Hooksett Sewer Commission
August 6, 2024
Meeting Minutes

This meeting was called to order at 12:00pm. Present were Chairman Sidney Baines, Commissioner Richard Bairam, Commissioner Robert Duhaime, Superintendent Ken Conaty and Assistant Superintendent John Clark.

Approve and Sign manifest

Approve meeting minutes: Commissioner Richard Bairam made motion to approve the regular meeting minutes and workshop minutes from July 16, 2024. Commissioner Robert Duhaime seconded. All in favor, the motion was carried unanimously.

Read Correspondence

Financial Report: Guy came in to give a brief update to the Commission on the sewer accounts.

- Commissioner Richard Bairam made motion to transfer $132,800 from the Hooksett sewer Commission checking account to the Hooksett Sewer Commission trust –Capital reserve account from FY 2025 budget. Commissioner Robert Duhaime seconded. All in favor, the motion was carried unanimously.

- Commissioner Richard Bairam made motion to transfer $68,544.44 from the Hooksett Sewer Commission checking account to the Hooksett Sewer Commission Trust- plant and composting account for system development fees collected from April through June 2024. Commissioner Robert Duhaime seconded. All in favor, the motion was carried unanimously.

- Commissioner Richard Bairam made motion to transfer $141,606.09 from the Hooksett Sewer Commission Trust- Capital plant and composting account to the Hooksett Sewer Commission checking account to reimburse the attached expenditures. Commissioner Robert Duhaime seconded. All in favor, the motion was carried unanimously.

- Commissioner Richard Bairam made motion to transfer $1000.00 from the Hooksett Sewer Commission checking account to reimburse RDK truck for the initial deposit. Commissioner Robert Duhaime seconded. All in favor, the motion was carried unanimously.

Scheduled Appointments: None

<u>Superintendent Conaty's Report:</u>

Plant:

- TSS 9.8mg/l 97% removal
- BOD 5.5mg/l 98% removal
- pH average 7.00
- Average low 6.87
- Lowest 6.61

Permit:

- Permits are open for public comment-still waiting
- Met with Attorney, Engineer and Clean sample expert
- Rick Cantu came in to do the first 4 tests-2per month through September
- Superintendent Conaty presented the Commission with a draft QAAP (attachment 1).
- Sludge inter-municipal agreement-working on final documents with Merrimack
- The plant is on train 2 only
- The plant is in a small upset due to the change over
- Started bisulfate dosing to remove chlorine before discharge
- The total gallons treated in fiscal 2023-2024 were, 382 million gallons at a cost of 7/10 cents per gallon.
- Superintendent Conaty presented the energy evaluation to the Sewer Commission (attachment 2).
- Lost mixer motor-OEM motor $3000.00. Superintendent Conaty found an aftermarket one for $800.00.

Solar:

- Production looks good
- Assistant Superintendent John Clark presented and went over the annual solar report (attachment 3)
- Battery Report

Force Main replacement/Martin's Ferry pump station upgrade

- 7 easements are needed
- Waiting on Eversource signatures
- Town easements are all set
- SNHU easements are all set
- Old Castle easement is all set
- McClellan easement- registered letter was sent with no response. Superintendent Conaty has a phone number to call.
- SRF Funding list came out (attachment 4).
- Martin's Ferry force main is #22 on the list

Dewatering Project:

- Screw presses to be delivered at the end of December
- The tank wall extensions are finished
- Work on the trench drain is being done

Asset Management:

- Continuing to enter new equipment. Working on creating a new database
- Superintendent Conaty is speaking at the asset management conference in October.

TIF Project:

- Tri-town pump station is under construction
- The electrician is almost done
- HVAC is complete
- The temporary VFD's are in
- Eversource pulled wires on 7/18/24
- The electric meter has been installed
- SRF funding list came out (attachment 5). Martin's Ferry pump station/pipe under the river/quality drive station is #68 on the list.

Other:

- Work at 7 Martin's Ferry Rd-Lamontagne project is stalled
- Gravel and gates are going to be installed on Lehoux Drive easement to prevent dumping
- Superintendent Conaty called on gates for the new pump stations and CC easement.

- Park Place residential project is under construction, the project is waiting on finals
- Park Place commercial project is under constructions, the foundation has been started
- Work on the Golden gate pump station will start once Tri-town is complete
- Superintendent Conaty presented a bid to the commission for a new zero turn mower (attachment 6). The sewer commission did not make a motion but gave Superintendent Conaty the go ahead to purchase the mower.
- Due to the plant equipment overheating, Superintendent Conaty had to contract for two mini splits for the electrical and chlorine room. The contract is for $27,500.00 (attachment 7). The mini splits are less expensive than replacing all the equipment they keep from overheating. Superintendent Conaty did call multiple companies. Sam mechanical was the most cost effective and the shortest wait time for installation.
- A large residential project is looking at Thames Road. This project would consist of 600, 55 or older units.
- Superintendent Conaty offered help to Milford, cleaning up storm damage
- Superintendent Conaty has started on 2025-2026 budget
- HWWTP had NHDES Industrial Pretreatment Project audit
- Superintendent Conaty has been communicating with Cummings printing about new permit.

Old Business:
- TIF updates are every third Tuesday of the month

New Business:
- The next Sewer Commission meeting is scheduled for August 20, 2024

Non-public Session: Commissioner Robert Duhaime made motion to go into non-public session under **RSA 91-A:3, II (a)** at 1:32pm. Commissioner Richard Bairam seconded. All in favor, the motion was carried unanimously. Office Manager Linda O'Keefe was also present during non-public session.
Commissioner Richard Bairam made motion to come out of non-public session at 3:11pm. Commissioner Robert Duhaime seconded. All in favor, the motion was carried unanimously. No decisions were made.

Public Input: None

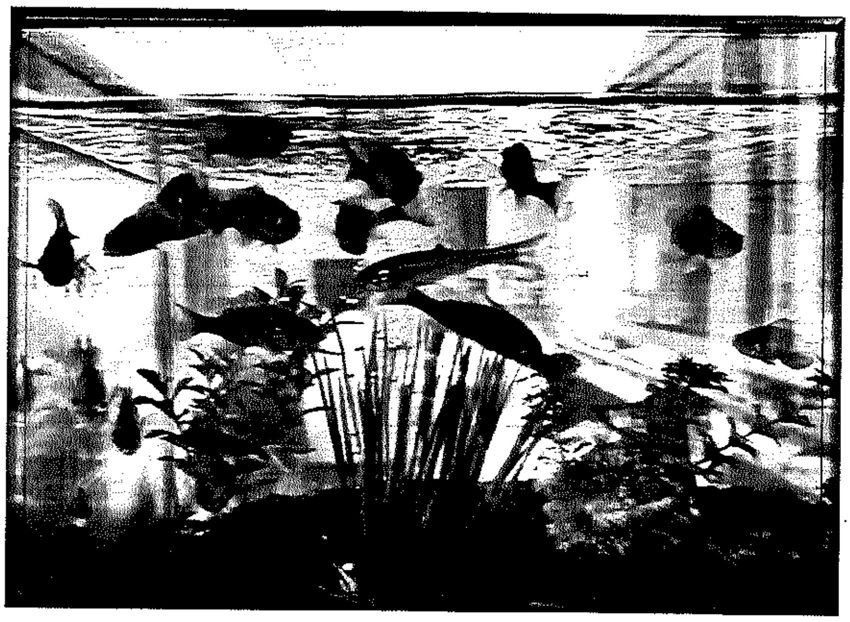
Adjournment: Commissioner Richard Bairam made motion to adjourn at 3:15pm. Commissioner Robert Duhaime seconded. All in favor, the motion was carried unanimously.

Respectfully Submitted,
Kim Langlois
Billing Clerk

Richard Bairam (Clerk)

Hooksett, NH Sewer Commission
QAPP for Ambient Merrimack River and Plant Effluent Sampling

Prepared for: Hooksett WWTP



WWTP Operations & Laboratory Team

Prepared by:
Ricardo Cantu, OspreyOwl Environmental

June 2024

Hooksett, New Hampshire

Prepared by Hooksett WWTP Staff and OspreyOwl Environmental, LLC

Approval Signatures: (EPA/NHDES not required)

Sidney Baines, Chairman, Hooksett Sewer Commission — Date

Richard Bairam, Hooksett Sewer Commission — Date

Robert Duhaime, Hooksett Sewer Commission — Date

Kenneth Conaty, Superintendent (Hooksett WWTP) — Date

Scott Tremaine, Laboratory Manager (Hooksett WWTP) — Date

John Clark , Assistant Superintendent (Hooksett WWTP) — Date

Michael Cobb, EPA Region 1 (Submitted for Informational Update) — Date

Hayley Franz, P.E., Permitting Engineer (Submitted for Informational Update) — Date

Quality Assurance Project Plan (QAPP)
for
Nutrient and Metals Testing in the Merrimack River and the WWTP Effluent Discharge

Prepared by

Ricardo Cantu, OspreyOwl Environmental
204 Pheasant Drive, Middleton, NH 03887

Superintendent, Laboratory and Operations Staff
1 Egawes Drive, Hooksett, NH 03106

June 2024

Distribution List

Sidney Baines, Chairman – Sewer Commission, Town of Hooksett
Richard Bairam, Sewer Commission, Town of Hooksett
Robert Duhaime, Sewer Commission, Town of Hooksett
Kenneth Conaty, Superintendent, Town of Hooksett
Scott Tremaine, Laboratory Manager, Town of Hooksett
John Clark, Assistant Superintendent, Town of Hooksett
David Mercier, Underwood Engineers
Michael Cobb, EPA Region 1, Boston, Massachusetts
Hayley Franz, NHDES, Concord, New Hampshire

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Quality Assurance Project Plan (QAPP) – Hooksett, New Hampshire, Wastewater Plant and Merrimack River, Metals and Nutrient Sampling for NPDES Permit Limitations

Introduction

The Town of Hooksett, New Hampshire (Town) has an NPDES permit for discharge to the Merrimack River (NPDES Permit NH0100129) for the Town's WWTP outfall 001 to the Merrimack River (Hydrologic Basin Code: 01092000). It is anticipated that 'Clean Sampling' of metals will result in substantially lower metal concentrations than previously obtained with the Whole Effluent Toxicity (WET) testing. All 'Clean Sampling' protocols outlined in this QAPP will apply to all metals and nutrient sampling equally. This QAPP is being prepared specifically for the summer of 2024 for all sampling events and will be the document used going forward for all subsequent NPDES sampling determining WPCF effluent and ambient Merrimack River concentrations.

Previously the Hooksett WWTP had no QA/QC Plan or a written sampling protocol and testing procedure for the Town's WET test ambient river sampling. Sample locations during that time were at the 001 outfall across the tracks from the administration/operations building at the plant. The bank slopes gently from the railroad tracks with riprap stone leading to the river. The outfall juts out about four feet into the receiving water where the plant's effluent is discharged. The historical sampling location is 15 feet to the north of the outfall along the eastern bank of this section of the river. This location was used for all WET testing and any associated Merrimack River ambient sampling.

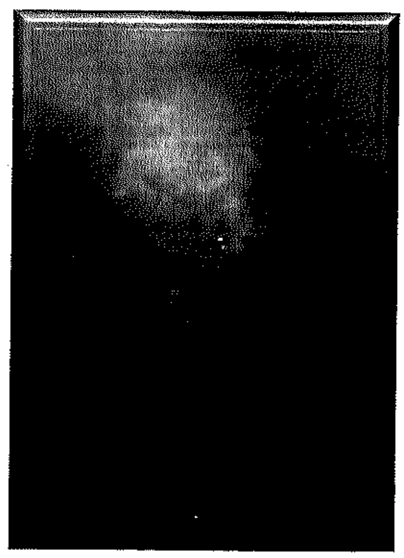


Figure 1 Outfall Dye Test

The site was inspected for compliance with representative sample requirements. It was found that this site was very representative of river conditions however, there were concerns that there could be some backflow the effluent discharge into the sampling area that is to represent upstream conditions. A dye test was conducted during a low-flow rate and it was found that the effluent stream did exit the outfall pipe and slowly meander southward not impacting the north side sampling area.

This location is a representative location that has good access during the four seasons of the year. The location is at the following coordinates, 43^0 07' 097"N and -71^0 46' 361"W. This will allow the staff the opportunity to take samples during any season of the year. There could be some freezing on the river along the banks during the coldest days in December, January, and February making it difficult to obtain river samples during those periods.

The current ambient sampling practice is for an operator to stand on the rocky bank of the river above the outfall, move to the north about 15 feet and extend a polycarbonate dipper out into the Merrimack River. This dipper is submerged, brought back to the surface, emptied and resubmerged (to clean any dust or film in the dipper) refilled and then moved to fill containers for the specified type of sample. The containers are withdrawn from a cooler that was not prepared for clean sampling events and the bottles are placed in the cooler with no protective covering. The dipping process can be done 10 or more times during the WET testing to fill the 2.5-gallon carboy provided by the lab. The filled bottles are then placed back in the cooler, iced, and prepared for pickup by the WET testing laboratory.

The effluent sampling location along with the ambient river sampling location was reviewed for the quality of sample that could be obtained. The proposed Merrimack River sample location was is used by the WWTP currently when taking WET samples from the Merrimack River.

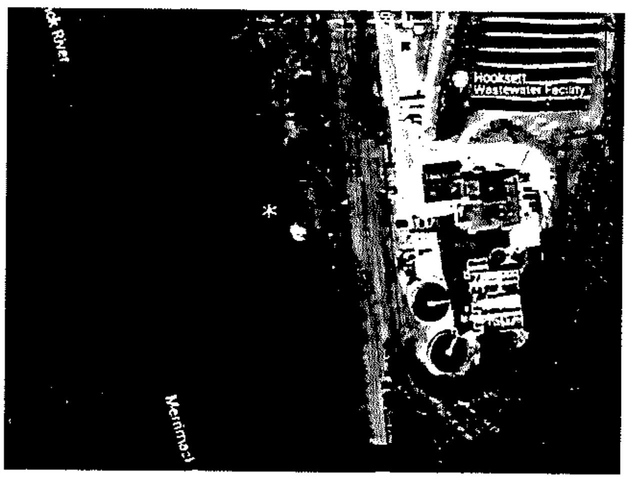


Figure 2 43^{0} 07' 097"N -71^{0} 46' 361"W

There is seldom boat traffic in this area due to the upstream and downstream dams that only allow for a 3.5-mile cruise along this segmented section of the Merrimack River. The majority of the boats are slow moving pontoon boats that would not contribute to the stirring up of silt from the river bed with being operated.

This site is upstream of the Goffs Falls USGS Gaging station which is located 300 feet north of the I-293 Bridge. The current sampling location will use the data from the Goffs Falls Gauge (USGS 01092000 MERRIMACK R NR GOFFS FALLS) to determine river flows at the time of sampling. The 7Q10 which is 613.81 cfs (330.34 mgd). The slope out into the river is gentle with good footing as this area was constructed as a boat launch and eliminates the steep embankments that are typically found along many stretches of the Merrimack River. As this is an area of a higher rocky river bed, there should be less concern with riverbed scouring.

There were no previous NHDES remediation or enforcement actions regarding WET sampling and analysis or sample collection at the WWTP's effluent or ambient river location.

1.0 Project Organization and Responsibilities

Figure 3, represents the project management structure and reporting relationships for nutrient and metals sample collection and analyses by the Merrimack WWTP staff for NPDES effluent discharge and WET testing monitoring. This QAPP is part of the Town's effort to obtain the highest quality and most representative sample for NPDES compliance. These practices include laboratory preparation of sampling containers, sample handling, sample analysis, and data loading for nutrients (Total Phosphorus). Total Recoverable Metals analyses are anticipated to be part of the NPDES Permit WET testing requirement for effluent monitoring and ambient Merrimack River sample collection.

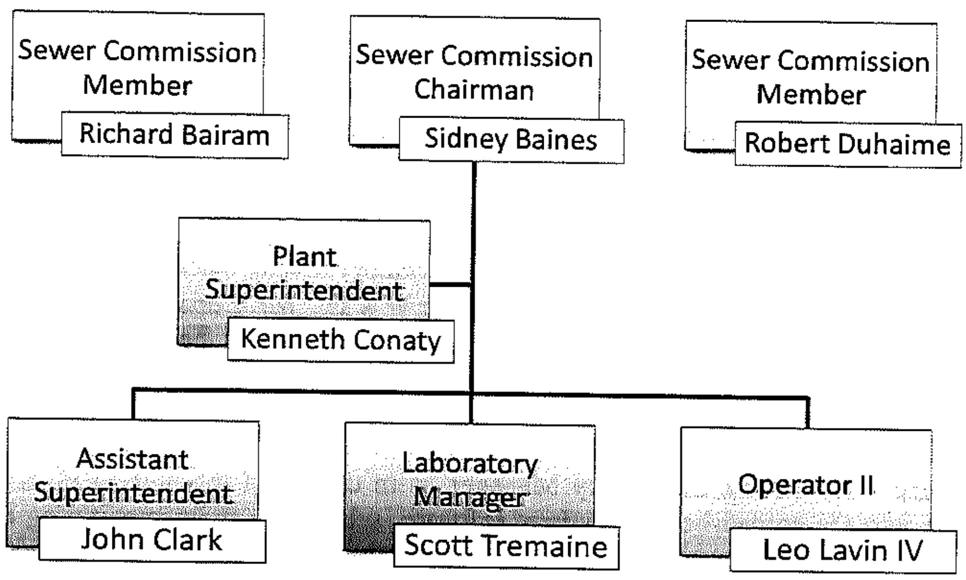


Figure 3 **Reporting Relationships**

Sidney Baines – Chairman of the Sewer Commission. Mr. Baines reviews the WWTP Operations and Collection System and infrastructure Projects to determine compliance with budget, completion dates, and cost overruns. He has full oversight of the other two commissioners and together they determine the billing process and oversight of billing administration, approve plant staffing, budget, capital projects and participate in personnel selection. Sidney is also involved with planning and coordinating of the capital projects. His capacity is oversight and contact with the general public and media. He is in weekly contact with Ken Conaty, the Superintendent of the WWTP. Mr. Baines is also responsible for the main interaction with Elected Officials, other city Department Heads dealing with Environmental and Wastewater items and Regulatory Agencies.

Richard Bairam – Mr. Bairam is an elected member of the Hooksett Sewer commission. His direct supervisory contact is the Sewer Commission Chairman and Richard assists the chairman with the review of WWTP Operations, the Collection System infrastructure projects and the WWTP's compliance with budget expenditures. He meets and discusses WWTP activities with the other two commissioners. Together they determine the billing process and oversight of billing administration, assist in the approval of plant staffing, budget, and capital projects. Mr Bairam may also act in the absence of the Chairman (Sidney) regarding minor authorizations involved with planning and coordinating of the capital projects. He also interacts with the Plant Superintendent on an as-needed basis.

Robert Duhaime – Mr. Duhaime is the third elected member of the Hooksett Sewer commission. His direct supervisory contact is the Sewer Commission Chairman with co-responsibilities shared with Richard Bairam. Robert also assists the chairman with the review of WWTP Operations, the Collection System infrastructure projects and the WWTP's compliance with budget expenditures. He meets and discusses WWTP activities with the other two commissioners. Together they determine the billing process and oversight of billing administration, assist in the approval of plant staffing, budget, and capital projects. Mr. Duhaime may also act in the absence of the Chairman (Sidney) regarding minor authorizations involved with planning and coordinating of the capital projects. He also interacts with the Plant Superintendent on an as-needed basis.

Kenneth Conaty – He is the Plant Superintendent in charge of the day-to-day operations of the wastewater treatment plant, the pumping stations, laboratory testing, NPDES Permit compliance, budget, and management of the staff of 6 people at the WWTP. Mr. Conaty reports directly to the Chairman of the Sewer Commission and in his absence, one or both of the other Sewer Commission Members. Ken has direct oversight of all plant staff. He is also the primary and direct contact with all third-party contract laboratory services.

Scott Tremaine – Hooksett's Laboratory Manager, is in charge of monitoring plant processes, entering data into the spreadsheet operations software, scheduling daily monitoring of NPDES permit requirements and other operational laboratory testing. He reports directly to Ken Conaty. Scott is involved with 'Clean Sampling' techniques and will assume a major role in the collection of clean samples.

John Clark – Assistant Superintendent. He is responsible for reviewing daily operational parameters, setting targets to meet NPDES permit requirements, directs the day shift in operations and equipment maintenance. Name reports directly to the Superintendent of the WWTP.

Leo Lavin IV – Operator II- Assists the Laboratory Manager with sample collection and required industrial sampling along with assisting with the collection of daily plant representative samples to determine the efficiency of plant operations. Name assists with the process and protocols associated with the 'Clean Sampling' events in regards to the quarterly WET testing. He reports directly to the Laboratory Manager and Supervisor of Operations.

Eastern Analytical- Contract Laboratory Services – This is a private laboratory service that provides sample containers for the Town of Hooksett and performs laboratory analysis on metals, nutrients, and other samples collected by the plant staff. Eastern Analytical prepares sample bottles, provides the appropriate chain of custody (COCs), and analyzes the plant effluent and ambient Merrimack River Water Quality analyses. They interact with and report directly to either the Plant Superintendent, Chief Operator or Pretreatment Manager.

1.1 Sampling Locations

The effluent sampling location is from a sampling hut (contains a flow-paced composite refrigerated sampler) located at the outfall of the chlorine contact chamber overflow trough.

The influent sampling location is in the grit room where the main pump station pumps into a influent trough that splits flow among all open channels before discharge directly to the head of the aerated grit chambers. These locations have been the historic sampling locations for each type of sample collected.

The WET test sample location remains in the historic sample collection location. As seen in Figure 2, (43^0 07' 097"N -71^0 46' 361"W) the location for ambient river WET sampling 15 or so feet above the WWTP effluent outfall. The dye testing performed in Figure 1 indicates this location is not impacted by the wastewater effluent plume during periods of moderate to low flow. It is not known if there is an impact at high flows. This location in the Merrimack River should be devoid of pollutant contribution from riverbed erosion when the flows are at 7Q10 conditions and up to about seven times that flow (around 4,300 cfs). There would be some colloidal suspension that won't settle at this flow; however, it is expected that the concentration values would remain below the 118 ug/l value that is expected in the 2024 draft General permit and certainly below the Aluminum Calculator value for Criterial Maximum Concentration (CMC) and Criteria Continuous Criteria (CCC). A larger map is included in Appendix A.

The 'Clean Sampling' SOP sampling protocol is detailed in **Appendix C** of this QAPP ('Clean Sampling' SOP). The process will be to wade out into the Merrimack River upstream from the effluent outfall pipe location to a depth of waist deep, wait for the stirred-up bottom sediment to completely settle, clear the surface from pollen, scum, leaf and grass debris and, any oil sheen, etc., then submerge an inverted, 1-liter Teflon beaker to between 18" and 24," flip the beaker upwards through the bubble and then pour off sample into the sample containers.

The effluent sample will be collected via a composite portable sampler, equipped with a non-metallic strainer, clean/new sample hose, and a plastic bag inserted into the 5 -gallon collection carboy before discharge into the Merrimack River. The 7Q10 at this location is 613.81 cfs (330.34 mgd).

Timing of flows from March through October can result in river gage discharges above 20,000 cfs in the spring-thaw months of March/April with flows between 1,500 and 3,000 cfs in the drier months of August/September. Peak river flows are 30 times higher or more than the 7Q10. The Merrimack River, like all rivers, experiences scouring velocities when a certain river gage flow is attained. This is dependent on the depth and width of the river along with the geographic bends in the river. The Merrimack River at this location seems to experience this phenomenon around 4000 to 4,500 cfs (seven times +/- the 7Q10). Once these flows are exceeded, metals (especially aluminum) climb quickly due to all the suspended particles that have been scoured off the river bed, especially in the silty bottom areas. **Appendix D** outlines the impact of scouring velocities in this area of the Merrimack River. This ambient sampling location should experience less scouring as there is a damn above and below this location with the river level raising and falling three feet or less in most conditions. Storms producing 100 year to 500 year floods would certainly negate this advantage.

During conditions near or slightly above the 7Q10 (613 cfs to 3,000 cfs), there is very little to no scouring, and true ambient river background concentrations are measured. These levels can be as low as 20% to 30% of the scoured velocity concentrations. This phenomena was displayed in the data from the 2013 NPDES Permit Fact Sheet calculation for Aluminum's Reasonable Potential.

The effluent sample will be a 24-hour flow proportioned composite sample taken via a portable sampler after the overflow from the chlorine contact chamber. The carboy for the effluent sample will have a new plastic bag insert to ensure there is no contamination from the inside of the carboy container sloughing off into the collected effluent sample. A metals-free strainer will be used for these specific sampling events. For this sample, as the effluent metals are anticipated to be in the low ppb range, a non-metallic strainer is recommended for use during these special 'Clean Sampling' events. New or acid-washed PVC tubing will be installed on the sampler line along with a new peristaltic pump hose to ensure the cleanest samples possible regarding the effluent sampling. If the hose is used on non-sampling days, it will be removed the day before the clean sampling event, soaked in a 3% nitric acid solution (ultra-pure deionized water and trace-metals grade nitric acid), and reinstalled the day the composite sampling begins. If it is used every quarter the hose is removed and stored in plastic bags until the next quarterly use or new vinyl sampling tubing and Tygon pump tubing will be used at the time of the next sample.

Figure 4 Metal Free Strainer

Figure 5 Example Bag Insert

Figure 6 Bag inside Carboy

With this in mind, the purpose of the 'Clean Sampling' effort described in this QAPP, or any future sampling endeavor, is to determine;

1) Continued assurance of a suitable upstream location to eliminate, or greatly reduce the possible impacts from dislodging particulate bed material and river scouring from quick water impacts;

2) Determine how this 'Clean Sampling' for various metals and nutrients compared to typical WET sampling in previous years;

3) Review sample concentrations from ongoing 'Clean Sampling' events and compare these with the grab samples done for previous WET testing;

4) Determine how total metal concentrations relate to river flow and pH;

5) Determine if upstream concentrations vary during collection in different months;

6) To determine if the Merrimack River is impaired for metals as outlined in Gold Book criteria, the NHDES Acid Soluble Aluminum converted concentration, or the EPA Aluminum Calculator Version 2.0 when compared to non-clean sampling with previous WET testing.

It is expected that the data collected under this QAPP will be used by NHDES and EPA to support the determination of Hooksett's calculations for 'Reasonable Potential'.

It is anticipated that the final NPDES permit will outline the Merrimack River ambient sampling schedule. A monthly or even bi-weekly sample will likely be required and obtained from the ambient sampling location. Sampling on the WWTP effluent and the upstream river location for pollutant metal concentrations will be performed under the conditions of this QAPP.

1.2 Training

The Town's staff is completing initial training during the summer of 2024. The goal is to have them observe the first few sample collection events, participate as the dirty-hands collectors during the next few sampling events, then finally perform as the 'Clean Hands' sampler leading the collection efforts in the final sampling events.

The data used in the 2013 sample permit and review of the data from subsequent WET testing indicate the need to have a 'Clean Sample' training program for current staff and future staff. This summer collection period will include training by OOE for the Laboratory Manager, Assistant Superintendent, and Operator II. These trainees will accompany OOE to the sampling sites to observe, ask questions, practice sampling protocols using the 'Clean Technique', and eventually take the entire sample under the watchful eye of OOE and future trained staff. The training will follow the procedures outlined in the 'Clean Sampling' SOP. When the trainee is considered fully trained, the Superintendent will be notified that said individual is ready to assume the 'Clean Technique' responsibilities for sampling. The data to be collected from the samples will be submitted with the monthly electronic DMRs.

The chain of command is generally a vertical format at the Hooksett WWTP (see fig 3). The Chairman of the Sewer Commission has overall responsibility for the WWTP's budget, capital improvements planning and ongoing sewer projects. The Superintendent is responsible for day-to-day operations of the collection system, budget, personnel, and all matters directly associated with the WWTP. The Laboratory Manager is responsible for laboratory analysis, and anything associated with the onsite NPDES testing and all NPDES and monthly NPDES required testing that is not sent out to a third-party private, State of New Hampshire certified, laboratory for analysis.

1.3 EPA Method 1669 "Clean Sampling Techniques"

In some cases, these water quality criteria are as much as 280 times lower than those achievable using existing EPA methods and required to support technology-based permits. Therefore, this sampling method, and the analytical methods referenced in this document, were developed by EPA to specifically address state needs for measuring toxic metals at water quality criteria levels, when such measurements are necessary to protect designated uses in state water quality standards. The latest criteria published by the EPA are those listed in the National Toxics Rule (57 *FR* 60848) and the Stay of Federal Water Quality Criteria for Metals (60 *FR* 22228)[1]. These rules include water quality criteria for 13 metals, and it is these criteria on which this sampling method and the referenced analytical methods are based and have been improved upon.

Method 1669 is "*performance-based*"; i.e., *an alternate sampling procedure or technique may be used, so long as neither samples nor blanks are contaminated when following the alternate procedures.*

The only way to measure the performance of the alternate procedures is through the collection and analysis of uncontaminated blank samples. The Method 1669 guidance identifies contamination problems in trace metals analysis. A field blank, as used in the QAPP, will determine ambient contamination along with the efficacy of field staff protocol for handling the bottles within the double-bagged method to ensure the cleanliness of the "Clean Sample" containers. This field process determines the technique of the water sampling methods to demonstrate that the samples were not contaminated during the sampling process by outside sources. A clean field blank reflects that the water sample taken is actually what is present in the flow and not introduced by the sampler or atmospheric conditions.

In recent years, it has been shown that much of the historical trace metals data collected in ambient water are erroneously high because the concentrations reflect contamination from sampling and analysis rather than ambient water source levels. Therefore, extreme care must be taken to avoid contamination when collecting and analyzing ambient water samples for trace metals.

2.0 Sampling Process Design (Summer of 2024)

Ambient river samples for trace metals analysis will be collected at the time of WET testing and a few times each month during this summer period. The sampling design plan calls for two samples taken each month during any week with low flow conditions. Low flow conditions are stated as a 72-hour period where antecedent rainfall is 0.1 inches or less of rainfall over this period and river flows less than seven times the 7Q10. Metals of concern (primarily aluminum and copper) will be collected during this period along with nutrients (total phosphorus), hardness, dissolved organic carbon, pH, water temperature and other determined parameters. The target metals are those that are outlined in the NPDES WET testing protocol and/or the NPDES Permit.

The time for these sample collections will be between late June through possibly October. The hope is the river levels drop quickly, a fairly dry season begins early, and that the daily samples

[1] Publication Date, 5/4/1995

can occur during weeks of flows near 7Q10 (or upwards of 5X this cfs). The plan is to sample a couple times per month going forward during weeks of lower flow (e.g. late June, July, August, September and possibly October). River levels and weather forecasts will dictate sampling dates. Hooksett plans to share this information with the EPA before the issuance of the General Draft Permit or as a comment to the General Draft Permit.

Samples will be collected at the above-referenced location. This location is removed from heavier downtown traffic and any large housing/commercial structures on either side of the sampling location. It is also removed from any boat docks or heavy river boating traffic. There is currently no planned construction activity upstream or downstream of this sampling location. If any of these activities occur it will be noted on the chain of custody (COC). This location is representative of background conditions and conforms with the recommendations of EPA Method 1669. This station is located about 15 feet upstream of Hooksett's WWTP outfall.

The upstream station is the critical station for determining permit limits for the Hooksett NPDES Permit since it represents background conditions.

In general, water samples for Total Metals, nutrients, and WET test analysis requirements as included in the Draft NPDES permit page are attached as **Appendix B**. These samples will all be collected using clean techniques as described in this QAPP. Metals, nutrients, and other parameters will all be collected by the same 'Clean Sampling' technique to assure consistency in the sampling method. All ambient WET samples and associated WET plant effluent samples are considered critical. This has more than come to light with the EPA using the five previous years of WET testing data for the development of the 2013 NPDES Permit. The collection 'Standard Operating Procedure' (SOP) procedure is outlined in **Appendix C** of this QAPP, 'Clean Sampling' SOP. The analytical methods hold times, and minimum reporting limits are outlined below in Table 2 and attached as **Appendix E.**

The parameters of concern for this permit cycle are aluminum, copper, and lead as these parameters were measured in the WET test ambient river sampling used for 'Reasonable Potential' calculations in the 2013 final NPDES. The current NHDES criteria for aluminum MCL are 78.3 ug/l (10% safety factor on Gold Book value of 87 ug/l) and with 106 ug/l being the target for the Acid Soluble criteria (118 ug/l with a 10% safety factor). The EPA has adopted the calculator method for Aluminum. Aluminum is dependent on several factors that are entered into the Aluminum Calculator V2 and produce a final result. Higher pH, dissolved organic carbon, and hardness in the ambient water are positive factors for additional aluminum concentration. Historically, locations in this segment of the Merrimack River would have allowable aluminum calculated concentrations over 200 ug/l due to the hardness, DOC, and river pH. Hooksett will target the 87 ug/l as outlined in the 2013 NPDES permit as the target value, but fully anticipates that the final effluent MCL will be calculated via the version 2.0 Aluminum Calculator.

Copper is another parameter that is modeled through the Biotic Ligand Model. A target copper concentration will be the 2.8 ug/l (Gold Book value with 2.57 ug/l being the 2013 NPDES concentration with the 10% safety factor).

Samples will be analyzed at Eastern Analytical whose QA/QC Plans outline steps to analyze "Clean Samples" via Laboratory Protocol for TRM and ASM as outlined in EPA Method 1669. The Laboratory that currently has the bid (as of the writing of this QAPP) for analyses of plant sample concentrations is Eastern Analytical. The Chain of Custody (COC), and NH laboratory Certifications are attached as **Appendix D.**

Eastern Analytical serves as the outside laboratory for Hooksett regarding NPDES analysis that is not performed in the plant Laboratory. Eastern Analytical is more familiar with 'Clean Sampling' analysis and bottle preparation. The SOPs for metals, TP, DOC, and TKN are also attached in **Appendix D**. The analytical methods, hold times and minimum reporting limits are below in Table 1.

Table 1: Analytical Methods

Parameter	EMethod/SM#	Hold Time	Typical MRL	Lab Specific MRL
Phosphorus, Total	E365.1/SM 4500-P F	28 days	0.005 mg/L	0.01 mg/l
Aluminum, Total	E200.7/3125B	6 months	0.02 mg/l	0.02 mg/l
Cadmium, Total	E200.7/3125B	6 months	0.0005 mg/l	0.0005 mg/l
Copper, Total	E200.7/3125B	6 months	0.005 mg/l	0.001 mg/l
Lead, Total	E200.7/3125B	6 months	0.001 mg/l	0.0003 mg/l
Nickel, Total	E200.7/3125B	6 months	0.001 mg/l	0.0002 mg/l
Zinc, Total	E200.7/3125B	6 months	0.005	0.004 mg/l
Dissolved Organic Carbon (field filter)	415.1	28 days	1 mg/l	1.0 mg/l
Hardness, Total	SM2340B	6 months	0.1 mg/l	0.05 mg/l

Temperature and pH will be collected following the same Field Protocols outlined in the QAPP for metals and nutrients. Monitoring for pH and temperature will be analyzed at Merrimack's WWTP Laboratory from the last ambient sample taken from the Merrimack River when all sampling is completed. The plant laboratory is one minute from the sampling location so samples can be transported back to the laboratory for analysis well before the 15-minute hold time as outlined in this QAPP. The plant pH meter also has a temperature sensing function and is calibrated monthly and certified annually for accuracy by QualCal Calibrations. The meter is given a two-point standardized calibration to pH 7.0 and 4.01. The plant also has a portable pH meter that may be used in the field if staff do not believe they can meet the 15-minute hold time before pH and temperature analysis. This portable meter will also undergo the two-point calibration of the laboratory meter and is also checked and calibrated annually by QualCal Calibrations. The Certifications are attached as **Appendix E.**

2.1 Flow Gaging

Flow information will be generated from the USGS Goffs Falls Gage, 0109200. The gage is upstream of the I-293 bridge in Manchester, NH. The coordinate is N42^{0}56'53" W-71^{0}27'50". The flow data will be collected for each day samples are taken to be compiled with the ambient river data results. This is the best data available in this segment of the Merrimack River. There may be daily variations of the flow due to water being held or released by upstream Dams. USGS information on the gaging station is below:

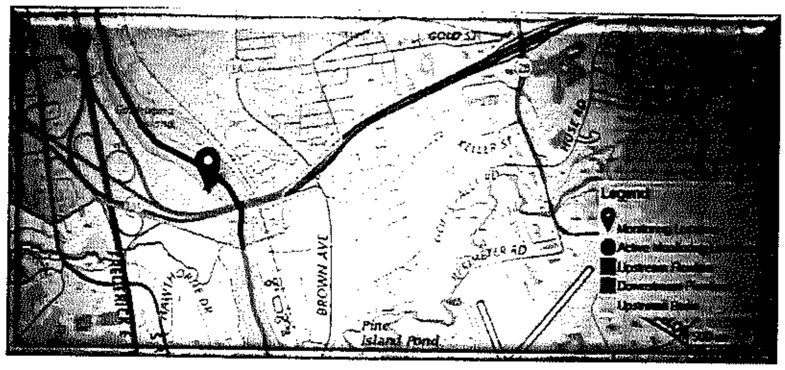


Figure 7 Goffs Falls Gaging Station USGS

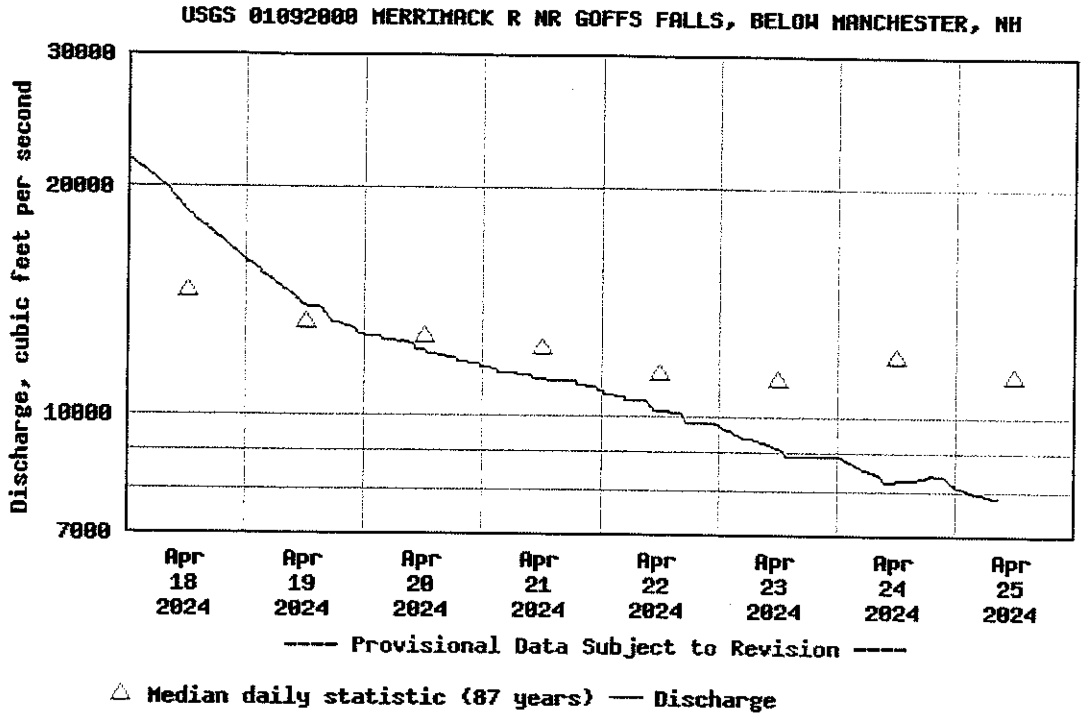
LOCATION--Lat 42^{0}56'53" Long -71^{0}27'50" NAD27. Hillsborough County, New Hampshire Hydrologic Unit 0107002, on the right bank (looking downstream), 600 ft upstream from the Interstate 293 bridge.
DRAINAGE AREA—3,0092 mi^2.
Datum of Gage—108.58 feet above NAVD88

Flow data is recorded from the daily table sheet with flow recorded at the start of the sampling effort, mid-way through the sampling effort (typically the 15-minute mark), and at the end of the sampling event usually when the field blank is closed and double-bagged (see example filled COC in **Appendix F**). The USGS table resembles the following.[2]

Date & Time	Discharge cfs	Gage Ht
07/15/2024 11:30 EDT	1,510^P	3.33^P
07/15/2024 11:45 EDT	1,500^P	3.32^P
07/15/2024 12:00 EDT	1,480^P	3.31^P
07/15/2024 12:15 EDT	1,470^P	3.30^P

The flow data will be collected for each day samples are taken and noted on the COC for the three, fifteen-minute increments of sampling time. This data is to be compiled with the ambient river concentration data results when the final analytical report is received from the lab. In some cases, the data may be marked as provisional (see below graph). This will be noted on the COC and the corrected value will be used at the time of data entry. Provisional data will be updated as the USGS site corrects final values.

[2] **Provisional Data Statement** This information is preliminary or provisional and is subject to revision. It is being provided to meet the need for timely best science. The information has not received final approval by the U.S. Geological Survey (USGS



This is the best data available in this segment of the Merrimack River and is the basis of flow volume measurements to calculate 7Q10 for the Hooksett WWTP, NPDES Permit. .

3.0 Quality Assurance/ Quality Control

These are provided to the laboratory at the time of bidding to assure the Town of Hooksett obtains the highest quality containers and blanks for analysis during sampling events.

Water samples will include those taken off the outfall pipe area (upstream) and will include duplicates and field blanks. Duplicate samples are defined as a second analysis of the field sample, made from the original sample container. The spike blank is a second field sample container filled with metals-free DI water from the analyzing lab and dosed with a known concentration of specified metals to be analyzed. The spike blank for metals will be prepared as follows:

In the Lab: (example spike samples may have higher or lower final concentrations).

A post-digestion spike is performed on one sample per analytical batch to determine if matrix interferences are present. The post-dilution spike is evaluated if the serial dilution fails or if the analyte concentration is not at least 50 times the instrument detection limit. This should be the same sample selected for the serial dilution in Section 9.2.7.

Transfer 10 ml of digestate to a suitable vial
Spike the sample with 20 ul/l of the ICP-MS calibration standard

Analyze the spiked aliquot and the unspiked aliquot (the unspiked may have been analyzed previously and does not need to be reanalyzed)
Calculate the percent recovery of the post-digestion spike as follows:

$$\%Rec = \frac{Cps - Cs}{C_2} \quad X100$$

Cps = Concentration of post-digestion spike (ug/l)
Cs = Concentration of unspiked sample (ug/l)
C2 = Theoretical concentration of spike (ug/l)[3]

QA/QC sampling frequency for each parameter is 10% of the total samples taken for QA/QC purposes or at least once per round of sampling.

The QA/QC information for each parameter associated with the QAPP can be found in the specific individual Eurofins SOPs attached in Appendix D.

4.0 Clean Sampling Technique

4.1 Scope & Application

This Standard Operating Procedure applies to the collection of representative metal samples from lakes, ponds, and streams. This procedure is a clean sampling procedure and has been developed to minimize contamination. Although this SOP was developed for metals sampling, this procedure may be used for organic and/or inorganic compounds where a clean sampling procedure is necessary.

4.2 Data Quality Objectives

Target parameters are essential to determine the accuracy and precision of sample collection techniques, preparation of samples by the laboratory for the analysis of specified concentration amounts, and the calibration accuracy of the instrument of the instrument itself. Table 2 outlining the Data Quality Objectives, is the minimum accuracy and reporting limits that Merrimack is requiring of Eastern Analytical during sampling analysis and the plant staff during the collection of 'Clean Samples.'

Table 2: Data Quality Objectives

Parameter		Units	Accuracy	Precision (RPD) (Field and Laboratory)	MRL
Phosphorus, Total		mg/L	90– 110% recovery of LCS; lab spike; pg 6/17, 9.1 TP-SOP lab blank < detection	25% - 10%	≤ 0.01 mg/L

[3] Eastern Analytical Metals SOP, pg 16 & 17/58, Attachment D

Parameter		Units	Accuracy	Precision (RPD) (Field and Laboratory)	MRL
Aluminum, Total **See Appendix C**		mg/L	80% - 120% recovery of LCS and 80% to 120% for Matrix Spike	25% - 20%	≤ 0.01 mg/L
Cadmium, Total		mg/l	80% - 120% recovery of LCS and 80% to 120% for Matrix Spike	25% - 20%	≤ 0.0005mg/L
Copper, Total		mg/l	80% - 120% recovery of LCS and 80% to 120% for Matrix Spike	25% - 20%	≤ 0.001 mg/L
Lead		mg/l	80% - 120% recovery of LCS and 80% to 120% for Matrix Spike	25% - 20%	0.0003 mg/l
Zinc		mg/l	80% - 120% recovery of LCS and 80% to 120% for Matrix Spike	25% - 20%	≤ 0.004 mg/L
Dissolved Organic Carbon		mg/l	80% - 120% recovery of LCS and 80% to 120% for Matrix Spike	25% - 20%	≤ 1.0 mg/L
Hardness		mg/l	80% - 120% recovery of LCS and 80% to 120% for Matrix Spike	25% - 20%	≤ 0.05 mg/L

Note: the relative percent difference (RPD) is the measurement of two samples (duplicates or splits) in which samples X^1 and X^2 are calculated as follows: $(X^2-X^1)/((X^2+X^1))/2$

4.3 Summary of Method

This SOP describes the procedure for the collection of representative water samples from a boat, using waders, from a structure that spans the water body, or from shore. This method assumes that the sampling parameters (pollutants) are uniformly distributed in the water column. This SOP includes sample parameters for specific methods used in ambient metals collection. It does not address flow proportioned sampling.

4.4 Definitions

4.4.1 Bottle Blank: Analyte-free water is collected into a sample container, of the same lot number as the containers used for the environmental samples. This sample evaluates contamination introduced from the sample container(s) from a common lot.

4.4.2 Field Blank: In the field, analyte-free water is prepared at the laboratory using the "Clean Sample" technique preparation. The sample containers are the same lot used for the environmental samples. This evaluates contamination introduced from the ambient condition(s) when opened in the field before sampling. Field blanks are not used for volatile samples. In this sampling event, all sampling equipment (Teflon beaker(s)) are prepared in a laboratory and certified clean. The Field Blank will be used as an environmental blank during the time of sample collection. This blank will be the first container opened, placed on the outer "dirty bag" upwind of the sampling location, and left open during the entire sample collection process. The cap will only be handled by the clean-hands person by the top of the cap (never touching the inside of the cap liner) and placed in the inner clean bag, sealed and securely set aside for reuse. The field blank will be the last bottle closed and secured. It will be analyzed to determine contamination from dust, wind conditions, forested canopy, rain, etc., and also verify the sampler technique during the cycle of the 'Clean Sample' collection.

4.4.3 Filter Blank: In the field, analyte-free water is passed through a filter and collected into the appropriate sample container. This is done only when samples are subject to field filtering. It is recommended that the sampler coordinate with the lab to have them filter the ambient sample to lessen the chance of stray particulate contamination. The filter blank is then preserved. It is suggested that the lab prepare a bottle with the necessary acid concentration to acidify the type of sample being analyzed so the sampler does not introduce stray particulate contamination during the addition of acid and the insertion of a pH test strip to determine the <2 pH value of acidified sample. This procedure is the same as the sample collection procedure.

4.4.4 Trip Blanks: A sample collected at the laboratory using analyte-free water in the appropriate sample container with the proper preservative, taken out to the field and returned to the laboratory for analysis without being opened. Trip blanks are generally for volatile organic compounds, low-level metals, and gasoline range hydrocarbon samples. Trip blanks are used to assess contamination introduced during sample transport and bottle preparation in the laboratory.

4.4.5 Field Replicates/Duplicates: Two or more samples collected at the same sampling location. Field replicates should be samples collected side by side or by collecting one sample and immediately collecting the second sample. Field replicates represent the precision of the whole method, site heterogeneity, field sampling, and laboratory analysis. Field duplicates are typically two containers opened, where the ambient river sample is collected in a Teflon beaker and poured as evenly as possible into one container, back to the other, into the first, and back to the second until both bottles are filled to the neck of the container. Typically, these bottles are 125ml to 250 ml and it is recommended that shared pours be in the 10 to 20 ml range (dependent on container size) so approximately 10 equal portions of the river sample can be alternately poured into the alternating bottles. This typically keeps duplicate QA/QC levels to 5% or fewer error values.

4.4.6 Spiked Blanks: The spike blank is a second field sample container filled with metals-free DI water from the analyzing lab and dosed with a known concentration of specified metals to be analyzed. Upon being reanalyzed the determination of instrument drift, and quality of the spike can be determined.

4.4.7 Field Split Samples: Two or more representative sub-samples taken from one environmental sample in the field. Before splitting, the environmental sample is homogenized to correct for sample heterogeneity that would adversely impact data comparability. Field split samples are usually analyzed by different laboratories (outside laboratory comparison) or by the same laboratory (intra-laboratory comparison). Field splits are used to assess sample handling procedures from field to laboratory and the laboratory's comparability analysis.

4.4.8 Clean sampling procedure: A procedure used to minimize contamination during sample collection. This procedure differs from regular sampling procedures by taking extra steps such as latex gloves, minimizing contact with other surfaces, having pre-prepared clean bottles, determining potential ambient and environmental contamination sources in the sampling areas, removing all metal jewelry, glasses, pens, etc. having only cotton clothing and canvas water shoes and usually involving a clean hands and dirty hands person.

5.0 Chain of Custody

5.1 Follow the Sample Control Procedures and chain-of-custody Standard Operating Procedures. COCs from Eastern Analytical used at the time of the finalization of this QAPP manual are found in **Appendix G**.

5.2 At a minimum enter the following information on the Chain of Custody form: sampling date, sampling time, station number and/or sample numbers, project name, number of containers per station/sample number, type of analyses, type of sample (composite or grab), pH of ambient river water, temperature of ambient river water, flow gage reading, and sampler's signatures. Also note any particular conditions (e.g. canoe offshore, geese in the area, oil sheen on surface, etc.) in the remarks section of the COC.

5.3 Chain of custody forms should stay with the samples at all times. When samples are not in the custody of the sampler or designated person (who signs the form) they should be maintained under lock and key (i.e. a locked vehicle or locked building).

5.4 Attach the custody seals to the cooler before shipment if for investigation or shipment to another laboratory.

6.0 Data and Records Management

6.1 All data and information shall be recorded in a hardbound book or on a data sheet. The WWTP records process data along with all laboratory testing data in the MOR spreadsheets. The Excel spreadsheets are capable of generating any queried information and also generate the monthly operating report for the WWTP that is submitted with the NET DMR monthly required reporting. The internal plant distribution list for this QAPP will be the Chairman of the Sewer Commission, two elected Sewer Commission members, Plant Superintendent, Laboratory Manager, Assistant Superintendent Supervisor and Operator II. A copy is available for any other staff who may be interested. A copy will also be presented to the NHDES and EPA for review.

6.2 The chain of custody form is generated by the laboratory staff and signed over to the certified laboratory's delivery service when any samples (Quarterly WET, and monthly samples) are picked up for third-party testing. A copy of the COC and the analytical results are kept with the sampling records in the laboratory file cabinets.

6.3 Final monthly reports, which include all DMR and plant process operating data are generated by the Hooksett WWTP using the Google Sheet Database. The data is initially reviewed by the Laboratory Manager/Assistant Superintendent upon initial entry into reporting spreadsheets. If the Lab Manager has any concerns regarding uploaded datasets, he will discuss these with the Plant Superintendent. This monthly printed report is initially reviewed by the Laboratory Manager at the Hooksett WWTP once the final MOR is generated. If there are any concerns beyond what was discussed or missed by the Laboratory Manager, the Plant Superintendent will take these concerns to the Three Member Sewer Commission Board. A course of action will be planned (process course correction of capital expenditure) and taken if the issue in question warrants. Once the data has been reviewed and QC'd, it is uploaded via the NET DMR for the required monthly NPDES report submission. These reports will be kept with the Town of Hooksett's files for seven years and forwarded to the EPA and NHDES with comments on the final NPDES Permit at the appropriate time.

6.4 Field, laboratory, and meta-data may be uploaded to EPA's Water Quality Exchange (or other appropriate national data system) and the NHDES database at their discretion.

7.0 Quality Control/Quality Assurance and Decontamination:

7.1 Representative samples are required. OOE along with the Hooksett WWTP staff will reevaluate the site toward the end of the sampling study and match the effluent data to the ambient river data. Large differences are expected but in the event the sample concentration values seem to be closer or overlap, back water causes will be further investigated. The Town is anticipating that EPA will determine that this location is sufficient (as previously determined) to represent the water quality that is upstream from Hooksett's WWTP outfall.

7.2 All field QC sample requirements in the QAPP must be followed. These may involve trip blanks, field blanks, equipment blanks, filter blanks, field duplicates, and the collection of extra samples for the laboratory's quality control.

8.0 Waste Management and Pollution Prevention:

During field sampling and analysis events, there may be hazardous waste produced from the sample collection (small amounts of nitric and/or sulfuric acid from waste sample containers). The waste must be handled and disposed of per federal, state, and municipal regulations. Dispose of the site-specific hazardous waste produced where the work was performed, if the operating site has proper disposal available. If no disposal meets regulatory requirements, the waste must be transported back to the Hooksett WWTP and lab-packed for future disposal through a hazardous waste disposal facility.

9.0 References:

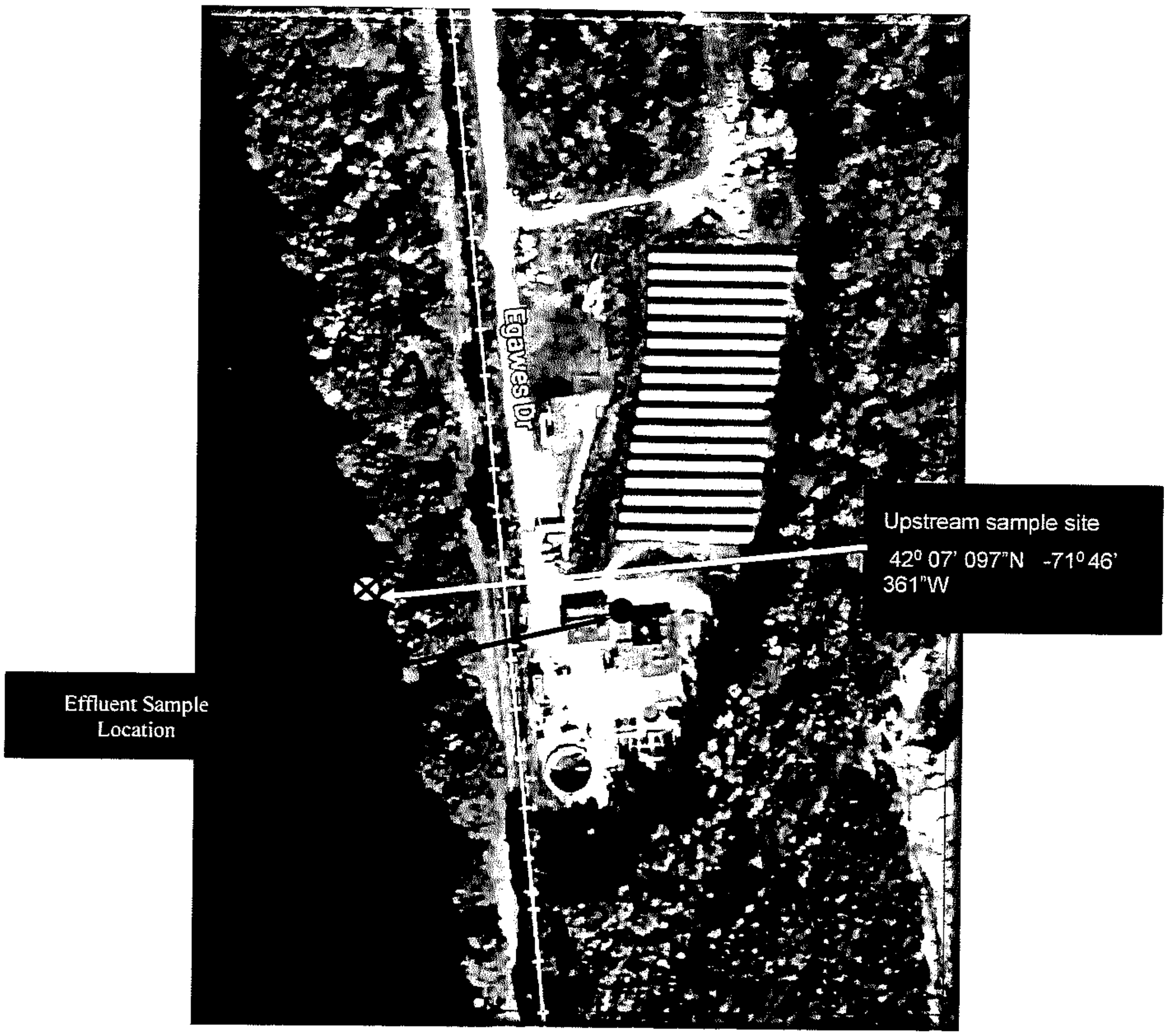
20.1 U.S. EPA, Office of Environmental Measurement and Evaluation, January 1998, revision 2. Safe Boating Standard Operating Procedures. EPA-RG 1-0EME/BOAT

20.2 U.S. EPA, Office of Environmental Measurement and Evaluation, 1/30/07, Revision 9. Standard Operating Procedures for calibration and field measurement procedures for the YSI model 6- series Sondes (Including temperature, pH, specific conductance, turbidity, dissolved oxygen, chlorophyll, rhodamine WT, ORP, and barometric Pressure. ECSSOP- YSI Sondes9

20.3 U.S. EPA, Office of Environmental Measurement and Evaluation, August 1996, Revision 1. Sample Control Procedures, chain-of-custody.

20.4 U.S. EPA 40 CFR Part 136.3 (e) Table II

Appendix A
WET Test Sampling Locations



Appendix B
NPDES WET Testing Parameters

VI. CHEMICAL ANALYSIS

At the beginning of a static acute toxicity test, pH, conductivity, total residual chlorine, oxygen, hardness, alkalinity and temperature must be measured in the highest effluent concentration and the dilution water. Dissolved oxygen, pH and temperature are also measured at 24 and 48 hour intervals in all dilutions. The following chemical analyses shall be performed on the 100 percent effluent sample and the upstream water sample for each sampling event.

Parameter	Effluent	Receiving Water	ML (mg/l)
Hardness[1]	x	x	0.5
Total Residual Chlorine (TRC)[2, 3]	x		0.02
Alkalinity	x	x	2.0
pH	x	x	--
Specific Conductance	x	x	--
Total Solids	x		--
Total Dissolved Solids	x		--
Ammonia	x	x	0.1
Total Organic Carbon	x	x	0.5
Total Metals			
Cd	x	x	0.0005
Pb	x	x	0.0005
Cu	x	x	0.003
Zn	x	x	0.005
Ni	x	x	0.005
Al	x	x	0.02
Other as permit requires			

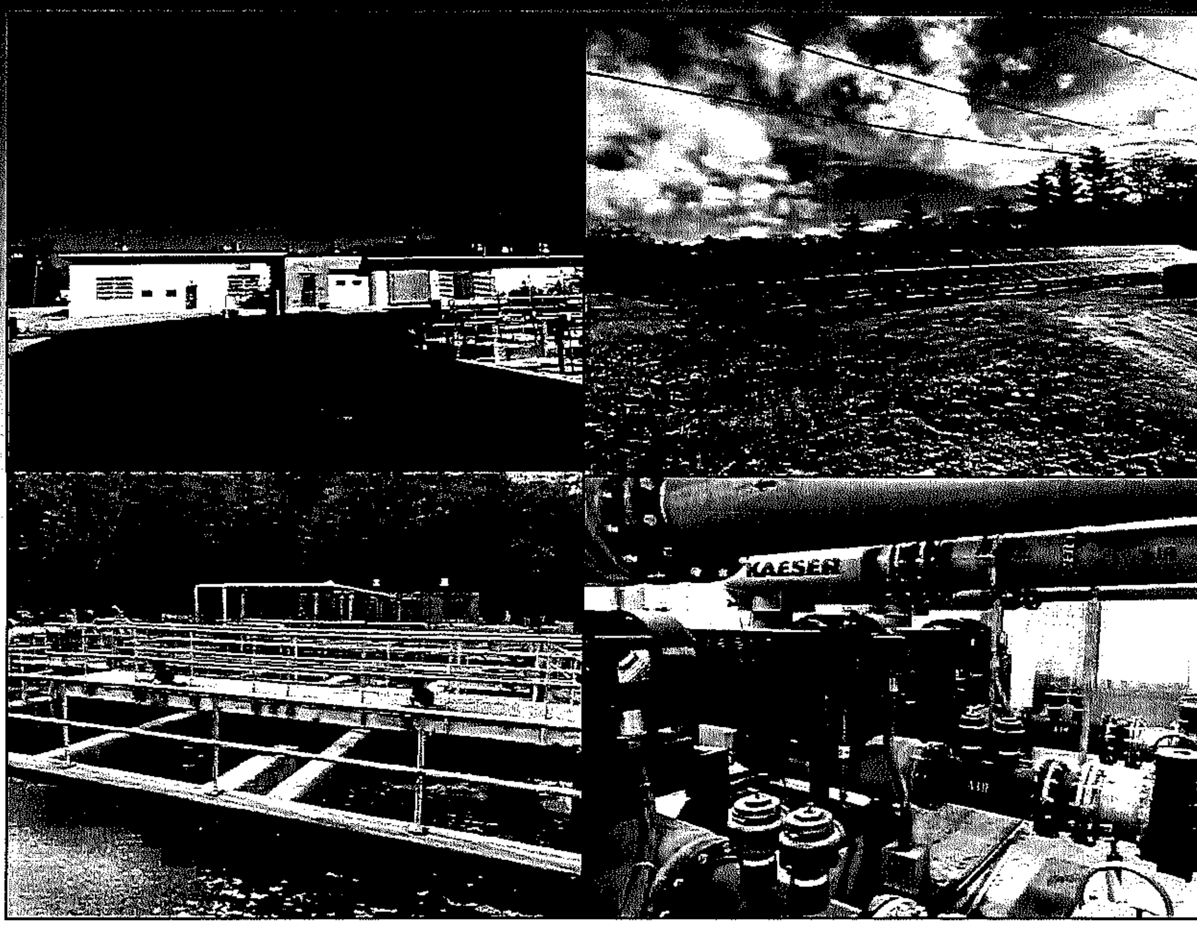
Notes:

1. Hardness may be determined by:
   - APHA <u>Standard Methods for the Examination of Water and Wastewater</u>, 21st Edition
     - Method 2340B (hardness by calculation)
     - Method 2340C (titration)
2. Total Residual Chlorine may be performed using any of the following methods provided the required minimum limit (ML) is met.
   - APHA <u>Standard Methods for the Examination of Water and Wastewater</u>, 21st Edition
     - Method 4500-CL E Low Level Amperometric Titration
     - Method 4500-CL G DPD Colorimetric Method
3. Required to be performed on the sample used for WET testing prior to its use for toxicity testing.

ENERGY EVALUATION

Hooksett Sewer Commission
Wastewater Treatment Plant

Hooksett, New Hampshire



PROCESS ENERGY SERVICES, LLC

WATER ♦ WASTEWATER ♦ INDUSTRIAL

ENERGY EVALUATION

for the

HOOKSETT WASTEWATER TREATMENT FACILITY

Original Report: June 2018
Updated: July 2024

Hooksett, NH 03106

Performed by:

Process Energy Services, LLC
2 Lafayette Rd.
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(603) 537-1286

Supported by:

New Hampshire Department of Environmental Services

TABLE OF CONTENTS

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..

1.3 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 supply measures (ESMs) for improvements that may reduce energy costs without reducing energy consumption (i.e. demand savings and rate schedule changes). Energy management practices (EMPs) that are essential for a successful energy management program are also included.

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 includes an energy related overview of each process at the wastewater plant and Section 4 includes a detailed review of each proposed measure.

The project evaluation summary table is presented in Table 1.1 and a summary of the qualified measures and their associated savings is presented in Table 1.2. The savings percent values have been determined using 2023 as the baseline year.

Table 1.1: Project Evaluation Summary

2023 Annual Baseline Electric Energy Costs

Wastewater Plant Electric Cost (including solar credit)	$ 72,642
Total Plant Energy Cost	**$ 72,642**

2023 Annual Baseline Fuel Oil, Propane & Water Costs

Plant Fuel Oil	$ 12,579
Plant Town Water Use (adjusted to reflect usage before plant water upgrade)	$ 7,945
Wastewater Plant Propane Use	$ 2,482
Total	**$ 23,006**

Projected Annual Cost and Savings Summary

	Calculated Savings	Percent of Costs
Electric Cost Savings	$ 31,172	43 %
Town Water Cost Savings (project by Town)	$ 5,198	65 %
Fuel Oil/Propane Cost Savings	$ 3,065	20 %
Annual Savings/Percent of Energy Costs	**$ 39,435**	**41 %**

Project Costs/Payback

Estimated Cost of Projects	**$ 71,500**
Simple Payback	**1.8 Years**

Electric Energy Reduced Power Plant Emissions

Reduced power plant emissions from the proposed energy efficiency measures are summarized below using the EPA's Avoided Emissions and Generation Tool (AVERT).

Annual Emissions Changes • **Power Sector Only**
New England Region

	Original	Post Change	Change
Generation (MWh)	49,108,280	49,108,110	-170
Total Emissions from Fossil Generation Fleet			
SO_2 (lb)	1,362,440	1,362,430	-10
NO_X (lb)	7,209,170	7,209,140	-30
Ozone season NO_X (lb)	3,606,780	3,606,760	-20
CO_2 (tons)	25,430,570	25,430,490	-90
$PM_{2.5}$ (lb)	1,380,600	1,380,590	–
VOCs (lb)	524,610	524,610	–
NH_3 (lb)	820,590	820,590	–
AVERT-derived Emission Rates:	Average Fossil		Marginal Fossil
SO_2 (lb/MWh)	0.028		0.064
NO_X (lb/MWh)	0.147		0.167
Ozone season NO_X (lb/MWh)	0.158		0.220
CO_2 (tons/MWh)	0.518		0.493
$PM_{2.5}$ (lb/MWh)	0.028		0.033
VOCs (lb/MWh)	0.011		0.012
NH_3 (lb/MWh)	0.017		0.017

- Negative numbers indicate displaced generation and emissions.
- All results are rounded to the nearest 10. A dash ("—") indicates non-zero results, but within +/- 10 units.
- When users evaluate a portfolio scenario including EVs and EE or RE, marginal fossil values are not reported and a null sign ("Ø") is shown.
- Data does not include changes to ICE vehicle emissions (e.g., emissions from tailpipes).
- Estimated marginal CO_2 emission rates for future years are available in the current AVERT Main Module.

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

Table 1.2: 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 Process Data	--	--	--	--
	Total for EMPs	--	--	--	--
	OPERATIONAL MEASURES				
OM 1	Discontinue Froth Spray Pump Use	24,120	$2,747	--	--
OM 2	Plant Water System Upgrades (2023 upgrade)	(888)	$5,198	--	--
OM 3	Adjust IFAS Dissolved Oxygen Level Setpoint	108,933	$12,521	--	--
	Total for OMs	**132,165**	**$20,466**	--	--
	ENERGY CONSERVATION MEASURES				
ECM 1	Install New Boiler	--	$3,065	$20,000	6.5
ECM 2*	Investigate Sludge Tank Bypass Piping	Saving based on energy use after 2024 sludge system upgrade			
ECM 3	Replace Chemical Bldg Electric Heaters with Heat Pumps	25,575	$2,804	$30,000	10.7
ECM 4	Flow Controls to Adjust Grit Blower VFD	2,190	$197	$1,500	7.6
	Total for ECMs	**27,765**	**$6,006**	**51,500**	**8.6**
	ENERGY SUPPLY MEASURES				
ESM 1	Investigate Community Power Purchase Program	--	$12,963	--	--
	Total for ESMs	--	**$12,963**	--	--
	WWTF Electric Energy and Cost Savings	--	$31,172	$51,500	1.6
	Town Water Cost Savings	--	$5,198	--	--
	WWTF Fuel Oil & Propane Energy and Cost Savings	--	$3,065	$20,000	6.5
	Total	**159,930**	**$39,435**	**$71,500**	**1.8**

*The energy savings in ECM #2 could not be included since it is based on reducing energy costs after the 2024 sludge dewatering upgrade.

The Eversource energy efficiency program can provide incentives for qualified measures in Table 1.2. The energy efficiency program information can be found at www.NHSaves.com..

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 4 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.

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.

Twelve years of benchmarking data for the Hooksett WWTF is summarized in Table 2.1. Although the energy use and benchmark values spiked in 2020, the overall trend has been a steady reduction in energy use with 2023 being the most efficient year. In addition, in 2023, 37% of the energy used at the plant was from the solar PV array.

Table 2.1: Hooksett WWTF 2012-2023 Benchmarking Data

Year	Total Grid Energy Usage (kWh)	Solar Power Use at Plant (kWh)	Total Energy Use*	Total Annual Flow (MG)	Average Daily BOD Removed, lb/day	Average kWh/lb BOD Removed	Annual Average kWh/MG Treated
2012	1,050,072	0	1,050,072	236	1,296	2.22	4,444
2013	989,576	0	989,576	247	1,412	1.92	4,012
2014	1,051,298	0	1,051,298	252	1,257	2.29	4,175
2015	937,364	0	937,364	233	1,476	1.74	4,020
2016	988,400	0	988,400	232	1,511	1.79	4,256
2017	937,000	0	937,000	261	1,401	1.83	3,590
2018	955,600	0	955,600	279	1,448	1.81	3,425
2019	942,800	0	942,800	238	1,335	1.93	3,961
2020	1,346,800	0	1,346,800	258	1,605	2.30	5,220
2021	829,200	397,015	1,226,215	319	1705	1.97	3,844
2022	614,000	380,434	994,434	266	1,548	1.76	3,738
2023	551,200	325,994	925,274	333	1,570	1.61	2,779

*Includes the Martin Ferry PS since original DES data includes one pump station

The benchmark data was compared to similar sized facilities in New Hampshire in Table 2.2. The values show that the Hooksett plant is operating very efficiently.

Table 2.2: 2023 Benchmarking Data Compared to Similar Size NH Facilities

NH Plant	Total Annual Energy Use (kWh) *	Total Annual Effluent Flow (MG)	Annual Average BOD Removed (lb/day)	Annual Average kWh/lb BOD Removed	Annual Average kWh/MG Treated
Newport	451,050	273	1,094	1.13	1,651
Milford	1,134,859	510	2,757	1.13	2,224
Littleton	546,650	210	1,141	1.31	2,603
Hooksett	**925,274**	**333**	**1,570**	**1.61**	**2,779**
Gorham	634,324	184	608	2.86	3,456
Durham	1,345,469	342	1,347	2.74	3,934
Newmarket	780,160	190	1,390	1.54	4,112
Jaffrey	971,023	231	854	3.12	4,212
Pease	1,163,295	267	2,084	1.53	4,349
Allenstown	1,261,512	281	1,067	3.24	4,489
North Conway	1,435,601	292	1,132	3.47	4,914

* The energy use data for all the plants includes one influent pump station

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 identified measures in this report are implemented, annual facility electric energy use could be reduced by approximately 159,930 kWh. The new benchmark values after implementing the proposed projects are summarized below.

Table 2.3: New Potential Benchmark Values after Energy Project Implementation

Plant	Total New Annual kWh Usage	2023 Total Effluent Flow (MG)	2023 Average Daily BOD Removed (lb/day)	Annual Average kWh/lb BOD removed	Annual Average kWh/MG Treated
Hooksett WWTF	728,864	333	1,570	1.27	2,188

The projected 18% electric energy savings will continue the facility's progress towards improving facility efficiency.

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

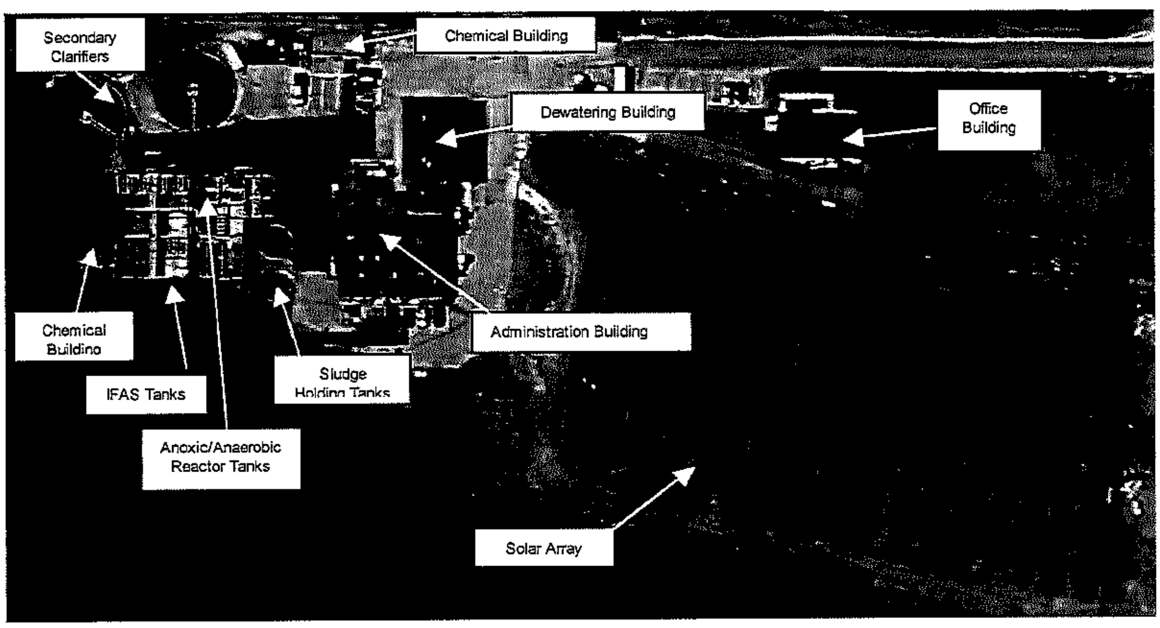
SECTION 3. FACILITY SYSTEMS

3.1 General

The Hooksett Wastewater Treatment Facility (WWTF) is located on Egawes Drive in Hooksett, NH. The original plant was constructed in 1969 and was upgraded during the years to increase flow capacity and treatment capabilities. The plant is currently designed for an average flow of 2.2 million gallons per day (MGD) and a peak flow 4.4 MGD. In 2023, the wastewater plant treated an average flow of 0.91 MGD. The collection system includes five pump stations and approximately 50 miles of sewer piping.

As wastewater flow enters the site, it is first directed to the screening and grit removal systems. After preliminary treatment, the influent flows by gravity to an advanced biological phosphorous treatment system. The system includes anaerobic, anoxic and integrated fixed film activated sludge (IFAS) reactors for the treatment process. Flow is then directed to the secondary clarifiers for solid separation. After the clarifiers, the flow passes through the chlorine contact tank for disinfection and dechlorination before it is discharged to the Merrimack River. A site plan of the facility is shown below.

Figure 3.1: Hooksett WWTF Site Plan



The biosolids process includes pumping the waste activated sludge to sludge holding tanks before the sludge is conditioned with polymer and pumped to a belt filter press for dewatering (the belt filter press will be replaced with a screw press in 2024). The dewatered sludge cake is hauled off site.

The solar array generates approximately 94% of the plant annual power use (37% used at plant and 57% sold back to the grid).

3.2 Electrical Energy

Electric power for the WWTF is billed on the "GV" Eversource rate schedule. Eversource provided the energy supply portion in 2023. A summary of the annual energy data is shown below.

Table 3.1: WWTF 2023 Electric Energy Use and Costs

Month	Total Energy Use (kWh)	Solar BTM Energy Use (kWh)	Utility Energy Use (kWh)	Solar Energy Back to Grid (kWh)	Billed Demand (kW)	Demand Cost	Energy (kWh) Cost	Total Delivery Cost	Total Supply Cost	Total Cost
Jan	90,400	18,800	71,600	16,000	171	$2,710	$1,514	$4,435	$26,957	$31,392
Feb	71,965	22,365	49,600	29,200	136	$2,093	$1,403	$3,707	$8,829	$12,536
Mar	81,356	33,756	47,600	58,400	121	$1,946	$1,272	$3,429	-$3,112	$318
Apr	64,630	29,830	34,800	53,600	119	$1,914	$1,020	$3,145	-$3,794	-$650
May	66,982	34,182	32,800	78,400	95	$1,533	$979	$2,723	-$7,459	-$4,736
Jun	68,927	33,327	35,600	53,200	100	$1,613	$1,035	$2,859	-$2,802	$57
Jul	67,320	31,320	36,000	60,000	111	$1,785	$1,043	$3,039	-$3,843	-$804
Aug	73,962	31,962	42,000	58,400	113	$1,811	$1,162	$3,184	-$1,823	-$4,772
Sep	47,534	25,934	21,600	40,000	119	$2,007	$758	$2,976	-$1,775	$1,201
Oct	68,525	21,325	47,200	23,600	133	$2,454	$1,265	$3,930	$2,482	$6,411
Nov	94,074	24,474	69,600	22,000	141	$2,602	$1,705	$4,518	$7,591	$12,110
Dec	93,119	18,719	74,400	14,400	150	$2,765	$1,801	$4,777	$14,801	$19,579
Totals	**888,794**	**325,994**	**562,800**	**507,200**	**1509**	**$25,233**	**$14,957**	**$42,722**	**$36,052**	**$72,642**

The 2023 billed data was used to determine an average energy unit cost of $0.091/kWh and demand cost of $16.72/kW. The monthly demand charge is based on the highest peak kW averaged over a 30-minute period.

As noted in Table 3.1, the wastewater plant total solar array energy production was 833,194 kWh compared to the plant energy use of 888,794 kWh. If the 55,600 kWh difference can be saved with efficiency measures (159,930 kWh of savings identified in this report), the plant will achieve "net zero".

3.3 Fuel/Water Use and Cost

A summary of fuel use and costs for the Administration Building is provided below. Note that the $3.95/gallon fuel costs could be reduced if the town negotiates a fixed cost prior to the heating season. This is common strategy for most NH municipalities.

Table 3.2: WWTF 2023 Fuel Use & Cost

Building	Town Water		Propane		Fuel Oil	
	Gallons	Cost	Gallons	Cost	Gallon	Cost
WWTF Administration Building	692,000	$8,570	1,195	$2,182	3,182	$12,579
Totals	**692,000**	**$8,570**	**1,195**	**$2,182**	**3,183**	**$12,579**
Average Unit Cost	$12.38/1000 gallons		--	$2.07/gal	--	$3.95/gal

3.4 Wastewater Facility Energy Balance

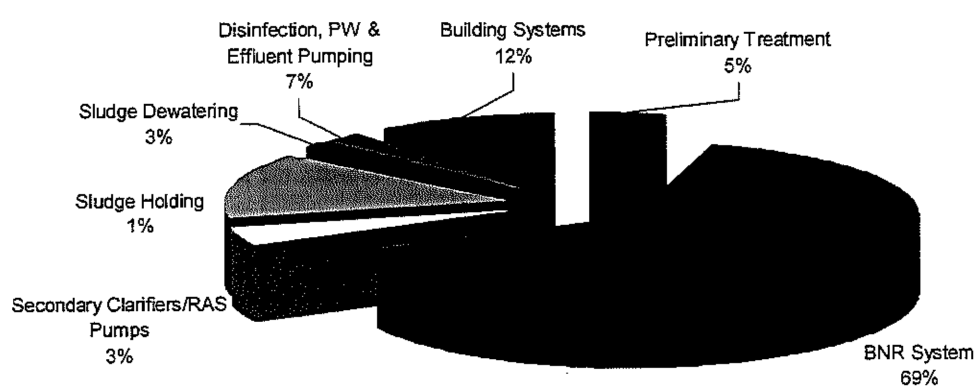
Using plant SCADA data, kW measurements and discussions with plant staff, a breakdown of electrical energy use for the WWTF was developed in Table 3.3. As expected, the BNR system was the highest energy user at the plant.

Table 3.3: WWTF Energy Use Breakdown

Plant System	2023 Baseline Annual Use (kWh)	Percent of Total
Preliminary Treatment	45,106	5%
BNR System	615,175	69%
Secondary Clarifiers/RAS Pumps	24,746	3%
Sludge Holding	11,988	1%
Sludge Dewatering	24,583	3%
Disinfection & Effluent Pumping	59,688	7%
Building Systems	106,172	12%
Annual Total	**887,458**	**100%**
Annual Electric Use 2023 Bills	**888,794**	--

The data is shown graphically below.

Figure 3.2: WWTF Energy Use



A summary of each treatment process is presented within this report section.

3.5 Preliminary Treatment

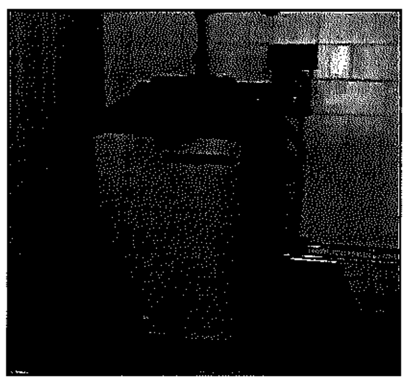
Headworks

As raw wastewater flows into the treatment plant site, it is directed to two Claro Environmental fine screens to remove rags and debris from the wastewater. Each screen includes a 1.5 hp motor and is activated based on differential pressure. The screenings are transferred to a washer compactor and the solids are deposited in a container for disposal. The compactor is equipped with a 5 hp motor. Based on the SCADA run time meters, the screens have minimal hours.

The screens are washed with a spray system supplied by a dedicated 1.0 hp plant water pump located in the chlorine contact tank pump chamber. According to the engineer's specifications, the screens require up to 10 gpm @ 86 psi.

Based on the run time and motor hp, the equipment operates less than 400 hours annually and results in minimal energy use.

Grit Removal



After screening, the wastewater flow is directed to the Lakeside Aeroductor grit system. The system equipment includes a Kaeser blower, grit chamber and ¾ hp classifier for grit washing.

The 7.5 hp Kaeser blower is rated for 100 cfm @ 21 psig and operates continuously to separate the organic from heavier grit solids in the grit chamber. The system circulation velocities remove the settled grit before it is discharged to a classifier.

The blower is equipped with a VFD to allow the operator to adjust the blower speed to optimize the separation of organic solids from the grit. During the site visit, the blower VFD was set at 41 Hz and the measured power draw of the unit was 1.7 kW. ECM #4 reviews the potential savings for automatically adjusting the blower speed based on influent flow A summary of system equipment is provided below.

Table 3.4: Preliminary Treatment System Energy Use

Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
Fine Screen #1 Drive	1.50	0.45	500	224
Fine Screen #2 Drive	1.50	0.45	500	224
Screw Wash Press	5.00	2.98	500	1,492
Grit Collector Drive	0.50	0.30	8760	2,614
Grit Blower	7.50	4.48	8760	39,210
Classifier	0.75	0.45	3000	1,343
Total				**45,106**

3.6 BNR System

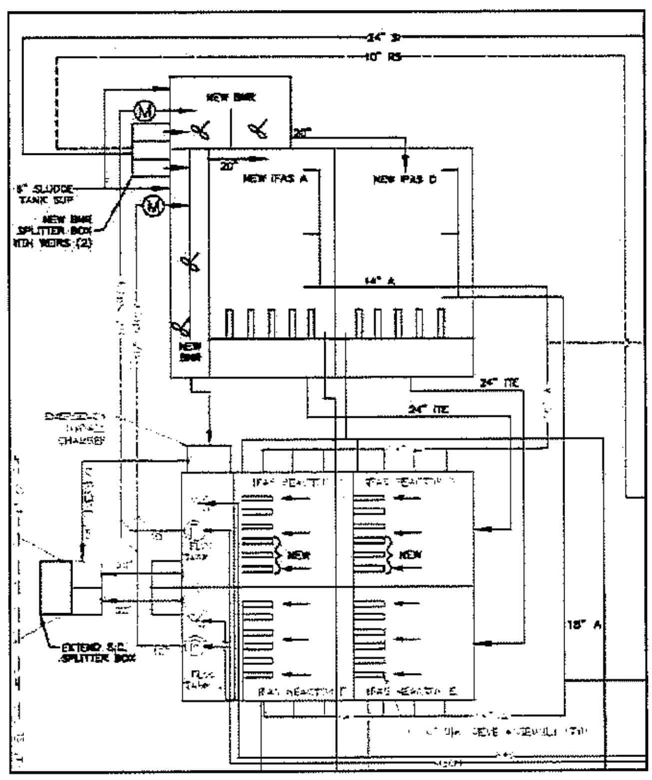
As part of the facility upgrades in 2010, the plant's conventional activated sludge system was converted to an integrated fixed film activated sludge (IFAS) process that increased the plant's flow and treatment capacity. This was achieved with the greater surface area of the plastic media used in the IFAS process. The process includes anoxic/anaerobic (BNR) zones followed by the IFAS reactor tanks. Airflow to the IFAS tanks is provided with one of four available blowers.

In the 2023 ugrade, two new BNR zones and two IFAS tanks were constructed. The new tanks expanded the treatment capacity of the existing trains. Since the system was installed, the facility has used only one train.

The new IFAS Tank designations and BNR zones are shown below for the two trains.

Figure 3.3: Upgraded BNR System

Tanks
BNR Tank 1A
BNR Tank 1B
IFAS Tank 1C
IFAS Tank 1D
IFAS Tank 1E
BNR Tank 2A
BNR Tank 2B
IFAS Tank 2C
IFAS Tank 2D
IFAS Tank 2E



In addition to expanding the system, the plant replaced all of the old BNR submersible mixers with new Invent "Hyperboloid" units. Each new 2 hp mixer replaced two of the old 2 hp submersible mixers.

After flow passes through the BNR zones and enters the IFAS tanks, diffused air is supplied to the process through medium bubble diffusers. As part of the system upgrades, a new DO control system with modulating valves for each IFAS zone was installed.

Nitrate Recycle Pumps

The recycle pumps provide nitrates from the IFAS reactors to the anoxic zone. The system was originally designed to provide continuous sludge recirculation flow of approximately 1.5 times the average plant flow. The Flygt pumps are rated for 1145 gpm @ 8' TDH and equipped with 7.5 hp motors and VFDs. The pumps are currently operated at 60% of the plant flow, instead of the original 150% recommended value to avoid overloading the IFAS process.

IFAS System

After the anoxic/anaerobic tanks, flow is directed to the integrated fixed film activated sludge (IFAS) trains. Each parallel train includes reactor zones filled with biofilm chips that measure 2 mm thick x 48mm in diameter.

The chips provide a greater surface area for the process and are able to handle greater flow and higher process loading than a conventional activated sludge process. The chips are suspended in the tank with a medium bubble diffuser grid system supplied by four available IFAS blowers. The airflow also supplies the air needed for the biological process.

Each reactor zone is equipped with a dissolved oxygen probe that automatically adjusts IFAS blower speed to maintain the desired setpoint. The new system consists of two control loops. For each portion of the IFAS tank, the DO probes control the valve position to adjust airflow to maintain a designated DO setpoint. The pressure of the air supply pipe is monitored and changes in the common discharge pressure are used to adjust the blower VFD to increase/decrease airflow.

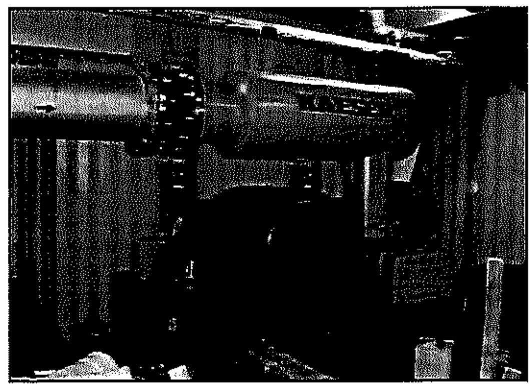
Air Sparge Blowers

As flow moves through the reactors, it passes through screens to maintain the media in the reactor tanks. To supplement the airflow from the IFAS blowers, a supplementary blower system was installed during the last upgrade. Three new 30 hp FPZ regenerative blowers were installed in place of a 7.5 hp blower used previously. The new blowers use the same diffusers directly under the screens with one unit operating continuously at 37 Hz. During the site visit, the on-line blower was measured to be drawing 12 kW of power.

Staff indicated that the engineer recommended the current speed and does not want to experiment with lower VFD speeds based on the potential of clogging the screens with media which would cause major process issues. However, it should be noted that the old blower was smaller (with a power draw of 4.5 kW) and appeared to be adequate. The difference in power amounts to 65,700 kWh or $7,420 annually.

Blower System

The IFAS blower system includes four Kaiser Model FB 790P positive displacement blowers rated for 2,200 scfm @ 6.4 psi discharge pressure. According to the O&M Manual, the blower speed range was set-up to operate the unit between 1,390 to 3,040 RPM. The blowers can be operated between 22 and 55 Hz (VFD range) with an RPM range of 1,160 to 2,439.



To determine existing blower performance, power measurements were taken for Blower #2 at various VFD speeds. This data was summarized below with the 2017 data for Blowers #1 and #4.

Table 3.5: Blower Test Data

	VFD Speed (Hz)	Curve Blower Speed (RPMs)	Measured Power (kW)	Discharge Pressure (psi)	Curve Airflow (icfm)	Airflow (scfm)	Estimated Blower Efficiency
Blower #1 (2017)	45	2,279	41.3	6.0	1,550	1,318	62%
Blower #2 (2024)	50	2,533	65.0	6.8	1,900	1,862	63%
	37	1,875	40.3	5.9	1,300	1,327	63%
	30	1,520	29.7	5.6	1,100	1,057	65%
Blower #4 (2017)	55	2,786	58.3	6.0	2,060	1,751	59%
	40	2,026	38.1	5.8	1,450	1,233	63%
	22	1,114	18.6	5.5	675	574	60%

The blower efficiency calculated above is very good for positive displacement blowers. This data was compared to an Aerzen GM 25S blower which had similar efficiencies. A new turbo blower such as Neuros NX75 would provide efficiency in the 70%+ range, but the lack of turndown would impact overall savings that would not support the cost of the project.

Reactor System Model Development

To evaluate the best approach to improve overall system efficiency, a model was developed using average monthly process load demands and estimated dissolved oxygen levels. For the baseline model, the process parameters in Table 3.6 were used.

Table 3.6: Model Process Parameters

Parameter	Process Value	Notes
Beta Value	0.95	Standard design value
Alpha	0.80	Estimated course bubble value (0.70 to 0.80 range)
Theta	1.024	Standard design value
SOTE	14%	Estimated to be less than the 15% value used in 2018
Avg. Discharge Pressure	6.0 psi	Average blower discharge pressure
Blower Efficiency	61%	Blower efficiency (average)
Motor Efficiency	93%	Motor efficiency
VFD Efficiency	96%	Estimated average efficiency value over varying loads
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

A summary of the 2023 process data is shown in Table 3.7. The airflow/kW relationship was developed using field data collected for the blowers. The last five months of DO data was not available and was estimated.

Table 3.7: Baseline IFAS Blower System Energy Use

2023 Month	Average Daily Flow (MGD)	BOD Load (lbs/day)	Estimated Nitrification O2 Load (lbs/day)	Estimated Dissolved Oxygen Level (mg/l)	OTR (lbs/day)	SOTR (lbs/day)	Calculated Air flow (scfm)	Model Calculated Energy Use (kWh)
Jan	0.849	1,156	348	4.3	1,446	3,499	1,023	24,271
Feb	0.815	1,385	334	4.6	1,649	4,139	1,209	28,413
Mar	0.865	983	355	4.8	1,288	3,400	994	23,664
Apr	0.862	1,433	353	4.7	1,714	5,017	1,466	34,439
May	0.736	1,455	302	5.2	1,684	6,174	1,804	42,181
Jun	0.798	1,693	327	5.0	1,936	7,237	2,115	48,159
Jul	1.162	1,581	476	4.3	1,978	6,131	1,792	41,908
Aug	0.898	1,609	368	4.0	1,896	5,492	1,605	37,699
Sep	1.099	1,985	450	4.0	2,336	6,766	1,977	45,705
Oct	0.873	1,742	358	4.0	2,012	5,571	1,628	38,236
Nov	0.847	1,776	347	4.0	2,034	5,529	1,616	37,949
Dec	1.138	2,047	466	4.0	2,411	6,167	1,802	42,137
Total /Avg	**0.91**	**1570.28**	**374**	**4.41**	**1,865**	**5,427**	**1,586**	**444,761**

The above energy use estimate matches the energy balance developed in Appendix B.

After the 2023 upgrade, the staff gained more confidence in the IFAS system controls. In addition, with the new sparger blower system, adequate airflow is available to keep the media suspended above the screen to avoid clogging.

As shown in Table 3.8, the average dissolved oxygen (DO) level in 2017 was 5.8 mg/l. As system upgrades were performed, this setpoint was reduced to 4.3 mg/l in 2023. To optimize the system energy use further, OM #2 recommends reducing the DO level setpoint to 3.0 mg/l.. If plant staff is not comfortable with this lower level, the measure savings can be adjusted to reflect a 3.5 mg/l value.

Table 3.8: DO Levels for 2016, 2023 and Proposed Setpoint Level

Month	2016 Dissolved Oxygen Level (mg/l)	2023 Dissolved Oxygen Level (mg/l)	Proposed Dissolved Oxygen Level (mg/l)
Jan	6.5	4.3	3.0
Feb	6.5	4.6	3.0
Mar	6.5	4.8	3.0
Apr	6.0	4.7	3.0
May	6.0	5.2	3.0
Jun	5.5	5.0	3.0
Jul	5.5	4.3	3.0
Aug	5.5	4.0	3.0
Sep	5.0	4.0	3.0
Oct	5.5	4.0	3.0
Nov	5.3	4.0	3.0
Dec	6.0	4.0	3.0
Total /Avg	**5.82**	**4.41**	**3.0**

If this setpoint adjustment can be made, the annual energy savings would be over 100,000 kWh based on the model data summarized in Tables 3.7 and 3.9. This adjustment is reviewed in OM #3.

Table 3.9: IFAS Blower System Energy Use with DO of 3 mg/l

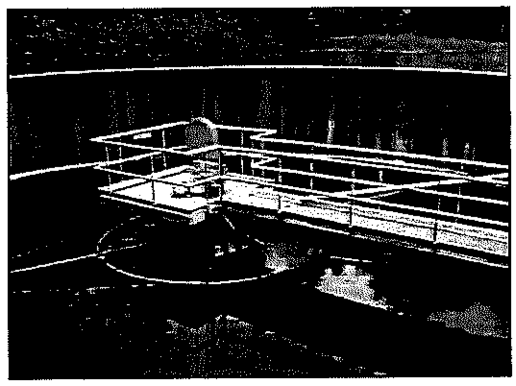
2023 Month	Average Daily Flow (MGD)	BOD Load (lbs/day)	Estimated Nitrification O2 Load (lbs/day)	Estimated Dissolved Oxygen Level (mg/l)	OTR (lbs/day)	SOTR (lbs/day)	Calculated Air flow (scfm)	Model Calculated Energy Use (kWh)
Jan	0.849	1,156	348	3.0	1,446	3,499	1,023	20,451
Feb	0.815	1,385	334	3.0	1,649	4,139	1,209	22,485
Mar	0.865	983	355	3.0	1,288	3,400	994	18,800
Apr	0.862	1,433	353	3.0	1,714	5,017	1,466	25,048
May	0.736	1,455	302	3.0	1,684	6,174	1,804	25,434
Jun	0.798	1,693	327	3.0	1,936	7,237	2,115	29,709
Jul	1.162	1,581	476	3.0	1,978	6,131	1,792	30,410
Aug	0.898	1,609	368	3.0	1,896	5,492	1,605	29,487
Sep	1.099	1,985	450	3.0	2,336	6,766	1,977	36,560
Oct	0.873	1,742	358	3.0	2,012	5,571	1,628	30,823
Nov	0.847	1,776	347	3.0	2,034	5,529	1,616	31,091
Dec	1.138	2,047	466	3.0	2,411	6,167	1,802	35,530
Total /Avg	**0.91**	**1570.28**	**374**	**3.0**	**1,865**	**5,427**	**1,586**	**335,828**

A summary of the BNR system equipment and estimated energy use is shown in Table 3.10.

Table 3.10: IFAS System 2023 Estimated Energy Use

Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
BNR Tank 1A Mixer	2.00	1.00	4380	4,380
BNR Tank 1B Mixer	2.00	1.00	4380	4,380
BNR Tank 2A Mixer	2.00	1.00	4380	4,380
BNR Tank 2B Mixer	2.00	1.00	4380	4,380
Pac Pump #1	1.00	0.30	4380	1,314
Pac Pump #1	1.00	0.30	4380	1,314
Sparge Blower #1	20.00	12.00	2920	35,040
Sparge Blower #2	20.00	12.00	2920	35,040
Sparge Blower #3	20.00	12.00	2920	35,040
Nitrate Recycle Pump #1	7.50	1.80	4380	7,884
Nitrate Recycle Pump #2	7.50	1.80	4380	7,884
IFAS Blower #1	100.0	48.00	3100	148,800
IFAS Blower #2	100.0	48.00	3100	148,800
IFAS Blower #3	100.0	48.00	3100	148,800
IFAS Blower #4	100.0	0.00	0	0
Rapid Mixer Chamber Mixer #1	1.0	0.52	4380	2,287
Rapid Mixer Chamber Mixer #2	1.0	0.52	4380	2,287
Polymer Pump #1	1.0	0.52	4380	2,287
Polymer Pump #2	1.0	0.52	4380	2,287
FeCl Pump #1	1.0	0.52	4380	2,287
FeCl Pump #2	1.0	0.52	4380	2,287
Floc Tank Mixer #1	1.0	0.80	4380	3,504
Floc Tank Mixer #2	1.0	0.80	4380	3,504
Floc Tank Mixer #3	1.0	0.80	4380	3,504
Floc Tank Mixer #4	1.0	0.80	4380	3,504
Total				**615,175**

3.7 Secondary Clarifiers & RAS Pumps



After the aeration system, flow is directed to two available 60' diameter secondary clarifiers. The clarifiers are equipped with ¾ hp drives to collect the settled sludge, and include density current baffles to prevent short-circuiting. Normal operation is to have one clarifier on-line.

A portion of the sludge settled is returned to the aeration tanks with one of three available return activated sludge (RAS) pumps. Each pump is rated for 764 gpm @ 24' TDH. The pumps are equipped with 7.5 hp motors and VFDs.

The pump flow has been set to maintain a suitable return sludge flow rate for the process. Staff indicated that the flow is typically 45% to 55% of effluent flow (set at 49% during the site visit).

The secondary scum pump is used to pump scum from the secondary clarifiers to the sludge holding tank. The pump is an ABS submersible pump rated for 164 gpm @ 34' TDH with a 5 hp motor.

A summary of the system equipment and estimated annual energy use is shown below. Total run time has been divided evenly between the available units.

Table 3.11: Secondary Clarifiers & RAS Pump System Energy Use

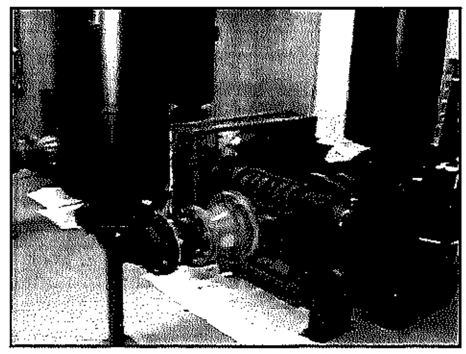
Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
Secondary Clarifier Drive #1	0.75	0.50	4380	2,206
Secondary Clarifier Drive #2	0.75	0.50	4380	2,206
RAS Pump #1	7.50	2.30	2920	6,716
RAS Pump #2	7.50	2.30	2920	6,716
RAS Pump #3	7.50	2.30	2920	6,716
Scum Pump	5.00	1.87	100	187
Total				**24,746**

3.8 Sludge Pumping & Holding Tank

WAS Pumps

The plant is equipped with two waste activated sludge (WAS) pumps that used to be cycled 4 times/hour to pump waste sludge to the holding tanks. Last year, the plant started wasting a side stream of sludge from the return activated sludge pump discharge line directly to the holding tank which has eliminated the use of the WAS pumps.

Sludge Holding Tanks & Blowers



The facility has three sludge holding tanks. Tanks #1 and #2 were originally constructed in 1969 as secondary clarifiers for the facility. When they were converted to sludge holding tanks, the rake structure was removed and new fine bubble diffusers were installed. Tank #3 was originally constructed for sludge storage and was used on a regular basis until the tankage was used to expand the BNR system during the last upgrade.

Aeration to the sludge holding tanks is provided by one of three Tuthill (MD Pneumatics) Model 5520 positive displacement blowers (curve shown below). During the 2023 energy audit site visit, a power reading of 7.2 kW was recorded for the on-line blower (Unit #3).

In 2016, the typical mode of operation was to operate the blower continuously. In 2017, staff began cycling the blower on for 10 minutes, and off for 30 minutes. This adjustment improved sludge dewatering and has reduced blower system energy use by approximately 47,000 kWh. In 2023, staff indicated that they reduced the run time further by only operating the blower when dewatering (approximately 1665 hours/year). Annual system energy use is estimated below.

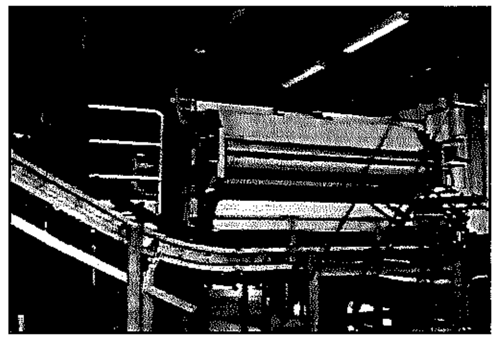
Table 3.12: Sludge Wasting and Storage System Energy Use

Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
WAS Pump #1	5.0	2.4	0	0
WAS Pump #2	5.0	2.4	0	0
Sludge Holding Tank Blower #1	50.0	7.20	555	3,996
Sludge Holding Tank Blower #2	40.0	7.20	555	3,996
Sludge Holding Tank Blower #3	40.0	7.20	555	3,996
Total				**11,988**

As part of the dewatering system upgrade, the positive displacement blowers will be replaced with new FKZ 20 hp blowers equipped with VFDs that will be operated at a low capacity continuously. It is unknown what the new blower energy use will be, but assuming an approximate 5 kW power draw, this could add 43,800 kWh to the system enegy use.

As an alternative to this approach, ECM #2 proposes installing a new sludge line that would continuously send a sidestream of sludge from the RAS pumps to the new process without the need to store the sludge or use the new blowers.

3.9 Sludge Dewatering



The dewatering system includes two sludge transfer pumps, belt filter press, polymer system and sludge discharge conveyor. A pump located in the chlorine contact tank pump pit provides wash water for the press (a back-up pump using town water is also available).

The sludge is pumped from the sludge holding tanks to the belt filter press using one of two available Penn Valley sludge transfer pumps rated for 213 gpm @20' TDH. Each pump is equipped with a 7.5 hp motor and VFD. The sludge is conditioned with polymer through an in-line mixing valve before being dewatered with the Asbrook two meter press. Normal operation is to operate the system three days/week for 7.5 hours each day. After the sludge is dewatered, it is transported with a 2 hp belt conveyor to the sludge truck bay. Annual system energy use is summarized below. The system represents minimal energy use at the facility.

Table 3.13: Sludge Dewatering System Energy Use

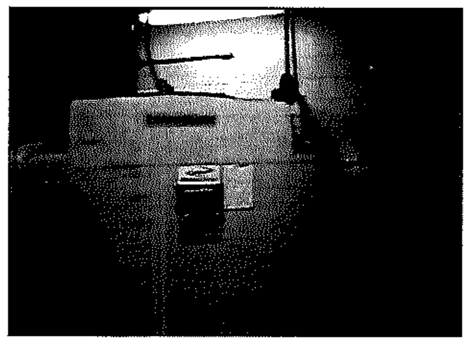
Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
Sludge Transfer Pump #1	7.50	4.48	600	2,686
Sludge Transfer Pump #2	7.50	4.48	600	2,686
BFP #1 Drive	3.00	1.79	1200	2,148
BFP #1 Hydraulic Unit	1.00	0.60	1200	716
BFP #1 Floc Mixer	0.50	0.30	1200	358
BFP Plant Water Pump	10.00	5.22	1200	6,266
Polymer Unit #1	2.00	1.19	1200	1,432
Conveyor #1	2.00	1.19	1200	1,432
Total				**17,725**

In 2024, the plant will be replacing their belt filter press with a new screw press system that will operate 24 hours/day, 7 days per week. This is expected to increase system energy use.significantly.

3.10 Disinfection & Effluent Pump System

Disinfection

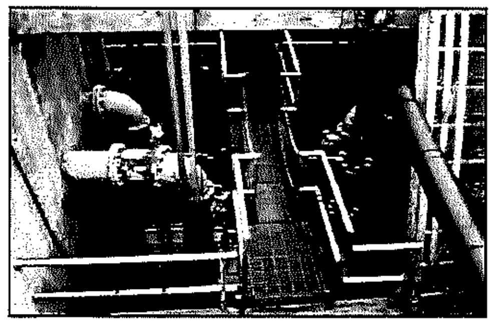
After the secondary clarifiers, effluent flow is directed to the chlorine contact tank. Sodium hypochlorite is added for effluent disinfection, and sodium bisulfite is used to reduce the chlorine residual.



The hypochlorite system includes a 1400-gallon hypochlorite chemical storage tank and two chemical metering pumps. The sodium bisulfite system includes one 1400-gallon tank and two metering pumps. During the last upgrade, a 5 hp mixer was installed to provide better chemical mixing.

Plant Effluent Pump System

The effluent pump system includes three submersible pumps rated for 1,600 gpm @ 18' TDH. The pumps are controlled with float switches in the chlorine contact tank that activates the pumps as required if the Merrimack River level increases to the point where the flow cannot discharge by gravity. Last year the pumps operated for approximately 500 hours



Plant Water System

During the last facility upgrade, the plant water system was improved with new pumps. Prior to the upgrade, the facility needed to use town water for chemical carrier water use, and supplying the dewatering spray pump and IFAS tank spray water.

A summary of water use before and after the system upgrades (based on billing data) is shown below.

Table 3.14: 2023 Water Use and Costs

Billing Quarter	Water Use (gallons)	Cost	Notes
Mar-23	231,000	$4,402	--
Jun-23	131,000	$1,272	--
Sep-23	165,000	$1,448	--
Dec-23	165,000	$1,448	Projected without upgrade
Estimated Total	**692,000**	**$8,570**	Estimated total w/o upgrade
Dec-23	49,000	$621	Actual use/cost after upgrade

The actual use/cost in December 2023 was 49,000 gallons/$621. If this is consistent, the new plant water use use/cost in 2024 will be 196,000 gallons/$2,484.

The plant now uses a 5 hp froth spray pump continuously for potential surface foam issues in the IFAS process (26,280 kWh annually). Staff indicated that there have been no foam issues recently and the pump could be turned off until it is required. The savings for this adjustment is reviewed in OM #1.

After implementing OM #1, the new pump energy use is estimated in Table 3.15.

Table 3.15: 2023 Plant Water Pump System Energy Use and Costs

Billing Quarter	Motor Size	Estimated kW	Estimated Hours	Total Energy Use (kWh)
Fine Screen Spray	1 hp	0.6 kW	150	90
Chemical Carrier Pump (VFD)	1 hp	0.4 kW	8,760	3,504
Dewatering Pump (VFD)	5 hp	2.5 kW	1,600	4,000
Froth Spray Pump	5 hp	3.0 kW (Measured)	720*	2,160
Estimated Total	--	--	--	**9,754**

* After Implementation of OM #1

Although energy use increased by 9,754 kWh with the new pumps on-line, annual town water savings/cost is projected to be 496,000 gallons / $6,086. The savings are reviewed in OM #2.

Annual 2023 estimated energy use for the systems is summarized below (before the proposed measures).

Table 3.16: Disinfection & Effluent Pump System Energy Use

Equipment	Hp	Power (kW)	Annual Hours	Annual Energy Use (kWh)
Hypo Pump #1	1.00	0.52	4380	2,287
Hypo Pump #2	1.00	0.52	4380	2,287
Bisulfite Pump #1	1.00	0.52	4380	2,287
Bisulfite Pump #2	1.00	0.52	4380	2,287
Chlorine Mixer	5.00	1.50	8760	13,140
Fine Screen Spray	1.00	0.60	150	90
Chemical Carrier Pump (VFD)	1.00	0.40	8,760	3,504
Dewatering Pump (VFD)	5.00	2.50	1,600	4,000
Froth Spray Pump	5.00	3.00	8760	26,280
Effluent Pump #1	15.00	7.83	150	1,175
Effluent Pump #2	15.00	7.83	150	1,175
Effluent Pump #3	15.00	7.83	150	1,175
Total				**59,688**

3.11 Building Heating & Ventilation System

The plant site includes the following buildings:

- Administration Building (includes other attached buildings)
- Chemical Building #1 (Hypo/Bisulfite)
- Chemical Building #2 (Ferric/Polymer)

The Administration Building is heated with a central fuel oil boiler, which is supplemented with infrared propane heater and rooftop propane furnace unit. The Chemical Buildings are heated with electric unit heaters with the room temperatures monitored on the facility SCADA system. A more detailed review of each building is provided below.

Administration Building

The Administration Building includes the following attached buildings/process areas.

- Administration/Lab Area
- Dewatering Area
- Blower Area
- Tool/Storage Room
- MCC Room
- Basement Pump Room
- Generator Room
- Grit Area

The Administration Building is heated with an oil-fired hydronic Weil Mclain Boiler. The boiler system includes three pumps to circulate hot water through unit heaters in each area. The individual wall units have fans that are activated with wall-mounted thermostats. During the site visit, the thermostat settings throughout the building were observed to be between 60 and 65 degrees. .

The administration area includes the lab/offices, lunchroom and bathrooms. The area is heated with a roof mounted propane/AC unit that provides heating and cooling. Wall thermostats maintain each area between 68 and 70 degrees.

The dewatering area includes the belt filter press room and sludge loading bay. In 2018, the areas were heated with wall mounted hydronic unit heaters supplied by the central boiler with wall mounted thermostats maintained between 60 and 65 degrees. After the heaters failed, the hot water piping was removed and two 15 kW electric unit heaters were instralled. These heaters are controlled with wall thermostats maintained at approximately 60 degrees.

Facility staff installed ceiling mounted stratification fans to pull heat away from the high ceiling down to the work area and help utilize the room heat more efficiently.

The blower room includes two roof mounted exhaust fans and a wall mounted louver that are activated automatically if the room temperature exceeds 80 degrees. Since the blowers generate enough heat to maintain a warm room temperature throughout the winter, facility staff installed a transfer fan in the wall adjoining the tool/storage room to automatically activate the fan and transfer the warm air to the tool room for supplemental heating.

The MCC/generator area is heated with a wall mounted hydronic unit heater supplied by the central boiler and wall mounted thermostat maintained between 60 and 65 degrees. The MCC area is equipped with a roof mounted exhaust fan and a wall-mounted louver activated if the room temperature exceeds 80 degrees. The generator room includes exhaust and intake louvers interlocked with the generator operation.

The grit/screening area includes a grit blower room with a hydronic unit heater, roof mounted exhaust fan and wall intake louver. The fan/louver is activated with a wall thermostat if the room temperature exceeds 80 degrees. The screening/grit classifier room has a Class 1, Division 1 rating and includes a roof mounted exhaust fan and wall intake louver. The room is heated with an explosion proof hydronic heater controlled with a wall-mounted thermostat.

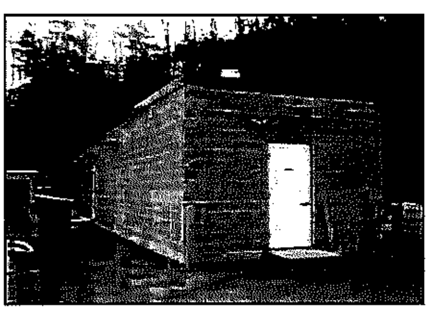
The maintenance garage adjacent to the lab/office area is heated with an infrared propane unit heater controlled with a wall thermostat. The basement/pump room does not include unit heaters.

Chemical Building #1

Chemical Building #1 is divided into two rooms. The south room is used for the sodium hypochlorite tanks and pumps, and the north room is used for the sodium bisulfite tanks and pumps.

Each room is heated with an electric unit heater controlled with a wall thermostat maintained at ~65 degrees. The rooms have a roof mounted exhaust fan and wall mounted louver. The building includes a 50-gallon electric hot water heater for the emergency eye wash/shower unit.

Chemical Building #2



Chemical Building #2 is divided into two rooms. The chemical area includes the ferric chloride and liquid polymer tanks and chemical pumps. The building includes a separate electric room for the motor control center.

The chemical area is heated with two electric unit heaters controlled with wall thermostats. The thermostats are typically maintained at ~65 degrees. The room includes two roof mounted exhaust fans and wall mounted louvers. One of the louver/fan units is controlled with the wall switch and the second unit is controlled with a wall-mounted thermostat that activates the fan/louver when the room temperature exceeds 80 degrees. The room also includes a 50-gallon electric hot water heater for the emergency eye wash/shower unit.

The electrical room is heated with one electric unit heater controlled with a wall thermostat. The thermostats are typically maintained at 65 degrees. The room also includes a louver/fan unit that is activated when the room temperature exceeds 80 degrees.

Recommended Heating System Adjustments

The Administration Building central oil fired hydronic boiler is 14+ years old with a 79% AFUE measured during servicing last year. ECM #1 recommends replacing the boiler with a new low mass high efficiency unit. The proposed boiler also includes a reset controller that adjusts the boiler temperature setpoint based on outside temperature.

A list of chemical building electric heaters is shown below. The hours of operation have been estimated based on observed room temperatures, ventilation, infiltration and building construction.

Table 3.17: Chemical Building Electric Heat Baseline Energy Use

Area with Electric Heater	Observed Thermostat Setting	Power (kW)	Annual Hours	Existing Energy Use (kWh)
Disinfection Bldg (Hypo Room)	65 deg	3.3	2,800	9,240
Disinfection Bldg (Bisulfite Room)	70 deg	3.3	3,500	11,550
Chemical Bldg Electric Room	60 deg	3.3	2,400	7,920
Chemical Bldg Pump/Tank Area (Unit #1)	68 deg	3.3	3,400	11,220
Chemical Bldg Pump/Tank Area (Unit#2)	68 deg	3.3	3,400	11,220
Energy Use Total	--	--	--	**51,150**

ECM #3 recommends replacing the multiple electric unit heaters with a three-zone and two zone heat pump system.

3.12 Solar PV Array & Potential Battery Storage

The Hooksett Sewer Commission (HSC) installed a solar PV array in 2020. ReVision Energy was selected as the contractor and installed 1,902 375-watt PV panels with a total capacity rating of 713.25 kW DC. In 2023, the solar array generated approximately 94% of the plant annual power use (37% used at plant and 57% sold back to the grid).

To further optimize the system, In 2024, LCI Energy reviewed the potential of installing a battery system that would store energy generated by the solar array and feed it back into the plant electrical system to reduce electric demand charges. However, the savings were not high enough to support the $300,000 estimated cost for the project (25 year payback).

SECTION 4. RECOMMENDED MEASURES

This section describes the proposed energy management practices (EMPs), operational measures (OMs), energy conservation measures (ECMs) and energy supply measures (ESMs) 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 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 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 WWTF, we recommend collecting the following data to maintain system efficiency:

Staff does an excellent job tracking monthly electric grid power, solar power and costs. To build on this effort, the following tasks are recommended:

- Benchmark energy use (grid and solar used in the plant) with flow and BOD load.
- Track indoor temperatures to verify that low temperature setpoints are maintained
- Track monthly equipment run time
- Track propane, fuel oil and town water costs

Cost & Savings Summary

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

4.2 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.

4.2.1 OM #1 Discontinue Froth Spray Pump Use

Description

The plant uses a 5 hp froth spray pump continuously for potential surface foam issues in the IFAS process. Staff indicated that there have been no foam issues recently and the pump could be turned off until it is required. Staff estimated that operating the pump in this manner could potentially only require 720 hours.

Savings Calculation

A summary of savings is estimated below.

Table 4.1: 2023 Plant Water Pump System Energy Use and Costs

Billing Quarter	Motor Size	Estimated kW	Estimated Hours	Energy Use (kWh)	NewHours	Energy Use (kWh)
Froth Spray Pump	5 hp	3.0 kW (Measured)	8760	26,280	720	2,160
Savings						**24,120**

Annual pump energy savings: 24,120 kWh

Cost and Savings Summary

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

Annual Energy (kWh) Savings	24,120 kWh	$ 0.091/kWh	$ 2,195
Annual Demand Savings (11 months)	3 kW	$ 16.72/kW	$ 552
Total Energy Cost Savings			**$ 2,747**
Project Cost			**–**
Simple Payback			**Immediate**

4.2.2 *OM #2 Plant Water System Upgrades*

Description

During the last facility upgrade, the plant water system was improved with new pumps. Prior to the upgrade, the facility needed to use town water for chemical carrier water use, and supplying the dewatering spray pump and IFAS tank spray water.

Savings Calculation

A summary of water use before and after the system upgrades (based on billing data) is shown below.

Table 4.2: 2023 Water Use and Costs

Billing Quarter	Water Use (gallons)	Cost	Notes
Mar-23	231,000	$4,402	--
Jun-23	131,000	$1,272	--
Sep-23	165,000	$1,448	--
Dec-23	165,000	$1,448	Projected without upgrade
Estimated Total	**692,000**	**$8,570**	Estimated total w/o upgrade
Dec-23	49,000	$621	Actual use/cost after upgrade

The actual use/cost in December 2023 was 49,000 gallons/$621. If this is consistent, the new plant water use use/cost in 2024 will be 196,000 gallons/$2,484.

New pump energy use is estimated below.

Table 4.3: 2023 Plant Water Pump System Energy Use and Costs

Billing Quarter	Motor Size	Estimated kW	Estimated Hours	Total Energy Use (kWh)
Fine Screen Spray	1 hp	0.6 kW	150	90
Chemical Carrier Pump (VFD)	1 hp	0.4 kW	8,760	3,504
Dewatering Pump (VFD)	5 hp	2.5 kW	1,600	4,000
Froth Spray Pump	5 hp	3.0 kW (Measured)	720*	2,160
Estimated Total	--	--	--	**9,754**

* After Implementation of OM #1

Annual pump energy use: 9,754 kWh
Annual town water savings/cost: 496,000 gallons / $6,086 (projected using the high water months)

Preliminary Cost Estimate

There is no cost estimate since the improvement was included in the last upgrade.

Cost and Savings Summary

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

Annual Energy (kWh) Savings	9,754 kWh	$ 0.091/kWh	($ 888)
Annual Water Savings	–	–	$ 6,086
Total Energy Cost Savings			**$ 5,198**
Project Cost			–
Simple Payback			–

4.2.3 OM #3 Adjust IFAS Dissolved Oxygen Level Setpoint

Description

After the 2023 upgrade, the staff gained more confidence in the IFAS system controls. In addition, with the new sparger blower system, adequate airflow is available to keep the media suspended above the screen to avoid clogging.

The average dissolved oxygen (DO) level in 2017 was 5.8 mg/l. As system upgrades were performed, the average DO was reduced to 4.3 mg/l in 2023. This measure recommends reducing the DO level setpoint one more time to 3.0 mg/l to optimize system operation. If plant staff is not comfortable with this lower level, the measure savings can be adjusted with a 3.5 mg/l value.

Savings Calculation

A summary of the model data discussed in Section 3.6 is shown below using the average plant flow, loads and dissolved oygen level to calculate the system energy use.

Table 4.4: Baseline IFAS Blower System Energy Use

2023 Month	Average Daily Flow (MGD)	BOD Load (lbs/day)	Estimated Nitrification O2 Load (lbs/day)	Estimated Dissolved Oxygen Level (mg/l)	OTR (lbs/day)	SOTR (lbs/day)	Calculated Air flow (scfm)	Average Blower Power (kW)	Model Calculated Energy Use (kWh)
Jan	0.849	1,156	348	4.3	1,446	3,499	1,023	33	24,271
Feb	0.815	1,385	334	4.6	1,649	4,139	1,209	39	28,413
Mar	0.865	983	355	4.8	1,288	3,400	994	32	23,664
Apr	0.862	1,433	353	4.7	1,714	5,017	1,466	47	34,439
May	0.736	1,455	302	5.2	1,684	6,174	1,804	58	42,181
Jun	0.798	1,693	327	5.0	1,936	7,237	2,115	66	48,159
Jul	1.162	1,581	476	4.3	1,978	6,131	1,792	57	41,908
Aug	0.898	1,609	368	4.0	1,896	5,492	1,605	52	37,699
Sep	1.099	1,985	450	4.0	2,336	6,766	1,977	63	45,705
Oct	0.873	1,742	358	4.0	2,012	5,571	1,628	52	38,236
Nov	0.847	1,776	347	4.0	2,034	5,529	1,616	52	37,949
Dec	1.138	2,047	466	4.0	2,411	6,167	1,802	58	42,137
Total /Avg	**0.91**	**1570.28**	**374**	**4.41**	**1,865**	**5,427**	**1,586**	**51**	**444,761**

The model was adjusted by changing the DO level to 3.0 mg/l while keeping the other parameters the same. The new calculated system energy use is shown in Table 4.5.

Table 4.5: IFAS Blower System Energy Use with DO of 3 mg/l

2023 Month	Average Daily Flow (MGD)	BOD Load (lbs/day)	Estimated Nitrification O2 Load (lbs/day)	Estimated Dissolved Oxygen Level (mg/l)	OTR (lbs/day)	SOTR (lbs/day)	Calculated Air flow (scfm)	Average Blower Power (kW)	Model Calculated Energy Use (kWh)
Jan	0.849	1,156	348	3.0	1,446	3,499	1,023	28	20,451
Feb	0.815	1,385	334	3.0	1,649	4,139	1,209	31	22,485
Mar	0.865	983	355	3.0	1,288	3,400	994	26	18,800
Apr	0.862	1,433	353	3.0	1,714	5,017	1,466	34	25,048
May	0.736	1,455	302	3.0	1,684	6,174	1,804	35	25,434
Jun	0.798	1,693	327	3.0	1,936	7,237	2,115	41	29,709
Jul	1.162	1,581	476	3.0	1,978	6,131	1,792	42	30,410
Aug	0.898	1,609	368	3.0	1,896	5,492	1,605	40	29,487
Sep	1.099	1,985	450	3.0	2,336	6,766	1,977	50	36,560
Oct	0.873	1,742	358	3.0	2,012	5,571	1,628	42	30,823
Nov	0.847	1,776	347	3.0	2,034	5,529	1,616	43	31,091
Dec	1.138	2,047	466	3.0	2,411	6,167	1,802	49	35,530
Total /Avg	**0.91**	**1570.28**	**374**	**3.0**	**1,865**	**5,427**	**1,586**	**38**	**335,828**

Annual energy savings: 444,761 kWh – 335,828 kWh = 108,933 kWh
Annual monthly demand savings: 51 kW-38 kW = 13 kW * 12 months = 156 kW

Preliminary Cost Estimate

There is no cost for this measure.

Cost and Savings Summary

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

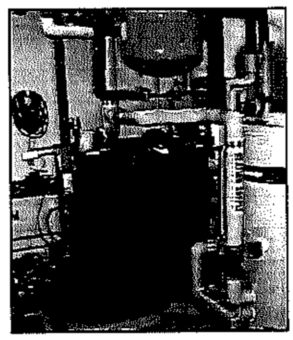
Annual Energy (kWh) Savings	108,933 kWh	$ 0.091/kWh	$ 9,913
Annual Demand Savings	156 kW	$ 16.72/kW	$ 2,608
Total Energy Cost Savings			**$ 12,521**
Project Cost			–
Simple Payback			–

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 Replace Boiler & Controls

Description



The Administration Building heating system includes a central oil fired hydronic boiler that distributes hot water through wall mounted unit heaters and baseboard units throughout the building. The existing boiler is 14+ years old with a 79% AFUE measured during servicing last year.

This measure recommends replacing the boiler with a new low mass unit. The proposed boiler also includes a reset controller that adjusts the boiler temperature setpoint based on outside temperature.

Savings

Fuel oil use in 2023 was 3,183 gallons
3,183 gallons * 16% boiler efficiency improvement = 509 gallons
With the reset controller, another 5% savings (267 gallons) can be expected.
Total savings: 776 gallons oil

Convert total gallons of oil to propane:
Fuel oil: 140,000 Btu/gal * 2,407 gallons /91,000 Btu/gallon = 3,703 gallons
2,407 gallons of fuel oil * $3.95 = $9,508
3,703 gallons of propane * $2.07 = $7,665
Fuel cost savings (based on 2023 unit costs) = $1,843 (not included in savings summary)

Preliminary Cost Estimate

Boiler replacement is expected to be approximately $20,000. A sample product data sheet for a replacement boiler is provided in Appendix B.

Cost and Savings Summary

The cost and savings estimate for this measure is summarized below. The $1,843 in fuel switching savings is not included.

Annual Fuel Savings	776 gallons	$3.95/gallon	$ 3,065
Total Energy Cost Savings			$ 3,065
Project Cost			$ 20,000
Simple Payback			6.5 years

4.3.2 ECM #2 Investigate Sludge Tank Bypass Piping

Description

The facility uses sludge holding tanks to keep the sludge mixed prior to dewatering with the current belt filter presses. Aeration is provided using one of three positive displacement blowers.

In 2024, the plant will be replacing their belt filter press with a new screw press system that will operate 24 hours/day, 7 days per week. As part of this upgrade, the old positive displacement blowers will be replaced with new FKZ 20 hp blowers equipped with VFDs that will be operated at a low capacity continuously. It is unknown what the new blower energy use will be, but for the purposes of this measure 5 kW power draw has been estimated (assuming the blower is operated 20 to 30 Hz).

This measure proposes installing a new sludge line that would continuously send a sidestream of sludge from the RAS pumps to the new process without the need to store the sludge or use the new blowers.

Savings Calculation

New FKZ blower energy use: 5 kW * 8760 hours = 43,800 kWh

Cost and Savings Summary

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

Annual Energy (kWh) Savings	43,800 kWh	$ 0.091/kWh	$ 3,986
Annual Demand (kW) Savings	60 kW	$ 16.72/kW	$ 1,003
Total Energy Cost Savings			**$ 4,989**
Project Cost			**$ 20,000**
Simple Payback			**4.0 years**

4.3.3 ECM #3 Install Heat Pumps in Chemical Buildings

Description

A list of chemical building electric heaters is shown below. The hours of operation have been estimated based on observed room temperatures, ventilation, infiltration and building construction.

Table 4.6: Electric Heat Estimated Baseline Energy Use

Area with Electric Heater	Observed Thermostat Setting	Power (kW)	Annual Hours	Existing Energy Use (kWh)
Disinfection Bldg (Hypo Room)	65 deg	3.3	2,800	9,240
Disinfection Bldg (Bisulfite Room)	70 deg	3.3	3,500	11,550
Chemical Bldg Electric Room	60 deg	3.3	2,400	7,920
Chemical Bldg Pump/Tank Area (Unit #1)	68 deg	3.3	3,400	11,220
Chemical Bldg Pump/Tank Area (Unit#2)	68 deg	3.3	3,400	11,220
Energy Use Total	--	--	--	**51,150**

This measure recommends replacing the multiple electric unit heaters with a three-zone and two zone heat pump system.

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: 51,150 kWh * 50% = 25,575 kWh
Annual Demand Savings: Total 16.5 kW * 30% Coincident kW = 5 kW * 6 months = 30 kW

Using the 3420 Btu = 1 kW relationship, the following heat pump sizing was estimated:

Disinfection Bldg: Two zone, 12,000 Btu/zone
Chemical Bldg: Three zone, 12,000 Btu/zone

Preliminary Cost Estimate

The cost for this project is estimated below. Sample heat pump cut sheets are included in Appendix B.

Item N°	Description	Qty	Unit	Equipment Cost	Labor Cost	Total
1	Three Zone 36,000 Btu Heat Pump	1	EA	$7,000	$7,000	$14,000
2	Two Zone 24,000 Btu Heat Pump	1	EA	$5,000	$5,000	$10,000
3	Electrical	1	Lot	$3,000	$3,000	$6,000
			Total			$30,000

Cost and Savings Summary

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

Annual Energy (kWh) Savings	25,575 kWh	$0.09/kWh	$ 2,302
Annual Demand (kW) Savings (6 months)	30.0 kW	$16.72/kW	$ 502
Total Energy Cost Savings			**$ 2,804**
Project Cost			**$ 30,000**
Simple Payback			**10.7 years**

4.3.4 *ECM #4 Flow Controls on Grit Blower*

Description

The plant aerated grit system includes a 7.5 hp Kaeser blower rated for 100 cfm @ 21 psig. The blower operates continuously to separate the organic from heavier grit solids in the grit chamber.

The blower is equipped with a VFD to allow the operator to adjust the blower speed to optimize the separation of organic solids from the grit. During the site visit, the blower VFD was set at 41 Hz and power draw was measured to be 1.7 kW. This measure reviews the potential savings for automatically adjusting the blower speed based on influent flow.

Savings

This measure will require some trial and error to determine a suitable airflow that works for low and high flows. It is assumed that the current setting works for high flows and that it may be possible to reduce the blower speed to 30 Hz during low flows with a 50/50 split between the two speeds. Power draw is estimated to be linear.

Baseline at 41 Hz: 1.7 kW * 8760 hours = 14,892 kWh
Power draw at 30 Hz: 1.2 kW
New energy use: 1.7 kW * 4380 hours + 1.2 kW * 4380 hours = 12,702 kWh

Preliminary Cost Estimate

The cost for this project is estimated to be $1,500 for SCADA programming time.

Cost and Savings Summary

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

Annual Energy (kWh) Savings	2,190 kWh	$0.09/kWh	$ 197
Annual Demand (kW) Savings (6 months)	0 kW	$16.72/kW	$ 0
Total Energy Cost Savings			**$ 197**
Project Cost			**$ 1,500**
Simple Payback			**7.6 years**

4.4 Energy Supply Measures

Energy supply measures are recommended improvements such as fuel switching, meter issues and demand savings that reduce energy costs, but do not reduce energy usage through efficiency improvements.

4.4.1 ESM #1 Investigate Community Power Purchase Programs

Description

When the solar array was first constructed, the plant needed to have Eversource as the default energy supplier to get full cost credit for any power sold back to the grid. This also resulted in high power costs when Eversource rates increased dramatically in 2022. At that time, selecting the utility as the default supplier was the only option for municipalities with large solar arrays to get full credit for the power sold back to the grid. Since that time, community power purchase programs have been able to qualify as "default" energy suppliers with typically lower rates compared to Eversource for the supply portion of the energy bill and providing full credit for solar power supplied back to the grid. The rates for the Community Power Coalition of New Hampshire (CPCNH) compared to Eversource are summarized below for 2024-2025.

Figure 4.1: CPCNH & Eversource 2024-2025 Rates

COMMUNITY POWER COALITION OF NEW HAMPSHIRE
For communities, by communities.

COMMUNITY POWER RATES

Effective August 1, 2024 — January 31, 2025

Electricity Supply Rates for Residential, General Service, and Outdoor Lighting Customers
Effective August 1, 2024 – January 31, 2025

Power Options		Renewable Content [1]	Rate (¢/kWh)	Estimated Cost per Month*
Community Power Coalition of New Hampshire	Clean 100	100%	12.0 ¢	~ $78
	Clean 50	50%	10.0 ¢	~ $65
	Granite Plus	33%	9.3 ¢	~ $60
	Granite Basic [4]	24.3%	8.6 ¢	~ $56
Utility Default Supply Rates	Liberty	24.3%	10.976 ¢	~ $71
	Until		10.506 ¢	~ $68
	Eversource [5]		10.458 ¢	~ $68
	NH Electric Co-op		8.648 ¢	~ $56

Note that the above Eversource rates above ($0.10458) are for the "G" rate schedule. The GV energy supply rate that the plant is on typically varies each month at a higher level.

This measure recommends investigating the potential to reduce the plant's supply energy costs while getting full credit for solar power sent back to the grid by signing up with CPCNH or other community power group. This would require the Town of Hooksett to also participate in this program.

Savings Calculations

The grid and solar power energy for 2023 is summarized in Table 4.7. The savings are interactive with the previous report measures. Costs are based on using 2023 and projected 2024/2025 costs. The lower "G" rates for 2024-2025 (compared to the typically higher GV supply rates) have been used to be conservative.

Table 4.7: Hooksett WWTF 2023 Eversource Energy & Costs

Year	Total Grid Energy Usage (kWh)	Solar Power Use at Plant (kWh)	Total Plant Energy Use	Solar Power Exported (kWh)	Cost for Grid Power Purchased	Credit for Power Sold to Eversource	Net Cost
2023 Eversource Unit Costs					**$0.268**	**$0.203**	--
2023	562,800	325,994	925,274	507,200	$151,098	$103,172	**$47,926***
After Measures	482,835	246,029	728,864	587,165	$129,400	$119,194	**$10,206**
2024-2025 Eversource Unit Costs					**$0.10458**	**$0.0792 (est)**	--
After Measures	482,835	246,029	728,864	587,165	$50,495	$46,503	**$3,991**

* This cost does not include demand charges or monthly service fees.

The costs using the CPCNH "Granite Basic" rate of $0.086/kWh is shown below.

Table 4.8: Hooksett WWTF Updated Annual Costs Using 2023 Energy Use

Year	Total Grid Energy Usage (kWh)	Solar Power Use at Plant (kWh)	Total Plant Energy Use	Solar Power Exported (kWh)	Cost for Grid Power Purchased from CPCNH	Credit for Power Sold to CPCNH	Net Cost
CPCNH Unit Costs					**$0.086**	**$0.086**	--
After Measures	482,835	246,029	728,864	587,165	$41,524	$50,496	**($8,972)**

Annual Savings: $3,991 – ($8,972) = $12,963

Preliminary Cost Estimate

Cost for this measure is expected to be minimal

Cost and Savings Summary

The cost and savings estimate is summarized below. The CPCNH unit cost credit assumptions should be verified before moving forward with this measure.

Annual Cost Savings	—	—	$ 12,963
Total Energy Cost Savings			$ 12,963
Project Cost			**Minimal**
Simple Payback			Immediate

APPENDIX A: UTILITY RATE SCHEDULE

2024 Summary of Electric Rates

Last Updated: February 1, 2024

Your bill includes charges for Delivery Service and, if you have not selected a competitive energy supplier, for Eversource Energy Service. However, if you have selected a competitive energy supplier and if the supplier has made arrangements for Eversource to provide billing services, the supplier's charges for Energy Service will also be included on your Eversource bill. Any Energy Service charges will appear in the Supplier Services section of your bill. This summary of rates is based on a monthly billing cycle.

Definition of Terms

Customer Charge - This charge recovers costs Eversource incurs in providing service to a customer, such as the installation, maintenance and replacement of your meter(s), reading your meter(s), maintaining your account records, and Eversource's 24-hour customer service center.

Distribution Charge - This charge recovers costs related to the maintenance and operation of Eversource's distribution system, and Eversource's power restoration and service operations. The kWh charge is based on the amount of kilowatt-hours (kWh) of electricity used during a billing period. The kW charge* is based on the greatest amount of electricity used in any half-hour period during a billing period.

Regulatory Reconciliattion Adjustment - This charge (or credit) reconciles costs related to the maintenance and operation of Eversource's distribution system not included in the distribution charge, such as vegetation management, property tax expenses, revenue lost due to net metering, storm restoration costs, and assessments and consultants hired by regulators . The kWh charge (or credit) is based on the amount of kilowatt-hours (kWh) of electricity used during a billing period. The kW charge* is based on the greatest amount of electricity used in any half-hour period during a billing period.

Transmission Charge - This charge recovers costs related to the delivery of electricity over the high-voltage or transmission system power lines. The kWh charge is based on the amount of kWh of electricity used during a billing period. The kW charge* is based on the greatest amount of electricity used in any half-hour period during a billing period.

Stranded Cost Recovery Charge - This charge helps fund the recovery of Eversource's past investment costs, including expenses incurred through mandated power contracts and other long-term investments and obligations. The kWh charge is based on the amount of kWh of electricity used during a billing period. The kW charge* is based on the greatest amount of electricity used in any half-hour period during a billing period.

Pole Plant Adjustment Mechanism - This charge recovers costs of operation, maintenance, inspection, replacement, and vegetation management of utility pole assets transferred to Eversource from Consolidated Communications (CCI) and approved by the New Hampshire Public Utilities Commission.

Energy Charge - This charge is based on the amount of kWh of electricity used during a billing period. It includes Eversource's costs, or a competitive supplier's costs to generate and/or buy power.

* *The kW charge, or "demand" charge, applies to non-residential rates.*

Taxes & Surcharges

System Benefits Charge - This charge funds energy efficiency programs for all customers as well as assistance programs for residential customers within certain income guidelines.

Late Payment Charge

A late payment charge of 1.5 percent is applied to amounts previously billed but remaining unpaid after the due date for customers receiving service under Rate GV, Rate LG or Rate B. For all other customers, the late payment charge is 1 percent. This charge is not applicable to income-eligible customers or certain customers who are abiding by the terms of an extended payment arrangement.

Service Charges

When you establish or re-establish an electric service account for residential or general service, one of the following service charges will be applied to your electric bill:

- **$10** - When it is not necessary to send an employee to the meter location to obtain a new meter reading to establish service.
- **$35** - When it is necessary to send an employee to the meter location during normal business hours to obtain a new meter reading or to connect a meter.
- **$80** - When it is necessary to send an employee to a meter location outside of normal business hours to obtain a new meter reading or to connect a meter.

Field Collection Fee

When it is necessary to send an employee to your location (residential or general service account) to collect a delinquent bill, a $26 field collection fee will be applied to your electric bill.

Available Rates

Rate R, Residential Standard Service

Available to customers living in individual residences and apartments.

• Customer Charge (per month):	$13.81
• Distribution Charge (per kWh):	5.357 ¢
• Regulatory Reconciliation Adjustment (per kWh):	0.047 ¢
• Pole Plant Adjustment Mechanism (per kWh):	0.270 ¢
• Transmission Charge (per kWh):	2.965 ¢
• Stranded Cost Recovery Charge (per kWh):	1.261 ¢
• System Benefits Charge (per kWh):	0.905 ¢
• Energy Charge (per kWh):	8.285 ¢

Rate R, Residential Uncontrolled Water Heating Rate
Closed to new customers. *Minimum tank size requirement of 40 gallons.*

- Meter Charge (per month): $4.87
- Distribution Charge (per kWh): 2.495 ¢
- Regulatory Reconciliation Adjustment (per kWh): 0.026 ¢
- Pole Plant Adjustment Mechanism (per kWh): 0.150 ¢
- Transmission Charge (per kWh): 2.295 ¢
- Stranded Cost Recovery Charge (per kWh): 1.261 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh): 8.285 ¢

Rate R, Residential Controlled Water Heating Rate
Closed to new customers. *Minimum tank size requirement of 40 gallons.*

- Meter Charge (per month): $4.87
- Distribution Charge (per kWh): 2.495 ¢
- Regulatory Reconciliation Adjustment (per kWh): 0.026 ¢
- Pole Plant Adjustment Mechanism (per kWh): 0.150 ¢
- Transmission Charge (per kWh): 2.295 ¢
- Stranded Cost Recovery Charge (per kWh): 0.642 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh): 8.285 ¢

Rate R - LCS, Thermal Storage Heating

Closed to new customers. For service to electric thermal storage devices used for water heating or space heating. Separately metered, must be taken along with Rate R.

- Customer Charges
  - 8-Hour or 10-Hour or 11-Hour Option [Closed] (per month)*: $4.87
  - Switching Option [Closed] (per month)**: $4.87
  - HEATSMART, Radio-Controlled Option [Closed] (per month)***: $6.99
- Distribution Charges
  - 8-Hour Option [Closed] (per kWh)*: 2.495 ¢
  - 10-Hour or 11-Hour Option [Closed] (per kWh)*: 2.495 ¢
  - HEATSMART, Radio-Controlled Option [Closed] (per kWh)***: 1.375 ¢
- Regulatory Reconciliation Adjustment (per kWh): 0.026 ¢
- Pole Plant Adjustment Mechanism (per kWh): 0.150 ¢
- Transmission Charge (per kWh): 2.295 ¢
- Stranded Cost Recovery Charge (per kWh): 0.642 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh): 8.285 ¢

* *Only available to locations that have continuously received service under one of the listed options since October 1, 2004.*
** *Only available to locations that have continuously received service under the Switching Option since January 1, 1994.*
*** *Only available to locations that have continuously received service under the Radio Controlled Option since January 1, 2021.*

Rate R-OTOD, Residential Time-of-Day Service
Closed to new customers
Off-peak hours: 8 p.m. to 7 a.m. weekdays; all day weekends and holidays.

- Customer Charge (per month): $32.08
- Distribution Charges
  - On-Peak Hours (per kWh): 15.256 ¢
  - Off-Peak Hours (per kWh): 0.979 ¢
- Regulatory Reconciliation Adjustment (per kWh): 0.047 ¢
- Pole Plant Adjustment Mechanism (per kWh): 0.270 ¢
- Transmission Charges
  - On-Peak Hours (per kWh): 2.965 ¢
  - Off-Peak Hours (per kWh): 1.936 ¢
- Stranded Cost Recovery Charge (per kWh): 1.055 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh): 8.285 ¢

Rate R-OTOD 2, Residential Time-of-Day Service Rate 2
Available to customers living in individual residences and apartments – varies by time of day.
On-peak hours: 1 p.m. to 7 p.m. weekdays; no weekends or holidays.
Off-peak hours: 7 p.m. to 1 p.m. weekdays; all day weekends and holidays.

- Customer Charge (per month): $16.50
- Distribution Charges
  - On-Peak Hours (per kWh): 6.456 ¢
  - Off-Peak Hours (per kWh): 4.718 ¢
- Regulatory Reconciliation Adjustment (per kWh): 0.047 ¢
- Pole Plant Adjustment Mechanism (per kWh): 0.270 ¢
- Transmission Charges
  - On-Peak Hours (per kWh): 9.955 ¢
  - Off-Peak Hours (per kWh): 1.162 ¢
- Stranded Cost Recovery Charge (per kWh): 1.055 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh): 8.285 ¢

Rate EAP (Electric Assistance Program)

Income-eligible residential customers may qualify for a discount of 8 percent or more off their monthly electric bill. Call us at 800-662-7764 for details.

Rate G, General Service
For customers whose demand does not exceed 100 kilowatts (kW).

- Customer Charge
  - Single-Phase Service (per month): $16.21
  - Three-Phase Service (per month): $32.39
- Distribution Demand Charge (per kW of demand above 5 kW): $12.22
- Distribution Energy Charges
  - First 500 kWh (per kWh): 2.82 ¢
  - Next 1,000 kWh (per kWh): 2.283 ¢
  - All Additional kWh (per kWh): 1.724 ¢
- Regulatory Reconciliation Adjustment (per kW of demand above 5 kW): 15.00 ¢
- Pole Plant Adjustment Mechanism (per kW of demand above 5 kW): 89.00 ¢
- Transmission Demand Charge (per kW of demand above 5 kW): $7.65
- Transmission Energy Charges
  - First 500 kWh (per kWh): 2.765 ¢
  - Next 1,000 kWh (per kWh): 1.040 ¢
  - All Additional kWh (per kWh): 0.558 ¢
- Stranded Cost Recovery Demand Charge (per kW of demand above 5 kW): 113.00 ¢
- Stranded Cost Recovery Energy Charges (per kWh) 1.007 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh): 8.285 ¢

Rate G, Uncontrolled Water Heating Rate
Closed to new customers. *Minimum tank size requirement of 40 gallons.*

- Meter Charge (per month): $4.87
- Distribution Charge (per kWh): 2.495 ¢
- Regulatory Reconciliation Adjustment (per kWh): 0.026 ¢
- Pole Plant Adjustment Mechanism (per kWh): 0.150 ¢
- Transmission Charge (per kWh): 2.295 ¢
- Stranded Cost Recovery Charge (per kWh): 1.32 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh): 8.285 ¢

Rate G, Controlled Water Heating Rate
Closed to new customers. *Minimum tank size requirement of 40 gallons.*

- Meter Charge (per month): $4.87
- Distribution Charge (per kWh): 2.495 ¢
- Regulatory Reconciliation Adjustment (per kWh): 0.026 ¢
- Pole Plant Adjustment Mechanism (per kWh): 0.150 ¢
- Transmission Charge (per kWh): 2.295 ¢
- Stranded Cost Recovery Charge (per kWh): 0.679 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh): 8.285 ¢

Rate G - LCS, Thermal Storage Heating

Closed to new customers. For service to electric thermal storage devices used for water heating or space heating. Separately metered, must be taken along with Rate G.

- Customer Charges
  - 8-Hour or 10-Hour or 11-Hour Option [Closed] (per month)*: $4.87
  - Switching Option [Closed] (per month)**: $4.87
  - HEATSMART, Radio-Controlled Option [Closed] (per month)***: $6.99
- Distribution Charges
  - 8-Hour Option [Closed] (per kWh)*: 2.495 ¢
  - 10-Hour or 11-Hour Option [Closed] (per kWh)*: 2.495 ¢
  - HEATSMART, Radio-Controlled Option [Closed] (per kWh)***: 1.375 ¢
- Regulatory Reconciliation Adjustment (per kWh): 0.026 ¢
- Pole Plant Adjustment Mechanism (per kWh): 0.15 ¢
- Transmission Charge (per kWh): 2.295 ¢
- Stranded Cost Recovery Charge (per kWh): 0.679 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh): 8.285 ¢

* *Only available to locations that have continuously received service under one of the listed options since October 1, 2004.*
** *Only available to locations that have continuously received service under the Switching Option since January 1, 1994.*
*** *Only available to locations that have continuously received service under the Switching Option since January 1, 2021.*

Rate G - Space Heating Service

Only available to certain Rate G customers who have continuously received service under the Transitional Space Heating rate in effect prior to June 1, 1992. Call us at 866-554-6025 for details.

Rate G-OTOD, General Time-of-Day Service
Available to customers with electric thermal storage devices whose demand does not exceed 100 kilowatts (kW).
Off-peak hours: 8 p.m. to 7 a.m. weekdays; all day weekends and holidays.

- Customer Charge
  - Single-Phase Service (per month): $41.98
  - Three-Phase Service (per month): $60.00
- Distribution Demand Charge (per kW of on-peak demand) : $15.65
- Distribution Charges
  - On-Peak Hours (per kWh): 5.350 ¢
  - Off-Peak Hours (per kWh): 0.851 ¢
- Regulatory Reconciliation Adjustment per kW of on-peak demand) : 15.00 ¢
- Pole Plant Adjustment Mechanism (per kWh): 89.00 ¢
- Transmission Demand Charge (per kW of on-peak demand) : $5.04
- Stranded Cost Recovery Demand Charges (per kW of on-peak demand) : $0.57
- Stranded Cost Recovery Energy Charges (per kWh) : 0.679 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh): 8.285 ¢

Rate GV, Commercial and Industrial

For commercial or industrial customers with demands not exceeding 1,000 kW. Customers must pay for necessary transforming, regulating and controlling apparatus.

- Customer Charge (per month): $211.21
- Distribution Demand Charges
  - First 100 (per kW): $7.20
  - Excess over 100 kW (per kW): $6.94
- Distribution Energy Charges
  - First 200,000 (per kWh): 0.663 ¢
  - All Additional kWh (per kWh): 0.590 ¢
- Regulatory Reconciliation Adjustment (per kW): 6.00 ¢
- Pole Plant Adjustment Mechanism (per kWh): 37.00 ¢
- Transmission Demand Charge (per kW): $10.24
- Stranded Cost Recovery Demand Charge (per kW): $1.09
- Stranded Cost Recovery Charge (per kWh): 0.89 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh)
  - February 2024: 18.173 ¢
  - March 2024: 12.061 ¢
  - April 2024: 9.495 ¢
  - May 2024: 9.004 ¢
  - June 2024: 9.443 ¢
  - July 2024: 11.602 ¢

Rate EV-2, Commercial and Industrial
For electric vehicle charging stations with demands not exceeding 1,000 kW. Customers must pay for necessary transforming, regulating and controlling apparatus. Available to serve the entire requirements of electric vehicle (EV) charging stations, which are available to the public. Must have separately metered service, with at least 90 percent of the load at that meter dedicated to EV charging. Must be "publicly accessible" EV charging equipment, meaning that the charging equipment is available to the public without restriction.

- Customer Charge (per month): $211.21
- Distribution Charge (per kWh): 10.495 ¢
- Regulatory Reconciliation Adjustment (per kWh): 0.084 ¢
- Pole Plant Adjustment Mechanism (per kWh): 0.518 ¢
- Transmission Charge (per kWh): 14.321 ¢
- Stranded Cost Recovery Charge (per kWh): 2.402 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh):
  - February 2024: 18.173 ¢
  - March 2024: 12.061 ¢
  - April 2024: 9.495 ¢
  - May 2024: 9.004 ¢
  - June 2024: 9.443 ¢
  - July 2024: 11.602 ¢

Rate LG, Commercial and Industrial Service
For commercial and industrial customers with demands in excess of 1,000 KW. Customers must pay for necessary transforming, regulating and controlling apparatus. Off-peak hours: 8 p.m. to 7 a.m. weekdays; all day weekends and holidays.

- Customer Charge (per month): $660.15
- Distribution Demand Charge (per kVa): $6.09
- Distribution Energy Charges
  - On-Peak (per kWh): 0.559 ¢
  - Off-Peak (per kWh): 0.473 ¢
- Regulatory Reconciliation Adjustment (per kWh): 5.000 ¢
- Pole Plant Adjustment Mechanism (per kWh): 30.000 ¢
- Transmission Demand Charge (per kVa): $10.09
- Stranded Cost Recovery Demand Charge (per kVa): $0.98
- Stranded Cost Recovery Charges
  - On-Peak (per kWh): 0.869 ¢
  - Off-Peak (per kWh): 0.598 ¢
- System Benefits Charge (per kWh): 0.905 ¢
- Energy Charge (per kWh)
  - February 2024: 18.173 ¢
  - March 2024: 12.061 ¢
  - April 2024: 9.495 ¢
  - May 2024: 9.004 ¢
  - June 2024: 9.443 ¢
  - July 2024: 11.602 ¢

Rate B, Backup Service

For commercial and industrial customers who sometimes require backup and standby service from Eversource along with their own source of generation. Optional for customers with generation installed on or before January 1, 1985, or whose generation is used only for emergency situations. Call us at 866-554-6025 for details.

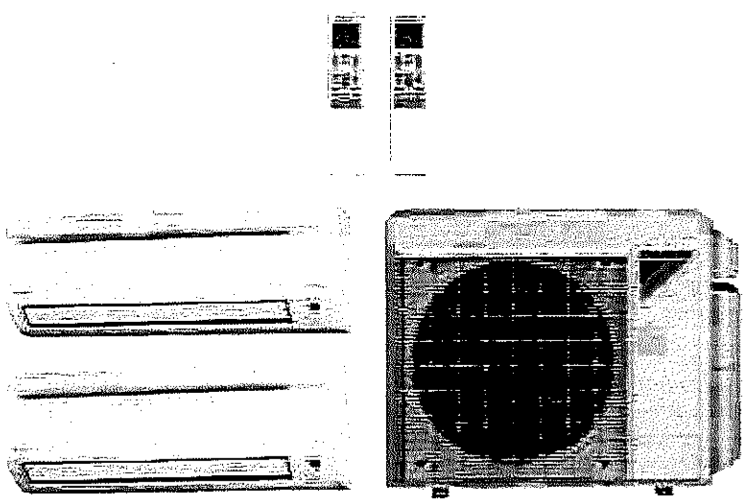
Rates EOL and EOL-2, Energy Efficient Outdoor Lighting

Available only to municipalities and governmental bodies that want to convert street and highway lighting to high pressure sodium vapor, metal halide, or Light Emitting Diode (LED) technology. Call us at 866-554-6025 for details.

Rate OL, Outdoor Lighting

Available for street and area lighting. For more information on the size and types of lighting fixtures available and the monthly costs, call us at 800-662-7764.

APPENDIX B: PRODUCT DATA SHEETS



Daikin

Daikin 27,000 Btu 20.2 Seer 2-Zone Mini Split Heat Pump System - 12K-15K - 5MXS48TVJU - FTXS12LVJU - FTXS15LVJU

$5,928.00

Price when purchased online ⓘ

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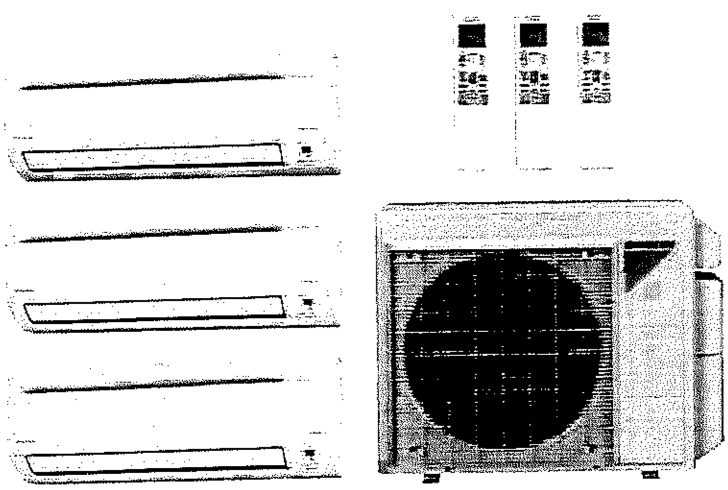
Free 30-day returns Details



Daikin

Daikin 37,000 Btu 20.2 Seer 3-Zone Mini Split Heat Pump System - 7K-15K-15K - 5MXS48TVJU - CTXS07LVJU - (2) FTXS15LVJU

Free 30-day returns

$6,511.00

Price when purchased online

Add to cart

How do you want your item?

Shipping	Pickup	Delivery
Arrives Aug 2 Free	Not available	Not available

Delivery to Derry, 03038

Sold and shipped by The AC Outlet LLC

WEIL-McLAIN®
www.weil-mclain.com

Evergreen™

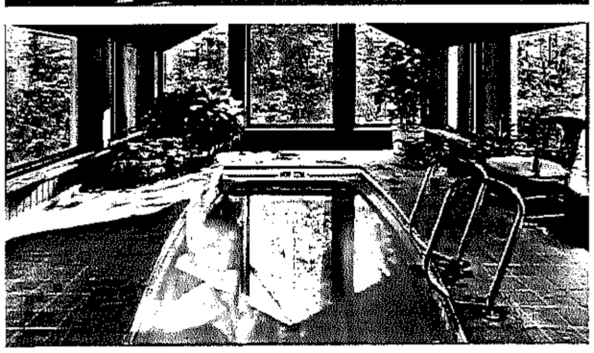
HIGH-EFFICIENCY CONDENSING BOILER

Water | Natural/Propane Gas | 220-399 MBH | 3 Sizes
Direct Vent | 95% AFUE*

APPLICATIONS

The new Evergreen™ boiler extends comfort levels to every area of your property for the long run. The Evergreen is perfect for light commercial or large residential applications and single or multi-unit installations with **ZoneStacking**™ up to 24 programmable zones.

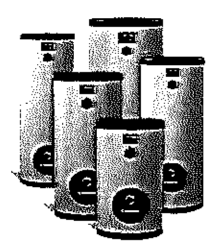
It's everything you want in heating: quiet operation, aesthetically pleasing design, floor standing or wall mount options, environmental sustainability with Low NOx, heating comfort with lower utility bills* and more.



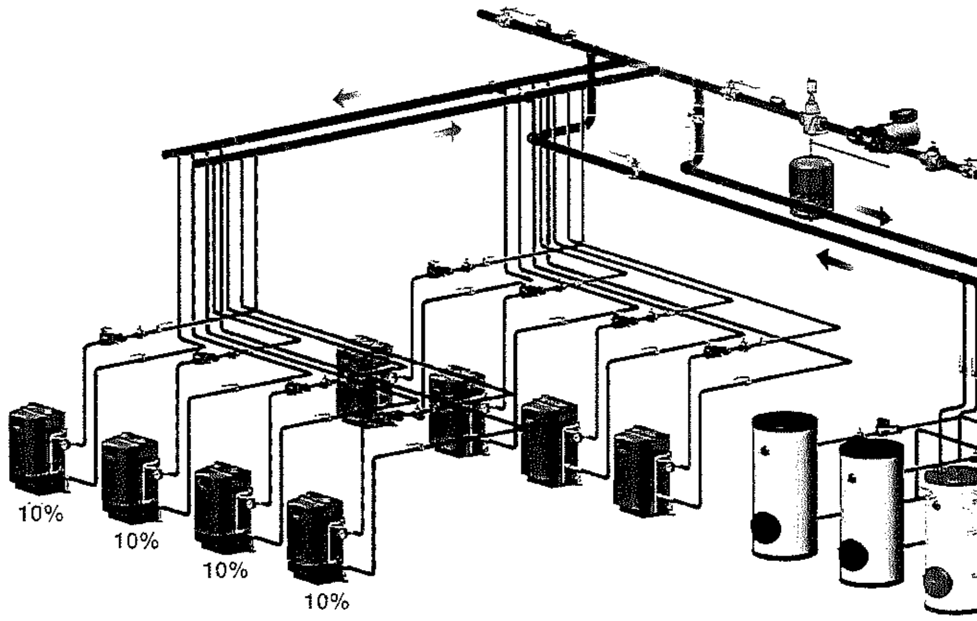
RESIDENTIAL

Stay *effortlessly comfortable* in any home environment with the new Evergreen boiler. The quiet operation of the Evergreen further enhances the sense of "invisible" heat, from multiple in-home zones to pool heating.

- The Evergreen's sleek, modern design adds value to the home or property.
- Ease of programmability makes achieving comfort simple.
- For the homeowner who wants heating comfort while maintaining lower utility bills and reducing their carbon footprint, the Evergreen 220 and 299 boilers are recognized as Most Efficient by Energy Star® 2015 standards with an AFUE rating of 95%. This could qualify the homeowner for available local utility rebates, if available. The Evergreen provides a Low NOx of < 20 PPM, which adds to the greener environment sustainability.
- The high performance of the Evergreen boiler works seamlessly with the efficient and durable AHRI Certified™ Weil-McLain AquaPlus® Indirect Fired Water Heaters, available in five sizes to meet demanding hot water applications.



Federal tax credit available in qualifying areas



ZONESTACKING

Enables all zone capabilities of each individual boiler when connected on a cascaded network of boilers. With the Evergreen boiler, the number of programmable zones is three times the number of boilers on the network, up to eight boilers.

COMMERCIAL

Familiar interface - innovative technology

As our technology has advanced to create smoother, more efficient operations, we've kept the interface of the Evergreen boiler familiar, simple to use and easy to learn.

- For the residential and light commercial customer who requires a multiple boiler setup, the Evergreen provides **ZoneStacking** - 24 zone capability <u>without</u> an additional external 3rd party control.
- **ZoneStacking** reduces the installation costs and time while increasing reliability. With this advanced control feature, the Evergreen boiler maintains optimal efficiency through lead-lag rotation and balanced heat loading.

EASE OF INSTALLATION

- Setup wizard efficiently guides the installer through a single or multiple boiler installation in minutes
- For the contractor, installer and/or service provider, the Evergreen has an easy to understand graphical user Interface and makes programming and monitoring operations simple
- Wiring diagrams provided are clear and easily accessible

EASE OF USE

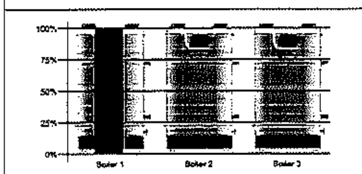
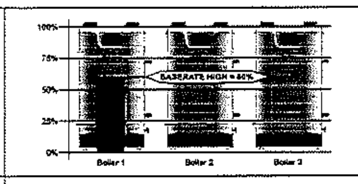
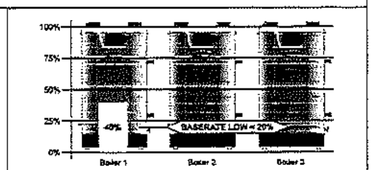
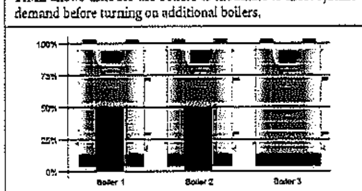
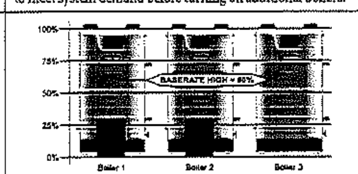
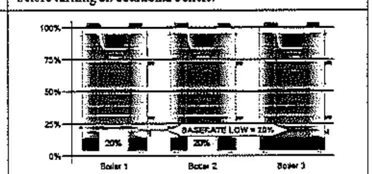
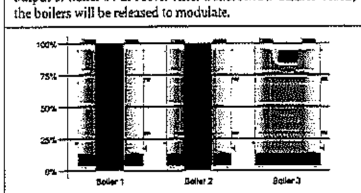
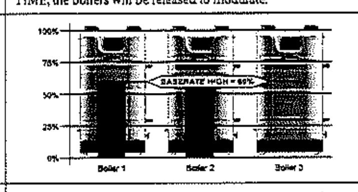
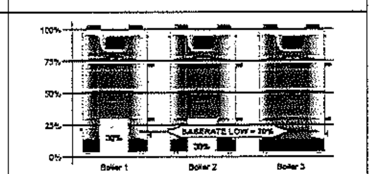
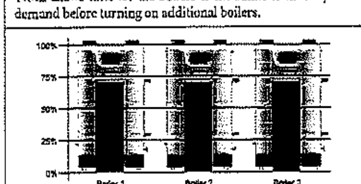
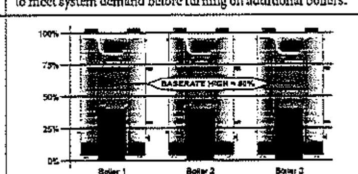
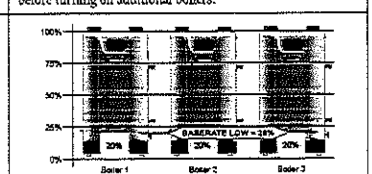
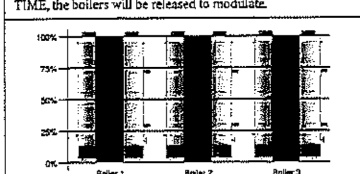
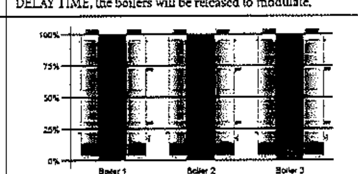
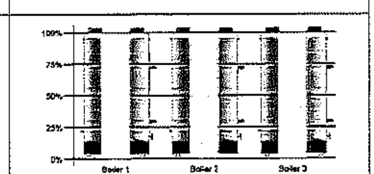
- Ability to control multiple boilers with lead-lag capability without an external device
- Interactive diagnostic capability
- Reliable operation
- Easy to understand and monitor controls
- Effortless heating and comfort in all zones

EASE OF MAINTENANCE

- Large, accessible panels for quick and easy maintenance checks
- Interactive diagnostic capability provides a snapshot of the past and current operation parameters
- Reliable operation of the complete heating system including radiant elements
- Sentinel X100® inhibitor is included with the boiler to ensure the water chemistry is optimal for heating system efficiency

MULTIPLE BOILER SEQUENCING

The flexibility of the Evergreen boiler system reduces setup time and keeps costs down.

SERIES Sequencing	PARALLEL Sequencing	SMART Sequencing
← Quicker Boiler Response Time	Higher Part-Load Efficiency →	
		
STAGE 1 – Lead boiler modulates up to a maximum of 100% before turning on the next boiler in the sequence. The STABILIZE TIME allows time for the boilers to modulate to meet system demand before turning on additional boilers.	STAGE 1 – Lead boiler modulates up to a maximum of Base Rate High before turning on the next boiler in the sequence. The STABILIZE TIME allows time for the boilers to modulate to meet system demand before turning on additional boilers.	STAGE 1 – Lead boiler modulates up to a low firing rate before turning on the next boiler in the sequence. The STABILIZE TIME allows time for the boilers to modulate to meet system demand before turning on additional boilers.
		
STAGE 2 – Boiler #2 in sequence ignites and both boilers modulate to so their combined energy output matches the energy output of Boiler #1 at 100%. After a short MOD DELAY TIME, the boilers will be released to modulate.	STAGE 2 – Boiler #2 in sequence ignites and both boilers modulate to so their combined energy output matches the energy output of Boiler #1 at Base Rate High. After a short MOD DELAY TIME, the boilers will be released to modulate.	STAGE 2 – Boiler #2 in sequence ignites and both boilers modulate to BASE RATE LOW. After a short MOD DELAY TIME, the boilers will be released to modulate.
		
STAGE 3 – Both boilers modulate up to a maximum of 100% before turning on the next boiler in the sequence. The STABILIZE TIME allows time for the boilers to modulate to meet system demand before turning on additional boilers.	STAGE 3 – Both boilers modulate up to a maximum of Base Rate High before turning on the next boiler in the sequence. The STABILIZE TIME allows time for the boilers to modulate to meet system demand before turning on additional boilers.	STAGE 3 – Both boilers modulate up to a low firing rate before turning on the next boiler in the sequence. The STABILIZE TIME allows time for the boilers to modulate to meet system demand before turning on additional boilers.
		
STAGE 4 – Boiler #3 in sequence ignites and then all boilers modulate to so their combined energy output matches the energy output of Boilers #1 and #2 at 100%. After a short MOD DELAY TIME, the boilers will be released to modulate.	STAGE 4 – Boiler #3 in sequence ignites and then all boilers modulate to so their combined energy output matches the energy output of Boilers #1 and #2 at Base Rate High. After a short MOD DELAY TIME, the boilers will be released to modulate.	STAGE 4 – Boiler #3 in sequence ignites and then all boilers modulate to BASE RATE LOW. After a short MOD DELAY TIME, the boilers will be released to modulate.
		
STAGE 5 – After all available boilers are firing, boilers are release to modulate up to 100% of rate.	STAGE 5 – After all available boilers are firing, boilers are release to modulate up to 100% of rate.	STAGE 5 – After all available boilers are firing, boilers are release to modulate up to 100% of rate.

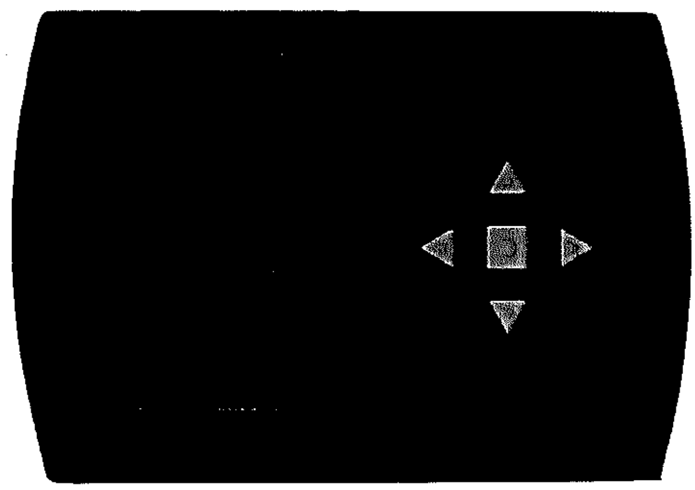
THREE SELECTABLE SEQUENCING MODES TO CHOOSE FROM

- **Series Sequencing**
  Quickest- boiler goes to 100% before another boiler is turned on; output is achieved more quickly with less total burner hours
- **Parallel Sequencing**
  Efficiency and speed-based on Base Rate High; Hybrid mode between Smart and Series modes; boilers will go to user-programmed base rate high before turning on the next boiler
- **SmartSequencing™**
  Most efficient- maximizes part-load efficiency by turning on as many boilers as possible

PROGRAMMABLE PREFERENCES FOR MULTIPLE BOILER SETUPS

- **Multiple Boiler Sequencing**
  User selects what point one boiler stops modulating before turning on another boiler
- **Lead Lag Rotation**
  User selects which boiler turns on first and can choose based on burner hours, fixed rotation or no rotation
- **Input/Output Options**
  Input and outputs can be used for every boiler with up to 24 capable input/output pairs
- **Redundant Sensors**
  If one system supply or outdoor temperature sensor fails, there are backups. If backups fail, the system can still run on a special safety mode
- **Auxiliary Output Flexibility**
  Ability to control system circulators, combustion air dampers and/or other auxiliary system components

SIMPLE INTERFACE - COMPLEX CALCULATIONS



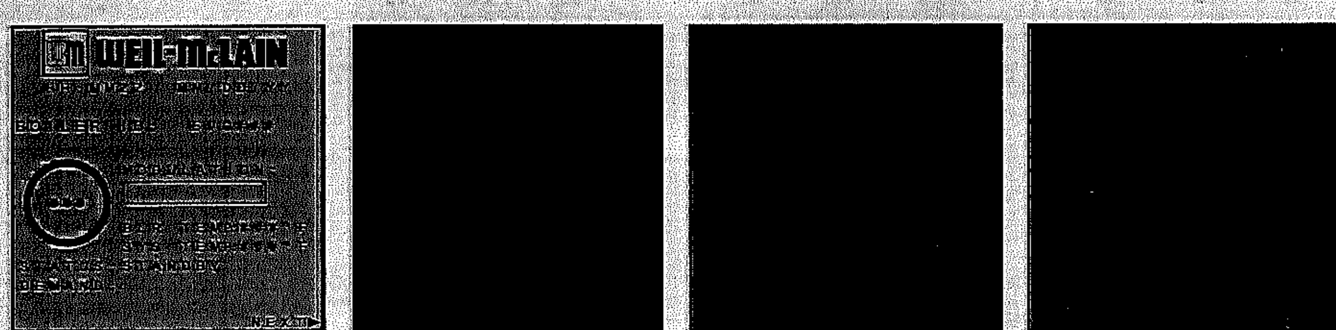
Straightforward, user-friendly design with advanced technology.

What's happening behind the scenes? Complex calculations of the required energy to meet system demands is distributed across all the boilers in the network.

System maximizes user's comfort by simultaneously meeting as many system demands as possible: When there are multiple requests on a cascaded boiler system, the control satisfies both local and network heating demands.

Setup is easy. The built-in wizard asks direct questions on setup, making customization easy and straightforward. Contextual help is also available on screen.

Visual Communication Screens



STANDBY | SPACE HEATING | DHW HEATING | CHECK SYSTEM

*Model 220 and 299 only

FEATURES

BOILER

- Stainless steel fire-tube heat exchanger
- Non-metallic heat exchanger base
- Floor standing or wall-mount option with kit
- Natural or LP gas
- Negative regulated combustion
- 10 to 1 turndown ratio
- Boiler circulator
- Propane conversion kit
- Low water cut-off
- Sentinel X100 inhibitor and test kit
- Low NOx < 20 PPM

CONTROL FEATURES

- Easy installation with Setup Wizard
- Zone and/or priority based control
- Three thermostat Inputs
- Outdoor reset for each priority
- Rate adjustable per priority
- 0-10V input (modulation or setpoint)
- Four total outputs
  - 1 dedicated boiler circulator output
  - 3 additional outputs can be used with circulators, dampers, or system aux
- Aux inputs – flow switch or end switch
- Aux outputs – system pump or damper
- Modbus® connectivity
- Additional heat demand contact

BOILER CIRCULATORS

- 1-1/4" & 1-1/2" flanges (220/299) Taco 0014
- 1-1/4" & 1-1/2" flanges (399) Taco 0013

MULTIPLE BOILER FEATURES

- Up to 8 boilers, multiple system
- Series, Parallel, or SmartSequencing
- Lead boiler rotation
- 2 network priorities for the system
- 2 local priorities per boiler
- 24 zone inputs and outputs with 8 total cascaded boilers
- Aux inputs – flow switch or end switch
- System aux outputs – system pump or damper

VENTING*

- Direct vent 100 ft. for intake and 100 ft. for vent
- Dual pressure zones
- Common combustion air

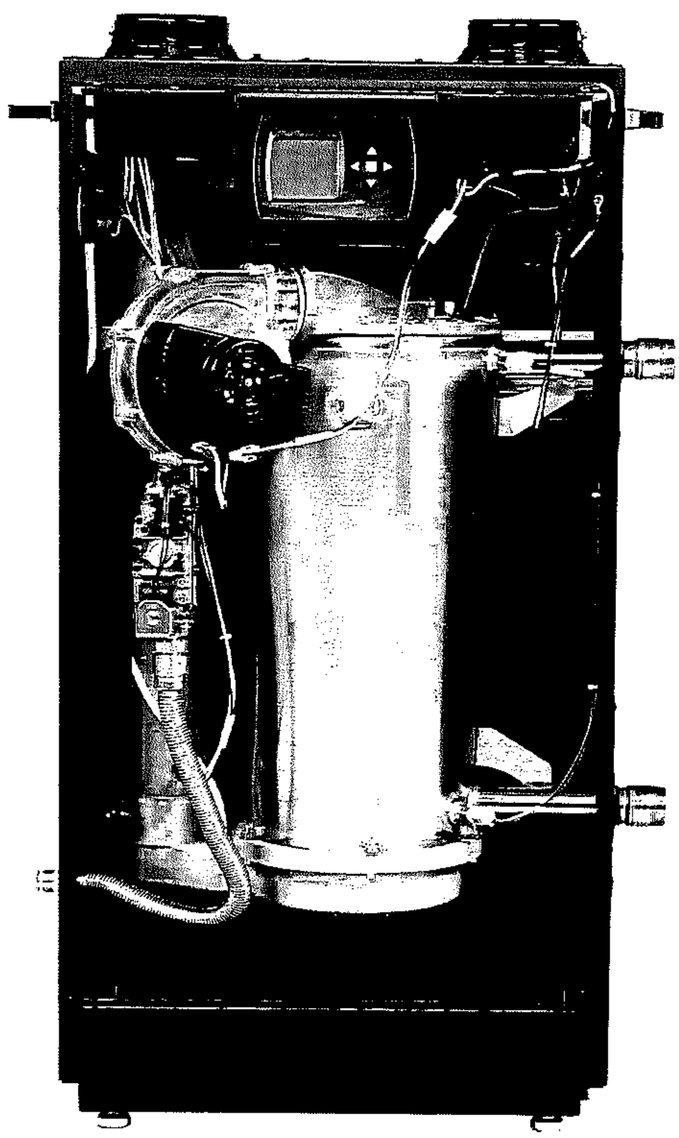
Please call your local Weil-McLain sales office for additional venting options.

JACKET ASSEMBLY

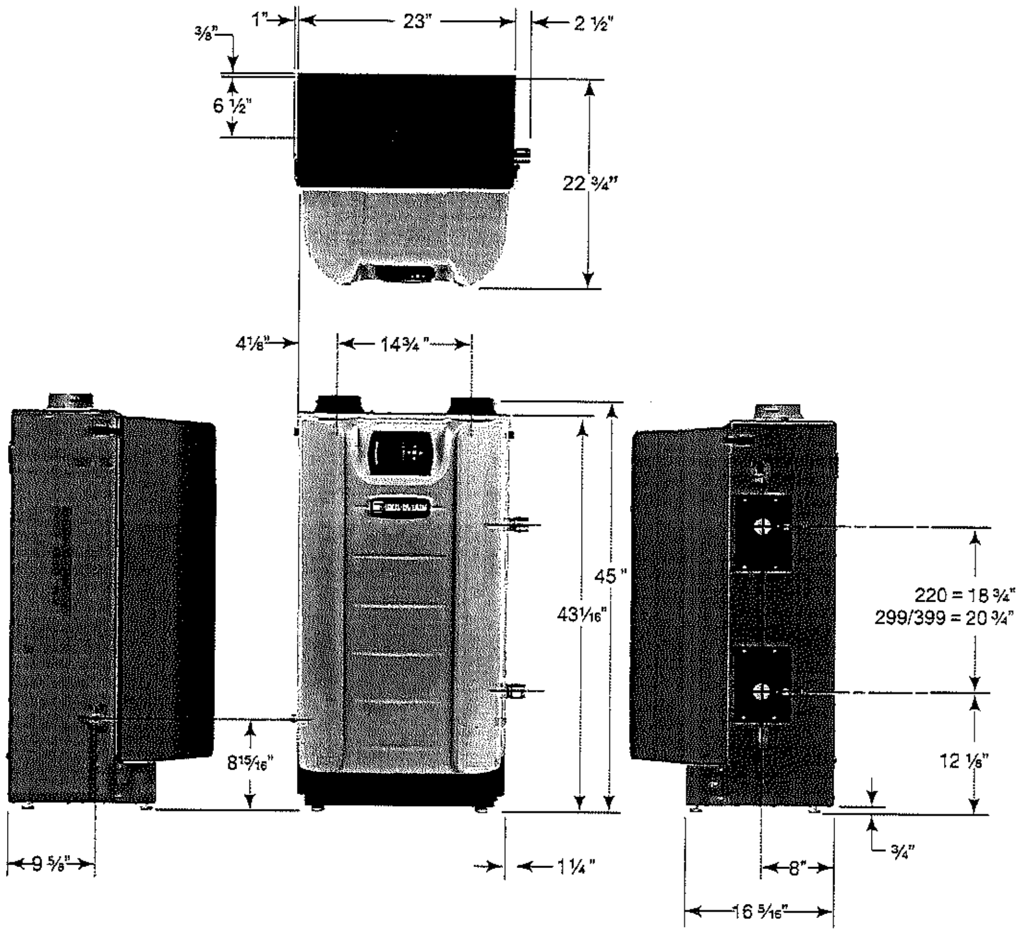
- Easy maintenance with top access panel
- Fully removable jacket front door
- Adjustable boiler legs
- On/off power switch
- Line voltage service receptacle
- Mounting bracket ready for wall-mount kit
- Condensate trap

OPTIONAL EQUIPMENT

- Wall-mount kit
- Concentric vent kit
- Condensate neutralizer kit
- Sidewall vent/air termination kit
- Maintenance kits

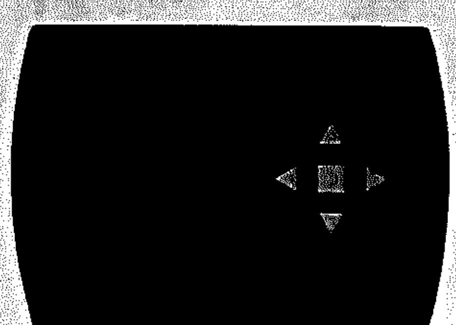


220-399 MBH SPECIFICATIONS



MODEL	CSA INPUT (MBH)	DOE HEATING CAPACITY (MBH)	NET AHRI (MBH)	DOE AFUE	VENT MATERIAL	VENT SIZE	COMBUSTION AIR SIZE	VENTING LENGTH	MIN. RECOMMENDED PIPE SIZE	SUPPLY/RETURN TAPPING	GAS CONNECTION SIZE	APPROX. SHIP WEIGHT	WATER VOLUME
EVG 220	220	206	179	95.0%	PVC, CPVC, PP, SS (AL29-4C)	3" or 4"	3" or 4"	100'	1 1/4"	1 1/2"	3/4"	215 lbs.	4.6 Gal.
EVG 299	299	280	243	95.0%	PVC, CPVC, PP, SS (AL29-4C)	4"	4"	100'	1 1/2"	1 1/2"	3/4"	260 lbs.	7.0 Gal.
EVG 399	399	383*	333	96.5%*	PVC, CPVC, PP, SS (AL29-4C)	4"	4"	100'	1 1/2"	1 1/2"	3/4"	260 lbs.	6.7 Gal.

Evergreen 399 ratings are gross output and combustion efficiency



INNOVATIVE CONTROL SYSTEM FEATURES

- 3 programmable priorities for up to three heat inputs
- Text display for easy operation monitoring and diagnostics
- 0-10 VDC input modulation
- Additional heat demand contact for hybrid system
- Integrated low water protection
- Dual temperature sensors on boiler outlet and flue
- Blower speed modulation

Contact your local Weil-McLain sales office for more information.

NEW ENGLAND
250 Richmond Street
Raynham, MA 02767
TEL: 508-822-3939
FAX: 508-822-0553

NEW YORK METRO
220 White Plains Road
Suite 110
Tarrytown, NY 10591
TEL: 914-789-3777
FAX: 914-366-7407

MID-ATLANTIC
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Suite B
Mount Laurel, NJ 08054
TEL: 856-866-7400
FAX: 856-866-8828

CENTRAL AND WESTERN SALES
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Suite 200
Burr Ridge, IL 60527
TEL: 630-560-3738
FAX: 855-248-2777
Toll Free: 800-854-5482

ADMINISTRATIVE OFFICE
999 McClintock Drive
Suite 200
Burr Ridge, IL 60527
TEL: 630-560-3700
FAX: 630-560-3769

Weil-McLain is a leading North American designer and manufacturer of hydronic comfort heating systems for residential, commercial and institutional buildings since 1881. Weil-McLain has manufacturing facilities in Michigan City, Indiana and Eden, North Carolina, along with regional sales offices throughout the United States and an administrative office in Burr Ridge, Illinois. Building on a reputation of quality and innovation, Weil-McLain is committed to creating Simplified Solutions for our Complex World™.

Architects, engineers, contractors, facility managers and homeowners alike rely on Weil-McLain for their comfort heating needs. Installed in homes, offices, schools, restaurants, hotels and other facilities throughout North America, the Weil-McLain brand is among the most respected and often used in the building industry.

Weil-McLain hydronic boilers and indirect-fired water heaters integrate the latest in advanced controls and materials including cast iron, stainless steel and aluminum heat exchanger technologies. The reliability and energy efficiency of our products has helped to make Weil-McLain industry leaders. Products are engineered with aesthetics, functionality, safety and structural tolerance in mind. By combining our expertise with the responsiveness of our support operations, we provide our customers with added value and peace of mind.

WM1507_BRO_020_EVG

WEIL-McLAIN®
weil-mclain.com

2023-24	KWH PRODUCED	[redacted]	BEHIND THE METER	GREEN ENERGY	ISO	UTILITY BILL W/O SOLAR	UTILITY BILL WITH SOLAR	TOTAL COST OF ELECTRIC	PERCENT SAVINGS
JUL	91,320	$9,606.00	$5,860.14	$2,465.64	$379.67	$14,662.19	-$803.95	$ (3,649.26)	124.9%
AUG	90,362	$6,488.24	$4,413.95	$2,439.77	$359.30	$6,130.30	-$4,771.89	$ (7,570.96)	223.5%
SEP	65,934	$4,144.00	$3,386.98	$1,780.22	$354.84	$8,731.90	$1,200.92	$ (934.14)	110.7%
OCT	44,925	$2,480.36	$2,817.03	$1,212.98	$236.56	$11,708.65	$6,411.26	$ 4,961.73	57.6%
NOV	46,474	$3,509.00	$4,564.40	$1,254.80	$236.56	$20,183.09	$12,109.69	$ 10,618.33	47.4%
DEC	33,119	$3,552.48	$5,123.39	$894.21	$236.56	$28,254.65	$19,578.78	$ 18,448.01	34.7%
JAN	31,319	$3,769.92	$4,886.21	$845.61		$26,904.36	$18,248.23	$ 17,402.62	35.3%
FEB	76,066	$7,135.08	$5,943.71	$2,053.78		$21,787.71	$8,708.92	$ 6,655.14	69.5%
MAR	76,071	$5,111.76	$4,238.52	$2,053.92		$14,510.36	$5,160.08	$ 3,106.16	78.6%
APR	76,081	$4,333.76	$3,573.59	$2,054.19		$10,795.06	$2,887.71	$ 833.52	92.3%
MAY	99,940	$5,849.60	$4,255.30	$2,698.38		$11,342.97	$1,238.07	$ (1,460.31)	112.9%
JUN	95,758	$4,982.48	$6,062.28	$2,585.47		$16,415.04	$5,370.28	$ 2,784.81	83.0%
TOTAL	**827,369**	**$60,962.68**	**$55,125.50**	**$22,338.96**	**$1,803.49**	**$191,426.28**	**$75,338.10**	**$51,195.65**	
SAVINGS							**$116,088.18**	**$140,230.63**	
MONTHLY AVG	68947	$5,080.22	$4,593.79	$1,861.58		$15,952.19	$6,278.18	$4,266.30	
		[redacted]	ENERGY VALUE (NOT THRU METER)						

Year/month	amount	source	amount	source	amount	source	Remainder of repayment	Estimate of Payoff
2021							$1,356,601.00	
January	$3,561.90	generation	$1,000.89	green credits	$6,438.10	other	$1,345,600.11	$1,346,601.00
February	$5,464.07	generation	$1,851.42	green credits	$4,535.93	other	$1,333,748.69	$1,335,600.11
March	$8,343.26	generation	$2,807.27	green credits	$1,656.74	other	$1,320,941.42	$1,323,748.69
April	$5,676.14	generation	$1,851.42	green credits	$4,323.86	other	$1,309,090.00	$1,310,941.42
May	$7,262.54	generation	$2,638.22	green credits	$2,737.46	other	$1,296,451.78	$1,299,090.00
June	$6,499.70	generation	$2,469.34	green credits	$3,500.30	other	$1,283,982.44	$1,286,451.78
July	$6,557.05	generation	$2,249.67	green credits	$3,442.95	other	$1,271,732.77	$1,273,982.44
August	$6,500.32	generation	$2,280.15	green credits	$3,499.68	other	$1,259,452.62	$1,261,732.77
September	$5,223.44	generation	$1,771.69	green credits	$4,776.56	other	$1,247,680.93	$1,249,452.62
October	$4,763.84	generation	$1,759.86	green credits	$5,236.16	other	$1,235,921.07	$1,237,680.93
November	$4,254.47	generation	$1,190.57	green credits	$5,745.53	other	$1,224,730.50	$1,225,921.07
December	$3,341.71	generation	$718.12	green credits	$6,658.29	other	$1,214,012.38	$1,214,730.50
2022							$1,214,012.38	
January	$7,611.90	generation	$1,208.98	green credits	$14,894.40	other	$1,190,297.10	$1,204,730.50
February	$13,428.00	generation	$1,865.00	green credits			$1,175,004.10	$1,194,730.50
March	$9,562.00	generation	$2,046.06	green credits	$438.00	other	$1,162,958.04	$1,184,730.50
April	$9,694.67	generation	$2,725.38	green credits	$305.33	other	$1,150,232.66	$1,174,730.50
May	$8,904.60	generation	$2,751.98	green credits	$1,095.40	other	$1,137,480.68	$1,164,730.50
June	$10,886.59	generation	$3,107.65	green credits			$1,123,486.44	$1,154,730.50
July	$15,182.20	generation	$2,694.98	green credits	$134.97	ISO	$1,105,474.29	$1,144,730.50
August	$21,541.68	generation	$2,591.78	green credits	$98.35	ISO	$1,081,242.48	$1,134,730.50
September	$14,430.97	generation	$1,969.33	green credits	$109.63	ISO	$1,064,732.55	$1,124,730.50
October	$12,595.68	generation	$1,652.40	green credits	$84.33	ISO	$1,050,400.14	$1,114,730.50
November	$14,213.92	generation	$1,244.13	green credits	$56.22	ISO	$1,034,885.87	$1,104,730.50
December	$16,216.95	generation	$961.55	green credits			$1,017,707.37	$1,094,730.50
2023							$1,017,707.37	
January	$17,404.74	generation	$939.60	green credits			$999,363.03	$1,084,730.50
February	$24,393.60	generation	$1,392.26	green credits			$973,577.17	$1,074,730.50
March	$29,372.99	generation	$2,488.21	green credits			$941,715.97	$1,064,730.50
April	$18,836.30	generation	$2,252.61	green credits			$920,627.06	$1,054,730.50
May	$19,845.44	generation	$3,039.71	green credits			$897,741.91	$1,044,730.50
June	$13,687.66	generation	$2,336.23	green credits			$881,718.02	$1,034,730.50
July	$15,466.14	generation	$2,465.64	green credits			$863,786.24	$1,024,730.50
August	$10,902.19	generation	$2,799.07	green credits	$1,298.74		$848,786.24	$1,014,730.50
September	$7,530.98	generation	$1,780.22	green credits	$2,469.02	other	$837,006.02	$1,004,730.50

October	$5,297.03	generation	$1,449.54	green credits	$8,253.43	other	$822,006.02	$994,730.50
November	$8,073.40	generation	$1,491.36	green credits	$5,435.24	other	$807,006.02	$984,730.50
December	$8,676.41	generation	$1,085.77	green credits	$5,237.82	other	$792,006.02	$974,730.50
2024							$792,006.02	
January	$8,656.13	generation	$845.61	green credits	$5,498.26	other	$777,006.02	$964,730.50
February	$13,078.79	generation	$2,053.78	green credits			$761,873.45	$954,730.50
March	$9,350.28	generation	$2,053.92	green credits	$3,595.80	other	$746,873.45	$944,730.50
April	$7,907.35	generation	$2,054.19	green credits	$5,038.56	other	$731,873.35	$934,730.50
May	$10,140.90	generation	$2,698.38	green credits	$2,160.72	other	$716,873.35	$924,730.50
June	$11,044.76	generation	$2,585.47	green credits	$1,369.77	other	$701,873.35	$914,730.50
July							$701,873.35	$904,730.50
August							$701,873.35	$894,730.50
September							$701,873.35	$884,730.50
October							$701,873.35	$874,730.50
November							$701,873.35	$864,730.50
December							$701,873.35	$854,730.50
2025							$701,873.35	
January							$701,873.35	$844,730.50
February							$701,873.35	$834,730.50
March							$701,873.35	$824,730.50
April							$701,873.35	$814,730.50
May							$701,873.35	$804,730.50
June							$701,873.35	$794,730.50
July							$701,873.35	$784,730.50
August							$701,873.35	$774,730.50
September							$701,873.35	$764,730.50
October							$701,873.35	$754,730.50
November							$701,873.35	$744,730.50
December							$701,873.35	$734,730.50
2026							$701,873.35	
January							$701,873.35	$724,730.50
February							$701,873.35	$714,730.50
[redacted]								
April							$701,873.35	$694,730.50
May							$701,873.35	$684,730.50
June							$701,873.35	$674,730.50
July							$701,873.35	$664,730.50

August							$701,873.35	$654,730.50
September							$701,873.35	$644,730.50
October							$701,873.35	$634,730.50
November							$701,873.35	$624,730.50
December							$701,873.35	$614,730.50
2027							$701,873.35	
January							$701,873.35	$604,730.50
February							$701,873.35	$594,730.50
March							$701,873.35	$584,730.50
April							$701,873.35	$574,730.50
May							$701,873.35	$564,730.50
June							$701,873.35	$554,730.50
July							$701,873.35	$544,730.50
August							$701,873.35	$534,730.50
September							$701,873.35	$524,730.50
October							$701,873.35	$514,730.50
November							$701,873.35	$504,730.50
December							$701,873.35	$494,730.50
2028							$701,873.35	
January							$701,873.35	$484,730.50
February							$701,873.35	$474,730.50
[redacted]								
April							$701,873.35	$454,730.50
May							$701,873.35	$444,730.50
June							$701,873.35	$434,730.50
July							$701,873.35	$424,730.50
August							$701,873.35	$414,730.50
September							$701,873.35	$404,730.50
October							$701,873.35	$394,730.50
November							$701,873.35	$384,730.50
December							$701,873.35	$374,730.50
2029							$701,873.35	
January							$701,873.35	$364,730.50
February							$701,873.35	$354,730.50
March							$701,873.35	$344,730.50
April							$701,873.35	$334,730.50
May							$701,873.35	$324,730.50

June							$701,873.35	$314,730.50
July							$701,873.35	$304,730.50
August							$701,873.35	$294,730.50
September							$701,873.35	$284,730.50
October							$701,873.35	$274,730.50
November							$701,873.35	$264,730.50
December							$701,873.35	$254,730.50
2030							$701,873.35	
January							$701,873.35	$244,730.50
February							$701,873.35	$234,730.50
March							$701,873.35	$224,730.50
April							$701,873.35	$214,730.50
May							$701,873.35	$204,730.50
June							$701,873.35	$194,730.50
July							$701,873.35	$184,730.50
August							$701,873.35	$174,730.50
September							$701,873.35	$164,730.50
October							$701,873.35	$154,730.50
November							$701,873.35	$144,730.50
December							$701,873.35	$134,730.50
2031							$701,873.35	
January							$701,873.35	$124,730.50
February							$701,873.35	$114,730.50
March							$701,873.35	$104,730.50
April							$701,873.35	$94,730.50
May							$701,873.35	$84,730.50
June							$701,873.35	$74,730.50
July							$701,873.35	$64,730.50
August							$701,873.35	$54,730.50
September							$701,873.35	$44,730.50
October							$701,873.35	$34,730.50
November							$701,873.35	$24,730.50
December							$701,873.35	$14,730.50
	Generation		Green Credit		Other			[redacted]
	$461,382.69		$83,219.41		$110,125.55		42 payments	

[redacted]

Current balance	$701,873.35	divided by	15,588.75	45 months	3 years 9 months	
						p/o date March 2028

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

2024 NHDES CLEAN WATER SRF PRIORITY LIST
WASTEWATER INFRASTRUCTURE PROJECTS

No.	APPLICANT	PROJECT NAME	TOTAL COST*	2024 CWSRF Amount [1,2,3,4,5,6]	EAMI	PLAN	(1) Protection of Water Quality & Public Health	GPR % cost	(2) Green Project Reserve	(3) Aging Infrastructure	RANKING SCORE	PF % Based on Affordability	PF Based on Affordability	PF EAMI[7]	Principal Forgiveness [8,9]
1	Claremont	WWTF Headworks, Solids Handling and Nutrient Removal Upgrade	$21,310,000	$1,605,000			20	0%	0	30	50.0	20.00%	$321,000		$321,000
2	Milton	Sewer Regionalization	$17,565,000	$1,020,000			30	0%	0	10	40.0	10.00%	$102,000		$102,000
3	Warner Village WD	WWTP Copper Removal Upgades	$20,000,000	$20,000,000			30	0%	0	10	40.0	25.00%	$5,000,000		$5,000,000
4	Rochester	Sewer System Master Plan FY26 Construction Phase	$1,163,000	$1,163,000		X	20	33%	10	10	39.9	20.00%	$232,600		$232,600
5	Exeter	High Street and Cross Country Sewer Upgrades - Phase 1	$3,800,000	$3,800,000			0	33%	10	30	39.9	20.00%	$760,000		$760,000
6	Berlin[10]	Infiltration & Inflow Reduction Phase 2 Contract 3	$800,000	$800,000			20	0%	0	10	30.0	NA	$800,000		$800,000
7	Concord	Heights Sewer Collection Improvements	$18,300,000	$1,200,000			0	0%	0	30	30.0	10.00%	$120,000		$120,000
8	Dover	WWTF Secondary Clarifier No. 3	$4,300,000	$3,600,000			20	0%	0	10	30.0	20.00%	$720,000		$720,000
9	Hopkinton	Webster Septage Lagoon Closure	$4,015,000	$4,015,000			20	0%	0	10	30.0	10.00%	$401,500		$401,500
10	Manchester	Cemetery Brook Drain Tunnel - Construction	$230,000,000	$0			20	0%	0	10	30.0	10.00%	$0		$0
11	Nashua	Class A Biosolids Upgrade and Maintenance Building-Construction	$29,330,000	$0			0	95%	29	0	28.6	10.00%	$0		$0
12	Merrimack	Pennichuck Pump Station Evaluation	$100,000	$50,000	X	X	0	39%	12	10	21.7	10.00%	$5,000		$5,000
13	Greenville	WWTF Improvements - Chemical Feed Building	$600,000	$600,000			20	2%	1	0	21.0	25.00%	$150,000		$150,000
14	Epping	Critical Wastewater Upgrades	$12,000,000	$12,000,000			20	0%	0	0	20.0	20.00%	$2,400,000		$2,400,000
15	Newport	WWTF Upgrade	$4,000,000	$4,000,000			20	0%	0	0	20.0	NA	$4,000,000		$4,000,000
16	New Castle	Sewer Manhole Rehabilitation	$695,000	$695,000		X	0	33%	10	10	19.9	20.00%	$139,000		$139,000
17	Portsmouth	Pease WWTF Rehabilitation	$30,998,000	$3,178,000	X	X	0	27%	8	10	18.0	20.00%	$635,600	$250,000	$885,600
18	Seabrook	WWTF Upgrades Phase 1	$2,510,800	$2,510,800	X	X	0	25%	8	10	17.5	10.00%	$251,080	$50,000	$301,080
19	Wolfeboro	South Main St Sanitary Sewer Improvements	$4,870,000	$0		X	0	21%	6	10	16.2	35.00%	$0		$0
20	Ashland	Infiltration Correction - L.W. Packard Building	$1,000,000	$1,000,000			0	15%	5	10	14.5	10.00%	$100,000		$100,000
21	Newmarket	Pump Station Upgrades	$3,250,000	$0			0	10%	3	10	13.0	20.00%	$0		$0
22	Hooksett	Martins Ferry Pump Station Force Main Replacement	$4,200,000	$4,200,000			0	10%	3	10	13.0	10.00%	$420,000		$420,000
23	Berlin	Devens Street Pump Station Upgrade	$670,000	$0			0	8%	2	10	12.5	20.00%	$0		$0
24	Portsmouth	Mechanic Street Pump Station Replacement	$23,500,000	$1,950,000		X	0	4%	1	10	11.3	20.00%	$390,000		$390,000
25	Somersworth	Main Street Utility Replacement	$5,356,000	$0			0	4%	1	10	11.1	20.00%	$0		$0
26	Plymouth Village W&S District	Pump Station No. 4 Upgrades	$3,285,000	$0			0	3%	1	10	10.9	25.00%	$0		$0
27	Plymouth Village W&S District	Pump Station No. 2 Replacement	$2,560,000	$0			0	3%	1	10	10.8	25.00%	$0		$0
28	Concord	Steeplegate Mall Pump Station Upgrades	$6,640,000	$0	X		0	3%	1	10	10.8	10.00%	$0		$0
29	Derry	WWTF Upgrade	$14,000,000	$0		X	0	2%	1	10	10.6	10.00%	$0		$0
30	Rochester	Airport Drive Sewer Pump Station Upgrade	$2,762,240	$0		X	0	1%	0	10	10.3	20.00%	$0		$0
31	Rochester	Ryan Circle Sewer Pump Station Upgrade	$1,909,943	$0		X	0	1%	0	10	10.3	20.00%	$0		$0
32	Winchester	Biosolids Improvements	$2,685,282	$2,685,282			0	1%	0	10	10.3	20.00%	$537,056		$537,056
33	Gorham	Sludge Dewatering Upgrades	$1,510,000	$1,475,000		X	0	0%	0	10	10.0	20.00%	$295,000		$295,000
34	Boscawen	Sewer Improvements Project 3 & 4	$1,300,000	$1,300,000			0	0%	0	10	10.0	20.00%	$260,000		$260,000
35	Berlin	Watson Street Pump Station Force Main Bypass Assemblies Upgrade	$960,000	$960,000			0	0%	0	10	10.0	20.00%	$192,000		$192,000
36	North Conway WP	Standby Generator Replacement	$865,000	$865,000			0	0%	0	10	10.0	20.00%	$173,000		$173,000
37	Brookside Cooperative	Sewer and Septic System Upgrades	$663,000	$663,000			0	0%	0	10	10.0	0.00%	$0		$0
38	Newmarket	Bay Road Pump Station and Forcemain Improvements	$5,500,000	$540,000		X	0	0%	0	10	10.0	20.00%	$108,000		$108,000
39	Gorham	WWTF Headworks Room Upgrade	$265,200	$232,050		X	0	0%	0	10	10.0	20.00%	$46,410		$46,410

2024 NHDES CLEAN WATER SRF PRIORITY LIST
WASTEWATER INFRASTRUCTURE PROJECTS

No.	APPLICANT	PROJECT NAME	TOTAL COST*	2024 CWSRF Amount [1,2,3,4,5,6]	EAMI	PLAN	(1) Protection of Water Quality & Public Health	GPR % cost	(2) Green Project Reserve	(3) Aging Infrastructure	RANKING SCORE	PF % Based on Affordability	PF Based on Affordability	PF EAMI[7]	Principal Forgiveness[8,9]
40	Gorham	Tinker Brook Pump Station Upgrade	$1,142,000	$174,720		X	0	0%	0	10	10.0	20.00%	$34,944		$34,944
41	New Castle	Pump Station Electrical System Upgrades	$146,100	$146,100			0	0%	0	10	10.0	20.00%	$29,220		$29,220
42	Ashland	Thomson Street Sewer Interceptor Replacement	$600,000	$0			0	0%	0	10	10.0	10.00%	$0		$0
43	Dover	Mill Street & Charles Street Pump Stations Consolidation	$6,511,000	$0			0	0%	0	10	10.0	20.00%	$0		$0
44	Dover	Phase C Stark Ave and Downtown Area	$3,400,200	$0			0	0%	0	10	10.0	20.00%	$0		$0
45	Hampton	Sewer Manhole Rehabilitation	$412,000	$0		X	0	0%	0	10	10.0	10.00%	$0		$0
46	Hampton	Moulton Road Sewer and Drainage Improvements	$2,034,000	$0			0	0%	0	10	10.0	10.00%	$0		$0
47	Keene	Martell Court Pump Station Permanent Bypass	$5,175,000	$0			0	0%	0	10	10.0	20.00%	$0		$0
48	Nashua	WWTF Upgrades - Phase 1	$10,027,900	$0			0	0%	0	10	10.0	10.00%	$0		$0
49	New Castle	Force Main Bridge Crossing Replacement	$1,030,000	$0		X	0	0%	0	10	10.0	20.00%	$0		$0
50	Newfields Village W&S District	Lagoon Sludge Removal and Aeration System Replacement	$1,803,000	$0			0	0%	0	10	10.0	10.00%	$0		$0
51	Newington	Disinfection Chemical System Upgrade	$650,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
52	Pittsfield	WWTF Upgrade Study Phase	$2,750,000	$0		X	0	0%	0	10	10.0	25.00%	$0		$0
53	Plymouth Village W&S District	Avery, Pleasant, and Cummings Street Sewer Rehabilitation	$450,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
54	Plymouth Village W&S District	Bayley Ave and Langdon Park Road Sewer Improvements	$360,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
55	Plymouth Village W&S District	Highland Street Cross Country Sewer Replacements	$4,290,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
56	Plymouth Village W&S District.	N. Main St (Route 3) Sewer Main Replacement	$1,400,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
57	Plymouth Village W&S District	WWTF Electrical and HVAC Upgrades	$3,310,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
58	Plymouth Village W&S District	Influent Pump Station and Headworks Upgrades	$6,670,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
59	Seabrook	WWTF Upgrades Phase 2	$5,294,600	$0		X	0	0%	0	10	10.0	10.00%	$0		$0
60	Somersworth	WWTF Phase 2 Upgrades	$19,000,000	$0			0	0%	0	10	10.0	20.00%	$0		$0
61	Winnipesaukee R. Basin Program	CMOM Phase 2 - Gilford Forcemains Rehabilitation	$6,800,000	$0		X	0	0%	0	10	10.0	20.00%	$0		$0
62	Winnipesaukee R. Basin Program	Laconia Compound Structural and Pipeline Upgrade	$760,000	$0		X	0	0%	0	10	10.0	20.00%	$0		$0
63	Winnipesaukee R. Basin Program	Franklin WWTF Septage Receiving & Solids Process Upgrades Phase 2	$2,930,000	$0		X	0	0%	0	10	10.0	20.00%	$0		$0
64	Winnipesaukee R. Basin Program	CMOM Phase 1 - Belmont Force Main Rehabilitation	$10,612,000	$0		X	0	0%	0	10	10.0	20.00%	$0		$0
65	Winnipesaukee R. Basin Program	Solids Handling Upgrade - Phase 1	$3,536,000	$0			0	0%	0	10	10.0	20.00%	$0		$0
66	Plymouth Village W&S District	Dewatering, Sludge Drying and Trailer Bay Improvements	$6,600,000	$0			0	23%	7	0	6.8	25.00%	$0		$0
67	Hooksett	Pump Stations and Sewer - Contract 1	$7,600,000	$0			0	0%	0	0	0.0	10.00%	$0		$0
68	Newport	Dorr Mills Lagoon Closure	$15,437,600	$0			0	0%	0	0	0.0	20.00%	$0		$0
69	Winnipesaukee R. Basin Program	Bar Screen Debris Management	$865,000	$0		X	0	0%	0	0	0.0	20.00%	$0		$0
			$620,834,865	$75,627,952									$17,823,410		$18,123,410

NOTES:

1. 2024 CWSRF Amount equals the portion of the project that is anticipated to be initiated by January 2027, or as adjusted to not exceed available funds.
   CWSRF Amount and Principal Forgiveness (PF) may be adjusted based on project scope and readiness, and subject to availability of funds.
2. 2024 CWSRF Amount assumes full eligibility.
3. USDA financing award may preclude CWSRF financing due to limited funding availability.
4. Ongoing outreach is performed to obtain project status and offer available funding to those lower on the list when applicable.
5. Higher ranked projects may be bypassed in favor of lower ranked projects to ensure that funds available are utilized in a timely manner and that statutory and capitalization grant requirements are met.
6. All projects proposed for funding will receive allocations from BIL (2024 Supplemental Capitalization Grant).
7. Principal Forgiveness for Energy Audit Measure Implementation (EAMI) may be adjusted based on information provided during the scope approval process.
8. Principal Forgiveness for Planning component shown on Wastewater Planning Project list.
9. Affordability principal forgiveness will not be awarded in addition to the Planning and EAMI incentives.
10. OSG Funding not included in total CWSRF Amount or PF.

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

2024 NHDES CLEAN WATER SRF PRIORITY LIST
WASTEWATER INFRASTRUCTURE PROJECTS

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1	Claremont	WWTF Headworks, Solids Handling and Nutrient Removal Upgrade	$21,310,000	$1,605,000			20	0%	0	30	50.0	20.00%	$321,000		$321,000
2	Milton	Sewer Regionalization	$17,565,000	$1,020,000			30	0%	0	10	40.0	10.00%	$102,000		$102,000
3	Warner Village WD	WWTP Copper Removal Upgades	$20,000,000	$20,000,000			30	0%	0	10	40.0	25.00%	$5,000,000		$5,000,000
4	Rochester	Sewer System Master Plan FY26 Construction Phase	$1,163,000	$1,163,000		X	20	33%	10	10	39.9	20.00%	$232,600		$232,600
5	Exeter	High Street and Cross Country Sewer Upgrades - Phase 1	$3,800,000	$3,800,000			0	33%	10	30	39.9	20.00%	$760,000		$760,000
6	Berlin[10]	Infiltration & Inflow Reduction Phase 2 Contract 3	$800,000	$800,000			20	0%	0	10	30.0	NA	$800,000		$800,000
7	Concord	Heights Sewer Collection Improvements	$18,300,000	$1,200,000			0	0%	0	30	30.0	10.00%	$120,000		$120,000
8	Dover	WWTF Secondary Clarifier No. 3	$4,300,000	$3,600,000			20	0%	0	10	30.0	20.00%	$720,000		$720,000
9	Hopkinton	Webster Septage Lagoon Closure	$4,015,000	$4,015,000			20	0%	0	10	30.0	10.00%	$401,500		$401,500
10	Manchester	Cemetery Brook Drain Tunnel - Construction	$230,000,000	$0			20	0%	0	10	30.0	10.00%	$0		$0
11	Nashua	Class A Biosolids Upgrade and Maintenance Building-Construction	$29,330,000	$0			0	95%	29	0	28.6	10.00%	$0		$0
12	Merrimack	Pennichuck Pump Station Evaluation	$100,000	$50,000	X	X	0	39%	12	10	21.7	10.00%	$5,000		$5,000
13	Greenville	WWTF Improvements - Chemical Feed Building	$600,000	$600,000			20	2%	1	0	21.0	25.00%	$150,000		$150,000
14	Epping	Critical Wastewater Upgrades	$12,000,000	$12,000,000			20	0%	0	0	20.0	20.00%	$2,400,000		$2,400,000
15	Newport	WWTF Upgrade	$4,000,000	$4,000,000			20	0%	0	0	20.0	NA	$4,000,000		$4,000,000
16	New Castle	Sewer Manhole Rehabilitation	$695,000	$695,000		X	0	33%	10	10	19.9	20.00%	$139,000		$139,000
17	Portsmouth	Pease WWTF Rehabilitation	$30,998,000	$3,178,000	X	X	0	27%	8	10	18.0	20.00%	$635,600	$250,000	$885,600
18	Seabrook	WWTF Upgrades Phase 1	$2,510,800	$2,510,800	X	X	0	25%	8	10	17.5	10.00%	$251,080	$50,000	$301,080
19	Wolfeboro	South Main St Sanitary Sewer Improvements	$4,870,000	$0		X	0	21%	6	10	16.2	35.00%	$0		$0
20	Ashland	Infiltration Correction - L.W. Packard Building	$1,000,000	$1,000,000			0	15%	5	10	14.5	10.00%	$100,000		$100,000
21	Newmarket	Pump Station Upgrades	$3,250,000	$0			0	10%	3	10	13.0	20.00%	$0		$0
22	Hooksett	Martins Ferry Pump Station Force Main Replacement	$4,200,000	$4,200,000			0	10%	3	10	13.0	10.00%	$420,000		$420,000
23	Berlin	Devens Street Pump Station Upgrade	$670,000	$0			0	8%	2	10	12.5	20.00%	$0		$0
24	Portsmouth	Mechanic Street Pump Station Replacement	$23,500,000	$1,950,000		X	0	4%	1	10	11.3	20.00%	$390,000		$390,000
25	Somersworth	Main Street Utility Replacement	$5,356,000	$0			0	4%	1	10	11.1	20.00%	$0		$0
26	Plymouth Village W&S District	Pump Station No. 4 Upgrades	$3,285,000	$0			0	3%	1	10	10.9	25.00%	$0		$0
27	Plymouth Village W&S District	Pump Station No. 2 Replacement	$2,560,000	$0			0	3%	1	10	10.8	25.00%	$0		$0
28	Concord	Steeplegate Mall Pump Station Upgrades	$6,640,000	$0	X		0	3%	1	10	10.8	10.00%	$0		$0
29	Derry	WWTF Upgrade	$14,000,000	$0		X	0	2%	1	10	10.6	10.00%	$0		$0
30	Rochester	Airport Drive Sewer Pump Station Upgrade	$2,762,240	$0		X	0	1%	0	10	10.3	20.00%	$0		$0
31	Rochester	Ryan Circle Sewer Pump Station Upgrade	$1,909,943	$0		X	0	1%	0	10	10.3	20.00%	$0		$0
32	Winchester	Biosolids Improvements	$2,685,282	$2,685,282			0	1%	0	10	10.3	20.00%	$537,056		$537,056
33	Gorham	Sludge Dewatering Upgrades	$1,510,000	$1,475,000		X	0	0%	0	10	10.0	20.00%	$295,000		$295,000
34	Boscawen	Sewer Improvements Project 3 & 4	$1,300,000	$1,300,000			0	0%	0	10	10.0	20.00%	$260,000		$260,000
35	Berlin	Watson Street Pump Station Force Main Bypass Assemblies Upgrade	$960,000	$960,000			0	0%	0	10	10.0	20.00%	$192,000		$192,000
36	North Conway WP	Standby Generator Replacement	$865,000	$865,000			0	0%	0	10	10.0	20.00%	$173,000		$173,000
37	Brookside Cooperative	Sewer and Septic System Upgrades	$663,000	$663,000			0	0%	0	10	10.0	0.00%	$0		$0
38	Newmarket	Bay Road Pump Station and Forcemain Improvements	$5,500,000	$540,000		X	0	0%	0	10	10.0	20.00%	$108,000		$108,000
39	Gorham	WWTF Headworks Room Upgrade	$265,200	$232,050		X	0	0%	0	10	10.0	20.00%	$46,410		$46,410

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

2024 NHDES CLEAN WATER SRF PRIORITY LIST
WASTEWATER INFRASTRUCTURE PROJECTS

No.	APPLICANT	PROJECT NAME	TOTAL COST*	2024 CWSRF Amount [1, 2, 3, 4, 5, 6]	EAMI	PLAN	(1) Protection of Water Quality & Public Health	GPR % cost	(2) Green Project Reserve	(3) Aging Infrastructure	RANKING SCORE	PF % Based on Affordability	PF Based on Affordability	PF EAMI[7]	Principal Forgiveness [8, 9]
40	Gorham	Tinker Brook Pump Station Upgrade	$1,142,000	$174,720		X	0	0%	0	10	10.0	20.00%	$34,944		$34,944
41	New Castle	Pump Station Electrical System Upgrades	$146,100	$146,100			0	0%	0	10	10.0	20.00%	$29,220		$29,220
42	Ashland	Thomson Street Sewer Interceptor Replacement	$600,000	$0			0	0%	0	10	10.0	10.00%	$0		$0
43	Dover	Mill Street & Charles Street Pump Stations Consolidation	$6,511,000	$0			0	0%	0	10	10.0	20.00%	$0		$0
44	Dover	Phase C Stark Ave and Downtown Area	$3,400,200	$0			0	0%	0	10	10.0	20.00%	$0		$0
45	Hampton	Sewer Manhole Rehabilitation	$412,000	$0		X	0	0%	0	10	10.0	10.00%	$0		$0
46	Hampton	Moulton Road Sewer and Drainage Improvements	$2,034,000	$0			0	0%	0	10	10.0	10.00%	$0		$0
47	Keene	Martell Court Pump Station Permanent Bypass	$5,175,000	$0			0	0%	0	10	10.0	20.00%	$0		$0
48	Nashua	WWTF Upgrades - Phase 1	$10,027,900	$0			0	0%	0	10	10.0	10.00%	$0		$0
49	New Castle	Force Main Bridge Crossing Replacement	$1,030,000	$0		X	0	0%	0	10	10.0	20.00%	$0		$0
50	Newfields Village W&S District	Lagoon Sludge Removal and Aeration System Replacement	$1,803,000	$0			0	0%	0	10	10.0	10.00%	$0		$0
51	Newington	Disinfection Chemical System Upgrade	$650,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
52	Pittsfield	WWTF Upgrade Study Phase	$2,750,000	$0		X	0	0%	0	10	10.0	25.00%	$0		$0
53	Plymouth Village W&S District	Avery, Pleasant, and Cummings Street Sewer Rehabilitation	$450,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
54	Plymouth Village W&S District	Bayley Ave and Langdon Park Road Sewer Improvements	$360,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
55	Plymouth Village W&S District	Highland Street Cross Country Sewer Replacements	$4,290,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
56	Plymouth Village W&S District	N. Main St (Route 3) Sewer Main Replacement	$1,400,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
57	Plymouth Village W&S District	WWTF Electrical and HVAC Upgrades	$3,310,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
58	Plymouth Village W&S District	Influent Pump Station and Headworks Upgrades	$6,670,000	$0			0	0%	0	10	10.0	25.00%	$0		$0
59	Seabrook	WWTF Upgrades Phase 2	$5,294,600	$0		X	0	0%	0	10	10.0	10.00%	$0		$0
60	Somersworth	WWTF Phase 2 Upgrades	$19,000,000	$0			0	0%	0	10	10.0	20.00%	$0		$0
61	Winnipesaukee R. Basin Program	CMOM Phase 2 - Gilford Forcemains Rehabilitation	$6,800,000	$0		X	0	0%	0	10	10.0	20.00%	$0		$0
62	Winnipesaukee R. Basin Program	Laconia Compound Structural and Pipeline Upgrade	$760,000	$0		X	0	0%	0	10	10.0	20.00%	$0		$0
63	Winnipesaukee R. Basin Program	Franklin WWTF Septage Receiving & Solids Process Upgrades Phase 2	$2,930,000	$0		X	0	0%	0	10	10.0	20.00%	$0		$0
64	Winnipesaukee R. Basin Program	CMOM Phase 1 - Belmont Force Main Rehabilitation	$10,612,000	$0		X	0	0%	0	10	10.0	20.00%	$0		$0
65	Winnipesaukee R. Basin Program	Solids Handling Upgrade - Phase 1	$3,536,000	$0			0	0%	0	10	10.0	20.00%	$0		$0
66	Plymouth Village W&S District	Dewatering, Sludge Drying and Trailer Bay Improvements	$6,600,000	$0			0	23%	7	0	6.8	25.00%	$0		$0
67	Hooksett	Pump Stations and Sewer - Contract 1	$7,600,000	$0			0	0%	0	0	0.0	10.00%	$0		$0
68	Newport	Dorr Mills Lagoon Closure	$15,437,600	$0			0	0%	0	0	0.0	20.00%	$0		$0
69	Winnipesaukee R. Basin Program	Bar Screen Debris Management	$865,000	$0		X	0	0%	0	0	0.0	20.00%	$0		$0
			$620,834,865	$75,627,952									$17,823,410		$18,123,410

NOTES:

1. 2024 CWSRF Amount equals the portion of the project that is anticipated to be initiated by January 2027, or as adjusted to not exceed available funds.
CWSRF Amount and Principal Forgiveness (PF) may be adjusted based on project scope and readiness, and subject to availability of funds.
2. 2024 CWSRF Amount assumes full eligibility.
3. USDA financing award may preclude CWSRF financing due to limited funding availability.
4. Ongoing outreach is performed to obtain project status and offer available funding to those lower on the list when applicable.
5. Higher ranked projects may be bypassed in favor of lower ranked projects to ensure that funds available are utilized in a timely manner and that statutory and capitalization grant requirements are met.
6. All projects proposed for funding will receive allocations from BIL (2024 Supplemental Capitalization Grant).
7. Principal Forgiveness for Energy Audit Measure Implementation (EAMI) may be adjusted based on information provided during the scope approval process.
8. Principal Forgiveness for Planning component shown on Wastewater Planning Project list.
9. Affordability principal forgiveness will not be awarded in addition to the Planning and EAMI incentives.
10. OSG Funding not included in total CWSRF Amount or PF.

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ROBO TURF
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ProParts Direct
(800) 305-9255

Work Order 1515629

Thank you for your business! We do not accept returns on serialized equipment, special orders or electrical parts. Parts that qualify for return maybe returned in 10 days with original receipt and unused in the original packaging.

Bill To	Ship To
Town Of Hooksett,sewer Commssn 1 Egawes Drive Hooksett, NH 03106	

Customer	Contact	Customer Tax Number	Phone	Cell Phone	Transaction	PO Number
29970			(603) 485-4112		Estimate	

Counter Person	Sales Person	Date Printed	Reference	Email Address	Department
Perry Chaloge	Perry Chaloge	07/02/24	1515629	ken.hooksettwastewater@gmail.com	Retail Sales

Model	Line	Description	Ordered	B/O'd	Shipped	List	Net	Amount
LZX801GKA606Q1	EXEW	60" Lazer X Kawi FX801V	1		1	$17,199.99	$13,599.00	$13,599.00

Description	Qty	Net Each	Amount
Factory Freight	1	$0.00	$0.00

Note
Quout good for 30 days

Invoice Total	$13,599.00
Sales Tax	$0.00
Grand Total	$13,599.00

Thank you for your business. You can now shop for parts online at www.propartsdirect.net.

Notes:

Customer acknowledges receipt thereof:

7

SAM Mechanical Services, LLC
1181 Hooksett Road
Hooksett, NH 03106
603-623-2370

Customer: Hooksett Wastewater

Address: 1 Egawes Dr Hooksett, NH 03106

Phone Number: (603)660-8674

Email Address: Ken.hooksettwastewater@gmail.com

Date: July 22, 2024

We propose to furnish labor and materials necessary to:

1) Install mini-split system in pump room
   - 3-ton condenser (06-MUYGS36NA2-U1)
   - 3-ton head (06-MSYGS36NA2-U1)
2) Install mini-split system in bleach room
   - 3-ton Condenser (06-MUYGS36NA2-U1)
   - 3-ton head (06-MSYGS36NA2-U1)
3) Perform proper start up and commissioning of equipment per manufacture specs
4) Provide all qualified labor and miscellaneous material
5) **Included:** 1-year equipment warranty, does not include our labor costs
6) **Excluded:** Pre-existing electrical, venting, piping, structural issues, or electrical upgrades

The above proposed project may involve heavy and bulky items that need to be moved in and out of the home or business along with the potential of cutting, drywall and installing varying mechanical devices (i.e., registers, grills, heating baseboards, ductless split heads, etc.) with respect to this project. With this stated, dents, dings, or scratches to finished surfaces may occur. Minor patching and painting may need to be performed by homeowner/business owner or other with respect to this unknown condition. SAM Mechanical will take precautions including reasonable protection and other such preventative measures but can't guarantee that minor imperfections may occur. This does not include any major mishaps which if in the unlikely event occurred would be completely remedied by SAM Mechanical, who is a fully insured contractor.

To the best of our knowledge, our proposal is in full compliance with current codes, energy codes and other such requirements with respect to municipal and state codes. Due to varying enforcement of certain portions of the code that may require additional componentry or items above and beyond what is quoted herein, additional charges may apply for these items that are not clearly part of the package being proposed above. In these rare instances, the additional code compliance items would undergo a review to include an explanation of any additional pricing that may be needed to satisfy the unexpected code requirements.

All work is to be completed in a workmanlike manner according to standard practices. Any alteration or deviation from the above specifications involving extra costs will be executed only upon written orders and will become an extra charge over and above the estimate. This project is governed by the laws of the State of NH. In the event of non-payment SAM Mechanical has the option to charge interest in the amount of 1.5% per month for balances that are over 30 days. Further in the event of non-payment any expenses incurred by SAM Mechanical to collect these amounts including reasonable attorney's fees shall be paid to SAM Mechanical. In accordance with State law there is a full one-year warranty on all items including labor and materials supplied for this installation except for repairs or parts related to service work and not new installations.

Please Note this quote is valid for 15 days.

Total Price: 26,990.45

Payment Terms: 50% deposit due upon acceptance and 50% upon project completion.

(Payments can be made by cash, check, ACH, or credit card. If payment is made by credit card, an additional 3% fee would be added to the total price.)

Representative Signature: Robert Perry

Accepted by: ______________________ Date: ______________

Please sign above as an acceptance of this agreement or email your approval to the above-mentioned representative.