

Q4 2018 Quarterly Progress Report Niagara Falls Water Board Order on Consent R9-20170906-129

Prepared for submission to:

New York State Department of Environmental Conservation Region 9
270 Michigan Avenue
Buffalo, New York 14203

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January 31, 2019



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Executive Summary

This document is the fourth required quarterly progress report for the Niagara Falls Water Board (NFWB) Order on Consent R9-20170906-129 (Consent Order) as required by Schedule A Item 15 of the Consent Order. This progress report covers the period from October 1, 2018 through December 31, 2018. The next quarterly progress report covering the period January 1, 2019 through March 31, 2019 is due April 30, 2019.

During the past quarter the NFWB has properly operated the wastewater treatment plant (WWTP) and has met all State Pollution Discharge Elimination System (SPDES) permit requirements. Solids processing (settling, thickening, dewatering) during this period has functioned as intended so that the WWTP is not accumulating solids. Primary effluent is clean (minimal suspended solids) which has allowed the WWTP's activated carbon filters to efficiently process the plant's influent flow. This quarter was particularly rainy, and two events of 100 foot weir flow occurred. These two events were the first occurrence of 100 foot weir flow in 2018. Unlike 100 foot weir flow in the past, the primary effluent is relatively clean and free of any dark color. The 100 foot weir flow was passed through the chlorine contact tank prior to discharge. Dewatering throughput during this period has kept up with incoming solids, which has allowed gravity thickener overflow to be substantially free of solids. The WWTP was operated free of any significant odors during the past quarter.

Maintenance activities during the reporting period have been ongoing, and as of the end of the quarter major treatment systems and components are functional. The WWTP is undertaking a number of capital upgrades and improvements that are within the capability of the WWTP's maintenance staff and/or contractors awarded service contracts. In addition to the projects being undertaken by the WWTP's staff and outside contractors, project planning for \$27 million in major capital upgrades is taking place. Requests for proposal (RFPs) for engineering services were received this past quarter and have been reviewed. Decisions to award engineering design phase services have been made, and contracts are expected to be in place in Q1 2019.

The NFWB has met all scheduled requirements of the Consent Order as identified in Schedule A. Specific submissions due during the past quarter have been submitted to the NYSDEC in accordance with the schedule identified in the Consent Order. Specific submissions and/or milestones achieved include:

- The third quarterly report for the third quarter of 2018 (Q3 2018) was submitted October 31, 2018 to the NYSDEC and posted on the NFWB's website.
- An amended Schedule A of the Consent Order was signed by the NFWB and the NYSDEC dated November 20, 2018. The amended Schedule A replaces the prior Schedule A.

The NFWB is committed to working cooperatively and openly with the NYSDEC to improve the Niagara Falls WWTP and operate it to the best of its capability. To that end, we have had an open dialogue with the NYSDEC through numerous meetings and discussions. Project status update meetings and discussions have been held between the NFWB and the NYSDEC on the following dates:

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- November 2, 2018 - the NYSDEC visited the WWTP during a wet weather event to observe plant operations.
- November 28, 2018 - a Consent Order update meeting including a tour of the biological treatability studies was conducted. The meeting was attended by NFWB and NYSDEC along with various consultant team members from AECOM, Baron and Associates, Clark Patterson Lee, and GHD. Rupp-Baase issued meeting notes.
- December 18, 2018 AECOM attended a meeting at the NYSDEC to discuss the previously submitted work plan for Consent Order Items 6, 7, 10 and the Engineering Report submitted for Consent Order Item 9.
- A number of written communications regarding maintenance work in Sedimentation Basin 5 occurred this past quarter.
- A number of email communications regarding the LaSalle Consent Order and Consent Order Item 11 b, including scheduling of meetings to be held in Q1 2019; occurred this past quarter.

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1. WWTP Performance

This section discusses the operation of the NFWB WWTP during the reporting period of October 1, 2018 through December 31, 2018. In the following sections Treatment Plant Operations, Solids Removal Performance, and Treatment Plant Equipment Readiness are discussed.

1.1 Treatment Plant Operations

Mr. Robert Dunn serves as the Chief Operator of the wastewater treatment plant. Until such time as Mr. Dunn achieves the necessary operator's license, Mr. Kenneth Moving (New York State 4A licensed Operator 7598) is serving as the licensed plant operator. Mr. Moving spends at least 4 hours per day on average at the facility on a Monday through Friday basis and assists Mr. Dunn with his duties. During the past quarter a vacancy was created in the operations staff due to the resignation of one (1) operations staff. In addition, one shift operations supervisor (SOS) was injured in a car accident that resulted in being out of work for a portion of Q4 2018. As a result, plant staffing this past quarter has at times been short staffed, and/or required overtime to fill vacant shifts. The NFWB is in the process of interviewing to fill the vacant operator position, and the injured SOS returned to work on November 19, 2018.

The four (4) SOS's and the Chief Operator continue to be provided with individual training by Mr. Tim Lockhart (NYS Class 4A License Number 7816). The plant's operations capabilities continue to improve. During the reporting period there have not been any SPDES permit excursions. This makes a consecutive 12 month period (calendar year 2018) with no SPDES permit excursions. Solids processing has kept up with the incoming solids, and equipment maintenance and repair activities have been conducted in a prompt and efficient manner.

During the past quarter the WWTP has begun the transition from "summer mode" to "winter mode". Wastewater temperatures entering the carbon filters have been dropping and sulfide concentrations exiting the filter have dropped from 20 plus mg/l to approximately 5 mg/l or less by the end of the year. With the drop in sulfide generation the sodium hypochlorite demand of the plant effluent has also dropped. Due to limitations in sodium hypochlorite pump capacity (as discussed below) the plant has struggled this past quarter to provide both effluent disinfection and consistent dosing of sodium hypochlorite during carbon filter backwashing. As a result sodium hypochlorite addition to filter backwashing has not been consistent. New (smaller) sodium hypochlorite pumps have been ordered and are expected soon. The smaller pumps are necessary to provide effluent disinfection, while the pumps currently used for effluent disinfection can be put to service for carbon filter backwashing. Once the new pumps are received, the plant should be able to consistently disinfect the effluent while consistently adding sodium hypochlorite to the carbon filter backwash water. The new effluent disinfection pumps should be on site in Q1 2019.

During the past quarter Sedimentation Basin 5 was successfully taken off line, dewatered, and repairs were performed. The basin was off-line from October 5, 2018 through October 9, 2018. This

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represents the third successful draining undertaken in Sedimentation Basin 5, without incident, since the signing of the Consent Order. While the basin was out of service, the cause of the sludge screw failure was determined to be a broken drive chain, and the chain was replaced using on-hand spare parts. Increased spare parts inventory established during the past year enabled a quick repair to be performed so the basin could be returned to service. All work in Sedimentation Basin 5 was performed successfully with NYSDEC concurrence and permission. The plant functioned successfully throughout the draining, cleaning, and repair of the basin without any adverse effects and without any detriment to the facility's effluent discharge.

Other operational improvements implemented during the past quarter include:

- A worksheet to record sludge judge readings of the sedimentation tanks was developed for use by the operations staff. Weekly sludge judge monitoring continues to be performed to monitor for any buildup of solids in the sedimentation tanks and gravity thickeners.
- Carbon measurement sticks were calibrated and used to measure GAC levels in all filters, and to identify filters in need of carbon addition. Two filters have been identified for "topping off".
- Operations staff successfully transferred spent carbon from Carbon Filters 22 and 25, and refilled the filters with new carbon. The spent carbon was disposed of off-site. This represents the first two carbon filters that have had their carbon changed in 2018.
- Spent odor control GAC accumulated during the past several years has been tested and a waste disposal profile was approved by Modern Landfill. It was determined that lime treatment similar to dewatered sludge is required to render the spent carbon pH within an acceptable range. The spent odor control carbon was then processed through the plant's dewatered sludge pugmill (with lime addition) for disposal with the WWTP's dewatered sludge. Approximately 3,200 pounds (4 carbon changes) of carbon was disposed of.
- The Main Pump Wet Wells (East and West) were cleaned. The NFWB has adopted an annual cleaning schedule for the wet wells to remove accumulated grit and floating material.
- Sodium Hypochlorite Tank 216 was emptied to enable an internal inspection to be performed. It was determined that there were several items internal to the tank that required repair (fill pipe, fill pipe standoffs, and fill pipe wear plate). The damaged items were determined to be the source of fiberglass materials that were recovered from the Tank 216 pumps. Other debris in the tank is likely resulting from the chemical supplier. The tank inspector allowed the tank to be returned to service while the repairs are arranged for. The tank was out of service from November 1 through November 8, 2018. Strainers will be installed in the future to prevent debris from clogging or damaging pumps and pipes.
- On October 16, 2018 flow to the chlorine contact tank was stopped and the calibration of the effluent flow meter was checked. The meter output signal to the plant SCADA system was also checked. All testing showed that the effluent flow meter is accurate and does accurately measure the amount of water being discharged by the WWTP. Three (3)

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subsequent spot checks of the flow meter reading (compared to manually measured head values used to calculate flow over a 30' rectangular weir with end contractions) also showed the meter to be accurate. As a result, following discussions with the NYSDEC, the WWTP has resumed use of the effluent flow meter readings on daily reports.

- As will be discussed in the Maintenance section, the west plant sewer valve has been replaced. The leaky valve was resulting in plant sewer flows containing gravity thickener overflow and scum pit sump pump discharge, contaminating the influent sample and raising the influent sample TSS. As of December 9, 2018 influent TSS samples should be more representative of actual plant influent flows. It is also expected that this repair will help improve the accuracy of the plant solids balance.

1.2 Solids Removal Performance

A solids balance for October, November, and December 2018 is presented in Table 1. As a result of using the "GPS + Main Pump" as the influent flow during the period September 20, 2018 through November 18, 2018, and elevated influent TSS due to the impact of the plant sewer; the solids balance shows that less than 100 percent of incoming solids was sent to the landfill for all three months of the past quarter. However December 2018 solids data (93%) is approaching the desired 100 percent. We believe that the impact of the plant sewer on influent TSS sample data is very significant and after being corrected on December 9, 2018, the impact of the plant sewer on influent TSS appears to have been reduced, as indicated by lower, more typical influent TSS data in December versus prior months.

In spite of the calculations above, based upon plant observation and sludge judge testing of the sedimentation basins, wastewater solids are not being retained in the treatment plant and the majority of solids present in the influent are being captured and disposed of in the landfill. During 2018, the average TSS removal for the WWTP was 92.3%. Following improvements to the effluent sampling facilities made in 2018 (completed in June 2018) the effluent sampling station is believed to be capturing a representative effluent sample.

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Table 1
NFWB WWTP Solids Balance

Month & Year	Average Daily Flow	Average Influent TSS	Average Effluent TSS	TSS Removed (Dry)	Ferric Chloride Added to Wastewater (Dry)	Lime Added to Sludge (Dry)	Total Solids (Dry) (TSS + Lime + Ferric)	Solids Content of Landfilled Sludge	Total Solids (Wet)	Solids Landfilled (DRY)	% Landfilled
	mgd	mg/l	mg/l	Tons/day	Tons/day	Tons/day	Tons/day	%	Tons/day	Tons/day	%
Oct-18	28.5	252	11.5	28.50	1.44	1.78	31.72	25%	82.60	20.65	65%
Nov-18	31.8	164	15.8	19.60	1.43	2.1	23.13	25%	92.50	17.13	74%
Dec-18	27.3	187	11.6	19.91	1.38	1.43	22.72	25%	90.88	21.16	93%

NOTES: mgd million gallons per day
TSS Total Suspended Solids

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1.3 Treatment Plant Equipment Readiness

During the reporting period there were several treatment plant equipment breakdowns that required maintenance staff to repair or replace the equipment. The frequency and severity of equipment breakdown is diminishing, and a number of the repairs have been proactively performed. Significant equipment repairs this past quarter have included:

- All sedimentation basin inlet gates (15 total) have been replaced with fabricated aluminum gates. The prior steel gates were rusted and in poor condition.
- Sedimentation Basin #1 sludge pump had its volute replaced.
- Sedimentation Basin #2 traveling bridge electrical power cable was replaced.
- Repairs to the grit screw in Sedimentation Basin #2 including replacement of the drive chain, tensioner, center block, center bearing, and hardware; were performed.
- Sedimentation Basin #4 traveling bridge had a drive shaft and bearing replaced.
- New scum skimmer attachment brackets were installed on Sedimentation Basins 2 and 3. The brackets are an improvement from the original design, which were prone to break due to a weak point inherent in the bracket design. Ten scum skimmer attachment brackets have been fabricated and delivered to the WWTP, with the intent to replace the remaining original brackets the next time the tank is out-of-service and empty. In the meantime the remaining original brackets continue to be used.
- Belt filter press #1 had its top belt replaced due to a rip. Rubber gaskets on BFP#1 and #3 thickening trays were replaced. All these parts were on-hand as part of the WWTP's improved spare parts inventory.
- The sludge conveyor belt from Belt Filter Presses #1 and #2 had one roller replaced. More extensive repairs will be performed at a later date when additional replacement rollers are obtained. In the meantime the conveyor continues to be used as it is.
- A spare grit screw was received on-site for future use in any of the sedimentation basins. Prior to this there was no spare grit screw available.
- The MCC bucket of the north gravity thickener rake arm was rebuilt including cleaning internal components and terminal blocks, along with replacement of all internal wiring. This should reduce the number of occurrences of the MCC bucket tripping.
- Inspections and repairs to the Gorge Pumping Station hydropneumatic tank were undertaken this past quarter. As a result of the evaluations it has been determined that the tank isolation valve is inoperable and internal planning is underway to replace the valve and perform additional repairs to the level control system.
- In preparation for replacing the Gorge Pump Station Hydropneumatic Tank isolation valve, all bolts in the valve and connecting fittings have been removed and replaced with new

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bolts. This pre-work will enable the valve replacement to be performed quicker, thereby minimizing the GPS down time.

- The air compressor at the GPS pump station serving the hydropneumatic tank has been replaced. At this time the Warrick level controls are inoperable, and the tank is being controlled solely by air pressure. Once the inlet valve is replaced allowing tank isolation, additional repairs to the control system are planned.
- The roadway to the chlorine contact tank has been graded and topped with millings.
- New bearings in the both dewatered sludge pug mills were installed at the non-drive end. The prior bearings provided less than one (1) year of service, therefore a different bearing utilizing a sealed design was used this time. In addition, a rubber seal was installed in front of the bearing to try and minimize the amount of sludge in contact with the bearing. Improved bearing life is anticipated.
- Main pump VFD #2 was determined to be defective and was removed and shipped to the manufacturer for repairs. The VFD was received back in 6 days and reinstalled immediately upon receipt.
- Main Pump #4 had its coupler repaired.
- The plant sewer valve in the west Main Pump Wet Well was replaced. The leaky valve was allowing plant sewer return flows to flow to both Main Pump Wet Wells and was biasing the influent TSS sample upward. To perform the work it was necessary to clean and drain the wet well and install/remove scaffolding to access the valve.
- On November 7, 2018 an inspection of Drop Shaft Zero (DSZ) was conducted to check the calibration of the Falls Street Tunnel (FST) flow measurement flume and to inspect the structure. Calibration issues were discovered in the flow measurement system in addition to a possible leak in the air line for the flow measurement bubbler system. A correction multiplier was applied to the FST overflow volume calculation on November 13, 2018. All overflow volume calculations after that date reflect the adjustment. This information was reported to the NYSDEC at the November 28, 2018 Consent Order status meeting.
- Work is underway to repair overhead garage doors and electric openers in the sludge and grit building to allow doors to be readily opened and closed to facilitate sludge and grit removal operations. The work is ongoing as of the end of Q4 2018.
- Valve actuators on carbon filters 7 and 8 were repaired. As a result all 28 filters are available for use.
- In past winters snow accumulation in the path of the traveling bridges has resulted in trips of the traveling bridges' end-of-travel limit switches. Snow accumulation necessitates the operator having to shovel the sedimentation basins and reset the limit switches. In anticipation of winter snow, plant maintenance staff designed, fabricated, and installed "snow plow blades" that were installed on each end of the traveling bridge to "plow" snow

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from the path of the limit switches. Hopefully these devices will prevent the traveling bridges' limit switches from tripping as a result of snow buildup. There has not been any significant snowfall since the plows were installed so they remain untested as of the end of 2018.

- Two (2) power "trip" shutdowns at the Gorge Pumping Station occurred in December 2018. As of the end of the year the situation is being evaluated by in-house and external maintenance and consulting personnel. The power interruption results in a brief overflow until the pumps restart. All overflow events have been reported to the NYSDEC.

Although these repairs may have kept equipment out of service for brief periods of time during the past quarter, it has not adversely affected the plant performance. In general a sufficient number of sedimentation basins with fully functional sludge removal equipment have been available to treat all incoming flows. Additionally, sufficient belt filter presses have been available for dewatering such that solids accumulation in the treatment plant has not occurred. As of the close of the fourth quarter of 2018, the following can be said regarding treatment equipment operability:

- Four (4) Main Pumps are operational.
- Three (3) Intermediate Pumps (#2, #3, and #4) are operational. The #1 intermediate pump is inoperable and the pump is unable to be isolated due to an inoperable valve. A plan to assess this pump will be developed in the near future. NOTE – The WWTP has excess pump capacity in its Intermediate Pumping Station, and therefore immediate repairs to this pump are not critical.
- Sedimentation Basins 1 through 4 are fully functional and available for service.
During the past quarter, two (2) sedimentation basins have been used for flows up to 40 mgd, three (3) basins used for flows between 40 mgd and 60 mgd, and four (4) basins for flows over 60 mgd. When backwashing to the head of plant (i.e. when Sedimentation Basin 5 was out of service) , these flows are somewhat reduced (3 basins put online at 35 mgd, 4 basins at 55 mgd) or as needed to allow the filters to be backwashed without the potential for 100 foot weir overflow.
- Twenty eight (28) activated carbon filters are functional.
- The filter backwash system is functional including two backwash pumps and one new air scour blower/piping system.
- Three (3) belt filter presses are fully functional and capable of operating simultaneously, along with four (4) thickened sludge pumps, and three (3) polymer feed pumps (with spare polymer pump on the shelf).
- Two (2) pugmills, two (2) lime feed systems, and two (2) lime storage silos are fully functional.

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2. Deliverables and Routine Communications

This section presents a listing and discussion of deliverables prepared by the NFWB for submission to the NYSDEC. In addition, other related written communications between the NYSDEC and the NFWB are also discussed.

2.1 Deliverables Status

Figure 1 presents a Microsoft Project schedule showing the status of all eighteen (18) items listed in the recently revised Schedule A of the Consent Order. The due date and the percent complete for each item is also listed in Figure 1. In the past quarter the items listed in Table 2 were submitted to the NYSDEC to meet the Consent Order Schedule A requirements.

2.1.1 Pilot Scale Biological Treatment Systems

During this past quarter two pilot scale biological treatment systems were delivered, installed, started up, and begun operation. The two systems are:

- **Membrane BioReactor (MBR)** – Suez (formerly Zenon) 10 square foot pilot scale membrane biological reactor system complete with aerobic and anoxic biological treatment tanks.
- **Moving Bed BioReactor (MBBR)** – World Water Works moving bed bioreactor pilot plant with two aerobic vessels in series followed by a clarifier. The MBBR uses a dumped (loose) plastic media to support fixed film operation. The media fills approximately 1/3rd of the reactor volume, so there is also a suspended growth biomass component present.

The MBR system was started up on November 7, 2018 using seed sludge from the Buffalo Sewer Authority return activated sludge. The MBBR system was started on November 15, 2018 using a fresh seed sludge from the Buffalo Sewer Authority return activated sludge. The NYSDEC toured the pilot systems on November 28, 2018. The systems are being operated by AECOM on a 7-day per week basis including collection of influent, effluent, and in-process samples. Process flow diagrams for the two systems are provided in Figure 2.

2.2 Deliverables Discussion

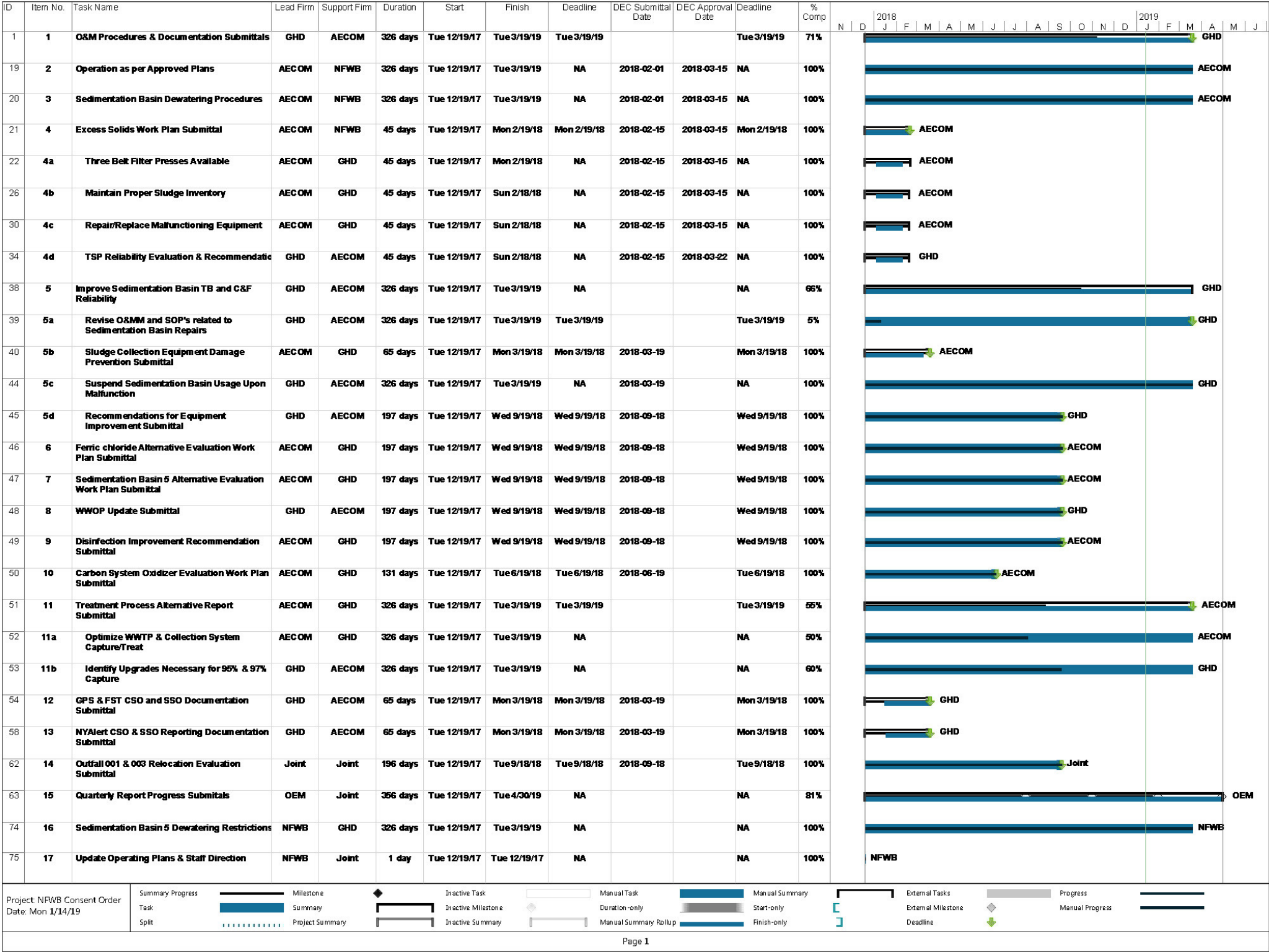
In addition to the above submittals prepared and submitted this past quarter, work is well underway on the following Consent order deliverables:

- Consent Order Item 1
- Consent Order Item 11

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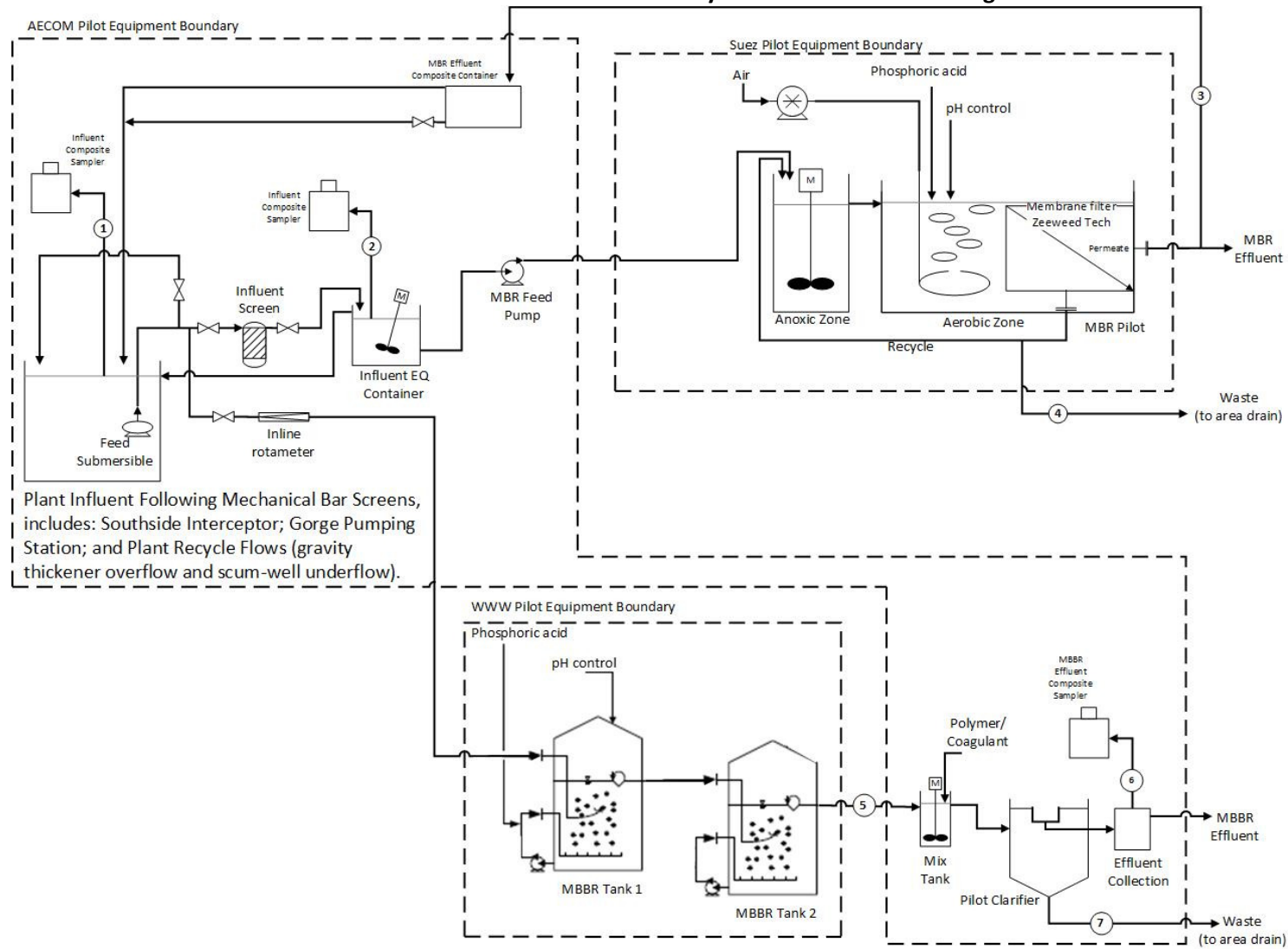
Figure 1
Consent Order Schedule Milestone Status



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Figure 2
Pilot Scale Treatability Studies Process Flow Diagram



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2.3 Deliverables in Next Quarter

During the first quarter of 2019 (January 1, 2019 through March 31, 2019) there are two submittals (per Schedule A of the Consent Order) due to the NYSDEC. They include:

- Consent Order Item 1 (due March 19, 2019)
- Consent Order Item 11 (due March 19, 2019)

Note that during discussions with the NYSDEC during Q4 2018, the NFWB has requested an extension of the long term treatment plant evaluation required under Consent Order Item 11. The reason for the extension request is the late start of the treatability study that did not allow for warm weather operating conditions to be tested. AECOM would like to continue the study to include warm weather operation. Based upon discussions to date, the NYSDEC appears agreeable to this request, but would still like the wet weather capture portion of the Item 11 evaluation to be completed and submitted by the March 19, 2019 deadline. A definitive agreement regarding this schedule extension request is expected to be reached in Q1 2019.

2.4 Routine Communications in Past Quarter

During the past quarter the correspondence items listed in Table 3 were submitted to the NYSDEC by the NFWB. The written communications listed below in Table 4 were received from the NYSDEC during the reporting period.

2.5 Unresolved Issues/Delays

To avoid project delays, the NFWB requests the following assistance or information from the NYSDEC:

- Response to the NFWB's request to extend the schedule for Consent Order Item 11 pertaining to the long term conversion of the WWTP (exclusive of Item 11b).

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Table 2
NFWB Submissions to NYSDEC per Schedule A of the Consent Order

Date	Prepared By	Consent Order Schedule A Items	Comment
October 31, 2018	AECOM	Item 15	Q3 2018 Progress Report

Table 3
NFWB Communications to NYSDEC

Date	Prepared By	Purpose
October 3, 2018	Rupp Baase	Letter with NFWB comments on draft NFWB SPDES permit (addressing BHC issue).
October 5, 2018	Rupp Baase	Letter requesting permission to take Sedimentation Basin 5 out of service to facilitate repairs. During such time filter backwash water will be directed to the head of the plant.
October 9, 2018	AECOM	Email informing the NYSDEC that Sedimentation Basin 5 is back in service.
December 3, 2018	Rupp Baase	Letter summarizing November 28, 2018 progress meeting.
December 5, 2018	Rupp Baase	NFWB PowerPoint orientation slide show was provided to the NYSDEC at the NYSDEC's request.
December 14, 2018	Rupp Baase	Email requesting meeting dates to discuss LaSalle SSO issue

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Table 4
Communications Received from NYSDEC

Date	Delivered To	Purpose
October 5, 2018	Rupp Baase	Letter approving request to dewater Sedimentation Basin 5.
November 2, 2018	NFWB	Letter with draft SPDES permit addressing BHC issues.
November 5, 2018	NFWB	Notice of award of \$20 million grant for capital upgrades to be administered by DASNY.
December 3, 2018	Rupp Baase	NYSDEC comments on Rupp Baase meeting minutes from 11/28/18 progress meeting.
December 14, 2018	Rupp Baase	Telephone call regarding potential upcoming SPDES permit modifications.
December 14, 2018	AECOM	Request for meeting to discuss CO Items 6, 7, 10 work plan and Consent Order Item 9 Engineering Report.
December 20, 2018	Rupp Baase	Email to schedule meeting to discuss LaSalle Consent Order for 1/4/19.
December 21, 2018	Rupp Baase	Email to schedule meeting to discuss Consent Order Item 11b for 1/16/19.
December 27, 2018	Rupp Baase	Email to confirm meeting dates for 1/4/19 and 1/16/19.

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3. Capital Improvement Program

In this section, progress on WWTP capital upgrades is discussed. Capital upgrades are proceeding on several fronts. Projects that are within the capability of in-house maintenance staff are being undertaken as quickly as possible. Additionally, outside contractors selected for WWTP work (Mechanical Contractor – Mollenberg Betz, Electrical Contractor – Ferguson Electric) are being utilized for larger projects. Lastly, planning is underway to perform a number of capital upgrades that are necessary to stabilize the operation of the existing treatment plant. Each of these items are discussed in this section.

3.1 In-House Capital Upgrades Completed/Underway

This category of projects includes work being undertaken by plant maintenance staff or outside contractors without the need for extensive design and engineering documents. This work is generally considered repair and/or replace in kind and therefore NYSDEC approval is not generally required prior to performing the work. During the past quarter, the following projects are proceeding and/or were completed:

- **12" Pipe to Head-Of-Plant (HOP)** - A 12" diameter pipeline to convey flows from the Sedimentation Basin 5 submersible pump to the head of plant via the plant sewer manhole located just west of the Scum Building, has been completed and placed into service as of November 13, 2018. The flow in the plant sewer is returned to the Main Plant Wet Well (i.e. "head-of-plant"). The pipe is not capable of conveying the full capacity of the submersible pump due to the 8" buried gravity sewer from the Scum Building to the Plant Sewer manhole serving as a bottleneck. It is estimated that 1,000 gpm are being directed to the head of plant and the remainder of the flow (estimated at 1,500 gpm) continue to be directed to the chlorine contact tank. The NFWB is evaluating options to convey additional flow to the plant sewer via a path that bypasses the 8" buried gravity sewer.
- **Sedimentation Basin 2, 3, 4, and 5 Traveling Bridge Work** - Replacement of all underwater components of the traveling bridge for Sedimentation Basin 2 has been performed in Q4 2018. Fabrication was performed by Mollenberg Betz under the contract maintenance services contract and was installed by NFWB forces. All four (4) traveling bridges that remain in service (Sedimentation Basins 2, 3, 4, and 5) have now had this work performed.
- **Ferric Chloride Feed Pumps** - Work is well underway on the installation of two (2) new ferric chloride feed pumps that will replace the existing ferric chloride feed pumps. The new pumps will be VFD controlled and will eventually be flow paced to allow variable chemical feed addition in response to changes in the plant influent flow. The pumps have been ordered, received and partially installed. Piping and electrical installation work is underway, with completion expected in Q1 2019.
- **Effluent Disinfection** - Replacement effluent disinfection pumps (2) to pump sodium hypochlorite were ordered to replace the existing sodium hypochlorite pumps. These

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pumps were received during Q4 2018 but were not the correct pumps, requiring a different (smaller capacity) pump to be ordered and installed. The new pump is expected in Q1 2019. This pump will be used to deliver sodium hypochlorite during low chlorine demand periods, whereas the larger pumps that were just received will be used in the future, during high chlorine demand periods. In the meantime double baskets strainers have been installed in the suction piping between the storage tank and the pumps to remove any debris that may harm or plug the pump. The strainers were determined to be necessary because of the recent discovery of debris in the pumps and piping that is believed to either be coming from the tank (Tank 216) and/or the supplier.

- **Primary Effluent Disinfection** - Work is underway to enable delivery of sodium hypochlorite to the primary effluent channel (at the Scum Building) so that filter influent can be chlorinated, as a means of reducing sulfide generation. Existing sodium hypochlorite pipelines that can be used (partially) for this purpose have been identified and have been pressure tested and were determined to hold pressure. Additional piping that is necessary to connect the two existing pipeline segments, and piping and diffuser in the Scum Building has been installed. Because all of the existing sodium hypochlorite pumps are too large for this service, a new sodium hypochlorite feed pump has been ordered and delivery is expected in Q1 2019. This work is part of Consent Order Item 10. Additionally a CL17 total residual chlorine analyzer was purchased and installed along with a dedicated sample pump to feed sample to the analyzer. The CL17 will be used to monitor and maintain a constant TRC in the filter influent. At this time, the only remaining item to be installed as part of this system is the sodium hypochlorite pump. Once the pump is received we will immediately install the pump and begin chlorinating the filter influent.
- **Check Valves and Pressure Gauges in Sludge Pump Gallery** - NFWB Maintenance staff are replacing check valves in the pump gallery on all 15 sludge and grit pumps. The work includes check valve replacement along with installation of a pressure gauge (discharge pressure) in an isolation diaphragm/ring. The existing check valves are original (40 years old) and were in need of replacement. The pressure gauge will improve plant operations and maintenance capabilities.
- **18" Diameter Pipe at Sedimentation Basin 5** - Mollenberg Betz was approved to replace an 18" diameter pipe that delivers carbon bed backwash to the furthest east window in Sedimentation Basin 5. The pipe is severely deteriorated with rust and in the event it failed, it would flood the Sludge Pump Gallery. The work is slated to occur in Q1 2019.

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3.2 Capital Improvement Projects

Longer term capital projects that are necessary to stabilize the operation of the treatment plant have been identified and are listed in Table 5. The capital projects are all necessary assuming the plant technology will remain as it is for the next several years. The total value of the capital projects identified is \$27 million dollars. These projects have been incorporated into the NFWB's 5-year capital improvement program (CIP). It should be noted that the projects listed in Table 5 are consistent with Engineering Report developed by GHD and was used in support of the NFWB's funding/grant applications. Table 5 is derived from Table 4-1 of Engineering Report titled Engineering Report – Wastewater Treatment Plant and Gorge Pumping Station Rehabilitation, GHD, July 2018.

The projects listed in Table 5 are necessary to stabilize and optimize the operation of the existing WWTP. Many of the projects address equipment that is near the end of its useful life and would be necessary regardless of future technology changes at the WWTP. The projects listed in Table 5 do not include any efforts to relocate the plant outfall or to change the treatment technology at the WWTP. The NFWB believes that decisions about whether to proceed in these directions will not be made until the required studies specified in Schedule A of the Consent Order are complete (Consent Order Items 6, 7, 10, and 11).

Engineering Requests for Proposal (RFPs) were reviewed by the NFWB and award announcements were made on November 15, 2018 for seven of the nine (9) projects listed in Table 5 (1, 2, 3, 4, 5, 7, and 9). Contract execution and notice to proceed is expected to occur in Q1 2019. The NFWB will be moving ahead with the effluent disinfection project that was part of Project 6, once approval from the NYSDEC is obtained.

3.3 Grant Application Status

In November 2018, the State of New York provided formal notification that \$20 million in grants would be provided to the Water Board. The grants will be issued under the State and Municipal (SAM) facilities program in two phases. Phase 1 grant will be in amount of \$13.5 million and Phase 2 grant will be in amount of \$6.5 million for a combined total of \$20 million. The Phase 1 grant will cover fifty percent of the \$27 million improvements currently proposed. A loan from the New York State Clean Water State Revolving Fund (CWSRF) has been applied for to assist with remaining fifty percent or \$13.5 million.

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Table 5
Planned Capital Upgrades

Project Group	Alternative	Description	Cost
1	2B	Primary Scum Removal and Treatment Improvements – Restore Scum Pumping and Install Fine Screen	\$1,020,000
	4C	Sedimentation Basin Improvements – Replacement of Traveling Bridges with Chain and Flight Equipment	\$8,680,000
	10C	Sedimentation Basin Isolation Plate Replacement – Replacement of Both Isolation Plate Guides	\$140,000
	19C	Sedimentation Basin No. 5 Effluent Management Improvements - Submersible Pumping System Upgrades	\$550,000
2	7C	Gorge Pumping Station Rehabilitation – Comprehensive Gorge Pumping Station Rehabilitation	\$4,110,000
3	3B	Screenings and Grit Transport Equipment Improvements - Replacement in Kind	\$560,000
	5C	Polymer Equipment Upgrades – Replacement and Upgrade of Polymer Equipment	\$820,000
	14C	Dewatering Equipment Control Upgrades – Comprehensive Dewatering System Control Upgrades	\$740,000
4	8B	Granular Activated Carbon Replacement – Replacement with Recycled Reactivated Carbon	\$1,500,000
	9B	Carbon Filter Support Gravel Replacement – Replacement of Support Gravel	\$500,000
5	1B	Electrical System Improvements - Complete Critical Repairs	\$2,360,000
	17B	Lighting Improvements – Needs Assessment and Lighting Improvements	\$250,000
6	6B	Disinfectant Dosage and Location Optimization – Optimize Sodium Hypochlorite Dosage and Location	\$650,000
	11B	Chemical Coagulant Optimization - Alternate Coagulant	\$1,500,000
	12B	Minimization of Sulfide Formation - Oxidant Addition	\$1,500,000
7	13B	Heating and Ventilation Improvements – Replacement of Critical Heating and Ventilation Equipment	\$1,160,000
8	15B	Backwash Blower Equipment Improvements – Replacement of Blower Equipment	\$300,000
9	16C	Thickened Sludge Building Waterline Replacement – Replacement of Plant Waterline and Process Waterline	\$140,000
	18B	Interior Process Piping Replacement – Needs Assessment and Piping Improvements	\$500,000
Total Project Cost (Rounded)			\$27,000,000

