions.**
- B. Sign change orders (i.e. C-941 of EJCDC) and partial payment estimates (i.e. C-620 of EJCDC) and thereby acknowledge responsibility for compliance with American Iron and Steel requirements.**
- C. Obtain the certification letters from the Engineer upon Substantial Completion of the project and maintain this documentation for the life of the loan.**
- D. Where the Owner directly procures American Iron and Steel products,**
 - 1. Include American Iron and Steel clauses in the procurement contracts;**
 - 2. Obtain Manufacturers' Certifications; and**
 - 3. Provide copies to Engineers and Contractors.**

Guidance Notes: Where the Owner provides their own engineering and/or construction services the Owner is responsible for all provisions included in this Bulletin.

This is **EXHIBIT C**, consisting of [] pages, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [].

Payments to Engineer for Services and Reimbursable Expenses
COMPENSATION PACKET BC-2: Basic Services – Standard Hourly Rates

Article 2 of the Agreement is supplemented to include the following agreement of the parties:

ARTICLE 2 – OWNER’S RESPONSIBILITIES

C2.01 Compensation For Basic Services (other than Resident Project Representative) – Standard Hourly Rates Method of Payment

- A. Owner shall pay Engineer for Basic Services set forth in Exhibit A, except for services of Engineer’s Resident Project Representative, if any, as follows:
1. An amount equal to the cumulative hours charged to the Project by each class of Engineer’s personnel times Standard Hourly Rates for each applicable billing class for all services performed on the Project, plus Reimbursable Expenses and Engineer’s Consultants’ charges, if any.
 2. The Standard Hourly Rates charged by Engineer constitute full and complete compensation for Engineer’s services, including labor costs, overhead, and profit; the Standard Hourly Rates do not include Reimbursable Expenses or Engineer’s Consultants’ charges.
 3. Engineer’s Reimbursable Expenses Schedule and Standard Hourly Rates are attached to this Exhibit C as Appendices 1 and 2.
 4. The total compensation for services under Paragraph C2.01 is estimated to be **\$95,300** based on the following estimated distribution of compensation:

a. Study and Report Phase	\$ NOT INCLUDED
b. Preliminary Design Phase	\$ NOT INCLUDED
c. Final Design Phase	\$ NOT INCLUDED
d. Bidding or Negotiating Phase	\$ NOT INCLUDED
e. Construction Phase	\$ 92,800
f. Post-Construction Phase	\$ 2,500

See Appendix 3 to Exhibit C for further breakdown of scope and fee.

5. Engineer may alter the distribution of compensation between individual phases of the work noted herein to be consistent with services actually rendered, but shall not exceed the total estimated compensation amount unless approved in writing by Owner **and Agency**. See also C2.03.C.2 below.
6. The total estimated compensation for Engineer's services included in the breakdown by phases as noted in Paragraph C2.01.A.3 incorporates all labor, overhead, profit, Reimbursable Expenses, and Engineer's Consultants' charges.
7. The amounts billed for Engineer's services under Paragraph C2.01 will be based on the cumulative hours charged to the Project during the billing period by each class of Engineer's employees times Standard Hourly Rates for each applicable billing class, plus Reimbursable Expenses and Engineer's Consultants' charges.
8. The Standard Hourly Rates and Reimbursable Expenses Schedule will be adjusted annually (**as of January of each year**) to reflect equitable changes in the compensation payable to Engineer. **Changes will not be effective unless and until concurred in by the Owner and Agency.**

C2.02 Compensation For Reimbursable Expenses

- A. Owner shall pay Engineer for all Reimbursable Expenses at the rates set forth in Appendix 1 to this Exhibit C.
- B. Reimbursable Expenses include the expenses identified in Appendix 1 and the following: transportation (including mileage), lodging, and subsistence incidental thereto; providing and maintaining field office facilities including furnishings and utilities; toll telephone calls, mobile phone charges, and courier charges; reproduction of reports, Drawings, Specifications, bidding-related or other procurement documents, Construction Contract Documents, and similar Project-related items; and Consultants' charges. In addition, if authorized in advance by Owner, Reimbursable Expenses will also include expenses incurred for the use of highly specialized equipment.
- C. The amounts payable to Engineer for Reimbursable Expenses will be the Project-related internal expenses actually incurred or allocated by Engineer, plus all invoiced external Reimbursable Expenses allocable to the Project, the latter multiplied by a factor of **1.0**.

C2.03 Other Provisions Concerning Payment

- A. Whenever Engineer is entitled to compensation for the charges of Engineer's Consultants, those charges shall be the amounts billed by Engineer's Consultants to Engineer times a factor of **1.0**.
- B. *Factors:* The external Reimbursable Expenses and Engineer's Consultants' factors include Engineer's overhead and profit associated with Engineer's responsibility for the administration of such services and costs.
- C. *Estimated Compensation Amounts:*

1. Engineer's estimate of the amounts that will become payable for specified services are only estimates for planning purposes, are not binding on the parties, and are not the minimum or maximum amounts payable to Engineer under the Agreement.
 2. When estimated compensation amounts have been stated herein and it subsequently becomes apparent to Engineer that the total compensation amount thus estimated will be exceeded, Engineer shall give Owner **and Agency** written notice thereof, allowing Owner to consider its options, including suspension or termination of Engineer's services for Owner's convenience. Upon notice, Owner and Engineer promptly shall review the matter of services remaining to be performed and compensation for such services. Owner shall either exercise its right to suspend or terminate Engineer's services for Owner's convenience, agree to such compensation exceeding said estimated amount, or agree to a reduction in the remaining services to be rendered by Engineer, so that total compensation for such services will not exceed said estimated amount when such services are completed. If Owner decides not to suspend the Engineer's services during the negotiations and Engineer exceeds the estimated amount before Owner and Engineer have agreed to an increase in the compensation due Engineer or a reduction in the remaining services, then Engineer shall be paid for all services rendered hereunder.
- D. To the extent necessary to verify Engineer's charges and upon Owner's timely request, Engineer shall make copies of such records available to Owner at cost.

COMPENSATION PACKET RPR-2:
Resident Project Representative – Standard Hourly Rates

Article 2 of the Agreement is supplemented to include the following agreement of the parties:

C2.04 Compensation for Resident Project Representative Basic Services – Standard Hourly Rates Method of Payment

A. Owner shall pay Engineer for Resident Project Representative Basic Services as follows:

- 1. Resident Project Representative Services:** For services of Engineer's Resident Project Representative under Paragraph A1.05.A of Exhibit A, an amount equal to the cumulative hours charged to the Project by each class of Engineer's personnel times Standard Hourly Rates for each applicable billing class for all Resident Project Representative services performed on the Project, plus related Reimbursable Expenses and Engineer's Consultant's charges, if any. The total compensation under this paragraph is estimated to be **\$83,154.00** based upon **part-time** RPR services **for a total of 652 hours on site over the duration of the project.**

B. Compensation for Reimbursable Expenses:

1. For those Reimbursable Expenses that are not accounted for in the compensation for Basic Services under Paragraph C2.01, and are directly related to the provision of Resident Project Representative or Post-Construction Basic Services, Owner shall pay Engineer at the rates set forth in Appendix 1 to this Exhibit C.
2. Reimbursable Expenses include the expenses identified in Appendix 1 and the following: transportation (including mileage), lodging, and subsistence incidental thereto; providing and maintaining field office facilities including furnishings and utilities; subsistence and transportation of Resident Project Representative and assistants; toll telephone calls, mobile phone charges, and courier charges; reproduction of reports, Drawings, Specifications, bidding-related or other procurement documents, Construction Contract Documents, and similar Project-related items. In addition, if authorized in advance by Owner, Reimbursable Expenses will also include expenses incurred for the use of highly specialized equipment.
3. The amounts payable to Engineer for Reimbursable Expenses, if any, will be those internal expenses related to the Resident Project Representative Basic Services that are actually incurred or allocated by Engineer, plus all invoiced external Reimbursable Expenses allocable to such services, the latter multiplied by a factor of **1.0**.
4. The Reimbursable Expenses Schedule will be adjusted annually (**as of April 1**) to reflect equitable changes in the compensation payable to Engineer. **Changes will not be effective unless and until concurred in by the Owner and Agency**

C. Other Provisions Concerning Payment Under this Paragraph C2.04:

1. Whenever Engineer is entitled to compensation for the charges of Engineer's Consultants, those charges shall be the amounts billed by Engineer's Consultants to Engineer times a factor of **1.0**.
2. *Factors:* The external Reimbursable Expenses and Engineer's Consultant's factors include Engineer's overhead and profit associated with Engineer's responsibility for the administration of such services and costs.
3. *Estimated Compensation Amounts:*
 - a. Engineer's estimate of the amounts that will become payable for specified services are only estimates for planning purposes, are not binding on the parties, and are not the minimum or maximum amounts payable to Engineer under the Agreement.
 - b. When estimated compensation amounts have been stated herein and it subsequently becomes apparent to Engineer that the total compensation amount thus estimated will be exceeded, Engineer shall give Owner **and Agency** written notice thereof, allowing Owner to consider its options, including suspension or termination of Engineer's services for Owner's convenience. Upon notice Owner and Engineer promptly shall review the matter of services remaining to be performed and compensation for such services. Owner shall either exercise its right to suspend or terminate Engineer's services for Owner's convenience, agree to such compensation exceeding said estimated amount, or agree to a reduction in the remaining services to be rendered by Engineer, so that total compensation for such services will not exceed said estimated amount when such services are completed. If Owner decides not to suspend Engineer's services during negotiations and Engineer exceeds the estimated amount before Owner and Engineer have agreed to an increase in the compensation due Engineer or a reduction in the remaining services, then Engineer shall be paid for all services rendered hereunder.
4. To the extent necessary to verify Engineer's charges and upon Owner's timely request, Engineer shall make copies of such records available to Owner ~~at cost.~~ **at no cost.**

This is **Appendix 1 to EXHIBIT C**, consisting of one (1) page, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

Reimbursable Expenses Schedule

Reimbursable Expenses are subject to review and adjustment per Exhibit C. Rates and charges for Reimbursable Expenses as of the date of the Agreement are:

Reimbursables						
	Mileage				IRS Reimbursable Rate	
	Field Supplies				At Cost	
	Postage				At Cost	
	Food & Lodging				At Cost	
	Subcontractors				At Cost	
	Miscellaneous Job Related Expenses				At Cost	

This is **Appendix 2 to EXHIBIT C**, consisting of one (1) page, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

Standard Hourly Rates Schedule

A. Standard Hourly Rates:

1. Standard Hourly Rates are set forth in this Appendix 2 to this Exhibit C and include salaries and wages paid to personnel in each billing class plus the cost of customary and statutory benefits, general and administrative overhead, non-project operating costs, and operating margin or profit.
2. The Standard Hourly Rates apply only as specified in Article C2.

B. Schedule:

Hourly rates for services performed on or after the date of the Agreement are:

Principal-in-Charge	\$175	to	\$230	per	hour
Senior Project Manager	\$130	to	\$190	per	hour
Project Manager	\$100	to	\$190	per	hour
Senior Project Engineer	\$90	to	\$160	per	hour
Project Engineer	\$70	to	\$130	per	hour
Senior Resident Engineer	\$70	to	\$145	per	hour
Resident Engineer	\$50	to	\$125	per	hour
Technician	\$50	to	\$125	per	hour
Clerical	\$50	to	\$80	per	hour

This is **Appendix 3 to EXHIBIT C**, consisting of one (1) page, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

SUMMARY OF FEES
Underwood Engineers, Inc.

Professional Engineering Services

Bennett & Sewell Pumping Station Improvements
Newmarket, NH
2517
2/11/2022

3-Feb-22

Task	Subtask	Breakdown					Extended Total
		Labor	Hours	Expen/Subs	Subs	Expenses	
Task 1 - Design			-				
Task 2 - Survey			-				
Task 3 - Subsurface			-				
Task 4 - Cadastral			-				
Task 5 - Construction Administration		\$38,779	302	\$39,821	\$38,350	\$1,471	\$78,600
Task 6 - Resident Engineering		\$76,284	652	\$6,870	\$6,750	\$120	\$83,154
Task 7 - Start Up		\$3,882	27	\$18		\$18	\$3,900
Task 8 - O&M Manual		\$3,610	32	\$390		\$390	\$4,000
Task 9 - Record Drawings		\$4,699	42	\$101		\$101	\$4,800
Task 10 -Funding Assistance		\$3,802	32	\$198		\$198	\$4,000
TOTAL		\$131,056	1,087	\$47,399	\$45,100	\$2,299	\$178,454

Note:

1 "Subs" for Task 6 is actually per diem to RPR.

This is **EXHIBIT D**, consisting of five (5) pages, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

Duties, Responsibilities, and Limitations of Authority of Resident Project Representative

Article 1 of the Agreement is supplemented to include the following agreement of the parties:

ARTICLE 1 - SERVICES OF ENGINEER

D1.01 Resident Project Representative

- A. Engineer shall furnish a Resident Project Representative ("RPR") to assist Engineer in observing progress and quality of the Work. The RPR may provide full time representation or may provide representation to a lesser degree. RPR is Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. **Full time Resident Project Representation is required unless requested in writing by the Owner and waived in writing by the Agency.**
- B. Through RPR's observations of the Work, including field checks of materials and installed equipment, Engineer shall endeavor to provide further protection for Owner against defects and deficiencies in the Work. However, Engineer shall not, as a result of such RPR observations of the Work, supervise, direct, or have control over the Work, nor shall Engineer (including the RPR) have authority over or responsibility for the means, methods, techniques, sequences, or procedures of construction selected or used by any Constructor, for security or safety at the Site, for safety precautions and programs incident to the Work or any Constructor's work in progress, for the coordination of the Constructors' work or schedules, or for any failure of any Constructor to comply with Laws and Regulations applicable to the performing and furnishing of its work. The Engineer (including RPR) neither guarantees the performances of any Constructor nor assumes responsibility for any Constructor's failure to furnish and perform the Work, or any portion of the Work, in accordance with the Construction Contract Documents. In addition, the specific terms set forth in Exhibit A, Paragraph A1.05, of this Agreement are applicable.
- C. The duties and responsibilities of the RPR are as follows:
 - 1. *General:* RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
 - 2. *Schedules:* Review the progress schedule, schedule of Shop Drawing and Sample submittals, schedule of values, and other schedules prepared by Contractor and consult with Engineer concerning acceptability of such schedules.
 - 3. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings

(but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.

4. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
5. *Liaison:*
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Construction Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
6. *Clarifications and Interpretations:* Receive from Contractor submittal of any matters in question concerning the requirements of the Construction Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Construction Contract Documents. Report to Engineer regarding such RFIs. Report to Engineer when clarifications and interpretations of the Construction Contract Documents are needed, whether as the result of a Contractor RFI or otherwise. Transmit Engineer's clarifications, interpretations, and decisions to Contractor. ,
7. *Shop Drawings and Samples:*
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples that are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal, if RPR believes that the submittal has not been received from Contractor, or has not been approved by Contractor or Engineer.
8. *Proposed Modifications:* Consider and evaluate Contractor's suggestions for modifications to the Drawings or Specifications, and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit Engineer's response (if any) to such suggestions to Contractor.
9. *Review of Work; Defective Work:*
 - a. Report to Engineer whenever RPR believes that any part of the Work is defective under the terms and standards set forth in the Construction Contract Documents, and provide recommendations as to whether such Work should be corrected,

removed and replaced, or accepted as provided in the Construction Contract Documents.

- b. Inform Engineer of any Work that RPR believes is not defective under the terms and standards set forth in the Construction Contract Documents, but is nonetheless not compatible with the design concept of the completed Project as a functioning whole, and provide recommendations to Engineer for addressing such Work. ; and
- c. Advise Engineer of that part of the Work that RPR believes should be uncovered for observation, or requires special testing, inspection, or approval.

10. *Inspections, Tests, and System Start-ups:*

- a. Consult with Engineer in advance of scheduled inspections, tests, and systems start-ups.
- b. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
- c. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.
- d. Observe whether Contractor has arranged for inspections required by Laws and Regulations, including but not limited to those to be performed by public or other agencies having jurisdiction over the Work.
- e. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work, record the results of these inspections, and report to Engineer.

11. *Records:*

- a. Maintain at the Site orderly files for correspondence, reports of job conferences, copies of Construction Contract Documents including all Change Orders, Field Orders, Work Change Directives, Addenda, additional Drawings issued subsequent to the execution of the Construction Contract, RFIs, Engineer's clarifications and interpretations of the Construction Contract Documents, progress reports, approved Shop Drawing and Sample submittals, and other Project-related documents.
- b. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- c. Upon request from Owner to Engineer, photograph or video Work in progress or Site conditions.

- d. Record and maintain accurate, up-to-date lists of the names, addresses, fax numbers, e-mail addresses, websites, and telephone numbers (including mobile numbers) of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- e. Maintain records for use in preparing Project documentation.
- f. Upon completion of the Work, furnish original set of all RPR Project documentation to Engineer.
- g. **Maintain all Manufacturers' Certifications in the project file and on-site during construction to ensure compliance with AIS, as applicable**

12. *Reports:*

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and Sample submittals.
- b. ~~Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.~~ **DELETED**
- c. Furnish to Engineer and Owner copies of all inspection, test, and system start-up reports.
- d. Immediately inform Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, possible force majeure or delay events, damage to property by fire or other causes, or the discovery of any potential differing site condition or Constituent of Concern.

13. *Payment Requests:* Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

14. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

15. *Completion:*

- a. Participate in Engineer's visits to the Site regarding Substantial Completion, assist in the determination of Substantial Completion, and prior to the issuance of a Certificate of Substantial Completion submit a punch list of observed items requiring completion or correction.

- b. Participate in Engineer's visit to the Site in the company of Owner and Contractor, to determine completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
 - c. Observe whether all items on the final punch list have been completed or corrected, and make recommendations to Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work (Exhibit E).
- D. Resident Project Representative shall not:
 - 1. Authorize any deviation from the Construction Contract Documents or substitution of materials or equipment (including "or-equal" items).
 - 2. Exceed limitations of Engineer's authority as set forth in this Agreement.
 - 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers, or any Constructor.
 - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of the Work, by Contractor or any other Constructor.
 - 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 - 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
 - 7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
 - 8. Authorize Owner to occupy the Project in whole or in part.

This is **EXHIBIT E**, consisting of two (2) pages, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].



NOTICE OF ACCEPTABILITY OF WORK

PROJECT:

OWNER:

CONTRACTOR:

OWNER'S CONSTRUCTION CONTRACT IDENTIFICATION:

EFFECTIVE DATE OF THE CONSTRUCTION CONTRACT:

ENGINEER:

NOTICE DATE:

To:

Owner

And To:

Contractor

From:

Engineer

The Engineer hereby gives notice to the above Owner and Contractor that Engineer has recommended final payment of Contractor, and that the Work furnished and performed by Contractor under the above Construction Contract is acceptable, expressly subject to the provisions of the related Contract Documents, the Agreement between Owner and Engineer for Professional Services dated _____, and the following terms and conditions of this Notice:

CONDITIONS OF NOTICE OF ACCEPTABILITY OF WORK

Exhibit E – Notice of Acceptability of Work.

EJCDC® E-500, Agreement Between Owner and Engineer for Professional Services.

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The Notice of Acceptability of Work ("Notice") is expressly made subject to the following terms and conditions to which all those who receive said Notice and rely thereon agree:

1. This Notice is given with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.
2. This Notice reflects and is an expression of the Engineer's professional opinion.
3. This Notice is given as to the best of Engineer's knowledge, information, and belief as of the Notice Date.
4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's work) under Engineer's Agreement with Owner, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Agreement.
5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the related Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Construction Contract Documents, or to otherwise comply with the Construction Contract Documents or the terms of any special guarantees specified therein.
6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner's reservations of rights with respect to completion and final payment.

By: _____

Title: _____

Dated: _____

This is **EXHIBIT G**, consisting of two (2) pages, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

Insurance

Paragraph 6.05 of the Agreement is supplemented to include the following agreement of the parties:

G6.05 Insurance

A. The limits of liability for the insurance required by Paragraph 6.05.A and 6.05.B of the Agreement are as follows:

1. By Engineer:

- a. Appendix 1 – Certificate of Liability Insurance: Commercial General, Automobile, and Umbrella Liability.
- b. Appendix 2 – Certificate of Liability Insurance: Professional Liability.

2. By Owner:

- a. Workers' Compensation: Per New Hampshire Statute
- b. Employer's Liability Insurance: \$1,000,000
- c. Comprehensive General Liability: \$1,000,000 per occurrence/
\$2,000,000 in the aggregate

Comprehensive General Liability Insurance shall include coverage for all claims of personal injury, bodily injury, sickness, disease, or death (including coverage for acts of Consultant's officials and employees), and broad form property damage (including loss of use resulting therefrom) and for completed operations.

- d. Comprehensive Automobile Liability:
 - Bodily Injury \$1,000,000 per occurrence/
 - Property Damage \$2,000,000 in the aggregate

B. *Additional Insureds:*

- 1. The Owner shall be listed on Engineer's general liability policy as provided in Paragraph 6.05.A.

This is **EXHIBIT H**, consisting of one (1) page, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

Dispute Resolution

Paragraph 6.09 of the Agreement is supplemented to include the following agreement of the parties:

H6.08 *Dispute Resolution*

- A. *Mediation*: Owner and Engineer agree that they shall first submit any and all unsettled claims, counterclaims, disputes, and other matters in question between them arising out of or relating to this Agreement or the breach thereof ("Disputes") to mediation by **mutually agreed upon mediator**. Owner and Engineer agree to participate in the mediation process in good faith. The process shall be conducted on a confidential basis, and shall be completed within 120 days. If such mediation is unsuccessful in resolving a Dispute, then (1) the parties may mutually agree to a dispute resolution of their choice, or (2) either party may seek to have the Dispute resolved by a court of competent jurisdiction.

This is **EXHIBIT I**, consisting of one (1) page, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

Limitations of Liability

Paragraph 6.11 of the Agreement is supplemented to include the following agreement of the parties:

A. Limitation of Engineer's Liability

1. *Engineer's Liability Limited to Stated Amount, or Amount of Engineer's Compensation:*
To the fullest extent permitted by Laws and Regulations, and notwithstanding any other provision of this Agreement, the total liability, in the aggregate, of Engineer and Engineer's officers, directors, members, partners, agents, employees, and Consultants, to Owner and anyone claiming by, through, or under Owner for any and all injuries, claims, losses, expenses, costs, or damages whatsoever arising out of, resulting from, or in any way related to the Project, Engineer's or its Consultants' services, or this Agreement, from any cause or causes whatsoever, including but not limited to the negligence, professional errors or omissions, strict liability, breach of contract, indemnity obligations, or warranty express or implied, of Engineer or Engineer's officers, directors, members, partners, agents, employees, or Consultants, shall not exceed the total amount of \$50,000.00 or the total compensation received by Engineer under this Agreement, whichever is greater. Higher limits are available for an additional fee.

This is **EXHIBIT J**, consisting of one (1) page, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

Special Provisions

This Agreement is amended to include the following agreements of the parties:

1. RUS Bulletin 1780-26, consisting of forty eight (48) pages (attached)

This is **EXHIBIT K**, consisting of two (2) pages, referred to in and part of the **Agreement between Owner and Engineer for Professional Services** dated [REDACTED].

AMENDMENT TO OWNER-ENGINEER AGREEMENT
Amendment No. _____

The Effective Date of this Amendment is: _____.

Background Data

Effective Date of Owner-Engineer Agreement:

Owner:

Engineer:

Project:

Nature of Amendment: [Check those that are applicable and delete those that are inapplicable.]

- _____ Additional Services to be performed by Engineer
- _____ Modifications to services of Engineer
- _____ Modifications to responsibilities of Owner
- _____ Modifications of payment to Engineer
- _____ Modifications to time(s) for rendering services
- _____ Modifications to other terms and conditions of the Agreement

Description of Modifications:

Here describe the modifications, in as much specificity and detail as needed. Use an attachment if necessary.

Agreement Summary:

Original agreement amount:	\$ _____
Net change for prior amendments:	\$ _____
This amendment amount:	\$ _____
Adjusted Agreement amount:	\$ _____

Change in time for services (days or date, as applicable): _____

The foregoing Agreement Summary is for reference only and does not alter the terms of the Agreement, including those set forth in Exhibit C.

Owner and Engineer hereby agree to modify the above-referenced Agreement as set forth in this Amendment. All provisions of the Agreement not modified by this or previous Amendments remain in effect.

OWNER:

ENGINEER:

By: _____
Print
name: _____

Title: _____

Date Signed: _____

By: _____
Print
name: _____

Title: _____

Date Signed: _____



Town Hall
186 Main Street
Newmarket, NH 03857

Tel: (603) 659-3617
Fax: (603) 659-8508

Founded December 15, 1727
Chartered January 1, 1991

TOWN OF NEWMARKET, NEW HAMPSHIRE