Engineering Report

Wastewater Treatment Plant and Gorge Pumping Station Rehabilitation

Niagara Falls Water Board
Niagara Falls, New York

GHD | 285 Delaware Avenue Suite 500 Buffalo New York 14202 USA

11145878 | 05 | 21 | Report No 01 | July 24 2018

Executive Summary

The Niagara Falls Water Board (NFWB) owns and operates a 48 million gallon per day (mgd) physical-chemical wastewater treatment plant (WWTP) located in the City of Niagara Falls, Niagara County, New York. The NFWB is currently under an Order on Consent (R9-20170906-129) with the New York State Department of Environmental Conservation (NYSDEC) for ongoing and continual efforts to make improvements to achieve the most effective wastewater treatment possible and to maximize the capture of wet weather flows for benefit of the environment. The Order on Consent includes a compliance schedule for a number of action items to be completed by the NFWB, including operation and maintenance (O&M) directives, several work plans and studies, and a comprehensive engineering planning-level report. The projects detailed in this report are in response to several of the Order on Consent action items and also address aging infrastructure.

In the Order on Consent, the NYSDEC cited alleged violations by the NFWB to Title 6 New York Codes, Rules and Regulations (NYCRR), Part 703.2, which includes the narrative water quality standard for turbidity applicable to Class-A-Special water bodies as “No increase that will cause a substantial visible contrast to natural conditions.” The alleged violations include an incident on July 29, 2017 whereby the WWTP discharged a dark effluent from Outfall 001 to the Niagara River that allegedly caused a substantial visible contrast to the natural conditions in the river. This incident received worldwide media coverage due to the location of the discharge in the Niagara River, next to a popular tourist destination at Niagara Falls. The Order on Consent also alleged several instances of combined sewer overflows and partially treated wastewater from Outfall 001 in October 2017 causing a substantial visible contrast to the natural conditions in the Niagara River. The requirements in the Order on Consent compliance schedule will help prevent or minimize future such discharges, and involve numerous operational adjustments, optimizations, work plan developments, and engineering studies to do so.

Both near-term and longer-term improvement projects are needed to assure proper operation of its wastewater facilities and maintain permit compliance. The WWTP was built in the mid-1970s and any equipment not replaced over the years is now over 40 years old and beyond a typical design life. Critical support systems at the WWTP, such as electrical and plant water are also in deteriorating condition and need to be addressed. This report details the current condition of critical processes and systems that are in need of upgrades to stabilize the operation of both the WWTP and the Gorge Pumping Station, maintain permit compliance, and minimize the potential for future violations.

The NFWB, in collaboration with its consultants, developed a list of both near-term and long-term facility needs, some of which are assigned to the NFWB’s in-house maintenance staff, some employ the services of outside contractors to supplement in-house capabilities, and the balance are included under the NFWB’s Capital Improvement Program (CIP). In order to comply with NYSDEC directives and to satisfy requirements contained within the Order on Consent, the NFWB intends to expeditiously implement a host of these critical CIP projects. Such improvements are required to stabilize the operation of the existing Wastewater Treatment Plant and Gorge Pumping Station facilities. Critical improvements include replacements, upgrades, and optimizations of existing

process equipment and supporting infrastructure. Based on the needs assessments and resulting CIP, the critical projects listed in Table ES.1 have been identified.

To identify the most cost-effective and technically feasible approach to addressing each of the nineteen critical projects listed in Table ES.1, multiple improvement alternatives were evaluated for each project. Potential solutions were evaluated to establish recommendations for increasing treatment process effectiveness, renewing aging infrastructure, addressing operational limitations, promoting permit compliance, and minimizing the likelihood of future violations. These improvement alternatives considered options such as:

- No action versus improvement
- Repair/rehabilitation versus replacement
- Existing versus alternate technology, equipment type, or unit process
- Optimize versus upgrade
- Implement in phases versus comprehensive overhaul

A summary of the alternatives evaluated for each critical project is presented in Table ES.1.

Table ES.1 Summary of Alternatives

Project	Description	Alter-native	Description
1	Electrical System Improvements	A	No Action
		B	Complete Critical Repairs
		C	Comprehensive Replacement
2	Primary Scum Removal and Treatment Improvements	A	No Action
		B	Restore Scum Pumping and Install Fine Screen
		C	Restore Pumping and Install Alternate Scum Treatment Technology
3	Screenings and Grit Transport Equipment Improvements	A	No Action
		B	Replacement in Kind
		C	Replacement with Alternate Screening Conveyance Technology
4	Sedimentation Basin Improvements	A	No Action
		B	Replacement in Kind
		C	Replacement of Traveling Bridges with Chain and Flight Equipment
5	Polymer Equipment Upgrades	A	No Action
		B	Replacement of Deficient Polymer Equipment
		C	Replacement and Upgrade of Polymer Equipment
6	Disinfectant Dosage and Location Optimization	A	No Action
		B	Optimize Sodium Hypochlorite Dosage and Location
7	Gorge Pumping Station Rehabilitation	A	No Action
		B	Gorge Pumping Station Replacement
		C	Comprehensive Gorge Pumping Station Rehabilitation
8	Granular Activated Carbon Replacement	A	No Action
		B	Replacement with Recycled Reactivated Carbon
		C	Replacement with Virgin Carbon

Table ES.1 Summary of Alternatives

Project	Description	Alter-native	Description
9	Carbon Filter Support Gravel Replacement	A	No Action
		B	Replacement of Support Gravel
10	Sedimentation Basin Isolation Plate Replacement	A	No Action
		B	Replacement of Corroded Plate with Stop Plate
		C	Replacement of Both Isolation Plate Guides
11	Chemical Coagulant Optimization	A	No Action
		B	Alternative Coagulant
12	Minimization of Sulfide Formation	A	No Action
		B	Oxidant Addition
13	Heating and Ventilation Improvements	A	No Action
		B	Replacement of Critical Heating and Ventilation Equipment
		C	Addressing of All Heating and Ventilation Equipment Needs
14	Dewatering Equipment Control Upgrades	A	No Action
		B	Replacement of Belt Filter Press Local Control Panels
		C	Comprehensive Dewatering System Control Upgrades
15	Backwash Blower Equipment Improvements	A	No Action
		B	Replacement of Blower Equipment
		C	Rehabilitation of Non-operational Blower Equipment
16	Thickened Sludge Building Waterline Replacement	A	No Action
		B	Replacement of Process Waterline
		C	Replacement of Plant Waterline and Process Waterline
17	Lighting Improvements	A	No Action
		B	Needs Assessment and Lighting Improvements
18	Interior Process Piping Replacement	A	No Action
		B	Needs Assessment and Piping Improvements
19	Sedimentation Basin No. 5 Effluent Management Improvements	A	No Action
		B	Existing Submersible Pumping System Improvements
		C	Submersible Pumping System Upgrades

A high-level, qualitative engineering assessment was performed on the alternatives, which resulted in a recommended alternative for each of the nineteen distinct projects. The nineteen distinct and process/system-focused projects were then bundled into nine project groups based on relative priority and are summarized in Table ES.2.

Table ES.2 Summary of Recommendations

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**

Criteria that were instrumental in establishing high priority items were in compliance with the Order on Consent and the SPDES permit, health and safety of staff and community, and the mitigation of the consequence and likelihood of critical asset failure. A detailed schedule has been excluded intentionally. The nine project groups that constitute the overall project are in varying stages of progression. Projects that require a needs assessment or further scope definition (e.g., Projects 1, 17, and 18) and those that require preliminary engineering, studies or on-site testing (e.g., Projects 11 and 12) may require additional time.

Table of Contents

Figure Index

Table Index

Appendix Index

1. Project Background and History

The Niagara Falls Water Board (NFWB) owns and operates a 48 million gallon per day (mgd) physical-chemical wastewater treatment plant (WWTP). The NFWB is currently under an Order on Consent (R9-20170906-129) with the New York State Department of Environmental Conservation (NYSDEC) for ongoing and continual efforts to make improvements to achieve the most effective wastewater treatment possible and to maximize the capture of wet weather flows for benefit of the environment. A copy of the Order on Consent is included in Appendix A. The Order on Consent includes a compliance schedule for a number of action items to be completed by the NFWB, including operation and maintenance (O&M) directives, several work plans and studies, and a comprehensive engineering planning-level report. The projects detailed in this report are in response to several of the Order on Consent action items and also address aging infrastructure.

1.1 Site Information

The NFWB WWTP is located in the City of Niagara Falls, Niagara County, New York and provides wastewater treatment to approximately 50,000 residents (source: U.S. Census Bureau, 2010) and numerous industries. Figure 1.1 identifies the location of the WWTP on the USGS topographic map, as well as the outfall pipe and the Gorge Pumping Station that pumps raw wastewater from a portion of the collection system to the WWTP. A detailed site plan of the WWTP is provided on Figure 1.2, which shows the boundary of the WWTP site. A site plan of the Gorge Pumping Station is included as Figure 1.3. Aerials of the WWTP and Gorge Pumping Station are included as Figures 1.4 and 1.5, respectively.

The primary soils within the WWTP site include glacial till, sand, gravel, and clay based on soil boring logs from 1970 before the WWTP was constructed. The same boring logs indicated the depth to bedrock in the project area to be approximately 20 to 30 feet, and the depth to groundwater varied from 4 to 20 feet below grade. [The United States Department of Agriculture (USDA) National Resources Conservation Services (NRCS) Soil Survey, http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx shows the WWTP site to be an unsurveyed area with no soil types noted). The topography on the WWTP site is generally flat. The WWTP site is not located in a FEMA-regulated floodplain based on the FEMA Flood Insurance Map for Community No. 360506.

The Gorge Pumping Station site is also noted as an unsurveyed area by the USDA NRCS Soil Survey. Based on its location along the Niagara River and visual observations, the pumping station is built mostly in bedrock. The pumping station is located approximately 150 feet from the edge of the Niagara River. As shown on Figure 1.3, the pumping station is located at the bottom of a relatively steep slope in the Niagara gorge with access provided by an elevator shaft that is about 130 feet deep. The pumping station is adjacent to the 100-year flood zone according to the aforementioned FEMA map.

While there are no known environmental resources located directly on the WWTP site that could be affected by the project design, the Niagara River is located just to the south of the WWTP site. Additionally, treated WWTP effluent is conveyed by the Adams Tail Race Tunnel and is discharged to the Niagara River gorge adjacent to the Rainbow Bridge (downstream of Niagara Falls) as shown

on Figure 1.1. The Gorge Pumping Station is also located next to the Niagara River, downstream of Niagara Falls (see Figure 1.1). The Niagara River is designated as a Class A Special waterbody by the NYSDEC.

1.2 Ownership and Service Area

The NFWB is a public benefit corporation created in 2002 by a special act of the New York State Legislature; it took ownership of both the drinking water and wastewater facilities from the City of Niagara Falls on September 25, 2003. The NFWB owns, operates and maintains the wastewater facilities including the WWTP, Gorge Pumping Station, and the sewer collection system, while the Niagara Falls Public Water Authority oversees the bonding and financing of the NFWB's assets. Wastewater conveyed to the WWTP consists of residential, commercial, and industrial wastewaters from more than 18,400 accounts. The service area includes the City of Niagara Falls and portions of the Town of Niagara as shown on Figure 1.6. There are over 280 miles of combined, sanitary and storm sewers in the service area, of which approximately 56 miles are separate sanitary and storm sewers in the eastern portion of the City (known as the LaSalle system), and smaller portions of downtown and west of Hyde Park. The NFWB also accepts, conveys and treats flow from the portions of the Town of Niagara through an agreement between the NFWB and the Town of Niagara.

Depending on the nature of the discharge, industrial users may be required to obtain a discharge permit to discharge wastewater to the collection system and WWTP under the NFWB's Industrial Pretreatment Program. This includes industrial-commercial user (ICU) permits and significant industrial user (SIU) permits. Currently, the WWTP has 22 permitted SIUs. Industrial wastewater represents approximately 50 percent of the dry weather flow treated at the WWTP (excluding infiltration and inflow). The NFWB had historically accepted industrial hauled waste at the WWTP, but suspended this practice in 2016 due to adverse impacts on odors and disinfection at the plant.

As the service area is predominantly the City of Niagara Falls, the City's historical population since 1990 and the estimated 2016 population are presented in Table 1.1. The U.S. Census data show a declining population for the City of Niagara Falls, with an approximate decrease of nearly 20 percent over the past 26 years. The City is mainly built-out, with development currently consisting of spot redevelopment as opportunities present themselves.

Table 1.1 City of Niagara Falls Historical Population

Year	Population	Source
1990	61,840	U.S. Census Bureau*
2000	55,593	U.S. Census Bureau*
2010	50,193	U.S. Census Bureau*
2016	49,810	2016 5-Year Estimate (American Community Survey)*

*Source: www.census.gov

1.3 Existing Facilities and Present Condition

The NFWB WWTP was constructed in the mid-1970s and placed into service in April 1977. The WWTP provides physical-chemical treatment of municipal and industrial wastewaters using activated carbon filtration; it is the largest physical-chemical treatment plant in the country. A physical-chemical treatment system was selected at that time due to the significant amount of organic and inorganic chemicals in the industrial wastewater discharges, and the notion that the chemicals would be inhibitory to conventional biological treatment processes. Physical-chemical treatment processes were used because they were considered less susceptible to loadings of organic chemicals, metals and pH changes due to the local industry discharges. Additionally, the WWTP was designed at a time prior to the implementation of industrial pretreatment regulations and the untreated industrial wastewaters were discharged directly to the WWTP. However, since the WWTP was placed in operation, the USEPA promulgated the industrial pretreatment regulations that require control of pollutants that can pass through or interfere with the treatment processes, resulting in pollutant limits for industrial users. The number of industries and/or amount of industrial wastewater has declined over the years. This has resulted in decreased pollutant loadings to the WWTP.

1.3.1 General Description of Wastewater Facilities

Wastewater is conveyed to the WWTP by two main influent sewers: the 72-inch diameter Southside Interceptor (SSI) and the 30-inch diameter Gorge Forcemain from the Gorge Pumping Station. Approximately 35 percent of the influent dry weather flow is conveyed through the Gorge Forcemain, with the remaining flow coming from the SSI. The SSI also conveys the majority of the industrial wastewater.

Treatment processes at the WWTP include mechanical screening, chemical addition/flocculation, sedimentation, activated carbon filtration and effluent disinfection. Solids generated in the WWTP are thickened, dewatered and stabilized prior to disposal offsite. A process flow schematic for the WWTP is shown on Figure 1.7. Treated effluent is discharged into the Ice Shaft, which freefalls approximately 150 feet down to the Adams Tail Race Tunnel (ATRT). There is also a Diversion Sewer that conveys industrial non-contact cooling water (NCCW) and stormwater to the Ice Shaft for combined discharge with the WWTP treated effluent. The ATRT runs underneath the City and discharges to the lower Niagara River gorge adjacent to the Rainbow Bridge (see Figure 1.1).

1.3.2 SPDES Permit

The current NFWB WWTP State Pollutant Discharge Elimination System (SPDES) permit, No. NY0026336, became effective on November 1, 2013 and is valid through October 2018 (copy included in Appendix B). The WWTP has one main permitted outfall for the WWTP, designated Outfall 001. This outfall represents the WWTP treated effluent and the sampling point for this outfall is located in the lower channel of the chlorine contact tank, after the final weir, prior to flowing to the Ice Shaft and the ATRT for ultimate discharge to the Niagara River.

There are also nine other permitted outfalls in the SPDES permit. Six are permitted combined sewer overflows (CSOs), one is the diversion sewer, and two are stormwater as listed below. All outfalls discharge to the Niagara River. The NFWB has an approved Stormwater Pollution Prevention Plan (SWPPP) for the two stormwater outfalls.

- Outfall 003 – Falls Street Tunnel CSO
- Outfall 004 – Diversion Sewer
- Outfall 006 – Gorge Pumping Station CSO
- Outfall 007 – Cleveland Avenue CSO
- Outfall 009 – Chasm Avenue CSO
- Outfall 010 – Maple Avenue CSO
- Outfall 011 – Garfield Avenue CSO
- Outfall 01A – Head of Ice Shaft (stormwater outfall at WWTP)
- Outfall 02A – Drop Shaft to International Paper Tunnel (stormwater outfall at WWTP)

The effluent requirements for major parameters in the SPDES permit are presented in Table 1.2. As the WWTP is a physical-chemical treatment plant, the permit contains effluent limits for certain parameters not typical with biological treatment facilities. For example, instead of biochemical oxygen demand (BOD_5), the NFWB WWTP is required to analyze for total organic carbon (TOC).

Table 1.2 Summary of Key SPDES Permit Requirements for NFWB WWTP

Parameter	Outfall 001 (WWTP)
Flow (monthly average) (1)	48.0 mgd
TOC (monthly average)	15,200 lb/d
TOC (7-day average)	22,800 lb/d
TSS (monthly average)	30 mg/L 12,000 lb/d
TSS (7-day average)	45 mg/L 18,000 lb/d
pH (2)	6.0 – 9.0
Total Phosphorus (monthly average)	1.0 mg/L
Total Phenolics (monthly average)	61 lb/d
Priority Pollutant Scan (annual)	Monitor (one per year)
α-BHC (monthly average) (3)	0.01 µg/L
β-BHC (monthly average) (3)	0.02 µg/L
γ-BHC (monthly average) (3)	0.02 µg/L
δ-BHC (monthly average) (3)	0.04 µg/L
Hexachlorobenzene (monthly average)	0.20 µg/L
Mercury (monthly average)	50.0 µg/L
Mirex (monthly average)	0.40 µg/L
PCB-1248 (monthly average)	0.20 µg/L
4,4'-DDD (monthly average)	0.04 µg/L
4,4'-DDE (monthly average)	0.02 µg/L
4,4'-DDT (monthly average)	0.05 µg/L
Chlorine Residual – (daily maximum)	3.0 mg/L

Table 1.2 Summary of Key SPDES Permit Requirements for NFWB WWTP

Parameter	Outfall 001 (WWTP)
Fecal Coliform (30-day geometric mean)	200/ 100 mL
Fecal Coliform (7-day geometric mean)	400/ 100 mL
Enterococci (30-day geometric mean)	Monitor

NOTE: (1) Also required to report times and durations of overflow of the 100-foot weir (bypass of carbon beds).

(2) Limits shall be achieved 99 percent of time on monthly basis. Excursions outside these limits shall not exceed 60 minutes in duration, with no single excursion outside the pH range of 4.0 to 11.0.

(3) These are enforceable limits effective 08/01/2018; interim limits apply until then (not included here).

The SPDES permit contains several other requirements, including the Best Management Practices (BMPs) to maximize pollutant capture and minimize water quality impacts from CSOs.

1.3.3 Compliance Issues

While the WWTP is generally in compliance with the numeric limits in its SPDES permit, the NFWB is under two Orders on Consent with the NYSDEC. In the first Order on Consent, the NYSDEC cited alleged violations by the NFWB to Title 6 New York Codes, Rules and Regulations (NYCRR), Part 703.2, which includes the narrative water quality standard for turbidity applicable to Class-A-Special water bodies as “No increase that will cause a substantial visible contrast to natural conditions.” The alleged violations include an incident on July 29, 2017 whereby the WWTP discharged a dark effluent from Outfall 001 to the Niagara River that allegedly caused a substantial visible contrast to the natural conditions in the river. This incident received worldwide media coverage due to the location of the discharge in the Niagara River, next to a popular tourist destination at Niagara Falls. The Order on Consent also alleged several instances of combined sewer overflows and partially treated wastewater from Outfall 001 in October 2017 causing a substantial visible contrast to the natural conditions in the Niagara River. As such, the Order on Consent contains requirements that will help prevent or minimize such future discharges and/or future instances of visible contrast. The NFWB has been and continues to comply with these requirements, as outlined in the Schedule of Compliance included in the Order on Consent (see Appendix A).

The NFWB is also under another Order on Consent (R9-20080528-32) with the NYSDEC to address its sanitary sewer overflows (SSOs) in the LaSalle area of the City.

For the purposes of this report, the projects are focused on addressing the Order on Consent related to the WWTP discharges, and not necessarily the SSO related Order.

1.3.4 Design and Existing Flows and Waste Loads

The WWTP was designed to treat a monthly average flow of 48 mgd and peak hourly flow of 85 mgd. The current average flow to the WWTP is approximately 30 mgd, although peak flows can exceed 85 mgd during wet weather events. Table 1.3 presents the original WWTP design influent flow and loadings from the 1970s, as well the current influent flow and loadings to the WWTP based

on July 2017 to March 2018 influent data. As shown in Table 1.3, the current loadings are only a fraction of the original design loadings. A comparison for the design chemical oxygen demand (COD) loading cannot be made to current loadings as the WWTP is no longer required to analyze for COD, but instead for TOC in accordance with its SPDES permit.

Table 1.3 WWTP Design and Current Influent Loadings

Parameter	Design	Current (1)
Flow, Average (mgd)	48	27
Flow, Peak (mgd)	85	>85
COD (lb/d)	145,320	(2)
TSS (lb/d)	100,090	22,384
TOC (lb/d)	(2)	7,004
Total Phenols (lb/d)	1,440	36
Total Phosphorus (lb/d)	2,600	311

NOTES:
(1) Based on July 2017 through March 2018 WWTP data.
(2) WWTP originally design based on COD; however, WWTP SPDES permit is for TOC and COD is no longer analyzed.

While the current average flow is approximately 55 to 60 percent of the design average flow, the current influent pollutant loadings are a much smaller fraction (ranging from 2 to 22 percent). This is likely due to a number of factors including the volume of infiltration and inflow in the influent wastewater, which in turn results in weaker influent concentrations, particularly for TSS and TOC, as well as reduced industrial flows and loadings over the years.

1.3.5 Existing Energy Consumption

The WWTP obtains low cost power from National Grid, which is made available through the New York Power Authority (NYPA). According the NFWB's 2016 Continuing Disclosure report, this amounts to approximately 1.6 megawatts (MW) per year; it has since been reduced to approximately 1.25 MW per year according to an agreement among the NFWB, NYPA, and National Grid. This allocation is routinely exceeded during high demand and/or cold weather periods.

1.3.6 History of Damage due to Storm or Flood Impacts

The NFWB has experienced a series of floods and power outages over the years resulting from circumstances beyond its control, such as severe wet weather events or strong winds. There were two severe events in recent years that resulted in damages to the WWTP. The first was on September 14, 1979 when the area received approximately 5 inches of rain in less than 24 hours. This resulted in flooding at the WWTP and numerous basement backups in the service area. The flooding prompted all four main pump motors to be placed out of service so that necessary repairs could be made. It is estimated that the pump repairs alone cost approximately $500,000. Following the occurrence of this storm, measures were implemented at the WWTP to mitigate the likelihood of recurrence of the damages suffered to the main pumps. The protective measures that were implemented, however, failed to account for higher intensity storms such as the storm event and resulting flooding that occurred between July 19 and 20, 2013. This second severe storm event had a recorded rainfall of 4.04 inches at the Niagara International Airport during the storm's peak hours

between 8 p.m. Friday, July 19 and 1 a.m. Saturday, July 20. This storm, which lasted approximately 8 hours in total, resulted in flooding, widespread power outages, and downed power lines in the NFWB's service area and caused very significant damage to the NFWB WWTP.

A high volume of stormwater entered into the combined sewers during the July 2013 event, which overloaded the WWTP's influent sewer lines. The steady, full pipe flow eventually exceeded the WWTP's capacity, knocking several key WWTP processes off-line, and inundated all four of the main influent pumps and related infrastructure. As wastewater flows continued to back up into the off-line treatment plant, raw sewage bypassed treatment and was discharged directly to the lower Niagara River. Compounding the severity of the situation were the environmental impacts, which accompanied the capital damages. It was estimated that approximately 25 mgd of sewage was discharged to the Niagara River for approximately five days after the storm. The surcharge of the NFWB collection system affected all structures 4 feet below grade in the region bounded by Hyde Park Blvd. to the East and Lockport Rd. to the North. Community damages due to this storm event, such as basement backups, prompted the filing of approximately 1,180 insurance claims that were estimated to cost approximately $7.1 million in repairs. The WWTP emergency repairs and long-term improvements to address the damage and provide protective measures for future events have totaled $8.1 million in cost.

1.3.7 Existing Unit Processes and Present Condition

A description of each major unit process in the NFWB WWTP is provided in this section. Additional information on current condition of the system and its equipment/components is provided in Section 2.

Gorge Pumping Station and Forcemain

The Gorge Pumping Station is located at the site of the former Ashland Avenue Sewage Treatment Plant along the Niagara Gorge, as shown on Figure 1.1. There are three 500 horsepower (hp) pumps at the Gorge Pumping Station, each having a capacity of 13.5 mgd, which pump wastewater to the WWTP through a 36-inch diameter forcemain, known as the Gorge Forcemain. The firm capacity of the pumping station is 19.5 mgd with two pumps operating and one pump serving as standby. This is also the hydraulic capacity of the Gorge Forcemain. The Gorge Forcemain is a true forcemain up to Fourth and Cedar Streets where it becomes a gravity sewer. The gravity sewer continues to Fourth and Ferry Streets where it becomes a low pressure gravity sewer for the remainder of the way to the WWTP. A magnetic flow meter on the Gorge Forcemain at the WWTP measures flow. Section 2.7 provides additional details on the condition of the pumping station and forcemain.

WWTP Influent Main Pumping Station

Influent wastewater from the SSI and the 12th Street Sewer enters the WWTP at the influent junction structure, and flow proceeds to one of two main wet wells at the WWTP. The Main Pumping Station has four 250 hp pumps, each capable of pumping 14.0 mgd to 21.9 mgd, which lift wastewater approximately 50 feet. Three pumps are available for use with one pump serving as backup. Each pump is equipped with a variable frequency drive (VFD), which is manually adjusted to control flow. A magnetic flow meter is located on each pump discharge line for flow measurement.

Mechanical Bar Screens

Flow from the main pumps and the Gorge Forcemain discharge to a common influent channel where the mechanical bar screens are located. There are three parallel mechanical bar screens with 3/4-inch bar screen openings that remove larger solids and debris from the wastewater. Screenings collected from the bar screens are collected in a waste container along with grit, which is hauled offsite for disposal. Additional details on the screening conveyor system are provided in Section 2.3.

Chemical Addition and Rapid Mix Tanks

Following the bar screens, chemicals for pH adjustment and coagulation can be pumped to the wastewater in the main channel, upstream of the rapid mix tanks. For pH adjustment, the WWTP is equipped with a concentrated sulfuric acid feed system to lower potentially high influent pH values. This system is operated manually based on the monitored influent pH; however, it is rarely used. The WWTP is equipped with a ferric chloride feed system for coagulation. Ferric chloride is used to provide phosphorus and solids removal and is continuously fed to the influent channel. The ferric chloride feed rate is controlled manually to deliver the appropriate dose.

There are two rapid mix tanks downstream of the chemical addition feed points that were historically used for chemical addition and mixing. Flow passes through these tanks, which are equipped with mixers. Settled grit is removed from the rapid mix tanks by one of two grit pumps, and grit is discharged to the grit separators.

The WWTP also adds polymer to increase particle size and improve solids settling in the sedimentation basins. Polymer is typically added at the inlet to the Stage 1 flocculation basin, but can also be added to a central diffuser line located over the main channel just after the rapid mix tanks.

Sedimentation Basins

There are five sedimentation basins at the WWTP; four are used for influent wastewater treatment and the fifth basin (Sedimentation No. 5) is used for carbon filter backwash treatment. At the inlet to each sedimentation basin are the flocculation tanks. Flocculation is a process in which polymer is added and mixed to bind smaller particles into larger particles that will settle more readily. There are three flocculation tanks or “stages” in series, ahead of each sedimentation basin. The original motor-driven paddle mixers were replaced in 2017 with tapered baffles in each stage to accomplish the same purpose using kinetic energy instead of electrical energy. The Stage 2 and 3 flocculation basins are equipped with submerged chain and flight sludge collectors that sweep sludge to the sludge screw, which conveys all the sludge to the east side where the sludge pumps remove the settled solids.

Following the Stage 3 flocculation basins, wastewater flows over the baffle wall into the sedimentation basins, where solids are settled out and scum/floatables are removed. Each basin is equipped with a traveling bridge collector that was designed to travel at two speeds in reciprocating directions, except for Sedimentation Basin No. 1. The traveling bridge equipment in Sedimentation Basin No. 1 recently was removed and replaced with new chain and flight style longitudinal scum and sludge collection equipment, to pilot the new technology. Additional details are provided in Section 2.4. The sedimentation basins were originally designed to include a scum handling and

treatment system, although this system has fallen into a state of disrepair and is currently out of service, as described further in Section 2.2.

Effluent from Sedimentation Basins No. 1 through 4 discharges over a weir into the primary effluent channel. There is a weir in the primary effluent channel, known as the 100-foot weir, which allows overflows to bypass the carbon filters and flow directly to the chlorine contact tank for disinfection and discharge during extreme wet weather flow conditions.

Each sedimentation basin has a grit pump (for the Stage 1 flocculation basin), a sludge pump, and a standby pump. The grit pump discharges to the grit equipment in the bar screen area, while the sludge pump discharges to the north or south thickener or back to the main channel. Details on grit and sludge handling are provided in the Solids Handling section below.

Acid Mix Tanks

After flowing through the primary effluent channel, wastewater is conveyed through the acid mix tanks. There are two acid mix tanks, in series, where final pH adjustments used to be made; however, there has been no need for pH adjustment at this location historically and the acid feed piping to these tanks is no longer in place. Flow currently only passes through these tanks.

Intermediate Pumps

Following the acid mix tanks, wastewater flows to the intermediate wet well, where it is pumped by the intermediate pumps. There are four 250-hp pumps, which lift wastewater approximately 18 feet to the activated carbon filters. Typically one pump is adequate for dry weather flow, and two pumps are used during wet weather flow. The pumps are operated to maintain sufficiently low intermediate wet well and carbon central influent channel levels to prevent overflow of the 100-foot weir and flooding in the carbon building.

Activated Carbon Filters

There are two activated carbon filter treatment trains, each with 14 granular activated carbon (GAC) filters for a total of 28 filters. The carbon filters provide secondary treatment through physical filtration and chemical adsorption. Incidental anaerobic biological degradation also occurs. Filters 1 through 14 are located in Train A on the east and filters 15 through 28 are in Train B on the west. Each filter measures 17.3 feet by 42 feet and contains approximately 6.5 feet of GAC media. Wastewater flows by gravity down through the GAC and a gravel support layer, and then through an underdrain system. The original filter bottoms failed in the first year of service and were replaced with a modular plastic underdrain block in 1985. Typically eight filters are in operation during dry weather, while a minimum of 22 filters must be in service during wet weather flows in accordance with the NFWB's SPDES permit. The target flow rate through each filter is approximately 2,400 gallons per minute (gpm).

Filtered wastewater from each filter is directed to a carbon bed effluent channel; there are four effluent channels, one under each set of seven carbon filters. Flow from each of these four channels discharges to the main carbon effluent channel, which in turn directs flow to the backwash wet well entrance weirs. There are two entrance weirs and two wells, in parallel, one servicing Train A and one servicing Train B. After flowing over the wet well entrance weirs, flow enters into a small entrance well and is directed to a 60-inch diameter pipe and into the adjoining backwash wet

well. When not backwashing, treated effluent flows over a weir in the wet well and passes to the chlorine contact tank via a 72-inch diameter pipe.

A filter remains online until the headloss increases to the point where it must be backwashed. The WWTP performs two types of carbon filter backwashes:

- Short, or “bump” washes, performed at 9,500 gpm to recover headloss and place the filter back online quickly (several performed daily)
- Long wash performed at 12,000 gpm using an air scour (twice per week on each filter)

Carbon bed effluent from the backwash wet well is used for backwash water and is pumped by one of four backwash pumps. The backwash wastewater can be routed to Sedimentation Basin No. 5 for settling, which is typically used, or flow back to the main channel at the rapid mix basins. Polymer is added to the backwash wastewater at the Backwash Mix Basins, prior to flowing to Sedimentation Basin No. 5. After settling, the effluent from Sedimentation Basin No. 5 is directed to the chlorine contact tank where it combines with carbon bed filter effluent for disinfection and discharge. When dewatering Sedimentation Basin No. 5 for maintenance or other purposes, the contents are directed to the Rapid Mix Tank or Thickener Tank.

The WWTP originally regenerated its own carbon in an on-site multiple hearth furnace; however, in 2008 the WWTP switched to a carbon inventory replacement system that bid out as a contracted service. Spent carbon is removed off-site for regeneration or landfill disposal, and either regenerated water treatment plant grade carbon that meets the quality specification or new virgin carbon is purchased for use in the filters.

Oxidation and Disinfection

The carbon bed effluent contains hydrogen sulfide and other reduced compounds due to the microbial activity in the filters. The WWTP adds hydrogen peroxide to the carbon bed effluent (at the backwash wet well influent) to provide hydrogen sulfide and odor control. The WWTP typically uses 600 to 800 gallons per day (gpd) of hydrogen peroxide.

For effluent disinfection, the WWTP originally used liquid chlorine, but converted to sodium hypochlorite in the early 2000s as it was much safer and, at the time, less expensive. Sodium hypochlorite is dosed as effluent flows over the backwash wet well weir to the 72-inch diameter pipe. Flow then proceeds to the chlorine contact tank, which consists of two parallel contact basins. Carbon bed effluent mixes with Sedimentation Basin No. 5 overflow in the upper reservoir of the chlorine contact tank. Treated effluent from the chlorine contact tanks discharges to the Ice Shaft, along with the Diversion Sewer flows (industrial NCCW and stormwater), to the ATRT, and ultimately to the Niagara River for discharge in the Niagara Gorge.

Solids Handling

Grit from the flocculation basin is pumped to one of two vortex separators, followed by one of two grit cyclones/classifiers, and then disposed offsite with the screenings from the mechanical bar screens. Additional details on the condition of the grit equipment is presented in Section 2.3.

Sludge from the sedimentation basins is pumped to one of two gravity sludge thickeners. Thickened sludge is then pumped to the three belt filter presses for dewatering; under normal

conditions two of the three belt filter presses operate. Lime is added to stabilize the dewatered sludge and the mixture is hauled off-site for landfill disposal.

1.4 Definition of the Problem

The dark discharge and subsequent Order on Consent with the NYSDEC brought to light a number of ongoing issues at the WWTP, such as the need for additional staff training, aging equipment and units out of service that require repairs, and the need for process studies, optimizations, and improvements to maintain permit compliance and protect water quality. The requirements in the Order on Consent compliance schedule are designed to prevent or minimize such future discharges, and involve numerous operational adjustments, optimizations, work plan developments, and engineering studies to do so. The NFWB will require both near-term and longer-term improvement projects to assure proper operation of its wastewater facilities and maintain permit compliance. The WWTP was built in the mid-1970s and any equipment not replaced over the years is now over 40 years old and beyond a typical design life. Critical support systems at the WWTP, such as electrical and plant water are also in deteriorating condition and need to be addressed. Sections 1.3.7 and 2.0 provide details on the current condition of critical processes and systems that are in need of upgrades to stabilize the operation of the both the WWTP and the Gorge Pumping Station, maintain permit compliance, and minimize the potential for future violations.

1.5 Financial Status

The NFWB is a combined utility, providing both water and sewer services, and as such, its pricing structure is commensurate with that. The NFWB's main source of income is the user charges for water and sewer; there are separate rate schedules for water and sewer. According the NFWB's adopted budget for 2018, the total revenue was projected to be $31,211,999, with $19,076,552 coming from sewer.

The NFWB's sewer billing rate schedule for wastewater services, including conveyance and treatment consists of two different user classes: Commercial/Small Industrial/Residential Users (CSIRU) and SIUs. For Commercial/Small Industrial/Residential Users (CSIRU), sewer rates are based on metered water consumption. The 2018 rates (from the NFWB website) for City customers are:

- $57.64 minimum charge per quarter, including usage allowance up to 1,300 cubic feet (cf)
- Additional usage charge (in excess of 1,300 cf) of $4.43 per 100 cf

Customers located outside the City have a different billing rate.

For SIUs, sewer rates are determined each quarter based on the measured quantities of the conventional discharge parameters, as shown below, as well as based on substances of concern parameter charges for specific pollutants in accordance with the individual SIU discharge permit.

- Flow: $3,117.56 per million gallons (MG)
- Suspended Solids: $1.00 per pound
- Soluble Organic Carbon: $1.73 per pound

The NFWB WWTP has a 5-year capital improvement program (CIP) in place for capital projects. The NFWB has also identified longer-term projects necessary to stabilize and optimize operation of the WWTP, which are included in Section 2 of the report.

From the 2016 Continuing Disclosure Report, the total debt service is approximately $7,755,000 for sewer and water. The Continuing Disclosure Report also lists the outstanding bonds and remaining principal amounts for the overall system, which includes Niagara Falls Public Water Authority Bonds and New York State Environmental Facilities Corporation (NYSEFC) Water Revolving Funds Revenue Bonds.

2. Alternative Development

The NFWB, in collaboration with its consultants, developed a list of both near-term and long-term facility needs. In the context of the Order on Consent, several scheduled projects were assigned to the NFWB's in-house maintenance staff. The NFWB also employed the services of outside contractors to supplement in-house capabilities. The balance of the facility needs are included under the NFWB's Capital Improvement Program (CIP). In order to comply with NYSDEC directives and to satisfy requirements contained within the Order on Consent, the NFWB intends to expeditiously implement a host of these critical CIP projects. Such improvements are required to stabilize the operation of the existing Wastewater Treatment Plant and Gorge Pumping Station facilities. Critical improvements include replacements, upgrades, and optimizations of existing process equipment and supporting infrastructure. Refer to Figure 1.2 and Figure 1.3 for site plans of the WWTP and Gorge Pump Station, respectively. A process flow schematic is included as Figure 1.7.

The purpose of this report is to document existing conditions and evaluate potential solutions to issues that have been observed, reported, or otherwise acknowledged under earlier and separate efforts. The potential solutions will then be used to establish recommendations for restoring treatment process effectiveness, renewing aging infrastructure, addressing operational limitations, promoting permit compliance, and minimizing the likelihood of future violations. Based on the needs assessments and resulting CIP, the critical projects listed below have been identified. Projects are listed without regard to relative criticality, which will be explored under subsequent sections of this report. It is this project list that will be described and evaluated under this report:

Electrical System Improvements

1. Primary Scum Removal and Treatment Improvements
2. Screenings and Grit Transport Equipment Improvements
3. Sedimentation Basin Improvements
4. Polymer Equipment Upgrades
5. Disinfectant Dosage and Location Optimization
6. Gorge Pumping Station Rehabilitation
7. Granular Activated Carbon Replacement
8. Carbon Filter Support Gravel Replacement
9. Sedimentation Basin Isolation Plate Replacement
10. Chemical Coagulant Optimization
11. Minimization of Sulfide Formation
12. Heating and Ventilation Improvements
13. Dewatering Equipment Control Upgrades

14. Backwash Blower Equipment Improvements
15. Thickened Sludge Building Waterline Replacement
16. Lighting Improvements
17. Interior Process Piping Replacement
18. Sedimentation Basin No. 5 Effluent Management Improvements

In order to identify the most cost-effective and technically feasible approach to addressing each need, multiple improvement alternatives have been considered and described. As the CIP largely contemplates the rehabilitation of existing facilities, in some instances the various alternatives for a given project feature only slight permutations. The list below outlines some considerations that influenced the development of the alternatives:

1. No action versus improvement
2. Repair/rehabilitation versus replacement
3. Existing versus alternate technology, equipment type, or unit process
4. Optimize versus upgrade
5. Implement in phases versus comprehensive overhaul

Due to the broad reach of this report, as evidenced by the project listing above, the alternatives assessment is limited to a qualitative engineering assessment. A detailed alternatives analysis of each item of this report would not fit within the NFWB's budgetary and scheduling constraints. As such, detailed technology/alternatives costing and comparison on a project-specific basis has been reserved for completion during the detailed design phase of the capital improvement project(s).

2.1 Project 1: Electrical System Improvements

2.1.1 Description of Existing Conditions

The existing NFWB WWTP facility's electrical power service is provided by National Grid's 115 kilovolt (kV) electrical network. The 115kV service feeders 187 and 188 terminate at the NFWB's primary switchgear component of the facility's double-ended 115kV to 13.8kV power service substation. The service substation is located outdoors and is immediately adjacent to the WWTP water/sewer maintenance building. The incoming medium-voltage 13.8kV service power is then stepped down at a series of power center transformers (Power Centers 1A, 1B, 2A, 2B, 3, 4, 5A, 5B, and 6). The power centers step the 13.8 kV service power down to a 480V load utilization level for distribution to various motor control centers. Refer to Figures 2.1A and 2.1B for an existing one-line diagram.

The NFWB has recently committed significant resources to the investigation and repair of the substation switchgear. The NFWB is currently under contract with an electrical contractor for the completion of testing and various repairs at the main substation. Some of the repair work was prompted by a recent substation failure. Several recent investigatory efforts have also identified

critical needs that must be addressed at various protective power center equipment. Specific issues requiring attention include:

- Power Center 1: The PCB-containing liquid insulated transformer located in Power Center 1A has failed and cannot be re-energized. The NFWB hired an electrical contractor to install a temporary jumper from the under-loaded Power Center 2 over to Power Center 1A to restore redundancy to Power Center 1. Power Center 1 supplies power to the main pumps, intermediate pumps, administration building, various heating and ventilation units, mechanical bar screens, pump building, scum building, primary travelling bridges, and the emergency power distribution panel. The failed transformer is thus a critical piece of equipment and must be removed, properly disposed of, and replaced.
- Power Center 3: Power Center 3 supplies power to the carbon filter backwash pumps, plant water pumps, and various heating and ventilation equipment. The internals of Power Center 3 are severely corroded and the equipment has required recent servicing. The original Power Center 3 was replaced in the early 1990s, also due to corrosion. Thus the existing Power Center 3 equipment is over 25 years old and has exceeded its anticipated useful life. Several alternatives were considered including the replacement of Power Center 3 with new atmospherically-protected equipment in the same location. Ultimately, the alternative that emerged as the most practical and cost-effective was the decommissioning, removal, and disposal of Power Center 3 and the extension of feeders from the under-loaded Power Center 2 to the MCC currently fed from Power Center 3.
- Power Center 5: The tie breaker between Power Center 5A and Power Center 5B is undersized and does not permit all loads to operate from a single feeder. Replacement of the tie breaker is necessary to restore this functionality.
- Substation: The existing high voltage (115kv) circuit switchers in the substation yard are currently operated locally from exterior panels located beneath the overhead wiring in the switchyard. Approximately five years ago, a nonfatal incident in that area prompted a reevaluation of practices and safety measures in the substation area. One recommendation that was made by NFWB was to relocate the controls for these switches to a safer location.
- Distribution System Components: Some of the 480 volt MCCs and power panelboards exhibit internal corrosion that should be corrected. A survey and inspection will identify the specific equipment requiring short-term replacement, deferring work on the remaining equipment for a subsequent project.
- Remote Monitoring of Substation: Currently, remote monitoring of substation loads, alarms, and controls is not practiced. Because the substation is an unmanned facility, it would be advantageous to introduce digital relaying and a connection of the existing fiber optic network to the substation relays to enable remote monitoring of relay parameters (e.g., voltage, current, breaker position, and faults) via the existing SCADA system. SCADA graphics could also be generated, which would provide a dynamic graphical representation of the medium voltage distribution system.
- Remote Monitoring of MCCs: Similarly it would be beneficial to incorporate power monitoring at the MCC level to help gauge electrical energy consumption per each unit process. Establishing a benchmark and trending against may support energy management.

2.1.2 Description of Alternatives

The deficient electrical equipment could be addressed in several ways. The alternatives that were examined as part of this report include:

Alternative 1A – No Action:

The WWTP's electrical system is comprised of critical equipment that is essential for operations. Some of the critical equipment is failing, in poor condition, or beyond its anticipated useful life. The degradation of electrical equipment not only introduces risk of equipment failure or loss of power, but also creates a health and safety concern. Inaction with regard to addressing the critical equipment issues is not acceptable.

Alternative 1B – Complete Critical Repairs:

In order to provide continuous and reliable levels of service, it is imperative that the noted issues be addressed without delay. The NFWB has allocated approximately $1 million towards near-term electrical system improvements. Based on this spending authority, electrical improvements have been prioritized. The issues noted herein are those that cannot be deferred and thus Alternative 1B is recommended to be completed under the NFWB's next capital improvements project. Additional costs for remote monitoring of MCCs and SCADA are provided.

Alternative 1C – Comprehensive Replacement:

Over the longer term, additional needs will continue to emerge, due to the age of the existing substation and power center equipment. The WWTP was designed for flow and loading conditions, which differ from current conditions. As such, all of the existing substation and power center transformers are oversized and could be downsized to achieve energy and cost savings. A comprehensive upgrade to include replacement of all major substation and power center equipment would renew equipment life, increase reliability, and result in energy savings. Completion of these improvements given other circumstances and other critical needs is cost prohibitive. For this reason, Alternative 1C is not recommended at this time.

2.1.3 Capital Project Cost Estimate

A preliminary project cost estimate was not developed for Alternative 1B. Rather, the preliminary project cost was established based on funds available. The NFWB allocated $1 million to the completion of power center and substation improvements. It is anticipated that the correction of the issues noted in this report will not exceed the allocated amount. Should the allocated amount be in excess of the cost required to address the noted issues, the balance of funds will be directed to other priority electrical system improvements. Using the allocated construction value, a total capital project cost was prepared that includes construction, contingency, and non-construction related costs; such as engineering costs, legal fees, and administrative costs (ELA) for services rendered. The estimated project cost estimate is included as Table 2.1.

Table 2.1 Alternative 1B – Complete Critical Repairs Cost Estimate

Item	Description	Total Installed Cost
1	Power Center 1 Replacement	$1,000,000
2	Power Center 3 Decommissioning	
3	Power Center 5 Improvements	
4	Substation Safety Improvements	
5	Remote Monitoring Improvements	
6	MCC and Panel Replacements	
7	MCC Power Monitoring	$600,000
8	SCADA and Integration Allowance	$100,000
	Construction Subtotal:	$1,700,000
	Engineering/Legal/Administrative (15%):	$260,000
	Contingency (20%):	$400,000
	Total Estimated Project Cost (Rounded):	$2,360,000

2.2 Project 2: Primary Scum Removal and Treatment Improvements

2.2.1 Description of Existing Conditions

The WWTP was originally designed to include a scum handling and treatment system. Scum within the sedimentation basins was collected by slotted scum pipes and transported by gravity to the scum building wet well by way of scum wells and interconnecting piping. The scum wet well included a mixer for shearing solids and keeping solids in suspension. The scum building dry well included two dry-pit submersible scum pumps. These pumps transported scum from the scum wet well to the inlet of a dissolved air flotation (DAF) system, which separated the solids, fats, oils, and greases from the wastewater. The separated solids were then directed to a dumpster and the clarified wastewater was directed back to the head of the plant.

Over time this system fell into a state of disrepair. Presently the scum treatment system is out of service. Much of the existing equipment located within the scum building has been abandoned in place, but the electrical room is maintained and contains equipment used to power and operate the sedimentation basin mechanical equipment. At the present, scum that has been collected in wells at the scum end of the sedimentation basin tanks is occasionally removed by vacuum truck and offloaded at an on-site drying area for subsequent loading into a roll-off container for disposal. This method of scum handling and disposal is inefficient and labor intensive. Further, it does not promote regular scum removal from the surfaces of the sedimentation basins. Regular scum removal is necessary to protect downstream unit processes and effluent water quality, and promote efficient carbon filter operation. For the various reasons mentioned herein, it is recommended that the scum removal and treatment system be restored.

2.2.2 Description of Alternatives

The following alternatives were considered with respect to the reinstatement of the former scum processing system.

Alternative 2A – No Action:

No action would result in the necessary continuation of current labor-intensive scum handling and disposal practices. These continued efforts would translate into inefficiencies and the utilization of labor that could otherwise be directed to maintenance. Further, a continuous scum removal system is necessary to support effective carbon filter operation and thus protect effluent water quality. For these reasons, inaction with regard to reinstating the scum removal and treatment process is not recommended.

Alternative 2B – Restore Scum Pumping and Install Fine Screen:

In 2015, various scum improvements were designed under Contract 65 to address the limitations described under section 2.2.1. The following improvements were constructed:

- New manually operated 16-inch diameter scum troughs/pipes.
- Scum wet well slide gate repairs.
- Door improvements.
- Electrical equipment improvements.
- Electrical room ventilation and lighting improvements.

Additional work was designed, but was not authorized for budgetary reasons. Faced with higher than anticipated bids, the project was repackaged and re-bid as Contract 65R. The following improvements were removed from the project and have not been constructed:

- Demolition of the existing DAF system and scum wet well mixer.
- Cleaning of existing scum wells and scum transport pipes.
- Supply and installation of a new wedge-wire fine drum screen system and controls.
- Supply and installation of two new scum pumps and level based controls.
- Supply and installation of a new sump pump in the scum pump dry well.
- Supply and installation of a new scum wet well mixer with controls for maintaining scum consistency.
- Supply and installation of new on-demand hot water heater.
- Completion of general improvements to isolate acid mixer area.
- Scum Building heating and ventilation improvements.

One viable alternative would be to update and reuse the existing design that was previously removed from Contract 65. This would result in cost savings for the NFWB and would allow for the improvements to be completed in a timely manner.

Alternative 2C – Restore Pumping and Install Alternate Scum Treatment Technology:

Alternative 2C also involves the restoration of the scum removal and treatment system, but aims to utilize an alternate scum processing technology such as dissolved air flotation or a different style of fine screen. Due to the previous efforts expended on the design of the fine drum screen system and due to constraints of utilizing the existing Scum Building and the available equipment footprint, there is limited value in exploring alternate scum processing technologies. For this reason, Alternative 2B is recommended.

2.2.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 2B. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost estimate is included as Table 2.2.

Table 2.2 Alternative 2B – Restore Pumping and Install Fine Screen Cost Estimate

Item	Description	Total Installed Cost
1	Demolition	$30,000
2	Clean Scum Wells and Transport Piping	$20,000
3	Scum Mixer Replacement	$60,000
4	Scum Pump and Piping Replacements	$75,000
5	Sump Pump Replacement	$3,000
6	Fine Screen System	$130,000
7	Safety Ladder	$7,500
8	Water Service	$25,000
9	Water Heater	$15,000
10	Door Improvements	$20,000
11	General Building Improvements	$30,000
12	Structural Repairs	$25,000
13	Heating and Ventilation Improvements	$100,000
14	Electrical Improvements	$110,000
15	Handrail Improvements	$10,000
16	SCADA and Integration Allowance	$70,000
	Construction Subtotal:	$731,000
	Engineering/Legal/Administrative (15%):	$110,000
	Contingency (20%):	$170,000
	Total Estimated Project Cost (Rounded):	$1,020,000

2.3 Project 3: Screenings and Grit Transport Equipment Improvements

2.3.1 Description of Existing Conditions

The NFWB headworks area is both corrosive and designated as an electrically classified area. As such, equipment tends to corrode aggressively due to the effects of influent gasses. The headworks area includes three parallel bar screens, which serve to remove solids from the influent flow, thereby protecting downstream pumping and process equipment. Screenings from each screen are collected on a belt conveyor, which transports the screenings from the three influent bar screens to a roll-off container for transport and disposal off site. The bar screens were replaced in 2008/2009 under Contract 56, but the screenings conveyor is original to the WWTP. Welded repairs have been performed over the years, but little original material remains in stressed areas, making future repairs difficult and less effective.

In the same vicinity as the screens are the NFWB's two grit cyclones/classifiers. Grit underflow collected in sumps within the rapid mix tanks and flocculator tanks is pumped to the grit cyclone, where the grit is washed to remove organics. Drain water is directed back to the main channel downstream of the mechanical bar screen equipment. The grit is deposited in the same roll-off container as the screenings for disposal off site. An overhead grit distribution screw was also installed under Contract 56, but since then it has worn, failed, and been removed. Presently, grit is deposited directly to a dumpster and NFWB personnel must manually rake the material to distribute the grit within the container.

2.3.2 Description of Alternatives

The following alternatives were considered with respect to the screenings and grit transport equipment improvements.

Alternative 3A – No Action:

Screenings and grit conveyance is necessary from a health and safety and housekeeping perspective. Non-operational equipment will result in screening and grit accumulation on the operating floor. Furthermore, the manual practice of raking the grit is inefficient and has contributed to injuries in the past. No action with respect to addressing the failing screenings conveyor and reinstating the former grit screw conveyors is not recommended.

Alternative 3B – Replacement in Kind:

The existing screening conveyor's condition has deteriorated to the point of requiring replacement. Alternative 3B features the replacement of the existing screenings handling equipment in kind. The OEM and alternate equipment manufacturers could be considered. The existing bar screening conveyor should be selectively demolished and replaced with a new system complete with structure, belt, explosion-proof belt motor and reducer, pulleys, bearings, safety switches, motor starters, and control interlocks with the existing screens. The new equipment should be constructed of corrosion resistant stainless steel to promote equipment longevity. The existing screening capacity remains unchanged and, therefore, the new conveyor can be based on the original design criteria, belt speed, and dimensions.

The former grit screw conveyor must be reinstated as it is necessary for the distribution of grit across the roll-off container. A new shaft-less screw conveyor with explosion-proof motors and all stainless steel construction is therefore necessary. Based on the appropriateness of current technologies, Alternative 3B is recommended.

Alternative 3C – Replacement with Alternate Screening Conveyance Technology:

Alternative 3C contemplates the replacement of the existing conveyance equipment in kind, but also seeks to introduce alternate conveyance technologies. Available screening handling options include:

- Direct to dumpster – This is the current method of operation for the grit equipment. It has been problematic for several reasons and should not be considered for screenings.
- Bagging – The screenings capacity is high relative to bag volume. As such, bagging is not appropriate for this WWTP.
- Belt conveyors – A belt conveyor is used today. Aside from deterioration due to being located in a corrosive environment, the equipment has performed as intended. Disadvantages include a high quantity of moving parts and odor, due to being uncovered. As the roll-off container is also uncovered, odor does not present an issue in this application.
- Shafted screw conveyors – Shafted screw conveyors are an option, but may increase O&M requirements due to a potential for screenings to occasionally become wound around the shaft.
- Shaft-less screw conveyors – Shaft-less screw conveyors have a higher capacity, but have many wear parts and a high relative O&M requirement.
- Sluice conveyance – Gravity sluice conveyance is efficient and features low O&M, but is not applicable for this application, due to relative elevations and existing headworks area layout.

For grit, a shaft-less screw conveyor to match existing is the most common and appropriate technology. Based on the comparison above, a transition to an alternate technology is not warranted. Alternate means of screening conveyance may be considered further during detailed design, but for the purposes of this report the recommendation is being made to replace both the screening conveyor and grit screw conveyor in kind with like equipment.

2.3.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 3B. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost estimate is included as Table 2.3.

Table 2.3 Alternative 3B – Replacement of Screenings and Grit Transport Equipment in Kind Cost Estimate

Item	Description	Total Installed Cost
1	Demolition of Existing Conveyors	$30,000
2	New Bar Screening Conveyor	$200,000
3	New Grit Screw Conveyor	$100,000
4	Electrical Improvements	$30,000
5	SCADA and Integration Allowance	$40,000
	Construction Subtotal:	$360,000
	Engineering/Legal/Administrative (15%):	$60,000
	Contingency (20%):	$92,000
	Total Estimated Project Cost (Rounded):	$560,000

2.4 Project 4: Sedimentation Basin Improvements

2.4.1 Description of Existing Conditions

As presented in Section 1.3.7, the WWTP features five primary sedimentation basins, four of which include traveling bridge scum and sludge collection equipment. The traveling bridge equipment is maintenance intensive, prone to failure, and has already been rebuilt once in the 1990s. In addition, costs for refurbishing the traveling bridges are high. The condition and limited operational reliability of the existing traveling bridge equipment prompted the NFWB to explore replacement with an alternate technology. This evaluation was completed under a separate effort. The outcome of this evaluation suggested that a conversion to a chain and flight type system was both appropriate and feasible. Under Contract 65R, the traveling bridge equipment within one of the five sedimentation basins was recently removed and replaced with new chain and flight style longitudinal scum and sludge collection equipment. The single basin retrofit was done to pilot the new technology. Plant staff are reportedly very satisfied with the performance of the new system. Refer to Figure 2.2 for a typical layout of the proposed chain and flight equipment and sedimentation basin retrofit.

2.4.2 Description of Alternatives

The following alternatives were considered with respect to the renewal of the existing sedimentation basin mechanical equipment.

Alternative 4A – No Action:

Primary treatment takes place in the sedimentation basins and the failure of a basin's traveling bridge would impair treatment capacity. No action with regard to replacement or upgrade of the existing sedimentation basin scum and sludge collection system equipment is not advisable. The critical equipment must be replaced.

Alternative 4B – Replacement in Kind:

Alternative 4B contemplates the replacement of the existing traveling bridge equipment in kind. Although this renews the equipment, this approach would diminish the value of completing the pilot and may even negate the results thereof. Furthermore, the NFWB would be left with two separate technologies for the same unit process that must be operated, maintained, and repaired. Lastly, as

demonstrated under a separate effort, the cost to retrofit the basins to include chain and flight style equipment was comparable to that required to simply replace the existing equipment in kind. For these reasons, it is recommended that the NFWB take advantage of the pilot project's success and retrofit the remaining four sedimentation basins with new chain and flight equipment to match Sedimentation Basin No. 1.

Alternative 4C – Replacement of Traveling Bridges with Chain and Flight Equipment:

Under Alternative 4C, it is recommended that the existing traveling bridge scum and sludge collection system equipment be removed and replaced with new chain and flight style equipment. It is anticipated that the design, construction, and operating experience gained during the pilot will translate into repeat success and cost savings for the NFWB. Standardization to guarantee that the new equipment is supplied by the original equipment manufacturer (OEM) of the chain and flight equipment installed within Basin No. 1 would be to the benefit of the NFWB for parts interchangeability and O&M consistency across all basins.

The chain and flight equipment requires that a new concrete partition wall be installed the length of the basin to reduce the span of the sludge scraper flights. The two sub-basins created by the partition wall would be hydraulically connected. Two separate chain and flight systems would be installed within each sub-basin. In addition, a new drive access platform and a concrete fillet along the top inner face of the basin's walls would be required. The bottom tee rails for the traveling bridge should be removed from the basin floor or ground down. The new equipment should be brought into SCADA to provide remote monitoring capabilities. Control, however, should be provided at a local pushbutton station.

Additional Work:

The replacement of the scum and sludge collection equipment and controls will require that the sedimentation basins be isolated, drained, and cleaned. The removal of the basins from operational service provides the opportune time to complete other ancillary repairs. Additional improvements that should be completed while each basin is out of service include:

- Concrete tank spall and crack repairs.
- Resealing of expansion joints between basins.
- Grit screw drive, sludge screw drive, and flocculation chain and flight drive replacements.
- Grit screw and sludge screw replacements.
- Remote monitoring of flocculation chain and flight tilt poles.
- Automatic shutdown and alarm generation upon loss of signal to flocculation chain and flight motors.
- Modify scum pipe handrail and incorporate a fall prevention tether system.

It is worth noting that measures to allow for alignment monitoring and sprocket rotation monitoring can be provided by chain and flight manufacturers. The cost and suitability of including monitoring instrumentation for each of the longitudinal chain and flight scum and sludge collection system will be further explored under detailed design.

Recent discussions between the NFWB and its consultants have also introduced the concept of extending the effluent launders to provide additional weir length to reduce the occurrence of short-circuiting and solids washout from within the sedimentation basins. The incorporation of this concept would involve concrete modifications, the addition of approximately 2,500 linear feet of effluent weir troughs, and relocation of the existing scum pipes. This has been budgeted for and practical and cost-effective methods for increasing weir length should be further explored during detailed design of the project.

2.4.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 4C and the additional work that was identified and described. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost is included in Table 2.4.

Table 2.4 Alternative 4C – Replacement of Traveling Bridge Equipment with Chain and Flight Equipment

Item	Description	Total Installed Cost
1	Demolition of Traveling Bridge Equipment (4 Basins)	$160,000
2	Cleaning of Existing Basins	$120,000
3	New Partition Walls (4 Basins)	$900,000
4	New Chain and Flight Equipment (4 Basins)	$1,600,000
5	New Drive Platforms (4 Basins)	$200,000
6	Electrical and Controls Improvements	$400,000
7	Structural Repairs	$400,000
8	Grit and Sludge Screw Replacements (5 Basins)	$375,000
9	Grit, Sludge, and Flocculator Drive Replacements (5 Basins)	$450,000
10	Screw and Flocculator Drives Relocation	$75,000
11	Flocculator Chain and Flight Improvements	$200,000
12	Effluent Launder Weir Improvements	$600,000
13	Fall Safety Tethering System	$600,000
14	SCADA and Integration Allowance	$200,000
	Construction Subtotal:	$6,280,000
	Engineering/Legal/Administrative (15%):	$950,000
	Contingency (20%):	$1,450,000
	Total Estimated Project Cost (Rounded):	$8,680,000

2.5 Project 5: Polymer Equipment Upgrades

2.5.1 Description of Existing Conditions

The polymer system consists of four polymer transfer pumps which transfer polymer from the mix tanks to the feed tanks, and five VFD-operated polymer feed pumps which serve to pump polymer to the process. There are a total of four tanks, or two mix tanks and two feed tanks. Primary polymer feed pump Nos. 1 and 2 draw from polymer feed tank No. 1 and pump polymer solution to the primary sedimentation basins via a motive water system. Belt filter press polymer feed pump Nos. 1, 2, and 4 draw from polymer feed tank No. 4 and pump polymer solution directly to the three BFPs.

Recently, the polymer feed pumps and transfer pumps were replaced with new progressive cavity pumps under Contract 65R. The facilities for preparing polymer solution, however, are original to the plant and several components have failed resulting in a loss of redundancy. Furthermore, the equipment is inefficient and inaccurate, which results in inconsistency of batch solutions.

2.5.2 Description of Alternatives

The following alternatives were considered with respect to the renewal of the existing dry polymer feeder and mixer equipment.

Alternative 5A – No Action:

No action with respect to addressing the deficient polymer feed/mix equipment is not recommended. Improvements to the polymer equipment are necessary to mitigate the likelihood of the failure of the remaining operational and non-redundant equipment. Inefficiency, age, and condition justify the replacement of the equipment, in lieu of repair.

Alternative 5B – Replacement of Deficient Polymer Equipment:

Alternative 5B contemplates the replacement of the existing dry polymer feeders and mix tank mixers in kind. The new system should include modern controls to both simplify the system and promote consistent batch solution production.

Alternative 5C – Replacement and Upgrade of Polymer Equipment:

Alternative 5C includes the base scope of Alternative 5B, but extends beyond it to also include a new pump and motor assembly dedicated to Sedimentation Basin No. 5. Introducing a dedicated polymer feed pump, discharge line, and controls would enable NFWB operations personnel to optimize dosages to the periodically-active basin. This would potentially improve performance and reduce polymer usage.

Alternative 5C also includes new pressure regulating valves and instrumentation for the influent polymer motive water system. Incorporation of this proposed equipment would help prevent backflow through the feed pumps and tank spillage, both of which have occurred on several occasions. Not only is this damaging to the pump equipment, but it also creates a slip and fall hazard, increases maintenance requirements, and interrupts polymer feed. Alternative 5C is recommended.

2.5.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 5C. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost estimate is included as Table 2.5.

Table 2.5 Alternative 5C – Replacement and Upgrade of Polymer Equipment Cost Estimate

Item	Description	Total Installed Cost
1	Demolition	$30,000
2	Tank Mixers	$60,000
3	Dry Polymer Feeders and Controls	$250,000
4	Polymer Feed Pump and VFD	$70,000
5	Discharge Piping and Valves	$50,000
6	Electrical Improvements	$75,000
7	Plant Water Pressure Regulation Valves and Instruments	$15,000
8	SCADA and Integration Allowance	$40,000
	Construction Subtotal:	$590,000
	Engineering/Legal/Administrative (15%):	$90,000
	Contingency (20%):	$140,000
	Total Estimated Project Cost (Rounded):	$820,000

2.6 Project 6: Disinfectant Dosage and Location Optimization

2.6.1 Description of Existing Conditions

There are two sodium hypochlorite feed pumps that are used to provide disinfection of granular activated carbon effluent. The existing pumps were installed approximately 10 years ago. Sodium hypochlorite solution is added to the effluent end of the backwash wet well, upstream of the chlorine contact tank. There is currently no means of adding additional sodium hypochlorite at the chlorine contact tank. The chlorine contact tank, however, receives treated carbon filter backwash water and wet weather carbon system bypass flows. For this reason, it is difficult to control sodium hypochlorite dosing for consistent effluent disinfection purposes.

2.6.2 Description of Alternatives

The following alternatives were considered with respect to the optimization of disinfectant dosage and location.

Alternative 6A – No Action:

No action is not feasible. The NFWB's Order on Consent Item No. 9 requires that action be taken.

Alternative 6B – Optimize Sodium Hypochlorite Dosage and Location:

Alternative 6B of this report is equivalent to "Alternative 7" as described in the October 2015 *WWTP Effluent Turbidity Engineering Report* (Turbidity Report), which was prepared for the NFWB by URS Corporation. The proposed measures outlined in the Turbidity Report include a new total residual chlorine monitor downstream of the backwash wet well for monitoring of the total residual chlorine at that location and the addition of a new chemical feed pump system to provide a means of dosing sodium hypochlorite at the inlet to the chlorine contact tank. These sodium hypochlorite pumps would be located in the existing Odor Control Building and would pump into a new pipeline. Options for the new pump feed discharge piping:

1. Install the new feedline inside the existing 72-inch diameter carbon bed effluent gravity pipe connecting the backwash wet well to the chlorine contact tank.

2. Install the new feedline from the Odor Control Building into the Chemical Tunnel and through the existing stretch of chlorine solution piping (providing secondary containment) to the chlorine contact tank.

Routing and termination choices will be further evaluated during detailed design to optimize the consistency and reliability of disinfection.

2.6.3 Capital Project Cost Estimate

A preliminary project cost estimate for Alternative 6B was prepared separately by others for inclusion within the NFWB's CIP. The total capital project cost was estimated to be $650,000. This amount includes construction, SCADA integration, contingency, and non-construction related costs.

2.7 Project 7: Gorge Pumping Station Rehabilitation

2.7.1 Description of Existing Conditions

The Gorge Pumping Station is located in the Niagara River Gorge near Ashland Avenue at the Robert Moses Parkway. It was constructed in the mid-1970s at the site of the former Ashland Avenue Sewage Treatment Plant under Contract 2. The Gorge Pumping Station is designed to pump up to 19.5 mgd to the WWTP on Buffalo Avenue via the Gorge Forcemain.

The Gorge Pumping Station serves the north, central and portions of the south end of the City of Niagara Falls. Flow enters the Gorge Pumping Station through two unlined rock tunnels known as the North Gorge Interceptor and the South Gorge Interceptor. The tunnels combine into a common approach channel, which have a series of overflow weir plates. These weir plates are overtopped if flow exceeds the station's pumping capacity. Downstream of the approach channel flow splits and passes through two motorized grinders, which grind up solids that could otherwise cause damage to the pumps. Flow is then directed into three wet wells, which each have a dedicated wastewater pump. The Gorge Pumping Station underwent a major rehabilitation in 1993 under Contract 40. A second major rehabilitation was completed in 2008 under Contract 55. Based on current critical needs and issues, another comprehensive facility rehabilitation project is recommended.

2.7.2 Description of Alternatives

The following alternatives were considered with respect to addressing the critical needs at the Gorge Pumping Station.

<u>Alternative 7A – No Action:</u>

The Gorge Pumping Station has several critical needs that necessitate the completion of a comprehensive rehabilitation. The factory rehabilitation of the pumps in 2008 was expected to last 10 years (2018). The pumps are now requiring expensive maintenance to continue operating. Canceling the project or deferring it are not viable options. Alternative 7A is not recommended.

Alternative 7B – Gorge Pumping Station Replacement:

Alternative 7B contemplates replacement of the existing pumping station with a new pumping station. This alternative does not emerge as cost-effective or viable in the context of the criticality of the equipment in need of correction for several reasons:

- The site location and topography do not support the station's replacement on the same site. The Gorge Pumping Station is aptly named in that it was constructed directly adjacent to the Niagara River gorge. There is no available space on the property to permit the installation of a new station while the existing remains operational. Any possible construction is made more difficult by the site access limitations; a photograph of the site is shown on Figure 2.3. Lastly the NFWB does not own the land that the Gorge Pumping Station resides upon, but rather makes use of the land through a 99 year lease agreement with the NYPA.
- Construction of a new pumping station at an alternate site would be complex and take a considerable amount of time. Land acquisition, permitting, regulatory approvals, and engineering and environmental studies would delay the detailed design and thus construction as well. Furthermore, rerouting of interceptor sewers and the Gorge Forcemain would be challenging and costly, due to being deep, unlined rock tunnels.
- The construction of a new station would cost much more than a rehabilitation of critical needs. This would defer other critical needs described in this report. Deferring work described in this report is not recommended.

Figure 2.3 Photograph of Gorge Pumping Station Site

Alternative 7C – Comprehensive Gorge Pumping Station Rehabilitation:

Alternative 7C involves the comprehensive rehabilitation of the pumping station. The recommended improvements include the following:

1. Pumping Improvements

   The Gorge Pumping Station includes three vertical, centrifugal, solids-handling wastewater pumps rated for 13.5 mgd (9,400 gpm) at 174 feet of total dynamic head. Each pump is driven using a 500 hp, 1,200 RPM motor that is controlled by an ABB VFD. Due to the demanding continuous duty, high flow, high motor speed, high head pumping application, the pumping equipment (installed in 1992 and rehabilitated in 2008) is approaching the end of its useful life and experiences diminished pump performance. The station historically has also had high pump/motor vibration issues. One possible contributing factor for the high vibration levels is the structural design of the pump room floor. The Gorge Pumping Station was constructed over top of the former Ashland Avenue Sewage Treatment Plant. The structure has a large open room beneath the pumps and a series of columns to support the floor. This arrangement may not be providing the correct stiffness required for the pump foundations to mitigate vibrations. Options for reducing vibrations include structurally reinforcing the pump room floor, upsizing the pump foundations or motor pedestals, and/or converting the pumps from the current vertical arrangement to a horizontal configuration. The pump VFDs are reportedly in fair operating condition and are installed in a climate-controlled environment that is isolated from the pump room. However, they are approximately 11 years old and nearing the end of their useful life. When evaluating the pumping improvements, several options will be considered.

   a. Replace Pumps in Kind (Vertical Configuration), Recondition Motors, and Reuse Drives:

      Replacement of the pumps in kind would allow for the reuse of the pump motors and VFDs. If the vertical pump-motor layout was preserved, motor rehabilitation would be an option. Motor rehabilitation, however, would only be an option if the pumps were replaced in kind with new Xylem pumps (the OEM) mounted in the vertical configuration. It is worth noting that reuse of motor and VFD equipment would not allow for the specification of a wire-to-water efficiency of the pump-motor-VFD combination. Rather, only pump efficiency and operating point could be specified.

   b. Replace Pumps in Kind (Vertical Configuration), Replace Motors, and Reuse Drives:

      Under this option, a similar approach is taken, except that the motors are replaced rather than rewound/reconditioned. The new motors would be supplied by the OEM pump manufacturer.

   c. Replace Pumps (Horizontal Configuration), Replace Motors, and Reuse Drives:

      Under this scenario, the pumps and motors would be replaced with a new horizontal pump-motor layout. Piping modifications would be necessary to transition from the vertical configuration to horizontal, which would add project costs. This option is only attractive if the horizontal configuration will conclusively address the vibration issue.

d. New Pumps, New Motors, and New Drives:

Under this option, all new pumps, motors, and VFDs would be provided. The potential exists for the proposed equipment to include new pumps with 600 hp motors. This would necessitate replacement of the existing VFDs.

Each of these approaches will be explored further during detailed design. For the purposes of this report and budgeting, Alternative 7C was structured to include new pumps, new motors, and new drives.

2. Grinder Improvements:

The Gorge Pumping Station features two in-channel, Franklin Miller, dimminuter-type grinder units. The north channel grinder was removed and sent off site for a factory rebuild in 2014. The south channel grinder was not rebuilt in 2014 and is in need of similar repair.

When evaluating the grinder improvements, several options will be considered.

a. Replacement of grinder.

b. Comprehensive off-site factory rebuild.

c. On-site wear parts replacements.

The grinder has not yet been rebuilt and as such replacement may be premature. Also, an on-site replacement of rotating and stationary cutters only is of limited value and may not address all facility needs. It is instead recommended that the grinder be subject to a comprehensive off-site rebuild, similar to the work done on the north channel grinder. The grinder should be removed, sent to an OEM authorized repair facility for evaluation, and rebuilt based on the evaluation findings. At a minimum, the stationary and rotating cutters, screen, and seals should be replaced with new equipment.

3. Wet Well Heating and Ventilation Improvements:

The Gorge Pumping Station wet well heating and ventilation equipment is currently out of service and needs to be replaced. It is recommended that the existing supply and exhaust ventilation equipment be removed and replaced. The equipment is located in a corrosive and electrically classified area and, as such, equipment should be explosion-proof rated. The dedicated wet well supply and exhaust system should be designed to achieve 12 air changes per hour. It is also advisable to specify corrosion resistant equipment and ductwork.

4. Wet Well and Overflow Channel Lighting Improvements:

Some of the existing lighting in the Gorge Pumping Station overflow channel and the wet well area is currently not functioning. The deficient lighting equipment must be replaced to alleviate safety concerns. The new lighting system should include replacement switches and luminaries, as required. A replacement emergency wall pack should also be included in the design.

5. Wet Well Sluice Gate Replacements:

The existing wall-mounted sluice gate used to isolate the Gorge Pumping Station Wet Well No. 2 from Wet Well No. 3 is currently inoperable. The inability to isolate the wet well imposes limitations on operations and maintenance.

The non-operational gate and the plate installed on the Wet Well No. 2 side of the wall opening should be removed. In their place, a new fabricated stainless steel wall-mounted sluice gate with a manual handwheel operator should be installed.

The existing cast iron sluice gate used for isolating the Gorge Pumping Station north inlet channel flows is non-operational and requires replacement. To restore isolation abilities, the deficient gate should be removed and replaced with a new fabricated stainless steel in-channel sluice gate equipped with manual handwheel operator. The installation work will require a temporary bulkhead and temporary pumps to facilitate contractor access.

6. Security System Improvements:

The Gorge Pumping Station has a video surveillance system and an intrusion detection system. The existing intrusion detection system serves to alert the NFWB about unauthorized access. Since the system's initial installation in 2009, several door switches have failed and have not yet been replaced. Due to the Gorge Pumping Station's high rate of vandalism and intrusion attempts, the NFWB desires to replace any non-operational switches and/or install motion detectors. It is recommended that deficient switches, electronic door hardware, and/or motion detectors be removed and replaced with new equipment. It is assumed that the existing security system panel is functional and does not require replacement.

7. Wet Well Door Repairs:

The Gorge Pumping Station wet well double doors include custom vandal-resistant padlock hardware. The locking mechanism's pin/shaft is worn and must be replaced with new. The door and frame, however, are reportedly in satisfactory condition. It is recommended that a new retaining shaft for the existing padlock be fabricated and installed.

8. Upper Building Interior Wall Stabilization:

The existing architectural wall covering within the hydropneumatic tank room is delaminating and underlying reinforcing mesh has become exposed in some areas. As a housekeeping item, it is recommended that the existing stucco-type wall covering be removed and replaced with a new corrosion resistant, low maintenance wall covering. Due to the age of the existing wall covering system, it is also recommended that the services of a testing agency be utilized for lead sampling and analysis.

Additional Work:

Additional work items have also been identified as near-term needs at the Gorge Pumping Station. The NFWB should consider its available options and make a determination as to whether to address these needs under the proposed capital project or to fund them separately. Additional improvements that should be completed include:

9. Elevator Rehabilitation:

The Gorge Pumping Station elevator is in need of an upgrade due to equipment age and controls obsolescence. This elevator is a freight elevator with manual, vertical-rise car gates and manual bi-parting freight doors. It is recommended that the elevator be evaluated and addressed. At a minimum, the controls should be upgraded and new work incorporated as required to render the elevator code-compliant. This work will require the replacement of the existing elevator hoist motor with new single speed, AC elevator motor, drive, and controller. The work will also include new car and hall signal fixtures, smoke detectors, and additional safety devices as required to satisfy relevant building code requirements. As an ancillary improvement, it is recommended that a new sump pump complete with controller and float-based level detection instrumentation be installed to manage water accumulation within the existing sump at the lower level of the elevator shaft.

2.7.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 7C and the additional work that was identified and described. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost estimate is included as Table 2.6.

Table 2.6 Alternative 7C – Comprehensive Gorge Pumping Station Rehabilitation Cost Estimate

Item	Description	Total Installed Cost
1	Pumping and Control Improvements	$2,000,000
2	Pump Room Structural Improvements	$100,000
3	Grinder Improvements	$110,000
4	Wet Well Heating and Ventilation Improvements	$100,000
5	Wet Well and Overflow Channel Lighting Improvements	$15,000
6	Wet Well Sluice Gate Replacement	$130,000
7	Security System Improvements	$25,000
8	Wet Well Door Repairs	$10,000
9	Upper Building Interior Wall Stabilization	$100,000
10	Elevator Improvements	$175,000
11	SCADA and Integration Allowance	$200,000
	Construction Subtotal:	$2,965,000
	Engineering/Legal/Administrative (15%):	$450,000
	Contingency (20%):	$690,000
	Total Estimated Project Cost (Rounded):	$4,110,000

2.8 Project 8: Granular Activated Carbon Replacement

2.8.1 Description of Existing Conditions

As presented in Section 1.3.7, the WWTP includes 28 GAC filters grouped into two parallel treatment trains (Train A and Train B) of 14 filters each. Each filter bay is approximately 42 feet long by 17 feet wide, with a typical carbon depth of approximately 6.5 feet. Filters are scheduled for carbon replacement based upon carbon age. Filters containing carbon that has aged beyond approximately 1,000 days are in need of carbon replacement. In 2016, the carbon within eight filters

was removed and replaced with new GAC under Contract 65R. In parallel, the NFWB replaced the carbon within an additional five filters, leaving several filters with over 1,000 days of exposure. The NFWB generally completes some carbon filter change-outs each year out of its operating budget. In 2017, only a few filters were addressed. It has also been reported that so far to date in 2018, no carbon filter change-outs have occurred. Additional carbon media replacement is recommended.

2.8.2 Description of Alternatives

The following alternatives were considered with respect to addressing the need for granular activated carbon media replacement.

Alternative 8A – No Action:

Not replacing carbon at the required interval decreases treatment effectiveness and thus increases risk of impaired effluent water quality. Alternative 8A is not an option.

Alternative 8B – Replacement with Recycled Reactivated Carbon:

Alternative 3B features the replacement of carbon from within approximately 30 percent to 40 percent of the carbon filters under the proposed capital project. The exact quantity of filters ultimately addressed will be based on actual carbon exposure and estimated carbon supply and disposal prices at the time of design. For the purposes of this report it was assumed that the scope of work would include the removal and replacement of the carbon within a minimum of nine separate filters.

Alternative 8C – Replacement with Virgin Carbon:

Alternative 8C is identical to Alternative 8B, except that it contemplates using virgin carbon instead of recycled reactivated carbon. The NFWB has had success with the recycled reactivated type, which is generally a more cost-effective solution. For these reasons, Alternative 8B is recommended.

2.8.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 8B. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost estimate is included as Table 2.7.

Table 2.7 Alternative 8B – Replacement with Recycled Reactivated Carbon Cost Estimate

Item	Description	Total Installed Cost
1	Remove and Dispose of Existing GAC Media (9 filters)	$270,000
2	Supply and Install New GAC Media (9 filters)	$810,000
	Construction Subtotal:	$1,080,000
	Engineering/Legal/Administrative (15%):	$170,000
	Contingency (20%):	$250,000
	Total Estimated Project Cost (Rounded):	$1,500,000

2.9 Project 9: Carbon Filter Support Gravel Replacement

2.9.1 Description of Existing Conditions

The granular activated carbon filter media is supported by 14 inches of support gravel of various gradations. Periodic displacement of the gravel bed supported by the filter underdrain system creates the potential for inefficient filter operation. The support gravel within 23 of the 28 filters was replaced under Contract 65R. Replacement of the support gravel also allowed for underdrain and filter wall inspections to be completed.

2.9.2 Description of Alternatives

The following alternatives were considered with respect to replacing the existing filter media support gravel.

Alternative 9A – No Action:

No action with regard to filter support gravel replacement in the remaining five filters is not recommended. Contract 65R work revealed that the gravel layering system had been disrupted and interfering materials (plastics) were present. Air vent line repairs are also presumed to be warranted, which necessitates gravel removal.

Alternative 9B: Replacement of Support Gravel:

Under Alternative 9B, the support gravel within the remaining five filters not addressed under Contract 65R would be removed and replaced with new gravel in gradations that match the existing in stone size and layer depth. The Contract 65R approach would be utilized for the replacement of support gravel within an additional five filter bays (Filter Nos. 3, 4, 12, 13, and 26). The work would include the removal and temporary storage of existing GAC filter media, removal and disposal of existing support gravel, inspection of the filter bay concrete, installation of new gravel, and reinstallation of existing GAC using liquid conveyance means. While each filter is out of service, discernible cracks and other defects within the underdrain should be addressed by completing spot repairs and grouting, as needed. It is also recommended that a borescope inspection of the filter underdrain modules be completed to determine condition and to ascertain whether media has pulled through. Lastly, repairs or replacements of damaged PVC vent piping should also be conducted while a filter is out of service. It is recommended that Alternative 9B be implemented.

2.9.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 9B. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost estimate is included as Table 2.8.

Table 2.8 Alternative 9B – Replacement of Support Gravel Cost Estimate

Item	Description	Total Installed Cost
1	Filter Support Gravel Replacement (5 filters)	$350,000
	Construction Subtotal:	$350,000
	Engineering/Legal/Administrative (15%):	$60,000
	Contingency (20%):	$90,000
	Total Estimated Project Cost (Rounded):	$500,000

2.10 Project 10: Sedimentation Basin Isolation Plate Replacement

2.10.1 Description of Existing Conditions

The sedimentation basin effluent channel features two existing sets of guides designed to accept a slide plate at Sedimentation Basin No. 5. The corroded influent slide plate was replaced, prior to total failure, but similar concerns for the effluent plate remain unaddressed at this time.

2.10.2 Description of Alternatives

The following alternatives were considered with respect to replacing the existing isolation plate.

Alternative 10A – No Action:

Not taking action to address the corroded plate will put the NFWB at risk for gate failure. Failure of the plate would allow for primary effluent to circumvent secondary treatment and flow uncontrolled directly into the chlorine contact tank. This would impact effluent water quality and may lead to permit violations. Alternative 10A is thus not recommended.

Alternative 10B: Replacement of Corroded Gate with Stop Plate:

Under Alternative 10B, the deficient stop plate and guides would be removed and replaced with a new removable stop plate and surface mounted channel wall guides. Temporary bulkhead of the sedimentation basin effluent channel from the chlorine contact tank would be necessary to facilitate the work.

Alternative 10C: Replacement of Both Isolation Plate Guides:

Alternative 10C includes the base scope from Alternative 10B, but contemplates the installation of new guides at both plate locations, as well. The guides would be able to accept the same stop plate. Alternative 10C is recommended.

2.10.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 10C. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost estimate is included as Table 2.9.

Table 2.9 Alternative 10C – Replacement of Both Isolation Plate Guides Cost Estimate

Item	Description	Total Installed Cost
1	Temporary Bypass Pumping and Bulkhead	$60,000
2	Demolition of Existing Plate and Guides	$5,000
3	Supply and Install of New Stop Plate and Guides	$30,000
	Construction Subtotal:	$95,000
	Engineering/Legal/Administrative (15%):	$15,000
	Contingency (20%):	$22,000
	Total Estimated Project Cost (Rounded):	$140,000

2.11 Project 11: Chemical Coagulant Optimization

2.11.1 Description of Existing Conditions

At the WWTP, ferric chloride is dosed downstream of the screens for phosphorus removal and to precipitate out solids present in the waste stream; thereby enhancing primary treatment. Ferric chloride is stored in each of two bulk storage tanks located in the lower level of the sludge building. The opportunity exists for coagulant dosing to be optimized.

2.11.2 Description of Alternatives

The following alternatives were considered with respect to optimizing chemical coagulant addition and treatment.

Alternative 11A – No Action:

Not taking measures to optimize coagulant dosing by exploring coagulant type and feed point would be inconsistent with an Order on Consent goal of improving treatment performance. For this reason, Alternative 11A is not recommended.

Alternative 11B – Alternate Coagulant:

Under Alternative 11B, bench scale testing would be performed to evaluate the effectiveness of both alternate coagulant types and alternate coagulant feed points. Alternate coagulant types, such as aluminum chloride or ferrous sulfate are worth exploring. Furthermore, it is possible that the most effective method of coagulation features multiple coagulant types and multiple feed points.

One possible scenario would involve the continued use of ferric chloride as the coagulant of choice for head of plant dosing and the introduction of a different coagulant to be fed to Sedimentation Basin No. 5 for enhanced treatment of carbon filter backwash water (or vice versa). The introduction of a new chemical feed system would result in the need for a new chemical transfer station, chemical bulk storage tank, feed pump system, delivery piping, diffusers/mixers at the delivery point(s), instruments and analyzer equipment, and controls and SCADA integration. It is presumed that a new building would not be required and that the unused neat polymer storage tank adjacent to the ferric chloride storage tanks could be removed and replaced with a new coagulant tank.

Concurrent with the implementation of the new coagulant feed system, the existing ferric chloride feed system should also be improved upon where necessary. Improvements should include, but not be limited to, replacement of the existing duplex pumping system equipment and controls upgrades to transition away from constant dose operation in favor of a flow-paced chemical feed rate.

It is recommended that Alternative 11B be pursued beginning with on-site testing and preliminary engineering and evaluation thereafter.

2.11.3 Capital Project Cost Estimate

A preliminary project cost estimate cannot be developed for Alternative 11B at this time. An engineering study and bench testing is necessary to determine the most prudent approach for coagulant optimization. Until the study efforts have been completed and the project scope refined, an estimate of project cost will not be available. Nonetheless, the NFWB would like to be proactive in the budgeting for and initiation of the investigation, design, and implementation of measures aimed at coagulant optimization. In the absence of a detailed scope and corresponding cost, the NFWB has allocated $1,500,000 for the completion of this project. This amount is inclusive of construction, SCADA integration, contingency, and non-construction related costs. It is also inclusive of preliminary engineering and services in support of on-site pilot testing, where applicable.

2.12 Project 12: Minimization of Sulfide Formation

2.12.1 Description of Existing Conditions

The WWTP produces a significant amount of sulfides. The majority of sulfide formation occurs within the carbon filters. GAC used for physical-chemical treatment is prone to hydrogen sulfide generation in anaerobic conditions. These anaerobic conditions exert an oxygen demand that diminishes water quality. Minimization of sulfide formation is warranted.

2.12.2 Description of Alternatives

Alternative 12A – No Action:

Inaction with regard to exploring sulfide formation minimization measures would be inconsistent with the terms of the Order on Consent. As such, Alternative 12A is not recommended.

Alternative 12B – Oxidant Addition:

Chemical oxidation is one method for controlling sulfide addition. It is recommended that the addition of an oxidizing agent be explored further with an engineering study. Preliminary efforts associated with the Turbidity Report suggest the following approaches may be viable solutions. It is important to note that the efficacy and appropriateness of each suggestion requires bench testing and/or pilot testing to confirm or refute viability.

1. Sedimentation Basin Influent Oxidant Addition:

   Hydrogen peroxide addition to the influent channel upstream of the sedimentation basins (downstream of existing screens) would both add dissolved oxygen and serve as an oxidant. Bench testing to further evaluate this alternative should be considered to ensure that chemical addition does not adversely affect floc formation and settling in the sedimentation basins. The proposed approach assumes a new hydrogen peroxide bulk storage tank, as well as a duplex chemical feed pump system, interconnecting piping, instrumentation, and remote monitoring and control integration. This approach would likely result in a significant increase in chemical usage.

2. Carbon Filter Influent Oxidant Addition:

   A second approach would involve the addition of sodium hypochlorite (or possibly hydrogen peroxide) to the carbon filter influent to help maintain a positive oxidation-reduction potential (ORP) within the carbon filter beds and act as a disinfectant thereby preventing the formation of new sulfides. Bench testing to determine the required dosage and the depletory effect of the chemicals on the carbon should be completed. Following the bench test a pilot test on an operational filter could be performed. This approach contemplates dedicated sodium hypochlorite addition pumping equipment for each filter and an ORP probe installed in the filter effluent piping. The existing sodium hypochlorite storage tanks in the Odor Control Building could be reused, but new interconnecting piping would be required.

3. Carbon Filter Backwash Water Oxidant Addition:

   An alternative approach would involve the addition of hydrogen peroxide or sodium hypochlorite to the backwash water so that the underdrain, support gravel, and granular activated carbon are subjected to a strong dose of chemical oxidizer/disinfectant during a backwash. To implement this approach, new sodium hypochlorite feed pumps would need to be installed and connected to the existing sodium hypochlorite storage tanks in the Odor Control Building. New probes would also be needed for monitoring of the ORP in the effluent backwash water.

4. Gravity Thickener Oxidant Addition:

   Under this concept, the gravity thickener influent would be dosed with either sodium hypochlorite or hydrogen peroxide to minimize and control sulfide levels in the overflow return to the WWTP headworks. The implementation of this system would require new chemical feed pumps, chemical feed piping to the center of each of the existing sludge thickeners, and ORP sensors. Again, reuse of the existing sodium hypochlorite or hydrogen peroxide chemical bulk storage tanks is being contemplated.

2.12.3 Capital Project Cost Estimate

A preliminary project cost estimate cannot be developed for Alternative 12B at this time. An engineering study, bench testing, and pilot testing is necessary to determine the most prudent approach for minimizing sulfide formation at the WWTP. Until the study has been completed and the project scope refined, an estimate of project cost will not be available. Nonetheless, the NFWB would like to be proactive in the budgeting for and initiation of the exploration and implementation of

sulfide minimization measures. In the absence of a detailed scope and corresponding cost, the NFWB has allocated $1,500,000 for the completion of the project. This amount is inclusive of construction, SCADA integration, contingency, and non-construction related costs. It is also inclusive of preliminary engineering and services in support of bench testing and pilot testing, where applicable.

2.13 Project 13: Heating and Ventilation Improvements

2.13.1 Description of Existing Conditions

The WWTP includes a variety of heating and ventilation equipment. Some of the equipment is rated for general occupancy or heat dissipation, whereas a large amount of the equipment is health and safety related and is necessary to achieve certain air changes per hour (ACH) in critical, corrosive, and electrically classified process areas. This critical equipment was generally designed for compliance with recommended design guidance such as National Fire Protection Association (NFPA) Standard 820 for Fire Protection in Wastewater Treatment and Collection Facilities, Ten State Standards for Wastewater Facilities, and New England Interstate Water Pollution Control Commission, TR-16 Guides for the Design of Wastewater Treatment Works.

Much of the existing equipment is non-operational or otherwise in need of improvements. GHD prepared a *Wastewater Treatment Plant Hydrogen Sulfide Preliminary Assessment* (Assessment) for the NFWB in 2016. As part of the Assessment, existing ventilation and odor control equipment were evaluated in terms of functional and operational status. Observations were used to establish recommendations. Many of the recommendations related to existing heating and ventilation equipment renewal or replacement and the addition of altogether new equipment. The heating and ventilation equipment needs were prioritized and several of the critical needs have been scheduled on the NFWB's CIP.

2.13.2 Description of Alternatives

The following alternatives were considered with respect to the completion of heating and ventilation improvements.

Alternative 13A – No Action:

Inaction with regard to replacement of deficient or non-operational equipment is not recommended. These needs should be addressed to restore design air change rates, promote health and safety, and reduce the deleterious effects of sewer gases and sulfides on mechanical and electrical equipment.

Alternative 13B – Replacement of Critical Heating and Ventilation Equipment:

Alternative 13B includes the replacement of those heating and ventilation equipment deemed most critical to health and safety, continuous operations, and equipment longevity. Alternative 13B includes the following work items:

1. Former Vacuum Pump Room Improvements:

   Under Project 14 (to be described under the subsequent section of this report) critical electrical equipment would be relocated from the belt filter press area to the former vacuum pump room. To protect the relocated electrical equipment, it is recommended that the room be isolated from the belt filter press process area. This would require among other improvements, the installation of a new curtain wall to extend from the top of the existing wall up to the building structure.

   Within the newly isolated electrical room (former vacuum pump room), a dedicated HVAC system should then be installed to service this new electrical room and the adjacent belt filter press lab/operator office. The proposed supply and exhaust system should be designed to maintain positive pressure in the proposed electrical room, thereby promoting the longevity of the new equipment. These former vacuum pump room improvements should only be performed in conjunction with Project 14's implementation.

2. Belt Filter Press Roof Exhaust Fan Improvements:

   Recent inspections and ductwork velocity sampling of the belt filter press area supply and exhaust system (performed as part of a *Wastewater Treatment Plant Hydrogen Sulfide Preliminary Assessment)* revealed several non-operational roof exhaust fans. The belt filter press area ventilation system requires continuous operation of these fans in order to achieve 12 ACH and align with NFPA guidance for sludge dewatering facilities. It is recommended that the five roof exhaust fans that service the belt filter press area be removed and replaced with new fans, ductwork (where applicable), and appurtenances.

3. Carbon Storage Area Ventilation Improvements:

   The WWTP's carbon storage area is a corrosive environment that features open concrete storage tanks for both regenerated and spent GAC media. Both the supply and exhaust units that service the carbon storage area should be replaced with new equipment.

4. Main Pump Building and Wet Well Ventilation Improvements:

   During the recent inspections performed as part of the Assessment, it was noted that several heating and ventilation units and exhaust fans designed to service the main pump dry well and wet well were not functioning. The existing units appeared to be original to the WWTP. Further investigation revealed that the manufacturer of said equipment no longer exists and thus the availability of parts for this equipment is questionable.

   Addressing the deficient equipment is complicated by the location of and access to the equipment. In some instances, full replacement may not be feasible without significant additional cost because equipment is currently located in congested mechanical rooms. Replacement of this equipment would likely require that the units be installed in an alternate location. Full replacement of this deficient heating/ventilation equipment is not contemplated under this project.

   It is instead recommended that a contractor first inspect the equipment and identify the specific needs. The needs assessment should provide insight as to whether the units can be repaired or if replacement is warranted.

In the absence of information substantiating a full replacement need, repair of the deficient main pump and wet well heating and ventilation equipment is instead contemplated under this report. Repairs would include, but not be limited to, belt, fan, motor, heating coil, and thermostat replacements, as required to return the equipment to operational service.

5. Headworks Area Heating and Ventilation Improvements:

An original heating and ventilation unit once serviced the bar screen area, but the unit was removed as part of flood recovery efforts performed within the past five years. Furthermore, the existing interlocked combination exhaust louver and associated return fan are not currently operational. New heating and ventilation equipment is required within the screen room and main channel area to meet NFPA standards of 12 ACH for headworks facilities.

Consideration was given to the design of a new interior heating and ventilation unit to match the performance of the former unit, but locating the unit indoors would subject the heating coils, motor, and ancillary components to corrosive conditions and a shortened life. It is instead proposed that two new outdoor supply fans be installed on the north wall of the screen room; each of the units would be rated to achieve 6 ACH. When used together they could achieve the desired airflow rate of 12 ACH.

The proposed ventilation system would also include a new exhaust fan interlocked with the air supply equipment and located at the east end of the main channel. To support a complete air sweep of the area to be serviced, a new return fan for the dead space at the main pump discharges and a recirculation fan to help prevent air stagnation between the supply and exhaust are also proposed.

It is also recommended that a series of new electric, explosion-proof unit heaters be installed to service this same area. Heat is necessary to prevent freezing when the new supply fans are operational. For the purposes of this report, it has been assumed that the proposed heat load will match the kW rating of the former heating/ventilation unit. The exact quantity and rating of unit heaters would be determined during detailed design.

Alternative 13C – Addressing of All Heating and Ventilation Equipment Needs:

During the recent inspections performed as part of the Assessment, additional non-operational heating and ventilation equipment (in addition to and separate from those needs listed under Alternative 13B) were identified. The additional heating equipment needs are largely unit heaters. Most of the additional non-operational ventilation equipment was designed for general occupancy. As such, it is less critical than ventilation equipment included under Alternative 13B, which addresses equipment predominately used to de-rate electrically classified areas; or otherwise comply with NFPA 820. Due to budget sensitivities and critical needs in other areas, it is not recommended that the Alternative 13C equipment needs be addressed as part of this project, unless value engineering or other cost reduction measures allow for reallocation of available funds towards these improvements. These additional heating and ventilation needs are recommended for completion, but may be better handled out of the operation and maintenance budget or as part of a separate capital improvements project.

2.13.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 13B. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost estimate is included as Table 2.10.

Table 2.10 Alternative 13B – Replacement of Critical Heating and Ventilation Equipment Cost Estimate

Item	Description	Total Installed Cost
1	Former Vacuum Pump Room HVAC Upgrades	$50,000
2	Belt Filter Press Roof Exhaust Fan Improvements	$50,000
3	Carbon Storage Area Exhaust Improvements	$50,000
4	Main Pump Building and Wet Well Ventilation Improvements	$315,000
5	Headworks Area Heating and Ventilation Improvements	$210,000
6	Electrical Improvements	$150,000
	Construction Subtotal:	$825,000
	Engineering/Legal/Administrative (15%):	$130,000
	Contingency (20%):	$200,000
	Total Estimated Project Cost (Rounded):	$1,160,000

2.14 Project 14: Dewatering Equipment Control Upgrades

2.14.1 Description of Existing Conditions

The NFWB owns and operates three belt filter presses that are utilized for sludge dewatering. Under normal conditions, two of the three belt filter presses are run in parallel, with the third unit in standby. A recent service visit by the original equipment manufacturer identified various electrical/control panel needs.

Located on the belt filter press access platform is the existing dewatering system control panel. This control panel houses the various relays and interlocks that control the belt filter presses, thickened sludge pumps, polymer feed pumps, conveyors, and lime feeders. This control panel is critical to sludge dewatering operations. Several functions on the existing panel are reportedly non-functional. Issues in the belt filter press local control panels also merit replacement and relocation.

2.14.2 Description of Alternatives

The following alternatives were considered with respect to the completion of dewatering system electrical and controls improvements.

Alternative 14A – No Action:

Inaction with regard to replacement of deficient or non-operational controls equipment is not recommended. Reliable sludge processing is essential to proper and compliant facility operation.

Alternative 14B – Replacement of Belt Filter Press Local Control Panels:

Under Alternative 14B, the three existing belt filter press control panels and various instruments mounted on the presses would be removed and replaced with new control panel equipment, including various press-mounted limit switches, level switches, junction boxes, and proximity switches.

To promote equipment longevity, the proposed equipment would be relocated to the adjacent former vacuum pump room. To support the relocation of the belt filter presses, it is recommended that the room be isolated from the belt filter press process area. This could be accomplished via the installation of a curtain wall to extend up to the building structure from the top of the existing wall. This wall would serve to effectively isolate the proposed electrical room (former vacuum pump room) from the corrosive, belt filter press process environment. Line of sight between equipment and controls would be preserved, due to the presence of existing transparent wall panels. Further, a human-machine interface (HMI) would remain in the process area to allow for local control. It is also recommended that completion of Alternative 14B be coupled with the implementation of the vacuum pump room ventilation improvements component described under Alternative 13B.

Alternative 14C – Comprehensive Dewatering System Control Upgrades:

Alternative 14C includes the Alternative 14B improvements, as well as upgrades to the dewatering system control panel. Under Alternative 14C, the existing dewatering system control panel would be removed and replaced with a new PLC-based control panel with SCADA interface located in the new electrical room (repurposed vacuum pump room). Due to the criticality of the equipment, complexity of the wiring, and concerns relating to maintainability and parts availability Alternative 14C is recommended.

2.14.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 14C. The total capital project cost includes construction, contingency, and non-construction related costs. The total capital project cost does not, however, include the former vacuum pump room heating and ventilation costs described and included under Alternative 13B. The estimated project cost estimate is included as Table 2.11.

Table 2.11 Alternative 14C – Comprehensive Dewatering System Control Upgrades Cost Estimate

Item	Description	Total Installed Cost
1	Belt Filter Press Local Control Panel Replacements	$275,000
2	Vacuum Pump Room General Improvements	$50,000
3	Vacuum Pump Room Heating and Ventilation Improvements	Not Included
4	Dewatering Control Panel Replacement and SCADA Integration	$200,000
	Construction Subtotal:	$525,000
	Engineering/Legal/Administrative (15%):	$80,000
	Contingency (20%):	$130,000
	Total Estimated Project Cost (Rounded):	$740,000

2.15 Project 15: Backwash Blower Equipment Improvements

2.15.1 Description of Existing Conditions

Located in the lower level of the odor control building are two positive displacement air blowers used during carbon filter backwash operations. One of the two original blowers was replaced with a Gardner Denver unit, which is currently being serviced by the NFWB. The second of the two blowers is original to the WWTP.

2.15.2 Description of Alternatives

The following alternatives were considered with respect to the blower improvements.

Alternative 15A – No Action:

The blowers are critical process equipment that support effective filter operation and as such inaction with regard to addressing the non-operational blower equipment is not recommended.

Alternative 15B – Replacement of Blower Equipment:

Under Alternative 15B, the original blower would be removed and replaced with a new blower and ancillary equipment. This alternative also contemplates a new, energy-efficient motor, as the existing 150 hp motor is old and has not been turned over in some time. It may also be necessary or desired to reconfigure existing piping to accommodate the new blower connections or to simply replace sections of exposed air piping, fittings, and valves that are in poor condition or otherwise deemed candidates for replacement.

Alternative 15C – Rehabilitation of Non-operational Blower Equipment:

Alternative 15C includes rehabilitation of the existing blower and motor. Rehabilitation of the existing motor could include pre-rehabilitation field testing and off-site inspection, cleaning, and repair at an authorized service center. Inspection and rehabilitation of the blower could similarly be accomplished at an authorized repair facility. Alternatively, the existing blower could be replaced with a remanufactured unit. A remanufactured unit may be a cost-effective solution, but would need to be explored further before committing to this approach. Although Alternative 15C is a viable solution for addressing the non-operational blower, Alternative 15B is being recommended at this time.

2.15.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 15B. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost estimate is included as Table 2.12.

Table 2.12 Alternative 15B – Replacement of Blower Equipment Cost Estimate

Item	Description	Total Installed Cost
1	Demolition	$20,000
2	New Blower (1)	$50,000
3	New Motor (1)	$15,000
4	Piping and Valve Improvements	$100,000
5	SCADA and Integration Allowance	$20,000
	Construction Subtotal:	$205,000
	Engineering/Legal/Administrative (15%):	$40,000
	Contingency (20%):	$50,000
	Total Estimated Project Cost (Rounded):	$300,000

2.16 Project 16: Thickened Sludge Building Waterline Replacement

2.16.1 Description of Existing Conditions

The only present source of water in the thickened sludge building for hosing and seal water is plant water. Plant water is carbon filter effluent, whereas process water is City water that has passed through a reduced pressure zone backflow preventer. A process water supply once existed, but a leak on the line prompted its isolation using exposed valves within the lower level of the sludge building. When the process water isolation valve is open, process water exfiltration reportedly follows the trench/bedding and leaks back to the basement of the sludge building.

The plant water presently being used for seal water is reportedly contributing to corrosion and pump seal wear. The NFWB has also reported a series of breaks along a buried stretch of plant water piping adjacent to the two exterior sludge thickener tanks. A review of record drawings has identified that the yard is congested with various buried utilities. This complicates the construction of the waterline's replacement in the same trench.

2.16.2 Description of Alternatives

The following alternatives were considered with respect to addressing the thickened sludge building water supply.

Alternative 16A – No Action:

Inaction with regard to addressing deficient waterlines is not recommended. The waterlines will continue to deteriorate until addressed.

Alternative 16B – Replacement of Process Waterline:

Under Alternative 16B, the isolated process waterline that once serviced the thickened sludge building would be replaced. This approach would renew the waterline and address the undue thickened sludge pump wear that is attributable to plant water use as pump seal water. This alternative, however, would not renew the plant waterline and yard hydrants.

Alternative 16C – Replacement of Plant Waterline and Process Waterline:

Under Alternative 16C, the existing plant waterline would be replaced in the same trench or a parallel alignment. The opportunity also exists for new yard hydrants to be installed to promote tank cleaning operations. In addition, a replacement process waterline (from a new interconnection in the lower level of the sludge building) would be installed in a new open-cut excavation. This would be completed to renew the waterline and help mitigate the migration of trench water into the building through cracks/pipe penetrations in the building foundation. The re-introduction of process water to the thickened sludge building would enable the sludge pump seal water connections to be configured such that process water was supplied, in lieu of plant water. This alternative would support maintenance, renew the plant waterline, and increase equipment reliability through the restoration of the process water supply line that formerly fed the thickened sludge building. For these reasons, Alternative 16C is recommended at this time.

2.16.3 Capital Project Cost Estimate

A preliminary project cost estimate was prepared for Alternative 16C. The total capital project cost includes construction, contingency, and non-construction related costs. The estimated project cost estimate is included as Table 2.13.

Table 2.13 Alternative 16C – Replacement of Plant Waterline and Process Waterline Cost Estimate

Item	Description	Total Installed Cost
1	Plant Waterline Replacement	$30,000
2	Plant Waterline Yard Hydrants and Valves	$15,000
3	Thickened Sludge Pump Seal Water Improvements	$10,000
4	Process Water Line Replacement	$20,000
5	Process Water Valves	$10,000
	Construction Subtotal:	$85,000
	Engineering/Legal/Administrative (15%):	$20,000
	Contingency (20%):	$30,000
	Total Estimated Project Cost (Rounded):	$140,000

2.17 Project 17: Lighting Improvements

2.17.1 Description of Existing Conditions

The NFWB WWTP includes several buildings, many of which are multi-level. Much of the critical process equipment is located indoors. Ambient light is limited and the WWTP is operated continuously. Indoor and outdoor lighting is thus necessary for safe access throughout the facility. Many existing lights are non-operational. Lighting issues are especially prevalent in the corrosive areas, such as the headworks area and connected main channel.

2.17.2 Description of Alternatives

The following alternatives were considered with respect to addressing the need for lighting improvements.

Alternative 17A – No Action:

Inaction with regard to addressing areas of the WWTP facility with inadequate lighting presents a health and safety concern and is not viable.

Alternative 17B – Needs Assessment and Lighting Improvements:

Under Alternative 17B, a survey of the WWTP would be completed. Based on the finding of the needs assessment a remedial action plan would be developed, which would guide the design of the deficient lighting system improvements. Lighting system improvements should include the replacement of luminaries, fixtures, switches, sensors, wiring, conduit, and lighting panelboards, as required to restore the appropriate lighting to the facility. As part of the lighting improvements, it is recommended that the transition to LED lighting be considered. Alternative 17B is recommended.

2.17.3 Capital Project Cost Estimate

A preliminary project cost estimate for Alternative 17B cannot be developed until the needs assessment has been completed and the scope refined. Rather, the preliminary project cost was established based on funds available. The NFWB has allocated $250,000 to the completion of lighting system improvements. It is anticipated that the correction of the issues noted in this report will not exceed the allocated amount. Should the allocated amount be in excess of the cost required to address the noted issues, the balance of funds will be directed to other priority electrical system improvements. The total capital project to complete the lighting system improvements was estimated to be $250,000. This amount is inclusive of construction, contingency, and non-construction related costs.

2.18 Project 18: Interior Process Piping Replacement

2.18.1 Description of Existing Conditions

The NFWB's WWTP includes a large quantity of process piping, fittings, and valves which facilitate the transport, routing, and isolation of various process fluids. Process piping may be used to transport, among other fluids, the following:

- Potable water
- Process water
- Plant water (carbon filter effluent)
- Process air
- Virgin and spent carbon slurry
- Sludge, scum, and grit
- Raw wastewater
- Treated wastewater effluent
- Chemicals
- Drain water

To accommodate the large variety of process fluids, pressures, and volumes a wide range of pipe materials and sizes are prevalent throughout the WWTP. There are several known piping, fitting, and valve issues including specific stretches of sludge piping located in the lower level of the sludge building.

2.18.2 Description of Alternatives

The following alternatives were considered with respect to addressing the need for piping improvements.

Alternative 18A – No Action:

Failing to act to address deteriorated process piping would allow that piping to continue to degrade until failure. Piping failure could create a health and safety concern and may also interrupt process. For these reasons, Alternative 18A is not recommended.

Alternative 18B – Needs Assessment and Piping Improvements:

The age and criticality of the facility warrants a comprehensive pipe survey and assessment to identify vulnerabilities and piping arrangements which could be improved upon. Under Alternative 18B, deteriorated piping would be identified, prioritized, and replaced. Alternative 18B is recommended at this time.

2.18.3 Capital Project Cost Estimate

A preliminary project cost estimate cannot be developed for Alternative 18B, until the needs assessment has been completed and the scope refined. The project cost was instead established based on funds available and a projection of the anticipated work. It is reasonable to expect that the implementation of the identified piping improvements would be completed in a phased approach. The NFWB has allocated $500,000 for the completion of the first phase of high priority piping improvements. This amount is inclusive of construction, contingency, and non-construction related costs.

2.19 Project 19: Sedimentation Basin No. 5 Effluent Management Improvements

2.19.1 Description of Existing Conditions

As mentioned previously, the WWTP's 28 GAC filters require periodic backwash to maintain proper operation. Presently, backwash flow rate is split between the rapid mix tanks and Sedimentation Basin No. 5. Flow directed to the rapid mix tanks passes through primary treatment and is then processed through the filters. The flow stream that is passed through Sedimentation Basin No. 5 can be routed to either the chlorine contact tank or the intermediate wet well for treatment through the filters. Backwash procedures produce a high rate of flow, which can complicate treatment operations. When backwash flow is directed to the chlorine contact tank, the large flow contribution impacts the color of the effluent.

In the attempt to reduce the hydraulic impact of the filter backwash on WWTP performance, the NFWB installed a submersible pump within Sedimentation Basin No. 5. This pump serves to

transport backwash flows from Sedimentation Basin No. 5 over the sedimentation basin effluent channel weir to the chlorine contact tank.

2.19.2 Description of Alternatives

The following alternatives were considered with respect to addressing the need to improve the management of carbon filter backwash flow.

Alternative 19A – No Action:

Failure to improve the current carbon filter backwash management procedures will not comply with Order on Consent directives and leaves the NFWB vulnerable to future permit violations. For these reasons, Alternative 19A is not viable.

Alternative 19B – Existing Submersible Pumping System Improvements:

The existing Sedimentation Basin No. 5 submersible pumping equipment is aging. The aging equipment could be renewed by way of replacing the existing equipment in kind. Backwash flow management could be improved by reconfiguring the piping to discharge to the sedimentation basin effluent channel instead of directly to the chlorine contact tank.

Alternative 19C – Submersible Pumping System Upgrades:

Under Alternative 19C, the current Sedimentation Basin No. 5 pumping system would be reconfigured and upgraded. Two new 2,500 gpm submersible pumps would be installed within Sedimentation Basin No. 5. These pumps would be located at the effluent end of Sedimentation Basin No. 5 and pump water out of Sedimentation Basin No. 5 and into the primary effluent channel. Capabilities could be provided wherein the pumps could discharge to either the primary effluent channel or the chlorine contact tank. This would provide operational flexibility and support wet weather management procedure adherence. To further assist with hydraulic equalization and a fluctuating water surface elevation within Sedimentation Basin No. 5 a scum baffle or curtain could be considered. Operational changes recommended in the Turbidity Report that may accompany this capital upgrade include:

- No more than one filter backwash at any one time
- Maximum of 16 filters backwashes on any given day

This backwash water management approach introduces additional pumping capacity and operational flexibility. For these reasons, Alternative 19C is recommended.

2.19.3 Capital Project Cost Estimate

A preliminary project cost estimate for Alternative 19C was prepared separately by others for inclusion within the NFWB's CIP. The total capital project cost was estimated to be $550,000. This amount includes construction, SCADA integration, contingency, and non-construction related costs.

3. Summary and Comparison of Alternatives

The overall WWTP and Gorge Pumping Station Rehabilitation project was deconstructed and organized into nineteen distinct and process/system-focused projects that align with the NFWB's CIP. A high-level alternatives evaluation was conducted and described under Section 2. The various alternatives that were considered as part of this report are summarized in Table 3.1.

Table 3.1 Summary of Alternatives

Project	Description	Alter-native	Description
1	Electrical System Improvements	A	No Action
		B	Complete Critical Repairs
		C	Comprehensive Replacement
2	Primary Scum Removal and Treatment Improvements	A	No Action
		B	Restore Scum Pumping and Install Fine Screen
		C	Restore Pumping and Install Alternate Scum Treatment Technology
3	Screenings and Grit Transport Equipment Improvements	A	No Action
		B	Replacement in Kind
		C	Replacement with Alternate Screening Conveyance Technology
4	Sedimentation Basin Improvements	A	No Action
		B	Replacement in Kind
		C	Replacement of Traveling Bridges with Chain and Flight Equipment
5	Polymer Equipment Upgrades	A	No Action
		B	Replacement of Deficient Polymer Equipment
		C	Replacement and Upgrade of Polymer Equipment
6	Disinfectant Dosage and Location Optimization	A	No Action
		B	Optimize Sodium Hypochlorite Dosage and Location
7	Gorge Pumping Station Rehabilitation	A	No Action
		B	Gorge Pumping Station Replacement
		C	Comprehensive Gorge Pumping Station Rehabilitation
8	Granular Activated Carbon Replacement	A	No Action
		B	Replacement with Recycled Reactivated Carbon
		C	Replacement with Virgin Carbon
9	Carbon Filter Support Gravel Replacement	A	No Action
		B	Replacement of Support Gravel
10	Sedimentation Basin Isolation Plate Replacement	A	No Action
		B	Replacement of Corroded Plate with Stop Plate
		C	Replacement of Both Isolation Plate Guides
11	Chemical Coagulant Optimization	A	No Action
		B	Alternative Coagulant
12	Minimization of Sulfide Formation	A	No Action
		B	Oxidant Addition

Table 3.1 Summary of Alternatives

Project	Description	Alter-native	Description
13	Heating and Ventilation Improvements	A	No Action
		B	Replacement of Critical Heating and Ventilation Equipment
		C	Addressing of All Heating and Ventilation Equipment Needs
14	Dewatering Equipment Control Upgrades	A	No Action
		B	Replacement of Belt Filter Press Local Control Panels
		C	Comprehensive Dewatering System Control Upgrades
15	Backwash Blower Equipment Improvements	A	No Action
		B	Replacement of Blower Equipment
		C	Rehabilitation of Non-operational Blower Equipment
16	Thickened Sludge Building Waterline Replacement	A	No Action
		B	Replacement of Process Waterline
		C	Replacement of Plant Waterline and Process Waterline
17	Lighting Improvements	A	No Action
		B	Needs Assessment and Lighting Improvements
18	Interior Process Piping Replacement	A	No Action
		B	Needs Assessment and Piping Improvements
19	Sedimentation Basin No. 5 Effluent Management Improvements	A	No Action
		B	Existing Submersible Pumping System Improvements
		C	Submersible Pumping System Upgrades

Also included under Section 2 is the recommended alternative for each project, a scope description, and selection rationale. Due to the extensive breadth of material covered by this report, a life-cycle cost analysis for each technically feasible alternative was deemed to be unwieldy and impractical. We do, however, recognize that a life-cycle cost analysis in the form of a net present value evaluation may be warranted for several projects. For this reason, it is anticipated that life-cycle cost analyses be conducted as part of the detailed design to help provide direction with regard to the selection of technologies and equipment.

The completion of some of the proposed improvements has the potential to impact the annual operation and maintenance (O&M) budget, but a more detailed scope definition must preface the completion of any O&M analysis. The proposed improvements will most likely impact cost centers for chemical and power, but staffing levels should also be examined. During detailed design, the net change in annual O&M obligations should be quantified, where applicable.

Furthermore, several of the projects have the potential for achieving energy efficiencies. As part of detailed design it is recommended that after evaluating available and feasible technologies, improvements be recommended that consider energy efficiencies and Building Energy Code. Energy efficient improvements could most notably impact projects that feature electrical systems upgrades, blower replacements, replacements of motors with new premium efficiency equipment, incorporation of VFD operation, lighting improvements, and heating, ventilation, and air conditioning improvements. It is these projects having an energy efficiency driver that a payback period analysis would be applicable. Payback period analyses have been reserved for completion during detailed design.

4. Recommended Alternative

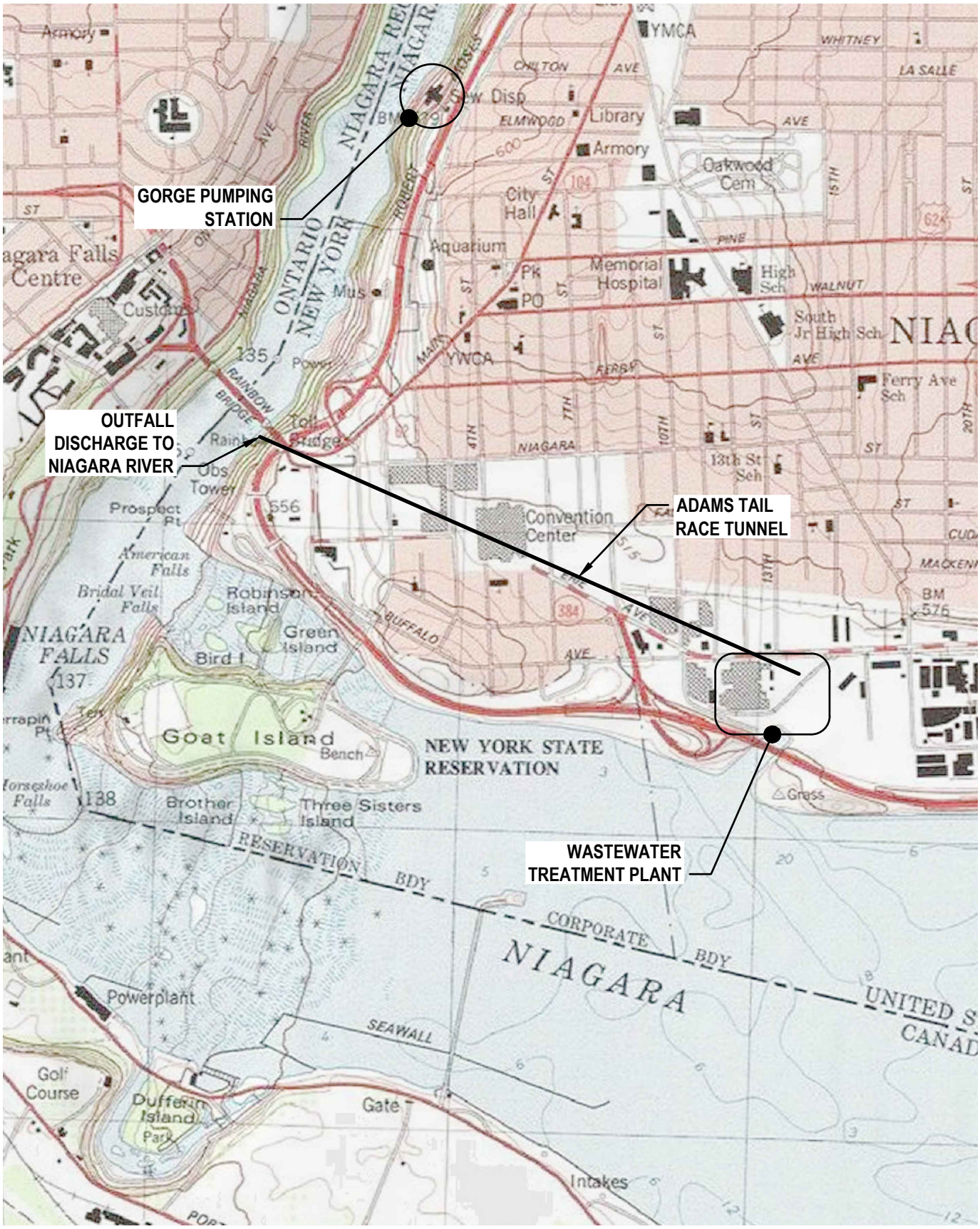
The recommended alternatives that were evaluated, compared, selected, and estimated under Section 2.0 are summarized in Table 4.1. The recommended alternatives were bundled into nine project groups based on relative priority. Recommended alternatives are sorted according to project group number.

Table 4.1 Summary of Recommendations

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**

Criteria that were instrumental in establishing high priority items were in compliance with the Order on Consent and the SPDES permit, health and safety of staff and community, and the mitigation of the consequence and likelihood of critical asset failure. A detailed schedule has been excluded intentionally. The nine project groups that constitute the overall project are in varying stages of progression. Projects that require a needs assessment or further scope definition (e.g., Projects 1, 17, and 18) and those that require preliminary engineering, studies or on-site testing (e.g., Projects 11 and 12) may require additional time.

Figures



N

0 1500'

NIAGARA FALLS WATER BOARD
NIAGARA FALLS, NEW YORK

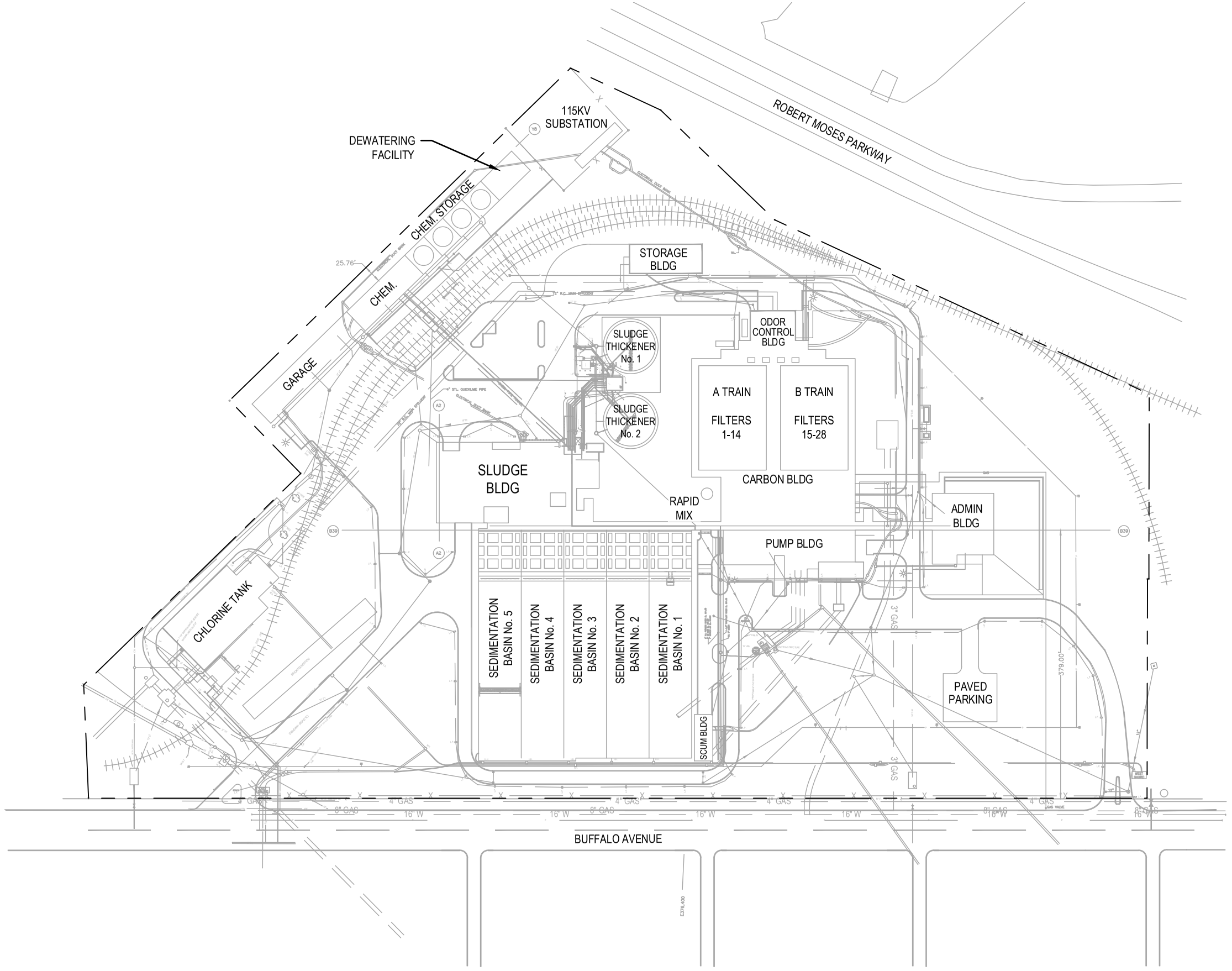
PROJECT LOCATION MAP

Project No. **11145878**
Report No. **002**
Date **MAY 2018**

FIGURE 1.1

Filename: P:\Drawings\10000000's\11145878\NFWB FIGURES\CADD\Drawings\Figures\FIGURE 1.1 PROJECT LOCATION MAP.dwg
Plot Date: 16 May 2018 - 2:40 PM

Source:



N

0 150'

GHD

NIAGARA FALLS WATER BOARD
NIAGARA FALLS, NEW YORK

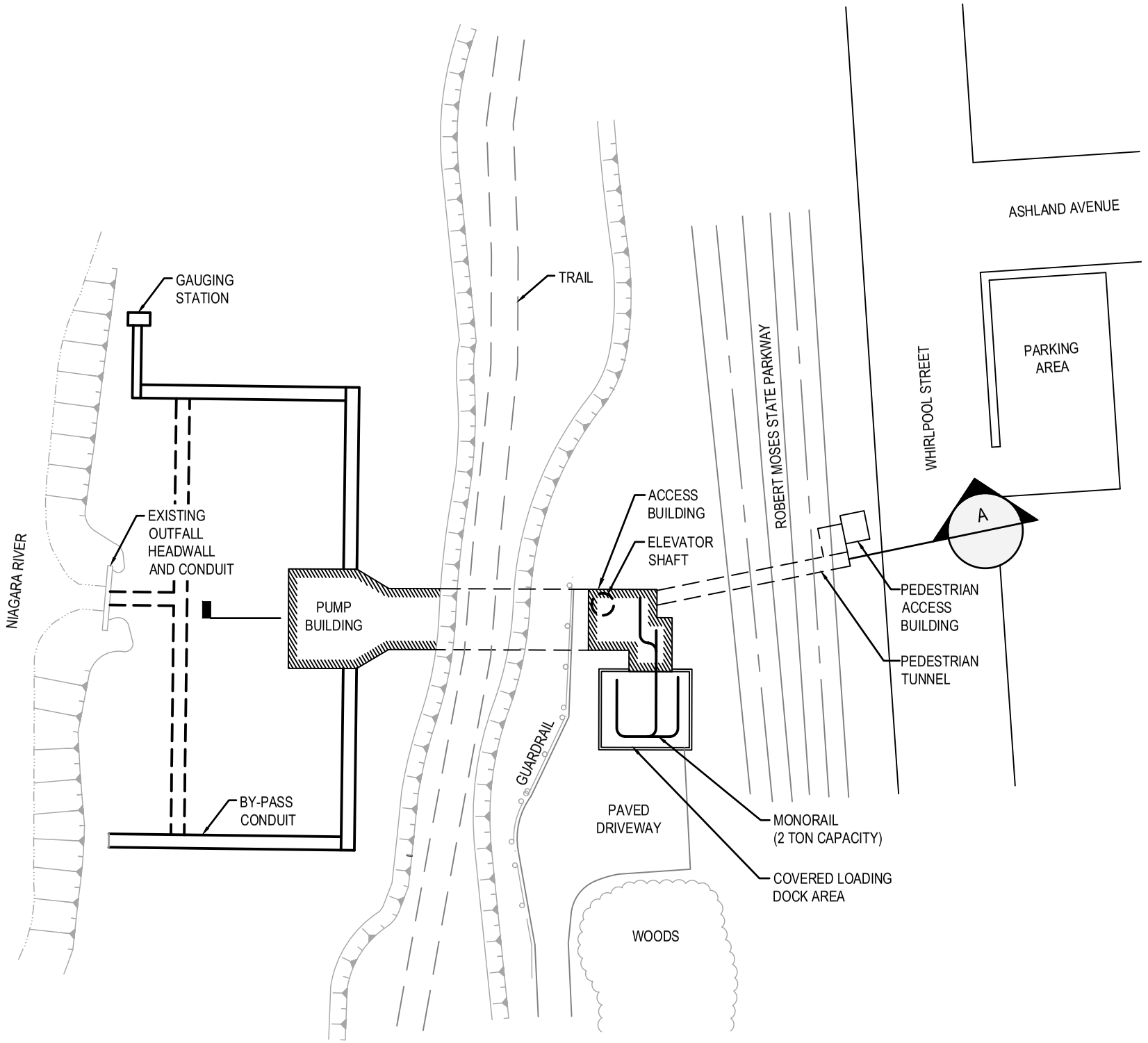
WWTP SITE PLAN

Project No. **11145878**
Report No. **002**
Date **MAY 2018**

FIGURE 1.2

Filename: P:\Drawings\10000000's\11145878\NFWB FIGURES\CADD\Drawings\Figures\FIGURE 1.2 WWTP SITE PLAN.dwg
Plot Date: 16 May 2018 - 2:40 PM

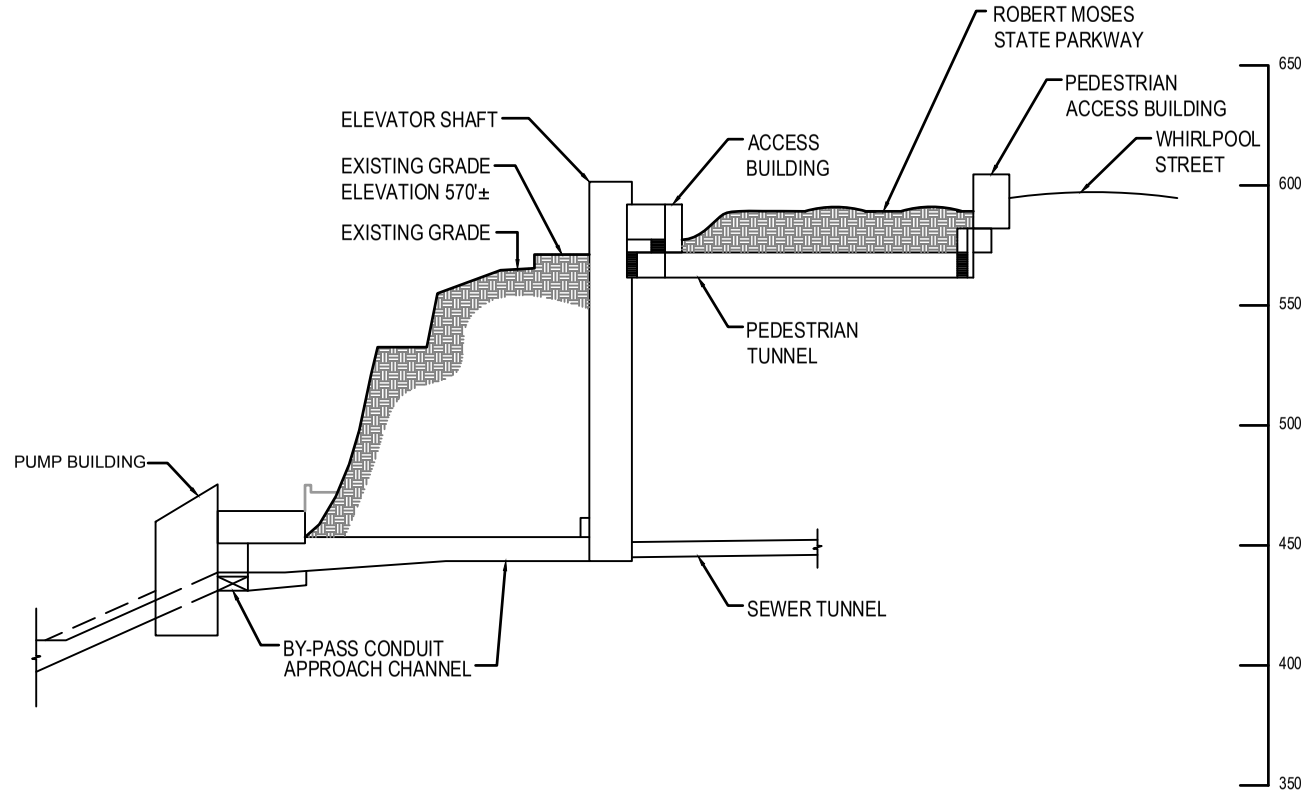
Source:



EXISTING SITE PLAN

SCALE: 1" = 80'

0 80' 160'



A

SECTION

SCALE: 1" = 80'

0 80' 160'

NIAGARA FALLS WATER BOARD
NIAGARA FALLS, NEW YORK

GORGE PUMPING STATION SITE PLAN

Project No. **11145878**
Report No. **002**
Date **MAY 2018**

FIGURE 1.3

Filename: P:\Drawings\10000000\s\11145878\NFWB FIGURES\CADD\Drawings\Figures\FIGURE 1.3 GORGE PUMPING STATION SITE PLAN.dwg
Plot Date: 16 May 2018 - 2:40 PM

Source:

N

0 200'

GHD

NIAGARA FALLS WATER BOARD
NIAGARA FALLS, NEW YORK

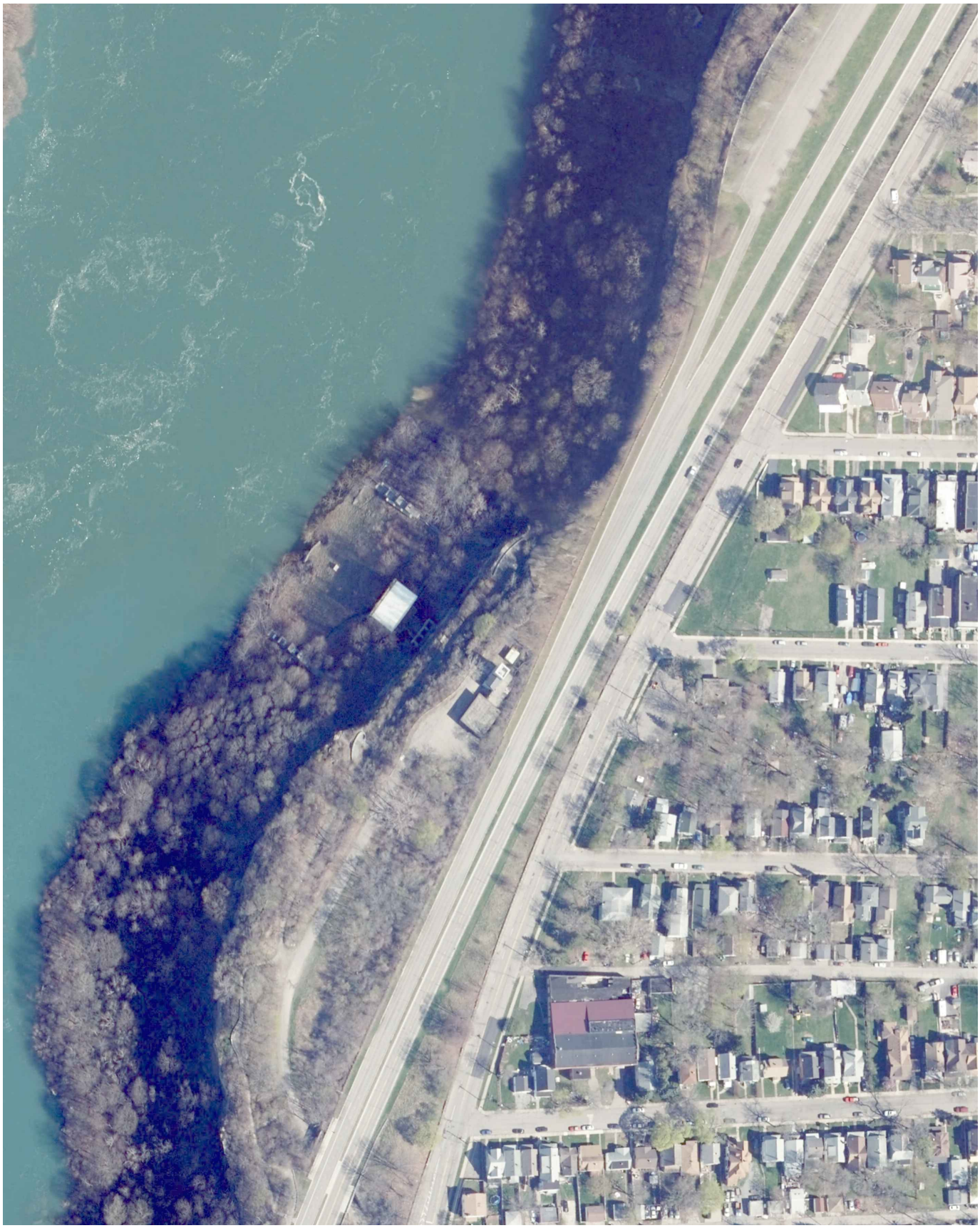
WWTP AERIAL

Project No. **11145878**
Report No. **002**
Date **MAY 2018**

FIGURE 1.4

Filename: P:\Drawings\10000000's\11145878\NFWB FIGURES\CADD\Drawings\Figures\FIGURE 1.4 WWTP AERIAL.dwg
Plot Date: 16 May 2018 - 2:40 PM

Source:



N

0 200'

NIAGARA FALLS WATER BOARD
NIAGARA FALLS, NEW YORK

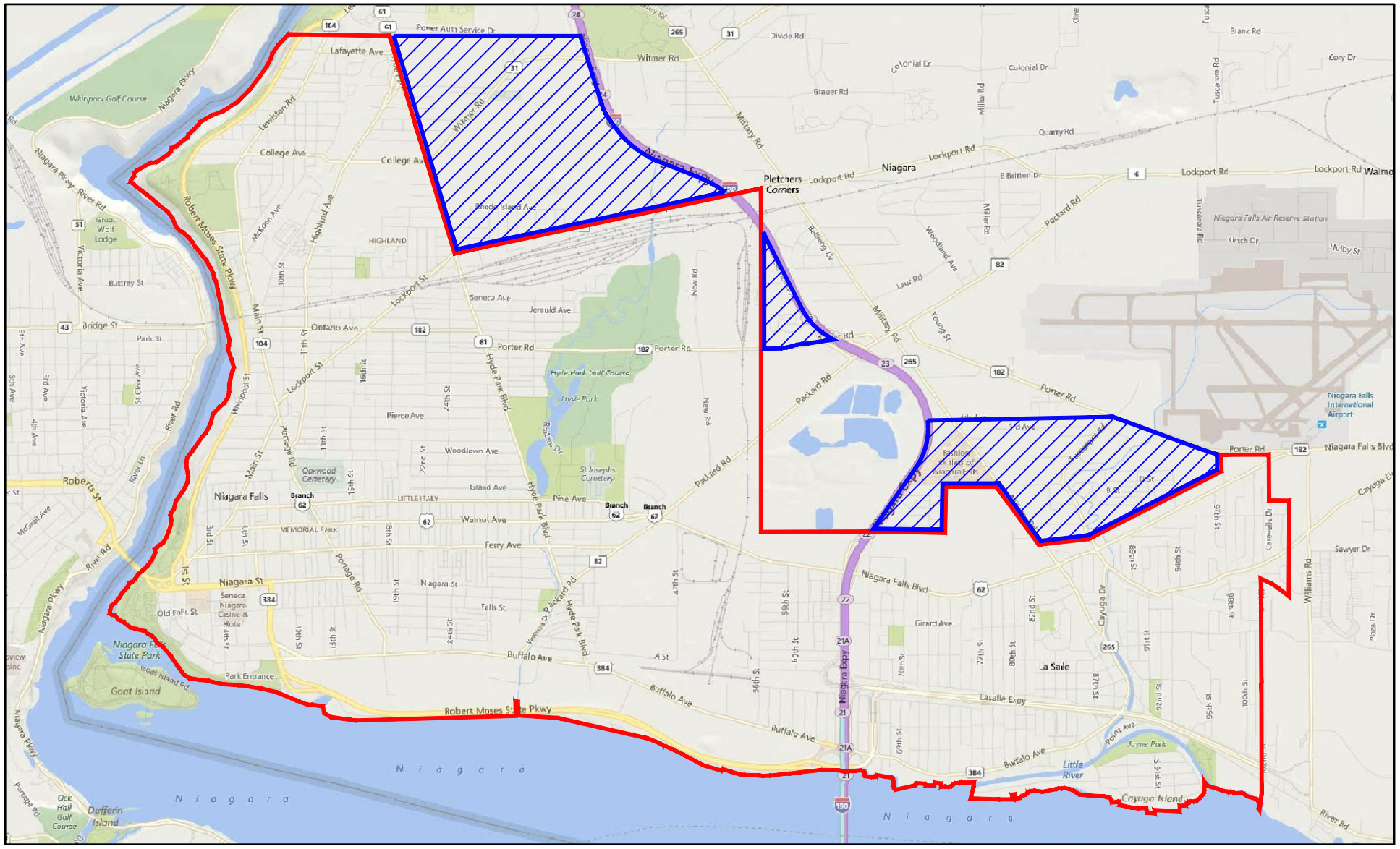
GORGE PUMPING STATION AERIAL

Project No. **11145878**
Report No. **002**
Date **MAY 2018**

FIGURE 1.5

Filename: P:\Drawings\10000000's\11145878\NFWB FIGURES\CADD\Drawings\Figures\FIGURE 1.5 GORGE PUMPING STATION AERIAL.dwg
Plot Date: 16 May 2018 - 2:40 PM

Source:



LEGEND:

- CITY OF NIAGARA FALLS
- TOWN OF NIAGARA TRIBUTARY AREAS

N

0 4000'

GHD

NIAGARA FALLS WATER BOARD
NIAGARA FALLS, NEW YORK

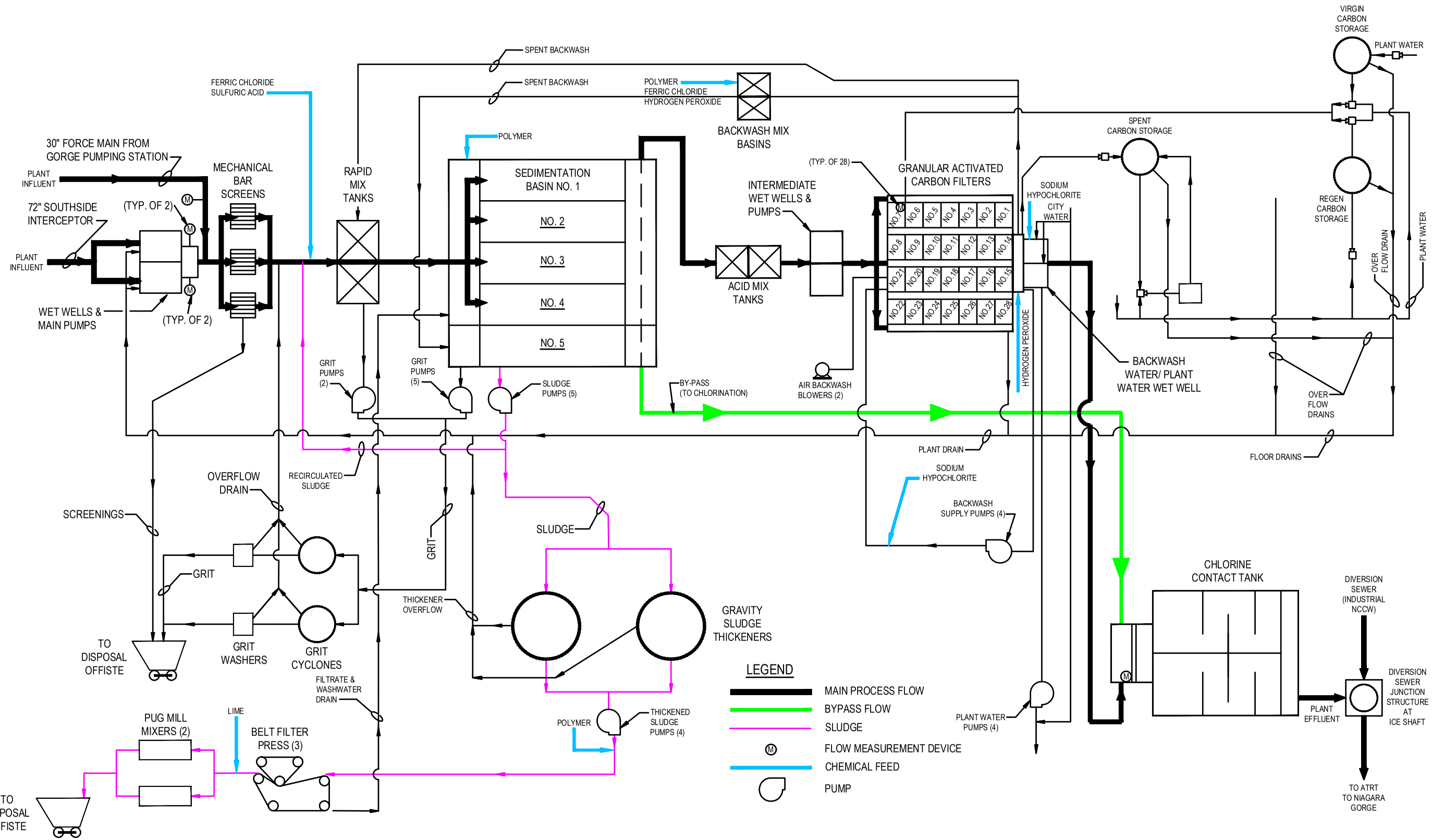
NFWB WWTP SERVICE AREA

Project No. **11145878**
Report No. **002**
Date **MAY 2018**

FIGURE 1.6

Filename: P:\Drawings\10000000's\11145878\NFWB FIGURES\CADD\Drawings\Figures\FIGURE 1.6 NFWB WWTP SERVICE AREA.dwg
Plot Date: 16 May 2018 - 2:40 PM

Source:



THIS DRAWINGS SHOWS THE RELEVANT (CURRENTLY USED) PROCESS FLOW DIAGRAM FOR THE NFWB WWTP

NIAGARA FALLS WATER BOARD
NIAGARA FALLS, NEW YORK

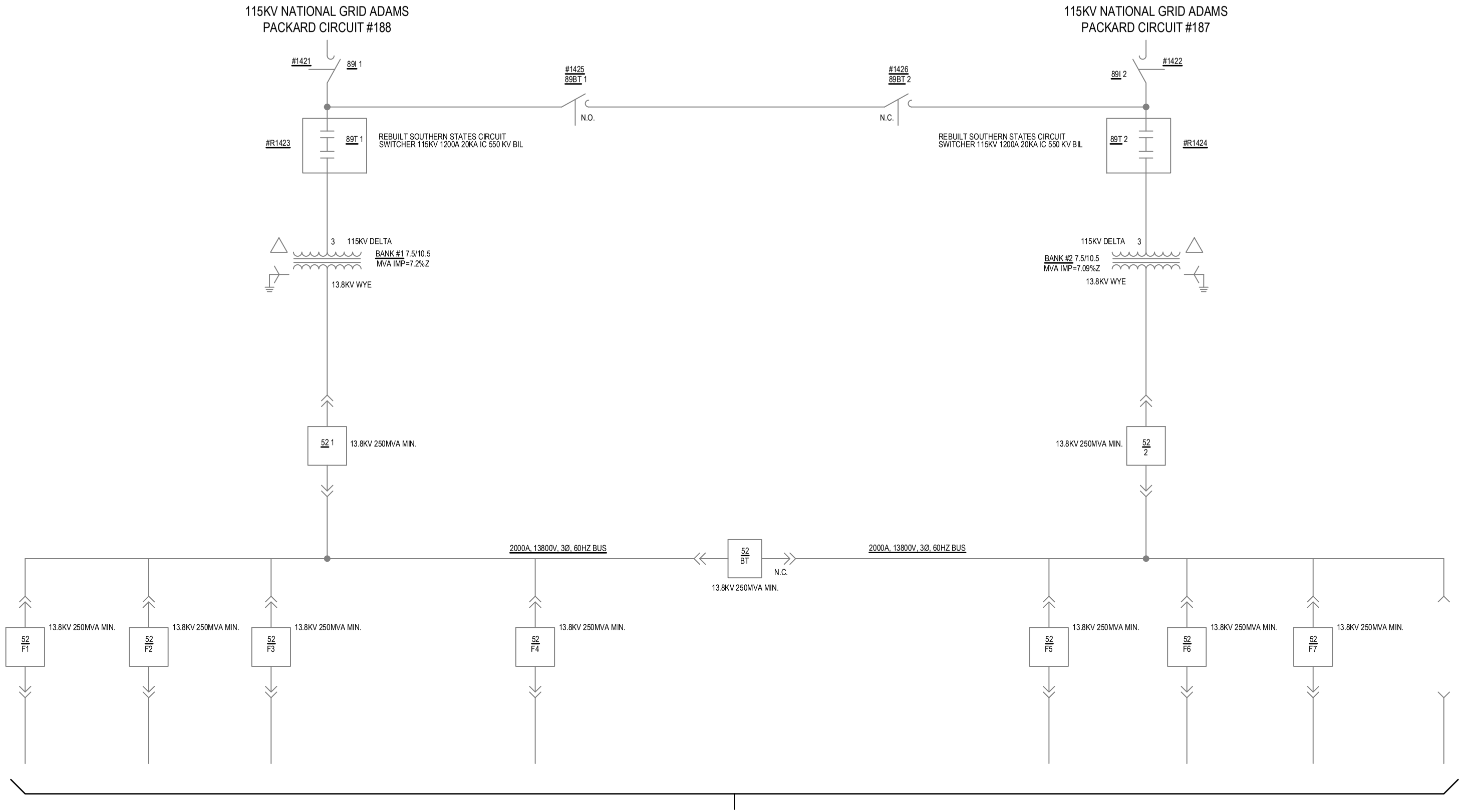
EXISTING WWTP PROCESS FLOW SCHEMATIC

Project No. **11145878**
Report No. **002**
Date **MAY 2018**

FIGURE 1.7

Filename: P:\Drawings\10000000's\11145878\NFWB FIGURES\CADD\Drawings\Figures\FIGURE 1.7 EXISTING PROCESS FLOW SCHEMATIC.dwg
Plot Date: 16 May 2018 - 2:40 PM

Source:



CONTINUED ON
FIGURE 2.1B

NIAGARA FALLS WATER BOARD
NIAGARA FALLS, NEW YORK

**EXISTING ONE LINE DIAGRAM
(SHEET 1 OF 2)**

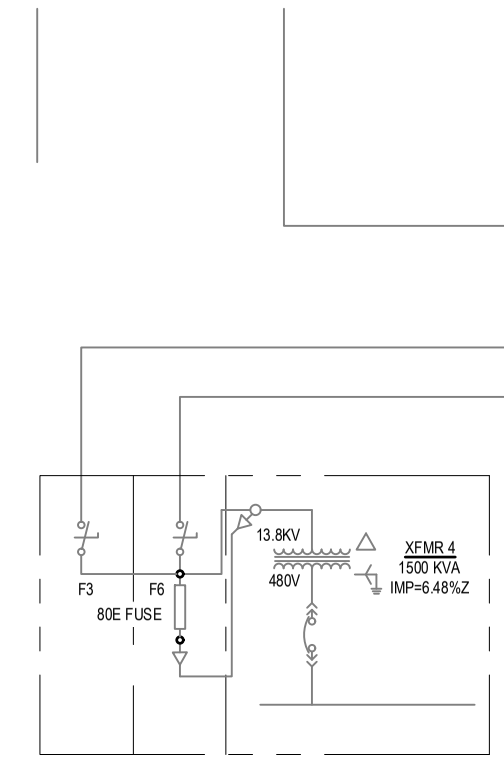
Project No. **11145878**
Report No. **002**
Date **MAY 2018**

FIGURE 2.1A

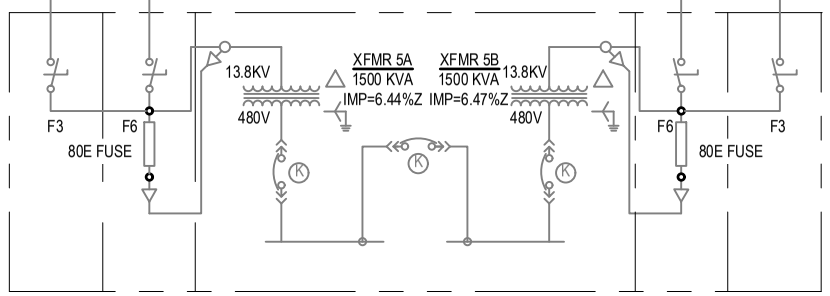
Filename: P:\Drawings\10000000's\11145878\NFWB FIGURES\CADD\Drawings\Figures\FIGURE 2.1A EXISTING ONE LINE DIAGRAM (SHEET 1 OF 2).dwg
Plot Date: 16 May 2018 - 2:41 PM

Source:

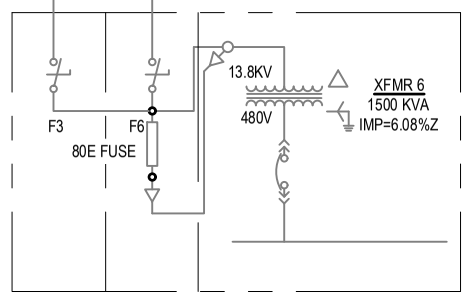
CONTINUED FROM
FIGURE 2.1A



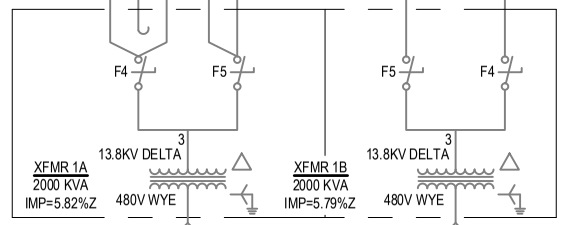
POWER CENTER 4



POWER CENTER 5 (5A & 5B)

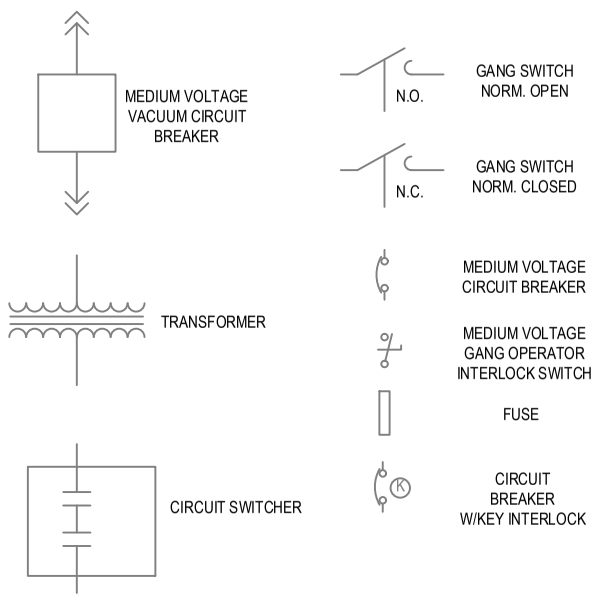


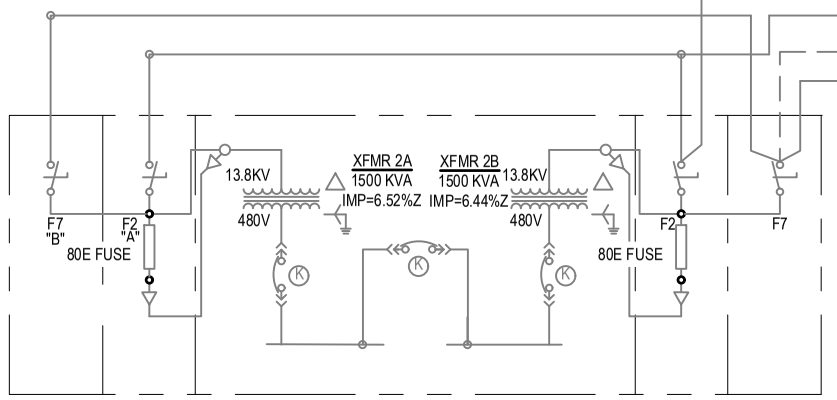
POWER CENTER 6



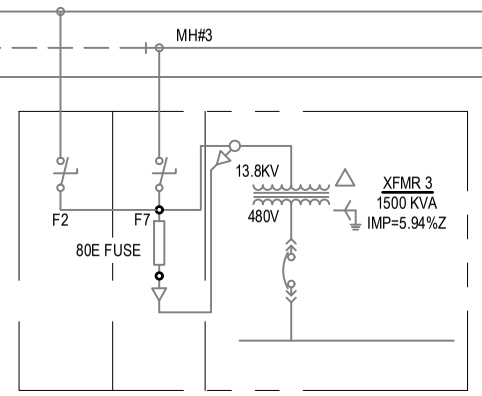
POWER CENTER 1 (1A & 1B)

SYMBOL LEGEND





POWER CENTER 2 (2A & 2B)

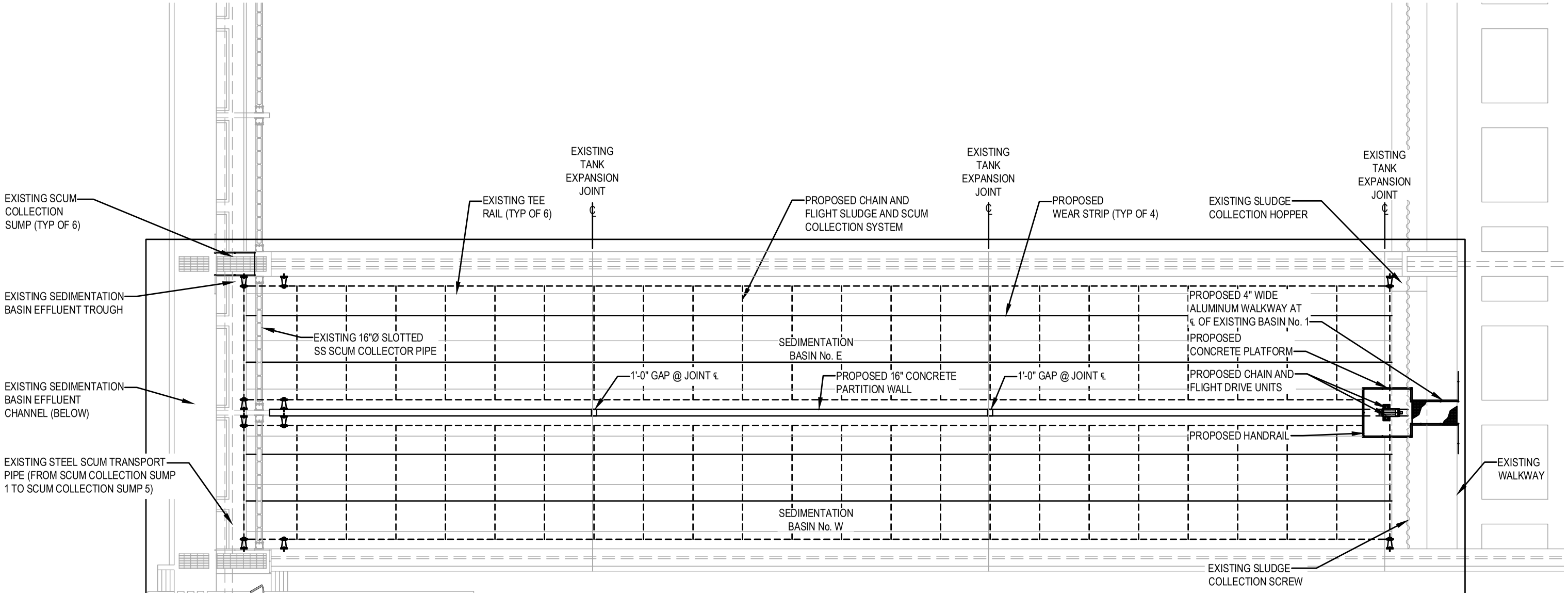


POWER CENTER 3

GHD	NIAGARA FALLS WATER BOARD NIAGARA FALLS, NEW YORK EXISTING ONE LINE DIAGRAM (SHEET 2 OF 2)	Project No. 11145878 Report No. 002 Date MAY 2018 FIGURE 2.1B

Filename: P:\Drawings\10000000's\11145878\NFWB FIGURES\CADD\Drawings\Figures\FIGURE 2.1B EXISTING ONE LINE DIAGRAM (SHEET 1 OF 2).dwg
Plot Date: 16 May 2018 - 2:41 PM

Source:



PLAN

SCALE : 1" = 20'

N

0 10' 20'

GHD

NIAGARA FALLS WATER BOARD
NIAGARA FALLS, NEW YORK

PROPOSED SEDIMENTATION BASIN PLAN

Project No. **11145878**
Report No. **002**
Date **MAY 2018**

FIGURE 2.2

Filename: P:\Drawings\10000000\s\11145878\NFWB FIGURES\CADD\Drawings\Figures\FIGURE 2.2 PROPOSED SEDIMENTATION BASIN PLAN.dwg
Plot Date: 16 May 2018 - 2:41 PM

Source:

Appendices

Appendix A
Order on Consent R9-20170906-129

STATE OF NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

In the Matter of a Violation of Article 17 of the Environmental Conservation Law and Title 6, Part 750, of the New York Codes, Rules and Regulations by:

Niagara Falls Water Board
5815 Buffalo Avenue
Niagara Falls, New York 14304

Respondent

ORDER ON CONSENT
File No. 17-52
R9-20170906-129

WHEREAS:

1. The Department of Environmental Conservation ("DEC" or "Department") is a Department of the State of New York ("State") with jurisdiction to enforce the environmental laws of the State pursuant to Section 3-0302 of the Environmental Conservation Law ("ECL"), Title 6 of the Official Compilation of the Codes, Rules and Regulations of the State ("6 NYCRR") and Orders issued thereunder.

2. The Department has jurisdiction over the abatement and prevention of pollution of State waters pursuant to ECL §17-0101, *et seq.*, and 6 NYCRR Part 750, *et seq.* This jurisdiction authorizes the Department to regulate the discharge of pollutants from point sources into the waters of the State in conformity with the Federal Clean Water Act, 33 U.S.C. 1251, *et seq.*

3. Pursuant to its authority to protect the waters of the State, the Department administers the State Pollutant Discharge Elimination System Permit ("SPDES") program. In general, the SPDES program prohibits any discharge of pollutants to the waters of the State without a SPDES permit establishing pollutant limitations, certain reporting obligations, and treatment requirements.

4. The Niagara Falls Water Board ("Respondent") is a municipal public benefit corporation which owns, operates, maintains control of and/or otherwise has responsibility for, various sanitary sewer systems, sanitary outfalls, and combined sewer outfalls associated with its wastewater treatment plant located in the City of Niagara Falls, New York ("Facility").

5. Respondent is subject to Article 17 of the ECL and its implementing regulations found in 6 NYCRR Part 750, *et seq.*, which govern the control and prevention of water pollution.

6. Respondent is also subject to the conditions and limitations imposed under SPDES Permit No. NY0026336, issued pursuant to ECL Article 17, Title 8, and 6

NYCRR 750 ("SPDES Permit"). The SPDES Permit was issued with an effective date of October 16, 2013 and expires on October 31, 2018.

7. Pursuant to ECL §17-0501, it is unlawful for any person, directly or indirectly, to throw, drain, run or otherwise discharge organic or inorganic matter that shall cause or contribute to a condition in contravention of the standards adopted by the Department pursuant to section 17-0301.

8. Pursuant to 6 NYCRR 703.2, the narrative water quality standard for turbidity applicable to a Class A-Special water body is "No increase that will cause a substantial visible contrast to natural conditions."

9. 6 NYCRR 750-2.8(a)(2) provides that a permittee shall, at all times, properly operate and maintain all disposal facilities, which are installed or used by the permittee to achieve compliance with the conditions of the permit.

10. The Facility discharges effluent through Outfall 001 to the Niagara River, which is a Class A-Special water body of the State.

11. The Department makes the following allegations, which it alleges violated the ECL and/or Respondent's SPDES permit:

a. On July 29, 2017 Respondent discharged dark effluent from Outfall 001 to the Niagara River, which caused a substantial visible contrast to natural conditions in the Niagara River and in contravention of the State's narrative water quality standard for turbidity, in violation of ECL §17-0501 and 6 NYCRR 703.2.
b. Respondent's July 29, 2017 discharge violation was the result of human operational error and the lack of training. Specifically, Respondent dewatered Sedimentation Basin 5 at the Facility, in preparation for planned maintenance to install baffles and make repairs, but failed to follow written protocols.
c. Sedimentation Basin 5 receives carbon filter backwash water consisting of activated carbon filter fines, wastewater solids, and biological solids. The color of the solids and settled material in Sedimentation Basin 5 is always dark . As detailed in Respondent's September 1, 2017 Report to the Department, inoperable and non-functioning equipment resulted in an accumulation of solids in Sedimentation Basin 5 during the period from March 2017 to July 29, 2017. The main reason for the discharge of the offending substance on July 29, 2017 is as follows:

    i. Respondent's Operations and Maintenance Manual provides that during dewatering (i.e., emptying of the basin for maintenance or other purposes), material from Sedimentation Basin 5 may be directed to the Rapid Mix

Tank or the Thickener Tank. Respondent instead pumped the material to the Chlorine Contact Tank, where it mixed with the plant effluent, resulting in the discharge of a dark effluent which caused a substantial visual contrast to natural conditions in the Niagara River.

d. Contributing causes were:

   i. The failure to follow the Operations & Maintenance Manual dewatering procedures was compounded by Respondent providing unclear verbal dewatering instructions to an operator trainee to turn off the submersible pump in Sedimentation Basin 5 when the mixed water in the Chlorine Contact Tank turned dark, and a second operator trainee was told to report the dark water but was not told to turn the pump off; and
   ii. The following deficiencies in Sedimentation Basin 5: a non-functioning chain and flight system and an inoperable traveling bridge.

e. The Facility has Combined Sewer Overflow (CSO) Outfall 003 which discharges from Respondent's Falls Street Tunnel into the Niagara River.
f. On August 15, 2017, Respondent discharged combined sewage from Outfall No. 003 into the Niagara River, and partially treated wastewater from Outfall 001 into the Niagara River, which caused a substantial visible contrast to natural conditions in the Niagara River and contravened the State's narrative water quality standard for turbidity, in violation of ECL §17-0501 and 6 NYCRR 703.2.
g. On October 4, 2017, Respondent discharged combined sewage from Outfall 003 and Outfall 006 and partially treated wastewater from Outfall 001 into the Niagara River, which caused a substantial visible contrast to natural conditions in the Niagara River and contravened the State's narrative water quality standard for turbidity, in violation of ECL §17-0501 and 6 NYCRR 703.2.
h. On October 8, 2017, Respondent discharged combined sewage from Outfall 003 and Outfall 006 and partially treated wastewater from Outfall 001 into the Niagara River, which caused a substantial visible contrast to natural conditions in the Niagara River and contravened the State's narrative water quality standard for turbidity, in violation of ECL §17-0501 and 6 NYCRR 703.2.

12. At the Department's direction Respondent performed the following actions in response to these alleged violations:

a. Provided details on how the NFWB will reduce accumulated solids in the sedimentation basins and sludge thickener tanks. This included an evaluation of the actual capacity (not design capacity) of all belt filter presses and the duration of operation that is necessary to remove accumulated solids within 30 days, so that the plant can resume typical solids handling procedures. The schedule detailed and included all means and methods utilized to remove liquid or dewatered sludge.
b. Reduced the solids accumulation in the two thickener tanks and is maintaining solids inventory at levels that minimize solids carryover in the thickener tank overflow.
c. Removed accumulated excessive sludge from all sedimentation basins.
d. Completed all repairs that were underway in Sedimentation Basin 5, consisting of repairs to the chain and flight system and traveling bridge.

13. Respondent neither admits nor denies these allegations referenced in paragraph 11, but reserves entirely its rights to dispute or contest them in this or any other matter, proceeding or action.

14. Notwithstanding all of the above, the Respondent now desires to enter into, and now agrees to enter into, this Consent Order as part of its on-going and continual efforts to make improvements to achieve the most effective wastewater treatment possible, and to maximize the capture of wet-weather flows for the benefit of the environment.

15. ECL §71-1929 imposes a penalty not to exceed Thirty-Seven Thousand Five Hundred Dollars ($37,500) per day for each alleged violation described in paragraph 11 and also provides for injunctive relief.

16. In order to address the alleged violations noted in paragraph 11 above, the Department and Respondent agree to enter into this Order, which contains requirements governing Respondent's Facility, designed to prevent or minimize future discharges.

17. The Department and Respondent have each consented to the making of this Order, without further action, litigation, hearing or adjudication of any issues of fact or law, and being duly advised, and it being in the public interest;

NOW, having considered this matter and being duly advised, **IT IS ORDERED THAT**:

I. CIVIL PENALTY

A. Respondent is assessed a total civil penalty in the amount of $50,000, which shall be paid by check or money order, made payable to the "New York State Department of Environmental Conservation," with the Case Number of this Order

on Consent written on the check and sent within 45 days of the Effective Date of the Order to the Regional Attorney, NYSDEC, 270 Michigan Avenue, Buffalo, New York 14203.

B. In addition to the payable penalty set forth in paragraph 1.A above, Respondent is assessed a suspended penalty of $100,000. The DEC may, however, vacate the suspension and assess the penalty, or any part of it, for a violation of the material provisions, terms or conditions of this Order, including the Schedule of Compliance attached as Schedule A to this Order. The suspended portion of the penalty shall be extinguished upon Respondent's full compliance with the terms and conditions of this Order, in accordance with paragraph XVII below.

C. The penalty assessed in this Order constitutes a debt owed to the State of New York. Failure to pay the assessed penalty, or any part thereof, in accordance with the schedule contained in the Order, may result in referral to the New York State Attorney General for collection of the entire amount owed (including the assessment of interest, and a charge to cover the cost of collecting the debt), or referral to the New York State Department of Taxation and Finance, which may offset any tax refund or other monies that may be owed to you by the State of New York by the penalty amount. Any suspended and/or stipulated penalty provided for in this Order will constitute a debt owed to the State of New York when and if such penalty becomes due.

II. COMPLIANCE

Respondent shall be immediately bound as provided by this Order and attached Schedule of Compliance, attached as "Schedule A." Respondent shall implement all actions set forth in Schedule A by the dates indicated therein. Schedule A, and any approved plan(s) or schedules developed pursuant to Schedule A, are hereby incorporated into and made an enforceable part of this Order.

III. STIPULATED PENALTIES

A. Except as otherwise provided herein, if Respondent fails to comply with any terms of this Order, including any approved plans or schedules incorporated into this Order, the Department shall be entitled to judgment against Respondent. Respondent hereby consents to entry of judgment in New York State Supreme Court for a stipulated penalty for each day of such violation of this Order. The stipulated penalty shall become due and payable, and may be entered as a judgment, upon thirty (30) days' notice to Respondent.

Said stipulated penalties shall be in the following amounts:

1. For days 1 to 14, the penalty shall be $250.00 per day;
2. For days 15 to 30, the penalty shall be $500.00 per day;
3. For days 31 to the date the corrective action has been completed, the penalty shall be $1,000.00 per day.

B. Any stipulated penalties assessed pursuant to this paragraph shall be separate, and in addition to, any suspended penalties assessed pursuant to paragraph I.B above.

IV. ON-SITE ENVIRONMENTAL MONITOR (OEM) and CONSULTANT

The Respondent shall fund environmental monitoring services to be performed by a third party contractor, as approved by the Department, within 90 days of the effective date of this Order. Said contractor will perform monitoring services including, but not limited to, the following:

A. Oversee and advise on management of operations of the plant and compliance monitoring to ensure adherence to the requirements of Schedule A, attached to and included with this Order.

B. Perform inspections in furtherance of its compliance monitoring.

C. Provide regular reports of its observations to the Department, at a minimum, on a quarterly basis.

D. Respondent shall fund the OEM on a quarterly basis, with funding due for the previous quarter within thirty (30) days of the submission of an invoice at the beginning of each subsequent quarter. The amount due for each quarter's environmental monitoring services shall not exceed $2,500 without prior approval of the Department and at least 30 days notice to the Respondent.

E. Failure to make the required payments to the third party contractor shall be a violation of this Order.

V. SUBMISSIONS

A. The Respondent shall send all documentation and submissions required by this Order to the Department at the following address, unless otherwise noted. All submissions must include a certification that they are in compliance with the requirements of this order:

Mr. Jeffrey Konsella, Regional Water Engineer
NYSDEC Region 9
270 Michigan Avenue
Buffalo, New York 14203

B. For purposes of this Order only, any document or plan which is required to be submitted to DEC pursuant to this Order must be approvable by the Department upon submission or with only "minimal revision" in response to Department comments. Consistent with 6 NYCRR Section 750-1.2(8), minimal revision shall mean

the facility plan can be revised and resubmitted to the Department within 60 days of notification by the Department that the revisions are necessary. The Department shall notify the Respondent in writing of its approval or disapproval of each submission and the reasons for any disapproval. All Department approved submissions shall be incorporated into and become an enforceable part of the Order and Respondent shall implement them in accordance with all approved schedules and terms.

C. The Department may request that Respondent modify and/or expand a submission if the Department determines that further work is necessary.

D. Stipulated penalties pursuant to Section III above, based on the failure to submit an approvable submittal, shall not begin to accrue unless 60 days have elapsed after Respondent has received the Department's comments on a submittal, and Respondent has not submitted an approvable revised document. It is expressly understood that stipulated penalties begin to accrue upon day 61 after Respondent has received the Department's comments on a submittal, if Respondent does not submit an approvable revised submittal by that date or such date as modified by DEC.

VI. ACCESS

For the purpose of monitoring or determining compliance with this Order, employees and agents of the Department shall be provided access to the Facility or records owned, operated, controlled or maintained by Respondent in order for Department staff or its agents to inspect and/or perform any necessary tests, related to the requirements of this Order, during reasonable hours. No prior notification to the Respondent of site inspections is required.

VII. RELEASE, REOPENER AND RESERVATION OF RIGHTS

A. This Order settles only all State claims for civil and administrative penalties concerning the alleged violations described in Paragraph 11 of this Order against Respondent and its successors (including successors in title) and assigns.

B. Nothing contained in this Order shall be construed as a release or waiver by the Department of its rights to: (1) seek penalties and other relief for any criminal liability for any violations listed in this Order; (2) seek stipulated penalties and entry of judgment as provided by Paragraph III of this Order; (3) reallege the violations listed in this Order to obtain injunctive relief or damages in support of natural resource damage claims; (4) seek injunctive relief to abate any violation of law or this Order ; and (5) seek to modify, suspend or revoke any Department issued permit.

C. Nothing contained in this Order shall be construed as a release or waiver of Respondent's rights to oppose and defend against injunctive relief, imposition of penalties, damages or any other imposition of liability by the Department. Nothing contained in this Order shall be construed as a waiver by Respondent of its rights to seek a modification of its Permit.

D. Except as provided hereunder, Respondent is responsible for achieving and maintaining complete compliance with all applicable federal, State and local laws, regulations and permits; and Respondent's compliance with this Order shall be no defense to any action commenced pursuant to any such laws, regulations, or permits, except as set forth herein. The Department does not, by its consent to the issuance of this Order, warrant or aver in any manner that Respondent's compliance with any aspect of this Order will result in compliance with provisions of any federal, State or local laws, regulations or permits.

E. This Order shall not be construed as being in settlement of events regarding which the Department lacks knowledge or notice and the Department reserves the right to require Respondent to take any additional measures deemed necessary by the Department to protect human health or the environment, to exercise its authorities under law to protect human health and the environment or to otherwise require compliance with the law.

VIII. FAILURE, DEFAULT AND VIOLATION OF ORDER

Respondent's failure to comply fully and in a timely manner with any provision, term or condition of this Order shall constitute a default and failure to perform an obligation under this Order and under the ECL.

IX. INDEMNIFICATION

Respondent shall indemnify and hold harmless the Department, the State of New York, and their representatives and employees for all claims, actions, damages and costs of every nature and description resulting from the Respondent's fulfillment or attempted fulfillment of this Order.

X. FORCE MAJEURE

If Respondent cannot comply with a deadline or requirement of this Order, because of an act of God, war, strike, riot, catastrophe or other condition which is not caused by the negligence or willful misconduct of Respondent and which could not have been avoided by Respondent through the exercise of due care, Respondent shall apply in writing to the Department within a reasonable time after obtaining knowledge of such fact and request an extension or modification of the deadline or requirement.

XI. DISPUTE RESOLUTION

A. Any dispute that arises between the Department and Respondent under this Order, shall, in the first instance, be the subject of informal negotiations between the Department and Respondent for a period of up to 20 working days from the time notice of a dispute is received by any of the parties. The period of negotiations may be extended by written agreement between the Department and Respondent. In the event that the parties are unable to resolve a dispute by informal negotiations,

Respondent may request to meet with the Region 9 Regional Engineer ("Regional Engineer") in order to discuss the Department's objections/determinations. At this meeting Respondent shall be given an opportunity to present its responses to the Department's objections/determinations, and the Regional Engineer shall have the authority to modify and/or withdraw such objections/ determinations. After the Regional Engineer makes his/her decision(s) Respondent shall either (a) within sixty (60) days of receipt of written notice of the Regional Engineer's determinations, commence a proceeding pursuant to Article 78 of the CPLR (the Regional Engineer's decision(s) shall be deemed to be final agency action for the purposes of such a proceeding) or (b) notify the Department that it intends to comply with the Regional Engineer's decision(s).

B. Stipulated penalties pursuant to Section III of this Order shall accrue during the term of Dispute Resolution for matters subject to dispute resolution hereunder, but payment shall be stayed pending resolution of the dispute. If Respondent does not prevail on the disputed issue, stipulated penalties may be assessed and paid as provided by Paragraph III of this Order, from the date the violation first occurred. Further, the invocation of Dispute Resolution shall not, by itself, extend, postpone or affect in any way any obligation of Respondent under this Order, including the Schedule A, unless and until a final resolution of the dispute so provides.

XII. BINDING EFFECT

This Order is binding on the Respondent, heirs, successors, employees and all persons, firms, or corporations acting under or for it.

XIII. MODIFICATIONS AND EXTENSIONS

No change or modification of this Order shall be effective unless the modification is done in writing and signed by both the Respondent and the Commissioner or his/her designee. If the Department receives a written request from the Respondent which (a) would extend an item(s) in Respondent's Compliance Schedule; (b) the extension does not exceed a cumulative of six months from the original milestone date(s); (c) the request is made before the milestone date and (d) sets forth good cause for the extension, the Department may extend the time frame requested by the issuance of a letter signed by the original signatory or designee of the signatory.

XIV. USE OF ORDER BY THIRD PARTIES

The existence of this Order, and Respondent's consent thereto, and compliance herewith, shall not give rise to any presumption of law or finding of fact which shall inure to the benefit of any third party.

XV. ENTIRE ORDER

The provisions of this Order and the attachments hereto constitute the complete and entire Order issued to the Respondent concerning the resolution of the violations

set forth in this Order. No term, condition, understanding or agreement purporting to modify or vary any term hereof shall be binding unless made in writing and subscribed by the party to be bound. No informal oral or written advice, guidance, suggestion or comment by the Department regarding any report, proposal, plan, specification, schedule, comment or statement made or submitted by Respondents shall be construed as relieving Respondent of its obligation to obtain such formal approvals as may be required by this Order.

XVI. GENERAL PROVISIONS

A. All references to "days" herein are to calendar days unless otherwise specified.

B. The section headings set forth in this Order are included for convenience of reference only and shall be disregarded in the construction and interpretation of any of the provisions of this Order.

C. This Order and its Appendices shall apply to, and be binding upon the parties, their officers, agents, servants, employees, successors and assigns, and each of them, and upon all persons, firms and corporations acting under, through or for, in active concert or participation with, the parties.

D. Respondent shall certify in writing, within 30 days of completion of each milestone or requirement set forth in Schedule A.

XVII. EFFECTIVE DATE AND TERMINATION OF THIS ORDER

A. The effective date of this Order ("EDO") is the date that the Commissioner or his designee signs it. The Department will provide Respondent (or Respondent's counsel) with a fully executed copy of this Order as soon as practicable after the Commissioner or his designee signs it.

B. This Order shall be deemed completely satisfied and shall terminate when each of the following conditions has been fully satisfied: (1) Respondent has paid the civil penalty as set forth in Section I above, and all other outstanding penalties assessed hereunder; and (2) Respondent has certified in writing the completion of each Schedule A item requiring an approvable submission to the Department and DEC has approved said certifications in writing.

DATED: Buffalo, New York

_____

Basil Seggos, Commissioner
New York State Department of
Environmental Conservation

By: _____
Abby M. Snyder
Regional Director

CONSENT BY NIAGARA FALLS WATER BOARD

Respondent hereby consents to the issuing and entering of the foregoing Order, waives its right to a hearing as provided by law, and agrees to be bound by the provisions, terms and conditions contained therein.

By: Daniel T. O'Callaghan Daniel T. O'Callaghan

Title: Chairman

Date: December 18, 2017

State of New York)
) ss.:
County of)

On the 18th day of December, in the year 2017, before me, the undersigned, personally appeared Daniel T. O'Callaghan, personally known to me who, being duly sworn, did depose and say that he resides at 540 62nd St., Niagara Falls, NY 14304 and that he is the Chairman of the Niagara Falls Water Board, the public benefit corporation described in and which executed the above instrument; and that he signed his name thereto by the authority of said public benefit corporation.

Erika Schroeder
Notary Public

ERIKA E SCHROEDER
NOTARY PUBLIC-STATE OF NEW YORK
No. 01SC6358270
Qualified In Niagara County
My Commission Expires 05-08-2021

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Niagara Falls Water Board

SCHEDULE A
Order on Consent R9-20170906-129

Respondent shall, on or before the dates indicated:

Item	Date
1. Update Operation and Maintenance (O&M) and training procedures and staffing plans as necessary and submit revisions to the Department for review and approval. O&M and staffing plans must address preventative maintenance as well as corrective maintenance. If any current O&M/training practices are not routinely performed in accordance with the latest Department approved version and schedule set forth in the O&M manual or training and staffing plans, Respondent must provide a summary of the practice(s), rationale for any proposed modification, and incorporate the changes into the updated O&M manual and/or training and staffing plans for Department review and approval. Respondent shall begin implementing the updated O&M manual, training and staffing plans, and any approved schedules, within 30 days of receiving approval from the Department.	Effective Date of Order (EDO) +15 Months
2. Operate all treatment processes in accordance with the latest Department approved O&M manual and training plan for the facility (including approved revisions). Discharges of effluent from Sediment Basin 5, only when Sediment Basin 5 is on-line, shall be permitted to the Chlorine Contact Tank without prior approval from the Department. Processes and equipment that have been properly decommissioned are exempt from this requirement.	Immediate
3. The current O&M manual procedures for sedimentation tank dewatering are specified in Section 3.4.7 and state that grit pumps and sludge pumps are to be used for basin dewatering. Sedimentation tank dewatering must be performed using either the current O&M manual or Department approved modifications to the O&M manual.	Immediate
4. Submit an approvable work plan and schedule which will remove excess solids from the treatment plant within 30 days. Respondent shall implement the approved work plan consistent with the approved schedule of compliance. The work plan and proposed schedule must address the following:	EDO+2 months

a. Ensure that all three sludge belt press systems are available for operation at all time (except for normal maintenance). Each belt press system includes a belt press and all supporting equipment including a thickened sludge pump and a polymer pump. All process piping and valving shall allow all three belts presses to operate simultaneously.

b. Upon elimination of the excess sludge inventory in the thickener tanks, plant sludge inventory shall be maintained at sufficiently low levels to enable all treatment processes to function as intended.

c. Identify and either repair or replace all sludge dewatering equipment which is currently not functioning appropriately.

d. Evaluate and provide a summary of recommendations to improve the reliability of the thickened sludge pumping system including replacing plastic piping with ductile iron piping.

5. Improve the reliability of all Sedimentation Basin traveling bridge and chain & flight equipment. Specific actions should include:

a. Revise the O&M manual, training plan, and standard operating procedures so that preventative maintenance and corrective actions will be undertaken in the sludge collection equipment as soon as practicable. Depending on the nature of the failure, this may require taking the basin off-line and dewatering for repairs. — EDO+15 months

b. Evaluate and summarize appropriate recommendations and maintenance schedules for the operation of sludge collector equipment in order to prevent significant damage in the event of failure. Such items may include, but are not limited to, the installation of torque sensors and/or automatic shut-offs. — EDO+3 months

c. As improper sludge removal contributes to septic conditions and causes the sedimentation basins to be more susceptible to wash-out, the basins should not routinely remain in service if they are not properly removing sludge. However, in certain instances, such as emergency situations, basins in such a condition may be returned to service upon Department approval. — Immediate

d. Submit a report which identifies the causes of the recurring

	failures of this equipment, and provides specific recommendations and schedules for improvements including the conversion from travelling bridge collectors to chain and flight collectors. Upon approval, implement the recommendations in accordance with the approved schedules.	EDO+9 months
6.	Submit a work plan to evaluate alternatives to the use of ferric chloride as a flocculant for removing phosphorus with the goal of reducing iron sulfide contributions to effluent color. The plan shall include bench scale and pilot scale testing of alternative flocculants.	EDO+9 months
7.	Submit a work plan for an evaluation of how to best manage the effluent from Sedimentation Basin 5. This evaluation should consider whether treatment of the backwash can be improved through chemical addition or other methods. The work plan must identify additional data needs and include a schedule of completion. Respondent shall implement the approved work plan consistent with the approved schedule of compliance.	EDO+9 months
8.	While continuing to follow the current Wet Weather Operating Plan (WWOP), evaluate and identify any potential changes to the WWOP – at the plant and in the collection system - which would reduce or eliminate plant bypasses due to excessive wet weather influent flows, and submit proposed changes for Department approval. Respondent shall begin implementing the updated WWOP within 30 days of receiving approval from the Department.	EDO+9 Months
9.	Evaluate and summarize recommendations to improve the plant's disinfection processes, including, but not limited to those alternatives previously identified in the October 2015 WWTP Effluent Turbidity Engineering Report. Respondent shall begin implementing a disinfection process within 30 days of receiving approval from the Department.	EDO+9 months
10.	Evaluate and provide a work plan and approvable schedule to conduct a pilot study to add oxidizer to carbon filter influent and backwash water to determine if sulfide generation in the carbon filters can be reduced or prevented. As part of the study, review the plant's previous use of sodium nitrate as an oxidizer. Respondent shall begin implementing the pilot study within 30 days of receiving approval from the Department.	EDO+6 months
11.	Submit a comprehensive planning level engineering report which	

evaluates the conversion or modification of the existing plant into an aerobic biological treatment process. The report should incorporate and utilize appropriate elements of the October 2015 WWTP Effluent Turbidity Engineering Report. The report must: A. include a detailed alternatives evaluation (including appropriate pilot testing), identification of the recommended process technology, optimizing the collection system and treatment plant to capture and treat combined sewer overflows, the new or modified facilities that would be required, and an updated cost estimate; and B. identify any necessary upgrades and modifications needed to capture between 95% and 97% of CSOs.	EDO+15 months
12. Submit a detailed description of the means and methods used to record: a) the activation and volumes of CSO discharges from the Falls Street Tunnel and the Gorge Pump Station; and b) activations and volumes of SSO discharges from the LaSalle area.	EDO+3 months
13. Submit a detailed summary of the procedures followed, and the specific personnel responsible for notifications to the NYAlert system for reporting of CSO and SSO discharges.	EDO+3 months
14. Submit an evaluation of re-locating Outfalls 001 and 003. This evaluation should consider the effect on the water quality of the receiving water if Outfalls 001 and 003 were to be re-located. The evaluation must identify all suitable locations, costs, and applicable schedules of compliance.	EDO + 9 months
15. Submit Quarterly progress reports summarizing all actions completed.	Every 3 months; ending when the last deliverable is submitted pursuant to Schedule A
16. Respondent shall not conduct any further dewatering of Sedimentation Basin 5 without the prior written approval and without direct supervision of the Department. In addition, all facility operations conducted by the Respondent shall be under the direct supervision and oversight of the Department as set forth in this Consent Order.	On-going

17. Respondent shall immediately update its day to day training and operating plans, including hiring new operators and providing clear verbal instructions to staff. Completed

Appendix B
NFWB SPDES Permit

New York State Department of Environmental Conservation
Division of Environmental Permits, 4th Floor
625 Broadway, Albany, NY 12233-1750
Phone: (518) 402-9167 • **Fax:** (518) 402-9168
Website: www.dec.ny.gov

Joe Martens
Commissioner

November 15, 2013

RECEIVED

NOV 20 2013

NIAGARA FALLS WATER BOARD

Mr. Richard R. Roll, P.E.
Director of Technical & Regulatory Services
Niagara Falls Water Board
6815 Buffalo Avenue
Niagara Falls, NY 14304

Re: Niagara Falls Wastewater Treatment Plant
DEC#9-2911-00056/00004 SPDES#: NY0026336

Dear Mr. Roll:

A final renewed State Pollutant Discharge Elimination System (SPDES) permit for the above referenced facility was sent to you on October 16, 2013. A typographical error was identified on page 20 of the permit. As a result the following minor modifications have been made to the issued permit:

- On page 20 of the permit under compliance action in the schedule of compliance, the interim enforceable limits due date has been corrected from January 1, 2015 to August 1, 2018.

- The interim enforceable limits effective date on page 5 of the permit (nos. 7, 8 and 9) has been clarified from EDP + 57 months to August 1, 2018.

Should you have questions on the administration of this modification and renewal, please feel free to contact me at the address or phone number listed above. Should you have technical questions on permit content, please contact the permit engineer, Cameron Ross, at (518) 408-5772, or the Regional Water Engineer, Jeff Konsella, at (716) 851-7070.

Sincerely,

Teresa Diehsner
Division of Environmental Permits

Enclosure
c: D. Denk, RPA
J. Konsella, RWE
C. Ross, Permit Engineer
C. Jamison, CO-BWP Permit Coordinator
M. Josilo, EPA Reg 2
N. Myers, NYSEFC
M. Child, IJC
NYSDOH District Office

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES)
DISCHARGE PERMIT

Frst3.99

Industrial Code:	**NA**	SPDES Number:	**NY0026336**
Discharge Class (CL):	**05**	DEC Number:	**9-2911-00056/00004**
Toxic Class (TX):	**T**	Effective Date (EDP):	**11/01/2013**
Major Drainage Basin:	**01**	Expiration Date (ExDP):	**10/31/2018**
Sub Drainage Basin:	**01**	Modification Dates: (EDPM):	**12/01/2013**
Water Index Number:	**0-158**		
Compact Area:	**IJC**		

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act, as amended, (33 U.S.C. 1251 et.seq.)(hereinafter referred to as "the Act").

PERMITTEE NAME AND ADDRESS

Name: **Niagara Falls Water Board**

Street: **5815 Buffalo Avenue** Attention: **Mr. Richard R. Roll**

City: **Niagara Falls** State: **NY** Zip Code: **14304**

is authorized to discharge from the facility described below:

FACILITY NAME AND ADDRESS

Name: **Niagara Falls WWTP**

Location (C,T,V): **Niagara Falls (C)** County: **Niagara**

Facility Address: **1200 Buffalo Avenue**

City: **Niagara Falls** State: **NY** Zip Code: **14304**

NYTM -E: **657.2** NYTM - N: **4772.2**

From Outfall No.: **001** at Latitude: **43 ° 05 ' 20 "** & Longitude: **79 ° 04 ' 00 "**

into receiving waters known as: **Niagara River** Class: **A-Special**

and (list other Outfalls, Receiving Waters & Water Classifications)

Additional outfalls are listed on page 2.

in accordance with: effluent limitations; monitoring and reporting requirements; other provisions and conditions set forth in this permit;
and 6 NYCRR Part 750-1and 750-2.

DISCHARGE MONITORING REPORT (DMR) MAILING ADDRESS

Mailing Name: **Mr. Joe LaGamba, Chief Operator, Niagara Falls WWTP**

Street: **5815 Buffalo Avenue**

City: **Niagara Falls** State: **NY** Zip Code: **14304**

Responsible Official or Agent: **Mr. Paul J. Drof, Executive Director** Phone: **(716) 283-9770**

This permit and the authorization to discharge shall expire on midnight of the expiration date shown above and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for permit renewal not less than 180 days prior to the expiration date shown above.

DISTRIBUTION:

CO BWP - Permit Coordinator
RWE
RPA
EPA Region II - Michelle Josilo
NYSEFC
IJC
NYSDOH District Office

Deputy Chief Permit Administrator: Stuart M. Fox

Address: Division of Environmental Permits
625 Broadway
Albany, NY 12233-1750

Signature: Stuart M. Fox Date: 11/15/13

ADDITIONAL OUTFALLS

Outfall	Description	Latitude	Longitude	Receiving Water	FOOTNOTES
003	Falls Street Tunnel (CSO)	43° 05' 24"	79° 04' 00"	Niagara River	(1)
004	Diversion Sewer	43° 05'20"	79° 04' 00"	Niagara River	
006	Gorge Pumping Station (CSO)	43° 05' 58"	79° 03' 38"	Niagara River	
007	Cleveland Avenue (CSO)	43° 06' 26"	79° 03' 25"	Niagara River	
009	Chasm Avenue (CSO)	43° 06' 49"	79° 03' 33"	Niagara River	
010	Maple Avenue (CSO)	43° 07' 32"	79° 03' 35"	Niagara River	
011	Garfield Avenue (CSO)	43° 07' 56"	79° 03' 03"	Niagara River	
01A	Head of Ice Shaft (Stormwater Outfall at WWTP)			Niagara River	(2)
02A	Drop Shaft to International Paper Tunnel (Stormwater Outfall at WWTP)			Niagara River	(2)

FOOTNOTES

(1) List of Regulators on the Southside Interceptor/Falls Street Tunnel

During dry weather, all Falls Street Tunnel flows shall be directed to the WWTP.

1. 19th Street
2A. 22nd Street
2B. 22nd Street
3A. 24th Street
3B. 24th Street
4A. 27th Street
4B. 27th Street
5. 30th Street
6A. Hyde Park Boulevard
6B. Hyde Park Boulevard
6C. Hyde Park Boulevard
9. Falls Street
10. 12th Street
11A. 10th Street
11B. 10th Street
12. 4th Street and Rainbow Blvd.

(2) A Storm Water Pollution Prevention Plan (SWPPP) was approved by the DEC on November 10, 2004. The permittee shall continue to maintain and implement this plan to prevent releases of significant amounts of pollutants to the waters of the State through plant site runoff; spillage and leaks; sludge or waste disposal; and other stormwater discharges including, but not limited to, drainage from raw material storage.

PERMIT LIMITS, LEVELS AND MONITORING DEFINITIONS

OUTFALL	WASTEWATER TYPE	RECEIVING WATER	EFFECTIVE	EXPIRING
	This cell describes the type of wastewater authorized for discharge. Examples include process or sanitary wastewater, storm water, non-contact cooling water.	This cell lists classified waters of the state to which the listed outfall discharges.	The date this page starts in effect. (e.g. EDP or EDPM)	The date this page is no longer in effect. (e.g. ExDP)

PARAMETER	MINIMUM	MAXIMUM	UNITS	SAMPLE FREQ.	SAMPLE TYPE
e.g. pH, TRC, Temperature, D.O.	The minimum level that must be maintained at all instants in time.	The maximum level that may not be exceeded at any instant in time.	SU, °F, mg/l, etc.	See below	See below

PARAMETER	EFFLUENT LIMIT or CALCULATED LEVEL	COMPLIANCE LEVEL/ ML	ACTION LEVEL	UNITS	SAMPLE FREQUENCY	SAMPLE TYPE
	Limit types are defined below in Note 1. The effluent limit is developed based on the more stringent of technology-based limits, required under the Clean Water Act, or New York State water quality standards. The limit has been derived based on existing assumptions and rules. These assumptions include receiving water hardness, pH and temperature; rates of this and other discharges to the receiving stream; etc. If assumptions or rules change the limit may, after due process and modification of this permit, change.	For the purposes of compliance assessment, the permittee shall use the approved EPA analytical method with the lowest possible detection limit as promulgated under 40CFR Part 136 for the determination of the concentrations of parameters present in the sample unless otherwise specified. If a sample result is below the detection limit of the most sensitive method, compliance with the permit limit for that parameter was achieved. Monitoring results that are lower than this level must be reported, but shall not be used to determine compliance with the calculated limit. This PQL can be neither lowered nor raised without a modification of this permit.	Action Levels are monitoring requirements, as defined below in Note 2, which trigger additional monitoring and permit review when exceeded.	This can include units of flow, pH, mass, temperature, or concentration . Examples include µg/l, lbs/d, etc.	Examples include Daily, 3/week, weekly, 2/month, monthly, quarterly, 2/yr and yearly. All monitoring · periods (quarterly, semiannual, annual, etc) are based upon the calendar year unless otherwise specified in this Permit.	Examples include grab, 24 hour composite and 3 grab samples collected over a 6 hour period.

Notes:

1. EFFLUENT LIMIT TYPES:
   a. DAILY DISCHARGE: The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for the purposes of sampling. For pollutants expressed in units of mass, the 'daily discharge' is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the 'daily discharge' is calculated as the average measurement of the pollutant over the day.
   b. DAILY MAX.: The highest allowable daily discharge. DAILY MIN.: The lowest allowable daily discharge.
   c. MONTHLY AVG: The highest allowable average of daily discharges over a calendar month, calculated as the sum of each of the daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
   d. 7 DAY ARITHMETIC MEAN (7 day average): The highest allowable average of daily discharges over a calendar week.
   e. 30 DAY GEOMETRIC MEAN: The highest allowable geometric mean of daily discharges over a calendar month, calculated as the antilog of: the sum of the log of each of the daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.
   f. 7 DAY GEOMETRIC MEAN: The highest allowable geometric mean of daily discharges over a calendar week.
   g. RANGE: The minimum and maximum instantaneous measurements for the reporting period must remain between the two values shown.

2. ACTION LEVELS: Routine Action Level monitoring results, if not provided for on the Discharge Monitoring Report (DMR) form, shall be appended to the DMR for the period during which the sampling was conducted. If the additional monitoring requirement is triggered as noted below, the permittee shall undertake a short-term, high-intensity monitoring program for the parameter(s). Samples identical to those required for routine monitoring purposes shall be taken on each of at least three consecutive operating and discharging days and analyzed. Results shall be expressed in terms of both concentration and mass, and shall be submitted no later than the end of the third month following the month when the additional monitoring requirement was triggered. Results may be appended to the DMR or transmitted under separate cover to the same address. If levels higher than the Action Levels are confirmed, the permit may be reopened by the Department for consideration of revised Action Levels or effluent limits. The permittee is not authorized to discharge any of the listed parameters at levels which may cause or contribute to a violation of water quality standards.

PERMIT LIMITS, LEVELS AND MONITORING

OUTFALL	LIMITATIONS APPLY:	RECEIVING WATER	EFFECTIVE	EXPIRING
001	All Year	Niagara River	EDP	ExDP

PARAMETER	EFFLUENT LIMIT					MONITORING REQUIREMENTS				FN
	Type	Concentration Limit	Units	Mass Limit	Units	Sample Frequency	Sample Type	Location Inf.	Location Eff.	
Flow	Monthly Average	-	-	48	mgd	Continuous	Recorder		X	1
Total Organic Carbon, TOC	Monthly Average	-	-	15200	lbs/d	3/week	24 hr. comp.	X	X	-
Total, Organic Carbon, TOC	7 day arithmetic mean	-	-	22800	lbs/d	3/week	24-hr. comp.	X	X	-
Solids, Total Suspended	Monthly average	30	mg/l	12000	lbs/d.	4/week	24-hr. comp.	X	X	-
Solids, Total Suspended	7 day arithmetic mean	45	mg/l	18000	lbs/d	4/week	24-hr. comp.	X	X	-
pH	Range	6.0-9.0	SU	-	-	Continuous	Recorder	X	X	2
Phosphorus, Total (as P)	Monthly Average	1.0	mg/l	-	-	4/week	24-hr. comp.	X	X	-
Phenolics, Total	Monthly Average	Monitor	mg/l	61	lbs/day	2/month	24 hr. comp.	-	X	3
Priority Pollutant Scan	Annual	Monitor	ug/l	-	-	1/year	Composite	X	X	4
α-BHC	Monthly Average	0.01	ug/l	Monitor	lbs/d	1/month	24 hr. comp.	-	X	5,7
β-BHC	Monthly Average	0.02	ug/l	Monitor	lbs/d	1/month	24 hr. comp.	-	X	5,8
γ-BHC	Monthly Average	0.02	ug/l	Monitor	lbs/d	1/month	24 hr. comp.	-	X	5,9
δ-BHC	Monthly Average	0.04	ug/l	Monitor	lbs/d	1/month	24 hr. comp.	-	X	5,10
Hexachlorobenzene	Monthly Average	0.20	ug/l	Monitor	lbs/d	1/month	24hr. comp.	-	X	5
Mercury	Monthly Average	50	ng/l	Monitor	lbs/d	2/month	Grab	-	X	6
Mirex	Monthly Average	0.40	ug/l	Monitor	lbs/d	1/month	24 hr. comp.	-	X	5
PCB-1248	Monthly Average	0.20	ug/l	Monitor	lbs/d	1/month	24 hr. comp.	-	X	5,11
4,4'-DDD	Monthly Average	0.04	ug/l	Monitor	lbs/d	1/month	24 hr. comp.	-	X	5
4,4'-DDE	Monthly Average	0.02	ug/l	Monitor	lbs/d	1/month	24 hr. comp.	-	X	5
4,4'-DDT	Monthly Average	0.05	ug/l	Monitor	lbs/d	1/month	24 hr. comp.	-	X	5
Effluent Disinfection required		[X] All Year		[ ] Seasonal from _____ to _____						
Coliform, Fecal	30-Day Geometric Mean	200	No./100 ml	-	-	4/week	Grab	-	X	12
Coliform, Fecal	7 Day Geometric Mean	400	No./100 ml	-	-	4/week	Grab	-	X	12
Enterococci	30-Day Geometric Mean	Monitor	No./100 ml	-	-	1/week	Grab	-	X	13
Chlorine, Total Residual	Daily Maximum	3.0	mg/l	-	-	1/hour	Grab	-	X	-
Whole Effluent Toxicity (WET) Testing – **Action Levels**										
WET - Acute Invertebrate	See footnote	15.3	TUa	-	-	Quarterly	See footnote	-	X	14
WET - Acute Vertebrate	See footnote	15.3	TUa	-	-	Quarterly	See footnote	-	X	14
WET - Chronic Invertebrate	See footnote	101	TUa	-	-	Quarterly	See footnote	-	X	14
WET - Chronic Vertebrate	See footnote	101	TUa	-	-	Quarterly	See footnote	-	X	14

Footnotes listed on pages 5 and 6 of this permit.

FOOTNOTES:

1. The permittee shall include the times and durations of overflow of the 100 foot weir (bypass of carbon beds) in the monthly operating reports.

2. These pH limits shall be achieved 99% of the time on a monthly basis. Excursions outside these limits shall not exceed 60 minutes in duration, with no single excursion being outside the pH range of 4.0 to 11.0. Any excursion outside the range of 4.0 to 11.0 shall be reported to the NYSDEC Region 9 office and included in the monthly operating report (Form 92-15-7).

3. Analysis by 4-amino antipyrine (4AAP) method.

4. The permittee shall implement an ongoing annual monitoring program for all priority pollutants plus the parameters listed below. Samples for the monitoring program shall be collected in 2nd quarter of each year from the WWTP influent, and from the WWTP effluent. All samples shall be collected concurrently (when multiple samples are required) and during dry weather. Samples at the influent and effluent shall be collected using a flow-proportioned composite automatic sampler. The samples shall be analyzed for all priority pollutants plus the parameters listed below using test procedures approved under 40CFR Part 136. The monitoring results for this requirement, including the flow for the day the sample was taken, shall be submitted in report form to the Regional Water Engineer within 60 days of the end of the monitoring period. The monitoring results shall be on electronic file or CDROM, in an Excel spreadsheet. The permit may be reopened for modifications if any parameter shows a reasonable potential to cause a violation of the water quality standards. Parameters to be monitored in addition to the priority pollutants include the following:

Monochlorotoluenes	Dichlorophenols
Chlorophenols	Trichlorobenzenes
Trichlorophenols	Dechlorane Plus
Chloro-methyl-phenols	

5. The enforceable compliance limits are based on the practical quantitation limits (PQL) based on the most sensitive analytical method. This is in accordance with DEC TOGS 1.3.3 stating that *"The water quality based effluent limitation (WQBEL) is less than detection level, i.e. the most stringent Practical Quantitation Limit (PQL) published in DEC's Analytical Detectability and Quantitation Guidelines for Selected Environmental Parameters, 1988."* Also, in accordance with DEC's Technical & Operational Guidance Series (TOGS)1.3.3, when this situation occurs the enforceable compliance level shall be set at the PQL for the most sensitive analytical method. Additionally, in accordance with 40 CFR 132, Appendix F, Procedure 8, for discharges tributary to the Great Lakes, the permit shall contain a requirement for the permittee to conduct a Pollutant Minimization Program (PMP) for that pollutant.

6. The **Interim Limit for Mercury is 130ng/l.** The calculated Water Quality Based Effluent Limit for Mercury is 0.7ng/l. However, the existing effluent quality (EEQ) from May 31, 2010 to November 30, 2012 indicates that the 0.7ng/l concentration may not be achievable at the Niagara Falls WWTP. Therefore, based on the EEQ, an interim limit of 130ng/L will be the enforceable limit. **The enforceable limit of 50 ng/l shall apply starting on January 1, 2015.** The permittee shall use Method 1631 for compliance purpose.

7. The **Interim Limit for α-BHC is 0.16 ug/l.** The calculated Water Quality Based Effluent Limit for α-BHC is 0.002 ug/l. However, the existing effluent quality (EEQ) from May 31, 2010 to November 30, 2012 indicates that the 0.002 ug/l concentration may not be achievable at the Niagara Falls WWTP. Therefore, based on the EEQ, an interim limit of 0.16 ug/l will be the enforceable limit. **The enforceable limit, set at the PQL of 0.01 ug/l shall apply starting on 08/01/2018.** The permittee shall use Method 608 for compliance purpose.

8. The **Interim Limit for β-BHC is 0.09 ug/l.** The calculated Water Quality Based Effluent Limit for β-BHC is 0.007 ug/l. However, the existing effluent quality (EEQ) from May 31, 2010 to November 30, 2012 indicates that the 0.007 ug/l concentration may not be achievable at the Niagara Falls WWTP. Therefore, based on the EEQ, an interim limit of 0.09 ug/l will be the enforceable limit. **The enforceable limit, set at the PQL of 0.02 ug/l shall apply starting on 08/01/2018.** The permittee shall use Method 608 for compliance purpose.

9. The **Interim Limit γ-BHC is 0.06 ug/l.** The calculated Water Quality Based Effluent Limit for γ-BHC is 0.008 ug/l. However, the existing effluent quality (EEQ) from May 31, 2010 to November 30, 2012 indicates that the 0.008 ug/l concentration may not be achievable at the Niagara Falls WWTP. Therefore, based on the EEQ, an interim limit of 0.06 ug/l will be the enforceable limit. **The enforceable limit, set at the PQL of 0.02 ug/l shall apply starting on 08/01/2018.** The permittee shall use Method 608 for compliance purpose.

Footnotes – Continued

10. The **Interim Limit for δ-BHC is 0.05 ug/l**. The calculated Water Quality Based Effluent Limit for δ-BHC is 0.008 ug/l. However, the existing effluent quality (EEQ) from May 31, 2010 to November 30, 2012 indicates that the 0.008 ug/l concentration may not be achievable at the Niagara Falls WWTP. Therefore, based on the EEQ, an interim limit of 0.05 ug/l will be the enforceable limit. **The enforceable limit, set at the PQL of 0.04 ug/l shall apply starting on 08/01/2018.** The permittee shall use Method 608 for compliance purpose.

11. In addition to the limit, the permittee will be required to develop, implement, and maintain a PCB Minimization Plan, because the 0.2 ug/l permit limit per PCB Aroclor exceeds the calculated water quality based effluent limit (WQBEL) of 1.0×10^{-6} ug/l for Total PCBs. The goal of the plan is to reduce PCB effluent levels in pursuit of the WQBEL. The basis for the 0.2 ug/l per Aroclor limit is the EPA Method 608 analytical Minimum Level for Aroclors.

12. No more than one test shall be completed per day.

13. Monitoring and reporting shall begin in **02/01/2014.**

14. Whole Effluent Toxicity (WET) Testing:

    Testing Requirements - WET testing shall consist of **Chronic only**. WET testing shall be performed in accordance with 40 CFR Part 136 and TOGS 1.3.2 unless prior written approval has been obtained from the Department. The test species shall be *Ceriodaphnia dubia* (water flea - invertebrate) and *Pimephales promelas* (fathead minnow - vertebrate). Receiving water collected upstream from the discharge should be used for dilution. All tests conducted should be static-renewal (two 24 hr composite samples with one renewal for Acute tests and three 24 hr composite samples with two renewals for Chronic tests). The appropriate dilution series bracketing the IWC and including one exposure group of 100% effluent should be used to generate a definitive test endpoint, otherwise an immediate rerun of the test is required. WET testing shall be coordinated with the monitoring of chemical and physical parameters limited by this permit so that the resulting analyses are also representative of the sample used for WET testing. The ratio of critical receiving water flow to discharge flow (i.e. dilution ratio) is 50:1 for acute, and 100:1 for chronic. Discharges which are disinfected using chlorine should be dechlorinated prior to WET testing or samples shall be taken immediately prior to the chlorination system.

    Monitoring Period - WET testing shall be performed at the specified sample frequency **during calendar years ending in 1 and 6**.

    Reporting - Toxicity Units shall be calculated and reported on the DMR as follows: TUa = (100)/(48 hr LC50) or (100)/(48 hr EC50) (note that Acute data is generated by both Acute and Chronic testing) and TUc = (100)/(NOEC) when Chronic testing has been performed or TUc = (TUa) x (10) when only Acute testing has been performed and is used to predict Chronic test results, where the 48 hr LC50 or 48 hr EC50 and NOEC are expressed in % effluent. This must be done for both species and using the Most Sensitive Endpoint (MSE) or the lowest NOEC and corresponding highest TUc. Report a TUa of 0.3 if there is no statistically significant toxicity in 100% effluent as compared to control.

    The complete test report including all corresponding results, statistical analyses, reference toxicity data, daily average flow at the time of sampling and other appropriate supporting documentation, shall be submitted within 60 days following the end of each test period to the Toxicity Testing Unit. A summary page of the test results for the invertebrate and vertebrate species indicating TUa, 48 hr LC50 or 48 hr EC50 for Acute tests and/or TUc, NOEC, IC25, and most sensitive endpoints for Chronic tests, should also be included at the beginning of the test report.

    WET Testing Action Level Exceedances - If an action level is exceeded then the Department may require the permittee to conduct additional WET testing including Acute and/or Chronic tests. Additionally, the permittee may be required to perform a Toxicity Reduction Evaluation (TRE) in accordance with Department guidance. If such additional testing or performance of a TRE is necessary, the permittee shall be notified in writing by the Regional Water Engineer. The written notification shall include the reason(s) why such testing or a TRE is required.

COMBINED SEWER SYSTEM OVERFLOW CONTROL STRATEGY

A. Best Management Practices

The permittee shall implement the following Best Management Practices (BMPs). These BMPs are designed to implement operation & maintenance procedures, utilize the existing treatment facility and collection system to the maximum extent practicable, and implement sewer design, replacement and drainage planning to maximize pollutant capture and minimize water quality impacts from combined sewer overflows. These BMPs are equivalent to the "Nine Minimum Control Measures" required under the USEPA National Combined Sewer Overflow policy. The EPA's policy is available at http://cfpub.epa.gov/npdes/cso/cpolicy.cfm?program_id=5.

1. CSO Maintenance/Inspection – The permittee shall continue to maintain and inspect all CSOs listed on page(s) 2 of this permit. Inspections shall include all regulators tributary to these CSOs, and shall be conducted during periods of both dry and wet weather. This is to insure that no discharges occur during dry weather and that the maximum amount of wet weather flow is conveyed to the Niagara WWTP for treatment. This program shall consist of inspections with required repair, cleaning and maintenance done as needed. This program shall consist of monthly inspections.

Inspection reports shall be completed indicating visual inspection, any observed flow, incidence of rain or snowmelt, condition of equipment and work required. These reports shall be submitted both in electronic and paper format and submitted to the Region with the monthly operating report (Form 92-15-7).

2. Maximum Use of Collection System for Storage – The permittee shall optimize the collection system by operating and maintaining it to minimize the discharge of pollutants from CSOs. It is intended that the maximum amount of in-system storage capacity be used (without causing service backups) to minimize CSOs and convey the maximum amount of combined sewage to the treatment plant in accordance with Item 4 below.

This shall be accomplished by an evaluation of the hydraulic capacity of the system but should also include a ongoing program of flushing or cleaning to prevent deposition of solids and the adjustment of regulators and weirs to maximize storage.

3. Industrial Pretreatment – The approved Industrial Pretreatment Program shall consider CSOs in the calculation of local limits for indirect discharges. Discharge of persistent toxics upstream of CSOs shall be in accordance with guidance under NYSDEC Division of Water Technical and Operational Guidance Series **(TOGS) 1.3.8 New Discharges to POTWs** (http://www.dec.ny.gov/docs/water_pdf/togs138.pdf). For industrial operations characterized by use of batch discharges, consideration shall be given to the feasibility of a schedule of discharge during conditions of no CSO. For industrial discharges characterized by continuous discharge, consideration must be given to the collection system capacity to maximize delivery of waste to the treatment plant. Non-contact cooling water should be excluded from the combined system to the maximum extent practicable. Direct discharges of cooling water must apply for a SPDES permit.

Consideration shall be given to maximize the capture of nondomestic waste containing toxic pollutants to the maximum extent practicable, and this wastewater should be given priority over residential/commercial service areas for capture and treatment by the POTW.

4. Maximize Flow to POTW – Factors cited in Item 2.above shall also be considered in maximizing flow to the POTW. Maximum delivery to the POTW is particularly critical in treatment of "first-flush" flows. The Niagara Falls treatment plant shall be capable of receiving the peak design hydraulic loading rates for all process units. During wet weather events, WWTP **primary influent flow** rates shall exceed 65 MGD before any regulators are closed, the Gorge pump station pumping rates are reduced or any bypass of the carbon beds is allowed. (Primary influent flows shall be defined as flows from the Southside interceptor plus flows from the Gorge pumping station plus WWTP recycle flows as measured by main pump and gorge force main totalizers/recorders.) The permittee shall maximize treatment of wet weather flows in excess of 65 MGD. This paragraph shall not apply if all available beds (and in no event less than 22 beds) are in operation and if achievement of these requirements is not physically possible.

The permittee shall continue the optimization program for treatment of storm flows and industrial wastewater at the WWTP. Specifically, the upper flow limit before overflow of the 100 foot weir and regulator bypass shall be increased through process improvements where practicable. Annual reports on storm flow and pollutant treatment optimization shall be submitted to the Department by **January 31st**, each year. The permittee shall operate all Regulators in a manner consistent with maximization of the conveyance of industrial wastewater to the treatment plant via the Southside Interceptor during high flow conditions in the system. The permittee shall operate the regulators in the Southside Interceptor (see page 2 of this permit) during dry weather in a manner to insure that industrial wastewater is conveyed to the permittee's wastewater treatment plant and not to the Falls Street Tunnel.

5. Wet Weather Operating Plan - The permittee shall continue to maximize treatment during wet weather. This shall be accomplished in accordance with the permittee's wet weather operating plan approved by DEC on November 24, 2004. The approved plan contains

COMBINED SEWER SYSTEM OVERFLOW CONTROL STRATEGY - Continued

procedures so as to operate unit processes to treat maximum flows while not appreciably diminishing effluent quality or destabilizing treatment upon return to dry weather operation. However, a revised wet weather operating plan must be submitted if the POTW and/or sewer collection system is replaced or modified in a manner that will significantly impact

The submission of a wet weather operating plan is a onetime requirement that shall be done to the Department's satisfaction once. However, a revised wet weather operating plan must be submitted whenever the POTW and/or sewer collection system is replaced or modified. When this permit is administratively renewed by NYSDEC letter entitled "SPDES NOTICE/RENEWAL APPLICATION/PERMIT," the permittee is not required to repeat the submission. The above due dates are independent from the effective date of the permit stated in the letter of "SPDES NOTICE/RENEWAL APPLICATION/PERMIT.".

6. Prohibition of Dry Weather Overflow – Dry weather overflows from the combined sewer system are prohibited. The occurrence of any dry weather overflow shall be promptly abated and reported to the NYSDEC Regional Office in accordance with 6 NYCRR Part 750-2.7.

7. Control of Floatable and Settleable Solids – The discharge of floating solids, oil and grease, or solids of sewage origin which cause deposition in the receiving waters, is a violation of the NYS Narrative Water Quality Standards contained in Part 703. As such, the permittee shall implement best management practices (BMPs) in order to eliminate or minimize the discharge of these substances. All of the measures cited in Items 1, 2, 4 & 5 above shall constitute approvable BMPs for mitigation of this problem. If aesthetic problems persist, the permittee should consider additional BMPs including but not limited to: street sweeping, litter control laws, installation of floatables traps in catch basins (such as hoods), booming and skimming of CSOs, and disposable netting on CSO outfalls. In cases of severe or excessive floatables generation, booming and skimming should be considered an interim measure prior to implementation of final control measures. Public education on harmful disposal practices of personal hygienic devices may also be necessary including but not limited to: public broadcast television, printed information inserts in sewer bills, or public health curricula in local schools.

8. Combined Sewer System Replacement – Replacement of combined sewers shall not be designed or constructed unless approved by NYSDEC. When replacement of a combined sewer is necessary it shall be replaced by separate sanitary and storm sewers to the greatest extent possible. These separate sanitary and storm sewers shall be designed and constructed simultaneously but without interconnections to maximum extent practicable. When combined sewers are replaced, the design should contain cross sections which provide sewage velocities which prevent deposition of organic solids during low flow conditions.

9. Combined Sewer/Extension – Combined sewer/extension, when allowed should be accomplished using separate sewers. These sanitary and storm sewer extensions shall be designed and constructed simultaneously but without interconnections. No new source of storm water shall be connected to any separate sanitary sewer in the collection system.

If separate sewers are to be extended from combined sewers, the permittee shall demonstrate the ability of the sewerage system to convey, and the treatment plant to adequately treat, the increased dry-weather flows. Upon a determination by the Regional Water Engineer an assessment shall be made by the permittee of the effects of the increased flow of sanitary sewage or industrial waste on the strength of CSOs and their frequency of occurrence including the impacts upon best usage of the receiving water. This assessment should use techniques such as collection system and water quality modeling contained in the 1999 Water Environment Federation Manual of Practice FD-17, Prevention and Control of Sewer System Overflows, 2nd edition.

10. Sewage Backups – If, there are documented, recurrent instances of sewage backing up into house(s) or discharges of raw sewage onto the ground surface from surcharging manholes, the permittee shall, upon letter notification from DEC, prohibit further connections that would make the surcharging/back-up problems worse.

By attaching a letter to the monthly operating report, the permittee shall inform the Department of all reported instances known to the permittee of sewage backing up into houses or discharge of raw sewage from surcharging manholes onto the ground surface and the conditions (wet weather, sewage blockage, ect) which caused this to occur.

11. Septage and Hauled Waste – The discharge or release of septage or hauled waste upstream of a CSO is prohibited.

12. Control of Run-off – It is recommended that the impacts of run-off from development and re-development in areas served by combined sewers be reduced by requiring compliance with the New York Standards for Erosion and Sediment Control and the quantity control requirements included in the New York State Stormwater Management Design Manual (http://www.dec.ny.gov/chemical/8694.html).

15. Public Notification – The permittee shall continue to maintain identification signs at all CSO outfalls owned and operated by the permittee. The permittee shall place the signs at or near the CSO outfalls and ensure that the signs are easily readable by the public. The signs shall have **minimum** dimensions of eighteen inches by twenty four inches (18" x 24") and shall have white letters on a green background and contain the following information:

COMBINED SEWER SYSTEM OVERFLOW CONTROL STRATEGY - Continued

N.Y.S. PERMITTED DISCHARGE POINT
(wet weather discharge)
SPDES PERMIT No.: NY_____

OUTFALL No. :____

For information about this permitted discharge contact:

Permittee Name:

Permittee Contact:

Permittee Phone: ( ) - ### - ####

OR:

NYSDEC Division of Water Regional Office Address :

NYSDEC Division of Water Regional Phone: ( ) - ### -####

Waiver requests approved on 2/26/98 and 6/5/03 will remain in effect during term of this permit.

The permittee shall implement a public notification program to inform citizens of the location and occurrence of CSO events. This program shall include a mechanism (public media broadcast, standing beach advisories, newspaper notice etc.) to alert potential users of the receiving waters affected by CSOs. The program shall include a system to determine the nature and duration of conditions that are potentially harmful to users of these receiving waters due to CSOs.

14. Characterization and Monitoring – The permittee shall characterize the combined sewer system, determine the frequency of overflows, and identify CSO impacts in accordance with Combined Sewer Overflows, Guidance for Nine Minimum Controls, EPA, 1995, Chapter 10. These are minimum requirements, more extensive characterization and monitoring efforts which may be required as part of the Long Term Control Plan. Characterization and monitoring shall be accomplished as part of the Post Construction Monitoring Plan under the Phase II LTCP requirements in this permit.

15. Annual report – The permittee shall submit an annual report summarizing implementation of the above best management practices (BMPs). The report shall list existing documentation of implementation of the BMPs and shall be submitted by January 31st of each year to the Regional office listed on the Recording, Reporting and Additional Monitoring page of this permit and to the Bureau of Water Permits, 625 Broadway, Albany, NY 12233-3505. Examples of recommended documentation of the BMPs are found in Combined Sewer Overflows, Guidance for Nine Minimum Controls (NMC), EPA, 1995. The permittee may obtain an electronic copy of the NMC guidance at http://www.epa.gov/npdes/pubs/owm0030.pdf. For guidance on developing the annual report, a BMP checklist is available from DEC on-line at http://www.dec.ny.gov/docs/water_pdf/csobmp.pdf. The permittee must submit completed electronic and paper completed copy of this report along with the annual report. The actual documentation shall be stored at a central location and be made available to DEC upon request.

B. Water Quality Requirements for Combined Sewer Overflows

The permittee shall not discharge any pollutant at a level that causes or contributes to an in-stream excursion above numeric or narrative criteria. EPA's 1994 CSO Control Policy indicates that a CSO control plan that meets the criteria below would be presumed to provide an adequate level on control to meet the water quality based requirements of the CWA.

- The permittee shall eliminate or capture for treatment or storage and subsequent treatment, at least 85 percent of the system-wide combined sewage volume collected in combined sewer systems during precipitation events under design conditions. Captured combined sewage shall receive the treatment specified below.

COMBINED SEWER SYSTEM OVERFLOW CONTROL STRATEGY - Continued

Any combined sewage captured or stored shall receive at minimum the following treatment:

- Primary clarification or equivalent
- Solids and floatables disposal
- Disinfection. Fecal Coliform monthly geometric mean, from a minimum of five examinations, shall not exceed 200 #/100 ml.
- Residual Chlorine. Total Residual Chlorine daily maximum shall not exceed 3.0 mg/l.

C. Long-Term Control Plan

The permittee, NFWB, has successfully completed all the Phase I requirements of the CSO Long Term Control Plan (LTCP). The permittee submitted a LTCP in February 2007 in accordance with the Guidance for Long-Term Control Plan, EPA, September 1995. The plan was approved on April 21, 2008 and in a follow up May 7, 2008 letter to the permittee.

In accordance with 6 NYCRR - Part 621 and the approved LTCP, the permittee was required to submit a schedule of compliance for design and construction and implementation of the selected CSO control methods and development of an operational plan and post-construction monitoring. NFWB completed construction implementing the approved long term control plan at the end of March 2010. This plan consisted of modifying CSOs to increase capture of wet weather flow in the sewer system and control floatables. Work was completed at the following five CSOs.

Outfall Number	*Outfall Name*	*Work Completed*
005	Walnut Avenue	A flow bottleneck in the system was removed by installing a new manhole next the Drop Shaft 3 to divert flow from the Walnut intercepting Chamber and into the drop shaft. The outfall in the Walnut Intercepting Chamber was isolated from the CSS and continues to function as a stormwater outfall only.
006	Gorge Pumping Station	Baffles were installed along the approach channel to capture floatables during overflow events.
008	Bath Avenue	The outfall and diversion chamber was completely isolated from the CSS. Weirs were removed from the structure so that all flow is directed into the gorge interceptor through drill holes. The outfall continues to function as a storm water outfall only.
010	Maple Avenue	Weirs in the structure were modified to direct less stormwater flow to the gorge interceptor, increasing stormwater flow to the outfall.
011	Garfield Avenue	A new weir was installed to decrease the volume of the water discharged during overflow events and maximize storage in the Garfield Tunnel. A baffle was installed on the weir to control the discharge of floatables.

The previous permit was modified to include a schedule of compliance for design and construction and implementation of the approved CSO control methods, and development of an operational plan and post-construction monitoring program.

Operational Plan - The wet weather operating plan that is required in the treatment plant's CSO Best Management Practices shall be required to be updated as a result of modifications to the CSS made during the implementation of the LTCP. The permittee shall continue to implement the wet weather operating plan under the CSO Best Management Practices (BMP) #5.

D. Monitoring Requirements – Post Construction Compliance Monitoring Program

The permittee developed and submitted a post-construction monitoring program on October 1, 2010 and was approved on March 11, 2013 that (a) is adequate to ascertain the effectiveness of the CSO controls and (b) can be used to verify attainment of water quality standards. The program includes a plan that details the monitoring protocols to be followed, including CSO and ambient monitoring and, where appropriate.

To ensure the effectiveness of the CSO controls and to verify attainment of water quality standards in years **ending in 3 and 8** NFWB will be required to complete a one month sampling program in April, July, and October. A wet weather event as defined in the report is any event that causes the Gorge Pump Station to overflow that is preceded by 3 dry weather days. Each

COMBINED SEWER SYSTEM OVERFLOW CONTROL STRATEGY - Continued

month shall comply with the following sampling schedule. Weekly dry weather sampling is to occur once a week. During a month one wet weather sample it to be taken. This schedule shall be effective during the **years ending in 3 and 8**.

Week	*Sample*	
1	Dry Weather Sample	Wet Weather Sample to be obtained as weather permits
2	Dry Weather Sample	
3	Dry Weather Sample	
4	Dry Weather Sample	

In the event in which an appropriate wet weather event does not occur in a given month an additional Dry Weather Sample shall be taken. Sampling Location shall be as follows:

- The sampling location shall be located just after the last NFWB CSO outfall (approximate location 79°2'30"W, 43°8'21"N)

PARAMETER	MONITORING REQUIREMENTS							FN
	Type	Value	Units	Value	Units	Sample Frequency	Sample Type	
Coliform, Fecal	30-day geometric mean	Monitor	#/100ml	-	-	1/week	Grab	1
Enterococci	30-day geometric mean	Monitor	#/100ml	-	-	1/week	Grab	

Footnotes

1. The water quality criteria for Fecal Coliform shall be considered an action level. Since multiple sewersheds discharge into the Niagara River, NFWB would not be the only contributor to a non-attainment of water quality if an exceedance is found.

E. Special Conditions

A. Reopener

This permit may be modified or revoked and reissued, as provided pursuant to 6NYCRR 750-1.18 6 NYCRR 750-1.20, 40 CFR 122.62 and 124.5, for the following reasons:

i. To include new or revised conditions developed to comply with any state of federal law or regulation that addresses CSOs that are adopted or promulgated subsequent to the effective date of this permit.

ii. To include new or revised conditions if new information, not available at the time of permit issuance, indicates that CSO controls imposed under the permit have failed to ensure the attainment of state water quality standards.

F. Reporting Requirements

Once every 5 years, a report shall be compiled and submitted to the NYSDEC. This report shall include a discussion of whether the CSO controls are meeting the goals of the presumption approach selected by the permittee in the LTCP to verify the effectiveness of CSO controls. The report shall also assess whether CSO receiving water quality complies with WQS. The report shall be submitted by January 31 following years ending in 3 and 8 to the Regional office listed on the Recording, Reporting and Additional Monitoring page of this permit and to the Bureau of Water Permits, 625 Broadway, Albany, NY 12233-3505. Guidance on CSO post construction compliance monitoring and reporting can be found at http://www.epa.gov/npdes/pubs/finalcsopccmguidance.pdf. A paper copy and electronic copy shall be submitted to the Department. In addition, any data or monitoring results shall accompany the report submittal on electronic file or CDROM, in an Excel spreadsheet.

MERCURY MINIMIZATION PROGRAM

1. **General** - The permittee shall continue to implement, and maintain a Mercury Minimization Program (MMP). The MMP is required because the 50 ng/L permit limit exceeds the statewide water quality based effluent limit (WQBEL) of 0.70 nanograms/liter (ng/L) for Total Mercury. The goal of the MMP will be to reduce mercury effluent levels in pursuit of the WQBEL. Note – The mercury-related requirements in this permit conform to the mercury Multiple Discharge Variance specified in NYSDEC policy *DOW 1.3.10.*

2. **MMP Elements** - The MMP shall be documented in narrative form and shall include any necessary drawings or maps. Other related documents already prepared for the facility may be used as part of the MMP and may be incorporated by reference. As a minimum, the MMP shall include an on-going program consisting of: periodic monitoring designed to quantify and, over time, track the reduction of mercury; an acceptable control strategy for reducing mercury discharges via cost-effective measures, which may include more stringent control of tributary waste streams; and submission of periodic status reports.

A. Monitoring - The permittee shall conduct periodic monitoring designed to quantify and, over time, track the reduction of mercury. All permit-related wastewater and stormwater mercury compliance point (outfall) monitoring shall be performed using EPA Method 1631. Use of EPA Method 1669 during sample collection is recommended. Unless otherwise specified, all samples shall be grabs.

Monitoring at influent and other locations tributary to compliance points may be performed using either EPA Methods 1631 or 245.7. Monitoring of raw materials, equipment, treatment residuals, and other non-wastewater/non-stormwater substances may be performed using other methods as appropriate. Monitoring shall be coordinated so that the results can be effectively compared between internal locations and final outfalls. Minimum required monitoring is as follows:

i. Sewage Treatment Plant Influent & Effluent Outfalls - Samples at each of these locations must be collected in accordance with the minimum frequency specified on the mercury permit limits page.
ii. Key Locations in the Collection System and Potential Significant Mercury Sources - The minimum monitoring frequency at these locations shall be semi-annual. Monitoring of properly treated dental facility discharges is not required.
iii. Hauled Wastes - Hauled wastes which may contain significant mercury levels must be periodically tested prior to acceptance to ensure compliance with pretreatment/local limits requirements and/or determine mercury load.
iv. Additional monitoring must be completed as may be required elsewhere in this permit or upon Department request.

B. Control Strategy - An acceptable control strategy is required for reducing mercury discharges via cost-effective measures, including but not limited to more stringent control of industrial users and hauled wastes. The control strategy will become enforceable under this permit and shall contain the following minimum elements:

i. Pretreatment/Local Limits - The permittee shall evaluate and revise current requirements in pursuit of the goal.
ii. Periodic Inspection - The permittee shall inspect users as necessary to support the MMP. Each dental facility shall be inspected at least once every five years to verify compliance with the wastewater treatment operation, maintenance, and notification elements of 6NYCRR Part 374.4. Other mercury sources shall also be inspected once every five years. Alternatively, the permittee may develop an outreach program which informs these users of their responsibilities once every five years and is supported by a subset of site inspections. Monitoring shall be performed as above.
iii. Systems with CSO Outfalls - Priority shall be given to controlling mercury sources upstream of CSOs through mercury reduction activities and/or controlled-release discharge. Effective control is necessary to avoid the need for the Department to establish mercury permit limits at these outfalls.
iv. Equipment and Materials – Equipment and materials which may contain mercury shall be evaluated by the permittee and replaced with mercury-free alternatives where environmentally preferable.

C. Annual Status Report - An annual status report shall be submitted to the Regional Water Engineer and to the Bureau of Water Permits summarizing: (a) all MMP monitoring results for the previous year; (b) a list of known and potential mercury sources; (c) all action undertaken pursuant to the strategy during the previous year; (d) actions planned for the upcoming year; and, (e) progress toward the goal.The first annual status report was **May 1, 2011** and follow up reports are due on every **March 1st** thereafter. A file shall be maintained containing all MMP documentation, including the dental forms required by 6NYCRR Part 374.4, which shall be available for review by NYSDEC representatives. Copies shall be provided upon request.

a. **MMP Modification** - The MMP shall be modified whenever: (a) changes at the facility or within the collection system increase the potential for mercury discharges; (b) actual discharges exceed 50 ng/L; (c) a letter from the Department identifies inadequacies in the MMP; or, (d) pursuant to a permit modification.

PCB MINIMIZATION PROGRAM

1. General - The permittee shall continue to implement, and maintain a Polychlorinated Biphenyl Minimization Program (PCBMP). The PCBMP is required because the 200 nanograms/liter (ng/L) permit limit per PCB Aroclor exceeds the water quality based effluent limit (WQBEL) of 0.001 ng/L for Total PCBs. The goal of the PCBMP is to reduce PCB effluent levels in pursuit of the WQBEL. The basis for the 200 ng/L per Aroclor limit is the EPA Method 608 analytical Minimum Level for Aroclors.

2. **PCBMP Elements** - The PCBMP shall be documented in narrative form and shall include any necessary drawings or maps. Other related documents already prepared for the facility may be used as part of the PCBMP and may be incorporated by reference. As a minimum, the PMP plan shall include an on-going program consisting of: periodic monitoring; an acceptable control strategy which will become enforceable under this permit; and, submission of annual status reports.

   A. Monitoring – The permittee shall conduct periodic monitoring designed to quantify and, over time, track the reduction of PCBs. Wastewater treatment plant influent and effluent shall be monitored using the most recent version of EPA Method 1668 at the minimum frequency specified below. Key locations in the wastewater collection system and known or potential PCB sources shall be monitored using Method 1668 at the following minimum frequencies.

Location	*Frequency*
WWTP(Wet Well)	Annual
WWTP Influent (Gorge Force Main)	Annual
WWTP Effluent	Annual
Collection System Locations	Annual (minimum)

   Hauled wastes which may contain PCBs must be periodically tested prior to acceptance to ensure compliance with pretreatment/local limits requirements.

   SPDES permit limit compliance monitoring shall be performed at the frequency specified on the permit limits page using Method 608. Effluent results from Method 1668, as required above, shall not be used for determining compliance with the 200 ng/L Aroclor permit limits. Additional monitoring must be completed as may be required elsewhere in this permit or upon Department request. Monitoring shall be coordinated so that the results can be effectively compared between internal locations and final outfalls, and between different analytical methods.

   B. Control Strategy - An acceptable control strategy is required for reducing PCB discharges via cost-effective measures, including but not limited to more stringent control of industrial users and hauled wastes. The control strategy will become enforceable under this permit and shall contain the following minimum elements:

   i. Pretreatment/Local Limits - The permittee shall evaluate and revise current requirements in pursuit of the goal.
   ii. Periodic Inspection - The permittee must inspect users as necessary to support the MMP.
   iii. Systems with CSO Outfalls - Priority shall be given to controlling PCB sources upstream of CSOs through PCB reduction activities and/or controlled-release discharge. Effective control is necessary to avoid the need for the Department to establish PCB permit limits at these outfalls.
   iv. Treatment System Operation - Required monitoring shall also be used, and supplemented if appropriate, to determine the most effective way to operate the wastewater treatment system to ensure effective removal of PCBs while maintaining compliance with other permit requirements.
   v. Records - A file shall be maintained containing all PCBMP documentation which shall be available for review by DEC representatives.

   C. Annual Status Report - An annual status report shall be submitted to the Regional Water Engineer and to the Bureau of Water Permits summarizing: (a) all PCBMP monitoring results for the previous year; (b) a list of known and potential PCB sources; (c) all action undertaken pursuant to the strategy during the previous year, (d) actions planned for the upcoming year, and (e) progress toward the goal. The first annual status report was due **April 1, 2011** and follow-up reports are due on every **April 1st** thereafter and follow-up status reports are due annually thereafter.

3. **PCBMP Modification** - The PCBMP shall be modified whenever: (a) changes at the facility or within the collection system increase the potential for PCB discharges; (b) actual discharges contain detectable Aroclors as measured with EPA Method 608; (c) a letter from the Department identifies inadequacies in the PCBMP; or (d) pursuant to a permit modification.

SPECIAL CONDITIONS - POTW POLLUTANT MINIMIZATION PROGRAM

The Department reviewed and approved the Pollution Minimization Plan (PMP) submitted in April 2006. The plan met the requirements of Appendix F to 40 CFR Part 132, Procedure 8 for discharges to the Great Lakes. The permittee shall continue to implement the approved plan. An annual status report shall be prepared and submitted to the Regional Water Engineer on every **March 1st**. The report shall summarize the effectiveness of the PMP control strategy and includes all PMP monitoring results and all control measures implemented during the previous calendar year. The goal of this program will be to meet the calculated water quality based effluent limit for the following substances:

Parameter	*WQBEL*
4,4'-DDD	$8.0x10^{-5}$ µg/L
4,4'-DDE	$7.0x10^{-6}$ µg/L
4,4'-DDT	$1.0x10^{-5}$ µg/L
Hexachlorobenzene	$3.0x10^{-5}$ µg/L
Mirex	$1.0x10^{-6}$ µg/L

Hexachlorocyclohexane's (α-BHC, β-BHC, γ-BHC, and δ-BHC)

1. The permittee shall develop, maintain, and implement a Pollutant Minimization Program (PMP). The PMP is required because the calculated water quality based effluent limit (WQBEL) for Hexachlorocyclohexane's is below the permit limit (quantification level) using an EPA approved method. The goal of the PMP is to reduce effluent levels in pursuit of the WQBEL. **WITHIN 9 MONTHS OF THE EDP**, the completed, approvable PMP plan shall be submitted to the Regional Water Engineer and to the Bureau of Water Permits for approval. Subsequent modifications or renewal of this permit does not reset or revise this deadline unless a new deadline is set explicitly by such a permit modification or renewal.

Parameter	*WQBEL*
α-BHC	$2.0x10^{-3}$ µg/L
β-BHC	$7.0x10^{-3}$ µg/L
γ-BHC	$8.0x10^{-3}$ µg/L
δ-BHC	$8.0x10^{-3}$ µg/L

2. The PMP plan shall be documented in narrative form and shall include any necessary plot plans, drawings, or maps. Other documents already prepared for the facility, such as a Best Management Practices Plan, may be used as part of the plan and may be incorporated by reference. As a minimum, the PMP plan shall include:

   A. An on-going potential source identification, evaluation, and prioritization program.

   B. Periodic monitoring designed to quantify and, over time, track the reduction of discharges of the substance(s) noted above. Minimum required monitoring is as follows: quarterly monitoring of wastewater treatment system influent(s), sludge(s), effluent(s), and outfall(s) which are known or suspected of containing the pollutant; and, semi-annual monitoring of potential sources except during the first year which shall be quarterly. This monitoring shall be performed using EPA Method 608 and shall be coordinated with routine compliance monitoring, if applicable, so that the results can be compared. Additional monitoring must be completed as may be required elsewhere in this permit.

   C. An approvable schedule for submission of an approvable control strategy for reducing pollutant discharges via cost-effective control measures, including but not limited to site treatment or remediation. The schedule for submission of a control strategy will become enforceable under this permit. The control strategy and the schedule for implementation of the control strategy will also become enforceable under this permit.

   D. Treatment System Operation - The periodic monitoring required in item (2B) and elsewhere in this permit shall also be used, and supplemented if appropriate, to determine the most effective way to operate the wastewater treatment system(s) to ensure the greatest removal of the pollutant. For example, monitoring data may indicate that greater pollutant removals are achieved when the system(s) are operated below certain hydraulic loading thresholds.

   E. An approvable annual report shall be prepared and submitted to the Regional Water Engineer and to the Bureau of Water Permits by **May 1st** of each year. This report shall summarize all pollutant monitoring data; for treatment systems include a mass balance comparison of influent, effluent, and sludge levels; a list of known or potential pollutant sources; all control measures implemented during the previous calendar year; monitoring, investigations, and control measures to be completed during the current calendar year; and document progress toward the goal of achieving the calculated WQBEL.

SPECIAL CONDITIONS - POTW POLLUTANT MINIMIZATION PROGRAM – Continued

3. The PMP plan shall be modified whenever: (a) changes at the facility increase the potential for discharge of the pollutant, (b) actual discharges indicate the plan is inadequate, or (c) a letter from the Department identifies inadequacies in the PMP plan.

DISCHARGE NOTIFICATION REQUIREMENTS

(a) Except as provided in (c) and (g) of these Discharge Notification Act requirements, the permittee shall install and maintain identification signs at all outfalls to surface waters listed in this permit. Such signs shall be installed before initiation of any discharge.

(b) Subsequent modifications to or renewal of this permit does not reset or revise the deadline set forth in (a) above, unless a new deadline is set explicitly by such permit modification or renewal.

(c) The Discharge Notification Requirements described herein do not apply to outfalls from which the discharge is composed exclusively of storm water, or discharges to ground water.

(d) The sign(s) shall be conspicuous, legible and in as close proximity to the point of discharge as is reasonably possible while ensuring the maximum visibility from the surface water and shore. The signs shall be installed in such a manner to pose minimal hazard to navigation, bathing or other water related activities. If the public has access to the water from the land in the vicinity of the outfall, an identical sign shall be posted to be visible from the direction approaching the surface water.

N.Y.S. PERMITTED DISCHARGE POINT
(wet weather discharge)
SPDES PERMIT No.: NY_____

OUTFALL No. :____

For information about this permitted discharge contact:

Permittee Name:

Permittee Contact:

Permittee Phone: ( ) - ### - ####

OR:

NYSDEC Division of Water Regional Office Address:

NYSDEC Division of Water Regional Phone: ( ) - ### -####

Waiver requests approved on 2/26/98 and 6/5/03 will remain in effect during term of this permit.

The signs shall have **minimum** dimensions of eighteen inches by twenty four inches (18" x 24") and shall have white letters on a green background and contain the following information:

(e) For each discharge required to have a sign in accordance with a), the permittee shall, concurrent with the installation of the sign, provide a repository of copies of the Discharge Monitoring Reports (DMRs), as required by the **RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS** page of this permit. This repository shall be open to the public, at a minimum, during normal daytime business hours. The repository may be at the business office repository of the permittee or at an off-premises location of its choice (such location shall be the village, town, city or county clerk's office, the local library or other location as approved by the Department). In accordance with the **RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS** page of your permit, each DMR shall be maintained on record for a period of five years

(f) The permittee shall periodically inspect the outfall identification sign(s) in order to ensure they are maintained, are still visible, and contain information that is current and factually correct. Signs that are damaged or incorrect shall be replaced within 3 months of inspection.

(g) All requirements of the Discharge Notification Act, including public repository requirements, are waived for any outfall meeting any of the following circumstances, provided Department notification is made in accordance with (h) below:

DISCHARGE NOTIFICATION REQUIREMENTS - Continued

(i) such sign would be inconsistent with any other state or federal statute;

(ii) the Discharge Notification Requirements contained herein would require that such sign could only be located in an area that is damaged by ice or flooding due to a one-year storm or storms of less severity;

(iii) instances in which the outfall to the receiving water is located on private or government property which is restricted to the public through fencing, patrolling, or other control mechanisms. Property which is posted only, without additional control mechanisms, does not qualify for this provision;

(iv) instances where the outfall pipe or channel discharges to another outfall pipe or channel, before discharge to a receiving water; or

(v) instances in which the discharge from the outfall is located in the receiving water, two-hundred or more feet from the shoreline of the receiving water.

(h) If the permittee believes that any outfall which discharges wastewater from the permitted facility meets any of the waiver criteria listed in (g) above, notification (form enclosed) must be made to the Department's Bureau of Water Permits, Central Office, of such fact, and, provided there is no objection by the Department, a sign and DMR repository for the involved outfall(s) are not required. This notification must include the facility's name, address, telephone number, contact, permit number, outfall number(s), and reason why such outfall(s) is waived from the requirements of discharge notification. The Department may evaluate the applicability of a waiver at any time, and take appropriate measures to assure that the ECL and associated regulations are complied with.

PRETREATMENT PROGRAM IMPLEMENTATION REQUIREMENTS

A. DEFINITIONS. Generally, terms used in this Section shall be defined as in the General Pretreatment Regulations (40 CFR Part 403). Specifically, the following definitions apply to terms used in this Section (PRETREATMENT PROGRAM IMPLEMENTATION REQUIREMENTS):

1. Categorical Industrial User (CIU) - an industrial user of the POTW that is subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N;

2. Local Limits - General Prohibitions, specific prohibitions and specific limits as set forth in 40 CFR 403.5.

3. The Publicly Owned Treatment Works (the POTW) - as defined by 40 CFR 403.3(q) and that discharges in accordance with this permit.

4. Program Submission(s) - requests for approval or modification of the POTW Pretreatment Program submitted in accordance with 40 CFR 403.11 or 403.18 and approved by letter dated May 8, 1985 and any amendments thereto.

5. Significant Industrial User (SIU) -

   a. CIUs;

   b. Except as provided in 40 CFR 403.3(v)(3), any other industrial user that discharges an average of 25,000 gallons per day or more of process wastewater (excluding sanitary, non-contact cooling and boiler blowdown wastewater) to the POTW;

   c. Except as provided in 40 CFR 403.3(v)(3), any other industrial user that contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant;

   d. Any other industrial user that the permittee designates as having a reasonable potential for adversely affecting the POTW's operation or for violating a pretreatment standard or requirement.

6. Substances of Concern - Substances identified by the New York State Department of Environmental Conservation Industrial Chemical Survey as substances of concern.

B. IMPLEMENTATION. The permittee shall implement a POTW Pretreatment Program in accordance 40 CFR Part 403 and as set forth in the permittee's approved Program Submission(s). Modifications to this program shall be made in accordance with 40 CFR 403.18. Specific program requirements are as follows:

1. Industrial Survey. To maintain an updated inventory of industrial dischargers to the POTW the permittee shall:

   a. Identify, locate and list all industrial users who might be subject to the industrial pretreatment program from the pretreatment program submission and any other necessary, appropriate and available sources. This identification and location list will be updated, at a minimum, every five years. As part of this update the permittee shall collect a current and complete New York State Industrial Chemical Survey form (or equivalent) from each SIU.

   b. Identify the character and volume of pollutants contributed to the POTW by each industrial user identified in B.1.a above that is classified as a SIU.

   c. Identify, locate and list, from the pretreatment program submission and any other necessary, appropriate and available sources, all significant industrial users of the POTW.

2. Control Mechanisms. To provide adequate notice to and control of industrial users of the POTW the permittee shall:

   a. Inform by certified letter, hand delivery courier, overnight mail, or other means which will provide written acknowledgment of delivery, all industrial users identified in B.1.a. above of applicable pretreatment standards and requirements including the requirement to comply with the local sewer use law, regulation or ordinance and any applicable requirements under section 204(b) and 405 of the Federal Clean Water Act and Subtitles C and D of the Resource Conservation and Recovery Act.

PRETREATMENT PROGRAM IMPLEMENTATION REQUIREMENTS, page 2 of 3

b. Control through permit or similar means the contribution to the POTW by each SIU to ensure compliance with applicable pretreatment standards and requirements. Permits shall contain limitations, sampling frequency and type, reporting and self-monitoring requirements as described below, requirements that limitations and conditions be complied with by established deadlines, an expiration date not later than five years from the date of permit issuance, a statement of applicable civil and criminal penalties and the requirement to comply with Local Limits and any other requirements in accordance with 40 CFR 403.8(f)(1).

3. Monitoring and Inspection. To provide adequate, ongoing characterization of non-domestic users of the POTW, the permittee shall:

a. Receive and analyze self-monitoring reports and other notices. The permittee shall require all SIUs to submit self-monitoring reports at least every six months unless the permittee collects all such information required for the report, including flow data.

b. The permittee shall adequately inspect each SIU at a minimum frequency of once per year.

c. The permittee shall collect and analyze samples from each SIU for all priority pollutants that can reasonably be expected to be detectable at levels greater than the levels found in domestic sewage at a minimum frequency of once per year.

d. Require, through permits, each SIU to collect at least one 24 hour, flow proportioned composite (where feasible) effluent sample every six months and analyze each of those samples for all priority pollutants that can reasonably be expected to be detectable in that discharge at levels greater than the levels found in domestic sewage. The permittee may perform the aforementioned monitoring in lieu of the SIU except that the permittee must also perform the compliance monitoring described in 3.c.

4. Enforcement. To assure adequate, equitable enforcement of the industrial pretreatment program the permittee shall:

a. Investigate instances of noncompliance with pretreatment standards and requirements, as indicated in self-monitoring reports and notices or indicated by analysis, inspection and surveillance activities. Sample taking and analysis and the collection of other information shall be performed with sufficient care to produce evidence admissible in enforcement proceedings or in judicial actions. Enforcement activities shall be conducted in accordance with the permittee's Enforcement Response Plan developed and approved in accordance with 40 CFR Part 403.

b. Enforce compliance with all national pretreatment standards and requirements in 40 CFR Parts 406 - 471.

c. Provide public notification of significant non-compliance as required by 40 CFR 403.8(f)(2)(viii).

d. Pursuant to 40 CFR 403.5(e), when either the Department or the USEPA determines any source contributes pollutants to the POTW in violation of Pretreatment Standards or Requirements the Department or the USEPA shall notify the permittee. Failure by the permittee to commence an appropriate investigation and subsequent enforcement action within 30 days of this notification may result in appropriate enforcement action against the source and permittee.

5. Record keeping. The permittee shall maintain and update, as necessary, records identifying the nature, character, and volume of pollutants contributed by SIUs. Records shall be maintained in accordance with 6 NYCRR Part 750-2.5(c).

6. Staffing. The permittee shall maintain minimum staffing positions committed to implementation of the Industrial Pretreatment Program in accordance with the approved pretreatment program.

C. SLUDGE DISPOSAL PLAN. The permittee shall notify NYSDEC, and USEPA as long as USEPA remains the approval authority, 60 days prior to any major proposed change in the sludge disposal plan. NYSDEC may require additional pretreatment measures or controls to prevent or abate an interference incident relating to sludge use or disposal.

PRETREATMENT PROGRAM IMPLEMENTATION REQUIREMENTS, page 3 of 3

D. REPORTING. The permittee shall provide to the offices listed on the Monitoring, Reporting and Recording page of this permit and to the Chief-Water Compliance Branch; USEPA Region II; 290 Broadway; New York, NY 10007; a periodic report that briefly describes the permittee's program activities over the previous year. This report shall be submitted to the above noted offices within 60 days of the end of the reporting period. The reporting period shall be ANNUAL with reporting periods ending on December 31st.

The periodic report shall include:

1. Industrial Survey. Updated industrial survey information in accordance with 40 CFR 403.12(i)(1) (including any NYS Industrial Chemical Survey forms updated during the reporting period).

2. Implementation Status. Status of Program Implementation, to include:

   a. Any interference, upset or permit violations experienced at the POTW directly attributable to industrial users.

   b. Listing of significant industrial users issued permits.

   c. Listing of significant industrial users inspected and/or monitored during the previous reporting period and summary of results.

   d. Listing of significant industrial users notified of promulgated pretreatment standards or applicable local standards who are on compliance schedules. The listing should include for each facility the final date of compliance.

   e. Summary of POTW monitoring results not already submitted on Discharge Monitoring Reports and toxic loadings from SIU's organized by parameter.

   f. A summary of additions or deletions to the list of SIUs, with a brief explanation for each deletion.

3. Enforcement Status. Status of enforcement activities to include:

   a. Listing of significant industrial users in Significant Non-Compliance (as defined by 40 CFR 403.8(f)(2)(viii) with federal or local pretreatment standards at end of the reporting period.

   b. Summary of enforcement activities taken against non-complying significant industrial users. The permittee shall provide a copy of the public notice of significant violators as specified in 40 CFR Part 403.8(f)(2)(viii).

SCHEDULE OF COMPLIANCE

a) The permittee shall comply with the following schedule:

Outfall	Parameters Affected	Interim Effluent Limits	Compliance Action	Due Date
001	α-BHC β-BHC γ-BHC δ-BHC	0.16 ug/l 0.09 ug/l 0.06 ug/l 0.05 ug/l	1. The permittee shall develop, maintain, and implement a Pollutant Minimization Program (PMP). The completed, approvable PMP plan shall be submitted to the Regional Water Engineer and to the Bureau of Water Permits for approval. Subsequent modifications or renewal of this permit does not reset or revise this deadline unless a new deadline is set explicitly by such a permit modification or renewal. 2. The proposed Interim Limits are provided. The calculated Water Quality Based Effluent Limit for these pollutants are below the PQLs. However, the existing effluent quality (EEQ) from May 31, 2010 to November 30, 2012 indicates that the compliance limits (PQLs) may not be achievable at the Niagara Falls WWTP. Therefore, based on the EEQ, the interim limits will be the enforceable limit until 08/01/2018. The permittee shall use Method 608 for compliance purpose	**08/01/2014** **08/01/2018**

b) **The permittee shall submit interim progress reports to the Department every twelve (12) months as part of the annual report for the PMP listed on page 14 until the due date for these compliance items are met.**

c) The permittee shall submit a written notice of compliance or non-compliance with each of the above schedule dates no later than 14 days following each elapsed date, unless conditions require more immediate notice as prescribed in 6 NYCRR Part 750-1.2(a) and 750-2. All such compliance or non-compliance notification shall be sent to the locations listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS. Each notice of non-compliance shall include the following information:

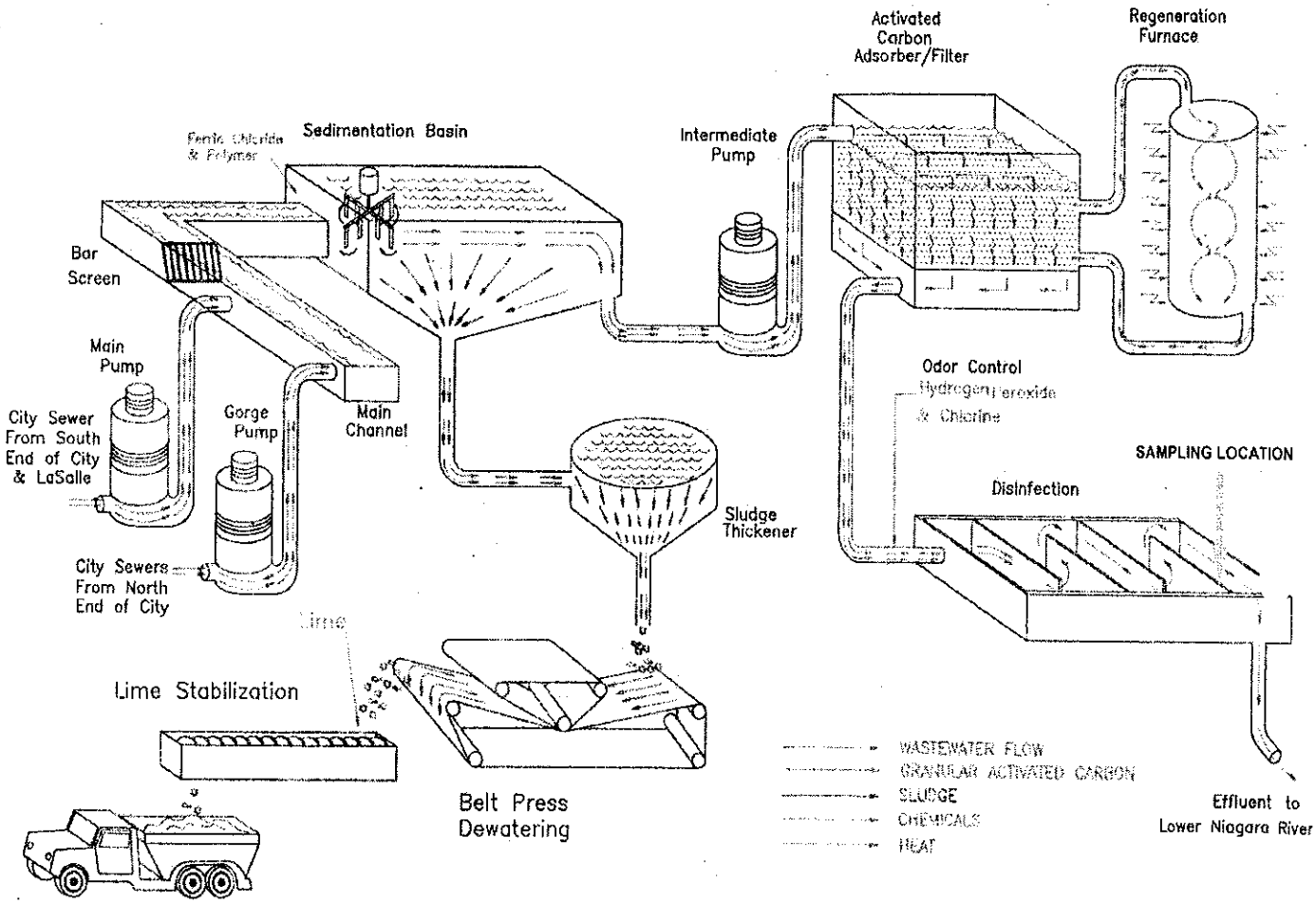
1. A short description of the non-compliance;
2. A description of any actions taken or proposed by the permittee to comply with the elapsed schedule requirements without further delay and to limit environmental impact associated with the non-compliance;
3. A description or any factors which tend to explain or mitigate the non-compliance; and
4. An estimate of the date the permittee will comply with the elapsed schedule requirement and an assessment of the probability that the permittee will meet the next scheduled requirement on time.

d) The permittee shall submit copies of any document required by the above schedule of compliance to NYSDEC Regional Water Engineer at the location listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS and to the Bureau of Water Permits, 625 Broadway, Albany, N.Y. 12233-3505, unless otherwise specified in this permit or in writing by the Department.

MONITORING LOCATIONS

The permittee shall take samples and measurements, to comply with the monitoring requirements specified in this permit, at the location(s) specified below:

- Effluent samples shall be 24 hour flow proportioned composites taken after chlorination in the chlorine contact chambers but before the discharge combines with the industrial cooling water in the Diversion Sewer.
- The influent samples shall be the composite of separate 24 hour flow proportioned samples of the Gorge Force Main and the Main Wet Well. Recycled flows shall not be included in the influent sample.



GENERAL REQUIREMENTS

A. The regulations in 6 NYCRR Part 750 are hereby incorporated by reference and the conditions are enforceable requirements under this permit. The permittee shall comply with all requirements set forth in this permit and with all the applicable requirements of 6 NYCRR Part 750 incorporated into this permit by reference, including but not limited to the regulations in paragraphs B through G as follows:.

B. General Conditions

1. Duty to comply	6NYCRR Part 750-2.1(e) & 2.4
2. Duty to reapply	6NYCRR Part 750-1.16(a)
3. Need to halt or reduce activity not a defense	6NYCRR Part 750-2.1(g)
4. Duty to mitigate	6NYCRR Part 750-2.7(f)
5. Permit actions	6NYCRR Part 750-1.1(c), 1.18, 1.20 & 2.1(h)
6. Property rights	6NYCRR Part 750-2.2(b)
7. Duty to provide information	6NYCRR Part 750-2.1(i)
8. Inspection and entry	6NYCRR Part 750-2.1(a) & 2.3

C. Operation and Maintenance

1. Proper Operation & Maintenance	6NYCRR Part 750-2.8
2. Bypass	6NYCRR Part 750-1.2(a)(17), 2.8(b) & 2.7
3. Upset	6NYCRR Part 750-1.2(a)(94) & 2.8(c)

D. Monitoring and Records

1. Monitoring and records	6NYCRR Part 750-2.5(a)(2), 2.5(c)(1), 2.5(c)(2), 2.5(d) & 2.5(a)(6)
2. Signatory requirements	6NYCRR Part 750-1.8 & 2.5(b)

E. Reporting Requirements

1. Reporting requirements	6NYCRR Part 750-2.5, 2.6, 2.7 & 1.17
2. Anticipated noncompliance	6NYCRR Part 750-2.7(a)
3. Transfers	6NYCRR Part 750-1.17
4. Monitoring reports	6NYCRR Part 750-2.5(e)
5. Compliance schedules	6NYCRR Part 750-1.14(d)
6. 24-hour reporting	6NYCRR Part 750-2.7(c) & (d)
7. Other noncompliance	6NYCRR Part 750-2.7(e)
8. Other information	6NYCRR Part 750-2.1(f)
9. Additional conditions applicable to a POTW	6NYCRR Part 750-2.9
10. Special reporting requirements for discharges that are not POTWs	6NYCRR Part 750-2.6

F. Planned Changes

1. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

   a. The alteration or addition to the permitted facility may meet of the criteria for determining whether facility is a new source in 40 CFR §122.29(b); or
   b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, or to notification requirements under 40 CFR §122.42(a)(1); or
   c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

In addition to the Department, the permittee shall submit a copy of this notice to the United States Environmental Protection Agency at the following address: U.S. EPA Region 2, Clean Water Regulatory Branch, 290 Broadway, 24th Floor, New York, NY 10007-1866.

GENERAL REQUIREMENTS continued

G. Notification Requirement for POTWs

1. All POTWs shall provide adequate notice to the Department and the USEPA of the following:
   a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging those pollutants; or
   b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
   c. For the purposes of this paragraph, adequate notice shall include information on:
      i. the quality and quantity of effluent introduced into the POTW, and
      ii. any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

POTWs shall submit a copy of this notice to the United States Environmental Protection Agency, at the following address: U.S. EPA Region 2, Clean Water Regulatory Branch, 290 Broadway, 24th Floor, New York, NY 10007-1866.

H. Sludge Management

The permittee shall comply with all applicable requirements of 6 NYCRR Part 360.

RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS

A. The monitoring information required by this permit shall be summarized, signed and retained for a period of at least five years from the date of the sampling for subsequent inspection by the Department or its designated agent. **Also, monitoring information required by this permit shall be summarized and reported by submitting;**

[X] (if box is checked) completed and signed Discharge Monitoring Report (DMR) forms for each __1__ month reporting period to the locations specified below. Blank forms are available at the Department's Albany office listed below. The first reporting period begins on the effective date of this permit and the reports will be due no later than the 28th day of the month following the end of each reporting period.

[ ] (if box is checked) an annual report to the Regional Water Engineer at the address specified below. The annual report is due by February 1 each year and must summarize information for January to December of the previous year in a format acceptable to the Department.

[X] (if box is checked) a monthly "Wastewater Facility Operation Report..." (form 92-15-7) to the:
[X] Regional Water Engineer and/or [X] County Health Department or Environmental Control Agency specified below

Send the **original** (top sheet) of each DMR page to:
Department of Environmental Conservation
Division of Water, Bureau of Water Compliance
625 Broadway, Albany, New York 12233-3506
Phone: (518) 402-8177

Send the **first copy** (second sheet) of each DMR page to:
Department of Environmental Conservation
Regional Water Engineer, Region 9
270 Michigan Avenue
Buffalo, NY 14203-2915
Phone: (716) 851-7070

Send an **additional copy** of each DMR page to:
Niagara County Health Department
5467 Upper Mountain Road
Lockport, NY 14094
Phone: (716) 439-7444

B. Monitoring and analysis shall be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

C. More frequent monitoring of the discharge(s), monitoring point(s), or waters of the State than required by the permit, where analysis is performed by a certified laboratory or where such analysis is not required to be performed by a certified laboratory, shall be included in the calculations and recording of the data on the corresponding DMRs.

D. Calculations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

E. Unless otherwise specified, all information recorded on the DMRs shall be based upon measurements and sampling carried out during the most recently completed reporting period.

F. Any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approval pursuant to section 502 of the Public Health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquiries regarding laboratory certification should be directed to the New York State Department of Health, Environmental Laboratory Accreditation Program.

Appendix C
Engineering Report Certification

Engineering Report Certification

To Be Provided by the Professional Engineer Preparing the Report

During the preparation of this Engineering Report, I have studied and evaluated the cost and effectiveness of the processes, materials, techniques, and technologies for carrying out the proposed project or activity for which assistance is being sought from the New York State Clean Water State Revolving Fund. In my professional opinion, I have recommended for selection, to the maximum extent practicable, a project or activity that maximizes the potential for efficient water use, reuse, recapture, and conservation, and energy conservation, taking into account the cost of constructing the project or activity, the cost of operating and maintaining the project or activity over the life of the project or activity, and the cost of replacing the project and activity.

Title of Engineering Report: Engineering Report, Wastewater Treatment Plant and Gorge Pumping Station Rehabilitation

Date of Report: July 24, 2018

Professional Engineer's Name: Robert P. Lannon Jr., PE

New York State Professional Engineer License Number: 066750

Signature: Robert P. Lannon Jr

Date: 7/24/18

Appendix D
Smart Growth Assessment Form

Appendix D: Smart Growth Assessment Form
(required for EFC financial assistance)

Smart Growth Assessment Form

This form should be completed by the applicant's project engineer or other design professional.[1]

Applicant Information

Applicant: Niagara Falls Water Board Project No.:

Project Name: Wastewater Treatment Plant and Gorge Pumping Station Rehabilitation

Is project construction complete? ☐ Yes, date: ☒ No

Project Summary: (provide a short project summary in plain language including the location of the area the project serves)
The NFWB intends to expeditiously implement a host of critical CIP projects and improvements at the existing Wastewater Treatment Plant and Gorge Pumping Station that required to stabilize the operation of the facilities, maintain permit compliance, and minimize the potential for future violations. Critical improvements include replacements, upgrades, and optimizations of existing process equipment and supporting infrastructure.

Section 1 – Screening Questions

1. Prior Approvals

1A. Has the project been previously approved for EFC financial assistance? ☐ Yes ☒ No

1B. If so, what was the project number(s) for the prior approval(s)? Project No.:

Is the scope of the project substantially the same as that which was approved? ☐ Yes ☐ No

IF THE PROJECT WAS PREVIOUSLY APPROVED BY EFC'S BOARD AND THE SCOPE OF THE PROJECT HAS NOT MATERIALLY CHANGED, THE PROJECT IS **NOT** SUBJECT TO SMART GROWTH REVIEW. SKIP TO SIGNATURE BLOCK.

2. New or Expanded Infrastructure

2A. Does the project add new wastewater collection/new water mains or a new wastewater treatment system/water treatment plant? ☐ Yes ☒ No
Note: A new infrastructure project adds wastewater collection/water mains or a wastewater treatment/water treatment plant where none existed previously

2B. Will the project result in either: ☐ Yes ☒ No

An increase of the State Pollutant Discharge Elimination System (SPDES) permitted flow capacity for an existing treatment system;

OR

An increase such that a NYSDEC water withdrawal permit will need to be obtained or modified, or result in the NYSDOH approving an increase in the capacity of the water treatment plant?

[1] If project construction is complete and the project was not previously financed through EFC, an authorized municipal representative may complete and sign this assessment.

Note: An expanded infrastructure project results in an increase of the SPDES permitted flow capacity for the wastewater treatment system, or an increase of the permitted water withdrawal or the permitted flow capacity for the water treatment system.

IF THE ANSWER IS "NO" TO BOTH "2A" and "2B" ON THE PREVIOUS PAGE, THE PROJECT IS NOT SUBJECT TO FURTHER SMART GROWTH REVIEW. SKIP TO SIGNATURE BLOCK.

3. Court or Administrative Consent Orders

3A. Is the project expressly required by a court or administrative consent order? ☐ Yes ☐ No

3B. If so, have you previously submitted the order to NYS EFC or DOH? If not, please attach. ☐ Yes ☐ No

Section 2 – Additional Information Needed for Relevant Smart Growth Criteria

EFC has determined that the following smart growth criteria are relevant for EFC-funded projects and that projects must meet each of these criteria to the extent practicable:

1. Uses or Improves Existing Infrastructure

1A. Does the project use or improve existing infrastructure? ☐ Yes ☐ No
Please describe:

2. Serves a Municipal Center

Projects must serve an area in either 2A, 2B or 2C to the extent practicable.

2A. Does the project serve an area **limited** to one or more of the following municipal centers?

i. A City or incorporated Village ☐Yes ☐No
ii. A central business district ☐Yes ☐No
iii. A main street ☐Yes ☐No
iv. A downtown area ☐Yes ☐No
v. A Brownfield Opportunity Area ☐Yes ☐No
(for more information, go to Department of State Website & search "Brownfield")
vi. A downtown area of a Local Waterfront Revitalization Program Area ☐Yes ☐No
(for more information, go to Department of State Website and search "Waterfront Revitalization")
vii. An area of transit-oriented development ☐Yes ☐No
viii. An Environmental Justice Area ☐Yes ☐No
(for more information, go to DEC Environmental Justice Areas)
ix. A Hardship/Poverty Area ☐Yes ☐No
Note: Projects that primarily serve census tracts and block numbering areas with a poverty rate of at least twenty percent according to the latest census data

Please describe all selections:

2B. If the project serves an area located outside of a municipal center, does it serve an area located adjacent to a municipal center which has clearly defined borders, designated for concentrated development in a municipal or regional comprehensive plan and exhibit strong land use, transportation, infrastructure and economic connections to an existing municipal center? ☐Yes ☐No

Please describe:

2C. If the project is not located in a municipal center as defined above, is the area designated by a comprehensive plan and identified in zoning ordinance as a future municipal center? ☐Yes ☐No

Please describe and reference applicable plans:

3. Resiliency Criteria

3A. Was there consideration of future physical climate risk due to sea-level rise, storm surge, and/or flooding during the planning of this project? ☐Yes ☐No

Please describe:

Signature Block: By entering your name in the box below, you agree that you are authorized to act on behalf of the applicant and that the information contained in this Smart Growth Assessment is true, correct and complete to the best of your knowledge and belief.

Applicant:	Phone Number:
Robert Lannon, PE, Principal, GHD Consulting Services, Inc.	716.856.2142
(Name & Title of Project Engineer or Design Professional or Authorized Municipal Representative)	
Robert P. Lannon	7/24/18
(Signature)	(Date)

www.ghd.com