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Q4 2019 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

Prepared by:
AECOM
257 West Genesee Street, Suite 400
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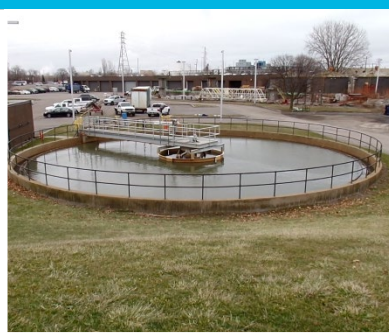
January 31, 2020



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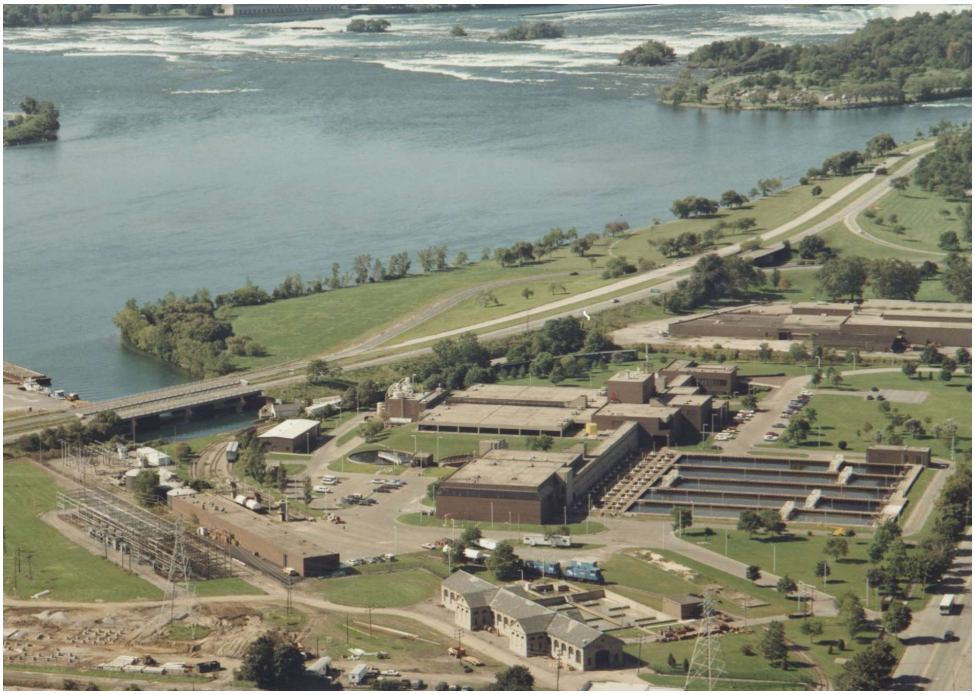

NIAGARA FALLS WATER BOARD

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Executive Summary

This document is the eighth (8th) 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, 2019 through December 31, 2019. The next quarterly progress report covering the period January 1, 2020 through March 31, 2020 is due April 30, 2020.

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[1]. Solids processing (settling, thickening, dewatering) during this period has functioned as intended. 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 the plant transitioned slowly to winter mode, with wastewater temperatures dropping from 70°F to 52°F by the end of the year. With the decreased temperature, sulfide levels exiting the carbon filters have dropped to the 3 to 5 mg/l range. Dewatering throughput during this period has mostly kept up with incoming solids, although October and November did witness a drop off in the sludge throughput compared to influent solids loadings. The WWTP was operated free of 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 and design for $27 million in major capital upgrades are taking place. Contracts are in place for eight (8) of the nine (9) capital projects (Projects 1, 2, 3, 4, 5, 6, 7 and 9) and one (1) of the capital projects has been completed by plant maintenance staff with assistance from an outside contractor under the mechanical services contract (Project 8).

The NFWB has met all scheduled requirements of the Consent Order as identified in Schedule A of the Consent Order. Specific submissions during the past quarter include:

- The seventh (7th) quarterly report for the third quarter of 2019 (Q3 2019) was submitted October 31, 2019 to the New York State Department of Environmental Conservation (NYSDEC) and posted on the NFWB's website (Consent Order Item 15).
- The draft alternative treatment plant evaluation report (Consent Order Item 11) was submitted October 31, 2019 to the NYSDEC and constitutes the last major deliverable identified in the Consent Order. The NYSDEC indicated they had no comments on the draft report and authorized the submission of the final report, which was submitted to the NYSDEC on December 19, 2019.

[1] A non-compliance report was submitted for October 2019, but it will be amended to state that there was a calibration issue with the pH probe, such that the non-compliance did not actually occur.

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. During the past quarter, several email and written communications took place regarding plant operations and consent order activities. Two update meetings were held this past quarter with the NYSDEC on October 9, 2019 and on December 16, 2019.

January 31, 2020

1. WWTP Performance

This section discusses the operation of the NFWB WWTP during the reporting period of October 1, 2019 through December 30, 2019. 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 Maving (New York State 4A licensed Operator 7598) is serving as the licensed plant operator. Mr. Maving 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.

The four (4) SOSs and the Chief Operator continue to be provided with individual training by Mr. Tim Lockhart (NYS Class 4A License Number 7816). During the reporting period there was a reported SPDES permit excursion related to effluent pH on October 31, 2019. However, the NFWB determined that the excursion did not occur but was the result of an improperly calibrated pH probe. The NFWB intends to submit an amended Discharge Monitoring Report (DMR) thereby rescinding the SPDES permit excursion. In the absence of this excursion, this marks a consecutive 24-month period with no SPDES permit excursions. Solids processing has generally kept up with the incoming solids, and equipment maintenance and repair activities have been conducted as promptly as possible.

During the past quarter, the WWTP has slowly transitioned from summer to winter mode. By the end of the year the influent temperature had dropped to 52^{o}F and sulfide concentrations finally began dropping. The sodium hypochlorite demand of the plant effluent has remained high throughout much of the past quarter. Adding to the sodium hypochlorite use for effluent disinfection is the continuing practice of chlorinating the plant's primary effluent (carbon filter influent) and dosing all filter backwashes with sodium hypochlorite. The practices of chlorinating the primary effluent and backwashing with sodium hypochlorite has kept sulfide levels exiting the filters in the 5 to 10 mg/l range compared to historical levels that were typically reported as "greater than 20 mg/l" exiting the filters. With sulfide levels in the 5 to 10 mg/l range, the effluent throughout the fourth quarter had its characteristic cloudy white/grey/green appearance. Only within the last several weeks of December 2019 did effluent turbidity decease significantly as sulfide levels dropped below 5 mg/l.

As a result of the sodium hypochlorite use, filter run times throughout the summer have remained very lengthy (4 to 8 hours is not uncommon) and has resulted in a significant reduction in the number of required filter backwashes per day. As a result of the Consent Order Item 6, 7, 10 testing and implementation, the following operational changes have been made to the carbon filters:

- Each filter is operated once per day. Influent total residual chlorine (TRC) levels are being maintained at approximately 1 mg/l. The filter throughput rate was increased to 2,800 gpm (each filter), however by the end of the quarter had been reduced back to 2,200 gpm. After each use, the filter is backwashed using an air scour lasting 1 to 2 minutes, followed by 10 minutes at 9,500 gpm backwash flow. Sodium hypochlorite is dosed into the backwash water before being pumped into the filter underdrain.
- Filters are generally run for approximately 4 hours before being taken out of service and backwashed. Within this time frame the filters are not plugging and could continue to be operated. However, in order to use each filter every day, filters are being taken out of service after approximately 4 hours. This practice ensures that each filter is operated at least once per day. This mode of operation was determined to be necessary to keep filters from sitting idle for too long which has been found to result in increased sulfide levels.
- Filter rotation proceeds in numerical order (within each Train) to ensure that each filter is operated once per day. An equal number of A train and B train filters are operated at any one time.
- Scheduled long backwashes have been eliminated after it was determined that filters that were not being operated would be backwashed. Eliminating this practice also has resulted in reduced backwash water being generated.

The above routine has resulted in a significant reduction in the volume of backwash water being generated, which now allows additional options for management of Sedimentation Basin 5 flows. With each filter being backwashed once per day, the plant is down to approximately 27 backwashes per day. This compares to the 100 plus backwashes per day that were typical prior to the use of sodium hypochlorite to treat primary effluent and carbon filter backwash water. Estimated current backwash volume is 2.6 MGD versus prior 10 to 12 MGD. The NFWB has requested and the NYSDEC has agreed to allow the NFWB to upgrade an 8-inch plant sewer so that additional flow from Sedimentation Basin 5 can be delivered to the head of plant. By doing this the plant hopes to be able to remove Sedimentation Basin 5 flows from discharging to the chlorine contact tank. Additionally, the full hydraulic equalization capacity of Sedimentation Basin 5 can be realized if the basin can be pumped as low as needed without having to turn off the submersible pump when the water level has dropped 2 feet (current practice) to avoid pumping the “bottom contents” of Sedimentation Basin 5 to the Chlorine Contact Tank.

During the past quarter, operations staff has also changed the odor control GAC and has ordered two additional pallets of Darco H2S activated carbon, enough for three (3) carbon changes.

1.2 Solids Removal Performance

A solids balance for October, November, and December 2019 is presented in Table 1. The data is based upon effluent flow meter measurements. The data shows that the amount of solids sent to the landfill was less than optimal for October and November but improved in December 2019. Reduced October and November 2019 solids throughput is believed to be the result of one belt press being out of service for portions of the past quarter. As of November 7, 2019, all three belt filter presses have been operational.

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 equipment. Significant equipment repairs this past quarter have included:

- The work on the plant's power distribution system as a result of an April 14, 2019 lightning strike continued throughout the quarter. Breakers in the main switchyard have been rebuilt to allow fully automatic switch over between incoming power feeders. Additional work to address deficiencies at transformers, PCs, and MCCs is continuing and should be completed in Q1 2020.
- The plant is in the process of procuring additional sludge and grit screws as these will likely be necessary in other sedimentation basins. The screws will be fabricated locally.
- Repairs made in Sedimentation Basins 1 through 4 included:
    - Sedimentation Basin 1 scum skimmer tipping pole was repaired.
    - Sedimentation Basin 2 and 3 have had their track splice plate bolts tightened and/or replaced, which will minimize misalignment of the rails, which can cause the traveling bridges to go off track.
    - Sedimentation Basin 3 chain and flight drive chain was replaced.
    - A new potable water pump seal water line was run in the pump gallery and all ten (10) sludge pumps and seven (7) grit pumps have been connected to the new seal water line. The new seal water line will improve the reliability of the pump seals, thereby minimizing pump downtime as a result of seal failure.
- Belt filter presses (BFP) required the following repairs:
    - The hydraulic cylinder on BFP#2 was replaced.
    - Both belts (top & bottom), rubber pan seals, and two (2) spray bars were replaced on BFP#3.
    - Wash water pump was replaced on BFP#3.

Table 1

NFWB WWTP Solids Balance

Q4 2019 Progress Report 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 ([1])
	mgd	mg/l	mg/l	Tons/day	Tons/day	Tons/day	Tons/day	%	Tons/day	Tons/day	%
Oct-19	25.7	162	8.1	16.4	1.5	2.25	20.2	27.7%	72.8	15.3	76%
Nov-19	24.7	152	8.0	14.7	1.4	3.07	19.2	27.3%	70.4	16.9	88%
Dec-19	31.4	141	6.5	17.6	1.6	1.87	21.1	27.0%	78.0	21.73	103%

NOTES: mgd million gallons per day
TSS Total Suspended Solids

[1] % greater than or equal to 100 indicates all incoming solids plus all chemicals added are removed and sent to landfill.

Although these repairs may have kept equipment out of service for periods of time during the past quarter, it has not significantly 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. As of the close of the fourth quarter of 2019, the following can be said regarding treatment equipment operability:

- Four (4) Main Pumps are operational.
- Four (4) Intermediate Pumps are operational.
- All sedimentation basins are functional. 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. Sedimentation Basin 5 continues to be used for filter backwash water treatment only.
- Twenty-eight (28) activated carbon filters are functional, although one carbon filter needs carbon replenishment and is only used during wet weather and only if necessary. This filter should be topped off with activated carbon in Q1 2020.
- The filter backwash system is functional including two backwash pumps and two air scour blowers.
- Two (2) pugmills, two (2) lime feed systems, and two (2) lime storage silos are fully functional.

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

All deliverables required under the consent order have been submitted to the NYSDEC in accordance with the schedule in the Consent Order. Deliverables submitted during the past quarter are listed in Table 2.

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

Date	Prepared By	Consent Order Schedule A Items	Comment
October 31, 2019	AECOM	Item 15	The seventh quarterly progress report for the third quarter of 2019 (Q3 2019) was submitted.
October 31, 2019	AECOM	Item 11	Draft Alternative Treatment Technology evaluation report was submitted.
December 19, 2019	AECOM	Item 11	Final Alternative Treatment Technology evaluation report was submitted.

2.1.1 Pilot Scale Biological Treatment Systems

A draft Alternative Treatment Technology evaluation report was submitted October 31, 2019 (Consent Order Item 11 Part 2) for NYSDEC review and comment. Since then the NYSDEC has indicated that there were no comments and the report has been finalized and resubmitted to the NYSDEC on December 19, 2019. To date no response from any state or Federal agency has been received regarding the potential to implement the recommended option. It should be noted that the NFWB cannot commit to implementing the recommended option without receiving significant grant funding.

2.1.2 Existing WWTP Optimization Efforts

AECOM has been performing studies and evaluations related to Consent Order Items 6, 7, and 10. This work focuses on optimization of the existing physical chemical treatment facilities. The work is being performed in accordance with the NYSDEC approved work plan. Briefly the work consists of:

Item 6 – Evaluate alternatives to the use of ferric chloride as a chemical coagulant.

Item 7 – Evaluate Sedimentation Basin 5 processes for managing carbon filter backwash water.

Item 10 – Evaluate oxidizer use for preventing sulfide formation in the carbon filters.

A status update report was issued to the NYSDEC in Q3 2019 and a meeting with the NYSDEC to discuss "next steps" was conducted on October 9, 2019 at the WWTP. Several follow up items came out of the October 9, 2019 meeting and additional items are still being considered by the NYSDEC.

2.2 Deliverables in Next Quarter

All deliverables required under the Consent Order have been submitted. No deliverables are pending or due in Q1 2020.

2.3 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.

2.4 Unresolved Issues/Delays

There are no unresolved issues currently.

Table 3
NFWB Communications to NYSDEC

Date	Prepared By	Purpose
October 2, 2019	AECOM	Response to NYSDEC email dated September 19, 2019 concerning the effluent disinfection project.
October 11, 2019	Rupp Baase	Letter memorializing meeting held on October 9, 2019 with the NYSDEC.
November 22, 2019	Rupp Baase	Letter regarding Effluent disinfection project schedule and status prepared in response to October 11, 2019 NYSDEC email communication.
December 5, 2019	Rupp Baase	Letter regarding miscellaneous plant piping projects (Hypo pipe, sludge pipes, SB5 to HOP) prepared in response to October 11, 2019 NYSDEC email communication.
December 6, 2019	Rupp Baase	Email communication requesting a meeting before the end of 2019 to follow up on loose ends.
December 10, 2019	AECOM	Email updating NYSDEC on plant operational status as it relates to plant optimization efforts, and request for: o Approval to route filter backwash to head of plant. o NYSDEC agreement on project sequencing plan for Project 1 (sedimentation basins and scum).
December 16, 2019	Rupp Baase	Follow up email regarding discussions held at meeting with NYSDEC on December 16, 2019 regarding the following: o The NYSDEC does not want the NFWB to install the mixer or mixer platform as part of the effluent disinfection project. o The NYSDEC approved the removal of the center divider wall in the chlorine contact tank, and the addition of two baffle walls in the chlorine contact tank as part of the effluent disinfection project.
December 18, 2019	Rupp Baase	Email summarizing outcome of December 16, 2019 meeting with the NYSDEC.
December 19, 2019	Rupp Baase	Email requesting permission to send filter backwash to HOP.
December 30, 2019	Rupp Baase	Email requesting permission to send filter backwash to HOP.
December 31, 2019	Rupp Baase	Email summarizing outcome of December 16, 2019 meeting with the NYSDEC including NYSDEC requested changes.

Table 4
Communications Received from NYSDEC

Date	Delivered To	Purpose
October 11, 2019	AECOM	Email regarding meeting held October 9, 2019 with comments regarding miscellaneous plant piping (Hypo pipe, sludge pipes, SB5 to HOP) and effluent disinfection project.
November 1, 2019	Rupp Baase et. al	Email regarding capital project schedule status.
December 16, 2019	Rupp Baase	Confirmatory email regarding NYSDEC requested changes to the effluent disinfection project.
December 23, 2019	Rupp Baase	Revisions to Rupp Baase December 18, 2019 meeting summary minutes.
December 30, 2019	Rupp Baase	Conditional approval to send filter backwash water to HOP and commentary on Project 1 sequencing plan.
December 30, 2019 (received date)	NFWB	Approval letter regarding miscellaneous plant piping (Hypo pipe, sludge pipes). (Letter was undated, received date was December 30, 2019).

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, design 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 is 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:

- **Traveling Bridge Rack and Rail Improvements –** Operation of the traveling bridges is becoming increasingly difficult due to a number of issues including the rack, rail, and hold down hardware. There are several places where rack and rail splices are loose, rack mounts are bent, and rail mounting hardware is out of tolerance. During the past quarter repairs were undertaken on Sedimentation Basins 2 and 3. Work will resume on Sedimentation Basin 4 in the spring of 2020. Assuming Sedimentation Basin 5 is the first basin addressed in Project 1 (Construction during 2020), rack and rail repairs to Sedimentation Basin 5 will not be undertaken.
- **Effluent Disinfection –** Work has continued on the installation of piping and equipment for effluent disinfection. This has included demolition of existing unused chlorine solution piping and the installation of pipe to bring sodium hypochlorite from the chemical feed area to the chlorine contact tank (aboveground/indoor portions of pipe). This portion of the work is complete. All remaining work will be performed by outside contractors under the service contracts. That work is expected to begin in Q1 2020.
- **Air Scour Blower Rebuild –** The second air scour blower project was completed in Q4 2019. This work constitutes Project 8 of the capital projects and was done using in-house staff and the Maintenance service contract (Mollenberg-Betz).

3.2 Capital Improvement Projects

A schedule for the ongoing capital projects is shown in Figure 1.

FIGURE 1

ESTIMATED CONSTRUCTION INSPECTION SCHEDULE

NFWB CAPITAL IMPROVEMENT PROJECTS

Updated: (1-20-20)

TASK DESCRIPTION	PLAN START	PLAN END
Project #1: Sedimentation Basin Upgrades (AECOM) - CA Services Not Approved		
Design and Bidding	5/22/2019	7/1/2020
Mobilization	8/1/2020	11/30/2020
Construction (Phase 1)	3/1/2021	11/30/2021
Construction (Phase 2)	3/1/2022	11/30/2022
Construction (Phase 3)	3/1/2023	11/30/2023
Construction (Phase 4)	3/1/2024	11/30/2024
Project #2 Gorge Pumping Station Rehab (GHD) - CA Services Approved (12-16-19)		
Design and Bidding	6/3/2019	4/27/2020
Construction	5/1/2020	4/1/2021
Project #3 Screens and Grit Transport Equipment (Arcadis) - CA Services Not Approved		
Design and Bidding	5/30/2019	4/25/2020
Construction	5/1/2020	3/1/2021
Project #4 Activated Carbon Replacement (AECOM) - CA Services Approved (11-25-19)		
Design and Bidding	5/22/2019	3/22/2020
Construction	4/1/2020	8/1/2020
Project #5 Electrical System Improvements (EI Team) - CA Services Not Approved		
Design and Bidding	4/25/2019	4/1/2020
Construction	5/1/2020	8/30/2020
Project #6 Effluent Disinfection (AECOM) - CA Services Approved (Previously)		
Design and Bidding	4/25/2019	1/1/2020
Construction	2/1/2020	10/1/2020
Project #7 HVAC Improvements (EI Team) - CA Services Not Approved		
Design and Bidding	4/25/2019	4/1/2020
Construction	5/1/2020	8/30/2020
Project #8 Replacement of Blower Equipment (In House) - CA Services by AECOM and CPL		
Design and Bidding	2/1/2019	6/1/2019
Construction	7/1/2019	2/1/2020
Project #9 Replacement of Process Piping (OBG) - CA Services Not Approved		
Design and Bidding	6/26/2019	4/26/2020
Construction	5/1/2020	10/1/2020
Project #10 SCADA Improvements (Kaman) - CA Services may not be required		
Design and Bidding	6/1/2019	12/1/2019
Construction	1/1/2020	11/1/2024
Project #11 Gorge Elevator Upgrade		
Design and Bidding	3/1/2019	4/9/2020
Construction	5/1/2020	10/1/2020
Project #99 WWTP Protective Measures		
Design and Bidding	1/1/2019	1/1/2020
Construction	2/1/2020	3/1/2021