Town of Byron

7028 Route 237, P.O. Box 9
Byron, NY 14422

PRELIMINARY ENGINEERING REPORT

for the

WASTEWATER TREATMENT SYSTEM IMPROVEMENTS

April 2023

CWSRF PROJECT NUMBER: C8-6514-01-00

MRB Group Project No. 0204.20001.000

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I. EXECUTIVE SUMMARY

The Town of Byron was notified on March 1, 2019 by the New York State Department of Environmental Conservation (DEC) with a "Notice of Intent to Modify" the State Pollutant Discharge Elimination System (SPDES) permit for the Town's sewage treatment system. A renewed SPDES permit for the Town became effective January 1, 2022 and included seasonal disinfection requirements for the sewer system effluent and requires the Town to design, install, and make operational, a disinfection treatment system by May 1, 2025. In order to meet this deadline, proceed with a cost-effective disinfection alternative, and have sufficient time to secure appropriate funding for construction, planning began immediately and is summarized within this Preliminary Engineering Report (PER).

The need for significant capital improvements to meet disinfection requirements, coupled with the age of the Town's wastewater facilities, prompted the Town to undertake a comprehensive review of their wastewater treatment facilities. This comprehensive review of the Town's wastewater facilities is also summarized within this Preliminary Engineering Report (PER).

The Town's sewer system was constructed in 1983 and is comprised of three (3) separate wastewater treatment facilities which are permitted to operate and discharge under one (1) SPDES permit No. NY0160971. All three (3) wastewater treatment facilities and associated collection systems are grey water systems discharging to subsurface sand filter beds for treatment. It is anticipated that the three (3) sand filtration wastewater treatment facilities will require complete replacement in the next ten (10) years. In recent years, summertime ammonia limits have become operationally more challenging to consistently meet. A revised wintertime ammonia limit issued in the Town's SPDES permit effective in January 2022 also further complicates operations. As indicated in the SPDES permit for the Town, effective January 1, 2022, Outfall 003 was not issued a disinfection related permit limit and therefore is not evaluated in-depth in this study.

No phosphorous limits are present in the Town's renewed SPDES permit at this time for any of the three (3) outfalls. However, the current NYSDEC fact sheet does note that a Draft Total Maximum Daily Load (TMDL) for Phosphorus in Upper Black Creek and Bigelow Creek is pending approval, since 2013 (Appendix B and L). The current draft available of NYSDEC's website indicates no total phosphorous load reductions being required from Outfall 001 Central Byron. The draft does indicate that a significant load reduction of 79% would be required from Outfall 002 South Byron. The status of this TMDL effort is unclear at this time. Nonetheless, if a

Total Phosphorous limit was to be applied to Outfall 002 significant capital improvements would need to be made to accommodate this.

In summary, this PER evaluates three (3) alternatives to provide a comprehensive plan for the Town's wastewater treatment facilities over the next thirty (30) years;

1) Disinfection Improvements Only
2) Rehabilitation of Sand Filtration Beds at Outfalls 001 and 002, with Disinfection Improvements (and septic tank replacements)
3) Replacement of Sand Filtration Beds at Outfalls 001 and 002 with two (2) Wastewater Treatment Plants, both with Disinfection improvements (and septic tank replacements)
4) Consolidation of South Byron and Central Byron into one (1) Wastewater Treatment Plant with Disinfection Improvements included (and septic tank replacements)
5) Pump Station and Forcemain Conveyance System to Monroe County Sewer System (and septic tank replacements)

Based on the analysis provided herein, Alternative #4 is recommended for the following reasons:

1) Provides a long-term (30-year planning period) solution to the Town's wastewater treatment facilities which are currently approaching the end of their useful life (specifically sand filter beds at Outfall 001).
2) Simplifies the Town's SPDES permit by consolidating Outfalls 001 and 002.
3) Enables the Town to address NYSDEC concerns with the South Byron outfall phosphorous loading to Black Creek by abandoning discharges at this point in the waterbody. In the event that NYSDEC decides to implement a total phosphorous limit in the future on the combined outfall (current Outfalls 001 and 002) the Town will have infrastructure in place to more easily comply with such limits.
4) Provides a new biological treatment process that is designed to comply with and exceed current ammonia removal requirements.
5) Allows for the installation of one (1) disinfection system to comply with SPDES permit disinfection limits, instead of multiple disinfection systems.
6) Provides future capacity to allow North Byron Outfall 003 to be abandoned and pumped to the new WWTP.

Per the 2022 Round 18 DEC Water Quality Improvement Project (WQIP) grant program award list, the Town has been awarded $1,000,000 for the disinfection component of the project. The Town may wish to consider re-applying to the WQIP program this year, under the general project category.

Additionally, per the Amended Median Household Income Survey letter from NYSEFC dated March 8, 2023 (Appendix N), the Median Household Income for the Town's Consolidated Sewer District (MHI) is $45,000. As a result, the project appears to be eligible for hardship financing as the MHI falls below the 80% MHI for Upstate NY of $54,789.

It is recommended to use this PER and the amended MHI to update the overall project on the Clean Water State Revolving Fund (CWSRF) Intended Use Plan (IUP) for consideration for hardship (0% interest) financing and to seek grant funding for the overall project through the Water Infrastructure Improvement Act (WIIA) and Bipartisan Infrastructure Law (BIL).

II. PROJECT BACKGROUND AND HISTORY

The Town of Byron (Town) is a rural, agricultural based community located in northeastern part of Genesee County. The current sewer system was constructed in 1983 and is comprised of three (3) separate wastewater treatment facilities which are permitted to operate and discharge under one (1) SPDES permit No. NY0160971. All three (3) wastewater treatment facilities and associated collection systems were originally formed as three (3) separate sewer districts. In early 2023, the Town has established a joint consolidation agreement between the three (3) sewer districts to form a Consolidated Sewer District. The wastewater facilities are grey water systems discharging to subsurface sand filter beds for treatment. Individual households and businesses within these districts are each connected to a septic tank. A summary of permitted outfalls is as follows.

SPDES Permit # NY0160971 Outfall	Service Area	Permitted Monthly Average Flow (MGD)	Receiving Waterbody	Receiving Waterbody Class	TMDL Present?	Listed on 2018 Section 303(d) list for Impaired Waterbodies?
001	Hamlet of Central Byron	0.053	Black Creek (PWL ID 0402-0028)	C	Yes, 2013 Draft Pending DEC Review	Yes, requiring TMDL Development. Pollutant of concern: Phosphorous (Refer to Appendix L)
002	Hamlet of South Byron	0.025				
003	Hamlet of North Byron	0.006	Spring Creek (PWL ID 0402-0036)	C	None	Yes, TMDL development may be deferred

The Town of Byron was notified on March 1, 2019 by the New York State Department of Environmental Conservation (DEC) with a "Notice of Intent to Modify" the State Pollutant Discharge Elimination System (SPDES) permit for the Town's sewage treatment system. A renewed SPDES permit for the Town became effective January 1, 2022 and included seasonal disinfection requirements for the sewer system effluent and requires the Town to design, install, and make operational, a disinfection treatment system by May 1, 2025.

As indicated in the SPDES permit for the Town, effective January 1, 2022, Outfall 003 was not issued a disinfection related permit limit and therefore will not be included in this comprehensive disinfection study. Minor improvements to Outfall 003 will be included as part of this project to add a small pump to assist the operators in obtaining SPDES compliance samples.

Additionally, since the Town's SPDES permit last technical review in 1994, all receiving waterbody streams were Class D. All receiving streams are now classified as Class C waterbodies and subject to more stringent water quality standards. As a result, Outfall 001 was issued a more restrictive ammonia limit for wintertime operations. The new wintertime ammonia limit is 11.4 mg/L as N, compared to the 1994 SPDES permit limit of 15 mg/L as NH_3 (12.3 mg/L as N). Based on existing operational data from Outfall 001 the current sand filter bed treatment system is often operationally challenging to consistently meet summertime ammonia limits of 7.4 mg/L as N. Outfall 001 also received a dissolved oxygen limit for summertime operations.

Furthermore, as noted in NYSDEC's fact sheet provided on December 8, 2021, no total phosphorous limits are present in the Town's renewed SPDES permit at this time for any of the three (3) outfalls. However, the fact sheet does note that a Draft Total Maximum Daily Load (TMDL) for Phosphorus in Upper Black Creek and Bigelow Creek is pending approval, since 2013. The current draft available of NYSDEC's website indicates no total phosphorous load reductions being required from Outfall 001 Central Byron. The draft does indicate that a significant load reduction of 79% would be required from Outfall 002 South Byron. The status of this TMDL effort is unclear at this time. Nonetheless, if a Total Phosphorous limit was to be applied to Outfall 002 significant capital improvements would need to be made to accommodate this.

A. SITE INFORMATION

The Town encompasses a 32.2 square mile area in Genesee County in DEC Region 8. As indicated previously, the Town's wastewater treatment facilities consist of multiple sand filter beds in three (3) locations: North Byron, Central Byron, and South Byron. According to the DEC online Environmental Resource Mapper tool, the Central Byron effluent beds are located near an area freshwater pond (blue), as well as an area of freshwater forested / shrub wetland (green). The South Byron effluent beds located near an area of freshwater forested / shrub wetland (green).

The United States Geographical Survey (USGS) 7.5-minute series quadrangle maps and United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) were used to compile information regarding the topography, soil data, depth to any restrictive layer, depth to groundwater, and flooding considerations.

According to USGS, only bedrock type near the effluent beds is the Camillus Shale (Scv). For surficial geology, the beds are located in an area of Till (t), with variable texture from boulders to silt and variable permeability with compaction.

According to date from USDA-NRCS, soils surrounding the Central Byron effluent beds are made up of 32% Teel silt loam (Te) and 36% Wayland soils complex (Wy). Soil Te is classified as Hydrologic Soil Group B/D. It has a slope ranging from 0 to 3%, a depth of water between 18 and 24 inches, a depth to a restrictive soil layer of more than 80 inches, occasional or no frequency of ponding or flooding, and moderate available water storage (about 8.9 inches). Soil Wy is classified as Hydrologic Soil Group B/D. It has a slope ranging from 0 to 3%, a depth of water between 0 and 6 inches, a depth to a restrictive soil layer of more than 80 inches, frequent or no frequency of ponding or flooding, and very high available water storage (about 12.6 inches).

The soils surrounding the South Byron effluent beds are made up of 49% Wakeville silt loam (Wk) and 10% Cazenovia silty clay loam (CgD3). Soil Wk is classified as Hydrologic Soil Group B/D. It has a slope ranging from 0 to 3%, a depth of water between 6 and 18 inches, a depth to a restrictive soil layer of more than 80 inches, occasional or no frequency of ponding or flooding, and high available water storage (about 10.9 inches). Soil CgD3 is classified as Hydrologic Soil Group C/D. It has a slope ranging from 15 to 25%, a depth of water between 18 and 30 inches, a depth to a restrictive soil layer of more than 80 inches, no frequency of ponding or flooding, and moderate available water storage (about 8.4 inches).

The other soil areas are not in direct vicinity of the beds. Therefore, there should not be any construction issues on site based on the soil and available depths. According to the DEC website, the wastewater treatment system is not located within an Environmental Justice area.

B. Ownership and Service Area

According to the 2011 Guides for the Design of Wastewater Treatment Works (TR-16), the design period for new processes and equipment should be a minimum of 20 years. Therefore, both recorded and projected population estimates were considered.

Population data for the Town was obtained from the Genesee / Finger Lakes Regional Planning Council and the U.S. Census Bureau. Based on the data provided, the Town population makes up about 3.9% of the entire population of Genesee County. This percentage was used to aid in the estimated projected populations:

Year	Genesee County Population	Town Population
2010	60,079	2,369
2020	60,788	2,397
2030	61,142	2,411
2040	61,449	2,424
2050	61,721	2,434

As shown, there is a projected increase in population of about 37 people between 2020 and 2050. Therefore, future design criteria for the wastewater treatment system will be based on a population estimate of approximately 2,500 people. This will prevent the system from being undersized in case of unexpected economic or urban development.

C. Current Operations

The following criteria represent the limits, levels, and monitoring set by the permit effective from January 2022 through the end of 2027 for Outfalls 001 and 002. In addition, effluent shall not exceed 15% of influent concentration values for BOD_5 and TSS, respectively. A copy of the 2022 SPDES permit and updated fact sheet are included for all outfalls in Appendix B.

Seasonal Limits: Summer (June through end of October)			
Parameter	**Central Byron (Outfall 001)**	**South Byron (Outfall 002)**	**Units**
Flow	53,000	25,000	gpd
$CBOD_5$	15	15	mg/L
Solids, Suspended	15	15	mg/L
Solids, Settleable	0.1	0.1	mL/L
Ammonia (as N)	7.4	6.6	mg/L
Dissolved Oxygen	7.0	Not applicable	mg/L
Fecal Coliform (30-day geometric mean)*	200	200	No./100mL
Fecal Coliform (7-day geometric mean)*	400	400	No./100mL
Seasonal Limits: Winter (November through end of May)			
Parameter	**Central Byron (Outfall 001)**	**South Byron (Outfall 002)**	**Units**
Flow	53,000	25,000	gpd
$CBOD_5$	25	25	mg/L
Solids, Suspended	30	30	mg/L
Solids, Settleable	0.1	0.1	mL/L
Ammonia (as N)	11.4	12.3	mg/L
Dissolved Oxygen	Monitor	Not applicable	mg/L

NOTE: *Disinfection is required to begin on May 1 of each year through October 31.

D. Design Sewer Network Inflow

According to the Discharge Monitoring Reports (DMR) for daily operations between 2018 and 2020, Central Byron had an average monthly flow rate of 25,286 gpd and maximum monthly flow rate of 48,230 gpd. South Byron had an average monthly flow rate of 18,289 gpd and maximum monthly flow rate of 30,893 gpd. Therefore, both the average and maximum monthly flow rates for Central Byron are below the issued SPDES limit of 53,000 gpd. The average monthly flow rate for South Byron is below the issued SPDES limit of 25,000 gpd, but the maximum monthly flow rate is not. A summary of the discharge monitoring reports for both outfalls between 2018 and 2020 is included in Appendix C.

Based on review of discharge monitoring reports from January 2018 through February 2021, the existing three-year average flow is summarized for Average Monthly Flow (AMF), Maximum Monthly Flow (MMF), Average Daily Flow (ADF) and Peak Daily Flow (PDF) in the table below.

Existing Flow (gpd)		
Condition	**Outfall 001**	**Outfall 002**
AMF	25,286	18,289
SPDES Permit Flow Limit (Monthly Average)	53,000	25,000
MMF	48,230	30,893
ADF	25,073	18,149
PDF	122,000	54,000

As shown in Section II(B) of this report, future population growth in the service area is anticipated to increase by approximately 3% by 2050. This future growth is planned for in the table below showing design flows. A column showing proposed design flows for an alternative where Outfall 001 and Outfall 002 are combined is also shown.

Design Flow (gpd)			
Condition	**Outfall 001**	**Outfall 002**	**Combined Outfall**
AMF	27,000	19,000	45,000
MMF	52,000	33,000	85,000
ADF	26,000	19,000	45,000
PDF	126,000	56,000	182,000

According to the 2014 Recommended Standards for Wastewater Facilities (Ten States), the sizing of wastewater collection systems shall be based on an average daily flow of 100 gallons per capita plus wastewater flow from industrial plants and major institutional and commercial facilities. Using the average monthly flow is 25,286 gpd for Central Byron, at 100 gallons per capita per day, the service area population would be estimated at 253. Using the average monthly flow of 18,289 gpd for South Byron, at 100 gallons per capita per day, the service area population would be estimated at 183. Based on the census data assumed gallons per capita per day, the combined service area population for the Town is approximately 436 people. Using this population estimate, a peaking factor of approximately 4.0 (PHF/ADF) should be used per Figure 1, Chapter 10 of Ten States Standards.

Design Flow (gpd)			
Condition	**Outfall 001**	**Outfall 002**	**Combined Outfall**
Estimated PHF	104,000	76,000	180,000

In the case of Outfall 001, the estimated PHF would be lower than the recorded PDF. To provide a conservative design, it is proposed to use a peaking factor of 4 relative to the design MMF in lieu of site-specific PHF data.

Design Flow (gpd)			
Condition	**Outfall 001**	**Outfall 002**	**Combined Outfall**
MMF	50,000	32,000	85,000
Estimated PHF	200,000	128,000	328,000
Estimated PHF/Actual ADF	8.0	7.1	7.6

Past investigations have identified that the collection systems attribute a substantial volume of peak flows to inflow and infiltration (I/I). Although it is not recommended to cater future design criteria solely to factors outside normal operations due to the small size of the overall system, I/I will continue to contribute to high volumes until network infrastructure is addressed. For the purposes of evaluating the existing sewer network and planning for disinfection improvements, higher volumes of I/I were considered, with the understanding that this will be addressed as part of the future improvements. The calculated peaking factors are high given the size of the sewer network and existing population, but account for these additional flows as necessary.

E. Existing Sewer Network and Present Condition

The existing sewer system in the Town consists of three sections: North Byron, Central Byron, and South Byron. Overall, due to the small population and accumulation of waste from individual septic tank effluent, the Town utilizes subsurface sand filters to treat collection system gray water effluent. This type of treatment is brought about by physical, chemical, and biological transformations. Suspended solids are removed principally by mechanical straining and sedimentation. Since bacteria colonize with sand grains, autofiltration caused by growth of bacteria further enhances the removal of suspended solids. The removal of BOD_5 and the conversion of ammonia to nitrate (nitrification) occurs under aerobic conditions by the microorganisms present in the sand beds. Intermittent application and venting of the underdrains help to maintain aerobic conditions within the filters. Specific constituents are removed both chemically and physically by sorption.

The following sections describe in detail each sewer area and the associated constituents involved in the treatment process. Existing site photos, as well as site plans and hydraulic profiles for Central and South Byron are included in Appendix D.

1. Sewer Networks

Central Byron accounts for the majority of the Town residential users, and all commercial, institutional, and industrial users. Both South and Central Byron utilize effluent beds located off New York State Route 237. The following sections describe the flow path of the waste stream from the users to the effluent from the treatment facility.

a. Collection System

The sanitary sewer collection system in Central Byron consists mostly of 4-inch diameter PVC pipe, with some 6-inch diameter PVC prior to entering the lift station at the sand filter beds. The Central Byron collection system contains approximately 18,400 linear feet of collection system piping.

Similar to the collection system in Central Byron, the sanitary sewer in South Byron consists mostly of 4-inch diameter PVC pipe, with some 6-inch diameter PVC prior to entering the lift station at the sand filter beds. The South Byron collection system contains approximately 10,110 linear feet.

In both collection systems, the majority of flow is by gravity with a limited number of lift stations in the collection system.

Each home in the sanitary collection system is served by a building lateral, which enters a septic tank. Effluent from the septic tanks then proceeds to enter the collection system leading gray water sewage to community sand filter beds. The Town of Byron owns and maintains all septic tanks and building laterals, in addition to the gray water collection system.

b. Pump Stations

The flow from Central Byron enters the filter bed site through 6-inch PVC to a lift pump station and tank. The pump station sends flow through a 3-inch PVC force main to 2,000-gallon septic tank. The flow from South Byron enters the filter bed site through 6-inch PVC to a 2,000-gallon septic tank, and into a lift pump station and tank.

c. Dosing Pumps and Tanks

At Central Byron, the septic tank effluent flows to dosing pumps and tank, and is then split between three (3) 4-inch PVC lines to distribution boxes along the edges of the filter beds. At South Byron, the pump station effluent flows to dosing pumps and tank, and is then split between three (3) 4-inch PVC lines to distribution boxes along the edges of the filter beds.

d. Distribution Boxes

Each filter bed consists of two (2) distribution boxes, for a total of six (6) distribution boxes at both Central Byron and South Byron. Flow from the distribution boxes is then applied to three (3) subsurface sand filters through 4-inch PVC pipes.

e. Single-Pass Subsurface Sand Filters

The Central Byron filters 1 through 3 are approximately 160 feet long by 120 feet wide. The South Byron filters 1 through 3 are approximately 100 feet long by 100 feet wide. Each filter contains 24 inches of filter sand over 8 inches of course sand over 4 inches of No. 1A stone. A 20-mil plastic liner exists between filter material and native soil. The beds are sloped downward to facilitate flow. A series of 4-inch PVC underdrain head rows lie beneath each filter, with multiple vents to the surface.

f. Effluent Manholes

Flow from each filter bed enters an observation manhole. The effluent flow from each observation manhole combines along 4-inch PVC pipe to a junction point at the aeration structure. Each manhole has a diameter of four (4) feet and depth of five (5) feet. The manholes are enclosed in concrete and covered with a steel lid.

g. Aeration Units

Flow enters the aeration structure from the sand filters through a 4-inch PVC line. The aeration structure consists of a series of eight (8) 12-inch vertical steps with back baffles to prevent flow pushing back upstream. A 24-inch manhole provides access to the aeration structure, and two (2) 6-inch cast iron goose neck vents sit on the top. The aeration chute is approximately one (1) foot wide with concrete sides to maintain its structure. At the last step, the structure discharges flow through a 6-inch PVC pipe to Black Creek.

h. Outfalls

The discharge line at Central Byron is approximately 220 feet long, and the discharge line at South Byron is approximately 850 feet long. The treated effluent from both Central Byron and South Byron discharges to Black Creek.

F. FLOOD PROTECTION

TR-16 design standards require that all new facilities constructed within a sewer system should (1) provide uninterrupted operation during to 100-year flood, and (2) be placed above or be protected against damage that might occur in an event that results in a water elevation above the 100-year flood. Critical equipment should be protected against damage up to a water surface elevation that is 3 feet above the 100-year flood elevation. Non-critical equipment should be protected against damage up to a water surface elevation of 2 feet above the 100-year flood elevation.

According to the FEMA Flood Insurance Risk Maps effective December 6, 1974, neither the Byron nor the South Byron existing effluent beds are located in a special flood hazard area. However, they both lie adjacent to Black Creek, and a potential associated special hazard area without a flood elevation being provided by FEMA. With either disinfection alternative, the new equipment would be placed above the 100-year flood level based on coordination during design. FEMA Flood Insurance Rate Maps for Byron and South Byron are included in Appendix E.

III. PROBLEM IDENTIFICATION

As previously discussed, the Town wastewater treatment facilities (Outfall 001 and Outfall 002, only) are required to implement disinfection. Per the Town's SPDES permit effective January 1, 2022, the Town is required to comply with final effluent limitations for disinfection by May 1, 2025. The disinfection will be seasonal between May 1st and October 31st each year.

Additionally, the Town has also decided to consider the future of their subsurface sand filtration beds which have been in service for approximately 40 years. Given recent operational data, the sand filtration system seems to be successful at wintertime operations in meeting ammonia limits, however, summertime ammonia limits are becoming increasingly difficult to meet on a consistent basis specifically at Outfall 001. Given their age and decreasing performance, the existing sand filtration beds will likely require complete replacement within the next ten (10) years.

An additional consideration the Town must contend with is with potential future SPDES permit limitations which may be added by NYSDEC. As noted in NYSDEC's fact sheet provided on December 8, 2021, no total phosphorous limits are present in the Town's renewed SPDES permit at this time for any of the three (3) outfalls. However, the fact sheet does note that a Draft Total Maximum Daily Load (TMDL) for Phosphorus in Upper Black Creek and Bigelow Creek is pending approval, since 2013. The current draft available of NYSDEC's website indicates no total phosphorous load reductions being required from Outfall 001 Central Byron. The draft does indicate that a load reduction would be required from Outfall 002 South Byron. Nonetheless, if a Total Phosphorous limit was to be applied to Outfall 002 significant capital improvements would need to be made to accommodate this.

Lastly, the Town's gray water collection system is known to have inflow and infiltration (I/I) issues. This is reflected in the rather large peaking factor shown in this report for the proposed design (peaking factor is approximately 7.5 PHF to MMF). The Town owns and maintains all septic tanks in the collection system. These septic tanks are known sources of I/I in the collection system. The Town has attempted to implement an annual replacement program of these septic tanks, however, with Town forces only working on this progress has been slow.

Given the combination of current disinfection limits, aging treatment and collection facilities, and the potential for additional SPDES permit revisions, the Town is also evaluating long-term solutions for its wastewater infrastructure in addition to meeting disinfection requirements.

A. Compliance Schedule

Upon DEC submission and approval of the PER, the State Environmental Quality Review (SEQR) process will be completed. The following Schedule of Compliance shall be followed for final effluent limits for Fecal Coliform and Total Residual Chlorine:

- Submit Preliminary Engineering Report (PER) detailing disinfection designs by January 1, 2023. Note, a PER was submitted in June 2022, but did not receive a sufficient funding package at the time to allow the project to proceed.
- Submit approvable Engineering Plans, Specifications, and Construction Schedule for Implementation by October 1, 2023.
- Begin construction of treatment facilities (contingent upon NYSDEC approval of plans and specifications).
- Complete construction and commence operation of the system by May 1, 2025.

Please note, if this project obtains sufficient funding for the recommended alternative, the Town will need to request an extension for compliance with disinfection from NYSDEC.

B. Financial Status

The sewer rate for the Town is set at $115 per unit per quarter, with a $10 late fee after 30 days. According to the 2021 sewer budget, the adopted budget was approximately $147,680.

The 2019 American Community Survey Statewide Median Household Income (MHI) for New York State is $68,486, which is adjusted for certain counties by a Regional Cost Factor (RCF). The RCF for Upstate is 1.0, and therefore the adjusted MHI is unchanged (i.e. $68,486). The 80% MHI is $54,789. Below the 80% MHI, the Clean Water State Revolving Fund (CWSRF) hardship program offers both interest free and/or grant funding to eligible projects.

Per the Amended Median Household Income Survey letter from NYSEFC dated March 8, 2023 (Appendix N), the Median Household Income for the Town's Consolidated Sewer District (MHI) is $45,000. As a result, the project appears to be eligible for hardship financing as the MHI falls below the 80% MHI for Upstate NY of $54,789.

IV. Disinfection Alternatives Analysis

The following alternatives will be considered in this study for implementation of effluent disinfection at the wastewater treatment system(s):

A. Chlorination using liquid sodium hypochlorite, and subsequent dechlorination using sodium bisulfate.
B. Ultraviolet (UV) light radiation disinfection.

Given limited on-site space at both Outfall 001 and Outfall 002, alternatives for disinfection will only consider disinfection implementation by intercepting current flow paths, pumping the effluent to a more favorable location on-site, disinfecting then resuming the existing flow path. Due to the requirement of pumping, a closed vessel system was selected to be installed on the forcemain of the effluent pumping system to reduce the costs associated with concrete work for open channel UV systems.

A. Alternative A: Chlorination / Dechlorination System

Both the Ten States Standards and TR-16 were used for sizing a chlorine contact tank to accommodate chlorination/dechlorination using chemicals. Ten States Standards require a minimum contact period of 15 minutes at design peak hourly flow to be provided after thorough mixing for chlorination and a minimum of 30 seconds for mixing and contact time at design peak hourly flow for dechlorination. TR-16 design standards require a minimum contact period of 30 minutes at design peak hourly flow for chlorination unless specific testing can demonstrate the ability to achieve the discharge limit at lower contact times. A minimum of 2 minutes contact time at average daily flow is required for dechlorination.

It is the understanding that the DEC has recently required disinfection facilities using chlorination to be designed using the more restrictive TR-16 design standards. Therefore, the TR-16 design standards are used for sizing the chlorination and dechlorination tanks in this report.

Currently, there is no chlorination / dechlorination system or infrastructure on site. In order to conserve funds, minimize operations, and meet DEC standards, a disinfection system is proposed that contains and feeds chemicals, and treats effluent in a single enclosure. A proposed chemical storage structure would house dosing equipment, a chlorine contact tank system, and chemical tanks.

Two (2) chemical feed dosing pumps would be provided per Outfall, along with a standby spare at each outfall. A larger tank would act as the chlorine contact tank with a mixer to disperse chemical. The overflow would be used as the discharge to inject chemical prior to entering the tank. A chemical skid would feed both the sodium hypochlorite and sodium bisulfate by 50-gallon drums.

A small pump station will be installed to force flow from the effluent manholes to the chlorination and dechlorination system enclosure on the opposite side of the sand beds. The flow rate will be great enough to pump flow through the disinfection treatment enclosure, through a mixing manhole to meet dissolved oxygen limits (mechanical aerator), and back into the effluent to the outfall. No additional easements or wetland permits would be required. However, chlorination and dechlorination requires handling of hazardous chemicals, which pose threats to operators and the environment.

Cost Estimate: The Alternative Opinion of Probable cost (OPC) is approximately $2,024,000 including contingency and legal, administrative, and engineering costs. The OPC and attached in Appendix F.

B. ALTERNATIVE B: UV RADIATION

A collimated beam sample and particle size analysis sample were taken to determine the UV transmittance of the wastewater effluent to determine if UV radiation is an adequate disinfection alternative to comply with the SPDES permit limit. The necessary design dose is a function of the process influent bacteria count, the target organisms and permit limit, process influent Total Suspended Solids (TSS) concentration, particle size distribution, hardness, and ultraviolet transmittance (UVT). The UVT is the percentage of germicidal UV light that penetrates 1 centimeter of water sample at 254 nanometers wavelength. The Town has received disinfection limits as previously listed in this report, and the outfalls have a permitted TSS limit of 15 mg/L for the majority of the year in which disinfection is required (TSS is limited to a daily maximum of 30 mg/L in May).

The following table shows the results of the collimated beam sample 20-0068 taken on May 11, 2021 at Outfall 001 Central Byron.

Table 1. Central Byron Outfall 001 Collimated Beam Sampling

Sample	UVT (%/cm)	UVT Filtered (%/cm)	TSS (mg/L)
20-0068	60	70	4.0

The following table shows the results of the collimated beam sample 20-0216 taken on August 19, 2020 and sample 20-0070 taken on May 11, 2021 at Outfall 002 South Byron.

Table 2. South Byron Outfall 002 Collimated Beam Sampling

Sample	UVT (%/cm)	UVT Filtered (%/cm)	TSS (mg/L)
20-0216	81	81	0.7
20-0070	78	78	< 0.3

All samples UVT values (pre-filtered) exceed 60%, and TSS is reported to be relatively low following sand filtration. These results indicate that UV light disinfection remains a viable disinfection alternative.

TR-16 provides guideline design dose ranges as a function of TSS, UVT and the permit effluent requirements. Given a SPDES permit limit of 200 MPN/100 mL, TR-16 typical ranges recommended for this application would be as follows:

UVT (%)	TSS (mg/L)	Effluent Requirement (per 100 mL)	UV Dose (mJ/cm^2)
55	30	200	35 – 40
65	10	200	25 – 30

Outfall 002 effluent results would indicate a minimum design dosage recommendation of 30 mJ/cm^2. Outfall 001 does not clearly fall into either typical range from TR-16. The results of the collimated beam results taken 60% UVT indicate a fecal coliform reduction meeting SPDES permit limits at a delivered dose of 5 mJ/cm^2. Based on these results, a minimum design dosage recommendation of 30 mJ/cm^2 would also apply to Outfall 001.

Cost Estimate: The Alternative Opinion of Probable cost (OPC) is approximately $1,642,000 including contingency and legal, administrative, and engineering costs. The OPC and attached in Appendix F.

Note that this Alternative only addresses immediate issues with the Town's wastewater infrastructure. As a result, a further analysis of long-term options for the Town's wastewater treatment systems is presented below in Section V.

C. DISINFECTION ALTERNATIVES CONCLUSION

Based on the disinfection alternatives analysis, UV light radiation proves to be the best suited methodology to meet the modified requirements issued by the DEC. The following points support this conclusion:

- Simple, safe, and environmentally friendly
- No risk associated with transporting, handling, or storing hazardous chemicals
- No disinfection by-products to harm aquatic life
- Rapid, effective inactivation of microorganisms

Furthermore, UVT sampling from both outfalls 001 and 002 support the selection of UV radiation as the selected disinfection alternative. The design criteria will be consistent with Ten States and TR-16 and/or the requirements and approval conditions of the NYSDEC and NYSEFC.

V. LONG-TERM WASTEWATER TREATMENT FACILITY ALTERNATIVES

The following summary of alternatives is intended to provide a description of all alternatives, along with pros and cons, and provide an opinion of probable costs estimate for each alternative. The following alternatives are summarized in this Section:

1. Disinfection Improvements Only
2. Rehabilitation of Sand Filtration Beds at Outfalls 001 and 002, with Disinfection Improvements
3. Replacement of Sand Filtration Beds at Outfalls 001 and 002 with two (2) Wastewater Treatment Plants, both with Disinfection improvements
4. Consolidation of South Byron and Central Byron into one (1) Wastewater Treatment Plant with Disinfection Improvements included
5. Pump Station and Forcemain Conveyance System to Monroe County Sewer System

A. ALTERNATIVE #1: DISINFECTION IMPROVEMENTS ONLY

Section IV provides an in-depth analysis between chlorination/dechlorination and UV disinfection. UV Disinfection is the selected disinfection alternative as concluded within that Section.

This alternative provides a solution for the immediate needs to the Town's wastewater facilities, in that they are able to meet disinfection limits in their most recent SPDES permit. The design criteria will be consistent with Ten States and TR-16 and/or the requirements and approval conditions of the NYSDEC and NYSEFC. In this alternative, the proposed UV system consists of two (2) closed vessel reactors (1 duty/1 redundant) and contains four (4) lamps or eight (8) lamps per reactor chamber. The UV system uses low-pressure, high-intensity amalgam lamps to provide an energy-efficient solution. The compact reactor design minimizes footprint and headloss while ensuring that maintenance activities such as lamp replacement can be performed quickly and safely.

The Central Byron system is rated for a peak hourly flow of 0.200 MGD, 60% UV transmittance, 15 mg/L TSS, and a disinfection limit of 200 Fecal Coliform per 100 mL. The South Byron system is rated for a peak hourly flow of 0.128 MGD, 60% UV transmittance, 15 mg/L TSS, and a disinfection limit of 200 Fecal Coliform per 100 mL.

The design dose will be greater than 30 mJ/cm^2 and bioassay validated. The basis of design model will be the TrojanUVFit™ system which includes an automatic cleaning mechanism. here are two (2) power distribution centers (PDC), one (1) per reactor. These includes a microprocessor controller. Each PDC requires 240V, single phase. The UV system will be contained in a small cabinet for easy access, and protection from direct sunlight and precipitation, and to assist in preventing algae growth.

The UV equipment will be enclosed in a custom fiberglass shelter measuring 12 feet long by 8 feet wide by 8 feet tall. There will be two (2) sets of double doors to access the equipment as needed. The enclosure will also include fixed louver ventilation and a set of stainless-steel lifting eyes to assist in maintenance operations.

Site availability on the existing outfall is limited. Installation of UV equipment at this location on-site would require additional easements and access roads to install, operate, and maintain the equipment. To resolve this, a small pump station will be installed to force flow from the effluent manholes to a UV system on the opposite side of the sand beds. The flow rate will be great enough to pump flow through the UV system, through a mixing manhole to monitor dissolved oxygen, and back into the existing outfall pipe. No additional easements or wetland permits would be required.

While the ability of the Alternative 1 to meet immediate needs is clear, the Alternative does not address the following goals of the Town's long-term infrastructure planning:

- **Future of Outfall 001 and 002 subsurface sand filtration beds**
  These sand filtration beds have been in service for approximately 40 years. Given recent operational data, the sand filtration system seems to be successful at wintertime operations in meeting ammonia limits, however, summertime ammonia limits are becoming increasingly difficult to meet on a consistent basis specifically at Outfall 001. Given their age and decreasing performance, the existing sand filtration beds will likely require complete replacement within the next ten (10) years.

- **Potential future SPDES permit limitations which may be added by NYSDEC**
  As noted in NYSDEC's fact sheet provided on December 8, 2021, no total phosphorous limits are present in the Town's renewed SPDES permit at this time for any of the three (3) outfalls. However, the fact sheet does note that a Draft Total Maximum Daily Load (TMDL) for Phosphorus in Upper Black Creek and Bigelow Creek is pending approval,

since 2013. The current draft available of NYSDEC's website indicates no total phosphorous load reductions being required from Outfall 001 Central Byron. The draft does indicate that a load reduction would be required from Outfall 002 South Byron, with a proposed Waste Load Allocation (WLA) equal to 0.6 mg/L of Total Phosphorous in the effluent of Outfall 002. The status of this TMDL effort is unclear at this time. Nonetheless, if a Total Phosphorous limit less than the proposed WLA was to be applied to Outfall 002 significant capital improvements would need to be made to accommodate this.

Cost Estimate: The Alternative Opinion of Probable cost (OPC) is approximately $1,682,000 including contingency and legal, administrative, and engineering costs. The OPC and attached in Appendix F.

As previously discussed, this Alternative only addresses immediate issues with the Town's wastewater infrastructure. Some combination of the following Alternatives 2 through 4 would likely be needed to be completed in the next ten (10) years.

B. ALTERNATIVE #2: REHABILITATION OF SAND FILTRATION BEDS AT OUTFALLS 001 AND 002, WITH DISINFECTION IMPROVEMENTS

Alternative 2 seeks to provide a long-term solution to the Town's wastewater infrastructure in addition to meeting disinfection SPDES permit limits. This alternative would involve the replacement-in-kind of both sand filtration beds at Outfalls 001 and 002.

Both single pass sand filtration beds are approximately 4'-6" deep. The Central Byron filters 1 through 3 are approximately 160 feet long by 120 feet wide, each. The South Byron filters 1 through 3 are approximately 100 feet long by 100 feet wide, each. In total, there is approximately 14,600 cubic yards of sand filter media that would need to be excavated and assumed to require hauling and disposal in an approved landfill location. The 20-mil plastic liners utilized in both systems would also be removed during the excavation and are assumed to likely be deteriorated already. The same quantity of sand would need to be replaced-in-kind, with new distribution piping and drainage piping, as well as new passive aeration vent piping.

UV disinfection would be provided, but as previously would require the effluent of the sand filtration beds to be intercepted and pumped to a location with easier site access. The UV disinfection system would be a closed vessel system. The design criteria will be consistent with Ten States and TR-16 and/or the requirements and approval conditions of the NYSDEC and NYSEFC.

This alternative addresses the need for a long-term solution to the sand filtration beds at Outfalls 001 and 002. Presumably, this alternative would have a similar forty (40) year useful life, as the existing beds have had. Given that the Town operators currently utilize this system, replacement-in-kind offers consistency from an operational point of view.

Additionally, this alternate will include the replacement of all remaining septic tanks in the collection system, which are owned by the Sewer District, to alleviate I/I issues in the collection system.

Cons to this alternative consist of the following:

1) The removal of this volume of sand filtration media, and assumed hauling and disposal is labor intensive and is costly.
2) By committing to continuing course with single-pass sand filtration beds, the Town will be limited in future ability to meet future SPDES permit requirements for total phosphorous (and the potential for more stringent ammonia limits as well). Phosphorous removal would be essentially unfeasible on-site at either Central Byron or South Byron as the sand filtration beds consume the entirety of the useable on-site space, which would be needed for metal salt storage (e.g. alum or similar) and presumably a clarifier or filter of some sort to collect solids from the precipitation of phosphorous.
3) Lastly, this alternative would keep Outfall 002 in service which has drawn special attention in Black Creek TMDL Draft prepared by NYSDEC.
4) A beneficial use determination (BUD) for the sand filter media will be pursued during detailed design, however, for purposes of this preliminary evaluation no BUD is assumed.

Cost Estimate: The Alternative Opinion of Probable cost (OPC) is approximately $13,016,000 including contingency and legal, administrative, and engineering costs. The OPC and attached in Appendix F.

Annual operation and maintenance costs would remain essentially the same as existing conditions, as reflected in the Town Sewer Budgets from 2018 thru 2021 included in Appendix J.

C. Alternative #3: Replacement of Sand Filtration Beds at Outfalls 001 and 002 with two (2) Wastewater Treatment Plants, both with Disinfection improvements

Alternative 3 would generally consist of the abandonment in place of both sand filtration beds at both outfalls. Influent and effluent pipes from individual filter cells would be cut, capped and abandoned, and follow all requirements of 6 CRR-NY 750-2.11. A new wastewater treatment plant would be constructed for both outfalls, generally consisting of the following:

1. Construction of a new treatment facility at both the Central Byron and South Byron sites consisting of a new biological process to provide BOD removal and nitrification, secondary clarification, ultraviolet disinfection and post-aeration.
   a. For a biological process, several alternatives were evaluated. Given the nature of the influent wastewater being effluent from septic tanks, and therefore somewhat lower in strength than typical raw municipal sewage, a fixed film process is preferred. Rotating biological contactors (RBCs), moving bed biofilm reactor (MBBR) and a fixed-film, aerobic treatment system (fixed bed biological reactor) were evaluated.
   b. A summary of the evaluation of biological treatment options is presented below:

Treatment Technology	Pros	Cons
Rotating biological contactors (RBCs)	1. Relatively low energy consumption. 2. Can effectively meet all current SPDES permit limits.	1. Requires concrete tankage to be constructed to install RBCs. This will be costly on a per user basis given the low number of EDUs.
Moving bed biofilm reactor (MBBR)	1. Can effectively meet all current SPDES permit limits.	1. Requires concrete tankage to be constructed to install RBCs. This will be costly on a per user basis given the low number of EDUs.

Treatment Technology	Pros	Cons
		2. Will utilize mechanical aeration, thereby an increase to energy consumption for the sewer district, relative to sand filter beds.
Fixed-film, aerobic treatment system (fixed bed biological reactor)	1. Can be provided as a "package-plant". In other words, a majority of the fabrication will occur off-site in a factory. This will ensure a high-quality product and also minimize costs associated with on-site labor. 2. Comes with a manufacturer process guarantee to meet required effluent limits. 3. Can effectively meet all current SPDES permit limits.	1. Will utilize mechanical aeration, thereby an increase to energy consumption for the sewer district, relative to existing sand filter beds.

Based on this evaluation, a fixed-film, aerobic treatment system is proposed to be utilized as the biological treatment technology for a new wastewater plant for this grey water influent stream. This option allows for the best opportunity to minimize capital costs and also obtain a high-quality product for the Town while obtaining a treatment technology that will meet and exceed all effluent requirements in the Town's SPDES permit.

2. Solids handling would consist of a holding tank at each location which would be a hold and haul configuration. The Town would utilize a treatment facility capable of handling these solids as their ultimate place of disposal.
3. It is assumed that the package plants could be constructed on green space at Central and South Byron. If a portion of the sand filter beds needed to be excavated and filled with suitable, compacted structural fill to construct the new wastewater treatment facilities a beneficial use determination (BUD) from NYSDEC for the sand filter media would be pursued during detailed design to allow the material to be re-used onsite.

Similar to Alternative 2, this alternative addresses the need for a long-term solution to the sand filtration beds at Outfalls 001 and 002. However, this Alternative also allows for the Town to achieve the following:

1) Produce higher quality effluent, such as the opportunity to size the process to meet more stringent ammonia limits.
2) Install a wastewater treatment technology with a much smaller footprint than sand filtration beds, allowing for the Town to more easily incorporate UV disinfection without the need to pump effluent. The proposed UV system in this configuration would be open channel by gravity.
3) Additionally, the system will be designed to easily incorporated metal salt addition for phosphorous precipitation in the event that a SPDES permit requirement for phosphorous is ever issued to these two outfalls (specifically Outfall 002).

Additionally, this alternate will include the replacement of all remaining septic tanks in the collection system to alleviate I/I issues in the collection system.

Cons to this alternative consist of the following:

1) There is a significant capital cost and operation and maintenance costs to build two (2) separate treatment facilities.

Cost Estimate: The Alternative Opinion of Probable cost (OPC) is approximately $13,087,000 including contingency and legal, administrative, and engineering costs. The OPC and attached in Appendix F. Annual operation and maintenance cost estimates are included in Appendix M.

D. Alternative #4: Consolidation of South Byron and Central Byron into one (1) Wastewater Treatment Plant with Disinfection Improvements included

Alternative #4 would consider consolidation of Outfall 001 and Outfall 002 into one consolidated treatment plant located on the Central Byron (Outfall 001) site. Consolidation would generally consist of the following:

1. New pump station at the site of Outfall 002 (South Byron)
2. New 6" HDPE DR-11 DIPS forcemain from the proposed South Byron pump station north along New York State Route 237. The forcemain would be approximately 2.35 miles in length.

3. Rehabilitation of the existing lift station at Central Byron
4. New flow equalization tank to receive discharge from both Central Byron lift station and South Byron forcemain. The flow equalization tank will reduce the sizing of the package plant needed.
5. Construction of a new treatment facility at the Central Byron site consisting of a "package plant" fixed-film, aerobic treatment system providing BOD removal and nitrification, along with secondary clarification. The facility would also have ultraviolet disinfection and post-aeration.
6. Solids handling would consist of liquid hauling only. The Town would utilize a wastewater treatment facility capable of handling these solids as their ultimate place of disposal.
7. Abandonment in place of sand filter beds at Outfall 002 in accordance with 6 CRR-NY 750-2.11. Outfall 001 sand filter beds would not be disturbed as part of this project and would remain in place as a redundant treatment option if needed.

A. Pump Station

It is proposed that a new above ground dry pit pump station would be located at the South Byron site. The pumps will be configured as suction lift and draw flow out a new wet well. The wastewater conveyance system from South Byron to Central Byron will consist of a single forcemain, designed to maintain sufficient pipe velocity to ensure scouring and working pressure. A pumping rate will be selected to provide a pumping rate equal to or greater than the design PHF (0.128 MGD or 89 gpm) for South Byron to maintain pipeline velocity greater than 2 feet per second.

A minimum of two (2) pumps will be provided and manifolded together to provide operator flexibility. A magnetic flowmeter will be configured on the discharge of the pump station to monitor discharge pumping rate to Central Byron.

B. Sewer Routing

Routing for the proposed wastewater conveyance system from South Byron to Central Byron was selected as it is a direct route along NYS Route 237 that does not cross the NYS road. Figure 1 shows the elevation profile of the proposed forcemain route. The wastewater conveyance system would consist of approximately 12,500 linear feet of 6-inch HDPE sewer forcemain. Note that the proposed forcemain alignment assumes directly pumping from South Byron to Central Byron, and does not assume discharging into the existing collection system for Central Byron.

The proposed routing of the conveyance system crosses the NYS Route 262, Cockram Road, and Terry Street. Additionally, it appears as though two (2) locations would require crossing Class C streams (tributaries to Black Creek). Trenchless technology (i.e. directional drilling) should be utilized at the crossings in order to limit disturbances. Permits and approvals will need to be obtained from the NYS Department of Transportation and NYSDEC, prior to beginning work.

The approximate ground elevation at the existing South Byron Outfall 002 is about 660 feet. At a station approximately 4,170 linear feet (LF) along NYS Route 237, there is a high point on the alignment of approximately 680 feet, or 20’ (+/- 9 psi) of elevation to pump against. The discharge elevation of the forcemain is approximately 617’, approximately 63’ lower than the highpoint along the alignment. Air/vacuum release valves and necessary appurtenances will be planned for and included in the design. Pigging structure(s) are also planned to be included in the design for long-term maintenance of the forcemain.

Figure 1. Elevation Profile from South Byron (left side) to Central Byron (right side)

C. Forcemain Sizing

The evaluation below was performed for determining the appropriate size of the forcemain for velocities and total dynamic head. The tables below are conceptual in nature and are outlined to provide a general idea of forcemain sizing. For this evaluation the pipe type selected was 6-inch DIPS DR-11 HDPE. Each alternative includes the 9 psi of discharge pressure to overcome the high point along forcemain from South Byron to Central Byron.

The following evaluation for forcemain sizes has been provided:

Flow (gpm)	Pipe Friction Loss (ft)	System Pressure (psi)	Pipe Velocity (ft/s)
0	0.0	13.0	0.0
18	0.6	13.3	0.3
36	2.1	14.0	0.5
53	4.5	15.0	0.8
71	7.7	16.5	1.0
89	11.6	18.2	1.3

Flow (gpm)	Pipe Friction Loss (ft)	System Pressure (psi)	Pipe Velocity (ft/s)
107	16.2	20.4	1.5
124	21.5	22.8	1.8
142	27.6	25.5	2.0
160	34.3	28.6	2.3
178	41.7	32.0	2.5

D. South Byron (Outfall 002) Decommissioning

Following the successful startup and extended operation of the pump station at South Byron, decommissioning of existing facilities will be performed per 6 CRR-NY 750-2.11. The outfall pipe will be sealed and tankage not used will be infilled and abandoned in place below grade. Sand filter beds will be abandoned in place.

E. Proposed Treatment Plant

a. Wastewater Characteristics

Influent waste stream data for Outfall 001 and Outfall 002 are summarized below based on 2018 through February 2021 data. The final column represents design values utilized for the evaluation of a consolidated wastewater treatment plant.

Influent Parameters	Existing Outfall 001	Existing Outfall 002	Design Combined Outfall
Avg. Daily Flow (gpd)	25,073	18,149	45,000
Max. Monthly Flow (gpd)	**48,230**	**30,893**	**85,000**
Max. Daily Flow (gpd)	122,000	54,000	182,000
Peak Hourly Flow (gpd)	200,000	128,000	328,000
Avg. BOD (mg/l)	60	53	60
Avg. BOD (lbs/day)	13	8	23
Max. Monthly Avg. BOD (mg/l)	**110**	**98**	**120**
Max. Monthly BOD Loading (lbs/day)	**44**	**25**	**85**
Avg. TSS (mg/l)	37	29	40
Avg. TSS (lbs/day)	8	4	15
Max. Monthly Avg. TSS (mg/L)	**103**	**63**	**120**
Max. Monthly TSS Loading (lbs/day)	**41**	**16**	**85**
Avg. Ammonia (mg/l)	38	39	40
Avg. Ammonia (lbs/day)	8	6	15
Max. Monthly Avg. Ammonia (mg/L)	**65**	**62**	**65**
Max. Monthly Ammonia Loading (lbs/day)	**26**	**16**	**46**

*Estimated value

b. Anticipated Effluent SPDES Parameters

The proposed consolidated wastewater treatment plant is anticipated to have the following combined effluent limits based on existing limits for Outfall 001 and Outfall 002.

Seasonal Limits: Summer (June through end of October)		
Parameter	**Combined Outfall 001 and 002**	**Units**
Flow	85,000	Gpd
$CBOD_5$	15	mg/L
Solids, Suspended	15	mg/L
Solids, Settleable	0.1	mL/L
Ammonia (as N)	7.4	mg/L
Dissolved Oxygen	7.0	mg/L
Fecal Coliform (30-day geometric mean) *	200	No./100mL
Fecal Coliform (7-day geometric mean) *	400	No./100mL
Seasonal Limits: Winter (November through end of May)		
Parameter	**Combined Outfall 001 and 002**	**Units**
Flow	85,000	Gpd
$CBOD_5$	25	mg/L
Solids, Suspended	30	mg/L
Solids, Settleable	0.1	mL/L
Ammonia (as N)	11.4	mg/L
Dissolved Oxygen	Monitor	mg/L

NOTE: *Disinfection is required to begin on May 1 of each year through October 31.

It is assumed that NYSDEC will issue a revised SPDES permit containing combined effluent limitations in the event a proposed consolidation of Outfall 001 and 002 moves forward to design.

As discussed within this PER, the potential for total phosphorous effluent limitations is referred to in both the draft 2013 TMDL for Upper Black Creek by NYSDEC and in the Town's SPDES permit fact sheet from 2021. At this time, no total phosphorous limitations exist in the Town's SPDES permit. Based on the Waste Load Allocations presented in the 2013 draft TMDL, Central Byron (Outfall 001) is proposed to be allocated 0.82 lbs/day of total phosphorous. At the proposed permitted capacity of this Alternative #4, equal to 85,000 gpd, this waste load allocation would appear to correspond with a concentration-based limitation of 1.15 mg/L of total phosphorous (0.085 MGD * 8.34 * 1.15 mg/L = 0.82 lb/day Total Phosphorous).

c. Proposed Consolidated Wastewater Treatment Plant

The proposed wastewater treatment plant would consist of the following:

- New lift station to pump Central Byron to flow equalization basin.
- Aerated flow equalization basin to reduce impact of peak hourly flow of 0.328 MGD on package plant sizing. The flow equalization tank will receive both the new lift station from Central Byron and the forcemain discharge from South Byron.
    - Total volume: 73,600 gallons (9,840 cubic feet)
- Fixed-film, aerobic treatment system (fixed bed biological reactor) “package plant”. This biological process will be sized for BOD Removal and nitrification. Process calculations are provided in Appendix G.
    - Process redundancy via three (3) separate aeration basins, with dedicated secondary clarifiers.
    - Total aeration volume = 134,400 gallons (17,978 cubic feet)
    - Design mixed liquor suspended solids = 164 mg/L (typical of fixed-film, aerobic treatment systems)
    - Min. Wastewater Design Temperature = 7 deg. C
    - Food/Mass Ratio = 0.686
    - Solids retention time = 2 days
    - Hydraulic retention time = 38 hours at 85,000 gpd
    - BOD loading = 7.16 lbs BOD/1,000 cf/day
    - Actual Oxygen Requirement (AOR) = 422 lbs O_2/day
    - Air Flow Required = 650 SCFM, coarse bubble
    - Supplemental alkalinity may be required and will be assumed to be added by the WWTP operator as needed.
- Three (3) 12-ft. square Secondary Clarifiers
    - Minimum sidewater depth in excess of 10-feet
    - Surface overflow rate at design PHF (after flow equalization) = 200 gpd/sq. ft. (sufficiently sized for a future total phosphorous limit)
    - Solids loading rate at design PHF (after flow equalization) = 0.5 lb/day/sq. ft.

- UV disinfection sized for a PHF of 0.328 MGD, UVT = 65%. The UV system will be provided with bypass piping to allow for the system to be taken offline during periods where disinfection is not required per the SPDES permit.
- Post-aeration tank with mechanical aerator to meet dissolved oxygen limit of 7 mg/L.
- Re-use of existing Outfall 001 (sizing to be confirmed during detailed design)
- Waste sludge from the clarifiers will be transferred to a holding tank where it will be decanted and thickened. The Town will need to periodically pump and haul liquid sludge to a separate wastewater treatment facility. No dewatering by the Town is planned due to the small size of the facility.
    - Basin Volume: 11,700 gallons (1,563 cubic feet)
    - Estimated solids holding time with decanting: 17 days
- The package plant will be partially buried to help maintain temperature (and therefore nitrification performance) during winter. The aeration tanks will also have pole barn canopy structure over them.
- Space will be allocated for the addition of chemical bulk storage tanks and associated feed equipment in the event a future total phosphorous limit is added to the Town's SPDES permit. A metal salt could be added directly to the aeration basin or just before entering the clarifiers. The facility would be set up to meet a total phosphorous limit of 1.0 mg/L with the additional of chemical storage and feed pumps.
- Cut sheets for proposed equipment are provide in Appendix G.

Additionally, this alternate will include the replacement of all remaining septic tanks in the collection system. This will benefit the proposed consolidated treatment plant by reducing I&I, and thereby help lower the need for flow equalization and reduce pumping requirements from the South Byron pump station.

Cost Estimate: The Alternative Opinion of Probable cost (OPC) is approximately $11,825,000 including contingency and legal, administrative, and engineering costs. The OPC and attached in Appendix F. Annual operation and maintenance cost estimates are included in Appendix M.

E. ALTERNATIVE #5: PUMP STATION AND FORCEMAIN CONVEYANCE SYSTEM TO MONROE

COUNTY SEWER SYSTEM

A final alternative to address the issues at hand with the Town of Byron wastewater treatment system would be to pursue a connection to the Gates-Chili-Ogden Sewer District as part of the Monroe County Pure Waters sanitary sewer collection system. In general, this proposed alternative would consist of the following:

- Abandonment of the sand filter beds at South and Central Byron
- Construction of a new pump station with a 12,500 linear foot forcemain from South Byron to Central Byron.
- Construction of a new pump station with a 53,500 linear foot forcemain from Central Byron to Churchville's Pump Station. Likely a minimum of two (2) pump stations would be required to pump the over 10-mile distance.
    - The tentative alignment would traverse Town highways, Genesee County highways Department (CR-6), NYSDOT Highways (NY-19 and NY-33), one (1) CSX railroad crossing and optimally would utilize portions of West Shore Trail.
- Coordination with several governmental entities on inter-municipal agreements to allow for force main conveyance, including; Gates-Chili-Ogden Sewer District; Town of Bergen (Genesee County) and Town of Riga/Village of Churchville (Monroe County).
- Further review of capacity available at the Churchville Pump Station and downstream collection system.
- North Byron sand filter beds would remain in place as the only permitted outfall under the Town of Byron SPDES permit, as the sand filtration beds appear to be in operating order currently, and the outfall is exempt from NYSDEC disinfection requirements.

Cost Estimate: The Alternative Opinion of Probable cost (OPC) is approximately $17,160,000 including contingency and legal, administrative, and engineering costs. The OPC and attached in Appendix F. Due to cost-prohibitive nature of this alternative, no further consideration is provided and annual operation and maintenance cost estimates were not evaluated.

8. COST ESTIMATE

The following economic analysis includes a review of sewer use based on type of user, associated costs per dwelling, overall cost estimate associated with both disinfection alternatives, and other non-monetary factors to consider.

a. EDU ANALYSIS

An Equivalent Dwelling Unit (EDU) is defined as a one single-family residential household. The Town has assigned EDUs based on property usage to each parcel receiving sewer service. Per the Town Clerk, the Town currently has 312.50 sewer EDUs.

b. CAPITAL COST ESTIMATES

The cost estimates below represent the four (4) alternatives discussed in this PER:

Alternatives	**Total Est. Project Cost***
Alterative 1 – Disinfection Improvements only	$1,682,000
Alterative 2 – Rehabilitation of Sand Filtration Beds at Outfalls 001 and 002, with Disinfection Improvements (including septic tank replacements)	$13,016,000
Alternative 3 – Replacement of Sand Filtration Beds at Outfalls 001 and 002 with two (2) Wastewater Treatment Plants, both with Disinfection improvements (including septic tank replacements)	$13,087,000
Alternative 4 - Replacement of Sand Filtration Beds at Outfalls 001 and 002 with one (1) consolidated Wastewater Treatment Plant with Disinfection improvements (including septic tank replacements)	$11,825,000
Alternative 5 - Pump Station and Forcemain Conveyance System to Monroe County Sewer System (including septic tank replacements)	$17,160,000

** Inclusive of total estimated construction costs with 20% contingency, and 25% legal, administrative and engineering costs*

Detailed preliminary opinion of probable costs for each alternative are included in Appendix F.

c. Financing Options

The DEC administers grants through the Water Quality Improvement Project (WQIP) program, as a competitive reimbursement program that funds projects that directly address documented water quality impairments or protect a drinking water source. Under this program, wastewater treatment improvement has a maximum potential award of up to $1.0M with a required community match of only 25% for high priority projects such as disinfection. The Town was awarded a maximum WQIP grant award of $1.0M in early 2023 for disinfection. The Town may wish to consider re-applying to the WQIP program under the general project category for consideration of additional grant funding.

The EFC provides a loan financing program based on community need. If used in conjunction with the WQIP grant, only the remaining community portion can be considered. The EFC offers financing options from a Hardship Rate at 0% to Market Rate at 4.5%. Per the Amended Median Household Income Survey letter from NYSEFC dated March 8, 2023 (Appendix N), the Median Household Income for the Town's Consolidated Sewer District (MHI) is $45,000. As a result, the project appears to be eligible for hardship (0% interest) financing as the MHI falls below the 80% MHI for Upstate NY of $54,789.

A copy of the Town sewer budgets for 2018 through 2021 is in Appendix J. The 2021 sewer budget was estimated at approximately $147,680, and there is no debt service reported.

9. CONCLUSION

a. RECOMMENDED ALTERNATIVE

Should the project obtain the needed funding to make it economically viable, Alternative #4 featuring the consolidation of South Byron and Central Byron is recommended to be pursued for the following reasons:

1) Provides a long-term (30-year planning period) solution to the Town's wastewater treatment facilities which are currently approaching the end of their useful life.
2) Simplifies the Town's SPDES permit by consolidating Outfalls 001 and 002.
3) Enables the Town to address NYSDEC concerns with the South Byron outfall phosphorous loading to Black Creek by abandoning discharges at this point in the waterbody. In the event that NYSDEC decides to implement a total phosphorous limit in the future on the combined outfall (current Outfalls 001 and 002) the Town will have infrastructure in place to more easily comply with such limits.
4) Provides a new biological treatment process that is designed to comply with and exceed current ammonia removal requirements.
5) Allows for the installation of one (1) disinfection system to comply with SPDES permit disinfection limits, instead of multiple disinfection systems.
6) Provides future capacity to allow North Byron Outfall 003 to be abandoned and pumped to the new WWTP.

The proposed project includes a 0.085 MGD treatment facility, one (1) pump station and associated forcemain with an approximate overall construction cost of $8,000,000. With engineering, administrative, and other cost impacts imposed by the project; the overall project budget is anticipated at $11,600,000. The construction cost estimate and total project cost estimate are included in Appendix F. A proposed site plan for the recommended Alternative #4 is provided in Appendix K.

A summary of potential funding scenarios associated with Alternative #4 is shown below:

Scenario #1 – Assume only the awarded $1.0 million WQIP grant, and a State Revolving Fund Loan with an interest rate = 0%

Total Estimated Project Cost	$11,825,000
WQIP Disinfection Grant	$1,000,000
Current Sewer EDUs	312.50
Existing Quarterly Sewer Rate per EDU	$115
Existing Annual Sewer Rate per EDU	$460
Yearly Debt Service @ 0%, n=30 years	$360,833
Yearly Debt Service Cost per EDU	1,155
Estimated Annual Sewer Cost per EDU	**$1,615**

Scenario #2 – In addition to the awarded $1.0 million WQIP grant - assume a WIIA Grant Award, BIL funding and a State Revolving Fund Loan with an interest rate = 0%

Total Estimated Project Cost	$11,825,000
25% WIIA Grant	$2,706,250
WQIP Disinfection Grant	$1,000,000
BIL Grant	$2,706,250
Current Sewer EDUs	312.50
Existing Quarterly Sewer Rate per EDU	$115
Existing Annual Sewer Rate per EDU	$460
Yearly Debt Service @ 0%, n=30 years	$180,417
Yearly Debt Service Cost per EDU	$577
Estimated Annual Sewer Cost per EDU	**$1,037**

Ideally a funding package would bring the overall cost per EDU as close as possible to the State Comptroller's threshold for sewer districts in 2023 of $694. This scenario would require a WIIA grant award and BIL funding along with hardship financing (in addition to the already awarded $1.0M WQIP Grant). Comptroller's approval would still be required for this project, when considering existing quarterly sewer charges coupled with the annual debt service associated with the proposed project described in Alternative #4.

b. PROPOSED INTENDED USE PLAN (IUP) SCORING

The Town submitted the original PER to NYSEFC for listing on the Clean Water State Revolving Fund IUP in June 2022. This project is listed under the 2023 CWSRF IUP as project number C8-6514-01-00, with a total score of 38. The project was listed under Category A, indicating a project in a municipality where population is 3,500 or less.

Given the proposed project in this updated PER, and the results of the income survey completed by the Town indicating hardship eligibility (Appendix N) it appears this project would be a Category D project per FY 2023 CWSRF IUP guidelines. A Category D project are those which meet eligibility criteria for interest-free financing under the State's Hardship Policy. The project would also be eligible for funds through the Bipartisan Infrastructure Law (BIL).

The summary below is a proposed scoring breakdown for the project proposed in this PER:

A. Existing Source Criterion
    a. The proposed project seeks to improve Black Creek, a Class C stream which is listed as impaired due to phosphorus. Outfalls 001 and 002 both discharge to Black Creek (Priority Waterbodies List (PWL) ID #0402-0028). Both outfalls currently only provide partial removal of phosphorus via biological uptake in the current sand filtration treatment system.
    b. NYSDEC has prepared a draft TMDL for Upper Black Creek (Appendix L). The draft indicates that a significant load reduction of 79% would be required from Outfall 002 to meet the TMDL's water quality improvements.
    c. The proposed project will allow the Town to chemically precipitate phosphorous if required in the future by NYSDEC.
    d. Based on this review it appears the project could be considered a critical source of pollution to Black Creek (PWL ID #0402-0028) contributing to the waterbody's assessment of "impaired" due to phosphorus. **<u>Total points proposed = 50</u>**.
B. Water Quality Improvement Criterion (WQIC)
    a. Classification Points Factor (CPF)
        i. Each receiving stream associated with the Town's SPDES permit is a Class C waterbody.The drainage basin is the Genesee River (HUC Code 0413000306). **<u>Total points proposed = 3</u>**
    b. Impairment Factor (IF)
        i. Black Creek (Priority Waterbodies List (PWL) ID #0402-0028) is listed as impaired due to phosphorus. **<u>Total points proposed = 4</u>**
    c. Potential Improvement Factor (PIF)
        i. The draft TMDL for Upper Black Creek (Appendix L) recommended consideration of the Alternative proposed in this PER to improve water quality. To be conservative it is assumed that removing all phosphorus

loading at Outfall 002 will reduce impairment by a minimum of one level (i.e. impaired to stressed). **Total points proposed = 2**

d. **Total WQIC points proposed = CPF x IF x PIF = 3 x 4 x 2 = 24**

C. Management Plant Consistency Criterion

a. NYSDEC's Great Lakes Action Agenda, Goal #2, is to Control Sediment, Nutrient and Pathogen Loadings (accessed via this weblink: https://www.dec.ny.gov/docs/water_pdf/glaa2030draft.pdf)

b. This proposed project will seek to both reduce nutrient loading (phosphorus) and pathogen loading (via the addition of UV disinfection) to Black Creek. Black Creek is a tributary to the Genesee River and ultimately Lake Ontario.

c. **Total points proposed = 10**

D. Intergovernmental Needs Criterion

a. D1 – Intergovernmental Needs: The Town's SPDES permit requires the addition of seasonal disinfection in order to comply with fecal coliform limits.
Total points proposed = 25

b. D2 – Construction Start: The project has not yet begun construction.
Total points proposed = 0

E. Financial Needs Criterion

a. Please refer to Appendix N, which indicates the MHI for the Town Consolidated Sewer District is $45,000. It appears based on this MHI, the project will qualify for hardship (0% interest) financing.
Total points proposed = 10

F. Economic Needs Criterion

a. The Town does not appear to be within an Empire Zone, nor is this project related to the NYS Open Space Plan.
Total points proposed = 0

G. Project Financing Agreement

a. The project does not have either a short-term or long-term finance agreement.
Total points proposed = 2

Total Project Points Proposed = 119

c. CONSOLIDATED WWTP PLANT SCORE

An updated WWTP score results in a 1 plant classification, as it includes:

- Flow Points = 3 points x 0.085 MGD design flow = 0.255 flow points (1 flow point)

- Preliminary Treatment = Raw sewage or effluent pumping (3), flow equalization basin (3), pre-aeration (2) = 8 points
- Primary Treatment = None (gray water system with individual septic tanks)
- Secondary Treatment = Activated Sludge = 20 points
- Advanced Treatment/Tertiary Treatment = Nitrification required by permit, activated sludge = 8 points
- Disinfection = UV Disinfection = 5 points
- Solids Handling = Wet hauling sludge = 0 points
- Miscellaneous = None
- Total Plant Score = 41 (31 – 55, activated sludge = Grade 2A required for Chief Operator, 1A require for Assistant/Shift Operator)

Based on this calculation, the Town's current WWTP Operators are not anticipated to be impacted by the consolidation of Outfalls 001 and 002.

d. PROJECT SCHEDULE

The proposed project pertaining to this PER is dependent on the outcome of the WIIA, and BIL funding request. It is anticipated that notice of all grant awards should be available to the public by December 2024.

If the consolidated project is financially feasible, reevaluation of some project schedule milestones may be necessary. However, it is anticipated that the construction and start-up milestones can be maintained, assuming that a decision on the funding and the overall project commitment be made in the near future. This would allow for the completion of design and the start of construction in spring of 2026 and completion of construction by spring 2027.

A preliminary schedule for critical milestones is outlined accordingly:

- Receive DEC/EFC PER Approval and IUP listing for the project would be updated accordingly – August 2024
- Notice of WIIA/BIL Grant Awards – December 2024
- Begin Survey/Geotech work – Spring 2025
- Begin design of Forcemain, Pump Station and consolidated WWTP – Spring 2025
- Start Construction – Spring 2026

- Construction Completion – Spring 2027

e. CONTINUING EFFORTS & COMMUNITY ENGAGEMENT

A public informational meeting is scheduled to inform and update the community on the project on May 31, 2023, at the Town of Byron Town Hall.

f. ENGINEERING REPORT CERTIFICATION

Included in Appendix H is an Engineering Report Certification for this PER.

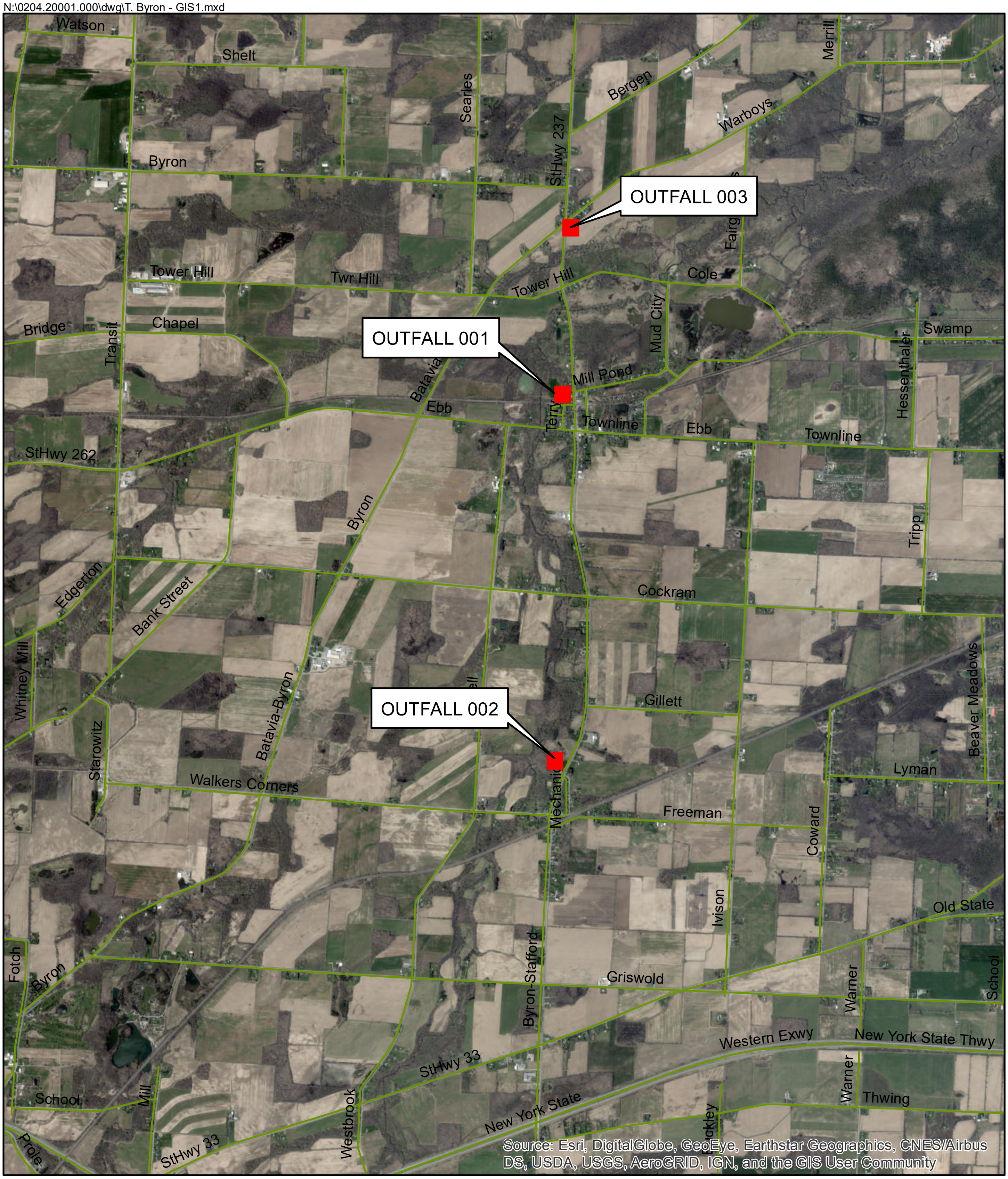
g. SMART GROWTH ASSESSMENT

Included in Appendix I is the Smart Growth Assessment Form for the proposed project.

APPENDIX A

LOCATIONAL MAP

N:\0204.20001.000\dwg\T. Byron - GIS1.mxd



WWTP DISINFECTION IMPROVEMENTS **TOWN OF BYRON, GENESEE COUNTY** **WASTEWATER SYSTEM LOCATIONS**	**1" = 4,000'** **JUNE 2022**	**MRB|group** Engineering, Architecture & Surveying, D.P.C. 145 Culver Road, Suite 160 Rochester, NY 14620 (585) 381-9250 Phone www.mrbgroup.com	**SHEET NO.** **1 of 1** **PROJECT NO.** **0204.20001**

APPENDIX B

SPDES PERMIT AND FACT SHEET

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 8
6274 East Avon-Lima Road, Avon, NY 14414-9516
P: (585) 226-5400 | F: (585) 226-2830
www.dec.ny.gov

December 8, 2021

Mr. Peter Yasses
Supervisor
Town of Bryon
7028 Byron Holley Rd, PO Box 9
Bryon, NY 14422

Re: Town of Byron Wastewater Treatment Facilities
EBPS DIM for plant upgrades
7028 Byron Holley Rd, PO Box 9
DEC ID # 8-1830-00001/00001
SPDES NY0160971
Town of Byron, Genesee County

Mr. Yasses:

The purpose of this letter is to transmit the modified and renewed to your SPDES permit which will be effective January 1, 2021 along with the updated Fact Sheet and responsiveness summary.

This permit includes interim limits during design and construction of the plant upgrades, followed by final limits after construction. The enclosed permit includes a full technical review therefore, the permit is given a new 5-year term.

Please review the enclosed permit. Please note that under 6 NYCRR Part 621.7(f) of the Uniform Procedures Act, if a permit for a project is denied, or is issued with significant conditions attached and an adjudicatory public hearing was not held, then the applicant may request that one be held. Such a request must be made within 30 calendar days of the date of the mailing of either the notice of denial or the permit with conditions.

If any questions arise or if problems develop with the facility during the life of this permit, please contact Kathy Ammari with the Division of Water at this office at 585-226-5483. If you have any questions regarding this general permit, you may contact me directly at 585-226-5392.

Sincerely,

Kimberly Merchant

Kimberly Merchant
Deputy Regional Permit Administrator

Enclosure: SPDES Permit
Fact Sheet
Responsiveness Summary

Ecc: B. Schilling, RE
K. Ammari, DOW
T. Haley, RPA
T. Blum, RE
C. Jamison, DOW BWP
BWC - SCIS
USEPA Region II
NYSEFC

State Pollutant Discharge Elimination System (SPDES) DISCHARGE PERMIT

SIC Code:	**4952**	NAICS Code:	**221320**	SPDES Number:	**NY0160971**
Discharge Class (CL):	**07**			DEC Number:	**8-1830-00001/00001**
Toxic Class (TX):	**N**			Effective Date (EDP):	**01/01/2022**
Major-Sub Drainage Basin:	**04 - 02**			Expiration Date (ExDP):	**12/31/2027**
Water Index Number:	**ONT**	Item No.:	**117-19(Portion 3)**	Modification Dates (EDPM):	
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.)

PERMITTEE NAME AND ADDRESS					
Name:	**Town of Byron**	Attention:	**Peter Yasses, Supervisor**		
Street:	**7028 Byron Holley Rd, PO Box 9**				
City:	**Byron**	State:	**NY**	Zip Code:	**14422**
Email:	**supervisor@byronny.com**	Phone:	**585-548-7123 Ext.14**		

is authorized to discharge from the facility described below:

FACILITY NAME, ADDRESS, AND PRIMARY OUTFALL															
Name:	**Town of Byron Wastewater Treatment Facilities**														
Address / Location:	**7028 Byron Holley Rd, PO Box 9**								County:	**Genesee**					
City:	**Byron**						State:	**NY**	Zip Code:	**14422**					
Facility Location:		Latitude:		°		'		" N	& Longitude:		°		'		" W
Primary Outfall No.:	**001**	Latitude:	**43**	°	**04**	'	**59**	" N	& Longitude:	**78**	°	**04**	'	**3.72**	" W
Outfall Description:	**Treated Sanitary**	Receiving Water:	**Black Creek**						Class:	**C**					

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

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
- CO BWC - SCIS
- RWE
- RPA
- EPA Region II
- NYSEFC

Permit Administrator:	Kimberly A. Merchant, NYSDEC		
Address:	6274 E. Avon-Lima Road, Avon, NY		
Signature:	Kimberly Merchant	Date:	12/08/2021

Contents

SUMMARY OF ADDITIONAL OUTFALLS

Outfall	Wastewater Description	Outfall Latitude						Outfall Longitude					
002	Treated Sanitary	**43**	°	**04**	’	**06**	” N	**78**	°	**04**	’	**00**	” W
Receiving Water:	**Black Creek**							Class:	**C**				
Outfall	Wastewater Description	Outfall Latitude						Outfall Longitude					
003	Treated Sanitary	**43**	°	**05**	’	**57**	” N	**78**	°	**04**	’	**06**	” W
Receiving Water:	**Spring Creek**							Class:	**C**				

DEFINITIONS FOR PERMIT LIMITS, LEVELS AND MONITORING TERMS

TERM	DEFINITION
7-Day Geo Mean	The highest allowable geometric mean of daily discharges over a calendar week.
7-Day Average	The average of all daily discharges for each 7-days in the monitoring period. The sample measurement is the highest of the 7-day averages calculated for the monitoring period.
12-Month Rolling Average (12 MRA)	The current monthly value of a parameter, plus the sum of the monthly values over the previous 11 months for that parameter, divided by 12.
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.
Action Level	Action level means a monitoring requirement characterized by a numerical value that, when exceeded, triggers additional permittee actions and department review to determine if numerical effluent limitations should be imposed.
Compliance Level / Minimum Level	A compliance level is an effluent limitation. A compliance level is given when the water quality evaluation specifies a Water Quality Based Effluent Limit (WQBEL) below the Minimum Level. The compliance level shall be set at the Minimum Level (ML) for the most sensitive analytical method as given in 40 CFR Part 136, or otherwise accepted by the Department.
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.
Daily Maximum	The highest allowable Daily Discharge.
Daily Minimum	The lowest allowable Daily Discharge.
Effective Date of Permit (EDP or EDPM)	The date this permit is in effect.
Effluent Limitations	Effluent limitation means any restriction on quantities, quality, rates and concentrations of chemical, physical, biological, and other constituents of effluents that are discharged into waters of the state.
Expiration Date of Permit (ExDP)	The date this permit is no longer in effect.
Instantaneous Maximum	The maximum level that may not be exceeded at any instant in time.
Instantaneous Minimum	The minimum level that must be maintained at all instants in time.
Monthly Average	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.
Outfall	The terminus of a sewer system, or the point of emergence of any waterborne sewage, industrial waste or other wastes or the effluent therefrom, into the waters of the State.
Range	The minimum and maximum instantaneous measurements for the reporting period must remain between the two values shown.
Receiving Water	The classified waters of the state to which the listed outfall discharges.
Sample Frequency / Sample Type / Units	See NYSDEC's "DMR Manual for Completing the Discharge Monitoring Report for the SPDES" for information on sample frequency, type and units.

INTERIM PERMIT LIMITS, LEVELS AND MONITORING (OUTFALL 001)

OUTFALL	LIMITATIONS APPLY	RECEIVING WATER	EFFECTIVE	EXPIRING
001	All Year	Black Creek	EDP	ExDP or Construction Completion[(4)]

PARAMETER	EFFLUENT LIMITATION					MONITORING REQUIREMENTS				FN
								Location		
	Type	Limit	Units	Limit	Units	Sample Frequency	Sample Type	Inf.	Eff.	
Flow	Monthly Average	0.053	MGD			Continuous	Recorder	X		
pH	Range	6.5-8.5	SU			1/week	Grab	X	X	
Temperature	Daily Maximum	Monitor	ºC			1/week	Grab	X	X	
$CBOD_5$ (June 1st- Oct 31st)	Daily Maximum	15	mg/L	6.6	lbs/d	4/year	Grab	X	X	(1)
$CBOD_5$ (November 1st- May31st)	Daily Maximum	25	mg/L	11.1	lbs/d	4/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (June 1st- Oct 31st)	Daily Maximum	15	mg/L	6.6	lbs/d	4/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (November 1st- May 31st)	Daily Maximum	30	mg/L	13.3	lbs/d	4/year	Grab	X	X	(1)
Settleable Solids	Daily Maximum	0.1	mL/L			1/week	Grab	X	X	
Ammonia (as N) (June 1st- Oct 31st)	Daily Maximum	7.4	mg/L		lbs/d	4/year	Grab	X	X	
Ammonia (as N) (November 1st -May 31st)	Daily Maximum	11.4	mg/L		lbs/d	4/year	Grab	X	X	

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INTERIM PERMIT LIMITS, LEVELS AND MONITORING (OUTFALL002)

OUTFALL	LIMITATIONS APPLY	RECEIVING WATER	EFFECTIVE	EXPIRING
002	All Year	Black Creek	EDP	ExDP or Construction Completion(4)

PARAMETER	EFFLUENT LIMITATION					MONITORING REQUIREMENTS				FN
								Location		
	Type	Limit	Units	Limit	Units	Sample Frequency	Sample Type	Inf.	Eff.	
Flow	Monthly Average	0.025	MGD			Continuous	Recorder	X		
pH	Range	6.5-8.5	SU			1/week	Grab	X	X	
Temperature	Daily Maximum	Monitor	ºC			1/week	Grab	X	X	
$CBOD_5$ (June 1st- Oct 31st)	Daily Maximum	15	mg/L	3.13	lbs/d	2/year	Grab	X	X	(1)
$CBOD_5$ (November 1st- May31st)	Daily Maximum	25	mg/L	5.21	lbs/d	2/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (June 1st- Oct 31st)	Daily Maximum	15	mg/L	3.13	lbs/d	2/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (November 1st- May 31st)	Daily Maximum	30	mg/L	6.26	lbs/d	2/year	Grab	X	X	(1)
Settleable Solids	Daily Maximum	0.1	mL/L			1/week	Grab	X	X	
Ammonia (as N) (June 1st- Oct 31st)	Daily Maximum	6.6	mg/L		lbs/d	2/year	Grab	X	X	
Ammonia (as N) (November 1st -May 31st)	Daily Maximum	12.3	mg/L		lbs/d	2/year	Grab	X	X	

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INTERIM PERMIT LIMITS, LEVELS AND MONITORING (OUTFALL003)

OUTFALL	LIMITATIONS APPLY	RECEIVING WATER	EFFECTIVE	EXPIRING
003	All Year	Spring Creek	EDP	ExDP or Construction Completion(4)

PARAMETER	EFFLUENT LIMITATION					MONITORING REQUIREMENTS				FN
								Location		
	Type	Limit	Units	Limit	Units	Sample Frequency	Sample Type	Inf.	Eff.	
Flow	Monthly Average	0.006	MGD			Continuous	Recorder	X		
pH	Range	6.5-8.5	SU			1/week	Grab	X	X	
Temperature	Daily Maximum	Monitor	ºC			1/week	Grab	X	X	
$CBOD_5$ (June 1st- Oct 31st)	Daily Maximum	15	mg/L	0.75	lbs/d	2/year	Grab	X	X	(1)
$CBOD_5$ (November 1st-May31st)	Daily Maximum	25	mg/L	1.26	lbs/d	2/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (June 1st- Oct 31st)	Daily Maximum	15	mg/L	0.75	lbs/d	2/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (November 1st- May 31st)	Daily Maximum	30	mg/L	1.5	lbs/d	2/year	Grab	X	X	(1)
Settleable Solids	Daily Maximum	0.1	mL/L			1/week	Grab	X	X	
Ammonia (as N) (June 1st-Oct 31st)	Daily Maximum	6.6	mg/L		lbs/d	2/year	Grab	X	X	
Ammonia (as N) (November 1st -May 31st)	Daily Maximum	11.4	mg/L		lbs/d	2/year	Grab	X	X	

Footnotes on Page 10

FINAL PERMIT LIMITS, LEVELS AND MONITORING (OUTFALL 001)

OUTFALL	LIMITATIONS APPLY	RECEIVING WATER	EFFECTIVE	EXPIRING
001	All Year	Black Creek	Construction Completion(4)	EDP+5

PARAMETER	EFFLUENT LIMITATION					MONITORING REQUIREMENTS				FN
								Location		
	Type	Limit	Units	Limit	Units	Sample Frequency	Sample Type	Inf.	Eff.	
Flow	Monthly Average	0.053	MGD			Continuous	Recorder	X		
pH	Range	6.5-8.5	SU			5/week	Grab	X	X	
Temperature	Daily Maximum	Monitor	ºC			5/week	Grab	X	X	
$CBOD_5$ (June 1st- Oct 31st)	Daily Maximum	15	mg/L	6.6	lbs/d	4/year	Grab	X	X	(1)
$CBOD_5$ (November 1st- May31st)	Daily Maximum	25	mg/L	11.1	lbs/d	4/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (June 1st- Oct 31st)	Daily Maximum	15	mg/L	6.6	lbs/d	4/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (November 1st- May 31st)	Daily Maximum	30	mg/L	13.3	lbs/d	4/year	Grab	X	X	(1)
Settleable Solids	Daily Maximum	0.1	mL/L			5/week	Grab	X	X	
Dissolved Oxygen (June 1st- Oct 31st)	Daily Minimum	7.0	mg/L			4/year	Grab		X	
Dissolved Oxygen (November 1st- May 31st)	Daily Minimum	Monitor	mg/L		lbs/d	4/year	Grab		X	
Ammonia (as N) (June 1st- Oct 31st)	Daily Maximum	7.4	mg/L		lbs/d	4/year	Grab	X	X	
Ammonia (as N) (November 1st -May 31st)	Daily Maximum	11.4	mg/L		lbs/d	4/year	Grab	X	X	

EFFLUENT DISINFECTION Required Seasonal from May 1st - October 31st		Limit	Units	Limit	Units	Sample Frequency	Sample Type	Inf.	Eff.	FN
Coliform, Fecal	30-Day Geometric Mean	200	No./ 100 mL			4/year	Grab		X	(3)
Coliform, Fecal	7-Day Geometric Mean	400	No./ 100 mL			4/year	Grab		X	(3)
Chlorine, Total Residual	Daily Maximum	0.03	mg/L			1/day	Grab		X	(2)(3)

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FINAL PERMIT LIMITS, LEVELS AND MONITORING (OUTFALL002)

OUTFALL	LIMITATIONS APPLY	RECEIVING WATER	EFFECTIVE	EXPIRING
002	All Year	Black Creek	Construction Completion(4)	EDP+5

PARAMETER	EFFLUENT LIMITATION					MONITORING REQUIREMENTS				FN
	Type	Limit	Units	Limit	Units	Sample Frequency	Sample Type	Location: Inf.	Location: Eff.	
Flow	Monthly Average	0.025	MGD			Continuous	Recorder	X		
pH	Range	6.5-8.5	SU			5/week	Grab	X	X	
Temperature	Daily Maximum	Monitor	ºC			5/week	Grab	X	X	
$CBOD_5$ (June 1st- Oct 31st)	Daily Maximum	15	mg/L	3.13	lbs/d	2/year	Grab	X	X	(1)
$CBOD_5$ (November 1st- May31st)	Daily Maximum	25	mg/L	5.21	lbs/d	2/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (June 1st- Oct 31st)	Daily Maximum	15	mg/L	3.13	lbs/d	2/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (November 1st- May 31st)	Daily Maximum	30	mg/L	6.26	lbs/d	2/year	Grab	X	X	(1)
Settleable Solids	Daily Maximum	0.1	mL/L			5/week	Grab	X	X	
Ammonia (as N) (June 1st- Oct 31st)	Daily Maximum	6.6	mg/L		lbs/d	2/year	Grab	X	X	
Ammonia (as N) (November 1st -May 31st)	Daily Maximum	12.3	mg/L		lbs/d	2/year	Grab	X	X	

EFFLUENT DISINFECTION Required Seasonal from May 1st - October 31st		Limit	Units	Limit	Units	Sample Frequency	Sample Type	Inf.	Eff.	FN
Coliform, Fecal	30-Day Geometric Mean	200	No./ 100 mL			2/year	Grab		X	(3)
Coliform, Fecal	7-Day Geometric Mean	400	No./ 100 mL			2/year	Grab		X	(3)
Chlorine, Total Residual	Daily Maximum	0.040	mg/L			1/day	Grab		X	(2)(3)

Footnotes on Page 10

FINAL PERMIT LIMITS, LEVELS AND MONITORING (OUTFALL003)

OUTFALL	LIMITATIONS APPLY	RECEIVING WATER	EFFECTIVE	EXPIRING
003	All Year	Spring Creek	Construction Completion(4)	EDP+5

PARAMETER	EFFLUENT LIMITATION					MONITORING REQUIREMENTS				FN
								Location		
	Type	Limit	Units	Limit	Units	Sample Frequency	Sample Type	Inf.	Eff.	
Flow	Monthly Average	0.006	MGD			Continuous	Recorder	X		
pH	Range	6.5-8.5	SU			5/week	Grab	X	X	
Temperature	Daily Maximum	Monitor	ºC			5/week	Grab	X	X	
$CBOD_5$ (June 1st- Oct 31st)	Daily Maximum	15	mg/L	0.75	lbs/d	2/year	Grab	X	X	(1)
$CBOD_5$ (November 1st- May31st)	Daily Maximum	25	mg/L	1.26	lbs/d	2/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (June 1st- Oct 31st)	Daily Maximum	15	mg/L	0.75	lbs/d	2/year	Grab	X	X	(1)
Total Suspended Solids (TSS) (November 1st- May 31st)	Daily Maximum	30	mg/L	1.5	lbs/d	2/year	Grab	X	X	(1)
Settleable Solids	Daily Maximum	0.1	mL/L			5/week	Grab	X	X	
Ammonia (as N) (June 1st- Oct 31st)	Daily Maximum	6.6	mg/L		lbs/d	2/year	Grab	X	X	
Ammonia (as N) (November 1st -May 31st)	Daily Maximum	11.4	mg/L		lbs/d	2/year	Grab	X	X	

EFFLUENT DISINFECTION Required Seasonal from May 1st - October 31st	Limit	Units	Limit	Units	Sample Frequency	Sample Type	Inf.	Eff.	(5)

FOOTNOTES:

1. Effluent shall not exceed 15% and 15% of influent concentration values for BOD_5 & TSS respectively.
2. Reporting for Total Residual Chlorine is only applicable if chlorine is used for disinfection, elsewhere in the treatment process, or the facility otherwise has reasonable potential to discharge chlorine.
3. No disinfection or Total Residual Chlorine (TRC) related reporting is required until **May 1st, 2025**. **Please see the compliance schedule on page 14.**
4. The existing facility limitations(Page 5, 6 and 7) will be effective until ExPD or DEC acceptance of the construction completion certification of the proposed project, whichever comes first. Upon DEC acceptance of the construction certification of the proposed project, the limitations identified on Page 6 will become effective. Construction cannot commence until after DEC approval of plans/ specification in accordance to 6 NYCRR Part 750-2.10. See Schedule of Compliance on Page 15.
5. Disinfection for Outfall 003- Given the lack of ability to expand the treatment system for addition of disinfection treatment due to lack of space at the site, disinfection at this outfall is not being added at this time. Disinfection requirements will be considered for addition to this outfall upon modification to the treatment system.

MERCURY MINIMIZATION PROGRAM (MMP) - Type IV

On 02/20/2021, the permittee submitted a Conditional Exclusion Certification, certifying that the facility does not have any of the mercury sources listed in Part III.A.3. of DOW Technical & Operational Guidance Series (TOGS) 1.3.10.

1. General - The permittee must develop, implement, and maintain a mercury minimization program (MMP), containing the elements set forth below.
2. MMP Elements - The MMP must be a written document and must include any necessary drawings or maps of the facility and/or collection system. Other related documents already prepared for the facility may be used as part of the MMP and may be incorporated by reference. At a minimum, the MMP must include the following elements[1] as described in detail below:

   a. Conditional Exclusion Certification - A certification (Appendix D of *DOW TOGS 1.3.10*), signed in accordance with 750-1.8 Signature of SPDES forms, must be submitted once every five (5) years to the Regional Water Engineer and to the Bureau of Water Permits certifying that the facility is neither a mercury source nor receives flows from a mercury source. Criteria to determine if a facility has a mercury source are as follows:

      - The facility is or receives discharge from 1) individually permitted combined sewer overflow (CSOs)[2] communities and/or 2) Type II sanitary sewer overflow (SSO)[3] facilities;
      - One or more effluent samples which exceed 12 ng/L, including samples taken as a result of the SPDES application process;
      - 1) Internal or tributary waste stream samples exceed the GLCA effluent limitation **AND** 2) the final effluent samples are less than the GLCA due primarily to dilution by uncontaminated or less contaminated waste streams. Both components of this criterion may include samples taken as a result of the SPDES application process;
      - A permit application or other information indicates that mercury is handled on site and could be discharged through outfalls;
      - Outfalls which contain legacy mercury contamination;
      - The facility's collection system receives discharges from a dental and/or categorical industrial user (CIU)[4] that may discharge mercury;
      - The facility accepts hauled wastes; or,
      - The facility is defined as a categorical industry that may discharge mercury. This may also include dentists, universities, hospitals, or laboratories which have their own SPDES permit.

   b. Control Strategy - The control strategy must contain the following minimum elements:
      i. Equipment and Materials – Equipment and materials (e.g., thermometers, thermostats) used by the permittee, which may contain mercury, must be evaluated by the permittee. As equipment and materials containing mercury are updated/replaced, the permittee must use mercury-free alternatives, if possible.
      ii. Bulk Chemical Evaluation – For chemicals, used at a rate which exceeds 1,000 gallons/year or 10,000 pounds/year, the permittee must obtain a manufacturer's certificate of analysis, a chemical analysis performed by a certified laboratory, and/or a notarized affidavit which describes the substances' mercury concentration and the detection limit achieved. If possible, the permittee

[1] Neither monitoring nor outreach is not required for facilities meeting the criteria for MMP Type IV, but monitoring and/or outreach can be included in the permittee's control strategy.
[2] CSO permits are included under the 05 and 07 permit classifications.
[3] These are overflow retention facilities (ORFs) and are included under the 05 and 07 permit classifications.
[4] CIUs include those listed under Federal Regulation in 40 CFR Part 400.

must only use bulk chemicals utilized in the wastewater treatment process which contain <10 ppb mercury.

MERCURY MINIMIZATION PROGRAM (MMP) – Type IV (Continued)

c. **<u>Status Report</u>** - An **annual** status report must be completed and maintained on site summarizing:

i. Review of criteria to determine if the facility has a potential mercury source;
   a. If the permittee no longer meets the criteria for MMP Type IV, the permittee must notify the Department for a permittee-initiated permit modification;

ii. All actions undertaken, pursuant to the control strategy, during the previous year; and

iii. Actions planned, pursuant to the control strategy, for the upcoming year.

The first status report is required to be completed in accordance with the Schedule of Additional Submittals. The permittee must maintain a file with all MMP documentation. The file must be available for review by Department representatives and copies must be provided upon request in accordance with 6 NYCRR 750-2.1(i) and 750-2.5(c)(4).

3. <u>MMP Modification</u> - The MMP must be modified whenever:
   a. Changes at the facility, or within the collection system, increase the potential for mercury discharges;
   b. A letter from the Department identifies inadequacies in the MMP.

The Department may use information in the annual status reports, in accordance with 2.c of this MMP, to determine if the permit limitations and MMP Type is appropriate for the facility.

DEFINITIONS:

Potential mercury source – a source identified by the permittee that may reasonably be expected to have total mercury contained in the discharge. Some potential mercury sources include switches, fluorescent lightbulbs, cleaners, degreasers, thermometers, batteries, hauled wastes, universities, hospitals, laboratories, landfills, Brownfield sites, or raw material storage.

DISCHARGE NOTIFICATION REQUIREMENTS

(a) The permittee shall install and maintain identification signs at all outfalls to surface waters listed in this permit, unless the Permittee has obtained a waiver in accordance with the Discharge Notification Act (DNA). 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.

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:

N.Y.S. PERMITTED DISCHARGE POINT

SPDES PERMIT No.: NY0160971

OUTFALL No. :001, 002, 003

For information about this permitted discharge contact:

Permittee Name: ______________________________

Permittee Contact: ______________________________

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

OR:

NYSDEC Division of Water Regional Office Address: 6274 E Avon Lima Rd, Avon, NY 14414

NYSDEC Division of Water Regional Phone: (585) - 226 -5450

(e) Upon request, the permittee shall make available electronic or hard copies of the sampling data to the public. In accordance with the RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS page of your permit, each DMR shall be maintained (either electronically or as a hard copy) 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) If the permittee believes that any outfall which discharges wastewater from the permitted facility meets any of the DNA waiver criteria, notification must be made to the Department's Bureau of Water Permits. Provided there is no objection by the Department, a sign 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.

SCHEDULE OF COMPLIANCE

a) The permittee shall comply with the following schedule:

Outfall(s)	Compliance Action	Due Date
001 002	ENGINEERING REPORT The permittee shall submit an approvable engineering report that meets the requirements of the most recent version of the EFC/DEC Engineering Report Outline (https://www.dec.ny.gov/permits/6054.html). The report shall be prepared by a Professional Engineer licensed to practice engineering in New York State and detail the designs that will be used to comply with the final effluent limitations for Fecal Coliform. Approvable is defined as that which can be approved by the Department with only minimal revision. Minimal revision shall mean revised and resubmitted to the Department within thirty days of notification by the Department of the revisions that are necessary. All approvable engineering submissions must include the seal and signature of the professional engineer.	January 1, 2023
	ENGINEERING PLANS / SPECIFICATIONS / SCHEDULE The permittee shall submit approvable Engineering Plans, Specifications, and Construction Schedule for the implementation of effluent disinfection. Department approval is subject to SEQR and other permits, as needed.	October 1, 2023
	BEGIN CONSTRUCTION The permittee shall begin construction of the treatment facilities in accordance with the Department approved schedule.	
	COMPLETE CONSTRUCTION & COMMENCE OPERATION The permittee shall complete construction and commence operation of the system, and comply with the final effluent limitations for Fecal Coliform and TRC.	**May 1st, 2025**
The above compliance actions are one-time requirements. The permittee shall comply with the above compliance actions to the Department's satisfaction once. When this permit is administratively renewed by NYSDEC letter entitled "SPDES NOTICE/RENEWAL APPLICATION/PERMIT," the permittee is not required to repeat the submission(s) noted above. The above due dates are independent from the effective date of the permit stated in the "SPDES NOTICE/RENEWAL APPLICATION/PERMIT" letter.		

b) 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. Any details which tend to explain or mitigate an instance of 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.

c) The permittee shall submit copies of any document required by the above schedule of compliance to the NYSDEC Regional Water Engineer and to the Bureau of Water Permits.

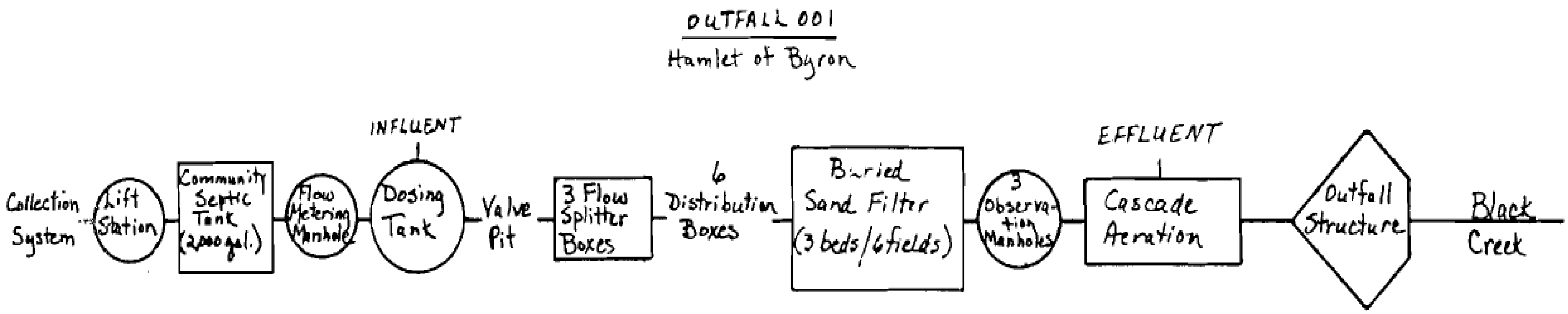
INTERIM MONITORING LOCATIONS

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

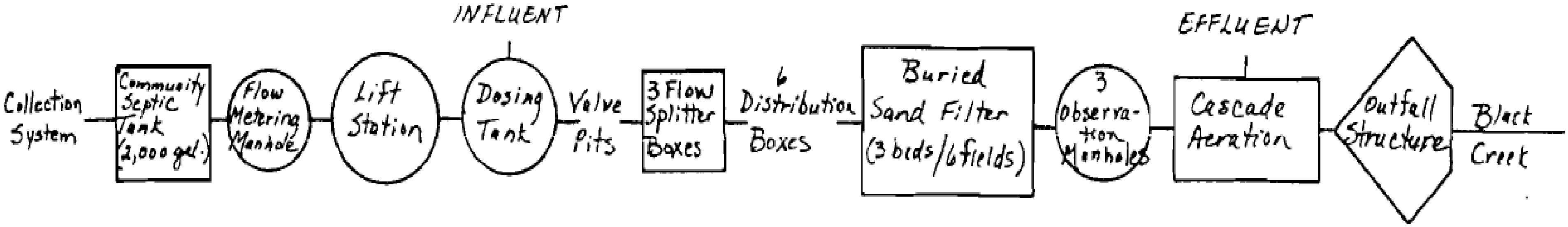
*Outfall 001—Influent and Effluent

*Outfall 002—Influent and Effluent

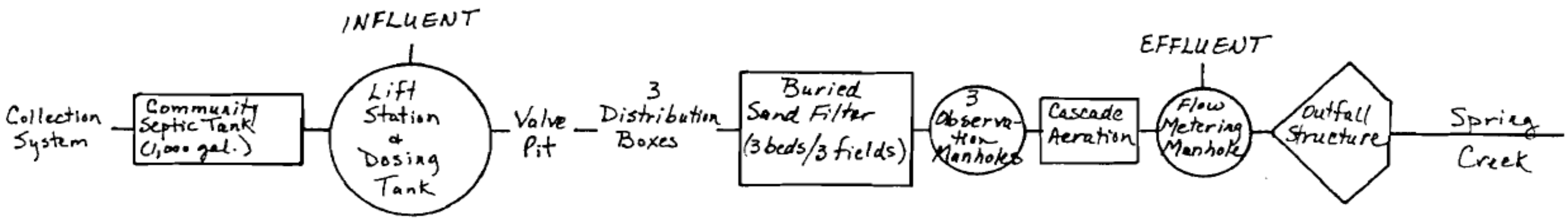
*Outfall003—Influent and Effluent



OUTFALL 002
Hamlet of South Byron



Outfall 003



FOOTNOTE: *The existing facility monitoring locations will be effective until ExPD or DEC acceptance of the construction completion certification of the proposed project, whichever comes first. Upon DEC acceptance of the construction certification of the proposed project, the monitoring locations identified on Page 17 will become effective. Construction cannot commence until after DEC approval of plans/ specification in accordance to 6 NYCRR Part 750-2.10. See Schedule of Compliance on Page 15.

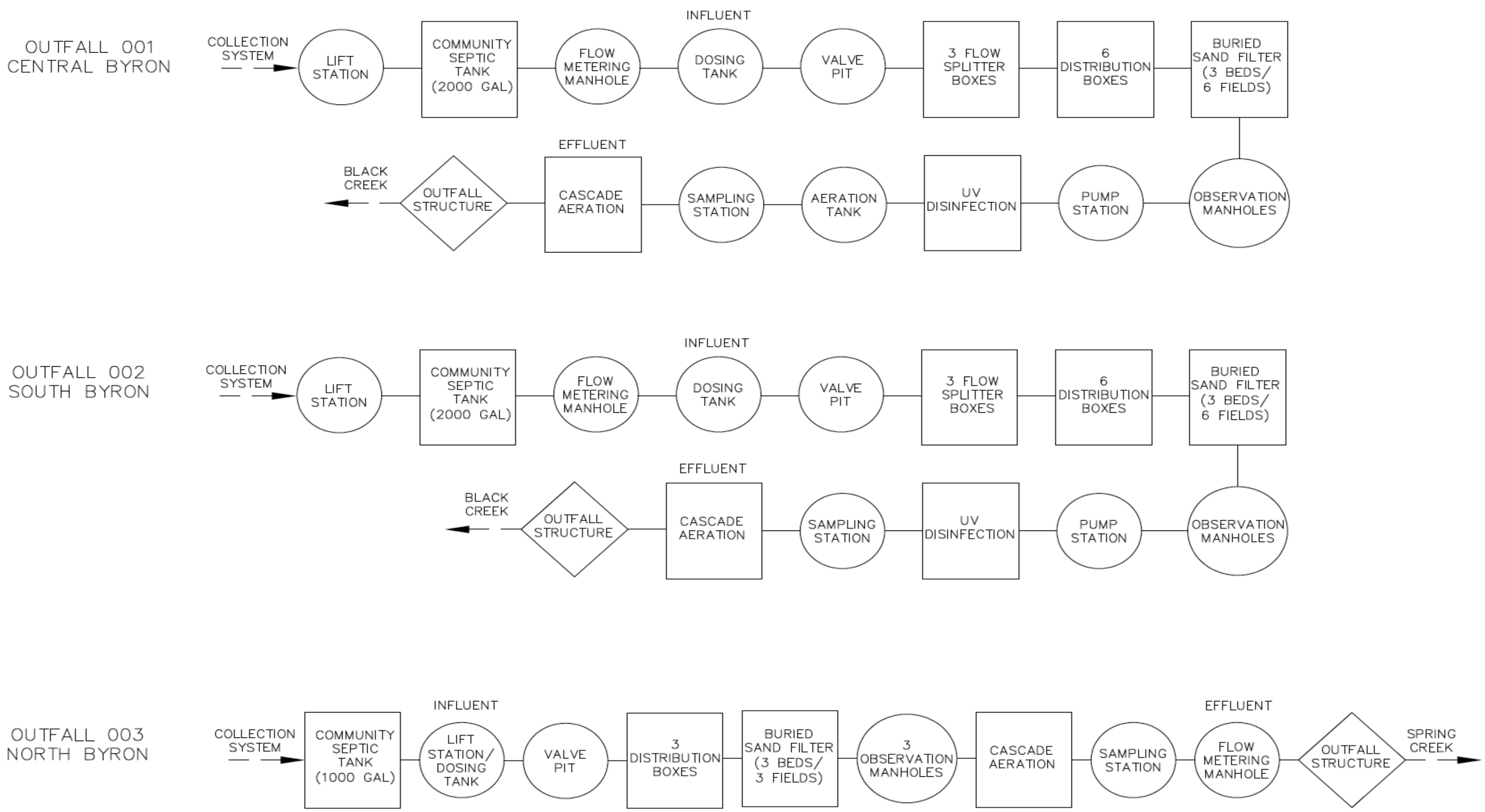
FINAL MONITORING LOCATIONS

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

Outfall 001—Influent and Effluent

Outfall 002—Influent and Effluent

Outfall003—Influent and Effluent



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 I as follows:

B. General Conditions

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

C. Operation and Maintenance

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

D. Monitoring and Records

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

E. Reporting Requirements

1.	Reporting requirements	6 NYCRR 750-2.5, 2.7 & 1.17
2.	Anticipated noncompliance	6 NYCRR 750-2.7(a)
3.	Transfers	6 NYCRR 750-1.17
4.	Monitoring reports	6 NYCRR 750-2.5(e)
5.	Compliance schedules	6 NYCRR 750-1.14(d)
6.	24-hour reporting	6 NYCRR 750-2.7(c) & (d)
7.	Other noncompliance	6 NYCRR 750-2.7(e)
8.	Other information	6 NYCRR 750-2.1(f)
9.	Additional conditions applicable to a POTW	6 NYCRR 750-2.9

F. Planned Changes

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

   a. The alteration or addition to the permitted facility may meet any 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 either 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)

2. Notification Requirement for POTWs
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

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

H. SPDES Permit Program Fee
The permittee shall pay to the Department an annual SPDES permit program fee within 30 days of the date of the first invoice, unless otherwise directed by the Department, and shall comply with all applicable requirements of ECL 72-0602 and 6 NYCRR Parts 480, 481 and 485. Note that if there is inconsistency between the fees specified in ECL 72-0602 and 6 NYCRR Part 485, the ECL 72-0602 fees govern.

I. Water Treatment Chemicals (WTCs)
New or increased use and discharge of a WTC requires prior Department review and authorization. At a minimum, the permittee must notify the Department in writing of its intent to change WTC use by submitting a completed *WTC Notification Form* for each proposed WTC. The Department will review that submittal and determine if a SPDES permit modification is necessary or whether WTC review and authorization may proceed outside of the formal permit administrative process. The majority of WTC authorizations do not require SPDES permit modification. In any event, use and discharge of a WTC shall not proceed without prior authorization from the Department. Examples of WTCs include biocides, coagulants, conditioners, corrosion inhibitors, defoamers, deposit control agents, flocculants, scale inhibitors, sequestrants, and settling aids.

1. WTC use shall not exceed the rate explicitly authorized by this permit or otherwise authorized in writing by the Department.
2. The permittee shall maintain a logbook of all WTC use, noting for each WTC the date, time, exact location, and amount of each dosage, and, the name of the individual applying or measuring the chemical. The logbook must also document that adequate process controls are in place to ensure that excessive levels of WTCs are not used.
3. The permittee shall submit a completed WTC Annual Report Form each year that they use and discharge WTCs. This form shall be submitted in electronic format and attached to either the December DMR or the annual monitoring report required below. The *WTC Notification Form and WTC Annual Report Form* are available from the Department's website at: http://www.dec.ny.gov/permits/93245.html

RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS

A. The monitoring information required by this permit shall be 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.

B. Discharge Monitoring Reports (DMRs): Completed DMR forms shall be submitted for each 1 month reporting period in accordance with the DMR Manual available on Department's website.

DMRs must be submitted electronically using the electronic reporting tool (NetDMR) specified by NYSDEC. Instructions on the use of NetDMR can be found at https://www.dec.ny.gov/chemical/103774.html. **Hardcopy paper DMRs will only be received at the address listed below for the Bureau of Water Permits, if a waiver from the electronic submittal requirements has been granted by DEC to the facility.**

Attach the monthly "Wastewater Facility Operation Report" (form 92-15-7) and any required DMR attachments electronically to the DMR or with the hardcopy submittal.

The first monitoring period begins on the effective date of this permit, and, unless otherwise required, the reports are due no later than the 28th day of the month following the end of each monitoring period.

C. The monitoring information required by this permit shall be summarized and reported to the RWE and Bureau of Water Permits at the following addresses:

Department of Environmental Conservation
Division of Water, Bureau of Water Permits
625 Broadway, Albany, New York 12233-3505 Phone: (518) 402-8111

Department of Environmental Conservation
Regional Water Engineer, Region 8
6274 E. Avon-Lima Road, Avon, New York, 14414-9519 Phone: (585) 226-5450

D. Bypass and Sewage Pollutant Right to Know Reporting: In accordance with the Sewage Pollutant Right to Know Act (ECL § 17-0826-a), Publicly Owned Treatment Works (POTWs) are required to notify DEC and Department of Health within two hours of discovery of an untreated or partially treated sewage discharge and to notify the public and adjoining municipalities within four hours of discovery. Information regarding reporting and other requirements of this program may be found on the Department's website. In addition, POTWs are required to provide a five-day incident report and supplemental information to the DEC in accordance with Part 750-2.7(d) by utilizing the Division of Water Report of Noncompliance Event form unless waived by DEC on a case-by-case basis.

E. Schedule of Additional Submittals:

The permittee shall submit as a hardcopy the following information to the Regional Water Engineer and to the Bureau of Water Permits, unless otherwise instructed:

SCHEDULE OF ADDITIONAL SUBMITTALS		
Outfall(s)	**Required Action**	**Due Date**
001 002 003	MERCURY MINIMIZATION PROGRAM – PLAN The permittee must complete and maintain onsite an annual mercury minimization status report in accordance with the requirements of this permit.	Maintained Onsite EDP + 12 months, annually thereafter

SCHEDULE OF ADDITIONAL SUBMITTALS		
Outfall(s)	**Required Action**	**Due Date**
001 002 003	MERCURY -CONDITIONAL EXCLUSION CERTIFICATION Permittee must submit a mercury conditional exclusion certification every five years certifying there are no mercury sources.	2/20/2026 Every 5 years thereafter

Unless noted otherwise, the above actions are one-time requirements. The permittee shall submit the results of the above actions to the satisfaction of the Department. When this permit is administratively renewed by NYSDEC letter entitled "SPDES NOTICE/RENEWAL APPLICATION/PERMIT", the permittee is not required to repeat the above submittal(s), unless noted otherwise. The above due dates are independent from the effective date of the permit stated in the letter of "SPDES NOTICE/RENEWAL APPLICATION/PERMIT."

F. Monitoring and analysis shall be conducted using sufficiently sensitive test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

G. 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.

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

I. 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.

J. 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.

SPDES Permit Fact Sheet
Town of Byron
Town of Byron Wastewater Treatment Facility
NY0160971

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Contents

Summary of Permit Changes

A State Pollutant Discharge Elimination System (SPDES) EBPS permit modification has been drafted for the Town of Byron Wastewater Treatment Facility. The following is a summary of the changes. **The details of these changes are specified below and in the permit:**

- New Requirement for Seasonal Disinfection (May 1- October 31) starting in 2025 for Outfall 001, and Outfall 002.
- If Chlorine Disinfection is used, the TRC limit of 0.03 mg/ is necessary at Outfall 001 due to the limited dilution and the detection level. 0.03 mg/l is the TRC PQL value.
- If Chlorine Disinfection is used, the TRC limit will be 0.04 mg/l at Outfall 002.
- Fecal coliform effluent limits of 200 (30-day geo mean) and 400 (7-day geo mean).

Outfall 003: Given the lack of space at the treatment facility, disinfection treatment cannot currently be added unless a modification to the treatment system is undertaken. Given that the treatment process currently operates satisfactorily a significant modification to the treatment system, to add disinfection, is not being required at this time. Upon modification of the treatment system the addition of a disinfection requirement will be considered. The permittee has sampled the effluent for fecal and reported values lower than the fecal limits. This data does not guarantee disinfection will not be required in the future, but indicates that the permittee may choose to seek variance from a future disinfection requirement

Date	FC Results in CFU/100ml
9/10/2020	31
10/08/2020	5
11/05/2020	39
11/12/2020	1

In addition to disinfection requirement changes:

Ammonia Changes: DOW now limits ammonia as N, based on a conversion of the ammonia as NH3 criteria specific in the (1998) TOG 1.1.1. Both the conversion and the reclassification from D to C have had influences on the ammonia as N WQBELs in the pollutant table in this Fact Sheet. (When last reviewed in 1993, the streams were Class D)

- Outfall 001 ammonia limits for Class C are to become limit of ammonia measured as N.

- Outfall 002 ammonia limits for Class C are to become limit of ammonia measured as N.

- Outfall 003 ammonia limits for Class C are to become limit of ammonia measured as N.

DO Change:

- **Monitoring DO is required for Outfall 001**. The DO standard for Class C is higher than the Class D when the review was performed in 1993. Monitoring will verify that there is adequate DO in the effluent.
- For Outfall 001 a summer minimum limit of 7.0 mg/l should be required.

Post Comment SPDES Permit Updates:

The Town of Byron has reviewed the Draft Permit and has objected on the following changes requirenements:

1) Testing for pH, Temp and SS change from 1/week to 7/week.

2) That the requirenments shown on Number 1 are effective upon issuance of permit.

In order for the Department to accommodate the Towns needs on changing sampling locations due to difficulty of accessability of such Outfalls, especially during the Winter months, the Department has agreed to the following changes on the Permit:

1) The Department is granting the Town's request of sampling pH, Temp and SS to 5/week.

2) The Department is granting the Town's request to start sampling 5/week for pH, Temp and SS when Disinfection limitations go into effect in May of 2025. This gives the Town the time necessary to construct an accessible sampling location.

3) The Department has granted INTERIM Limits for sampling frequency and Monitoring Locations as shown on the Permit.

This factsheet summarizes the information used to determine the effluent limitations and other conditions contained in the permit. General background information about the regulatory bases for the effluent limitations and other conditions contained in this permit are in the Appendix linked throughout this factsheet.

Administrative History

3/1/1994 No Full Technical Review has been done for this facility since the three outfalls at separate physical treatment plants were administrative placed into one SPDES Permit in 1993.

The permit was administratively renewed in 2014 and again in 2019. The current permit administrative renewal is effective until 1/1/2024.

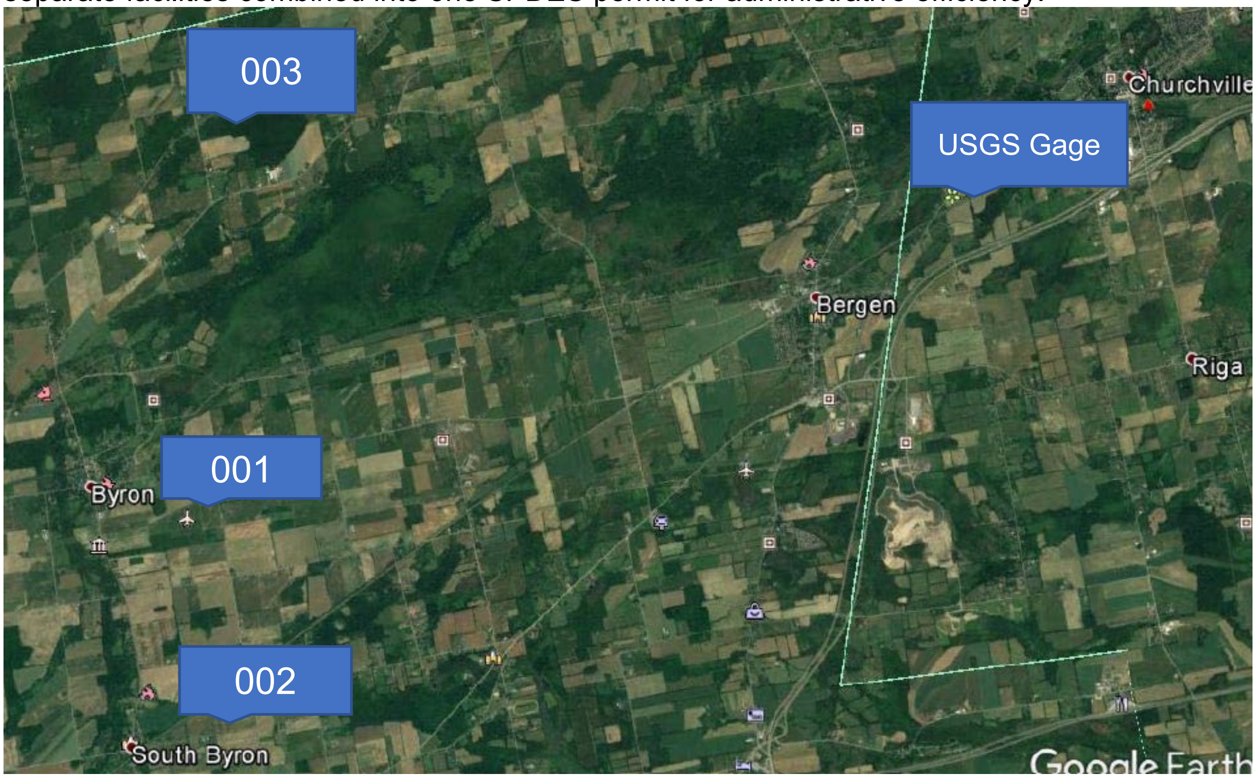
3/1/2019 Department issued a Request for Information (RFI) to modify and renew the SPDES permit due to the facility's EBPS score[1]. At the time of the RFI, the facility had an EBPS score of 180 and ranking of 179/742.

1/22/2020 The Town of Byron submitted a complete NY-2A permit application.

[1] Pursuant to 6 NYCRR 750-1.18 and NYS Environmental Benefit Permit Strategy (EBPS)

Facility Information

The Town of Byron Wastewater Treatment Facility, SPDES # NY0160971, consists of three physically separate facilities combined into one SPDES permit for administrative efficiency.



Outfall 001 is near Byron, Outfall 002 is near South Byron, and Outfall 003 is AT Pumpkin Hill on Spring Creek which is a tributary of Black Creek.

Site Overview

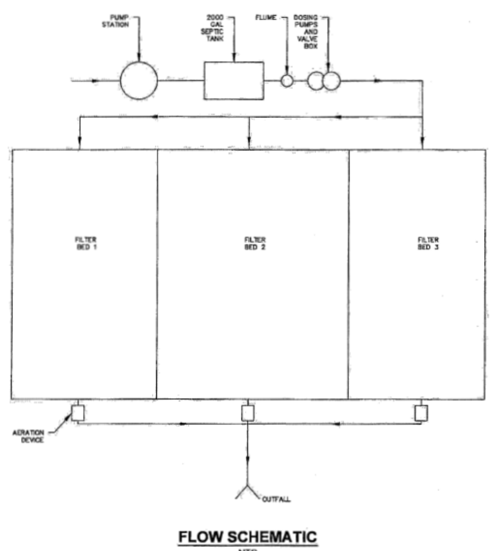


Figure 1: Byron WWTP Outfall 001. Please note the Latitude and Longitude mentioned on the previous permit is incorrect. Actual Latitude and Longitude as follows: Latitude= 43° 4'59.01"N, Longitude= 78° 4'3.72"W.

This is a publicly owned treatment works that receives flow from domestic users. The sewage collection system consists of separate sewers. The combined plant design flows of the three outfalls is reported as 0.084 MGD.

The Outfall 001 current treatment plant consists of:

- Preliminary Treatment: Raw Sewage Pump Station.
- Primary Treatment: Community Septic Tank.
- Secondary Treatment: Buried Sand filters.
- Tertiary Treatment: Nitrification by other process.
- Cascade Aeration after sand filters.
- Sludge is hauled away for treatment and disposal.

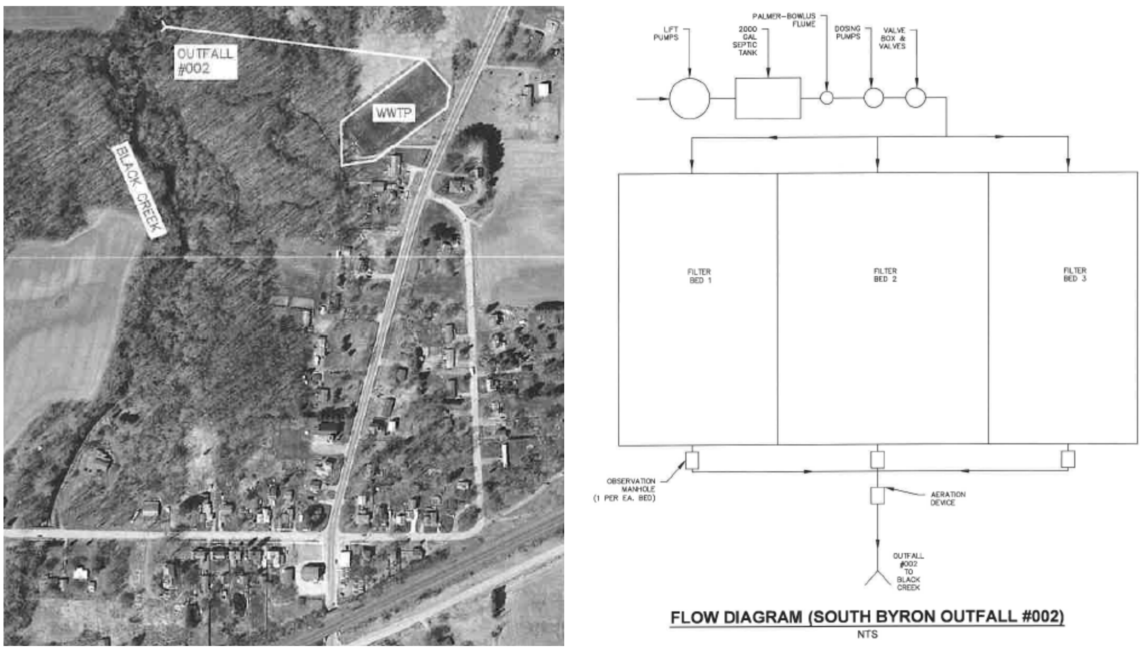


Figure 2: Outfall 002 is near South Byron at Latitude 43° 03' 06" N and Longitude 78° 04' 00" W.

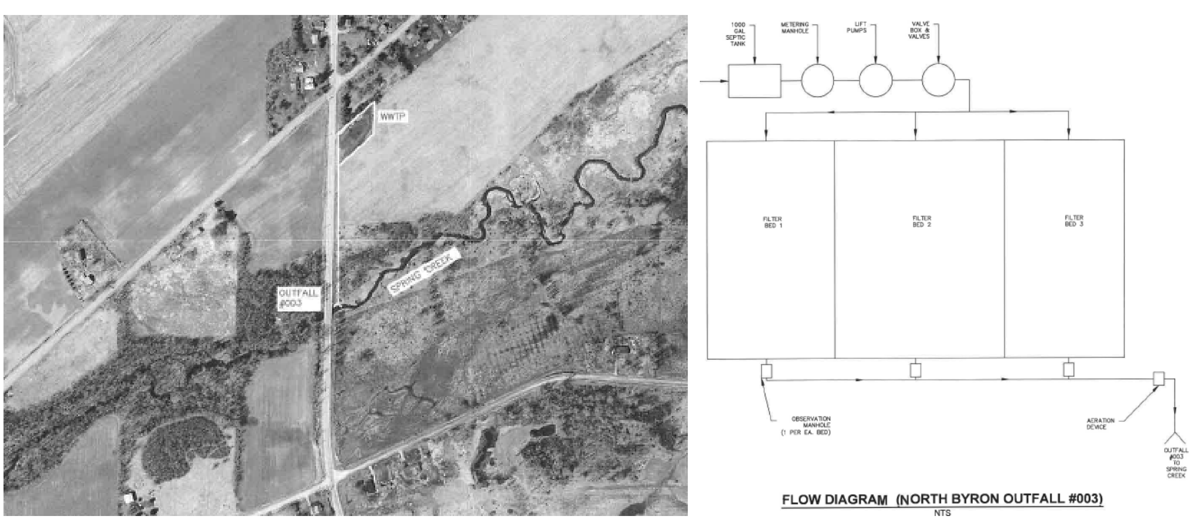


Figure 3: Outfall 003 is near Pumpkin Hill at Latitude 43° 03' 06" N and Longitude 78° 04' 00" W.

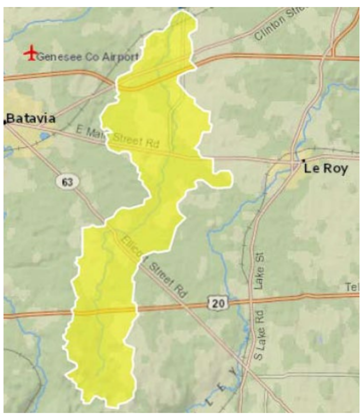
Environmental regulatory compliance and enforcement information for this facility can be found on the Enforcement and Compliance History Online at https://echo.epa.gov.

Existing Effluent Quality

The Pollutant Summary Table presents the existing effluent quality and permit limitations for discharges from the facility. Concentration and mass data are presented, based on Discharge Monitoring Reports submitted by the permittee for the period 8/31/2014 to 8/31/2019.

Receiving Water Information

The facility discharges via the following outfalls:



Outfall 001 @ Byron

Outfall 002 @ South Byron

Outfall 003 @Spring Creek

The USGS Gage 04231000 on Black Creek near Churchville has a drainage area of 123 square miles and a 7Q10 flow of 0.97 cfs according to USGS Bulletin 74. All three outfalls are part of this sub-basin/drainage area. Using direct drainage area ratios for each outfall the 7Q10 s become:

Outfall No.	SIC Code	Wastewater Type	Receiving Water	Drainage area (sq. miles) to discharge point
001	4592	Treated Sanitary Sewer	Black Creek	44.7
002	4592	Treated Sanitary Sewer	Black Creek	29.8
003	4592	Treated Sanitary Sewer	Spring Creek	21.4

The location of the outfall(s), and the name, classification, and index numbers of the receiving waters are indicated in the Outfall and Receiving Water Summary Table at the end of this fact sheet. Appendix Link

Impaired Waterbody Information

In 2016, Black Creek segment (PWL No. 0402-0028) was listed on the New York State Section 303(d) List of Impaired/TMDL Waters as impaired due to Nutrients (Phosphorus) from Streambank Erosion; suspected agriculture, municipal discharges. The segment continues to be listed as of the 2019 NYS Section 303(d) List. Although a draft TMDL has been developed to address the impairment in 2013, this draft TMDL has ***not*** *been* *submitted to EPA for approval*, and therefore no applicable wasteload allocation (WLAs) in it are considered facility requirements at this time. If this 2013 draft is submitted in its' present form, the proposed WLAs in the current draft would reduce the South Byron outfall per the following table excerpts:

Source	Growing Season Total Phosphorus Load (lb/d)			% Reduction
	Current	Allocated	Reduction	
S. Byron SDSTP (NY0160971 002M)	0.38	0.08	0.30	79%
Byron SDSTP (NY0160971 001M)	0.82	0.82	0	0%

The Spring Creek Outfall (003) was not considered in the draft TMDL

Mixing Zone and Critical Receiving Water Data

These 'Outfalls' are actually at 3 physically separate locations and would usually be considered 3 facilities had they not been combined into one SPDES Permit for administrative efficiency due to having the same permittee. As indicated in the table above, 001 & 002 discharge to Black Creek about 3 miles apart, and 003 discharges to a trib called Spring Creek. Spring Creek flows into Black Creek at a confluence about 2.6 miles downstream of outfall 001.

The 7Q10 flow for the discharge points in Black Creek and Spring Creek, as shown in the Table below, were used to calculate the chronic A(C) dilution ratio. The 7Q10 flow was obtained from the USGS/NYSDEC, Bulletin 74, 1979, gage station number 0423 1000 and the relevant drainage area ratios. The 30Q10 was estimated by applying a multiplier of 1.2 to the 7Q10 flow to calculate the Human, Aesthetic, Wildlife (HEW) dilution ratio. The 1Q10 flows were estimated by applying a multiplier of 0.5 to the 7Q10 and were used to calculate the acute A(A) dilution ratio.

Outfall No.	Acute Dilution Ratio A(A)	Chronic Dilution Ratio A(C)	Human, Aesthetic, Wildlife Dilution Ratio (HEW)	Basis
001	3.1:1	5.3:1	6.2:1	USGS data/ watershed ratio
002	4.0:1	7.1:1	8.3:1	USGS data/ watershed ratio
003	10.1:1	19.2:1	22.8:1	USGS data/ watershed ratio

The DO sag curve calculated in 1993 & 4 assumed all the outfalls at one point and assume at total discharge much lower than that presently permitted. The discrepancy is not clear according to file notes. Outfall 001 evaluation assumptions for calculating DO sag were; 25C in summer, 10C in winter, 13 ft drop per mile per WQMP (Water Quality Management Plan), approximately 2.6 miles to the next trib confluence(measured via ARC GIS), DO waste at 7 mg/l, and:

DOsag (minimum DO levels) were calculated for the outfalls using the **R**iver Based Effluent Limit **S**creening **A**nalysis **T**ool (RSAT). Below are the outfall assumptions used in the calculations verifying that stream DO standards are expected to be maintained for summer and winter scenarios for each of the 3 outfalls.

- Note: Since actual channel depth and width at low flow were not know, the RSAT Calculator Tab calculated default values based on the know flow parameters at the downstream gages and watershed area ratios

Effluent/Stream Assumptions used in the DO sag calculations:

Outfall 002 is referenced first in this section because it is upstream of 001 on Black Creek.
The **002 Summer** Stream at 25C, & 6.6 mg/l ammonia as N = 48.3 mg/l NOD.

The **002 Winter** Stream 10C, & 12.3 mg/l ammonia as N = 89.9 mg/l NOD.

Outfall 002 is about 3 miles upstream of 001, and DO saturation is attained before Outfall 001.
Outfall 001 to Black Creek Assumptions:
001: Summer Effluent=19.3 C via NY-2c, 7 mg/l DO, 7.4 mg/l ammonia as N = 54.1 mg/l NOD & stream=25C
001 Winter Stream = 10C, Effluent = 0 mg/l DO, & ammonia as N = 11.4 mg/l = 83.4 mg/l NOD
Outfall 003 to Spring Creek. Assumptions:
003: Summer Stream at 25 C, ammonia 6.6 mg/l as N = 48.2 mg/l NOD
003: Winter Stream at 10 C, ammonia 12.4 mg/l as N = 90.7 mg/l NOD

Critical receiving water data are listed in the table above and in the Pollutant Summary Table at the end of this fact sheet.
Appendix Link

Permit Requirements

The technology based effluent limitations (TBELs), water quality-based effluent limitations (WQBELs), existing effluent quality and a discussion of the selected effluent limitation for each pollutant present in the discharge are provided in the Pollutant Summary Table.

USEPA Effluent Limitation Guidelines (ELGs) Applicable to Facility

Best Practicable Control Technology Currently Available (BPT), Best Conventional Pollutant Control Technology (BCT), Best Available Technology Economically Achievable (BAT), and New Source Performance Standards (NSPS) limitations are based on effluent guidelines developed by USEPA for specific industries[2].
Select Option

Whole Effluent Toxicity (WET) Testing

An evaluation of the discharge indicates the potential for toxicity based on the following criteria: Appendix Link

No effluent WET test is recommended. Black Creek has an impairment due to nutrients, but not attributable to discharge toxicity.

Anti-backsliding

The following effluent limitations are subject to an antibacksliding determination. $CBOD_5$, TSS and 1 ammonia.

Antidegradation

The permit contains effluent limitations which ensure that the designated best use of the receiving waters will be maintained. Please see the Environmental Notice Bulletin for information on the State Environmental Quality Review (SEQR)[3] determination. Appendix Link

Discharge Notification Act Requirements

In accordance with the Discharge Notification Act (ECL 17-0815-a), the permittee is required to post a sign at each point of wastewater discharge to surface waters. The permit also contains a requirement that the permittee make the sampling data available, upon request, to the public.

[2] As promulgated under 40 CFR Parts 405 - 471
[3] As prescribed by 6 NYCRR Part 617

Mercury[4]

The multiple discharge variance (MDV) for mercury provides the framework for NYSDEC to require mercury monitoring and mercury minimization programs (MMPs), through SPDES permitting. Appendix Link

The facility is a MMP Type IV. On 02/24/2021, the permittee submitted a Conditional Exclusion Certification, certifying that the facility does not have any of the mercury sources listed in Part III.A.3. of DOW 1.3.10. Therefore, consistent with DOW 1.3.10, the permit includes requirements for the implementation of MMP Type IV and does not include mercury effluent limitations. The schedule of submittals also includes a due date for re-certification every five years as required by MMP Type IV. This requirement is new.

Schedule(s) of Compliance

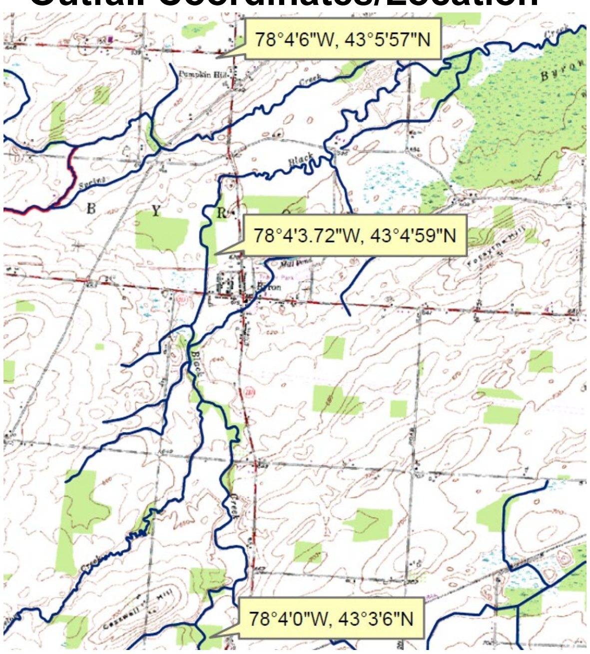
A Schedule of Compliance is being included in the permit[5] based on a reasonable finding of the following:

- The Department is implementing Disinfection into the permit.

Items in the Schedule of Compliance:

- Submit an approvable engineering report for disinfection upgrades, detailing the facility upgrade needed to comply with Fecal Coliform and Total Residual Chlorine standards.
- Submit approvable engineering plans, specifications, and construction schedule for disinfection.

Outfall Coordinates/Location



- Northern Coordinates are Outfall 003 on Spring Creek
- Byron is the location of Outfall 001 at the center of this map
- South Byron, Outfall 002, is the coordinates at the bottom of the map

[4] In accordance with DOW 1.3.10 Mercury – SPDES Permitting & Multiple Discharge Variance (MDV), December 30, 2020.
[5] Pursuant to 6 NYCRR 750-1.14

OUTFALL AND RECEIVING WATER SUMMARY TABLE

Outfall	Latitude	Longitude	Receiving Water Name	Water Class	Water Index No. / Priority Waterbody Listing (PWL) No.	Major / Sub Basin	1Q10 (MGD)	7Q10 (MGD)	30Q10 (MGD)	Critical Effluent Flow (MGD)	Dilution Ratio A(A)	Dilution Ratio A(C)	Dilution Ratio HEW
001	43° 04' 59" N	78° 04' 3.72" W	Black Creek	C	Ont 117-19(Portion 3) PWL: 0042-0028	04/02	0.114	0.228	0.274	0.053	3.1:1	5.3:1	6.2:1
" "	" "	" "	" "	" "	Dilution w 002 effluent added to stream (+0.025 MGD)	" "	0.139	0.253	0.299	0.053	3.4:1	5.8:1	6.7:1
002	43° 03' 06" N	78° 04' 00" W	Black Creek	C	Ont 117-19(Portion 3) PWL: 0042-0028 -	04/02	0.076	0.152	0.182	0.025	4.0:1	7.1:1	8.3:1
003	43° 05' 57" N	78° 04' 06" W	Spring Creek	C	Ont 117-19-28 PWL: 0042-0036	04/02	0.055	0.109	0.131	0.006	10.1:1	19.2:1	22.8:1

POLLUTANT SUMMARY TABLE:

Outfall 001

Outfall #	001	**Description of Wastewater:** Residential Wastewater
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration

Effluent Parameter	Units	Averaging Period	Existing Discharge Data: Permit Limit	Existing Discharge Data: Existing Effluent Quality[6]	Existing Discharge Data: # of Data Points Detects / Non-Detects	TBELs: Limit	TBELs: Basis	Water Quality Data & WQBELs: Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL	ML	Basis for Permit Requirement
General Notes: Existing discharge data from 8/2014 to 8/2019 was obtained from Discharge Monitoring Reports provided on EPA ICIS.															
Flow Rate	MGD	Monthly Avg	0.053	0.03 Actual Avg.	61/0	**0.053**	Design Flow	Narrative: No alterations that will impair the waters for their best usages.					703.2	-	TBEL
	Consistent with TOGS 1.3.3, a monthly average flow limitation equal to the average daily design capacity of the treatment plant is specified. (TBEL as design flow likely)														
pH	SU	Minimum	6.5	6.88 Actual Avg.	61/0	6.0	TOGS 1.3.3	-	6.5-8.5	6.5 – 8.5	Range	6.5 - 8.5	703.3	-	WQBEL
		Maximum	8.5	7.12 Actual Avg.	61/0	9.0									
	The WQBEL based on Class C stream standards														

[6] Existing Effluent Quality: Daily Max = 99% lognormal; Monthly Avg = 95% lognormal (for datasets with ≤ 3 nondetects);.Daily Max = 99% delta-lognormal; Monthly Avg = 95% delta-lognormal (for datasets with > 3 nondetects)

Outfall #	001	**Description of Wastewater:** Residential Wastewater													
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration													
Effluent Parameter	Units	Averaging Period	Existing Discharge Data			TBELs		Water Quality Data & WQBELs						ML	Basis for Permit Requirement
			Permit Limit	Existing Effluent Quality[6]	# of Data Points Detects / Non-Detects	Limit	Basis	Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL		
Temperature	°C	Daily Max	Monitor	14.98 Actual Average	61/0	-	-	Narrative (Non-Trout): The water temperature at the surface of a stream shall not be raised to more than 90F at any point and... shall not be raised or lowered to more than 5F over the temperature that existed before the addition					704.2	-	Monitor
	Monitoring is required for process control and informational purposes. Summer effluent temp avg on NY-2A was **19.3C** – this used for RSAT Model														
Dissolved Oxygen	mg/L	Daily Min	-	-	-	-	-	-	4.0	4.0	Narrative	7.0 min.	703.3	-	WQBEL
(DO)	The downstream DO concentration was modeled using the Streeter-Phelps equations in a model using the following assumptions: 'f factor of 2' from WQMP Summer Effluent DO = 7.0 mg/l, actual effluent temp of 19.3 C (fromNY-2A) in summer, and CBOD5 = 15 and NOD=54.1 mg/l Winter Effluent DO = 0, Effluent temp = 10C, and CBOD5 = 25 mg/l The Summer Effluent Limit will be DO=7mg/L; Winter Effluent Limit DO=Monito**r.**														
5-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	Summer mg/L	Daily Max	15	2.33 Actual Average	6/20	15	Antibacksliding	-	See Dissolved Oxygen			**15**	703.3 DO	-	WQBEL
	Winter mg/l	Daily Max	25	2.86 Actual Average	14/17	25	TOGS 1.3.3					**25**			
	Summer lbs/d	Daily Max	6.6	0.49 Actual Average	6/20	6.6	Antibacksliding					-			
	Winter lbs/d	Daily Max	11.1	0.85 Actual Average	14/21	11.1	TOGS 1.3.3					-			
	% Rem	Minimum	85	99.5 Actual Average	61/0	85%	TOGS 1.3.3					**85**			
	Consistent with the present CBOD permit limit in the previous permit. The downstream DO concentration was modeled using the Streeter-Phelps equations used in DO sag water quality models using the assumptions for stream temperatures found in TOG 1.3.1. Effluent evaluated using a Streeter Phelps Equation model. Other model assumptions are discussed in the receiving water narrative section of this fact sheet. TBEL: Anti-backsliding requirements are specified in the CWA sections 402(o) and 303(d)(4), ECL 17-0809, and regulations at 40 CFR 122.44(*l*) and 6 NYCRR 750-1.10(c) and (d). These requirements are summarized in TOGS 1.2.1. Generally, the relaxation of effluent limitations in permits is prohibited unless one of the specified exceptions applies, which will be cited on a case-by-case basis in this factsheet. Antibacksliding for Summer CBOD5.														

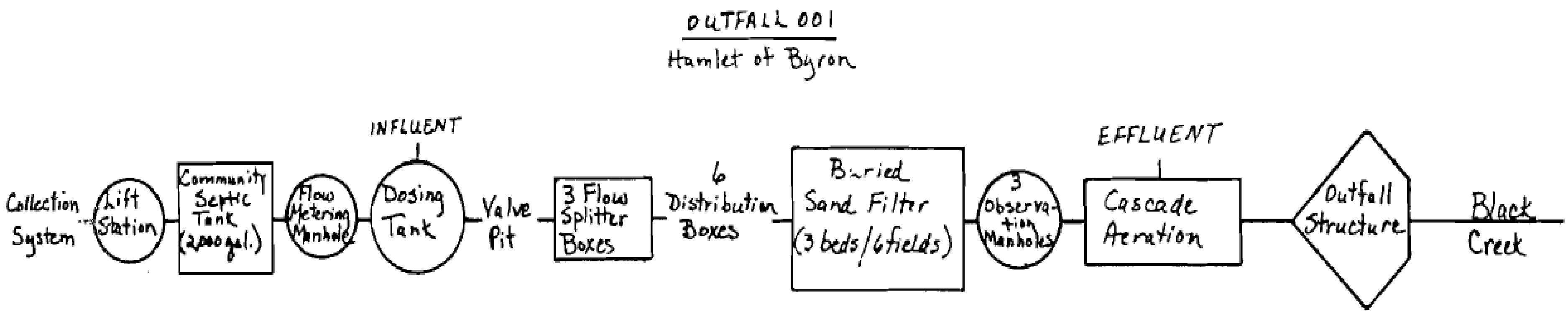
Outfall #	001	**Description of Wastewater:** Residential Wastewater
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration

Effluent Parameter	Units	Averaging Period	Existing Discharge Data			TBELs		Water Quality Data & WQBELs						ML	Basis for Permit Requirement
			Permit Limit	Existing Effluent Quality[6]	# of Data Points Detects / Non-Detects	Limit	Basis	Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL		
Total Suspended Solids (TSS)	Summer mg/L	Daily Max	15	11.48 99% Delta Log-Normal	10/13	**15**	Antibacksliding	-	Narrative: None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.			-	703.2	-	TBEL
	Winter mg/l	Daily Max	30	14.78 99% Delta Log-Normal	16/19	**30**	TOGS 1.3.3								
	Summer lbs/d	Daily Max	6.6	4.0 99% Delta Log-Normal	15/11	**6.6**	Antibacksliding								
	Winter lbs/d	Daily Max	13.3	7.64 99% Delta Log-Normal	17/18	**13.3**	TOGS 1.3.3								
	% Rem	Minimum	85	99.54 95% Log-Normal	61/0	**85%**	TOGS 1.3.3								
	TBEL: Anti-backsliding requirements are specified in the CWA sections 402(o) and 303(d)(4), ECL 17-0809, and regulations at 40 CFR 122.44(*l*) and 6 NYCRR 750-1.10(c) and (d). These requirements are summarized in TOGS 1.2.1. Generally, the relaxation of effluent limitations in permits is prohibited unless one of the specified exceptions applies, which will be cited on a case-by-case basis in this factsheet. Antibacksliding for Summer TSS**.**														
Settleable Solids	mL/L	Daily Max	0.1	<0.1 Actual Average	<0.1	**0.1**	TOGS 1.3.3	Narrative: None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages				-	703.2	-	TBEL
	Consistent with TOGS 1.3.3 the effluent limitation is equal to the TBEL of 0.1 mL/L for POTWs providing secondary treatment and filtration. Given that adequate dilution is available the TBEL is reasonably protective of the WQS.														
Nitrogen, Ammonia (as N) June 1st – Oct. 31st	mg/L	Daily Max	8 As NH_3	6.35 Actual Average	26/0	-	-	0.1 assumed	1.2 As N	1.2 As N	A(C)	**7.4** As N	TOGS 1.1.1	-	TBEL
	The original ammonia of 8 mg/l as NH3 = 6.6 mg/l ammonia as N. WQBEL is less restrictive at; (ambient conc. of 1.2-0.1 background) x dilution (6.7) = 7.4 mg/l as N This assumed a DO minimum concentration of 7 mg/l for the DO sag. It further assumes that dilution that includes the upstream permitted discharge into Black Creek for the toxicity dilutions assessment using the TOGS 1.1.1 from a summer pH of 7.5 and a temperature of 25C. Anti-backsliding requirements are specified in the CWA sections 402(o) and 303(d)(4), ECL 17-0809, and regulations at 40 CFR 122.44(*l*) and 6 NYCRR 750-1.10(c) and (d). These requirements are summarized in TOGS 1.2.1. Generally, the relaxation of effluent limitations in permits is prohibited unless one of the specified exceptions applies, which will be cited on a case-by-case basis in this factsheet.														

Outfall #	001	**Description of Wastewater:** Residential Wastewater
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration

Effluent Parameter	Units	Averaging Period	Existing Discharge Data			TBELs		Water Quality Data & WQBELs						ML	Basis for Permit Requirement
			Permit Limit	Existing Effluent Quality[6]	# of Data Points Detects / Non-Detects	Limit	Basis	Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL		
Nitrogen, Ammonia (as N) Nov. 1st – May 31st	mg/L	Daily Max	15 As NH_3	5.53 Actual Average	35/0	-	-	0.1 assumed	1.4 As N	1.8 As N	A(C)	**11.4** As N	TOGS 1.1.1	-	WQBEL
	The WQS for Ammonia was determined from TOGS 1.1.1 from a winter pH of 7.5 and a temperature of 10C. The WQBEL of 1.8-.01 x 6.7 = 11.4 mg/l as N This 11.4 ammonia as N limit models as causing an acceptable minimum stream DO.														
Mercury	ng/L	Select	-	-	-	-	Select	-	-	0.7	H(FC)	0.7	-	-	MDV
	To minimize the potential for a discharge of mercury, a Mercury Minimization Program for Low Priority POTWs is being added to the permit.														
Coliform, Fecal	#/100 ml	30d Geo Mean	200	-		**200**	TOGS 1.3.3	-	Narrative: The monthly geometric mean, from a minimum of five examinations, shall not exceed 200.				703.4	-	TBEL
		7d Geo Mean	400	-		**400**	TOGS 1.3.3	-							
	Consistent with TOGS 1.3.3, effluent disinfection is required seasonally from May 1st - October 31st, due to the class of the receiving waterbody. Fecal coliform limits equal to the TBEL are specified.														
Calcium	ug/L	One Sample	N/A	98,600 Value from NY-2A	1	-	-	-						-	No Limitation
Copper	ug/L	One Sample	N/A	16 Value From NY-2A	1	-	-	-	5.2	15.3	A(A)	47.5	TOG 1.1.1	-	No Limitation
	Using a file value in the area of H = 115 and stream default pH of 7.5 the limiting ambient copper criteria would be based on the acute value of 15.3 ug/l x 3.1 (acute dilution) = 47.5 ug/l. The NY—2C indicates no reasonable potential to exceed this value, so a zinc limit is not needed. (upstream discharge of 002 is not considered in this calculation as it is in UOD dilutions since this is a conservative pollutant – hence the dilution of 3.1:1)														
Total Hardness	ug/L	One Sample	N/A	318,000 Value from NY-2A	1		-	-						-	No Limitation
Zinc	ug/L	One Sample	N/A	11.2 Value from NY-2A	1		-	-	43	132	A(A)	409	TOG 1.1.1	-	No Limitation
	Using a file value in the area of H = 115 and stream default pH of 7.5 the limiting ambient zinc criteria would be based on the acute value of 132 ug/l x 3.1 (acute dilution)=409 ug/l The NY—2C indicates no reasonable potential to exceed this value, so a zinc limit is not needed. (upstream discharge of 002 is not considered in this calculation as it is in UOD dilutions since this is a conservative pollutant – hence the dilution of 3.1:1)														
Specific Conductance	Umhos/cm	One Sample	N/A	1210 Value from NY-2A	1		-	-						-	No Limitation

Outfall #	001	**Description of Wastewater:** Residential Wastewater													
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration													
Effluent Parameter	Units	Averaging Period	Existing Discharge Data			TBELs		Water Quality Data & WQBELs						ML	Basis for Permit Requirement
			Permit Limit	Existing Effluent Quality[6]	# of Data Points Detects / Non-Detects	Limit	Basis	Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL		
Total Dissolved Solids	mg/L	One Sample	N/A	704 Value from NY-2A	1		-	-	132	500	Standard	500	703.3	-	No Limitation
	At 7Q10 flow the dilution is 5:3:1 and the impact of the NY-2C value would be 700/5.3 = 132 mg/l. If this is a representative sample it may be assumed that this effluent has limited reasonable potential to exceed the stream standard of 500 mg/l, and no limit is required.														
Phosphorus	mg/L	One Sample	N/A	5 Value from NY-2A	1	-	-	-			Narrative		703.2	-	-
	There is no ambient concentration specified for class C water beyond the narrative defining an impairment, and since the Phosphorus TMDL for Black Creek has not been finalized and approved by EPA there is no TMDL WLA for Phosphorus from this discharge presently. Should the TMDL be finalized and approved a WLA may be imposed at that time														
Total Residual Chlorine	mg/L	Daily Max	-	-	-	2.0	TOGS 1.3.3	-	0.0057	0.005	A(C)	0.0028	TOGS 1.1.1	**0.03**	ML
	Seasonal effluent disinfection is being added to the permit. Due to the low dilution, the calcualted WQBEL is less than the TBEL and less than the minimum level of detection. Therefore, an effluent limitation equal to the minimum level of detection of 0.030 mg/L is appropriate.														



Outfall 002

Outfall #	002	**Description of Wastewater:** Residential Wastewater												
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration												
Effluent Parameter	Units	Averaging Period	Existing Discharge Data			TBELs		Water Quality Data & WQBELs					ML	Basis for Permit Requirement
			Permit Limit	Existing Effluent Quality[7]	# of Data Points Detects / Non-Detects	Limit	Basis	Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL		
General Notes: Existing discharge data from 8/2014 to 8/2019 was obtained from Discharge Monitoring Reports provided on EPA ICIS.														
Flow Rate	MGD	30 Day Avg	0.025	0.02 Actual Average	61/0	**0.025**	Design Flow	Narrative: No alterations that will impair the waters for their best usages.					703.2	-	TBEL
	Consistent with TOGS 1.3.3, a monthly average flow limitation equal to the average daily design capacity of the treatment plant is specified.													
pH	SU	Minimum	6.5	7.07 Actual Average	61/0	6.0	TOGS 1.3.3	-	6.5 – 8.5	6.5 – 8.5	Range	6.5 - 8.5	703.3	-	WQBEL
		Maximum	8.5	7.33 Actual Average	61/0	9.0									
	The WQBEL is based on Class C stream standards													
Temperature	°C	Daily Max	**Monitor**	15.1 Actual Average	61/0	-	-	-	Narrative (Non-Trout): The water temperature at the surface of a stream shall not be raised to more than 90F at any point and... shall not be raised or lowered to more than 5F over the temperature that existed before the addition				704.2	-	Monitor
	Monitoring is required for process control and informational purposes													
Dissolved Oxygen	mg/L	Daily Min	-	-	-	-	-	-	S/W= 4.04/5.74 Critical Point	(Non-Trout) 4.0 mg/L	Narrative	X	703.3	-	No Limitation
(DO)	The downstream DO concentration was modeled using the Streeter-Phelps equations in a model using the following assumptions: ‘f factor of 2’ from WQMP Summer Effluent DO = 0 mg/l, assumed stream temp of 25 C in summer, and CBOD5 = 15 and NOD=48.3 mg/l Winter Effluent DO = 0, stream temp = 10C, and CBOD5 = 25 mg/l and NOD = 89.9 mg/l													

[7] Existing Effluent Quality: Daily Max = 99% lognormal; Monthly Avg = 95% lognormal (for datasets with ≤ 3 nondetects);.Daily Max = 99% delta11.1-lognormal; Monthly Avg = 95% delta-lognormal (for datasets with > 3 nondetects)

Outfall #	002	Description of Wastewater: Residential Wastewater
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration

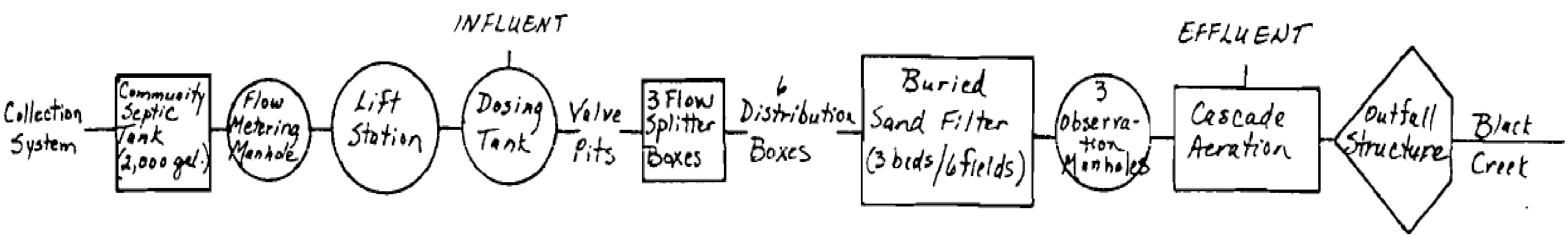
Effluent Parameter	Units	Averaging Period	Existing Discharge Data: Permit Limit	Existing Discharge Data: Existing Effluent Quality[7]	Existing Discharge Data: # of Data Points Detects / Non-Detects	TBELs: Limit	TBELs: Basis	Water Quality Data & WQBELs: Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL	ML	Basis for Permit Requirement
5-day Carboneous ous Biochemical Oxygen Demand ($CBOD_5$)	Summer mg/L	Daily Max	15	2.29 Actual Average	7/19	15	Antibacksliding	-	*Previous Permit UOD parameters assessed to verify that the minimum standards for Dissolved Oxygen of 4.0 mg/l minimum are maintained if* ***antibacksliding values*** *are selected as permit limits.*			*15*	703.3 DO	-	TBEL
	Winter mg/l	Daily Max	25	3.0 Actual Average	13/22	25	TOGS 1.3.3					*25*			
	Summer lbs/d	Daily Max	3.1	0.27 Actual Average	7/19	3.13	Antibacksliding					-			
	Winter lbs/d	Daily Max	5.2	0.57 Actual Average	11/24	5.21	TOGS 1.3.3					-			
	% Rem	Minimum	85	99.56 Actual Average	61/0	85%	TOGS 1.3.3					-			
	Consistent with the existing Permit limits for CBOD, the downstream DO concentration was modeled using the Streeter-Phelps equations in the RSAT model using the following assumptions: The downstream DO concentration was modeled using the Streeter-Phelps equations in a model using the following assumptions: ‘f factor’ of 2 from WQMP Summer Effluent DO = 0 mg/l, effluent and stream temps of 25 C (fromNY-2A) in summer, and CBOD5 = 15 Winter Effluent DO = 0, Effluent temp = 25C and stream temp = 10, and CBOD5 = 25 mg/l **TBEL =** Antibacksliding for CBOD5.														
Total Suspended Solids (TSS)	Summer mg/L	Daily Max	15	1.87 Actual Average	8/18	15	Antibacksliding	-	Narrative: None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.			-	703.2	-	TBEL
	Winter mg/l	Daily Max	30	20.73 99% Delta Log-Normal	10/25	30	TOGS 1.3.3								
	Summer lbs/d	Daily Max	3.1	0.14 Actual Average	08/18	3.13	Antibacksliding								
	Winter lbs/d	Daily Max	6.3	2.63 99% Delta Log-Normal	11/24	6.26	TOGS 1.3.3								
	% Rem	Minimum	85	99.54 95% Log-Normal	61/0	85%	TOGS 1.3.3								
	TBEL: Anti-backsliding requirements are specified in the CWA sections 402(o) and 303(d)(4), ECL 17-0809, and regulations at 40 CFR 122.44(*l*) and 6 NYCRR 750-1.10(c) and (d). These requirements are summarized in TOGS 1.2.1. Generally, the relaxation of effluent limitations in permits is prohibited unless one of the specified exceptions applies, which will be cited on a case-by-case basis in this factsheet. Antibacksliding for Summer TSS.														

Outfall #	002	**Description of Wastewater:** Residential Wastewater													
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration													
Effluent Parameter	Units	Averaging Period	Existing Discharge Data			TBELs		Water Quality Data & WQBELs						ML	Basis for Permit Requirement
			Permit Limit	Existing Effluent Quality[7]	# of Data Points Detects / Non-Detects	Limit	Basis	Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL		
Settleable Solids	mL/L	Daily Max	0.1	<0.1 Actual Average	<0.1	**0.1**	TOGS 1.3.3	Narrative: None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages				-	703.2	-	TBEL
	Consistent with TOGS 1.3.3 the effluent limitation is equal to the TBEL of 0.1 mL/L for POTWs providing secondary treatment and filtration. Given that adequate dilution is available the TBEL is reasonably protective of the WQS.														
Nitrogen, Ammonia (as N) June 1st – Oct. 31st	mg/L	Daily Max	8 As NH_3	5.72 99% Log-Normal	25/1	-	-	0.1	0.9 As N	1.2 As N	8 mg/l NH3 = 6.6 mg/l ammonia as N. This value used for DO assessment.			-	WQBEL
	The original permit limit for ammonia of 8 mg/l as NH3 = 6.6 mg/l ammonia as N. this value was used for the NOD portion of the DO sag curve assessment.														
Nitrogen, Ammonia (as N) Nov. 1st – May 31st	mg/L	Daily Max	15 As NH_3	3.05 Actual Average	35/0	-	-	0.1	1.6 As N	1.8 As N	15 mg/l NH3 = 12.3 mg/l ammonia as N. This value used for DO assessment.			-	WQBEL
	The original permit limit for ammonia of 8 mg/l as NH3 = 12.3 mg/l ammonia as N. this value was used for the NOD portion of the DO sag curve assessment														
Mercury	ng/L	Select	-	-	-	-	-	-	-	0.7	H(FC)	0.7	-	-	MDV
	To minimize the potential for a discharge of mercury, a Mercury Minimization Program for Low Priority POTWs is being added to the permit.														
Coliform, Fecal	#/100 ml	30d Geo Mean	200	-	-	**200**	TOGS 1.3.3	-	Narrative: The monthly geometric mean, from a minimum of five examinations, shall not exceed 200.				703.4	-	TBEL
		7d Geo Mean	400	-	-	**400**	TOGS 1.3.3	-							
	Consistent with TOGS 1.3.3, effluent disinfection is required seasonally from May 1st - October 31st, due to the class of the receiving waterbody. Fecal coliform limits equal to the TBEL are specified.														
Copper (9.3 ug/l) and Zinc (11.0 ug/l) were detected in the lab results for the Application but were not of such quantity to have a reasonable potential for exceeding ambient guidelines.															

Outfall #	002	**Description of Wastewater:** Residential Wastewater
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration

Effluent Parameter	Units	Averaging Period	Existing Discharge Data			TBELs		Water Quality Data & WQBELs						ML	Basis for Permit Requirement
			Permit Limit	Existing Effluent Quality[7]	# of Data Points Detects / Non-Detects	Limit	Basis	Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL		
Phosphorus	Mg/l	One sample	NA	2.8 Fr. NY-2A	1						Narrative		703.2 or TMDL	-	No limit until TMDL is Approved
	There is no ambient concentration specified for class C water beyond the narrative defining an impairment, and since the Phosphorus TMDL for Black Creek has not been finalized and approved by EPA there is no TMDL WLA for Phosphorus from this discharge presently. Should the TMDL be finalized and approved a WLA may be imposed at that time. If the Current (now on the DEC Website) Phosphorus TMDL for Black Creek is submitted and approved, the WLA for South Byron (Outfall 002) will be 0.8 lbs/day loading.														
Total Residual Chlorine	mg/L	Daily Max	-	-	-	2.0	TOGS 1.3.3	-	0.005	0.005	A(C)	**0.040**	TOGS 1.1.1	-	WQBEL
	Seasonal effluent disinfection is being added to the permit. The WQBEL was calculated by multiplying the WQS by the chronic dilution ratio. Due to the low dilution, the calculated WQBEL is less than the TBEL and an effluent limitation equal to the WQBEL is appropriate.														

OUTFALL 002
Hamlet of South Byron



Outfall 003

Outfall #	003	Description of Wastewater: Residential Wastewater													
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration													
Effluent Parameter	Units	Averaging Period	Existing Discharge Data			TBELs		Water Quality Data & WQBELs						ML	Basis for Permit Requirement
			Permit Limit	Existing Effluent Quality[8]	# of Data Points Detects / Non-Detects	Limit	Basis	Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL		
General Notes: Existing discharge data from 8/2014 to 8/2019 was obtained from Discharge Monitoring Reports provided on EPA ICIS.															
Flow Rate	MGD	Select	0.006	0.0037 Actual Average	59/0	0.006	Design Flow	Narrative: No alterations that will impair the waters for their best usages.					703.2	-	TBEL
	Consistent with TOGS 1.3.3, a monthly average flow limitation equal to the average daily design capacity of the treatment plant is specified.														
pH	SU	Minimum	6.5	7.5 Actual Average	61/0	6.0	TOGS 1.3.3	-	**6.5-8.5**	6.5 – 8.5	Range	6.5 - 8.5	703.3	-	WQBEL
		Maximum	8.5	7.82 Actual Average	60/0 Note: Removed 1 outlier	9.0									
	The WQBEL based on Class C stream standards														
Temperature	°C	Daily Max	**Monitor**	14.79 Actual Average	61/0	-	-	-	Narrative (Non-Trout): The water temperature at the surface of a stream shall not be raised to more than 90F at any point and... shall not be raised or lowered to more than 5F over the temperature that existed before the addition				704.2	-	Monitor
	Monitoring is required for process control and informational purposes														
Dissolved Oxygen	mg/L	Daily Min	-	-	-	-	-	-	S/W = 5.2/8.1 Critical Point	(Non-Trout) 4.0 mg/L	Narrative	4.0 min	703.3	-	WQBEL
(DO)	The downstream DO concentration was modeled using the Streeter-Phelps equations in a model using the following assumptions: 'f factor of 2' from WQMP Summer Effluent DO = 0 mg/l, assumed stream temp of 25 C in summer, and CBOD5 = 15 and 6.6 mg/l ammonia as N = 48.3 mg/l NOD Winter Effluent DO = 0, stream temp = 10C, and CBOD5 = 25 mg/l and 12.4 mg/l ammonia as N = 90.7 mg/l NOD														

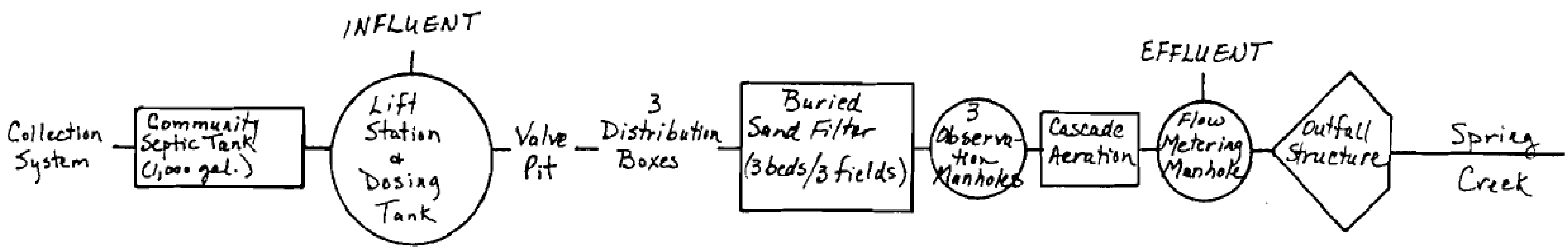
[8] Existing Effluent Quality: Daily Max = 99% lognormal; Monthly Avg = 95% lognormal (for datasets with ≤ 3 nondetects);.Daily Max = 99% delta-lognormal; Monthly Avg = 95% delta-lognormal (for datasets with > 3 nondetects)

Outfall #	003	Description of Wastewater: Residential Wastewater
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration

Effluent Parameter	Units	Averaging Period	Existing Discharge Data: Permit Limit	Existing Discharge Data: Existing Effluent Quality[8]	Existing Discharge Data: # of Data Points Detects / Non-Detects	TBELs: Limit	TBELs: Basis	Water Quality Data & WQBELs: Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL	ML	Basis for Permit Requirement
5-day Carbonecous Biochemical Oxygen Demand (CBOD$_5$)	Summer mg/L	Daily Max	15	4.67 Actual Average	9/17	15	Antibacksliding	-	*Previous Permit UOD parameters assessed to verify that the minimum standards for Dissolved Oxygen of 4.0 mg/l minimum are maintained if **antibacksliding values** are selected as permit limits.*			15	703.3 DO	-	TBEL
	Winter mg/L	Daily Max	25	3.75 Actual Average	12/23	25	TOGS 1.3.3					25			
	Summer lbs/d	Daily Max	0.8	0.075 Actual Average	10/16	0.75	Antibacksliding					-			
	Winter lbs/d	Daily Max	1.3	0.16 Actual Average	13/5	1.26	TOGS 1.3.3					-			
	% Rem	Minimum	85	99.44 Actual Average	61/0	85%	TOGS 1.3.3					-			
	Consistent with the existing Permit limits for CBOD, the downstream DO concentration was modeled using the Streeter-Phelps equations in the RSAT model using the following assumptions: The downstream DO concentration was modeled using the Streeter-Phelps equations in a model using the following assumptions: ‘f factor’ of 2 from WQMP Summer Effluent DO = 0 mg/l, effluent and stream temps of 25 C (fromNY-2A) in summer, and CBOD5 = 15 Winter Effluent DO = 0, Stream Temp = 10, and CBOD5 = 25 mg/l Antibacksliding for Summer CBOD5.														
Total Suspended Solids (TSS)	Summer mg/L	Daily Max	15	2.44 Actual Average	9/17	15	Antibacksliding	-	Narrative: None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.			-	703.2	-	TBEL
	Winter mg/L	Daily Max	30	6.05 99% Delta Log-Normal	10/25	30	TOGS 1.3.3								
	Summer lbs/d	Daily Max	0.8	0.037 Actual Average	9/17	0.75	Antibacksliding								
	Winter lbs/d	Daily Max	1.5	0.27 99% Delta Log-Normal	10/25	1.5	TOGS 1.3.3								
	% Rem	Minimum	85	99.54 95% Log-Normal	61/0	85%	TOGS 1.3.3								
	TBEL: Anti-backsliding requirements are specified in the CWA sections 402(o) and 303(d)(4), ECL 17-0809, and regulations at 40 CFR 122.44(*l*) and 6 NYCRR 750-1.10(c) and (d). These requirements are summarized in TOGS 1.2.1. Generally, the relaxation of effluent limitations in permits is prohibited unless one of the specified exceptions applies, which will be cited on a case-by-case basis in this factsheet Antibacksliding for Summer TSS.														

Outfall #	003	**Description of Wastewater:** Residential Wastewater													
		Type of Treatment: Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration													
Effluent Parameter	Units	Averaging Period	Existing Discharge Data			TBELs		Water Quality Data & WQBELs						ML	Basis for Permit Requirement
			Permit Limit	Existing Effluent Quality[8]	# of Data Points Detects / Non-Detects	Limit	Basis	Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL		
Settleable Solids	mL/L	Daily Max	0.1	<0.1 Actual Average	<0.1	0.1	TOGS 1.3.3	Narrative: None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages					703.2	-	TBEL
	Consistent with TOGS 1.3.3 the effluent limitation is equal to the TBEL of 0.1 mL/L for POTWs providing secondary treatment and filtration. Given that adequate dilution is available the TBEL is reasonably protective of the WQS.														
Nitrogen, Ammonia (as N) June 1st – Oct. 31st	mg/L	Daily Max	8 As NH_3	2.05 99% Log-Normal	15/11	6.6 As N	Antibacksliding	0.1 assumed	0.49 As N	1.2 As N	A(C)	23	TOGS 1.1.1	-	TBEL
	The original ammonia of 8 mg/l as NH3 = 6.6 mg/l ammonia as N. This assumed a DO minimum concentration of 0 mg/l for the DO sag. It further assumes that dilution that includes the upstream permitted discharge into Spring Creek for the toxicity dilutions assessment using the TOGS 1.1.1 from a winter pH of 7.5 and a temperature of 25C. … (In stream conc = 6.6/22.8 + 0.1 background)														
Nitrogen, Ammonia (as N) Nov. 1st – May 31st	mg/L	Daily Max	15 As NH_3	2.16 Actual Average	24/11	11.4 As N	Antibacksliding	0.1 assumed	0.64 As N	1.8 As N	A(C)	39	TOGS 1.1.1	-	TBEL
	The WQS for Ammonia was determined from TOGS 1.1.1 from a winter pH of 7.5 and a temperature of 10C. The WQBEL of 1.8-.01 x 22.8 = 39 mg/l as N The antibacksliding value of ammonia when converted to N, 11.4 ammonia as N limit models as causing an acceptable minimum stream DO. (In stream conc = 12.3 / 22.8 + 0.1 background)														
Mercury	ng/L	Select	-	-	-	-	-	-	-	0.7	H(FC)	0.7	-	-	MDV
	To minimize the potential for a discharge of mercury, a Mercury Minimization Program for Low Priority POTWs is being added to the permit.														
Coliform, Fecal	#/100 ml	30d Geo Mean	-	-		200	TOGS 1.3.3	-	Narrative: The monthly geometric mean, from a minimum of five examinations, shall not exceed 200.				703.4	-	TBEL
		7d Geo Mean	-	-		400	TOGS 1.3.3	-							
	Consistent with TOGS 1.3.3, effluent disinfection is required seasonally from May 1st - October 31st, due to the class of the receiving waterbody. Fecal coliform limits equal to the TBEL are specified.														
Copper (15.9 ug/l) was detected in the lab results for the Application, but was not of such quantity to indicate a reasonable potential for exceeding ambient guidelines															

Outfall #	003	**Description of Wastewater:** Residential Wastewater **Type of Treatment:** Community septic system, dosing tank, distribution boxes, buried sand filters, and cascade aeration													
Effluent Parameter	Units	Averaging Period	Existing Discharge Data			TBELs		Water Quality Data & WQBELs						ML	Basis for Permit Requirement
			Permit Limit	Existing Effluent Quality[8]	# of Data Points Detects / Non-Detects	Limit	Basis	Ambient Bkgd. Conc.	Projected Instream Conc.	WQ Std. or GV	WQ Type	Calc. WQBEL	Basis for WQBEL		
Total Residual Chlorine	mg/L	Daily Max	-	-	-	2.0	TOGS 1.3.3	-	-	0.005	A(C)	**0.10**	TOGS 1.1.1	-	WQBEL
	Seasonal effluent disinfection is being added to the permit. The WQBEL was calculated by multiplying the WQS by the chronic dilution ratio. Due to the low dilution, the calculated WQBEL is less than the TBEL and an effluent limitation equal to the WQBEL is appropriate.														



Appendix: Regulatory and Technical Basis of Permit Authorizations

The information presented in the Appendix is meant to supplement the factsheet for multiple types of permits and may not be applicable to this specific permit.

Regulatory References

The requirements included in SPDES permits are based on both federal and state laws, regulations, policies, and guidance.

- Clean Water Act (CWA) 33 section USC 1251 to 1387
- Environmental Conservation Law (ECL) Articles 17 and 70
- Federal Regulations
  - 40 CFR, Chapter I, subchapters D, N, and O
- State environmental regulations
  - 6 NYCRR Part 621
  - 6 NYCRR Part 750
  - 6 NYCRR Parts 700 - 704 – Best use and other requirements applicable to water classes
  - 6 NYCRR Parts 800 – 941 - Classification of individual surface waters
- NYSDEC water program policy, often referred to as Technical and Operational Guidance Series memos (TOGS)
- USEPA Office of Water Technical Support Document for Water Quality-based Toxics Control, March 1991, Appendix E

The following is a quick guide to the references used within the factsheet:

SPDES Permit Requirements	Regulatory Reference
Anti-backsliding	6 NYCRR 750-1.10(c)
Best Management Practices (BMPS) for CSOs	6 NYCRR 750-2.8(a)(2)
Environmental Benefits Permit Strategy (EBPS)	6 NYCRR 750-1.18, NYS ECL 17-0817(4), TOGS 1.2.2 (revised January 25,2012)
Exceptions for Type I SSO Outfalls (bypass)	6 NYCRR 750-2.8(b)(2), 40 CFR 122.41
Mercury Multiple Discharge Variance	Division of Water Program Policy 1.3.10 (TOGS 1.3.10)
Mixing Zone and Critical Water Information	TOGS 1.3.1 & Amendments
PCB Minimization Program	40 CFR Part 132 Appendix F Procedure 8, 6 NYCRR 750-1.13(a) and 750-1.14(f), and TOGS 1.2.1
Pollutant Minimization Program (PMP)	6 NYCRR 750-1.13(a), 750-1.14(f), TOGS 1.2.1
Schedules of Compliance	6 NYCRR 750-1.14
Sewage Pollution Right to Know (SPRTK)	NYS ECL 17-0826-a, 6 NYCRR 750-2.7
State Administrative Procedure Act (SAPA)	State Administrative Procedure Act Section 401(2), 6 NYCRR 621.11(l)
State Environmental Quality Review (SEQR)	6 NYCRR Part 617
USEPA Effluent Limitation Guidelines (ELGs)	40 CFR Parts 405-471
USEPA National CSO Policy	33 USC Section 1342(q)
Whole Effluent Toxicity (WET) Testing	TOGS 1.3.2
General Provisions of a SPDES Permit Department Request for Additional Information	NYCRR 750-2.1(i)

The provisions of the permit are based largely upon 40 CFR 122 subpart C and 6 NYCRR Part 750 and include monitoring, recording, reporting, and compliance requirements, as well as general conditions applicable to all SPDES permits.

Outfall and Receiving Water Information

Impaired Waters

The NYS 303(d) List of Impaired/TMDL Waters (http://www.dec.ny.gov/chemical/31290.html) identifies waters where specific designated uses are not fully supported and for which the state must consider the development of a TMDL or other strategy to reduce the input of the specific pollutant(s) that restrict waterbody uses, in order to restore and protect such uses. SPDES permits must include effluent limitations necessary to implement a WLA of an EPA-approved TMDL (6 NYCRR 750-1.11(a)(5)(ii)), if applicable. In accordance with 6 NYCRR 750-1.13(a), permittees discharging to waters which are on the list but do not yet have a TMDL developed may be required to perform additional monitoring for the parameters causing the impairment. Accurate monitoring data is needed for the development of the TMDL, and to allow the Department to accurately determine the existing capabilities of the wastewater treatment plant to assure that wasteload allocations (WLAs) are allocated equitably.

Existing Effluent Quality

During development of the permit, a statistical evaluation of existing effluent quality is performed to calculate the 95th (monthly average) and 99th (daily maximum) percentiles of the existing effluent quality. That evaluation is completed in accordance with TOGS 1.2.1 and the USEPA Office of Water Technical Support Document for Water Quality-based Toxics Control, March 1991, Appendix E. When there are three or fewer non-detects, a lognormal distribution of the data is assumed, and lognormal calculations are used to determine the monthly average and daily maximum concentrations of the existing effluent. When there are greater than three non-detects, a delta-lognormal distribution is assumed, and delta-lognormal calculations are used to determine the monthly average and daily maximum pollutant concentrations. Statistical calculations are not performed for parameters where there are less than ten data points. If additional data is needed, a monitoring requirement may be specified either through routine monitoring or a short-term high intensity monitoring program. The Pollutant Summary Table identifies the number of sample data points available.

Permit Requirements

Basis for Effluent Limitations

Sections 101, 301, 304, 308, 401, 402, and 405 of the CWA and Titles 5, 7, and 8 of Article 17 ECL, as well as their implementing federal and state regulations, and related guidance, provide the basis for the effluent limitations and other conditions in the permit.

When conducting a full technical review of an existing permit, the previous permit limitations form the basis for the next permit. Existing effluent quality is evaluated against the existing permit limitations to determine if these should be continued, revised, or deleted. Generally, existing limitations are continued unless there are changed conditions at the facility, the facility demonstrates an ability to meet more stringent limitations, and/or in response to updated regulatory requirements. Pollutant monitoring data is also reviewed to determine the presence of additional contaminants that should be included in the permit based on a reasonable potential analysis to cause or contribute to a water quality standards violation.

Anti-backsliding

Anti-backsliding requirements are specified in the CWA sections 402(o) and 303(d)(4), ECL 17-0809, and regulations at 40 CFR 122.44(*l*) and 6 NYCRR 750-1.10(c) and (d). These requirements are summarized in TOGS 1.2.1. Generally, the relaxation of effluent limitations in permits is prohibited unless one of the specified exceptions applies, which will be cited on a case-by-case basis in this factsheet.

Antidegradation Policy

New York State implements the antidegradation portion of the CWA based upon two documents: (1) Organization and Delegation Memorandum #85-40, "Water Quality Antidegradation Policy" (September 9, 1985); and, (2) TOGS 1.3.9, "Implementation of the NYSDEC Antidegradation Policy – Great Lakes Basin (Supplement to Antidegradation Policy dated September 9, 1985) (undated)." The permit for the facility contains effluent limitations which ensure that the existing best usage of the receiving waters will be maintained. To further support the antidegradation policy, SPDES applications have been reviewed in accordance with the State Environmental Quality Review Act (SEQR) as prescribed by 6 NYCRR Part 617.

Effluent Limitations

In developing a permit, the Department determines the technology-based effluent limitations (TBELs) and then evaluates the water quality expected to result from technology controls to determine if any exceedances of water quality criteria in the receiving water might result. If there is a reasonable potential for exceedances of water quality criteria to occur, water quality-based effluent limitations (WQBELs) are developed. A WQBEL is designed to ensure that the water quality standards of receiving waters are met. In general, the CWA requires that the effluent limitations for a particular pollutant are the more stringent of either the TBEL or WQBEL.

Technology-based Effluent Limitations (TBELs)

CWA sections 301(b)(1)(B) and 304(d)(1), 40 CFR 133.102, ECL section 17-0509, and 6 NYCRR 750-1.11 require technology-based controls, known as secondary treatment. These and other requirements are summarized in TOGS 1.3.3. Equivalent secondary treatment, as defined in 40 CFR 133.105, allow for effluent limitations of the more stringent of the consistently achievable concentrations or monthly/weekly averages of 45/65 mg/l, and the minimum monthly average of at least 65% removal. Consistently achievable concentrations are defined in 40 CFR 133.101(f) as the 95th percentile value for the 30-day (monthly) average effluent quality achieved by the facility in a period of two years. The achievable 7-day (weekly) average value is equal to 1.5 times the 30-day average value calculated above. Equivalent secondary treatment applies to those facilities where the principal treatment process is either a trickling filter or a waste stabilization pond; the treatment works provides significant biological treatment of municipal wastewater; and, the effluent concentrations consistently achievable through proper operation and maintenance of the facility cannot meet traditional secondary treatment requirements.

Other Technology Based Effluent Limitations:

There are no federal technology-based standards for toxic pollutants from POTWs. For each toxic parameter present in the discharge a Reasonable Potential Analysis is conducted. This may be a statistical analysis of existing data in accordance with TOGS 1.2.1, or an assessment of the technology employed at the facility and selection of the appropriate limitation from TOGS 1.2.1 Attachment C. Where the TBEL is more stringent than the WQBEL, the TBEL is applied as an action level in accordance with TOGS 1.3.3.

Water Quality-Based Effluent Limitations (WQBELs)

In addition to the TBELs, permits must include additional or more stringent effluent limitations and conditions, including those necessary to protect water quality. CWA sections 101 and 301(b)(1)(C), 40 CFR 122.44(d)(1), and 6 NYCRR Parts 700-704 and 750-1.11 require that permits include limitations for all pollutants or parameters which are or may be discharged at a level which may cause or contribute to an exceedance of any State water quality standard adopted pursuant to NYS ECL 17-0301. The limitations must be stringent enough to ensure that water quality standards are met and must be consistent with any applicable WLA which may be in effect through a TMDL for the receiving water. These and other requirements are summarized in TOGS 1.1.1, 1.3.1, 1.3.2, 1.3.5 and 1.3.6.

Mixing Zone Analyses

Mixing zone analyses are conducted in accordance with the following documents: "EPA Technical Support Document for Water Quality-Based Toxics Control," (March 1991); EPA Region VIII's "Mixing Zones and Dilution Policy", (December 1994); NYSDEC TOGS 1.3.1, "Total Maximum Daily Loads and Water Quality-Based Effluent Limitations" (July 1996).

Critical Flows

In accordance with TOGS 1.2.1 and 1.3.1, water quality-based effluent limitations are developed using dilution ratios that relate the critical low flow condition of the receiving waterbody to the critical effluent flow. The critical low flow condition used in the dilution ratio will be different depending on whether the limitations are for aquatic or human health protection. For chronic aquatic protection, the critical low flow condition of the waterbody is typically represented by the 7Q10 flow and is calculated as the lowest average flow over a 7-day consecutive period within 10 years. For acute aquatic protection, the critical low flow condition is typically represented by the 1Q10 and is calculated as the lowest 1-day flow within 10 years. However, NYSDEC considers using 50% of the 7Q10 to be equivalent to the 1Q10 flow. For the protection of human health, the critical low flow condition is typically represented by the 30Q10 flow and is calculated as the lowest average flow over a 30-day consecutive period within 10 years. However, NYSDEC considers using 1.2 x 7Q10 to be equivalent to the 30Q10. The 7Q10 or 30Q10 flow is used with the critical effluent flow to calculate the dilution ratio. The critical effluent flow can be the maximum daily flow reported on the permit application, the maximum of the monthly average flows from discharge monitoring reports for the past three years, or the facility design flow.

Reasonable Potential Analysis (RPA)

The Reasonable Potential Analysis (RPA) is a statistical estimation process, outlined in the 1991 USEPA Technical Support Document for Water Quality-based Toxics Control (TSD), Appendix E. This process uses existing effluent quality data and statistical variation methodology to project the maximum amounts of pollutants that could be discharged by the facility. This projected instream concentration (PIC) is calculated using the appropriate ratio and compared to the water quality standard (WQS). When the RPA process determines the WQS may be exceeded, a WQBEL is required. The procedure for developing WQBELs includes the following steps:

1) identify the pollutants present in the discharge(s) based upon existing data, sampling data collected by the permittee as part of the permit application or a short-term high intensity monitoring program, or data gathered by the Department;

2) identify water quality criteria applicable to these pollutants;

3) determine if WQBELs are necessary (i.e. reasonable potential analysis (RPA)). The RPA will utilize the procedure outlined in Chapter 3.3.2 of EPA's Technical Support Document (TSD). As outlined in the TSD, for parameters with limited effluent data the RPA may include multipliers to account for effluent variability; and,

4) calculate WQBELs (if necessary). Factors considered in calculating WQBELs include available dilution of effluent in the receiving water, receiving water chemistry, and other pollutant sources.

The Department uses the following modeling tools to estimate the expected concentrations of the pollutant in the receiving water and develop WQBELs. These tools were developed in part using the methodology referenced above. If the estimated concentration of the pollutant in the receiving water is expected to exceed the ambient water quality standard or guidance value, then there is a reasonable potential that the discharge may cause or contribute to an exceedance of any State water quality standard adopted pursuant to NYS ECL 17-0301. If a TMDL is in place, the facility's WLA for that pollutant is applied as the WQBEL.

- RSAT: The River Based Effluent Limitation Screening Analysis Tool (RSAT) was developed by the Department for determining WQBELs for point sources discharging to freshwater streams. The model considers both non-conservative oxygen demanding pollutants and conservative toxic pollutants;

- PonSAT: The Ponded Waterbody Based Effluent Limitation Screening Analysis Tool (PonSAT) was developed by the Department for determining WQBELs for point sources discharging to freshwater ponded waterbodies. The model considers both non-conservative oxygen demanding pollutants and conservative toxic pollutants;

- CORMIX: Cornell University along with USEPA developed this hydrodynamic mixing zone model and decision support system for pollutant discharges into oceans, rivers, lakes, and estuaries based upon facility specific discharge and receiving water data. The model considers both non-conservative oxygen demanding pollutants and conservative toxic pollutants.

Additional information regarding the use and inputs to RSAT and PonSAT may be found in the User's Manuals for RSAT and PonSAT.

Whole Effluent Toxicity (WET) Testing:

WET tests use small vertebrate and invertebrate species to measure the aggregate toxicity of an effluent. There are two different durations of toxicity tests: acute and chronic.

Acute toxicity tests measure survival over a 96-hour test exposure period. Chronic toxicity tests measure reductions in survival, growth, and reproduction over a 7-day exposure. TOGS 1.3.1 includes guidance for determining when aquatic toxicity testing should be included in SPDES permits. The authority to require toxicity testing is in Part 702.16(b) of Chapter X, Title 6 of the New York State Codes, Rules, and Regulations. TOGS 1.3.2 describes the procedures which should be followed when determining whether to include toxicity testing in a SPDES permit and how to implement a toxicity testing program. Per TOGS 1.3.2, WET testing may be required when any one of the following seven criteria are applicable:

1. There is the presence of substances in the effluent for which ambient water quality criteria do not exist.
2. There are uncertainties in the development of TMDLs, WLAs, and WQBELs, caused by inadequate ambient and/or discharge data, high natural background concentrations of pollutants, available treatment technology, and other such factors.
3. There is the presence of substances for which WQBELs are below analytical detectability.
4. There is the possibility of complex synergistic or additive effects of chemicals, typically when the number of metals or organic compounds discharged by the permittee equals or exceeds five.
5. There are observed detrimental effects on the receiving water biota.
6. Previous WET testing indicated a problem.
7. POTWs which exceed a discharge of 1 MGD. Facilities of less than 1 MGD may be required to test, e.g., POTWs <1 MGD which are managing industrial pretreatment programs.

Minimum Level of Detection

Pursuant to 40 CFR 122.44(i)(1), SPDES permits must contain monitoring requirements using sufficiently sensitive test procedures approved under 40 CFR Part 136. A method is "sufficiently sensitive" when the method's minimum level (ML) is at or below the level of the effluent limitation established in the permit for the measured pollutant parameter; or the lowest ML of the analytical methods approved under 40 CFR Part 136. The ML represents the lowest level that can be measured within specified limitations of precision and accuracy during routine laboratory operations on most effluent matrices. When establishing effluent limitations for a specific parameter (based on technology or water quality requirements), it is possible that the calculated limitation will fall below the ML established by the approved analytical method(s). In these instances, the calculated limitation is included in the permit with a compliance level set equal to the ML of the most sensitive method.

Monitoring Requirements

CWA section 308, 40 CFR 122.44(i), and 6 NYCRR 750-1.13 require that monitoring be included in permits to determine compliance with effluent limitations. Additional effluent monitoring may also be required to gather data to determine if effluent limitations may be required. The permittee is responsible for conducting the monitoring and reporting results on Discharge Monitoring Reports (DMRs). The permit contains the monitoring requirements for the facility. Monitoring frequency is based on the minimum sampling necessary to adequately monitor the facility's performance and characterize the nature of the discharge of the monitored flow or pollutant. Variable effluent flows and pollutant levels may be required to be monitored at more frequent intervals than relatively constant effluent flow and pollutant levels (6 NYCRR 750-1.13). For industrial facilities, sampling frequency is based on guidance provided in TOGS 1.2.1. For municipal facilities, sampling frequency is based on guidance provided in TOGS 1.3.3; Appendix A

Other Conditions

Mercury

The DOW Program Policy 1.3.10, Mercury SPDES permitting and Multiple Discharge Variance (MDV) (TOGS 1.3.10) was developed in accordance with 6 NYCRR 702.17(h) and approved by EPA in October 2015. The MDV is necessary because human caused conditions or sources of mercury prevent attainment of the water quality standard and cannot be remedied, i.e., mercury is ubiquitous in New York waters at levels above the water quality standard and compliance with WQBELs for mercury cannot be achieved with demonstrated treatment technologies. The MDV will result in reasonable progress toward achieving the WQBEL by including meaningful, yet achievable, requirements in SPDES permits.

During the period where the MDV is applicable, the increased risks to human health are mitigated by fish consumption advisories issued periodically by both the NYS Department of Health and the United States Food and Drug Administration. Therefore, NYSDEC has determined that the MDV is consistent with the protection of the public health, safety, and welfare.

All surface water SPDES permittees are eligible for authorization by the MDV provided they meet the requirements specified in TOGS 1.3.10.

Schedules of Compliance

Schedules of compliance are included in accordance with 40 CFR Part 132 Attachment F, Procedure 9, 40 CFR 122.47 and 6 NYCRR 750-1.14. Schedules of compliance are intended to, in the shortest reasonable time, achieve compliance with applicable effluent standards and limitations, water quality standards, and other applicable requirements. Where the time for compliance is more than nine months, the schedule of compliance must include interim requirements and dates for their achievement. If the time necessary to complete the interim milestones is more than nine months, and not readily divisible into stages for completion, progress reports must be required.

Responsiveness Summary
SPDES NY0160971
Town of Byron WWTP

I. Permittee Comment: The Permittee requested that the pH, Temperature and Settleable Solids sampling frequency of 1/Day is reduced for Outfall 001, 002 and 003.

DEC Response: After evaluating the Town of Byron Permit again, as well as past data for pH, Temperature and Settleable solids at Outfall 001, 002 and 003, the Department agrees and has changed the pH, Temperature and Settleable Solids sampling frequency from 1/day to 5/week.

II. Permittee Comment: The Permittee requested that the "additional" sampling of pH, Temperature and SS is extended.

DEC Response: Since the Town of Byron has difficulty accessing Outfall 001, 002 and 003, and the engineer for the Town has added additional plans to pump the effluent to a safer sampling location when the disinfection project takes place, the Department has accepted the extension of sampling frequency of 5/week to take place when disinfection is due at the Town of Byron.

The Department has placed Interim Limits and Final Limits in the Permit. Interim Limits will include pH, Temperature and Settable Solids to be measured 1/week for Outfall 001, 002 and 003. DO requirements for Outfall 001 will not be required during the Interim. Disinfection limits (Total Residual Chlorine and Fecal Coliform) will also not be required in the Interim.

The Final Limits in the Permit will take place in May of 2025, when Disinfection is due. The Final Limits include pH, Temperature and Settable Solids to be measured 5/Week, Do requirements at Outfall 001, and Total Residual Chlorine and Fecal Coliform Limits.

The Department has included an Interim Monitoring Location and Final Monitoring Location for the Town of Byron. When the Disinfection project takes place, the Town of Byron will change the effluent Monitoring locations for Outfall001, 002 and 003, to the Final Monitoring Location, as described above.

APPENDIX C

DISCHARGE MONITORING REPORTS
MONTHLY SUMMARY

2018 - 2021 MONTH - Outfall 001

Date	Flow (MGD)	Inf. Temp (deg-C)	Eff. Temp. (deg-C)	Inf. pH	Eff. pH	Inf. Set. Solids (ml/L)	Eff. Set. Solids (ml/L)	Inf. BOD (mg/L)	Eff. BOD (mg/L)	Inf. TSS (mg/L)	Eff. TSS (mg/L)	Inf. Ammonia (mg/L)	Eff. Ammonia (mg/L)
Min	0.011	7.3	6.8	7.1	6.7	0.0	0.0	33	0	13	0	14	0
Avg	0.025	13.1	12.8	7.4	7.0	0.0	0.0	61	2	36	3	38	5
Max	0.048	20.6	21.0	7.7	7.4	0.0	0.0	131.5	3.5	102.5	6.5	59.2	12.4
SD	0.009	4.6	4.9	0.1	0.1	0.0	0.0	18	1	17	1	11	3

Date	Flow (MGD)	Inf. Temp (deg-C)	Eff. Temp. (deg-C)	Inf. pH	Eff. pH	Inf. Set. Solids (ml/L)	Eff. Set. Solids (ml/L)	Inf. BOD (mg/L)	Eff. BOD (mg/L)	Inf. TSS (ml/L)	Eff. TSS (ml/L)	Inf. Ammonia (mg/L)	Eff. Ammonia (mg/L)
Jan-18	0.038	9	8	7.4	7.0	0.0	0.0	58	0	34	2	29	8
Feb-18	0.019	8	8	7.4	7.0	0.0	0.0	56	0	30	0	22	4
Mar-18	0.033	8	8	7.5	7.1	0.0	0.0	72	0	28	0	30	6
Apr-18	0.042	9	9	7.6	7.0	0.0	0.0	33	2	17	2	14	6
May-18	0.024	14	14	7.3	7.0	0.0	0.0	78	0	37	5	40	6
Jun-18	0.019	16	16	7.2	6.8	0.0	0.0	69	0	50	0	51	5
Jul-18	0.018	19	19	7.2	6.8	0.0	0.0	58	0	55	0	55	7
Aug-18	0.020	21	21	7.3	6.9	0.0	0.0	36	0	48	0	37	5
Sep-18	0.019	20	20	7.3	6.9	0.0	0.0	54	0	60	2	51	1
Oct-18	0.021	17	17	7.5	6.9	0.0	0.0	57	0	64	0	41	1
Nov-18	0.033	12	11	7.5	7.0	0.0	0.0	62	4	34	0	41	2
Dec-18	0.032	10	10	7.5	7.0	0.0	0.0	46	0	29	0	37	4
Jan-19	0.032	8	8	7.5	7.1	0.0	0.0	45	0	28	3	26	3
Feb-19	0.048	7	7	7.4	7.1	0.0	0.0	38	0	13	0	20	4
Mar-19	0.030	8	7	7.5	7.1	0.0	0.0	63	0	23	0	31	6
Apr-19	0.034	9	10	7.5	7.1	0.0	0.0	56	0	25	0	33	9
May-19	0.032	12	12	7.3	6.9	0.0	0.0	53	2	17	0	22	8
Jun-19	0.023	15	15	7.3	6.8	0.0	0.0	102	0	103	0	35	5
Jul-19	0.019	19	20	7.3	7.0	0.0	0.0	76	0	40	0	44	12
Aug-19	0.016	20	20	7.3	6.9	0.0	0.0	49	0	36	0	46	8
Sep-19	0.019	19	18	7.4	7.2	0.0	0.0	55	0	34	0	29	2
Oct-19	0.026	16	15	7.4	7.0	0.0	0.0	67	0	43	0	39	3
Nov-19	0.028	13	12	7.5	7.0	0.0	0.0	45	0	23	0	28	3
Dec-19	0.035	9	9	7.5	7.1	0.0	0.0	51	0	25	0	26	4
Jan-20	0.031	8	7	7.7	7.4	0.0	0.0	63	0	24	0	31	1
Feb-20	0.032	8	8	7.7	7.2	0.0	0.0	52	0	26	0	30	6
Mar-20	0.028	9	8	7.5	7.2	0.0	0.0	52	0	22	0	25	6
Apr-20	0.027	10	10	7.4	7.0	0.0	0.0	52	2	26	7	36	9
May-20	0.022	12	13	7.5	6.8	0.0	0.0	132	0	37	0	40	7
Jun-20	0.017	17	18	7.4	6.9	0.0	0.0	62	0	32	0	50	12
Jul-20	0.018	20	20	7.1	6.9	0.0	0.0	59	0	56	0	44	2
Aug-20	0.011	21	21	7.2	6.7	0.0	0.0	76	0	33	0	53	4
Sep-20	0.012	19	19	7.2	6.9	0.0	0.0	63	0	50	3	47	0
Oct-20	0.015	16	15	7.4	7.0	0.0	0.0	53	0	41	0	54	0
Nov-20	0.016	14	13	7.5	6.9	0.0	0.0	58	0	56	0	59	1
Dec-20	0.022	10	9	7.5	7.0	0.0	0.0	63	3	32	0	56	4
Jan-21	0.017	9	8	7.6	6.9	0.0	0.0	84	0	24	0	38	5
Feb-21	0.021	8	7	7.5	6.9	0.0	0.0	68	0	26	1	42	7

2018 - 2021 MONTH - Outfall 002													
Date	**Flow (MGD)**	**Inf. Temp (deg-C)**	**Eff. Temp. (deg-C)**	**Inf. pH**	**Eff. pH**	**Inf. Set. Solids (ml/L)**	**Eff. Set. Solids (ml/L)**	**Inf. BOD (mg/L)**	**Eff. BOD (mg/L)**	**Inf. TSS (ml/L)**	**Eff. TSS (ml/L)**	**Inf. Ammonia (mg/L)**	**Eff. Ammonia (mg/L)**
Min	0.008	7.0	6.5	7.2	7.0	0.0	0.0	29	0	10	0	19	0
Avg	0.018	13.1	12.8	7.4	7.2	0.0	0.0	53	2	28	2	38	1
Max	0.031	20.8	21.0	7.6	7.4	0.0	0.0	145	3	63	3	58	8
SD	0.007	4.8	5.1	0.1	0.1	0.0	0.0	20	1	10	1	10	2

Date	Flow (MGD)	Inf. Temp (deg-C)	Eff. Temp. (deg-C)	Inf. pH	Eff. pH	Inf. Set. Solids (ml/L)	Eff. Set. Solids (ml/L)	Inf. BOD (mg/L)	Eff. BOD (mg/L)	Inf. TSS (ml/L)	Eff. TSS (ml/L)	Inf. Ammonia (mg/L)	Eff. Ammonia (mg/L)
Jan-18	0.025	9	8	7.4	7.1	0.0	0.0	75	0	37	0	30	1.7
Feb-18	0.031	9	8	7.5	7.2	0.0	0.0	51	0	24	0	27	1.9
Mar-18	0.026	8	7	7.5	7.3	0.0	0.0	95	0	30	0	26	1.3
Apr-18	0.027	8	8	7.5	7.2	0.0	0.0	40	0	16	0	19	1.8
May-18	0.017	14	14	7.3	7.1	0.0	0.0	61	0	41	2	38	1.8
Jun-18	0.014	17	17	7.2	7.1	0.0	0.0	90	0	51	0	51	0.8
Jul-18	0.015	19	19	7.4	7.2	0.0	0.0	145	0	38	0	58	0.3
Aug-18	0.019	21	20	7.3	7.1	0.0	0.0	37	0	29	0	38	0.1
Sep-18	0.018	20	20	7.3	7.1	0.0	0.0	50	0	37	0	48	0.1
Oct-18	0.020	18	17	7.4	7.1	0.0	0.0	55	0	63	3	42	0.2
Nov-18	0.026	12	11	7.5	7.2	0.0	0.0	41	2	21	0	35	0.2
Dec-18	0.025	11	10	7.4	7.2	0.0	0.0	45	0	30	0	35	0.6
Jan-19	0.025	8	7	7.4	7.2	0.0	0.0	44	0	21	0	43	1.9
Feb-19	0.031	7	7	7.5	7.2	0.0	0.0	37	0	19	0	19	0.9
Mar-19	0.027	8	7	7.5	7.2	0.0	0.0	68	0	13	0	33	1.6
Apr-19	0.026	10	9	7.4	7.2	0.0	0.0	54	0	10	0	30	1.5
May-19	0.023	12	12	7.3	7.1	0.0	0.0	48	2	28	0	27	7.7
Jun-19	0.019	15	16	7.3	7.0	0.0	0.0	52	0	38	0	38	5.7
Jul-19	0.017	19	19	7.2	7.0	0.0	0.0	46	0	40	0	48	2.5
Aug-19	0.017	20	21	7.2	7.1	0.0	0.0	58	0	32	0	51	0.0
Sep-19	0.019	19	19	7.3	7.3	0.0	0.0	53	0	28	0	51	0.0
Oct-19	0.023	16	15	7.4	7.2	0.0	0.0	43	0	28	0	40	0.0
Nov-19	0.025	13	12	7.5	7.3	0.0	0.0	29	0	30	0	27	0.0
Dec-19	0.013	10	9	7.5	7.3	0.0	0.0	43	0	36	0	31	0.3
Jan-20	0.012	8	7	7.6	7.4	0.0	0.0	40	0	14	0	30	1.9
Feb-20	0.013	7	7	7.6	7.3	0.0	0.0	42	0	31	3	26	0.8
Mar-20	0.013	9	8	7.5	7.3	0.0	0.0	47	0	20	0	28	0.5
Apr-20	0.013	10	9	7.4	7.1	0.0	0.0	40	0	18	0	31	1.5
May-20	0.011	13	13	7.4	7.1	0.0	0.0	46	0	32	0	34	1.2
Jun-20	0.008	18	18	7.3	7.2	0.0	0.0	58	3	29	0	51	0.7
Jul-20	0.009	20	21	7.2	7.1	0.0	0.0	45	0	22	0	42	0.0
Aug-20	0.008	21	21	7.2	7.3	0.0	0.0	48	0	23	2	53	0.0
Sep-20	0.009	19	19	7.3	7.3	0.0	0.0	47	0	23	2	50	0.1
Oct-20	0.011	16	15	7.4	7.3	0.0	0.0	41	0	26	0	45	0.0
Nov-20	0.019	14	13	7.5	7.3	0.0	0.0	49	0	32	0	52	0.0
Dec-20	0.009	10	9	7.5	7.3	0.0	0.0	38	3	27	0	41	0.2
Jan-21	0.011	8	7	7.5	7.2	0.0	0.0	61	0	27	0	37	0.6
Feb-21	0.011	8	7	7.6	7.2	0.0	0.0	49	0	21	0	36	1.0

APPENDIX D

EXISTING SITE PHOTOS, SITE PLANS AND PROFILES

Central Byron Parking Lot

Central Byron Controls

Central Byron Septic Tank

Central Byron Dosing Station

Central Byron Pump Station Controls

Central Byron Filter Beds

Central Byron Filter Beds

Central Byron Filter Beds

Central Byron Filter Beds

Central Byron Aeration Structure, Manhole, and Vents

Central Byron Discharge Point to Black Creek

Central Byron Effluent Observation MH and Vent

Central Byron Boundary Fence

Central Byron Boundary Fence

South Byron Entrance

South Byron Septic Tank, Pump Station, Etc.

South Byron Pump Plate

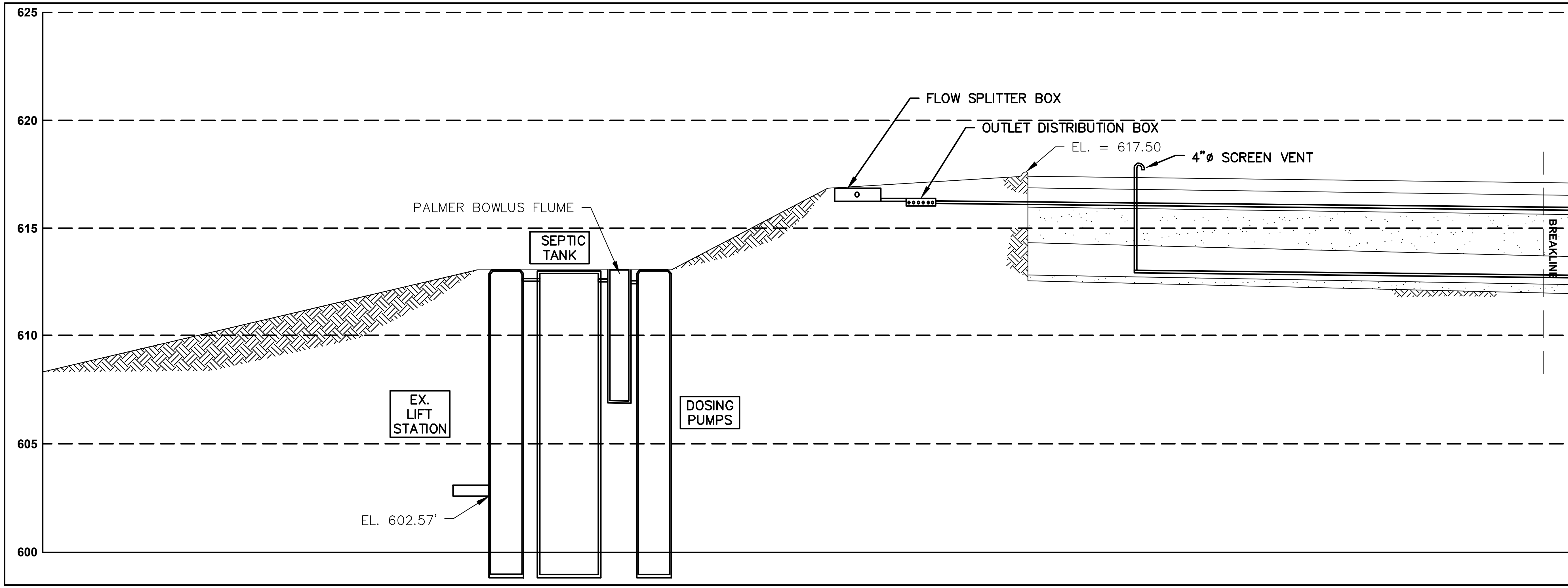
South Byron Controls

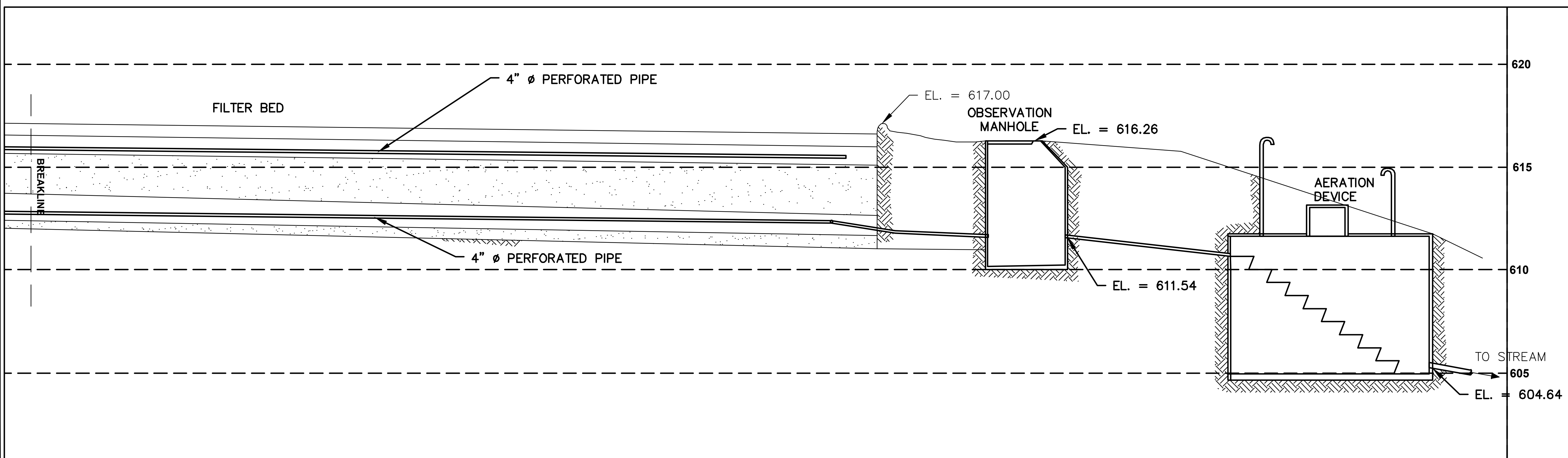
South Byron Filter Beds

South Byron Filter Beds

South Byron Filter Beds and Aeration Structure

South Byron Aeration Structure MH





DRAWING ALTERATION
THE FOLLOWING IS AN EXCERPT FROM THE NEW YORK EDUCATION LAW ARTICLE 145 SECTION 7209 AND APPLIES TO THIS DRAWING.
"IT IS A VIOLATION OF THIS LAW FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE SEAL OF AN ENGINEER OR LAND SURVEYOR IS ALTERED, THE ALTERING ENGINEER OR LAND SURVEYOR SHALL AFFIX TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION"

No.	REVISIONS AND DESCRIPTIONS	BY	DATE

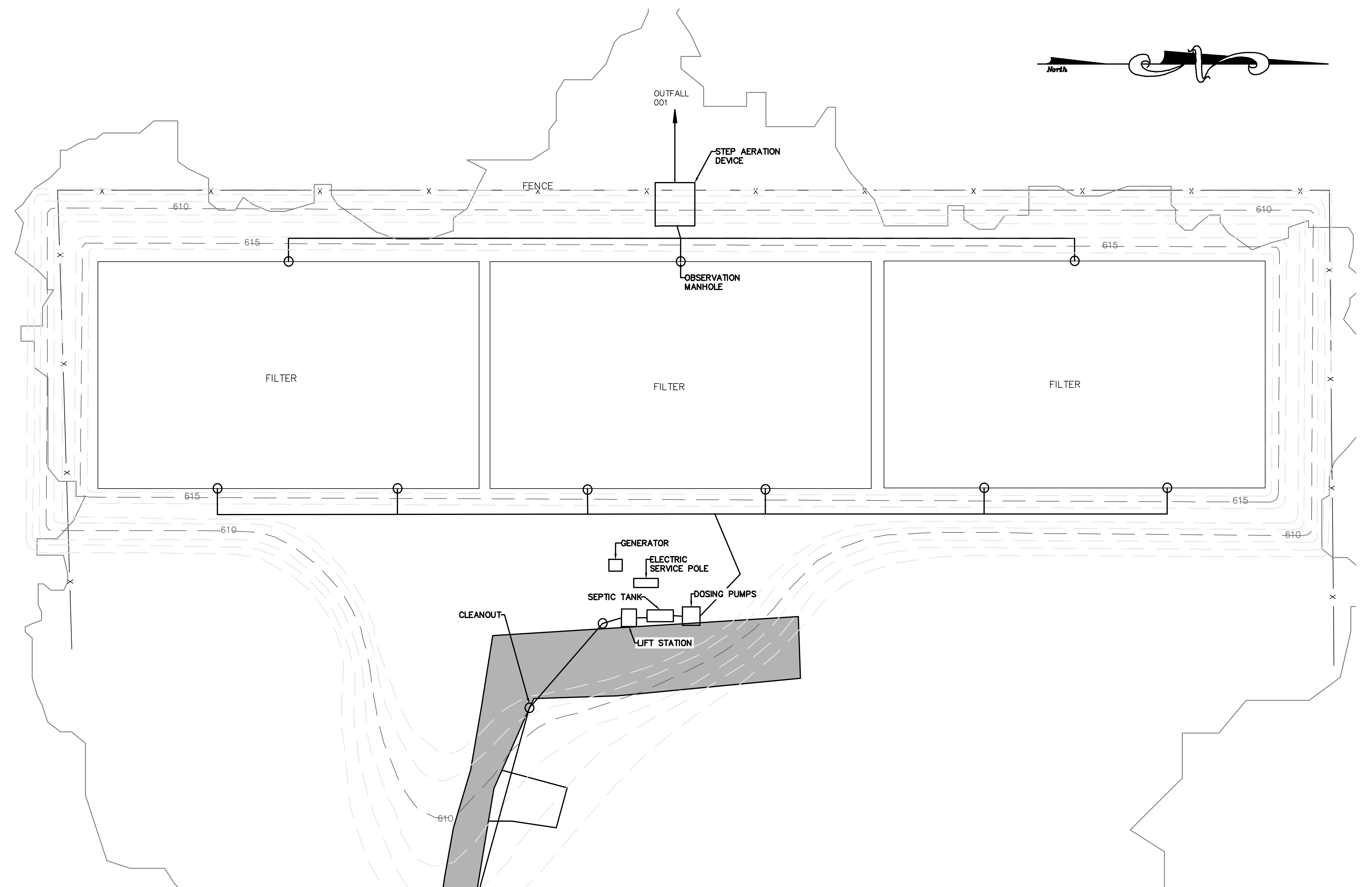
Project Title:
PRELIMINARY ENGINEERING REPORT
TOWN OF BYRON WWTP IMPROVEMENTS
GENESEE COUNTY, NEW YORK

Drawing Title:
EX. PROFILE (OUTFALL 001)

Drawn By: MPB
Checked By: JDH
Scale: N.T.S.
Date: JUNE 2022

MRB group
Engineering, Architecture & Surveying, D.P.C.
The Culver Road Armory, 145 Culver Road, Suite 160, Rochester, New York 14620
Phone: 585-381-9250
www.mrbgroup.com

Sheet No.
—— of ——
Project No.
0204.20001



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No.	REVISIONS AND DESCRIPTIONS	BY	DATE

Project Title:
PRELIMINARY ENGINEERING REPORT
TOWN OF BYRON WWTP IMPROVEMENTS
GENESEE COUNTY, NEW YORK

Drawing Title:
EXISTING SITE PLAN (OUTFALL 001)

Drawn By: MPB
Checked By: JDH
Scale: N.T.S.
Date: JUNE 2022

MRB group
Engineering, Architecture & Surveying, D.P.C.
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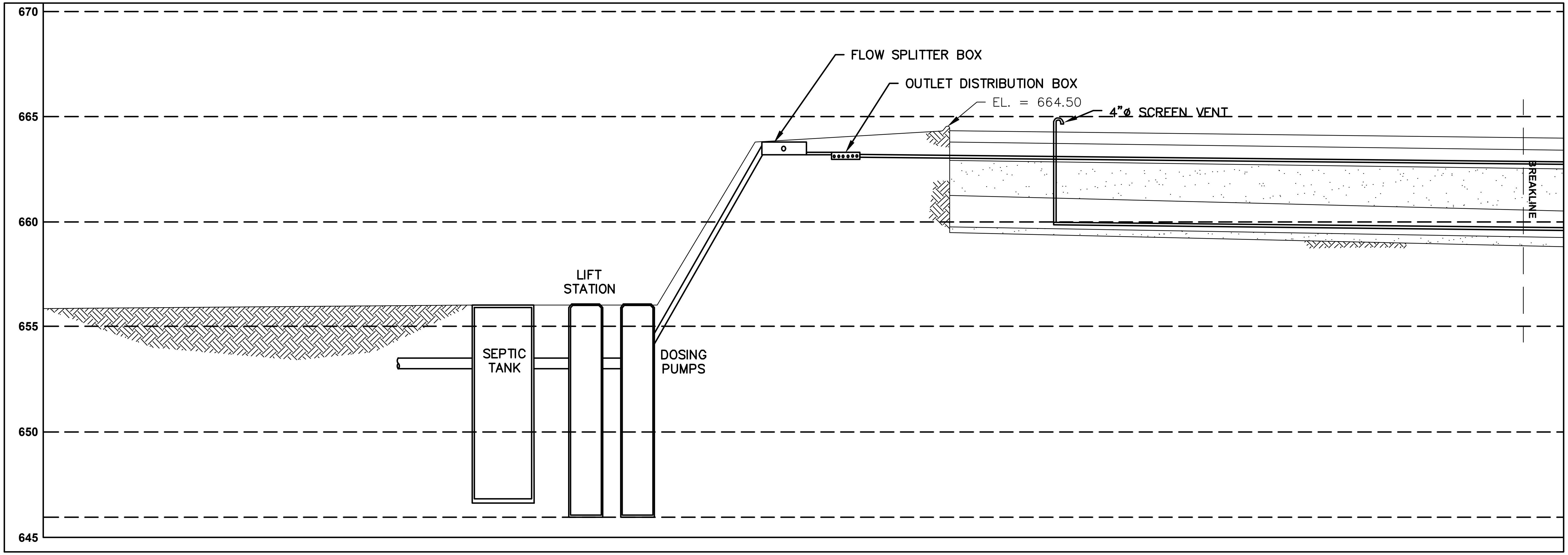
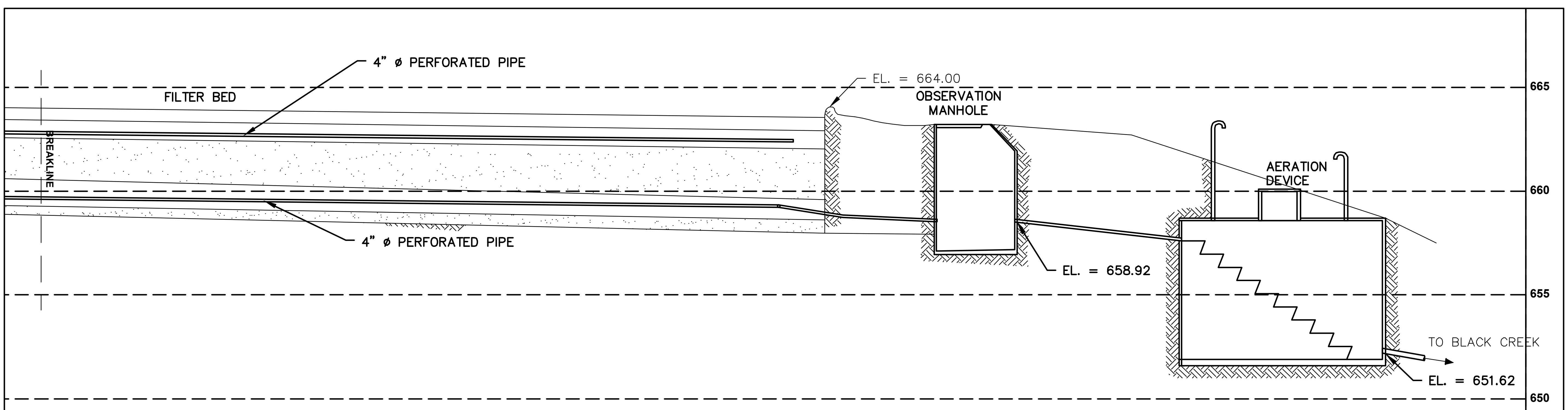
Project No.
0204.20001





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No.	REVISIONS AND DESCRIPTIONS	BY	DATE

Project Title:
PRELIMINARY ENGINEERING REPORT
TOWN OF BYRON WWTP IMPROVEMENTS
GENESEE COUNTY, NEW YORK

Drawing Title:
EX. PROFILE (OUTFALL 002)

Drawn By: MPB
Checked By: JH
Scale: N.T.S.
Date: JUNE 2022

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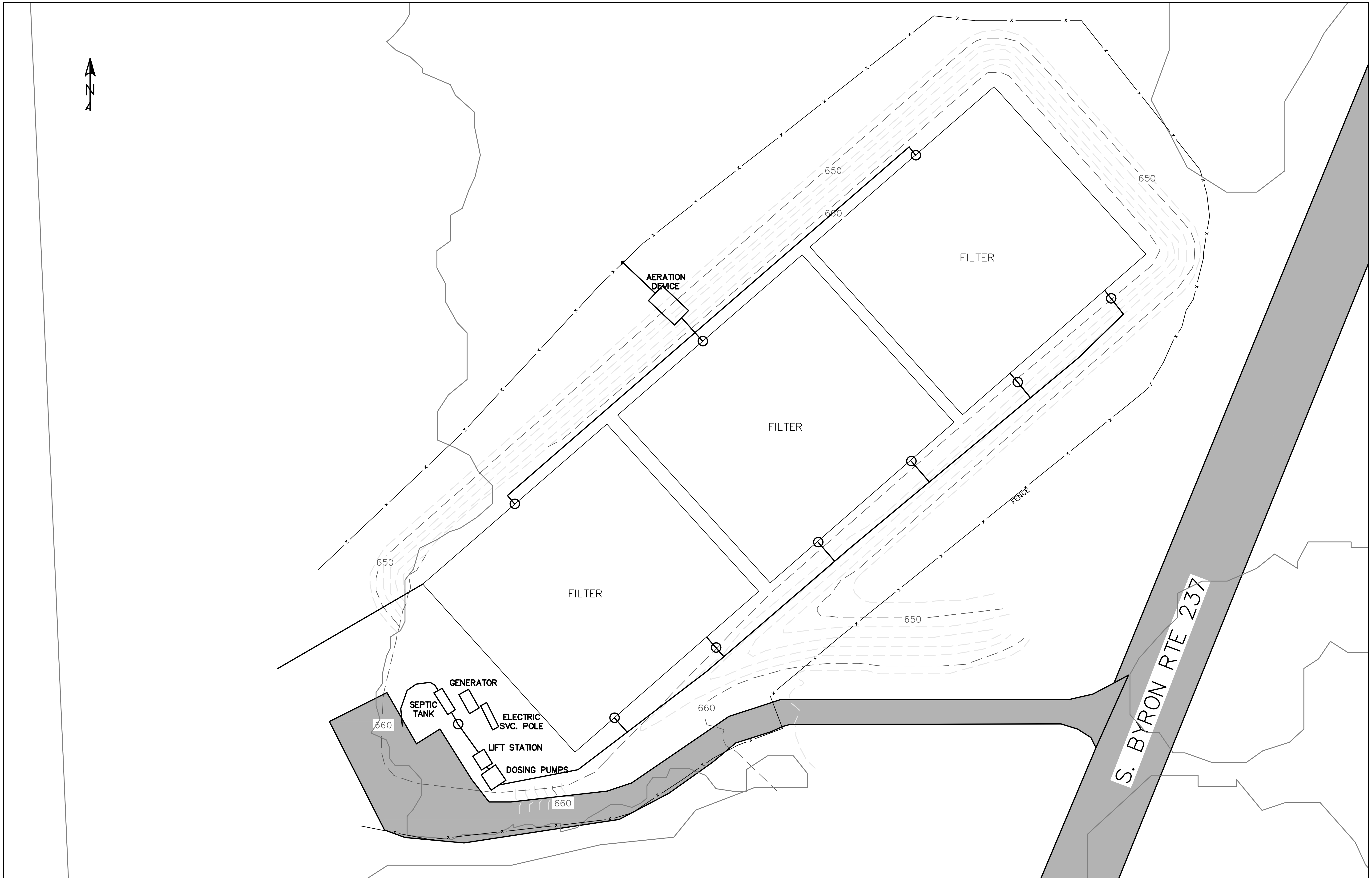
of

Project No.
0204.20001



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No.	REVISIONS AND DESCRIPTIONS	BY	DATE

Project Title:
PRELIMINARY ENGINEERING REPORT
TOWN OF BYRON WWTP IMPROVEMENTS
GENESEE COUNTY, NEW YORK

Drawing Title:
EXISTING SITE PLAN (OUTFALL 002)

Drawn By: MPB
Checked By: JH
Scale: N.T.S
Date: JUNE 2022

MRB group
Engineering, Architecture & Surveying, D.P.C.
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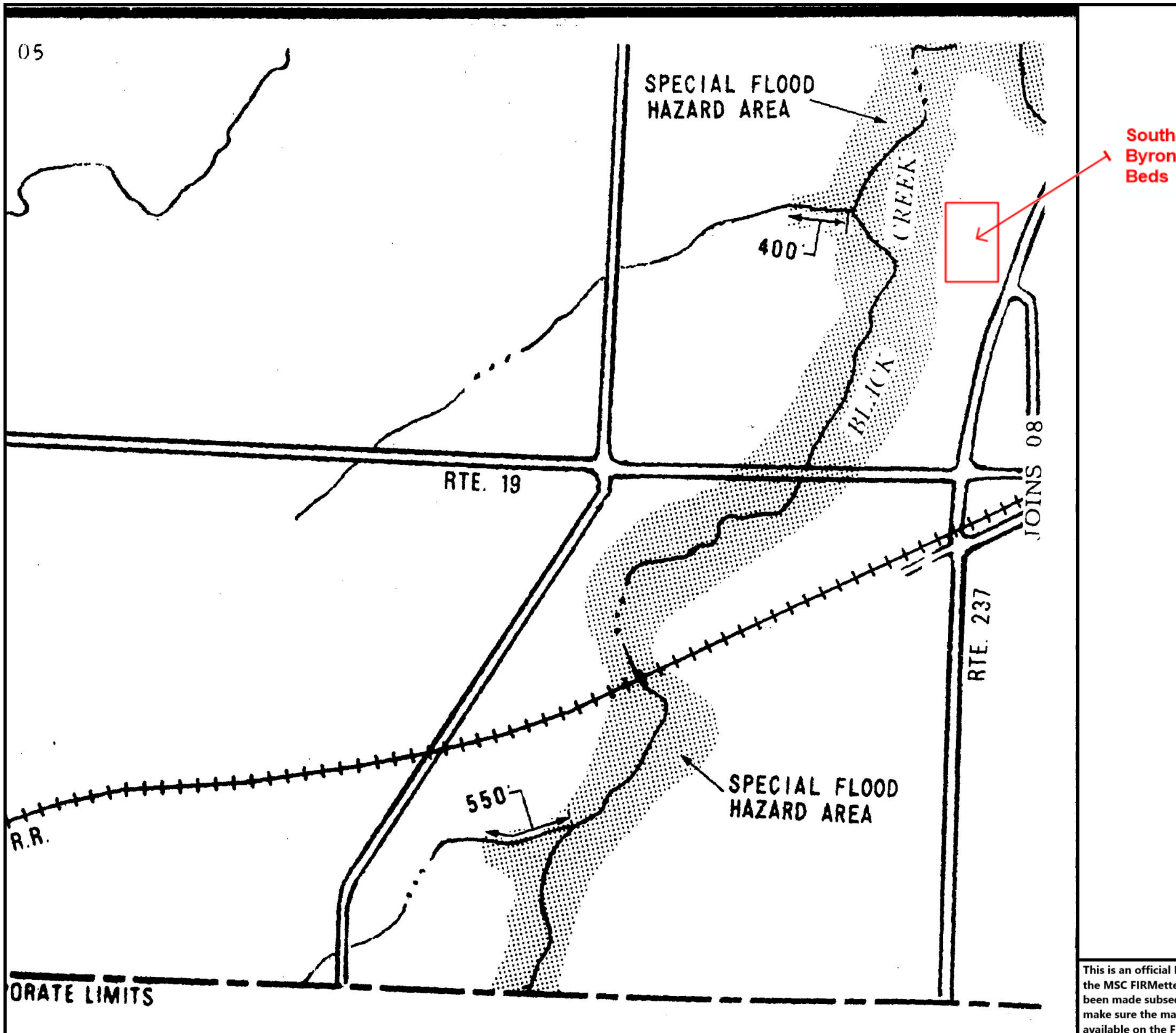
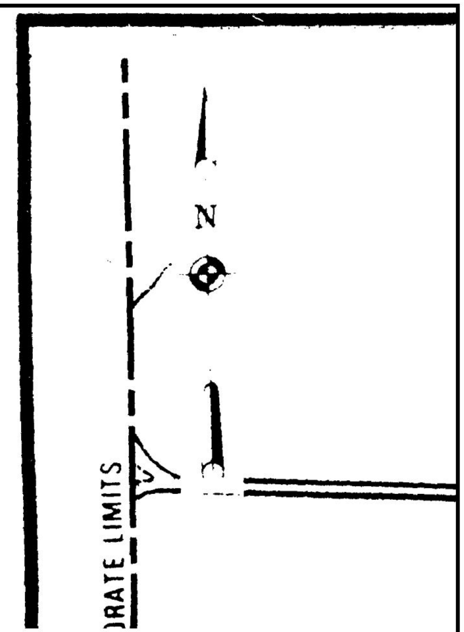
—— of ——

Project No.
0204.20001

APPENDIX E

FEMA FLOOD INSURANCE RATE MAPS





This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at https://msc.fema.gov.

07

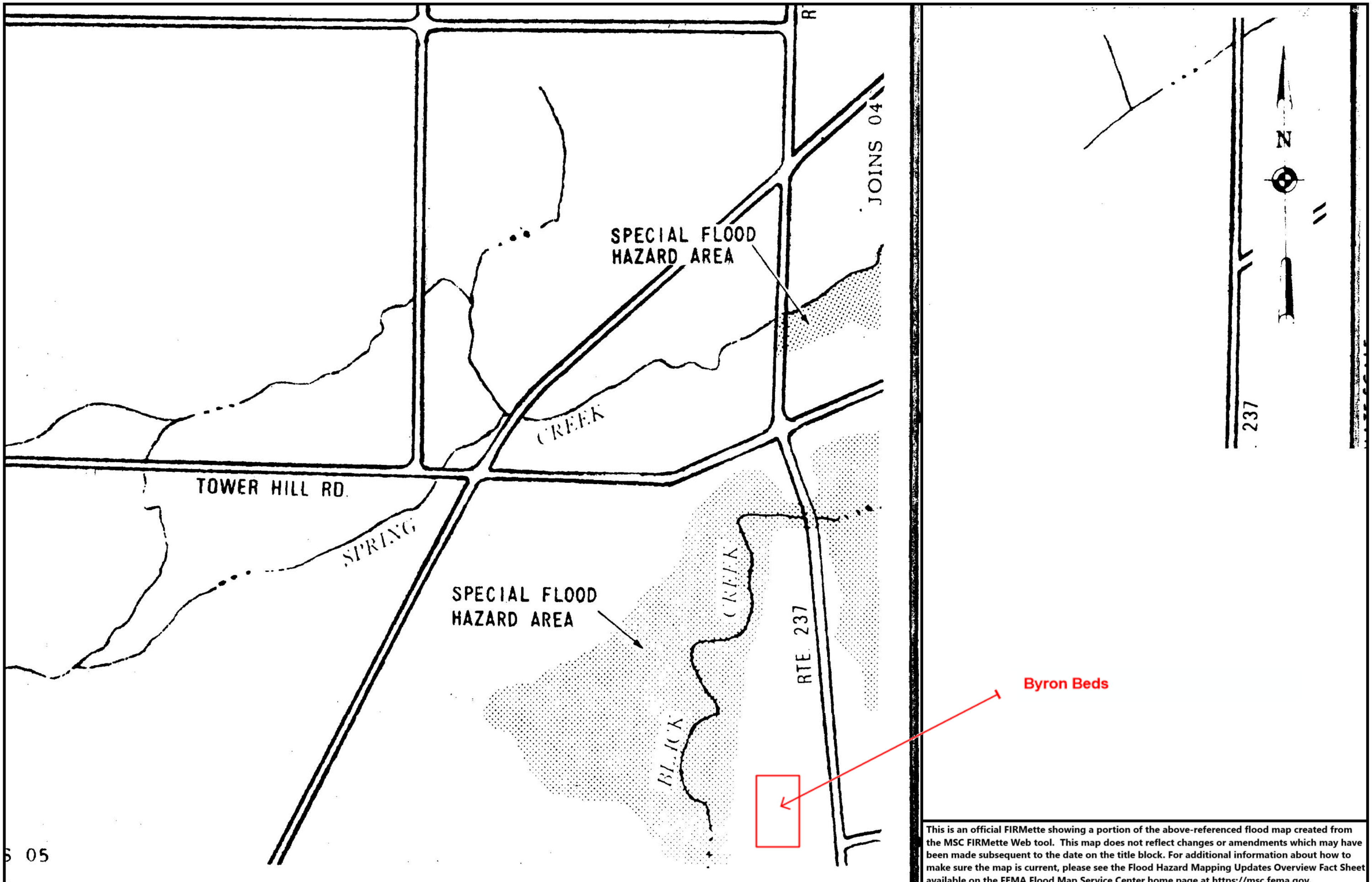
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF BYRON, NY
(GENESEE CO.)

APPROXIMATE SCALE
500 0 1000 2000 3000 FEET

FIA FLOOD HAZARD BOUNDARY MAP
No. H 07

Effective Date:
DECEMBER 6, 1974



This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at https://msc.fema.gov.

03

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
TOWN OF BYRON, NY
(GENESEE CO.)

APPROXIMATE SCALE
500 0 1000 2000 3000 FEET

FIA FLOOD HAZARD BOUNDARY MAP
No H 03

Effective Date
DECEMBER 6, 1974

APPENDIX F

OPINION OF PROBABLE COST ESTIMATES

Chlorination/Dechlorination Evaluation					
Item No.	Item Description:	Qty*	Unit	Unit Price	Total
1	Mobilization / Demobilization	1	LS	$ 70,000	$ 70,000
2	Site Grading	2	LS	$ 40,000	$ 80,000
3	Excavation and Backfill	2	LS	$ 50,000	$ 100,000
4	Site Piping	2	LS	$ 40,000	$ 80,000
5	Metering Pumps	6	EA	$ 10,000	$ 60,000
6	Chemical Skid	2	EA	$ 20,000	$ 40,000
7	Chlorine Contact Tank System	2	EA	$ 50,000	$ 100,000
8	Chemical Tank System	2	EA	$ 50,000	$ 100,000
9	Chemical Storage Structure	500	SF	$ 250	$ 125,000
10	Effluent Pump Stations, Piping	2	EA	$ 150,000	$ 300,000
11	Effluent Pump and Piping Outfall 003	1	EA	$ 40,000	$ 40,000
12	Dissolved Oxygen Mixing Manhole/Equip.	2	EA	$ 50,000	$ 100,000
13	Electrical / Controls	2	LS	$ 100,000	$ 200,000
				Subtotal Cost	**$ 1,395,000**
				20% Construction Contingency	$ 279,000
				Total Estimated Construction Cost	**$ 1,674,000**
				5% Legal, Administration (const. total only, no contingency)	**$ 69,750**
				20% Engineering (const. total only, no contingency)	**$ 279,000**
				Total Estimated Project Cost	**$ 2,023,000**

* Note: Quantities shown herein are conceptual in nature and will be confirmed during detailed design.

SCENARIO #1, WQIP GRANT ONLY

WQIP Disinfection Grant Award	$ 1,000,000
Remaining Project Costs	$ 1,023,000
Assume Hardship Financing:	
Yearly Debt Service @ 0%, n=30 years	$ 34,100
Current Sewer EDUs	312.5
Yearly Debt Service Cost per EDU	**$ 109**
Quarterly Sewer Rate per EDU	**$ 115**
Annual Sewer Rate per EDU	**$ 460**
Estimated Annual Cost per EDU	**$ 569**

Alternative 1 - Disinfection only, at both Central Byron and South Byron					
Item No.	**Item Description:**	**Qty***	**Unit**	**Unit Price**	**Total**
1	Mobilization / Demobilization	1	LS	$ 70,000	$ 70,000
2	UV Disinfection Equipment, with Pre-Manufactured Heated Enclosure	2	EA	$ 200,000	$ 400,000
3	Post-Aeration	2	EA	$ 50,000	$ 100,000
4	Electrical	2	EA	$ 100,000	$ 200,000
5	Effluent Pump Stations, Piping	2	EA	$ 150,000	$ 300,000
6	Effluent Pump and Piping Outfall 003	1	EA	$ 40,000	$ 40,000
7	Site Restoration	2	LS	$ 25,000	$ 50,000
				Subtotal Cost	**$ 1,160,000**
				20% Construction Contingency	$ 232,000
				Total Estimated Construction Cost	**$ 1,392,000**
				5% Legal, Administration (const. total only, no contingency)	**$ 58,000**
				20% Engineering (const. total only, no contingency)	**$ 232,000**
				Total Estimated Project Cost	**$ 1,682,000**

* Note: Quantities shown herein are conceptual in nature and will be confirmed during detailed design.

SCENARIO #1, WQIP GRANT ONLY

WQIP Disinfection Grant Award	$ 1,000,000
Remaining Project Costs	$ 682,000
Assume Hardship Financing:	
Yearly Debt Service @ 0%, n=30 years	$ 22,733
Current Sewer EDUs	312.5
Yearly Debt Service Cost per EDU	**$ 73**
Quarterly Sewer Rate per EDU	**$ 115**
Annual Sewer Rate per EDU	**$ 460**
Estimated Annual Cost per EDU	**$ 533**

Alternative 2 - Sand Filter Bed Replacement in Kind					
Item No.	Item Description:	Qty*	Unit	Unit Price	Total
1	Mobilization / Demobilization	1	LS	$ 30,000	$ 30,000
2	Excavation of Sand Filter Beds (inclusive of piping removal and liner removal)	14,600	CY	$ 100	$ 1,460,000
3	Disposal/Hauling of Sand Filtration Material to Suitable Landfill	23,652	TON	$ 120	$ 2,838,240
4	New Sand Filtration Media, Liner, Piping Installed	14,600	CY	$ 80	$ 1,168,000
5	New Lift and Dosing Pumps, Piping	4	LS	$ 150,000	$ 600,000
6	UV Disinfection/Post-Aeration	2	LS	$ 250,000	$ 500,000
7	Effluent Pump and Piping Outfall 003	1	EA	$ 40,000	$ 40,000
8	Septic Tank Replacement	230	EA	$ 10,000	$ 2,300,000
9	Site Restoration	2	LS	$ 20,000	$ 40,000
				Subtotal Cost	**$ 8,976,200**
				20% Construction Contingency	$ 1,795,240
				Total Estimated Construction Cost	**$ 10,771,440**
				5% Legal, Administration (const. total only, no contingency)	**$ 448,810**
				20% Engineering (const. total only, no contingency)	**$ 1,795,240**
				Total Estimated Project Cost	**$ 13,016,000**

* Note: Quantities shown herein are conceptual in nature and will be confirmed during detailed design.

SCENARIO #1, WQIP GRANT ONLY

WQIP Disinfection Grant Award	$ 1,000,000
Remaining Project Costs	$ 12,016,000
Assume Hardship Financing:	
Yearly Debt Service @ 0%, n=30 years	$ 400,533
Current Sewer EDUs	312.5
Yearly Debt Service Cost per EDU	**$ 1,282**
Quarterly Sewer Rate per EDU	**$ 115**
Annual Sewer Rate per EDU	**$ 460**
Estimated Annual Cost per EDU	**$ 1,742**

SCENARIO #2, WIIA, WQIP, BIL GRANT FUNDING

Assume 25% WIIA Grant Award	$ 3,004,000
WQIP Disinfection Grant Award	$ 1,000,000
Assume BIL Grant	$ 3,004,000
Remaining Project Costs	$ 6,008,000
Assume Subsidized Financing:	
Yearly Debt Service @ 0%, n=30 years	$ 200,267
Current Sewer EDUs	312.5
Yearly Debt Service Cost per EDU	**$ 641**
Quarterly Sewer Rate per EDU	**$ 115**
Annual Sewer Rate per EDU	**$ 460**
Estimated Annual Cost per EDU	**$ 1,101**

Alternative 3 - New WWTP at both South and Central Byron					
Item No.	**Item Description:**	**Qty***	**Unit**	**Unit Price**	**Total**
1	Mobilization / Demobilization	1	LS	$ 150,000	$ 150,000
2	Duplex Prepackaged Grinder Pump Station (New Lift Station and Dosing Pumps at each)	4	LS	$ 150,000	$ 600,000
3	Gas Services	2	LS	$ 25,000	$ 50,000
5	Site Restoration	2	LS	$ 5,000	$ 10,000
6	Abandonment of South Byron and Central Byron	1	LS	$ 100,000	$ 100,000
7	Smith and Loveless Package Plant, including excavation	2	LS	$ 1,650,000	$ 3,300,000
8	Pole Barn for Blowers, Electric/Control Panel	4,000	SF	$ 175	$ 700,000
9	UV Equipment	2	LS	$ 150,000	$ 300,000
10	Post-Aeration	2	LS	$ 50,000	$ 100,000
11	Site Piping	2	LS	$ 250,000	$ 500,000
12	Effluent Pump and Piping Outfall 003	1	EA	$ 40,000	$ 40,000
13	Septic Tank Replacement	230	EA	$ 10,000	$ 2,300,000
				General Contract Subtotal	**$ 8,150,000**
21	Electrical Contract	1	EA	$ 500,000	$ 500,000
22	Generator	2	LS	$ 100,000	$ 200,000
23	Electrical Services	2	LS	$ 25,000	$ 50,000
				Electrical Contract Subtotal	**$ 750,000**
24	HVAC Contract	1	EA	$ 75,000	$ 75,000
				HVAC Contract Subtotal	**$ 75,000**
25	Plumbing Contract	1	EA	$ 50,000	$ 50,000
				Plumbing Contract Subtotal	**$ 50,000**
				Subtotal Cost	**$ 9,025,000**
				20% Construction Contingency	$ 1,805,000
				Total Estimated Construction Cost	**$ 10,830,000**
				5% Legal, Administration (const. total only, no contingency)	**$ 451,250**
				20% Engineering (const. total only, no contingency)	**$ 1,805,000**
				Total Estimated Project Cost	**$ 13,087,000**

* Note: Quantities shown herein are conceptual in nature and will be confirmed during detailed design.

SCENARIO #1, WQIP GRANT ONLY

WQIP Disinfection Grant Award	$ 1,000,000
Remaining Project Costs	$ 12,087,000
Assume Hardship Financing:	
Yearly Debt Service @ 0%, n=30 years	$ 402,900
Current Sewer EDUs	312.5
Yearly Debt Service Cost per EDU	**$ 1,289**
Quarterly Sewer Rate per EDU	**$ 115**
Annual Sewer Rate per EDU	**$ 460**
Estimated Annual Cost per EDU	**$ 1,749**

SCENARIO #2, WIIA, WQIP, BIL GRANT FUNDING

Assume 25% WIIA Grant Award	$ 3,021,750
WQIP Disinfection Grant Award	$ 1,000,000
Assume BIL Grant	$ 3,021,750
Remaining Project Costs	$ 6,043,500
Assume Subsidized Financing:	
Yearly Debt Service @ 0%, n=30 years	$ 201,450
Current Sewer EDUs	312.5
Yearly Debt Service Cost per EDU	**$ 645**
Quarterly Sewer Rate per EDU	**$ 115**
Annual Sewer Rate per EDU	**$ 460**
Estimated Annual Cost per EDU	**$ 1,105**

Alternative 4 - New Package WWTP, with consolidation of South and Central Byron					
Item No.	Item Description:	Qty*	Unit	Unit Price	Total
1	Mobilization / Demobilization / Contract Requirements	1	LS	$ 150,000	$ 150,000
2	Maintenance and Protection of Traffic	1	LS	$ 30,000	$ 30,000
3	6" DR-11 San. Sewer FM - inc. excavation and backfill	12,500	LF	$ 90	$ 1,125,000
4	Directional Drilling	500	LF	$ 200	$ 100,000
5	Asphalt/Gravel Repair	2,500	LF	$ 10	$ 25,000
6	Fencing	1	LS	$ 15,000	$ 15,000
7	Duplex Prepackaged Grinder Pump Station (South Byron PS, New Central Byron Lift Station)	2	LS	$ 150,000	$ 300,000
8	Gas Services	2	LS	$ 25,000	$ 50,000
9	Lawn Restoration	10,000	LF	$ 3	$ 30,000
10	Air/Vacuum Release Valve Manholes	5	LS	$ 15,000	$ 75,000
11	Pigging Launch Station	1	LS	$ 20,000	$ 20,000
12	Abandonment of South Byron and Central Byron	1	LS	$ 100,000	$ 100,000
13	Smith and Loveless Package Plant, including excavation	1	LS	$ 1,650,000	$ 1,650,000
14	UV Equipment	1	LS	$ 200,000	$ 200,000
15	Post-Aeration	1	LS	$ 35,000	$ 35,000
16	Pole Barn Canopy for Package Plant	3,400	SF	$ 75	$ 255,000
16A	Enclosed, conditioned Pole Barn for Blowers, Electric/Control Panel	600	SF	$ 175	$ 105,000
17	Site Piping	1	LS	$ 250,000	$ 250,000
18	Effluent Pump and Piping Outfall 003	1	EA	$ 40,000	$ 40,000
19	Base slab and UV/Post-aeration tankage	1	EA	$ 150,000	$ 150,000
20	Septic Tank Replacement	230	EA	$ 10,000	$ 2,300,000
				General Contract Subtotal	**$ 7,005,000**
21	Electrical Contract	1	EA	$ 750,000	$ 750,000
22	Generator	2	LS	$ 100,000	$ 200,000
23	Electrical Services	2	LS	$ 25,000	$ 50,000
				Electrical Contract Subtotal	**$ 1,000,000**
24	HVAC Contract	1	EA	$ 100,000	$ 100,000
				HVAC Contract Subtotal	**$ 100,000**
25	Plumbing Contract	1	EA	$ 50,000	$ 50,000
				Plumbing Contract Subtotal	**$ 50,000**
				Total Construction Subtotal Cost	**$ 8,155,000**
				20% Construction Contingency	$ 1,631,000
				Total Estimated Construction Cost	**$ 9,786,000**
				5% Legal, Administration (const. total only, no contingency)	**$ 407,750**
				20% Engineering (const. total only, no contingency)	**$ 1,631,000**
				Total Estimated Project Cost	**$ 11,825,000**

* Note: Quantities shown herein are conceptual in nature and will be confirmed during detailed design.

SCENARIO #1, WQIP GRANT ONLY

WQIP Disinfection Grant Award	$ 1,000,000
Remaining Project Costs	$ 10,825,000
Assume Hardship Financing:	
Yearly Debt Service @ 0%, n=30 years	$ 360,833
Current Sewer EDUs	312.5
Yearly Debt Service Cost per EDU	**$ 1,155**
Quarterly Sewer Rate per EDU	**$ 115**
Annual Sewer Rate per EDU	**$ 460**
Estimated Annual Cost per EDU	**$ 1,615**

SCENARIO #2, WIIA, WQIP, BIL GRANT FUNDING

Assume 25% WIIA Grant Award	$ 2,706,250
WQIP Disinfection Grant Award	$ 1,000,000
Assume BIL Grant	$ 2,706,250
Remaining Project Costs	$ 5,412,500
Assume Hardship Financing:	
Yearly Debt Service @ 0%, n=30 years	$ 180,417
Current Sewer EDUs	312.5
Yearly Debt Service Cost per EDU	**$ 577**
Quarterly Sewer Rate per EDU	**$ 115**
Annual Sewer Rate per EDU	**$ 460**
Estimated Annual Cost per EDU	**$ 1,037**

Alternative 5 - Pump Station and Forcemain Conveyance System to Monroe County Sewer System					
Item No.	Item Description:	Qty*	Unit	Unit Price	Total
1	Mobilization / Demobilization / Contract Requirements	1	LS	$ 300,000	$ 300,000
2	Maintenance and Protection of Traffic	1	LS	$ 100,000	$ 100,000
3	6" DR-11 San. Sewer FM - inc. excavation and backfill	60,000	LF	$ 90	$ 5,400,000
4	Directional Drilling	4,000	LF	$ 200	$ 800,000
5	Asphalt/Gravel Repair	12,000	LF	$ 10	$ 120,000
6	Pump Station Fencing	3	LS	$ 15,000	$ 45,000
7	Duplex Prepackaged Grinder Pump Station (South Byron PS, then 2 pump stations to get to Central and South Byron to Churchville)	3	LS	$ 200,000	$ 600,000
8	Gas Services	3	LS	$ 25,000	$ 75,000
9	Lawn Restoration	48,000	LF	$ 3	$ 144,000
10	Air/Vacuum Release Valve Manholes	25	LS	$ 15,000	$ 375,000
11	Pigging Launch Station	3	LS	$ 20,000	$ 60,000
12	Abandonment of South Byron and Central Byron	1	LS	$ 100,000	$ 100,000
17	Site Piping	1	LS	$ 250,000	$ 250,000
18	Effluent Pump and Piping Outfall 003	1	EA	$ 40,000	$ 40,000
20	Septic Tank Replacement	230	EA	$ 10,000	$ 2,300,000
				General Contract Subtotal	**$ 10,709,000**
21	Electrical Contract	1	EA	$ 600,000	$ 600,000
22	Generator	3	LS	$ 100,000	$ 300,000
23	Electrical Services	3	LS	$ 25,000	$ 75,000
				Electrical Contract Subtotal	**$ 975,000**
24	HVAC Contract	1	EA	$ 100,000	$ 100,000
				HVAC Contract Subtotal	**$ 100,000**
25	Plumbing Contract	1	EA	$ 50,000	$ 50,000
				Plumbing Contract Subtotal	**$ 50,000**
				Total Construction Subtotal Cost	**$ 11,834,000**
				20% Construction Contingency	$ 2,366,800
				Total Estimated Construction Cost	**$ 14,200,800**
				5% Legal, Administration (const. total only, no contingency)	**$ 591,700**
				20% Engineering (const. total only, no contingency)	**$ 2,366,800**
				Total Estimated Project Cost	**$ 17,160,000**

* Note: Quantities shown herein are conceptual in nature and will be confirmed during detailed design.

SCENARIO #1, NO GRANT FUNDING (WQIP WOULD NOT APPLY)

Remaining Project Costs	$ 17,160,000
Assume Hardship Financing:	
Yearly Debt Service @ 0%, n=30 years	$ 572,000
Current Sewer EDUs	312.5
Yearly Debt Service Cost per EDU	**$ 1,830**
Quarterly Sewer Rate per EDU	**$ 115**
Annual Sewer Rate per EDU	**$ 460**
Estimated Annual Cost per EDU	**$ 2,290**

SCENARIO #2, WIIA, BIL GRANT FUNDING

Assume 25% WIIA Grant Award	$ 4,290,000
Assume BIL Grant	$ 4,290,000
Remaining Project Costs	$ 8,580,000
Assume Hardship Financing:	
Yearly Debt Service @ 0%, n=30 years	$ 286,000
Current Sewer EDUs	312.5
Yearly Debt Service Cost per EDU	**$ 915**
Quarterly Sewer Rate per EDU	**$ 115**
Annual Sewer Rate per EDU	**$ 460**
Estimated Annual Cost per EDU	**$ 1,375**

APPENDIX G

CUT SHEETS FOR PROPOSED ALTERNATE #4

Smith & Loveless Inc.

Understanding Your Effluent Goals: FAST®

Project Name: Byron NY
Project Manager: Ryan Asbury

Units: US Customary

Date: 11/11/2022

Flow Conditions		
Avg. Flow	45.0	kGPD
Maximum Month Flow	85.0	kGPD
Peak Day Flow	182	kGPD
Peak Hour Flow	328	kGPD
Peak Hour Flow Duration	N/A	hr

Influent Waste Characteristics		
Max Month Flow Rate	85.0	kGPD
BOD	85	lb/d
TSS	85	lb/d
NH_3-N	N/A	mg/L
TKN	65	mg/L
TP	N/A	mg/L
pH*	7-8	pH units
Alkalinity*	300	mg $CaCO_3$/L
Min. Water Temperature*	7	^oC
Max. Water Temperature*	25	^oC

Site		
Elevation	500	ft
Summer Air Temperature	27	^oC
Winter Air Temperature	-8	^oC
Available Footprint / Area	N/A	ft.2

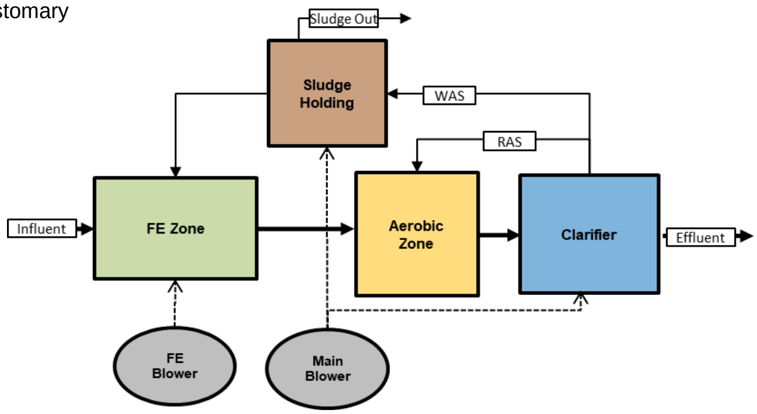
Effluent Requirements		
BOD	15	mg/L
TSS	15	mg/L
NH_3-N	5.0	mg/L
TN	N/A	mg/L
TP	N/A	mg/L
pH*	7-8	pH units
Alkalinity*	75	mg $CaCO_3$/L

*Assumed values

Smith & Loveless Inc.

Achieving Results: FAST® Process Design Summary

Units: US Customary



Flow Equalization — *Design Goals*

Influent in Flow Equalization (FE) zone is mixed with coarse bubble diffusers to keep solids in suspension. At design flow condition, the FE zone can hold the water for the retention time, that can help the maintenance and improve the consistency of flow to the system.

Basin Volume - Total	9,840	ft³
Number of Zones	1	Zones
Usable Volume Each Zone	8,364	ft³
Equalized Design Flow	85.0	kGPD
Peak Day Flow	182.0	kGPD
Retention Time at Design Flow	17.7	hrs

Sludge Holding — *Design Goals*

Excess solids produced during biological treatment are removed from the system through wasting process and are held in a sludge holding zone until they can be properly disposed. This zone has the capabilities to further concentrate the solids and decant the supernatant back to the FE zone. The sludge holding zone was designed based the values listed at right.

Basin Volume - Total	1,563	ft³
Number of Zones	1	Zones
Volume each Zone	1,562.8	ft³
Estimated Solids Production	116	lb TSS/d
Waste Sludge Concentration	2,500	mg TSS/L
Volume of WAS per Day	5,577	gpd
% Solids After Concentration (Est.)	2.0	%
Solids Holding Time with Decanting	17	days

Achieving Results: FAST®

Aerobic Basin			Design Goals
The flow enters the aerobic basin, in which the biomass converts BOD into inoccuous products such as carbon dioxide and water while producing additional biomass. A portion of ammonia or total Kjeldahl nitrogen (TKN) is utilized by bacteria for growth and maintenance while the remaining portion is converted to nitrate. This zone is designed based on the characteristics listed at right.	**Basin Volume - Total**	17,978	ft³
	Number of Zones	3	Zones
	Volume Each Zone	5,993	ft³
	Total Aerobic Solids Retention Time	2	days
	Hydraulic Retention Time	38.0	hours
	Mixed Liquor Concentration	164	mg TSS/L
	Volatile Mixed Liquor Concentration	110	mg VSS/L
	F/M Ratio MLVSS Basis	0.686	
	BOD Loading Rate	7.16	lb/kft³.d

Clarifier			Design Goals
The treated wastewater from aerobic basin enters a clarifier, where biomass and treated wastewater will be separated through sedimentation process. Treated wastewater will be discharged from the clarifier. A portion of biosolids will be recycled back to aerobic basin while the remaining are sent to the sludge holding zone.	**Number of Clarifiers**	3.0	
	Clarifier Model	HC 142	
	Total Surface Area	426.0	ft²
	Overflow Rate at Average Daily Flow	199.5	gpd/ft²
	Solids Loading at Average Daily Flow	0.5	lb/ft².d

Smith & Loveless Inc.

Achieving Results: FAST®

Aeration Requirements

Air diffusers will provide the required dissolved oxygen for BOD and ammnoia removal, and provide adequate mixing in the aeration zone. Main blower will provide air to aerated zones except the FE zone. A separate FE blower will provide air to mix the FE zone. The aeration requirements were designed as follows.

Diffuser Design		
Coarse Bubble Diffusers		
Actual O_2 Requirement (AOR)	422	lb O_2/d
O_2 Credit From Air Scour	0.0	lb O_2/d
Alpha	0.90	
Beta	0.95	
Membrane Air Scour Air	0	scfm
Coarse Bubble Air	650	scfm
Total Aerobic Zone Air	650	scfm

Additional Operational Air Requirements		
Mixing in the SH Zone(s)	47	scfm
Air For Airlifts	56	scfm
Mixing in the FE Zone(s)	148	scfm

Total Air Requirements		
Main Blower	752	scfm
FE Blower	154	scfm

Power Requirements

Main Blower Design		
Main - Gauge Pressure	6.6	psi
Calculated Power Req'd	31.2	BHP

Flow Equalization Blower Design		
FE Blower Gauge Pressure	6.6	psi
Calculated Power Req'd	6.1	BHP

Nutrients Required for BOD Removal

MacroNutrients		
N Req'd. for BOD Removal	10.2	mg N/L
P Req'd. for BOD Removal	2.2	mg P/L

Chemical Addition

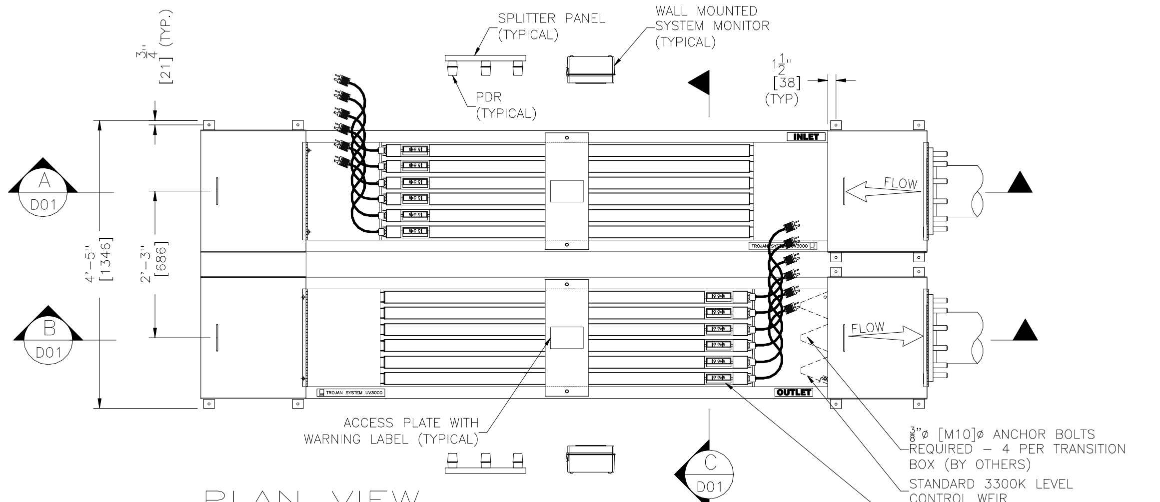
Alkalinity Addition		
Inf. Alkalinity (Client Verify)	300	mg $CaCO_3$/L
Supplimental Alk Required?	Yes	
Alkalinity to be Added	89	lb $CaCO_3$/d

Supplimental Carbon Dosing		
Anoxic (1) Zone Carbon Dosing ?	No	
Anoxic (2) Zone Carbon Dosing ?	No	
Anoxic (1) Dosing	0	gal/d Methanol
Anoxic (2) Dosing	0	gal/d Methanol

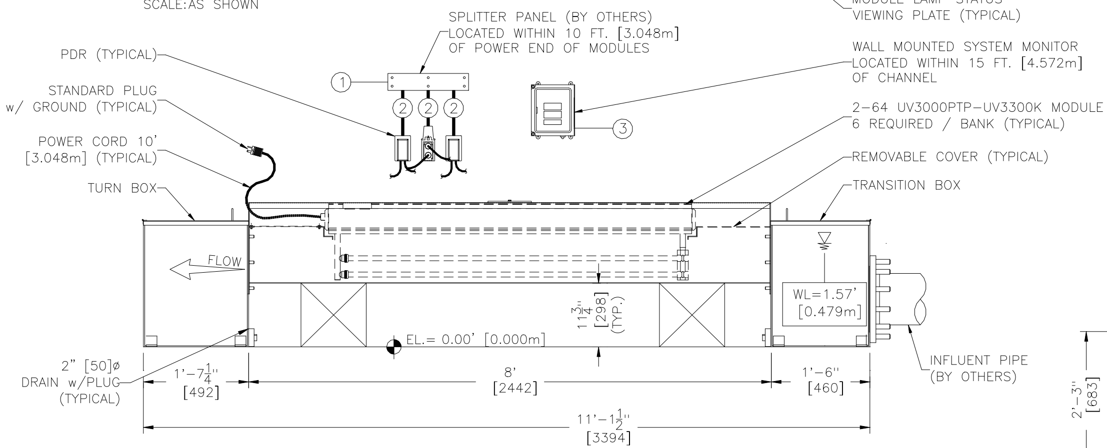
TROJAN UV3000™ PTP

EQUIPMENT INTERCONNECTIONS

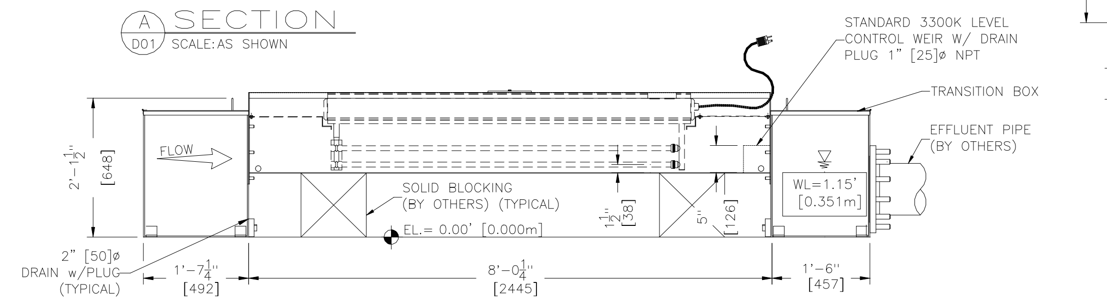
No.	DESCRIPTION	FROM	TO
1	SPLITTER PANEL POWER SUPPLY 120V, 1 PHASE, 2 WIRE, ACTUAL DRAW 9.6 AMPS / SPLITTER PANEL	DISTRIBUTION PANEL (DP) (NOT SHOWN) (BY OTHERS)	SPLITTER PANEL (BY OTHERS)
2	POWER DISTRIBUTION RECEPTACLE (PDR) POWER SUPPLY 120V, 1 PHASE, 2 WIRE, ACTUAL DRAW 3.2 AMPS / PDR	SPLITTER PANEL (BY OTHERS)	PDR
3	SYSTEM MONITOR POWER SUPPLY 120V, 1 PHASE, 2 WIRE, 5 AMPS	DP (NOT SHOWN) (BY OTHERS)	SYSTEM MONITOR



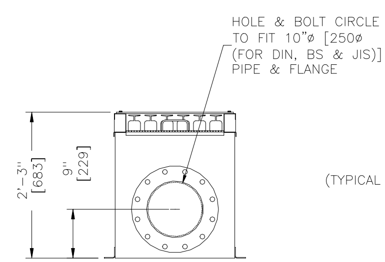
PLAN VIEW
SCALE:AS SHOWN



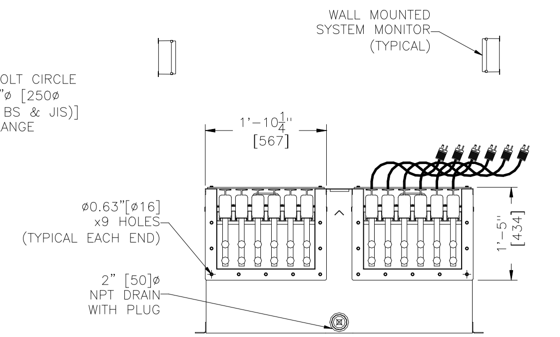
A SECTION
D01 SCALE:AS SHOWN



B SECTION
D01 SCALE:AS SHOWN
NOTE: PDR, SPLITTER PANEL (BY OTHERS) AND SYSTEM MONITOR NOT SHOWN FOR CLARITY



END VIEW
(TYPICAL OF 2)
SCALE:AS SHOWN



C SECTION
D01 SCALE: AS SHOWN
NOTE: PDR AND SPLITTER PANEL (BY OTHERS) NOT SHOWN FOR CLARITY

NOTES:

- : DO NOT SLOPE CHANNEL FLOOR.
- : CHANNEL WIDTH & DEPTH MUST BE KEPT WITHIN A TOLERANCE OF + OR − ¼" [6].
- : ANCHOR BOLTS ARE NOT SUPPLIED BY TROJAN TECHNOLOGIES.
- : BOLTS, WASHERS AND NUTS FOR CONNECTION OF CHANNELS AND TRANSITION BOXES TO CHANNELS ARE PROVIDED BY TROJAN TECHNOLOGIES.
- : SYSTEM CONDUIT, WIRING, DISTRIBUTION PANELS & INTERCONNECTIONS BY OTHERS.
- : ELECTRICAL REQUIREMENTS SHOWN ARE TO SUPPLY TROJAN UV EQUIPMENT ONLY. ELECTRICAL INRUSH FACTOR TO BE ADDED AS PER LOCAL CODE.
- : ANY EXTRA OUTLETS NOT BEING USED BY TROJAN EQUIPMENT HAVE NOT BEEN INCLUDED IN THE INTERCONNECT AMPERAGE.
- : CONTRACTOR TO REVIEW ALL TROJAN TECHNOLOGIES INSTALLATION INSTRUCTIONS PRIOR TO EQUIPMENT INSTALLATION.
- : ACCESS IS REQUIRED FOR MODULE REMOVAL − NOTE THE CHANNEL WIDTH AND ENSURE ADEQUATE ACCESS IS PROVIDED TO ALL MODULES.
- : DO NOT ENCASE THE STEEL CHANNEL IN CONCRETE.
- : [ ] INDICATES MILLIMETERS UNLESS OTHERWISE SPECIFIED.

MULTIPLE CHANNELS IN PARALLEL (OPTION):

- : ADDITIONAL UNITS CAN BE INSTALLED PARALLEL TO THE UNIT SHOWN.
- : ACCESS BETWEEN EVERY 2 PARALLEL CHANNELS IS REQUIRED FOR MODULE REMOVAL − NOTE THE CHANNEL WIDTH AND ENSURE ADEQUATE ACCESS IS PROVIDED BETWEEN TRANSITION BOXES AND CHANNELS.
- : ACCESS BETWEEN A MAXIMUM OF 2 CHANNELS IS NOT REQUIRED FOR MODULE REMOVAL. TRANSITION BOXES CAN BE INSTALLED ADJACENT TO EACH OTHER.

TROJAN UV

CONFIDENTIALITY NOTICE

DESCRIPTION: LAYOUT, UV3000PTP−UV3300K 1 CHANNEL 2 BANKS 2 LAMPS WEIR TURNBOX		STANDARD DRAWING NO. 3M0602	
DRAWN BY : SLO/JMM/CJB	DATE : 12JL17	REFERENCE NO. N/A	
CHECKED BY : SAH	DATE : 12JL19		
APPROVED BY : CAP	DATE : 12JL19	DWG NO. D01	REV. C
SCALE (11x17) : NOT TO SCALE	LOG NUMBER : N/A		

Tornado®

SURFACE ASPIRATING AERATOR

Powerful and reliable, self-aspirating surface Tornado aerators are used to upgrade lagoon systems and expand the treatment capacity of mechanical wastewater treatment plants.

Tornado surface aspirating aerators improve aeration and mixing in a wide range of applications.

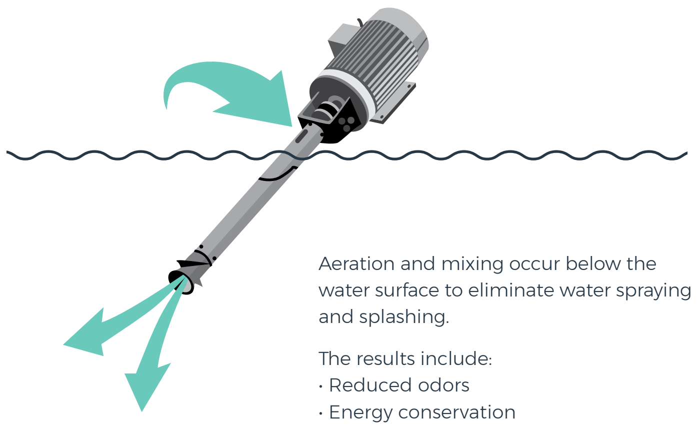
Tornado provides high oxygen transfer and intensive mixing capabilities in a wide range of applications. The Tornado aerator's turbulent directional mixing and jet propulsion discharge assures that oxygen is quickly blended with the wastewater for unmatched oxygen transfer. The intense action of the jet propulsion shears wastewater solids to increase treatment performance and provide better contact for the oxygen and wastewater bacteria.




Principle of Operation

The Tornado aerator mounts at an angle in the water with the motor and air intake above the surface and the propeller submerged below the water. The solid motor shaft spins a proprietary stainless steel propeller. Water moves at a high velocity through and near the propeller, creating a low pressure zone at the hub. The low pressure zone draws air in through the stationary intake and down the large diameter draft tube. The air exits into the water at the propeller hub. Turbulence and flow created by the propeller breaks up the air bubbles, mixes the basin, and disperses oxygen.

Air enters the Tornado through the opening in the draft tube



Aeration and mixing occur below the water surface to eliminate water spraying and splashing.

The results include:
- Reduced odors
- Energy conservation
- Icing problems eliminated

Key Technical Features

- Available horsepower range: 2-100 hp (1.5 kW-75 kW)
- Operational speed: 1800 rpm at 60 Hz (1500 rpm at 50 Hz)
- Premium efficiency (TEFC) motors
- 304 stainless steel (standard) or 316 stainless steel (optional) construction
- Grease-lubricated bearings and a solid shaft ensure a vibration-free design

Markets and Industries

- Municipal Wastewater Treatment
- Aquaculture
- Wineries & Breweries
- Chemical Processing
- Pulp & Paper Mills
- Textile
- Oil & Gas
- Mining
- Dairies
- Food & Beverage Processing

Suitable Applications

- Activated sludge basins
- Sludge holding tanks/digesters
- Oxidation ditches
- Lagoons
- Post Aeration
- Odor and algae control/air cap
- Ice control
- Leachate treatment

Rugged Construction

Harsh wastewater environments require tough, rugged materials designed for longevity and reliability in extreme environmental conditions. The Tornado's sealed, grease-lubricated bearings allow the aerators to be used in applications with high amounts of solids, grit, or sand and in leachate treatment. The two tapered roller bearings securely support the aerator shaft, preventing vibration and taking up all propeller thrust loads. The roller bearings are designed for up to 100,000 hours of service life. The unique self-heating bearing design allows the system to be installed in cold climates and operate year-round.

Stainless Steel Components

Durable stainless steel floats are unmatched in the industry and ensure the aerator remains buoyant for its full life, even in the harshest of environments. Proprietary engineering ensures that the aerator runs properly throughout its service life, without time-consuming maintenance.

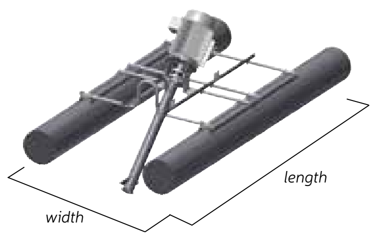
Reduced Energy Costs

Every Tornado aerator is equipped with a premium efficiency motor to reduce energy costs. Larger motors are designed to work with soft start or Variable Frequency Drive (VFD) controllers to eliminate power surge penalties and reduce energy costs.

Tornado® Specifications

hp	kW	60 Hz Motor rpm	Motor FLA 460V	50 Hz Motor rpm	Motor FLA 380 V	Ship Weight lb (kg)	Pontoon System Available
2	1.5	1730	3.1	1425	3.7	118 (54)	a, b
3	2	1745	4.0	1450	4.8	161 (73)	a, b
5	4	1750	6.5	1445	7.9	169 (76)	a, b
7.5	5.5	1750	9.4	1445	11.6	225 (102)	a, b
10	7.5	1750	12.4	1445	15	248 (113)	a, b
15	11	1760	18.6	1450	22.6	407 (185)	b, c
20	15	1760	23.5	1450	31.4	492 (223)	b ,c
25	18.5	1770	29.6	1460	35.2	539 (244)	b, c
30	22	1770	35.5	1460	42	541 (245)	b, c
40	30	1770	47.1	1460	55	730 (331)	b, c
50	37	1770	59.2	1460	68	914 (415)	c, d
60	45	1775	69.4	1465	83	1146 (520)	c, d
75	56	1775	86.2	1465	103.5	1219 (553)	d
100	74.5	1780	114	1480	135	1353 (1353)	d

Pontoon System	Length in (cm)	Width in (cm)
2-Float (a)	72 (183)	70 (177)
4-Float (b)	145 (368)	70 (177)
6-Float (c)	145 (368)	105 (267)
8-Float (d)	145 (368)	105 (267)



fluence™

Available Accessories

- Anti-erosion shields to prevent erosion in shallow (clay or earthen) basins
- Anti-vortex shield if vortexing occurs or if an aerator is operated below the standard 45 degree angle of operation
- Low-level legs to prevent damage to basin or equipment when waterlevels drop below three feet
- Walls and bridge mounts for mounting flexibility
- Swing arms to accommodate up to 15 feet of fluctuations in water elevation
- Maintenance decks built on pontoon platforms for easy servicing access
- Automatic grease lubrication equipment to reduce maintenance
- Blower add-on kit accessory to convert to blower-assisted operation

Rental units also available

The Blower Assisted TORNADO Aerator is used for wastewater treatment applications that require a higher level of oxygenation. A blower is added to the self-aspirating aerator to force additional air down the inlet hole. The blower uses a small motor, typically from 2 to 10 HP (1.5kW to 7.5 kW), that inputs more oxygen as compared to a standard Tornado aerator. The Tornado Blower-assist aerator mounts at an angle on floats or can be wall-mounted. The motor and air intake is above the surface and the propeller is submerged beneath the water.

Fluence is Your EXPERT

With thousands of installed units around the world, Fluence is your expert provider for wastewater treatment solutions. We offer all major wastewater aeration technologies and the expertise to help you select and apply the equipment best suited for your application. Our technical experts are ready to assist you with the proper sizing, layout, and operation of your aeration system.

APPENDIX H

ENGINEERING REPORT CERTIFICATION

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: Town of Byron Preliminary Engineering Report for the Wastewater Treatment System Improvements

Date of Report: April 2023

Professional Engineer's Name: Mark Bailey, PE

Signature:

Date: 4/28/2023

APPENDIX I

SMART GROWTH ASSESSMENT FORM

NEW YORK STATE OF OPPORTUNITY. | Department of Health | Environmental Facilities Corporation

Smart Growth Assessment Form

This form should be completed by an authorized representative of the applicant, preferably the project engineer or other design professional.[1]

Section 1 – General Applicant and Project Information

Applicant: Town of Byron Project No.: C8-6514-01-00

Project Name: WWTP Improvements

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

Please provide a brief project summary in plain language including the location of the area the project serves:

Project will involve the addition of UV disinfection to comply with Town SPDES permit, and will also include the consolidation of two (2) separate sand filter bed treatment systems in the Town into one (1) consolidated wastewater treatment plant.

Section 2 – Screening Questions

A. Prior Approvals

1. Has the project been previously approved for Environmental Facilities Corporation (EFC) financial assistance? ☐ Yes ☑ No
2. If yes to A(1), what is the project number(s) for the prior approval(s)? Project No.:
3. If yes to A(1), is the scope of the previously-approved project substantially the same as the current project? ☐ Yes ☑ No

If your responses to A(1) and A(3) are both yes, please proceed to Section 5, Signature.

B. New or Expanded Infrastructure

1. Does the project involve the construction or reconstruction of new or expanded infrastructure? ☐ Yes ☑ No

Examples of new or expanded infrastructure include, but are not limited to:

(i) The addition of new wastewater collection/new water mains or a new wastewater treatment system/water treatment plant where none existed previously;

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

[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.

(iii) An increase of the permitted water withdrawal or the permitted flow capacity for the water treatment system such that a Department of Environmental Conservation (DEC) water withdrawal permit will need to be obtained or modified, or result in the Department of Health (DOH) approving an increase in the capacity of the water treatment plant.

If your response to B(1) is no, please proceed to Section 5, Signature.

Section 3 –Smart Growth Criteria

Your project must be consistent will all relevant Smart Growth criteria. For each question below please provide a response and explanation.

1. Does the project use, maintain, or improve existing infrastructure?
   ☐ Yes ☐ No

   Explain your response:

2. Is the project located in a (1) municipal center, (2) area adjacent to a municipal center, or (3) area designated as a future municipal center, as such terms are defined herein (please select one response)?

   ☐ Yes, my project is located in a municipal center, which is an area of concentrated and mixed land uses that serves as a center for various activities, including but not limited to: central business districts, main streets, downtown areas, brownfield opportunity areas (see www.dos.ny.gov for more information), downtown areas of local waterfront revitalization program areas (see www.dos.ny.gov for more information), areas of transit-oriented development, environmental justice areas (see *www.dec.ny.gov/public/899.html* for more information), and hardship areas (projects that primarily serve census tracts or block numbering areas with a poverty rate of at least twenty percent according to the latest census data).

   ☐ Yes, my project is located in an area adjacent to a municipal center which has clearly defined borders, is designated for concentrated development in the future in a municipal or regional comprehensive plan, and exhibits strong land use, transportation, infrastructure, and economic connections to an existing municipal center.

   ☐ Yes, my project is located in an area designated as a future municipal center in a municipal or comprehensive plan and is appropriately zoned in a municipal zoning ordinance

   ☐ No, my project is not located in a (1) municipal center, (2) area adjacent to a municipal center, or (3) area designated as a future municipal center.

   Explain your response and reference any applicable plans:

3. Is the project located in a developed area or an area designated for concentrated infill development in a municipally-approved comprehensive land use plan, local waterfront revitalization plan, and/or brownfield opportunity area plan?

   ☐Yes ☐No

   Explain your response and reference any applicable plans:

4. Does the project protect, preserve, and enhance the State's resources, including surface and groundwater, agricultural land, forests, air quality, recreation and open space, scenic areas, and significant historic and archaeological resources?

   ☐Yes ☐No

   Explain your response:

5. Does the project foster mixed land uses and compact development, downtown revitalization, brownfield redevelopment, the enhancement of beauty in public spaces, the diversity and affordability of housing in proximity to places of employment, recreation and commercial development, and the integration of all income and age groups?

   ☐Yes ☐No

   Explain your response:

6. Does the project provide mobility through transportation choices including improved public transportation and reduced automobile dependency?

   ☐Yes ☐No ☐N/A

   Explain your response:

7. Does the project involve coordination between State and local government, intermunicipal planning, or regional planning?

   ☐Yes ☐No

   Explain your response and reference any applicable plans:

8. Does the project involve community-based planning and collaboration?

   ☐Yes ☐No

   Explain your response and reference any applicable plans:

9. Does the project support predictability in building and land use codes?

   ☐Yes ☐No ☐N/A

   Explain your response:

10. Does the project promote sustainability by adopting measures such as green infrastructure techniques, decentralized infrastructure techniques, or energy efficiency measures?

    ☐Yes ☐No

    Explain your response and reference any applicable plans:

11. Does the project mitigate future physical climate risk due to sea-level rise, storm surges, and/or flooding, based on available data predicting the likelihood of future extreme weather events, including hazard risk analysis data, if applicable?

    ☐Yes ☐No

    Explain your response and reference any applicable plans:

Section 4 – Miscellaneous

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

   If yes, and you have not previously provided the applicable order to EFC/DOH, please submit it with this form.

Section 5 – Signature

By signing 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: Town of Byron	Phone Number:
Name and Title of Signatory:	
Signature:	Date:

APPENDIX J

2018 THROUGH 2021 TOWN SEWER BUDGETS

2018

SEWER DISTRICT APPROPRIATIONS

ACCOUNTS	CODE	ACTUAL LAST YEAR 2016	BUDGET THIS YEAR AS AMENDED 2017	BUDGET OFFICERS TENTATIVE BUDGET 2018	PRELIMINARY BUDGET 2018	ADOPTED 2018
SPECIAL ITEMS TAXES ON SEWER DISTRICT PROPERTY						
Contractual Exp.	SS1950.4					
Contingency	SS1990.4		18,119.00	26,839.00	26,839.00	26,839.00
TOTAL		0.00	18,119.00	26,839.00	26,839.00	26,839.00
ADMINISTRATION						
Personal Services	SS8110.1	4,271.00	4,356.00	4,443.00	4,443.00	4,443.00
Personal Services Dep	SS8110.1A					
Equipment	SS8110.2					
Contractual Exp.	SS8110.4	3,461.00	6,000.00	5,000.00	5,000.00	5,000.00
Drug Testing	SS8110.4A					
TOTAL		7,732.00	10,356.00	9,443.00	9,443.00	9,443.00
SEWAGE COLLECTING SYSTEM						
Personal Services	SS8120.1					
Personal Services - Deputy	SS8120.1A					
Equipment	SS8120.2	1,466.00	4,000.00	4,000.00	4,000.00	4,000.00
Contractual Exp.	SS8120.4	10,115.00	5,000.00	2,000.00	2,000.00	2,000.00
Electric Reimb.	SS8120.4A	800.00	1,000.00	1,000.00	1,000.00	1,000.00
FEMA	SS8120.4					
Contractual Exp.	SS8120.4PT	2,000.00	15,000.00	15,000.00	15,000.00	15,000.00
TOTAL		14,381.00	25,000.00	22,000.00	22,000.00	22,000.00
SEWAGE TREATMENT AND DISPOSAL						
Personal Services	SS8130.1					
Equipment	SS8130.2					
Contractual Exp.	SS8130.4					
Electric	SS8130.4A	6,711.00	7,500.00	7,500.00	7,500.00	7,500.00
Add'l Svc	SS8130.4B	1,345.00	2,500.00	3,500.00	3,500.00	3,500.00
VRI Contract	SS8130.4C	27,652.00	32,000.00	32,000.00	32,000.00	32,000.00
TOTAL		35,708.00	42,000.00	43,000.00	43,000.00	43,000.00
SEWAGE SAMPLING AND TESTING						
Contractual	SS8132.4	7,020.00	9,000.00	7,000.00	7,000.00	7,000.00
TOTAL		7,020.00	9,000.00	7,000.00	7,000.00	7,000.00
GENERAL OPERATION AND TRANSPORT SVC						
Personal Services	SS8140.1	661.00	3,000.00			
Personal Services- Mowing	SS8140.1A	625.00	2,000.00	2,000.00	2,000.00	2,000.00
Equipment - Mower & Fencing	SS8140.2			3,500.00	3,500.00	3,500.00
Contractual Exp.	SS8140.4	251.00	2,000.00			
TOTAL		1,537.00	7,000.00	5,500.00	5,500.00	5,500.00

2018

SEWER DISTRICT APPROPRIATIONS

ACCOUNTS	CODE	ACTUAL LAST YEAR 2016	BUDGET THIS YEAR AS AMENDED 2017	BUDGET OFFICERS TENTATIVE BUDGET 2018	PRELIMINARY BUDGET 2018	ADOPTED 2018
			UNDISTRIBUTED			
EMPLOYEE BENEFITS						
State Retirement	SS9010.8	851.00	3,000.00	693.00	693.00	693.00
Social Security	SS9030.8	413.00	1,000.00	1,000.00	1,000.00	1,000.00
Compensation Ins.	SS9040.8					
Life Insurance	SS9045.8					
Unemployment Ins.	SS9050.8					
Disability Ins.	SS9055.8					
Hospital and Medical Insurance	SS9060.8	600.00	600.00	600.00	600.00	600.00
In Lieu of Hosp. Ins	SS9060.8A					
Dental Ins	SS9060.8C	175.00	175.00	175.00	175.00	175.00
Medicare	SS9089.8					
TOTAL		2,039.00	4,775.00	2,468.00	2,468.00	2,468.00
DEBT SERVICE PRINCIPAL						
Serial Bonds	SS9710.6					
Statutory Bonds	SS9720.6					
Bond Anticipation	SS9730.6					
Capital Notes	SS9740.6					
Budget Notes	SS9750.6					
Revenue Antici.	SS9770.6					
Debt Payments to Public Authorities	SS9780.6					
TOTAL		0.00	0.00	0.00	0.00	0.00
INTEREST						
Serial Bonds	SS9710.7					
Statutory Bonds	SS9720.7					
Bond Anticipation	SS9730.7					
Capital Notes	SS9740.7					
Budget Notes	SS9750.7					
Revenue Antici.	SS9770.7					
Debt Payments to Public Authorities	SS9780.7					
TOTAL		0.00	0.00	0.00	0.00	0.00
INTERFUND TRANSFERS TRANSFER TO:						
Other Funds	SS9901.9					
Capital Project Fund	SS9950.9		12,500.00	12,500.00	12,500.00	12,500.00
TOTAL		0.00	12,500.00	12,500.00	12,500.00	12,500.00
BUDGETARY PROVISIONS FOR OTHER USES	SS962					
TOTAL APPROPRIATIONS AND OTHER USES		68,417.00	128,750.00	128,750.00	128,750.00	128,750.00 *

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2018

SEWER DISTRICT ESTIMATED REVENUES

ACCOUNTS	CODE	ACTUAL LAST YEAR 2016	BUDGET THIS YEAR AS AMENDED 2017	BUDGET OFFICERS TENTATIVE BUDGET 2018	PRELIMINARY BUDGET 2018	ADOPTED 2018	
Special Assessments	SS1030						
User Fees	SS2120	125,668.00	126,200.00	126,200.00	126,200.00	126,200.00	
Sewer Charges	SS2122						
Interest and Penalties On Sewer Rents	SS2128	3,641.00	2,500.00	2,500.00	2,500.00	2,500.00	
Services to Other Gov't	SS2374						
Interfund Revenue	SS2801						
Interest and Earnings	SS2401	460.00	50.00	50.00	50.00	50.00	
Interest - Reserve	SS2401R						
Sewer Permits	SS2590						
Sales of Scrap and Excess Materials	SS2650						
Sale of Equipment	SS2665						
Minor Sales, Other	SS2655						
Insurance Recoveries	SS2680						
FEMA	SS4960						
Other Compensation of Loss	SS2690						
State Aid for Operation and Maintenance of Sewage Disposal Plant	SS3901						
Reimb Prior Yr Expense	SS2701						
Other, Specify	SS2770						
________	SS____						
TOTAL		129,769.00	128,750.00	128,750.00	128,750.00	128,750.00	*
Levy For Operations & Maint							
UNEXPENDED BALANCE							*

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2019

SEWER DISTRICT APPROPRIATIONS

ACCOUNTS	CODE	ACTUAL LAST YEAR 2017	BUDGET THIS YEAR AS AMENDED 2018	BUDGET OFFICERS TENTATIVE BUDGET 2019	PRELIMINARY BUDGET 2019	ADOPTED 2019
SPECIAL ITEMS TAXES ON SEWER DISTRICT PROPERTY						
Contractual Exp.	SS1950.4					
Contingency	SS1990.4		26,839.00			
TOTAL		0.00	26,839.00	0.00	0.00	0.00
ADMINISTRATION						
Personal Services	SS8110.1	4,356.00	4,443.00	4,531.00	4,531.00	4,531.00
Personal Services Dep	SS8110.1A					
Equipment	SS8110.2					
Contractual Exp.	SS8110.4	3,289.00	5,000.00	5,000.00	5,000.00	5,000.00
Drug Testing	SS8110.4A					
TOTAL		7,645.00	9,443.00	9,531.00	9,531.00	9,531.00
SEWAGE COLLECTING SYSTEM						
Personal Services	SS8120.1					
Personal Services - Deputy	SS8120.1A					
Equipment	SS8120.2		4,000.00	4,000.00	4,000.00	4,000.00
Contractual Exp.	SS8120.4	8,803.00	2,000.00	2,500.00	2,500.00	2,500.00
Electric Reimb.	SS8120.4A	900.00	1,000.00	1,000.00	1,000.00	1,000.00
FEMA	SS8120.4					
Contractual Exp.	SS8120.4PT	13,613.00	15,000.00	15,000.00	15,000.00	15,000.00
TOTAL		23,316.00	22,000.00	22,500.00	22,500.00	22,500.00
SEWAGE TREATMENT AND DISPOSAL						
Personal Services	SS8130.1					
Equipment	SS8130.2					
Contractual Exp.	SS8130.4	9,662.00				
Electric	SS8130.4A	6,601.00	7,500.00	7,500.00	7,500.00	7,500.00
Add'l Svc	SS8130.4B	13,072.00	3,500.00	3,000.00	3,000.00	3,000.00
VRI Contract	SS8130.4C	30,786.00	32,000.00	32,600.00	32,600.00	32,600.00
TOTAL		60,121.00	43,000.00	43,100.00	43,100.00	43,100.00
SEWAGE SAMPLING AND TESTING						
Contractual	SS8132.4		7,000.00	7,000.00	7,000.00	7,000.00
TOTAL		0.00	7,000.00	7,000.00	7,000.00	7,000.00
GENERAL OPERATION AND TRANSPORT SVC						
Personal Services	SS8140.1					
Personal Services- Mowing	SS8140.1A		2,000.00	2,000.00	2,000.00	2,000.00
Equipment - Mower & Fencing	SS8140.2		3,500.00			
Contractual Exp.	SS8140.4					
TOTAL		0.00	5,500.00	2,000.00	2,000.00	2,000.00

2019

SEWER DISTRICT APPROPRIATIONS

ACCOUNTS	CODE	ACTUAL LAST YEAR 2017	BUDGET THIS YEAR AS AMENDED 2018	BUDGET OFFICERS TENTATIVE BUDGET 2019	PRELIMINARY BUDGET 2019	ADOPTED 2019
			UNDISTRIBUTED			
EMPLOYEE BENEFITS						
State Retirement	SS9010.8	639.00	693.00	693.00	693.00	693.00
Social Security	SS9030.8	498.00	1,000.00	1,000.00	1,000.00	1,000.00
Compensation Ins.	SS9040.8					
Life Insurance	SS9045.8					
Unemployment Ins.	SS9050.8					
Disability Ins.	SS9055.8					
Hospital and Medical Insurance	SS9060.8					
In Lieu of Hosp. Ins	SS9060.8A		600.00	600.00	600.00	600.00
Dental Ins	SS9060.8C					
Medicare	SS9089.8		175.00	175.00	175.00	175.00
TOTAL		1,137.00	2,468.00	2,468.00	2,468.00	2,468.00
DEBT SERVICE PRINCIPAL						
Serial Bonds	SS9710.6					
Statutory Bonds	SS9720.6					
Bond Anticipation	SS9730.6					
Capital Notes	SS9740.6					
Budget Notes	SS9750.6					
Revenue Antici.	SS9770.6					
Debt Payments to Public Authorities	SS9780.6					
TOTAL		0.00	0.00	0.00	0.00	0.00
INTEREST						
Serial Bonds	SS9710.7					
Statutory Bonds	SS9720.7					
Bond Anticipation	SS9730.7					
Capital Notes	SS9740.7					
Budget Notes	SS9750.7					
Revenue Antici.	SS9770.7					
Debt Payments to Public Authorities	SS9780.7					
TOTAL		0.00	0.00	0.00	0.00	0.00
INTERFUND TRANSFERS TRANSFER TO:						
Other Funds	SS9901.9					
Capital Project Fund	SS9950.9		12,500.00	42,500.00	42,500.00	42,500.00
TOTAL		0.00	12,500.00	42,500.00	42,500.00	42,500.00
BUDGETARY PROVISIONS FOR OTHER USES	SS962					
TOTAL APPROPRIATIONS AND OTHER USES ---		92,219.00	128,750.00	129,099.00	129,099.00	129,099.00 *

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2019

SEWER DISTRICT ESTIMATED REVENUES

ACCOUNTS	CODE	ACTUAL LAST YEAR 2017	BUDGET THIS YEAR AS AMENDED 2018	BUDGET OFFICERS TENTATIVE BUDGET 2019	PRELIMINARY BUDGET 2019	ADOPTED 2019
Special Assessments	SS1030					
User Fees	SS2120					
Sewer Charges	SS2122	115,708.00	126,200.00	126,200.00	126,200.00	126,200.00
Interest and Penalties On Sewer Rents	SS2128	2,277.00	2,500.00	2,500.00	2,500.00	2,500.00
Services to Other Gov't	SS2374					
Interfund Revenue	SS2801					
Interest and Earnings	SS2401	414.00	50.00	50.00	50.00	50.00
Interest - Reserve	SS2401R					
Sewer Permits	SS2590					
Sales of Scrap and Excess Materials	SS2650					
Sale of Equipment	SS2665					
Minor Sales, Other	SS2655					
Insurance Recoveries	SS2680					
FEMA	SS4960					
Other Compensation of Loss	SS2690					
State Aid for Operation and Maintenance of Sewage Disposal Plant	SS3901					
Reimb Prior Yr Expense	SS2701	100.00				
Other, Specify	SS2770					
______	SS___					
TOTAL Levy For Operations & Maint		118,499.00	128,750.00	128,750.00	128,750.00	128,750.00 *
UNEXPENDED BALANCE				349.00	349.00	349.00 *

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SEWER DISTRICT APPROPRIATIONS

2020

ACCOUNTS	CODE	ACTUAL LAST YEAR 2018	BUDGET THIS YEAR AS AMENDED 2019	BUDGET OFFICERS TENTATIVE BUDGET 2020	PRELIMINARY BUDGET 2020	ADOPTED 2020
SPECIAL ITEMS TAXES ON SEWER DISTRICT PROPERTY						
Sewer Engineering	SS1440.4				7,500.00	7,500.00
Contractual Exp.	SS1950.4					
Contingency	SS1990.4					
TOTAL		0.00	0.00	0.00	7,500.00	7,500.00
ADMINISTRATION						
Personal Services	SS8110.1	4,443.00	4,531.00	4,622.00	4,622.00	4,622.00
Personal Services Dep	SS8110.1A					
Equipment	SS8110.2					
Contractual Exp.	SS8110.4	2,281.00	5,000.00	5,000.00	5,000.00	5,000.00
Drug Testing	SS8110.4A					
TOTAL		6,724.00	9,531.00	9,622.00	9,622.00	9,622.00
SEWAGE COLLECTING SYSTEM						
Personal Services	SS8120.1					
Personal Services - Deputy	SS8120.1A					
Equipment	SS8120.2	7,202.00	4,000.00	54,000.00	46,500.00	46,500.00
Contractual Exp.	SS8120.4	2,636.00	2,500.00	4,000.00	4,000.00	4,000.00
Electric Reimb.	SS8120.4A	900.00	1,000.00	1,000.00	1,000.00	1,000.00
FEMA	SS8120.4					
Contractual Exp.	SS8120.4PT	11,252.00	15,000.00	15,000.00	15,000.00	15,000.00
TOTAL		21,990.00	22,500.00	74,000.00	66,500.00	66,500.00
SEWAGE TREATMENT AND DISPOSAL						
Personal Services	SS8130.1					
Equipment	SS8130.2					
Contractual Exp.	SS8130.4					
Electric	SS8130.4A	6,509.00	7,500.00	7,000.00	7,000.00	7,000.00
Add'l Svc	SS8130.4B	3,780.00	3,000.00	4,000.00	4,000.00	4,000.00
VRI Contract	SS8130.4C	31,582.00	32,600.00	33,500.00	33,500.00	33,500.00
TOTAL		41,871.00	43,100.00	44,500.00	44,500.00	44,500.00
SEWAGE SAMPLING AND TESTING						
Contractual	SS8132.4	6,480.00	7,000.00	7,000.00	7,000.00	7,000.00
TOTAL		6,480.00	7,000.00	7,000.00	7,000.00	7,000.00
GENERAL OPERATION AND TRANSPORT SVC						
Personal Services	SS8140.1					
Personal Services- Mowing	SS8140.1A	1,654.00	2,000.00	2,000.00	2,000.00	2,000.00
Equipment - Mower & Fencing	SS8140.2	3,221.00				
Contractual Exp.	SS8140.4					
TOTAL		4,875.00	2,000.00	2,000.00	2,000.00	2,000.00

2020

SEWER DISTRICT APPROPRIATIONS

ACCOUNTS	CODE	ACTUAL LAST YEAR 2018	BUDGET THIS YEAR AS AMENDED 2019	BUDGET OFFICERS TENTATIVE BUDGET 2020	PRELIMINARY BUDGET 2020	ADOPTED 2020
			UNDISTRIBUTED			
EMPLOYEE BENEFITS						
State Retirement	SS9010.8	682.00	693.00	693.00	693.00	693.00
Social Security	SS9030.8	463.00	1,000.00	1,000.00	1,000.00	1,000.00
Compensation Ins.	SS9040.8					
Life Insurance	SS9045.8					
Unemployment Ins.	SS9050.8					
Disability Ins.	SS9055.8					
Hospital and Medical Insurance	SS9060.8	600.00	600.00	600.00	600.00	600.00
In Lieu of Hosp. Ins	SS9060.8A					
Dental Ins	SS9060.8C	175.00	175.00	175.00	175.00	175.00
Medicare	SS9089.8					
TOTAL		1,920.00	2,468.00	2,468.00	2,468.00	2,468.00
DEBT SERVICE PRINCIPAL						
Serial Bonds	SS9710.6					
Statutory Bonds	SS9720.6					
Bond Anticipation	SS9730.6					
Capital Notes	SS9740.6					
Budget Notes	SS9750.6					
Revenue Antici.	SS9770.6					
Debt Payments to Public Authorities	SS9780.6					
TOTAL		0.00	0.00	0.00	0.00	0.00
INTEREST						
Serial Bonds	SS9710.7					
Statutory Bonds	SS9720.7					
Bond Anticipation	SS9730.7					
Capital Notes	SS9740.7					
Budget Notes	SS9750.7					
Revenue Antici.	SS9770.7					
Debt Payments to Public Authorities	SS9780.7					
TOTAL		0.00	0.00	0.00	0.00	0.00
INTERFUND TRANSFERS TRANSFER TO:						
Other Funds	SS9901.9					
Capital Project Fund	SS9950.9		42,500.00	42,500.00	42,500.00	42,500.00
TOTAL		0.00	42,500.00	42,500.00	42,500.00	42,500.00
BUDGETARY PROVISIONS FOR OTHER USES	SS962					
TOTAL APPROPRIATIONS AND OTHER USES		83,860.00	129,099.00	182,090.00	182,090.00	182,090.00 *

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2020

SEWER DISTRICT ESTIMATED REVENUES

ACCOUNTS	CODE	ACTUAL LAST YEAR 2018	BUDGET THIS YEAR AS AMENDED 2019	BUDGET OFFICERS TENTATIVE BUDGET 2020	PRELIMINARY BUDGET 2020	ADOPTED 2020	
Special Assessments	SS1030						
User Fees	SS2120	133,985.00	126,200.00	126,200.00	126,200.00	126,200.00	
Sewer Charges	SS2122						
Interest and Penalties On Sewer Rents	SS2128	3,032.00	2,500.00	2,500.00	2,500.00	2,500.00	
Services to Other Gov't	SS2374						
Interfund Revenue	SS2801						
Interest and Earnings	SS2401	663.00	50.00	50.00	50.00	50.00	
Interest - Reserve	SS2401R						
Sewer Permits	SS2590						
Sales of Scrap and Excess Materials	SS2650						
Sale of Equipment	SS2665						
Minor Sales, Other	SS2655						
Insurance Recoveries	SS2680						
FEMA	SS4960						
Other Compensation of Loss	SS2690						
State Aid for Operation and Maintenance of Sewage Disposal Plant	SS3901						
Reimb Prior Yr Expense	SS2701						
Other, Specify	SS2770						
____________	SS____						
TOTAL Levy For Operations & Maint		137,680.00	128,750.00	128,750.00	128,750.00	128,750.00	*
UNEXPENDED BALANCE			349.00	53,340.00	53,340.00	53,340.00	*

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2021

SEWER DISTRICT APPROPRIATIONS

ACCOUNTS	CODE	ACTUAL LAST YEAR 2019	BUDGET THIS YEAR AS AMENDED 2020	BUDGET OFFICERS TENTATIVE BUDGET 2021	PRELIMINARY BUDGET 2021	ADOPTED 2021
SPECIAL ITEMS TAXES ON SEWER DISTRICT PROPERTY						
Sewer Engineering	SS1440.4		7,500.00	5,000.00	5,000.00	5,000.00
Contractual Exp.	SS1950.4					
Contingency	SS1990.4					
TOTAL		0.00	7,500.00	5,000.00	5,000.00	5,000.00
ADMINISTRATION						
Personal Services	SS8110.1	4,531.00	4,622.00	4,622.00	4,622.00	4,622.00
Personal Services Dep	SS8110.1A					
Equipment	SS8110.2					
Contractual Exp.	SS8110.4	6,170.00	5,000.00	5,000.00	5,000.00	5,000.00
Drug Testing	SS8110.4A					
TOTAL		10,701.00	9,622.00	9,622.00	9,622.00	9,622.00
SEWAGE COLLECTING SYSTEM						
Personal Services	SS8120.1					
Personal Services - Deputy	SS8120.1A					
Equipment	SS8120.2	11,514.00	46,500.00	50,000.00	50,000.00	50,000.00
Contractual Exp.	SS8120.4	7,105.00	4,000.00	4,000.00	4,000.00	4,000.00
Electric Reimb.	SS8120.4A	900.00	1,000.00	1,000.00	1,000.00	1,000.00
FEMA	SS8120.4					
Contractual Exp.	SS8120.4PT	11,250.00	15,000.00	15,000.00	15,000.00	15,000.00
TOTAL		30,769.00	66,500.00	70,000.00	70,000.00	70,000.00
SEWAGE TREATMENT AND DISPOSAL						
Personal Services	SS8130.1					
Equipment	SS8130.2					
Contractual Exp.	SS8130.4					
Electric	SS8130.4A	6,691.00	7,000.00	7,000.00	7,000.00	7,000.00
Add'l Svc	SS8130.4B	5,135.00	4,000.00	4,000.00	4,000.00	4,000.00
VRI Contract	SS8130.4C	32,529.00	33,500.00	34,505.00	34,505.00	34,505.00
TOTAL		44,355.00	44,500.00	45,505.00	45,505.00	45,505.00
SEWAGE SAMPLING AND TESTING						
Contractual	SS8132.4	6,480.00	7,000.00	7,000.00	7,000.00	7,000.00
TOTAL		6,480.00	7,000.00	7,000.00	7,000.00	7,000.00
GENERAL OPERATION AND TRANSPORT SVC						
Personal Services	SS8140.1					
Personal Services- Mowing	SS8140.1A	777.00	2,000.00			
Equipment - Mower & Fencing	SS8140.2					
Contractual Exp.	SS8140.4					
TOTAL		777.00	2,000.00	0.00	0.00	0.00

2021

SEWER DISTRICT APPROPRIATIONS

ACCOUNTS	CODE	ACTUAL LAST YEAR 2019	BUDGET THIS YEAR AS AMENDED 2020	BUDGET OFFICERS TENTATIVE BUDGET 2021	PRELIMINARY BUDGET 2021	ADOPTED 2021
			UNDISTRIBUTED			
EMPLOYEE BENEFITS						
State Retirement	SS9010.8	688.00	693.00	693.00	693.00	693.00
Social Security	SS9030.8	405.00	1,000.00	1,000.00	1,000.00	1,000.00
Compensation Ins.	SS9040.8					
Life Insurance	SS9045.8					
Unemployment Ins.	SS9050.8					
Disability Ins.	SS9055.8					
Hospital and Medical Insurance	SS9060.8		600.00	600.00	600.00	600.00
In Lieu of Hosp. Ins	SS9060.8A					
Dental Ins	SS9060.8C		175.00	175.00	175.00	175.00
Medicare	SS9089.8					
TOTAL		1,093.00	2,468.00	2,468.00	2,468.00	2,468.00
DEBT SERVICE PRINCIPAL						
Serial Bonds	SS9710.6					
Statutory Bonds	SS9720.6					
Bond Anticipation	SS9730.6					
Capital Notes	SS9740.6					
Budget Notes	SS9750.6					
Revenue Antici.	SS9770.6					
Debt Payments to Public Authorities	SS9780.6					
TOTAL		0.00	0.00	0.00	0.00	0.00
INTEREST						
Serial Bonds	SS9710.7					
Statutory Bonds	SS9720.7					
Bond Anticipation	SS9730.7					
Capital Notes	SS9740.7					
Budget Notes	SS9750.7					
Revenue Antici.	SS9770.7					
Debt Payments to Public Authorities	SS9780.7					
TOTAL		0.00	0.00	0.00	0.00	0.00
INTERFUND TRANSFERS TRANSFER TO:						
Other Funds	SS9901.9					
Capital Project Fund	SS9950.9		42,500.00	42,500.00	42,500.00	42,500.00
TOTAL		0.00	42,500.00	42,500.00	42,500.00	42,500.00
BUDGETARY PROVISIONS FOR OTHER USES	SS962					
TOTAL APPROPRIATIONS AND OTHER USES		94,175.00	182,090.00	182,095.00	182,095.00	182,095.00 *

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2021

SEWER DISTRICT ESTIMATED REVENUES

ACCOUNTS	CODE	ACTUAL LAST YEAR 2019	BUDGET THIS YEAR AS AMENDED 2020	BUDGET OFFICERS TENTATIVE BUDGET 2021	PRELIMINARY BUDGET 2021	ADOPTED 2021	
Special Assessments	SS1030						
User Fees	SS2120	121,384.00	126,200.00	126,200.00	145,130.00	145,130.00	
Sewer Charges	SS2122						
Interest and Penalties On Sewer Rents	SS2128	3,994.00	2,500.00	2,500.00	2,500.00	2,500.00	
Services to Other Gov't	SS2374						
Interfund Revenue	SS2801						
Interest and Earnings	SS2401	2,614.00	50.00	50.00	50.00	50.00	
Interest - Reserve	SS2401R						
Sewer Permits	SS2590						
Sales of Scrap and Excess Materials	SS2650						
Sale of Equipment	SS2665						
Minor Sales, Other	SS2655						
Insurance Recoveries	SS2680						
FEMA	SS4960						
Other Compensation of Loss	SS2690						
State Aid for Operation and Maintenance of Sewage Disposal Plant	SS3901						
Reimb Prior Yr Expense	SS2701						
Other, Specify	SS2770						
____________	SS____						
TOTAL		127,992.00	128,750.00	128,750.00	147,680.00	147,680.00	*
Levy For Operations & Maint							
UNEXPENDED BALANCE			53,340.00	53,345.00	34,415.00	34,415.00	*

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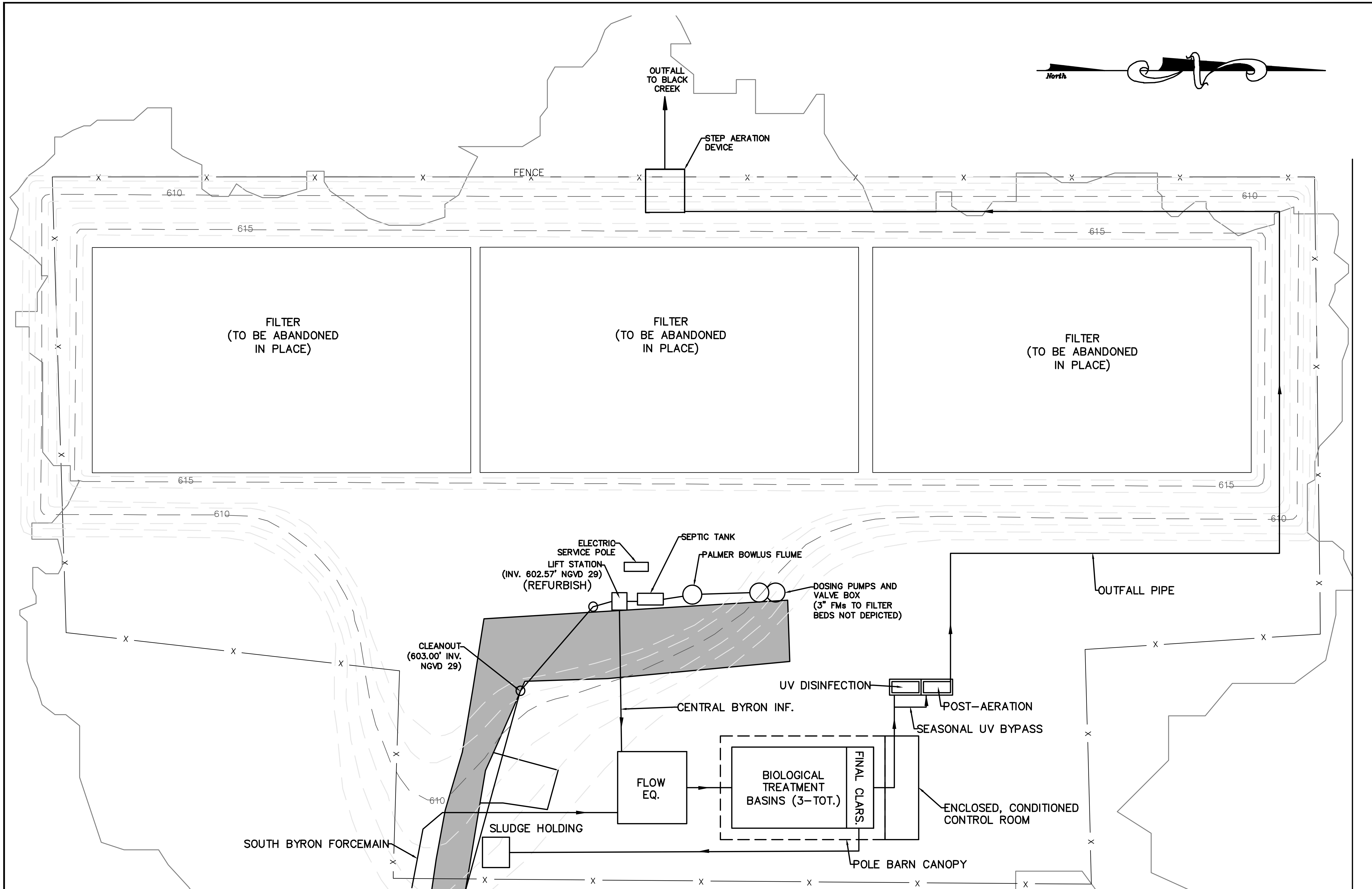
APPENDIX K

PROPOSED SITE PLAN – ALTERNATIVE #4



DRAWING ALTERATION
THE FOLLOWING IS AN EXCERPT FROM THE NEW YORK EDUCATION LAW ARTICLE 145 SECTION 7209 AND APPLIES TO THIS DRAWING.
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No.	REVISIONS AND DESCRIPTIONS	BY	DATE

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GENESEE COUNTY, NEW YORK

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APPENDIX L

DRAFT TOTAL MAXIMUM DAILY LOAD (TMDL) FOR PHOSPHOROUS IN UPPER BLACK CREEK AND BIGELOW CREEK PREPARED BY NYSDEC, SEPTEMBER 2013

DRAFT

Total Maximum Daily Load (TMDL) for Phosphorus in Upper Black Creek and Bigelow Creek

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September 2013

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1.0 Introduction

1.1 Background

In April of 1991, the United States Environmental Protection Agency (EPA) Office of Water's Assessment and Protection Division published "Guidance for Water Quality-based Decisions: The Total Maximum Daily Load (TMDL) Process." In July 1992, EPA published the final "Water Quality Planning and Management Regulation" (U.S. EPA April 1991). Together, these documents describe the roles and responsibilities of EPA and the states in meeting the requirements of Section 303(d) of the Federal Clean Water Act (CWA) as amended by the Water Quality Act of 1987, Public Law 100-4. Section 303(d) of the CWA requires each state to identify those waters within its boundaries not meeting water quality standards for any given pollutant applicable to the water's designated uses.

Further, Section 303(d) requires EPA and states to develop TMDLs for all pollutants violating or causing violation of applicable water quality standards for each impaired water body. A TMDL determines the maximum amount of pollutant that a water body is capable of assimilating while continuing to meet the existing water quality standards. Such loads are established for all the point and nonpoint sources of pollution that cause the impairment at levels necessary to meet the applicable standards with consideration given to seasonal variations and margin of safety. TMDLs provide the framework that allows states to establish and implement pollution control and management plans with the ultimate goal indicated in Section 101(a)(2) of the CWA: "water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water, wherever attainable" (U. S. EPA March 1991).

1.2 Problem Statement

Black Creek is divided into three segments: Upper, Middle and Lower (Figure 1). The main stem of Black Creek runs over 46 miles before its confluence with the Genesee River and has a drainage area of about 202 square miles (129,280 acres). The headwaters of Black Creek originate in Wyoming County, New York, in the Town of Middlebury and then flow north into Genesee County. Within Genesee County the Upper Black Creek (UBC) watershed includes areas of the Towns of Bethany, Stafford, LeRoy, Batavia and Byron, and the City of Batavia.

Upper Black Creek (WI/PWL ID 0402-0048) was listed on the New York State Section 303(d) List of Impaired Waters Requiring a TMDL in 2004 due to impairments caused by phosphorus and is considered a high priority waterbody for TMDL development. Agriculture and municipal waste were identified as the source. The New York State Priority Waterbodies List indicates that aquatic life is known to be impaired and recreation is known to be stressed in UBC.

Bigelow Creek (WI/PWL ID 0402-0016), a subwatershed of UBC, was listed in the 303(d) list in 2004 due to phosphorus impairment with agriculture identified as the primary source. Aquatic life is known to be impaired in the Creek. Pathogens, silt/sediment and unknown toxicity have also been identified as suspected pollutants. Streambank erosion has also been identified as a suspected source of pollutants.

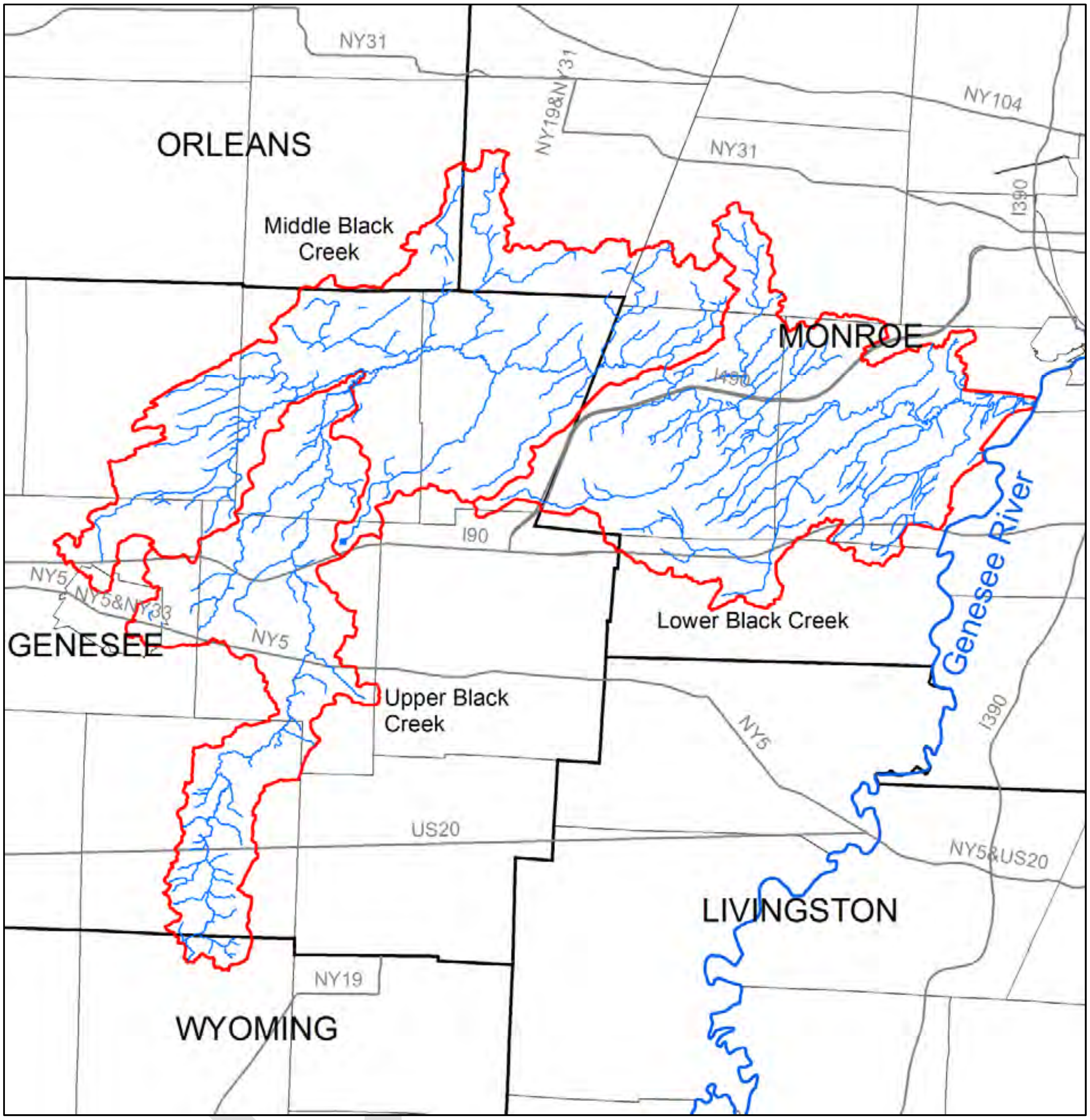

Figure 1: Black Creek watershed showing the Upper, Middle and Lower watershed segments.

An earlier effort to develop a TMDL was postponed because numeric nutrient criteria for phosphorus protective of the aquatic life use were not yet developed enough to identify an endpoint (CEI 2011b). Instead a watershed restoration strategy was developed to quantify the phosphorus loads to Black Creek and to identify different actions which could be undertaken.

Upper Black and Bigelow Creeks remain on the 303(d) List of Impaired Waters. This TMDL for phosphorus has been developed to address the impairments to aquatic life best uses in Upper Black and Bigelow Creeks. Part of the work associated with the development of this TMDL was the development of site specific numeric nutrient criteria to address the aquatic life best use impairments of these Creeks. The development of this TMDL has progressed with the recognition that a watershed restoration based approach to nutrient management and protection of aquatic life is more practical and efficient than addressing nutrients alone.

2.0 System Characterization

2.1 Watershed Characterization

The Black Creek watershed is located within the Genesee River Basin and has a total drainage area of about 202 square miles (129,280 acres). Black Creek originates in northern Wyoming County, flows northerly until Byron in Genesee County, and then easterly to join the Genesee River 3 miles upriver of the Barge Canal in Monroe County. Downstream from Byron the Creek passes through the Byron-Bergen Swamp and then passes over a spillway dam in the Village of Churchville. The USGS maintains a stream gage (Site Number 04231000) below the dam.

Upper Black Creek (UBC) is defined as the portion of the watershed from the confluence of Spring and Black Creeks near Byron, upstream to the headwaters. The main stem of UBC is nearly 27 miles long and has a drainage area of 46 square miles (29,042 acres). The majority of UBC falls within Genesee County with only a small portion of the headwaters located within Wyoming County. The watershed contains the lands of six towns and one city. Upper Black Creek has one major tributary, Bigelow Creek, which has a drainage area of 10 square miles (6,436 acres) and a main channel stream length of 10.7 miles. The confluence between Bigelow and Black Creek is 3.8 miles upstream from the outlet of the UBC watershed. The headwaters of Bigelow Creek are located partially within the City of Batavia.

Digital land use/land cover data were obtained from the 2006 National Land Cover Database (NLCD2006) (Fry, et al. 2011). NLCD2006 is a consistent representation of land use across the conterminous United States at 30 meter resolution. Land use within UBC and Bigelow Creek is detailed in Table 1 and shown graphically in Figure 2 and Figure 3, respectively. Agriculture is the dominant land use in both watersheds. Developed land is also important due in part to the City of Batavia which is located partially within the Bigelow Creek watershed. Within the developed land use category in UBC, open space is 2,022 acres (7.0%), which can, in large part, be attributed to three golf courses found within the UBC watershed, two of which are located within the Bigelow Creek subwatershed. Roads appear within NLCD2006 as either high or low intensity developed land. Land use distribution throughout the watershed is shown in Figure 4.

Approximately 1,634 acres (5.6%) of the UBC watershed is served by sanitary sewer districts. The majority of this (1,444 acres, 5.0%) is served by the Town of Batavia sewer district, which is transferred out of the UBC watershed for treatment at the City of Batavia sewage treatment plant (STP) (SPDES number NY0026514). The Byron Sewer District provides sanitary sewer service in the northern end of the UBC watershed via two separate systems: the South Byron Sewer District STP serving approximately 72 acres (0.2%), and the Byron Sewer District STP serving approximately 118 acres (0.4%). Buildings within the remaining 94.4% of the UBC watershed are assumed to use on-site wastewater treatment (septic) systems.

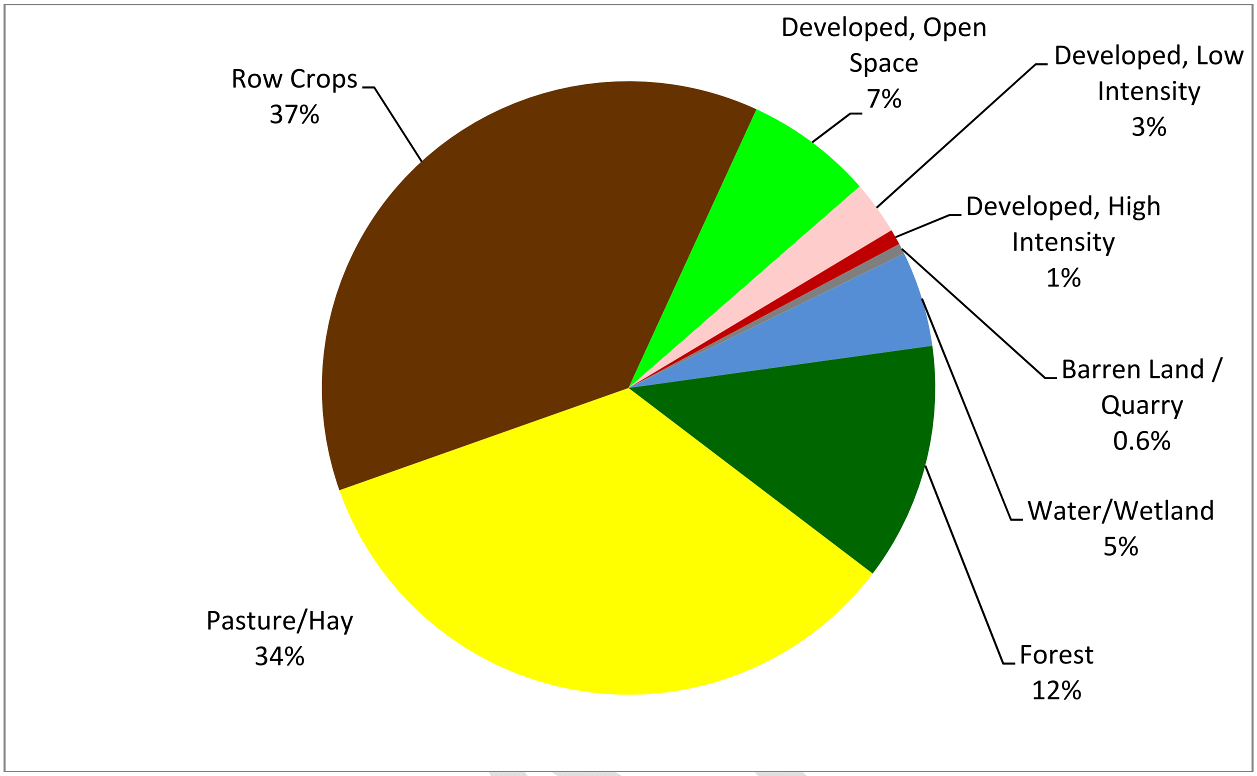

Figure 2: Land use in Upper Black Creek.

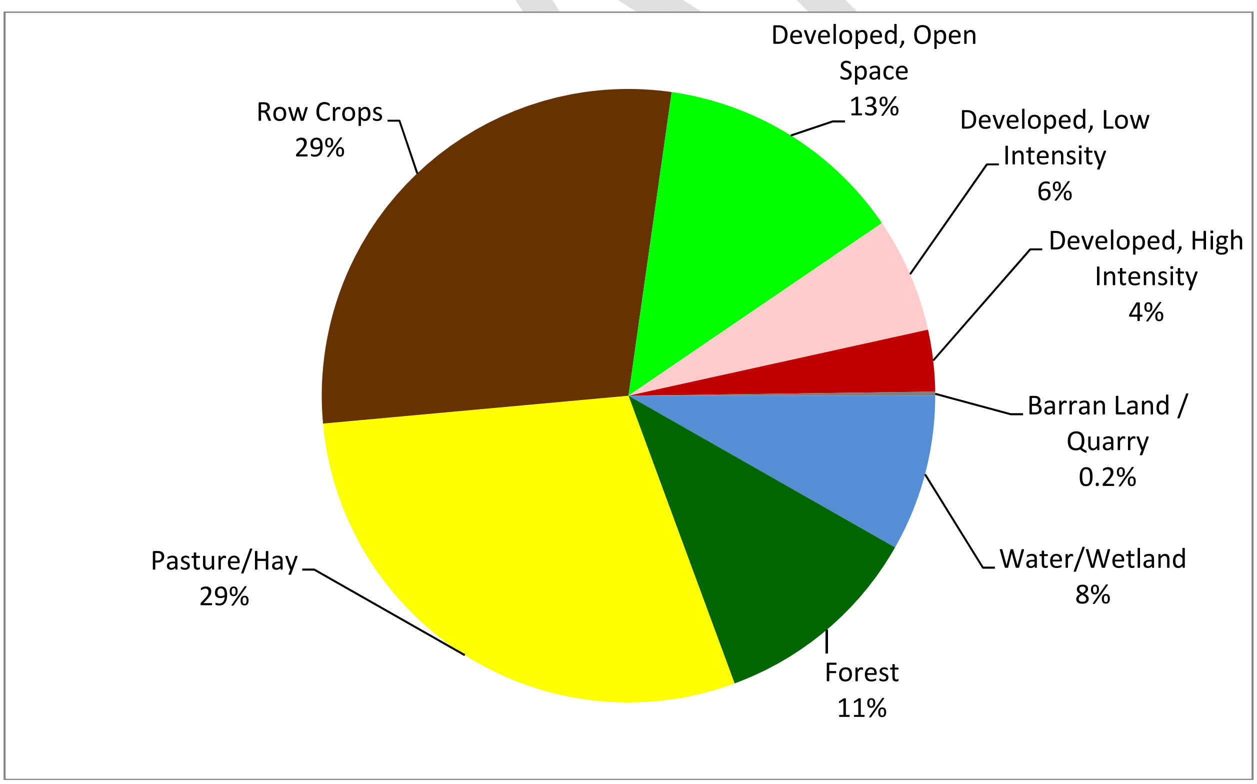

Figure 3: Land use in Bigelow Creek.

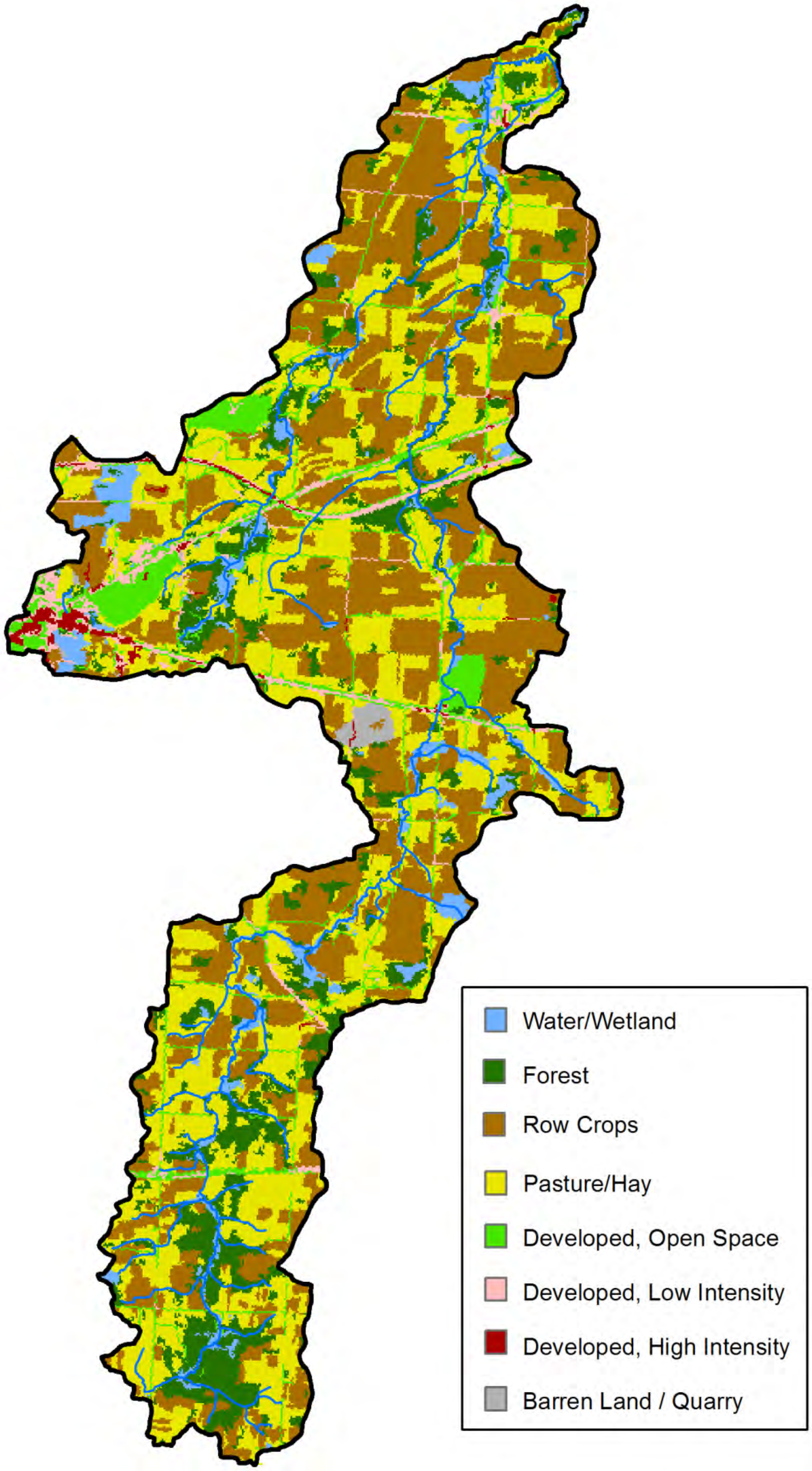

Figure 4: Land Use Distribution within the Upper Black Creek watershed

Table 1: Land Use in Upper Black and Bigelow Creeks. Upper Black Creek is inclusive of Bigelow Creek.

	Upper Black Creek		**Bigelow Creek**	
Land Use Description	**Area (acres)**	**Percent**	**Area (acres)**	**Percent**
Water/Wetland	1,464	5.0%	529	8.2%
Forest	3,684	12.7%	716	11%
Agriculture	20,645	71.7%	3719	58%
Pasture/Hay	*9,876*	*34.0%*	*1875*	*29%*
Row Crops	*10,769*	*37.1%*	*1844*	*29%*
Developed Land	3,090	10.6%	1448	22%
Open Space	*2,022*	*7.0%*	*850*	*13.2%*
Low Intensity	*825*	*2.8%*	*390*	*6.1%*
High Intensity	*242*	*0.8%*	*208*	*2.2%*
Barren Land/ Quarry	160	0.6%	13.9	0.2%
Total	**29,042**	**100%**	**6,442**	**100%**

2.2 Stream Characterization

Upper Black Creek originates within the northernmost portion of Wyoming County from lands dominated by agriculture. Flowing north into Genesee County, UBC enters a county park before returning to a predominantly agricultural land use. Between sites BLAK-03 and 04 the stream gradient decreases and the Creek exhibits deeper, slow moving waters (Figure 5). Land use is still dominated by agriculture; however, row crops become the dominant agricultural land use and forests decrease from more than 20% of the land use to less than 10%.

Between sites BLAK-04 and BLAK-05 (Figure 5), UBC passes over a large escarpment formed by the edge of the carbonate bedrock of the Onondaga Limestone (Reddy and Kappel 2010). The limestone formation is known to contain karst features and may be a potential source of water to UBC at the escarpment face. Modeling by Winslow (2012) of the Black Creek watershed indicated the formation may be a source of water in February, March and April.

The fraction of land use best described as rural residential increases in the portion of UBC below the escarpment; however agriculture is still the dominant land use, with row crops increasingly more important than hay/pasture.

Bigelow Creek (BC), a significant tributary to UBC, enters just below BLAK-08 (Figure 5). The headwaters of BC are within the City of Batavia. The area is served by both sanitary and stormwater sewers. Sanitary waste is transferred out of the basin. Several ponds and natural springs are located within the upper portions of BC. Agriculture accounts for nearly 60% of the land use while developed land, as a mix of open, low intensity and high intensity, account for another 20%.

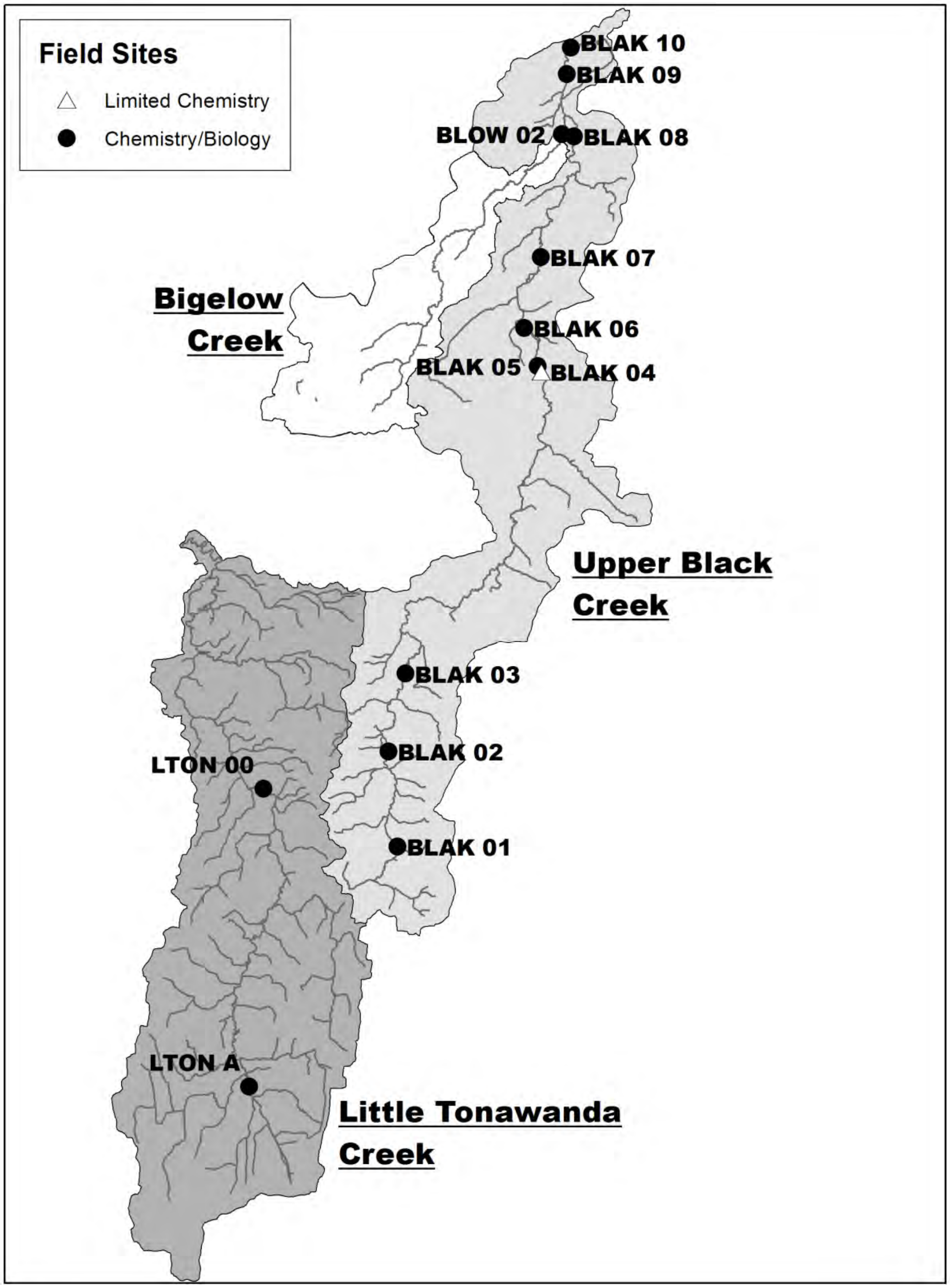

Figure 5: Sampling locations within the study watersheds.

The official water body classifications for New York State are contained in Title 6 of the New York Codes, Rules and Regulations. Black Creek is covered in Part 721; the Water Index Number is Ont. 117-19. The UBC watershed primarily contains waters identified as class “C.”

Bigelow Creek (Ont. 117-19-30) has one tributary, Thornell Brook (Ont. 117-19-30-3) to which “C(T)” standards apply. Several ponded waters within the Bigelow Creek watershed are designated as class “B”: Godfrey’s Pond (Ont. 117-19-30-P 17), Horseshoe Lake (Ont. 117-19-30-P 18), Chapin’s Pond (Ont. 117-19-30-P 18a) and Seven Springs Pond (Ont. 117-19-30-P 19). No water quality data for these waters is available.

The best usage of Class B waters is primary and secondary contact recreation and fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival (NYSDEC 2008).

The best usage of Class C waters is fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes (NYSDEC 2008).

The symbol (T), appearing in an entry in the “standards” column in the classification tables of Parts 800 through 941 of 6 NYCCR Chapter X, means that the classified water in that specific item are trout waters. Any water quality standard, guidance value, or thermal criterion that specifically refers to trout or trout waters applies.

2.3 Water Quality

Several previous measurements of water quality data in Black Creek are available. A Water Quality Restoration Strategy (WQRS) prepared for New York State Department of Environmental Conservation (NYSDEC) by the Center for Environmental Initiatives (CEI) conducted water quality sampling within UBC in August and September of 2010 (CEI 2011b). Data from the 2000 NYSDEC Rotating Integrated Basin Studies (RIBS) was collected in Byron at the State Route 237 bridge with samples collected between April and November. The USGS collected data at the USGS gage station in Churchville (Site Number 04231000) below the Churchville dam. Summary data from the three sources are presented in Table 2. Only the CEI and RIBS data were collected within the UBC watershed. An additional 55 total phosphorus measurements made from 1970 to 1975 by the USGS are not reported here.

Table 2: Existing total phosphorus monitoring data in Black Creek

	CEI	RIBS	USGS
Year(s)	2010	2000	1998-2011
Location	Outlet of Upper Black Creek	State Route 237 in Byron	USGS gage in Churchville
Number of Samples	4	10	645
Min TP (µg/L)	70	21	17
Max TP (µg/L)	91	107	810
Avg. TP (µg/L)	83	58	70

Table 3: Monitoring data collected in Black Creek by Winslow (2012) from June 2010 to June 2011.

Site	Upper Black Creek		Bigelow Creek		Middle Black Creek	
Condition	Event	Nonevent	Event	Nonevent	Event	Nonevent
Mean TP (µg/L)	198.5	69.0	200.4	60.2	94.6	54.9
Mean SRP (µg/L)	90.0	41.1	81.6	27.7	37.6	21.0
Mean TSS (µg/L)	37.9	6.3	41.2	5.7	17.4	6.8

Winslow (2012) sampled Black Creek for multiple water quality parameters at several locations throughout the watershed from June 2010 to June 2011. Parameters sampled included total phosphorus (TP), soluble reactive phosphorus (SRP) and total suspended solids (TSS). Samples were collected during or shortly after rainfall events (event) and during baseflow conditions (nonevent). Summary data from three sites are presented in Table 3. The Upper Black Creek sites corresponds roughly to site BLAK-10 (Figure 5), the Bigelow Creek site to sample site BLOW-02 (Figure 5) and Middle Black Creek was located near the dam in Churchville.

Phosphorus data collected for the development of this TMDL are summarized in Table 4. Additional details on the data collected are included in Appendix A. Site locations are shown in Figure 5.

2.4 Biological Conditions

Macroinvertebrates are excellent indicators of overall water quality. NYS has a long standing program of assessing biological conditions in streams using macroinvertebrate samples collected in riffles through its RIBS program. Assessments are carried out using a Biological Assessment Profile (BAP) score which consists of the mean of several individual 10-scale metrics.

Table 4: Base (non-event) flow average phosphorus concentrations collected from May 30 to September 19, 2012 for the development of this TMDL. For the purpose of this TMDL, these samples are considered to represent the summer growing season.

Site	Number of samples	Soluble Reactive Phosphorus (µg/L)	Total Phosphorus (µg/L)
BLAK-01	7	11	42
BLAK-02	7	8	23
BLAK-03	7	7	40
BLAK-04	6	53	75
BLAK-05	7	54	72
BLAK-06	7	50	65
BLAK-07	7	45	66
BLAK-08	7	67	93
BLAK-09	8	58	89
BLAK-10	8	81	124
BLOW-02	8	42	82
LTON-00	7	5	14
LTON-A	6	6	22

Historically four individual metrics have been used by NYSDEC to determine the BAP score. A fifth metric, which specifically incorporates the impact of nutrients, has been developed and is used for the assessments associated with this TMDL. Water quality impact is assessed using the BAP score with a four-tiered scale of impact (non-, slight, moderate, or severe) (Smith, Heitzman, et al. 2012). A BAP score less than 5.0, corresponding to moderate of severe impact, designates impaired biological conditions which do not meet the fish, shellfish and wildlife propagation and survival best uses identified for these waters (Section 2.2).

As part of the RIBS program, NYSDEC has conducted biological monitoring within the UBC watershed several times since 1996, sampling a total of 3 sites. Two sites on the main stem of UBC were sampled: BLAK-08[1] at the Cockram Road Bride and BLAK-10 near the Route 237 bridge (Figure 5). Bigelow Creek at the Caswell Road bridge, site BLOW-02, was sampled once. Original assessments of impairment were based upon a four metric BAP score. To be consistent with the biological assessment metric used for this TMDL, the historic results were reassessed using the five metric BAP, the results from which are shown in Table 5. Summary data from previous assessments are included in Appendix D in the Priority Waterbodies List for UBC and Bigelow Creek.

Macroinvertebrate samples collected in September 2012 as part of the development of this TMDL indicates that the majority of UBC is moderately impacted based upon the 5-metric BAP score and would therefore be considered impaired (Figure 6). One site, BLAK-03, showed severe impact and two sites, BLAK-06 and BLOW-02, showed only slight impact and would not be considered impaired. Both of the Little Tonawanda (LTON) reference sites were slightly impacted. BAP scores in the upper watershed may have been suppressed due to low-flow or no-flow conditions during part of the summer. Low-flow or no-flow conditions may also have resulted in a decreased BAP score in the upper watershed of the neighboring Little Tonawanda Creek watershed (Figure 5), which was used as a watershed reflective of best attainable conditions during the numeric endpoint development (Appendix A).

Table 5: Results from past RIBS sampling in Upper Black Creek. A level of impact of moderate or severe is considered impaired. Historic data was reassessed using the 5 metric BAP criteria. See text for further details.

Site	Year	BAP Score	Level of Impact
BLAK-08	1996	3.68	Moderate
BLAK-08	2008	5.12	Slight
BLAK-10	1996	4.50	Moderate
BLAK-10	1999	4.13	Moderate
BLAK-10	2000	3.43	Moderate
BLAK-10	2004	5.07	Slight
BLAK-10	2009	4.78	Moderate
BLOW-02	1999	4.47	Moderate

[1] The site identification numbers used for this field work differed from those used by the RIBS program. The corresponding numbers are: BLAK-08 corresponds to RIBS site BLAK-01, BLAK-10 to RIBS site BLAK-02 and BLOW-02 to RIBS site BLOW-01.

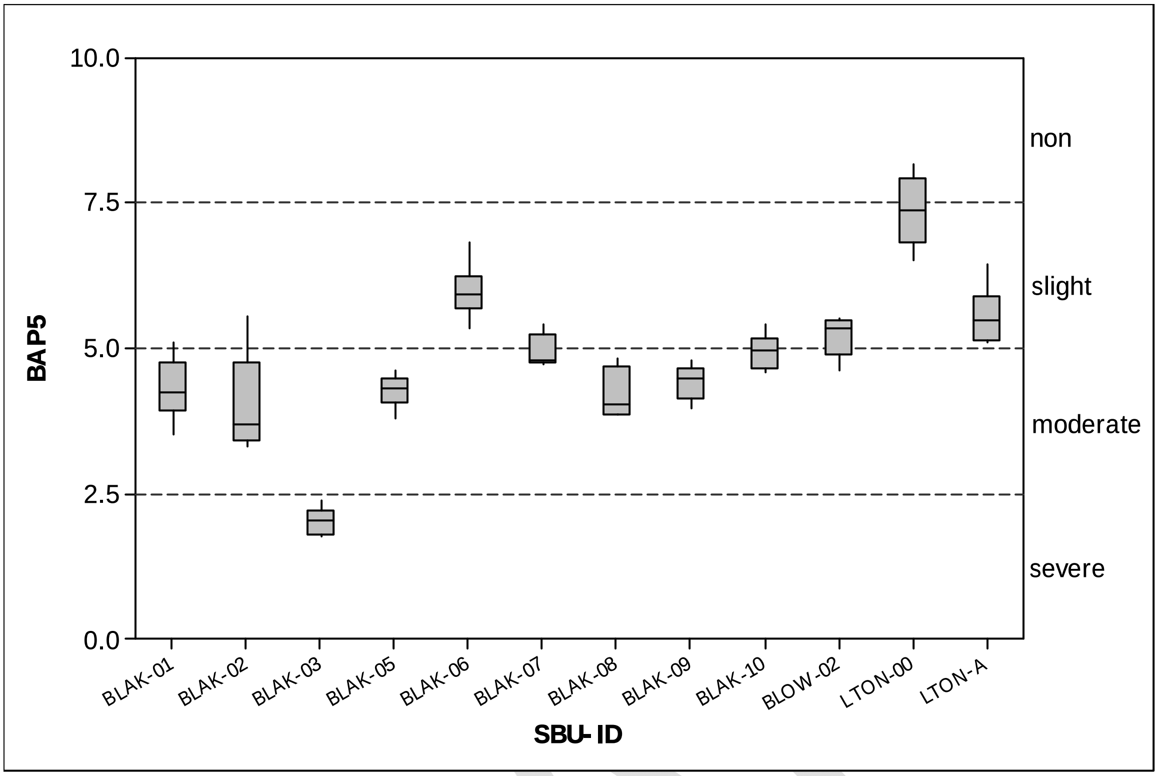

Figure 6: Five Metric BAP scores for 2012. Boxes show 25th percentile, median and 75th percentile scores. Whiskers indicate minimum and maximum measured values. Scores less than 5 are considered impaired by NYSDEC. See Figure 5 for site locations.

3.0 Water Quality Standards and Supporting Information for Numeric Water Quality Targets

3.1 Applicable Water Quality Standards

The official water body classifications are contained in Title 6 of the New York Codes, Rules and Regulations. The Black Creek watershed is covered in Part 821; Black Creek's Water Index Number is Ont. 117-19. The watershed contains primarily class "C" waters, however the Bigelow Creek (Ont. 117-19-30) watershed also contains both class "C(T)" and class "B" waters as previously discussed in Section 2.2.

New York State has a narrative standard for nutrients (phosphorus and nitrogen) applicable to all class "B" and "C" waters: "none in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages" (NYSDEC 2008). NYSDEC has not translated this standard into a numeric water quality criterion for lotic (flowing water) systems, including streams and rivers. Statewide numeric nutrient criteria are currently being developed. Part of the assessment associated with the development of this TMDL has been to develop site specific numeric nutrient criteria (Appendix A).

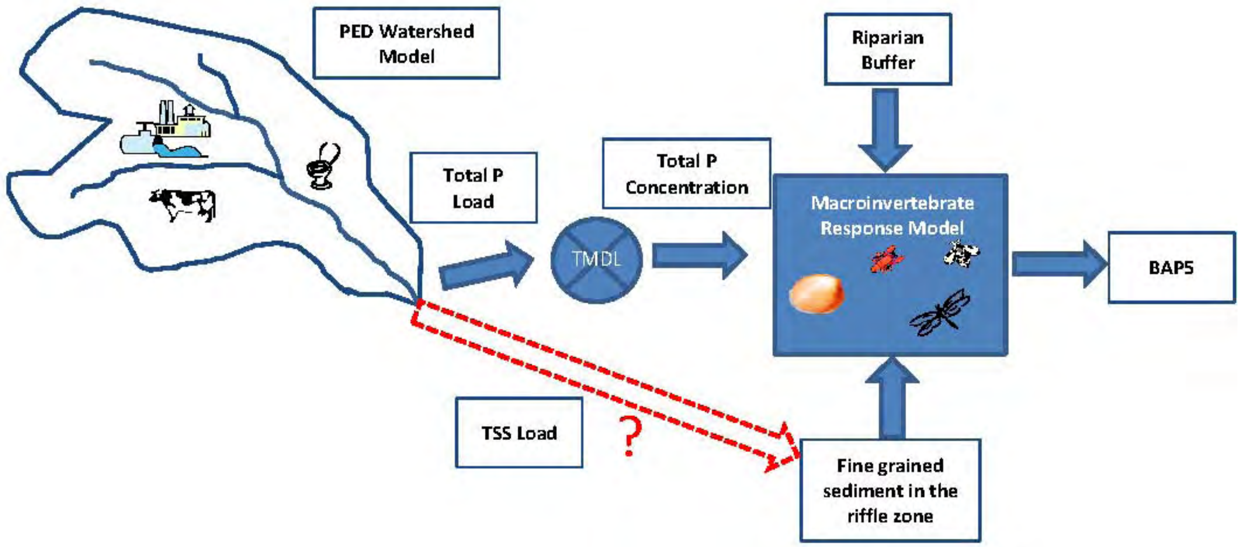

Figure 7: Conceptual diagram of the interaction between the different model component and the TMDL.

3.2 Modeling Approach

A suite of models were used for the development of this TMDL to estimate water flow and phosphorus loads from land within the watershed and to model the impact of these parameters on aquatic life within the watershed. An overview of each of the modeling components are presented below. Additional details on the watershed, sediment and phosphorus models are presented in Appendix C and on the macroinvertebrate response model in Appendix A. Conceptually, the interaction between the different models and the TMDL are depicted in Figure 7. The literature indicates the amount of fine grained material in the riffle zone may be attributed to erosion in the watershed (Cover, et al. 2006, Larsen, Baughan and Ormerod 2009); however, this relationship was not quantified as part of this TMDL.

3.2.1 Hydrology Model

The Parameter Efficient Distributed (PED) model is a semi-distributed rainfall-runoff model based upon the Thornthwaite and Mather (1955) water balance procedure and can be run at daily, weekly, or monthly time steps (Collick, et al. 2009, Tesemma, Mohamed and Steenhuis 2010, Steenhuis, et al. 2009). Watersheds are divided into three regions, each with a separate water balance. Conceptually, the three regions represent a restricted infiltration area, high infiltration area usually along the hillslope, and flatter (bottom) areas that potentially become saturated. The restricted infiltration areas are characteristic of exposed bedrock, hardpan, or other restricted infiltration areas which produce surface runoff. Water which infiltrates into the permeable hillslopes is transported via the subsurface as rapid interflow in the shallow subsurface or as baseflow through deeper soil and rock layers. The bottom areas which drain the surrounding hillslopes become surface runoff sources when saturated. Infiltrated water may also be lost from the subsurface via evapotranspiration. Precipitation may reach the stream as either subsurface flow from the permeable hillslopes or as overland flow from the restricted infiltration areas or the bottom areas once saturated. Methods described by Walter, et al. (2005) were used to model snowmelt. Additional information including equations can be found in the referenced publications.

3.2.2 Sediment Model

Within the model, sediment is generated from each of the same three model regions (hillslope, baseflow, runoff) used in the hydrology. The model follows the form $L = aQ^n$ where L is the sediment load in kg/km^2/day, Q is flow in m^3/day, the exponent n is a calibrated parameter which is common across all model regions and the coefficient a is a calibrated parameter for each of the model regions. The coefficient a for runoff is much greater than for interflow or baseflow.

3.2.3 Phosphorus Model

The phosphorus model is comprised of two components, a particulate phosphorus (PP) model, which builds upon the sediment model and a soluble reactive phosphorus model (SRP). Total phosphorus is the sum of the PP and SRP fractions. The PP model uses an enrichment factor, $E= 12.5S^{-0.35}$, where S is the sediment load from the sediment model following the work of Vadas et al. (2005), Sharpley (1980) and Menzel (1980). For S < 0.5 kg/km^2/day, E = 15.9. Sediment particles are enriched with less phosphorus as more sediment is produced and transported. PP is calculated as the product of: the amount of sediment transported, the enrichment factor, and a reference soil phosphorus concentration. A single calibrated value of the reference soil phosphorus concentration was used in the PP model. PP loads from the STPs were incorporated explicitly into the model.

SRP in the model uses calibrated loading reference rates for up to 24 different combinations of: the four land use categories, the 2 water table depth categories and the three model hydrologic outflow types. Land use categories are row (assumed non-perennial) crops, grass (assumed perennial) crops, developed land and other land use which is primarily forest and wetlands. Shallow water tables reach the surface often enough to influence soil properties. SRP load is calculated as the product of: the reference concentration, the volume of water generated, and for the hillslope and baseflow categories, a temperature adjustment factor.

3.2.4 Macroinvertebrate Response Model

Macroinvertebrate community assemblages are driven by a wide range of physicochemical factors. Stream geomorphology and the flow of resources change in a predictable manner as they flow from headwaters downstream (Vannote et al. 1980). These changes are a result of natural physicochemical shifts that occur along a continuum throughout the watershed. Anthropogenic influences, however, can accelerate and alter resource flow changes through land use and habitat alterations. Additional nutrients and eutrophication of waterbodies result. The relationship between nutrients and primary production in streams is confounded by the complicated interaction of light, flow, substrate, substrate stability, sedimentation, temperature, shading, flooding, grazing, and a number of other interrelated variables (Smith, Tilman and Nekola 1999, Miltner and Rankin 1998). Habitat degradation that impacts any number of variables may potentially increase algal production (Hynes 1970, Cushing and Allan 2001, Delong and Brusven 1998). Nutrient enrichment also causes oxygen depletion resulting from plant respiration and decomposition. Eutrophication driven changes in primary production alter resource quality and quantity and therefore affect consumers such as macroinvertebrates and aquatic life through changes in community structure, function, and abundance (Rosemond, Mulholland and Elwood 1993).

Macroinvertebrates are excellent indicators of overall water quality. The species comprising the community each occupy a distinct niche defined and limited by a set of environmental requirements. The composition of the macroinvertebrate community is thus determined by many factors, including habitat, food source, flow regime, and temperature (Allan, Erickson and Fay 1997, Rempel, Richardson and Healey 2000). The NYSDEC Stream Biomonitoring Unit employs well established methods and a multi-metric index for the biological assessment of water quality using the macroinvertebrate community as indicators (Smith, et al. 2012). The multi-metric index, the 5 metric biological assessment profile (BAP) score, provides an overall assessment of the macroinvertebrate community, with BAP < 5 indicating moderate or severe impact. The BAP score is used by NYSDEC to assess attainment of the fish, shellfish and wildlife survival and propagation designated best use.

To identify a numeric endpoint for this TMDL, data collected during the summer 2012 growing season was used to quantify the macroinvertebrate community response to the phosphorus load, thus linking the indicator directly to the pollutant load while accounting for instream and habitat influences on the assimilative capacity of the stream. By using a multiple regression model it was determined that the variability in the BAP score could be explained by a constant and three linear terms. The independent variables selected were the concentration of a form of phosphorus (either the soluble reactive or total phosphorus, SRP or TP, respectively), the total riparian width (TRW) and the non-dimensional fraction of fines in the riffle (FFR). Growing season average phosphorus concentration data was used in the model development, based upon samples collected twice per month. For the purpose of this TMDL the growing season has been defined as June through September. Phosphorus concentrations in samples collected on May 16 and 17 were much lower than those collected during the rest of the sampling period. These samples were deemed not representative of the summer growing season. Samples collected on May 30 and 31 have phosphorus concentrations in good agreement with those collected in the June – September period. Chemistry data from the end of May were included in the calculation of the growing season average as these samples would be representative of concentrations measured in early June. TRW is the sum of the widths of riparian buffers on either side of the stream, in meters. FFR is the fraction of bed material less than 16 mm in diameter determined by pebble count in the riffle (Smith, et al. 2012).

Both TP and SRP were considered for use in the macroinvertebrate response model. SRP proved to be a stronger predictor of BAP score; however, for consistency with SPDES permits and the numeric nutrient criteria currently under development by NYSDEC, TP was selected for use in the model. Using TP is more conservative than SRP (Appendix A). The resulting equation for the macroinvertebrate response model was:

$$BAP = 5.59 - 17.4 \times TP + 0.091 \times TRW - 3.43 \times FFR$$

This model indicates that BAP score may be improved by actions which decrease TP, increase TRW and/or decrease FFR. The equation had an R^2 of 70.0%.

3.3 Numeric Water Quality Target

As indicated in Section 2.2, the waters of Upper Black Creek and Bigelow Creek must be suitable for fish, shellfish and wildlife propagation and survival, as well as for primary and secondary contact recreation. Macroinvertebrates provide an excellent indicator of overall water quality and NYS has a long standing, robust program for assessing biological best use attainment using macroinvertebrates (Sections 2.4 and 3.2.4).

Attainment of the designated best uses for fish, shellfish and wildlife propagation and survival in New York is based upon achieving a BAP score of 5 or greater. As the 303(d) listings for Upper Black Creek and Bigelow Creek are due to aquatic life use impairments, attainment of BAP ≥ 5 would indicate the waterbodies are in attainment of that best use.

The numeric endpoint for this TMDL will be to achieve a BAP score of 5 or greater at the BLAK-08, BLAK-10 and BLOW-02 sites. This assessment criterion is consistent with the current criteria used by the NYSDEC stream biomonitoring unit (Smith, Heitzman, et al. 2012) and with the numeric nutrient criteria currently being developed by NYSDEC (Smith and Tran 2010). Assessment of the macroinvertebrate community at BLAK-10 was the reason UBC was determined to be impaired. BLOW-02 is being included as Bigelow Creek is listed separately on the 303(d) list as impaired for phosphorus. BLAK-08 is included to address the upper parts of the watershed, which is primarily agricultural, separate from the lower parts of UBC and from Bigelow Creek. This will ensure that sufficient restoration practices are targeted towards the upper parts of the watershed.

Based upon the macroinvertebrate response model, if only TP is to be reduced, the TP concentrations shown in Table 6 would need to be met in order to achieve a BAP ≥5. Many practices put in place to reduce TP may also have beneficial impacts upon FFR and/or TRW. Alternately, practices may be put in place solely to reduce FFR or increase TRW. Section 7.1 provides further information on how restoration of the stream corridor by decreasing FFR or increasing TRW may achieve BAP ≥ 5 with smaller decreases in TP concentrations. The criteria for delisting UBC from the 303(d) list will be the attainment of a BAP ≥ 5, independent of whether the TP concentrations shown in Table 6 are achieved.

Table 6: Maximum allowable TP concentration in order to achieve a BAP score of 5 given the values for FFR and TRW measured in September 2012.

Site	Fraction fines in riffle (FFR) (-)	Total Riparian Width (TRW) (m)	Total Phosphorus (TP) Target (mg/L)
BLAK-08	0.30	18	0.048
BLOW-02	0.39	20	0.083*
BLAK-10	0.30	20	0.121

***The 2012 assessment determined a BAP score greater than 5 for Bigelow Creek. The target concentration is therefore held constant at the measured value.**

4.0 Source Assessment

4.1 Analysis of Phosphorus Contributions

This TMDL will focus on quantifying and reducing total phosphorus (TP). The models described in Section 3.2 were used to estimate phosphorus loading from the watershed to Upper Black Creek. The output from the model was used to determine the contribution of phosphorus from the different types of land use categories present within the watershed. Flow and concentration data were used when available to include point sources as discreet loads in the model.

4.2 Sources of Phosphorus Loading

Total phosphorus loads from the watershed for the period of 1979 to 2012 were estimated from the models. Point source loads were estimated from monitoring data when available. Sources and associated loads are shown in Table 7 and Figures 8, 9 and 10 for sites BLAK-08, BLAK-10 and BLOW-02, respectively. Nonpoint source loads were attributed to the different sectors using the results of the SRP model. Daily loads, as presented in this TMDL for source assessment and load allocations refers to a typical summer growing season day characterized by average phosphorus concentrations and median flows (see also Section 6.4). The summer growing season is defined here as June through September.

Table 7: Estimated phosphorus loads to Upper Black Creek and Bigelow Creek during the growing season (June to September). Upper Black Creek at BLAK-10 is inclusive of Bigelow Creek.

	Upper Black Creek at BLAK-08		**Bigelow Creek**		**Upper Black Creek at BLAK-10**	
Source	**Load (lb/d)**	**Percent**	**Load (lb/d)**	**Percent**	**Load (lb/d)**	**Percent**
Background (Forest, Wetland)	0.03	1%	0.01	2%	0.05	1%
Agriculture	1.49	64%	0.24	36%	1.84	46%
Developed Land (including septic systems)	0.37	16%	0.37	56%	0.80	20%
Point Sources	0.44	19%	0.04	6%	1.30	33%
Total	**2.33**	**100%**	**0.66**	**100%**	**3.99**	**100%**

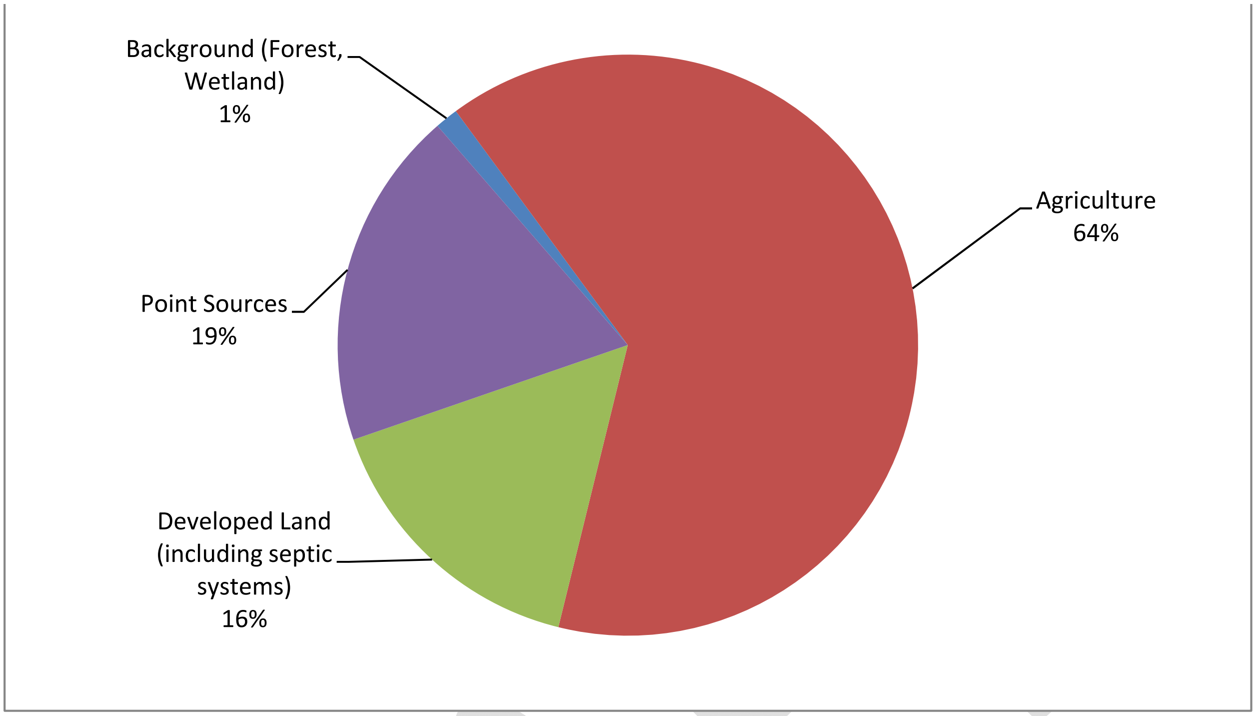

Figure 8: Estimated phosphorus loads to Upper Black Creek at BLAK-08

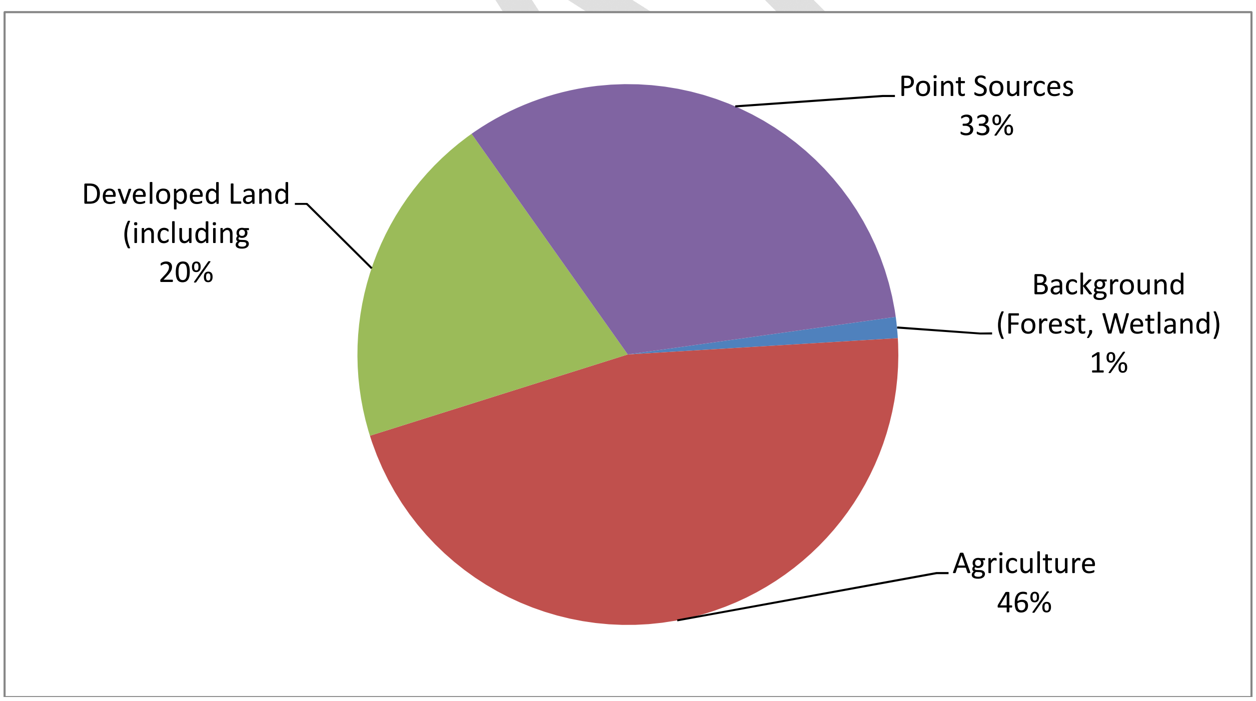

Figure 9: Estimated phosphorus loads to Upper Black Creek at BLAK-10.

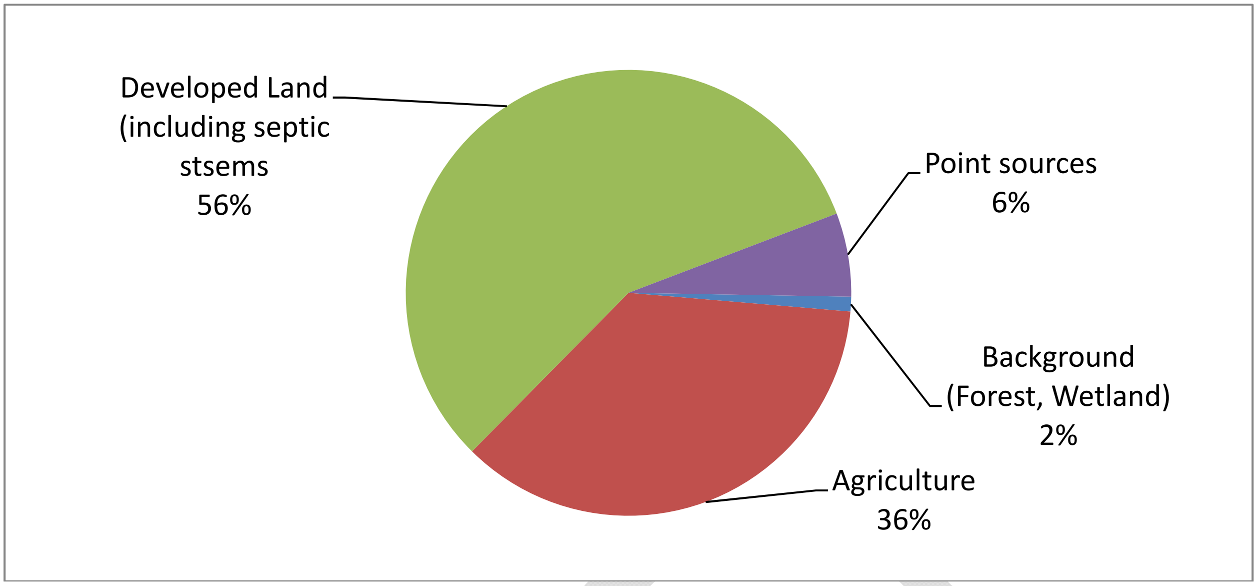

Figure 10: Estimated phosphorus loads to Bigelow Creek

4.2.1 SPDES Permits

Discharges of wastewater to the waters of New York are regulated under State Pollution Discharge Elimination System (SPDES) permits. Discharges within the UBC watershed which discharge phosphorus containing waste are listed in Table 8 and their locations within the watershed are shown in Figure 11. When available, growing season (June – September) loads are based off of reported flows and concentration values for that period. Otherwise, for point source discharges, growing season loads are calculated as one-third of the annual load. Point sources are estimated to contribute 1.30 lb/d of total phosphorus, or about 33% of the total load at BLAK-10.

Two publicly owned wastewater treatment plants currently discharge into the UBC watershed: the Byron Sewer District Sewage Treatment Plant (Byron SDSTP) and the South Byron Sewage District Sewage Treatment Plant (South Byron SDSTP). These two discharges, and North Byron SDSTP which discharges to Spring Creek, have been administrative combined under SPDES permit number NY0160971 as outfalls 001M, 002M and 003M, respectively. Effluent phosphorus concentrations were determined from a single effluent sample and mass balance calculations based upon water samples collected from UBC above and below the outfalls (Appendix B). Total phosphorus concentrations were estimated to be 3.70 mg/L for the Byron SDSTP and 2.85 mg/L for the South Byron SDSTP. SRP concentrations were estimated to be 3.42 mg/L and 2.72 mg/L, respectively. The permitted flow at Byron SDSTP is 0.053 MGD but DMR data from March 1999 to February 2013 indicate an annual average flow of only 0.033 MGD and a growing season average of 0.0264 MGD. The permitted flow at South Byron SDSTP is 0.025 MGD and the DMR data from the same period indicate an average flow of 0.019 MGD and a growing season average flow of 0.0159 MGD. Flows exceeded the permitted flow ten times at Byron SDSTP, primarily in the spring. At the South Byron SDSTP the permitted flow is exceeded frequently between October and May with a total of 25 excursions since March 2008.

The Batavia Country Club (NY0159069) is a private, commercial and institutional (PCI) permitted discharge within the Bigelow Creek watershed. There are no SRP measurements for the Batavia Country Club discharge. Conservatively, the estimated TP load was assumed to be all SRP. Sampling in Black Creek by SUNY Brockport also identified the Hanson Aggregate Stafford Quarry (NYR00D626) as a potential source of phosphorus (Table 8) (Winslow 2012). The phosphorus attributed to Hanson Quarry results from mine dewatering due to groundwater inflow and does not contain additional phosphorus from mine operations.

Two medium and one large concentrated animal feeding operation (CAFO) are located within the UBC watershed. Animal counts for each CAFO in 2009 and the number of acres of land to which manure was applied is listed in Table 9. Locations of the CAFOs are shown in Figure 11. East View Farm operates under a combined permit with Lor-Rob Dairy Farm. Some of the land application acreage may lie outside the watershed for those CAFOs near watershed boundary. Additionally, a number of CAFOs are also located just outside of the watershed which may land apply manure within UBC. These discrepancies are assumed to compensate one another. Under the nutrient management plans required of medium and large CAFOs, land application of manure is to occur at agronomic rates. Lands receiving manure in accordance with a comprehensive nutrient management plan are therefore no more a source of phosphorus than other types of agricultural lands receiving fertilizer i.e. row crops.

Table 8: Upper Black Creek SPDES permits

Permit	Name	Receiving Water	Annual Soluble Reactive Phosphorus (lb/yr)	Annual Total Phosphorus Load (lb/yr)	Growing Season Total Phosphorus Load (lb/d)
NY0160971 Outfall 001M*	Byron Sewer District Sewage Treatment Plant	Black Creek	312**	338**	0.81**
NY0160971 Outfall 002M*	South Byron Sewer District Sewage Treatment Plant	Black Creek	199**	208**	0.38**
NY0159069	Batavia Country Club	Bigelow Creek	≤14[†]	14[†]	0.04
NY0073610	Barber's/Batavia Party House	Groundwater	0	0	0
NYR00D626	Hanson Aggregate Stafford Quarry	Black Creek	2.1[#]	21.2[#]	0.06

* Permits for Byron, S. Byron and N. Byron SDSTPs have been administratively combined under a single permit (NY0160971) as outfalls 001M, 002M and 003M, respectively. South Byron was previously covered under permit NY0160989.

**See Appendix B for the calculation of these loads.

†2,000 gpd at 2.3 mg/L TP. No SRP data was available. Conservatively, SRP is assumed equal to TP.

[#] Based off of samples collected from a drainage ditch receiving the water resulting from mine dewatering (Winslow 2012).

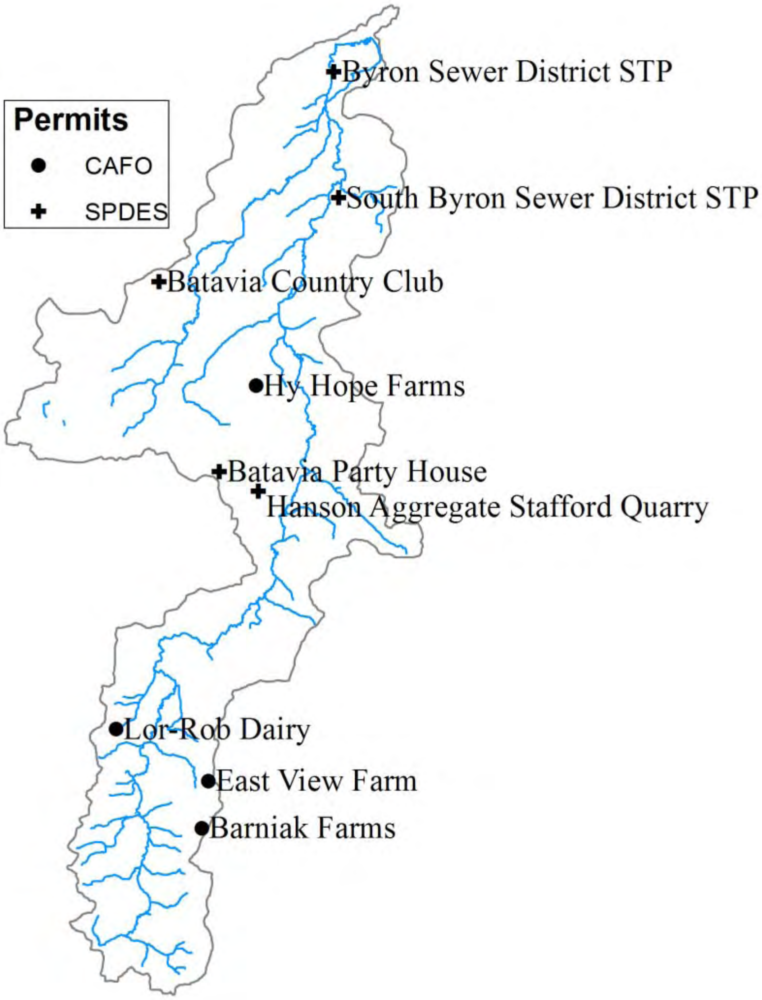

Figure 11: Location of permitted discharges within the Upper Black Creek watershed

Table 9: Upper Black Creek CAFOs

Permit	**Name**	**Size**	**Mature Dairy Cattle****	**Dairy Heifers****	**Land Application Acres**
NYA001421	Barniak Farms	Medium	620	600	1,830
NYA000271	Lor-Rob Dairy Farm	Large	2,156	1,572	2,500
NYA000102	Hy Hope Farms, Inc.	Medium	565	350	1,116
*	East View Farm	*	*	*	*

*Operates under a combined CAFO registration with Lor-Rob Dairy Farm. Animal counts combined.
**2009 data.

4.2.2 Onsite Wastewater Treatment (Septic) Systems

Nearly 95% (27,408 acres) of the UBC watershed relies upon onsite wastewater treatment systems (OWTS, also known as septic systems) for wastewater treatment. Properly operating systems dispose of wastewater to the subsurface where soils remove phosphorus. Systems may fail for a number of reasons including: improper maintenance, poor soil permeability, insufficient distance to ground or surface waters and direct connections to surface waters.

CEI, in their preparation of the Water Quality Restoration Strategy for Upper Black Creek determined the phosphorus loads to UBC from OWTS (CEI 2011b, CEI 2011a). CEI estimated there are about 3,300 septic systems in UBC of varying age, type and level of maintenance. The following details CEI's estimates of OWTS systems within UBC (CEI 2011a):

> Following methodology of earlier New York TMDL studies approved by NYSDEC, CEI estimates that 100% of the septic systems within 50 feet of streams and 85% of the septic systems between 50 and 250 feet of streams should be categorized as substandard in some way. In addition, an estimated 15% of the septic systems greater than 250 feet from a stream are assumed to also be malfunctioning. Therefore CEI projects that a total of 627 (19%) of the 3,300 Upper Black Creek watershed septic systems are substandard. This overall percentage is similar to that reported from surveys in other states.
>
> Understanding the likely failure modes is also important. The AVGWLF model [used by CEI for the Water Quality Restoration Strategy development] provides for the following categories of substandard septic systems: direct discharge (i.e., piped directly to surface waters), short-circuiting (i.e., close proximity to surface/ground waters not allowing full treatment), and ponding (i.e. discharge to ground surface). Based on previous TMDL studies in NY, and utilizing its best judgment and understanding of the watershed, CEI estimates that:
>
> - Of the 73 systems within 50 feet of a stream, about 5% (4) were direct discharges and 95% (69) were defined as short-circuiting.
> - Of the 99 systems between 50 and 250 feet of a stream, approximately 3% (3) were direct discharges, 77% (76) were defined as short-circuiting, 5% (5) ponding, and the remaining 15% (15) were functioning normally.
> - Of the 3,127 systems greater than 250 feet of a stream, 15% (469) were estimated to be substandard, of which 1% (5) were estimated to have direct discharge, 19% (89) were ponded, and 80% (375) were short-circuited.
>
> Overall, in the Upper Black Creek watershed, approximately 627 (19%) of the estimated 3,300 Black Creek watershed septic systems were categorized as substandard, with 10 direct discharges, 96 ponded, and 521 short-circuits. Since the AVGWLF model deals with human populations, these system numbers can be converted to population numbers using the standard household size of 2.61 (2000 census).

Based on the assessment conducted by CEI, OWTS contributed about 85% of the combined OWTS and developed land annual TP load (CEI 2011b). Most of this load is assumed to be delivered as SRP however some seasonal variation in load may occur due to lower rates of failure during periods when groundwater tables are lower. OWTS were not included explicitly within the model used for the development of this TMDL. Their contribution is accounted for within the developed land use category. Above site BLAK-08, developed land contributes about 0.37 lb/d of the total load. If a similar percentage of the combined OWTS and developed land load is attributed to OWTS as indicated by CEI's data (85%), approximately 0.31 lb/d is attributable to OWTS at site BLAK-08. Within the Bigelow Creek watershed, developed land contributes 56% of the total load. Much of this comes from urban runoff from the developed lands in and around the City of Batavia. These lands are served by sanitary sewer and therefore do not contribute to the OWTS load. OWTS are still used within the rest of the subwatershed, thus the OWTS load for Bigelow Creek is estimated to be 0.08 lb/d based upon a similar loading rate (lb/acre/day) as observed in the rest of the watershed. Below BLAK-08 and BLOW-02 downstream to BLAK-10, developed land and OWTS contribute 0.06 lb/d, of which 0.05 lb/d is estimated to be attributable to OWTS.

4.2.3 Agricultural Runoff

Agricultural is the primary land use within UBC with row crops encompassing 10,769 acres (37.1%) of the watershed and pasture/hay encompassing an additional 9,876 acres (34.0%). These lands are estimated to contribute 1.84 lb/d of phosphorus, or about 46% of the total load at BLAK-10. Of that, 1.49 lb/d originates from above site BLAK-08. Within Bigelow Creek agricultural lands constitute about 58% of the total subwatershed area. Phosphorus loading is estimated at 0.24 lb/d during the growing season, or about 36% of the total load.

4.2.4 Urban and Residential Development Runoff

Developed land comprises 3,090 acres (10.6%) of the watershed. Of that, open space (parks, golf courses, etc.) contributes 2,022 acres (7.0%) and the remaining 1,068 acres (3.6%) are comprised of low intensity and high intensity development.

Of the 242 acres (0.8%) of high intensity development, roughly half occurs within the city of Batavia (Figure 4). The city of Batavia contains 24% of the developed land within UBC. Developed lands are estimated to contribute a combined 0.80 lb/d of phosphorus to UBC, or 20% of the total load at BLAK-10. Of that load, approximately 0.44 lb/d is attributed to OWTS, as discussed in Section 4.2.2. The remaining 0.36 lb/d is from developed lands, much of which originates from the developed lands in and around the City of Batavia, although there are sources throughout the watershed including roads and other developed areas.

4.2.5 Background

Forested land comprises 3,684 acres (12.7%) of the UBC watershed. Wetlands cover 1,464 acres (5%) of the watershed. Phosphorus contributions from natural background source areas comprised 0.05 lb/d, or 1% of the total phosphorus load at BLAK-10. Phosphorus contributions from water/wetlands and forest are considered a component of the background loading.

4.2.6 Other Sources

Atmospheric deposition, wildlife, waterfowl, and domestic pets are also potential sources of phosphorus loading to the Creek. All of these small sources of phosphorus are incorporated into the land used loadings as identified in the TMDL analysis (and therefore are accounted for). The relative contribution of these sources is minor.

5.0 Determination of Load Capacity

The Parameter Efficient Distributed (PED) watershed model was used in combination with Macroinvertebrate Response Model to develop the Upper Black Creek phosphorus TMDL. This approach consisted of using PED to determine the growing season water volume and total phosphorus load delivered to the UBC and Macroinvertebrate Response Model to define the extent to which the watershed loads need to be reduced to meet the water quality target established in Section 3.3.

The determination of the load capacity for this TMDL uses growing season average total phosphorus concentrations and growing season median flows. The growing season was used in the analysis because this was the identified critical period characterized by high phosphorus concentrations, high temperatures (which increases productivity and decreasing dissolved oxygen [DO] saturation) and low stream flows. Outside the growing season conditions are less likely to cause impairment because of lower phosphorus concentrations, lower temperatures and higher flows. Seasonal median flow and mean phosphorus concentration were used because long term exposure to high phosphorus concentrations and low flows create the conditions for excess algal growth which decreases DO, leading to macroinvertebrate use impairment.

5.1 Model Results

The watershed model was used to estimate streamflow, sediment loads and phosphorus loads within Upper Black Creek from January 1, 1979 to April 12, 2013. Details of the model development and calibration are in Appendix C. The output of the watershed model was total phosphorus concentrations at each of the sampling locations (Figure 5) as well as locations downstream used for model development. Results from the phosphorus model for 2010 to 2012 are shown in Figure 12 for site BLAK-10. This site was one of the most data rich sites with total phosphorus (TP) and soluble reactive phosphorus (SRP) measurements during the summer of 2012 made by NYSDEC and from June 2010 to June 2012 made by Winslow (2012). Overall the model does a good job of predicting phosphorus concentrations. There is some indication that the model over predicts the concentration during dry events e.g. August 2012. This is an artifact of the hydrology model which tends to under predict stream flow during very dry periods, yielding less water available for dilution of point source loads.

While the focus of this study was on the growing season, others have modeled Upper Black Creek and reported total phosphorus loads on an annual basis. The annual loads predicted by this

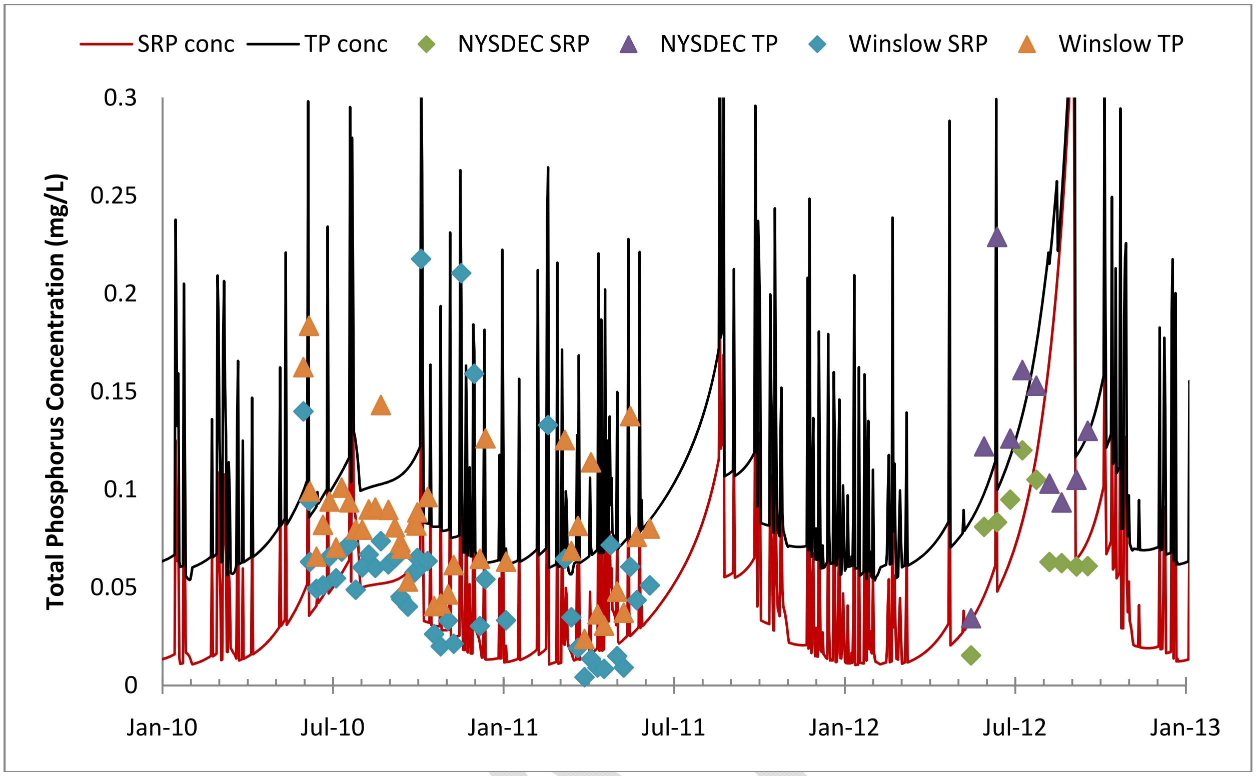

Figure 12: Time series of modeled total phosphorus (TP) and soluble reactive phosphorus (SRP) at BLAK-10 and corresponding measured concentrations.

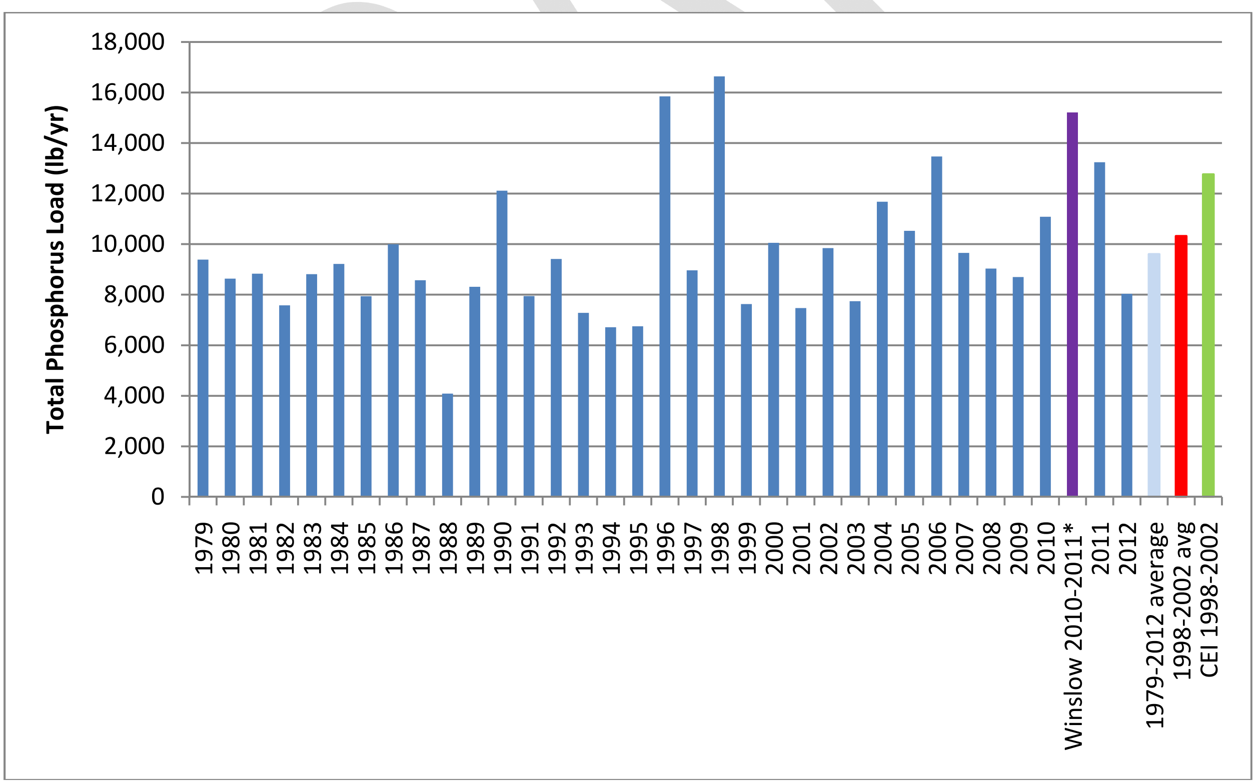

Figure 13: Annual phosphorus loads from this (blue) and other studies. *The data from Winslow (2012) covered June 2010 to June 2011.

model and several others (Winslow 2012, CEI 2011b) are shown in Figure 13 for the sake of comparison. The load predicted by Winslow for June 2010 to June 2011 is somewhat higher than the load from this study for either 2010 or 2011 although because of the different timeframes a direct comparison is not possible. CEI also modeled the watershed from 1998-2002 and produced a modeled load of 12,769 lb/yr. For the same time period the PED modeled TP load was 10,328 lb/yr, a difference of about 20%. CEI used a different numerical model which was calibrated using data from the USGS gage in Churchville so some discrepancy between the different models is expected.

The phosphorus model used for this TMDL has significant annual variation in load in response to different weather patterns. Dry years resulted in less delivered phosphorus (2008) while wet years resulted in greater phosphorus loads (1996, 1998).

Loading capacities of UBC and Bigelow Creek were determined using the growing season hydrology model results from 1979 through 2012. The growing season average target concentrations (Table 6) were used to determine growing season load capacities. The target concentrations were the concentrations determine by the macroinvertebrate response model (Section 3.2.4) which would result in use attainment through phosphorus reductions alone.

5.2 Load Duration Curves

Duration curves are useful when there is a correlation between water quality impairments and flow conditions. The U.S. EPA has prepared guidance for using load duration curves (LDCs) in the development of TMDLs (U.S. EPA 2007). LDCs are developed using time series of flow data and water quality data. Flow data may be measured or modeled. For TMDL development the water quality endpoint is a water quality standard or other water quality target. The LDC is developed by multiplying the stream flow by the water quality target, yielding an allowable load that is a function of stream flow. By using the flow time series to calculate flow percentiles, the duration curve identified how often a given flow, and therefore load, can occur.

LDCs may be developed for the entire year or may focus on smaller time periods such as seasons or months. For this TMDL the focus is upon reducing total phosphorus concentrations in the stream during the growing season, defined here as June through September. Flow and concentration data from the growing season were used to develop the LDCs. Focusing upon this period ensures that sufficient reductions will occur during the typical growing season flows when the impact upon the macroinvertebrates is the greatest.

Load capacities at three separate sites within UBC were determined for this TMDL. BLAK-10 is the bottom of the UBC watershed and was the assessment point which resulted in UBC being listed on the 303(d) list. Bigelow Creek also appears on the 303(d) list, thus the load capacity at BLOW-02 was determined in order to prepare a TMDL for this waterbody as well. The load capacity at BLAK-08 was also calculated as BLAK-08 is above the confluence of Upper Black and Bigelow Creeks. Development of a separate load allocation for the area above BLAK-08 will ensure sufficient load reduction occurs within the upper part of the watershed.

The growing season total phosphorus load duration curve for BLAK-10 is shown in Figure 14. The x-axis is the flow duration interval (FDI) : the fraction of time a given flow is met or exceeded. Low FDI values (approaching 0) correlate to high flows; high values (approaching 1) correlate to low flows. During the growing season high flows are due primarily to summer storms. Note actual flows are not shown in the figure. Rather, the y-axis is the associated total phosphorus load in lb/d for a given flow. The blue solid line is the modeled 1979-2012 growing season load. At the 50th percentile flow, the modeled phosphorus load is 3.99 lb/d. The *NYSDEC 2012* data points are the phosphorus loads calculated based upon the samples collected during summer 2012 as part of this TMDL. Data points labeled *Winslow* are the total phosphorus loads calculated using the phosphorus samples collected by M. Winslow from June 2010 through June 2011 (Winslow 2012). Only those samples which fall within the June-September growing season are shown. The load attributed to the Byron SDSTP is shown by the *Byron SDSTP current* line. Only at the lowest flows (flow duration approaching 1) does the Bryon SDSTP contribute most of the load at BLAK-10. Such low flows are not generally sustained for long periods of time. Given the conceptual model (Appendix A.1) the impact of short term high phosphorus concentration upon the macroinvertebrate population is minimal.

In Figure 14 the BLAK-10 target load (blue dashed line) is the total phosphorus load based upon meeting the total phosphorus target of 0.121 mg/L identified in Table 6. At low flows UBC provides dilution for point source discharges while at higher flows UBC may be impacted by nonpoint sources of total phosphorus. It is recognized that at the lowest flows, flow duration interval approaching 1, the point sources contribute more phosphorus than the stream can

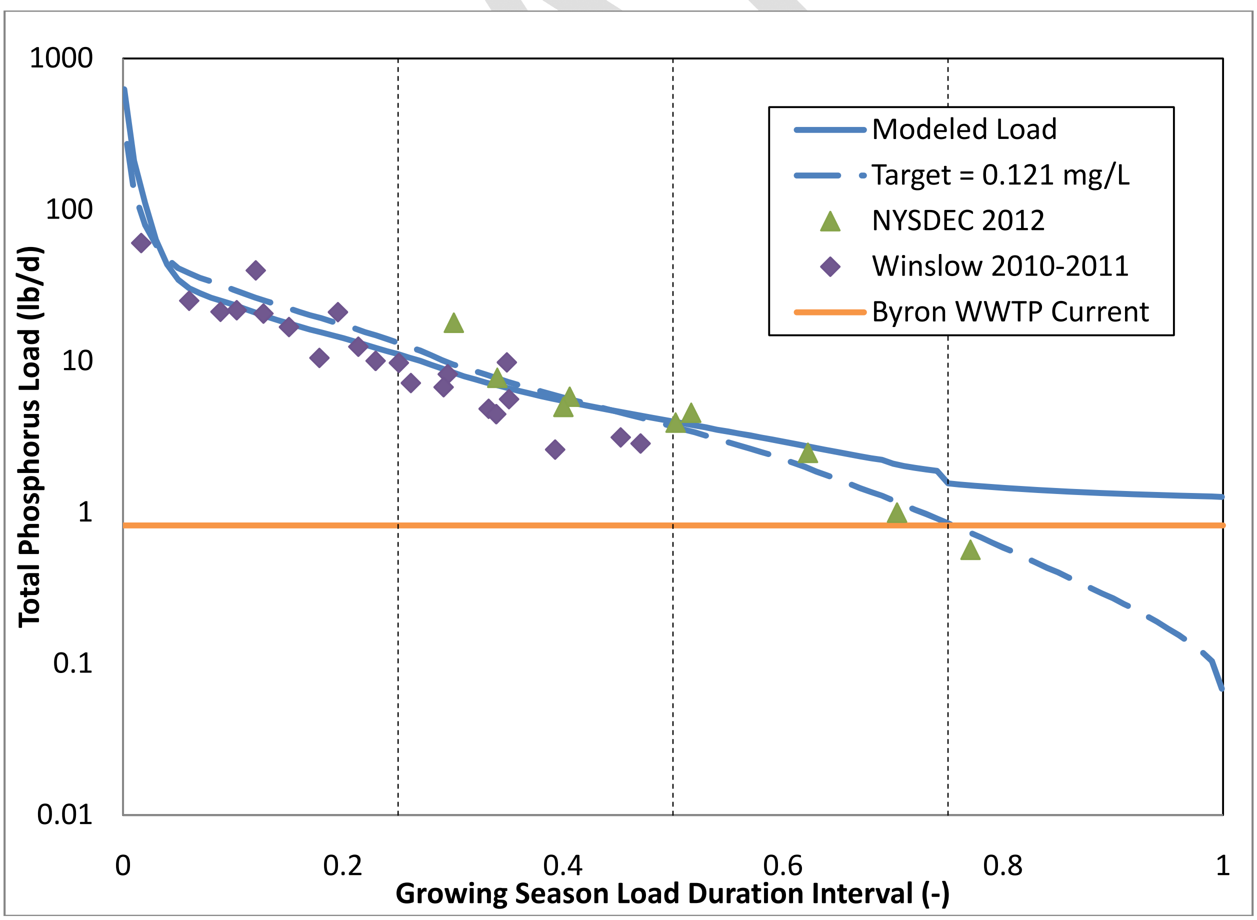

Figure 14: Growing season total phosphorus load duration curve for BLAK-10

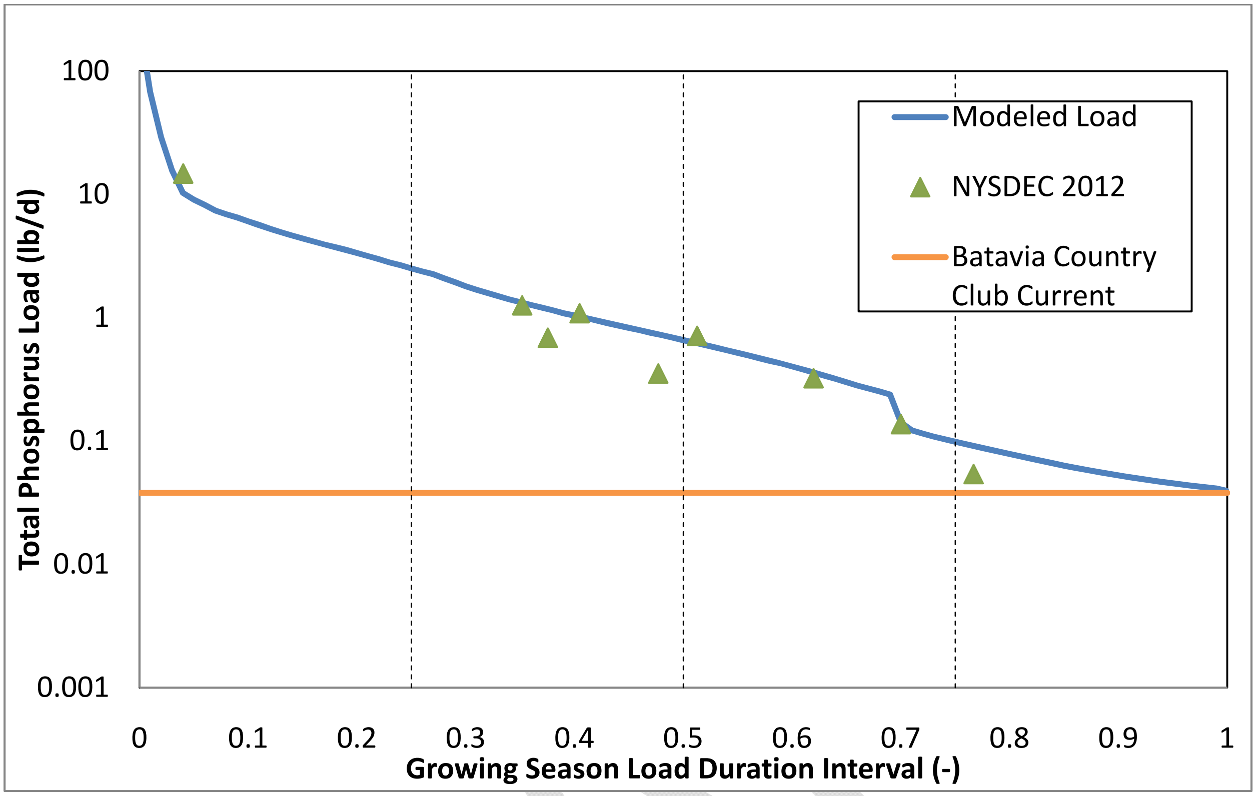

Figure 15: Total phosphorus load duration curve for Bigelow Creek during the growing season.

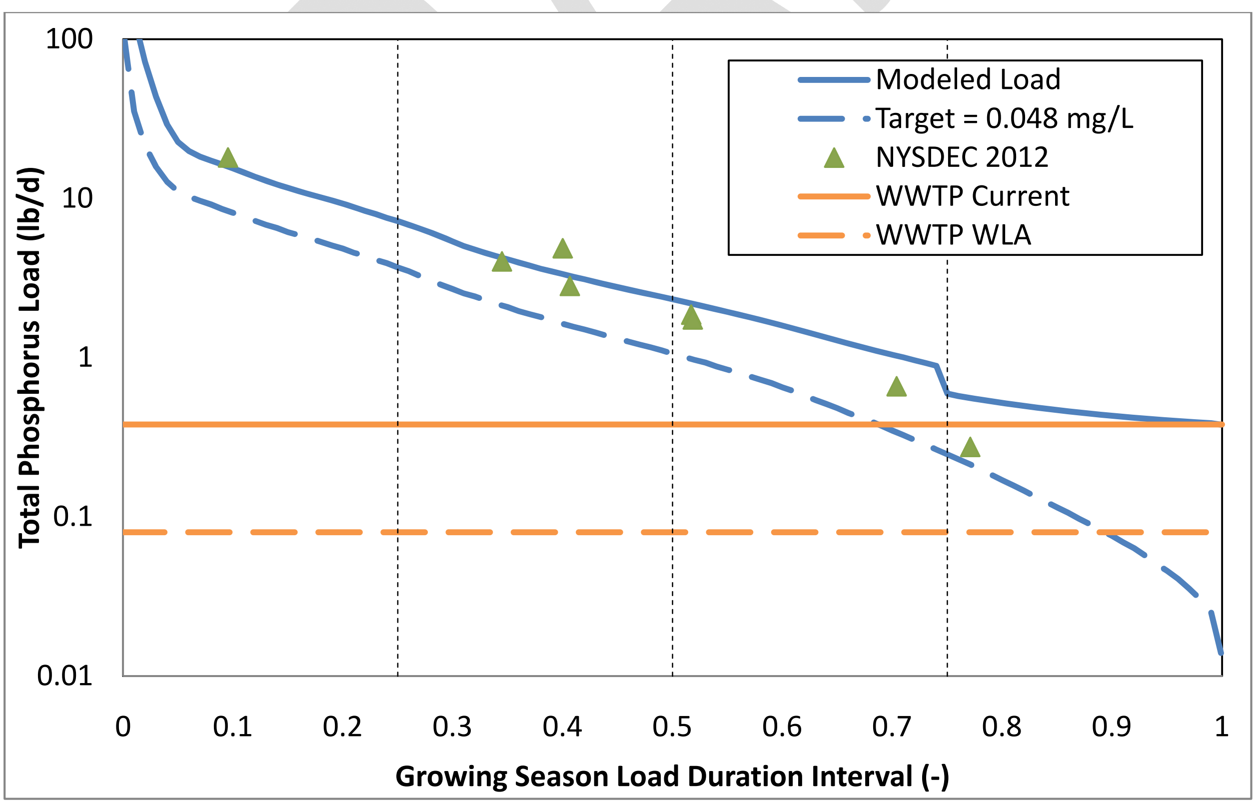

Figure 16: Growing season total phosphorus load duration curve for BLAk-08

Table 10: Growing season load reductions needed at each site to achieve target loads.

	Current load (lb/d)	TMDL target load (lb/d)	Percent Reduction
BLAK-08	2.33	1.06	55%
BLOW-02	0.66	0.66	0%
BLAK-10	3.99	3.70	7%

assimilate. Such low flows occur infrequently and are typically not sustained for long periods of time. Short periods of high phosphorus concentrations are unlikely to cause significant impacts. Thus, a longer, average flow was used for the loading capacity analysis, which was conducted using the 50^{th} percentile growing season flow. This is representative of average conditions during the critical period. As the growing season average concentration was used in the endpoint development, average flow conditions were used to determine the average target load.

Load duration curves for BLOW-02 and BLAK-08 are shown in Figures 15 and 16, respectively. The current load and target load for each site are listed in Table 10.

6.0 Pollutant Load Allocation

Separate load allocation tables have been developed for the three identified reaches. Allocations for the headwaters of UBC to site BLAK-08 (Table 11, Figure 17), Bigelow Creek (Table 12, Figure 18) and for the area between the confluence of Upper Black and Bigelow Creeks downstream to site BLAK-10 (Table 13, Figure 19) are below. Allocations for UBC at BLAK-08 and Bigelow Creek appear in the TMDL allocation table for BLAK-10 as part of the load allocation.

Table 11: TMDL allocations from the headwaters to BLAK-08 in order to meet a phosphorus reduction target of 0.048 mg/L.

Source	Growing Season Total Phosphorus Load (lb/d)			% Reduction
	Current	Allocated	Reduction	
Background (forest and water/wetland)	0.03	0.03	0	0%
Agriculture	1.49	0.65	0.84	56%
Developed land including septic systems	0.37	0.19	0.18	49%
LOAD ALLOCATION	**1.89**	**0.87**	**1.02**	**54%**
S. Byron SDSTP (NY0160971 002M)	0.38	0.08	0.30	79%
Hanson Aggregate Stafford Quarry (NYR00D626)	0.06	0.06	0	0%
WASTE LOAD ALLOCATION	**0.44**	**0.14**	**0.30**	**68%**
WLA + LA	2.33	1.01	1.32	57%
MARGIN OF SAFETY (5%)	-	0.05	-	-
TOTAL	2.33	1.06	1.27	55%

Table 12: TMDL allocations for Bigelow Creek from headwaters to BLOW-02 in order to meet a total phosphorus target of 0.083 mg/.

Source	Growing Season Total Phosphorus Load (lb/d)			% Reduction
	Current	Allocated	Reduction	
Background (forest and water/wetland)	0.01	0.01	0	0%
Agriculture	0.24	0.21	0.03	13%
Developed land including septic systems	0.37	0.33	0.04	11%
LOAD ALLOCATION	**0.62**	**0.55**	**0.07**	**11%**
Batavia Country Club (NY0159069)	0.04	0.04	0	0%
WASTE LOAD ALLOCATION	**0.04**	**0.04**	**0**	**0%**
WLA + LA	0.66	0.59	0.07	11%
MARGIN OF SAFETY (10%)	-	0.07	-	-
TOTAL	0.66	0.66	0	0%

Table 13: TMDL allocations for Upper Black Creek at BLAK-10 in order to meet a phosphorus reduction target of 0.121 mg/L.

Source	Growing Season Total Phosphorus Load (lb/d)			% Reduction
	Current	Allocated	Reduction	
Background (forest and water/wetland)	0.01	0.01	0	0%
Agriculture	0.11	0.11	0	0%
Developed land including septic systems	0.06	0.06	0	0%
Load from UBC at BLAK-08**	2.33	1.01	1.32	57%
Load from Bigelow Creek**	0.66	0.59	0.07	11%
LOAD ALLOCATION	**3.17**	**1.78**	**1.39**	**44%**
Byron SDSTP (NY0160971 001M)	0.82	0.82	0	0%
WASTE LOAD ALLOCATION	**0.82**	**0.82**	**0**	**0%**
WLA + LA	3.99	2.60	1.39	35%
MARGIN OF SAFETY (30%)	-	1.10	-	-
TOTAL	3.99	3.70	0.29	7%

**Percent reductions to point and nonpoint sources are the same as those called for at these upstream sites (Table 11 and Table 12)

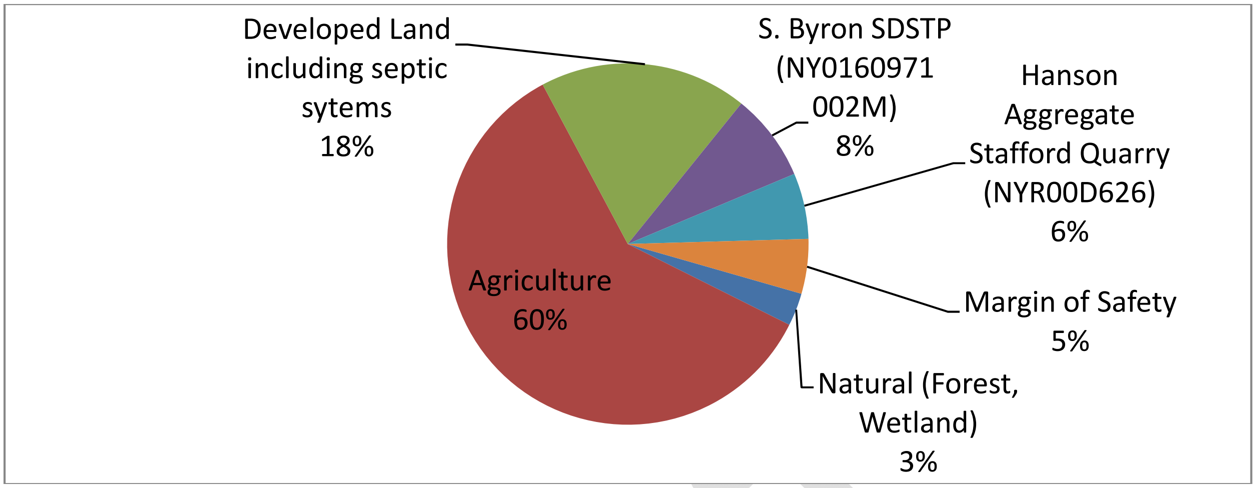

Figure 17: Total phosphorus load allocations at BLAK-08

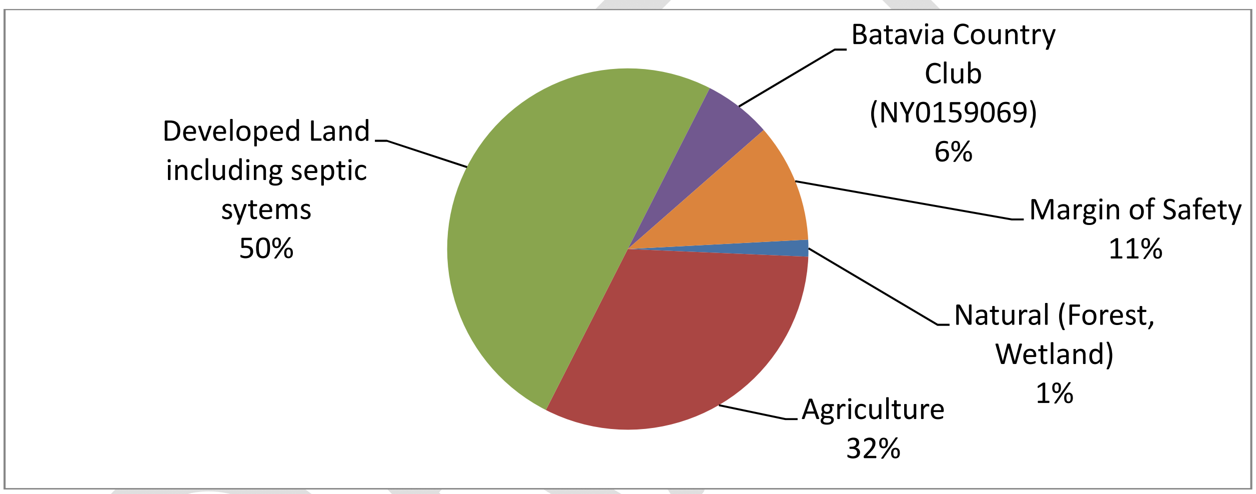

Figure 18: Total phosphorus load allocations at BLOW-02

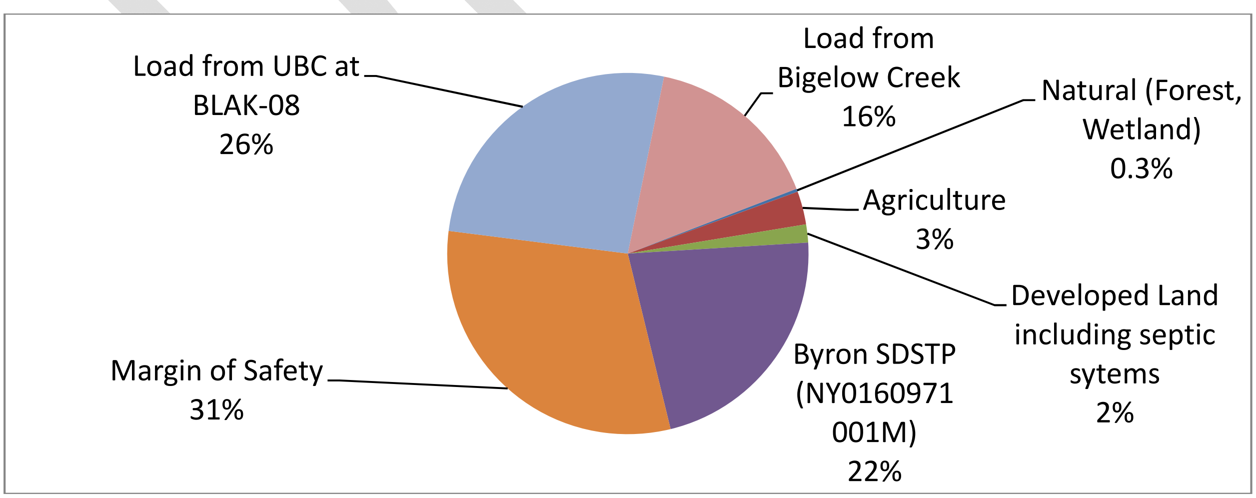

Figure 19: Total phosphorus load allocations at BLAK-10

Allocations at each site were developed based upon meeting the phosphorus reduction targets identified in Table 6 which assumed only phosphorus reductions without any improvements to the stream corridor. Restoration practices which increase the total riparian width or decrease the amount of fine particulate are predicted to increase the allowable amount of total phosphorus while still being able to attain all of the identified best uses for these waterbodies. This would in turn increase the total maximum daily load and decrease the overall amount of phosphorus reductions required. A stream restoration based approach to meeting the endpoint of this TMDL is discussed further in 7.1.

6.1 Waste Load Allocation

Growing season waste load allocations (WLAs) have been set for each of the 3 reaches. At BLAK-08 the WLA is 0.14 lbs/d during the growing season, split between the S. Byron SDSTP and the Hanson Aggregate Stafford Quarry. In Bigelow Creek the WLA is 0.04 lbs/d during the growing season, allocated to the Batavia Country Club. At BLAK-10 a WLA of 0.82 lbs/d during the growing season is allocated to the Byron SDSTP. In the BLAK-08 reach load reduction will be required from the S. Byron SDSTP. Reductions from the other permitted point sources are not needed in order to meet the TMDLs for those reaches. Reductions from the quarry will not be required as the water discharged from the mine in reflective of background conditions.

6.1.1 Byron SDSTP (NY0160971 001M)

No load reduction is needed at this time in order to meet the target total phosphorus concentration identified in Table 6. Monitoring of total phosphorus will be incorporated into this facility's SPDES permit upon approval of this TMDL. Load from this facility will be capped at the amount identified in Table 13. The facility will be given three years following TMDL approval to come into compliance with the specified load cap. This will allow for better characterization of their effluent and, if necessary, time to come into compliance with the WLA. Additional load reductions from the S. Byron SDSTP beyond what is specified in this TMDL may also be credited towards this facility. Load reductions achieved at the Byron SDSTP may not be credited towards the S. Byron SDSTP.

6.1.2 South Byron SDSTP (NY0160971 002M)

The WLA for the South Byron SDSTP is equivalent to achieving 0.6 mg/L TP at the growing season average flow of 0.0159 MGD, yielding a WLA of 0.08 lbs/d of TP. While the TMDL is targeting the June through September growing season, the permit will include TP limits from June 1 through October 31 to be consistent with existing seasonal limits. This will extend the period of TP reduction one month beyond the period established by the TMDL. To allow time to identify and implement treatment technologies which are effective for small plants such as this, the WLA indicated in Table 11 will take effect ten years following approval of this TMDL. This period will also allow for an adaptive management approach which may reduce some or all of the load reduction required from this facility. A compliance schedule will be included in the facility permit upon TMDL approval. This WLA may be changed in the future via a TMDL revision if, prior to achievement of the indicated WLA, subsequent assessments of Upper Black Creek indicate no use impairments as determined by a BAP ≥ 5. Any such revisions to the approved TMDL would need to be approved by the U.S. EPA.

6.1.4 Other Point Sources

Hanson Aggregate Stafford Quarry accounts for 0.06 lbs/d of TP during the growing season. Water discharge from the mine contains approximately 20 µg/L of TP, significantly less than found in the receiving water and generally reflective of natural background concentrations of TP. Due to the relatively small contribution of this discharge to Upper Black Creek and the lack of cost effective means for phosphorus control for this discharge, no reductions are proposed. Under the proposed allocations, the discharge will contribute 6% of the growing season TP load at BLAK-08.

As Bigelow Creek was found to meet the aquatic life use criteria of a BAP score of 5 or greater, no reduction from the Batavia Country Club load is specified in Table 12. This discharge will contribute 6% of the load to Bigelow Creek under the TMDL. Monitoring of TP will be incorporated into this facility's permit upon approval of this TMDL. Trading and offsets with the nonpoint source sector in Bigelow Creek will be considered for this facility.

6.2 Load Allocation

The load allocations (LA) for the segments are 0.87 lbs/d, 0.55 lbs/d and 1.74 lbs/d during the growing season for UBC above BLAK-08, Bigelow Creek, and UBC above BLAK-10, respectively. The LA for BLAK-10 incorporates incoming loads from the upstream BLAK-08 and BLOW-02 reaches. Excluding the upstream contributions, nonpoint sources contribute 0.18 lb/d of TP to BLAK-10. Nonpoint sources that contribute total phosphorus to Upper Black Creek include loads from natural sources (including forested lands, wetlands and stream banks), developed lands, on-site wastewater treatment systems, and agricultural lands.

Phosphorus originating from natural sources is a minor source and is assumed unlikely to be reduced further. Therefore the load allocations for these sources are set at the current loading.

6.2.1 Developed Lands Including Onsite Wastewater Treatment Systems

The LAs for the developed lands including onsite wastewater treatment (septic) systems are 0.37 lbs/d (19% of the total load) for BLAK-08, 0.33 lbs/d (50%) for Bigelow Creek, and 0.06 lbs/d (2%) for BLAK-10. Reductions are sought from the developed lands within each of the watersheds in order to meet the overall load reductions needed.

6.2.2 Agricultural Lands

Agricultural lands represent a significant non-point source of load to all regions of Upper Black and Bigelow Creeks. The LA for agriculture at BLAK-08 is 0.65 lbs/d, or 61% of the allowable load. In Bigelow Creek the agriculture LA is 0.21 lbs/d (32%) and at BLAK-10 is 0.11 lbs/d (3%).

6.3 Margin of Safety

A margin of safety (MOS) can be implicit (incorporated into the TMDL analysis through conservative assumptions) or explicit (expressed in the TMDL as a portion of the loadings) or a combination of both. An implicit MOS can be provided by making conservative assumptions at various steps in the TMDL development process (e.g., by selecting conservative model input parameters or a conservative TMDL target).

A MOS of 5% was specified at BLAK-08. A smaller than typical MOS was specified because recent historic data (Table 5) indicated this reach was in attainment of the aquatic life best use. Substantial load reductions are still being specified from this reach based upon the 2012 assessment.

In Bigelow Creek no load reductions were specified because the reach was found to meet the aquatic life best use during the 2012 assessment. To ensure the reach continues to meet this best use, a fraction of the current loading is being set aside. A MOS of 10% has been included in the analysis.

At BLAK-10 reductions from the Bigelow Creek and BLAK-08 reaches reduced loading below the amount needed to attain the TP target specified in Table 6. The extra capacity was assigned to the MOS. At 30%, the MOS is larger than typically specified but is justified because: 1) historic assessments (Table 5) indicate the BAP score may be lower than measured in 2012 and 2) meeting the TMDL at BLAK-10 relies upon upstream load reductions but in-stream attenuation of phosphorus is not considered in the load calculations.

6.4 Critical Conditions

Critical conditions for this TMDL have been identified as the typical (median) flow conditions during the growing season. During this period high phosphorus loads from agricultural activities coupled with low summer flows available for point source effluent dilution result in high phosphorus concentrations in the stream. Lower dissolved oxygen (DO) saturation concentrations due to increased temperature coupled with increased algae growth as a result of the increased phosphorus concentrations and temperatures will result in diel changes in DO concentrations. Short term fluctuations of low flow or high phosphorus concentrations are less critical as these transient conditions do not have large impacts upon the algae grow out behavior which creates the aquatic life best use impact. Protection of the best uses during the critical growing season will ensure that these best uses are also met during other conditions when flows are greater and phosphorus concentrations are lower.

The sampling associated with the development of this TMDL occurred during what was later identified as a dry year. The MA7CD10 (7 day average flow with a 10 year recurrence interval) flow value at the Churchville gage (USGS gage 04231000) is 1.55 cfs, based upon data from 1/1/1964 to 4/12/2013. Low flows of 1.7 and 1.8 cfs were measured on 7/21/12 and 9/4/12, respectively, at the Churchville gage. As part of 7, 30, and 90 day averages, these low flows corresponded to approximately 5 year, 5 year, and 3 year return frequencies. As the USGS gage is located below the Churchville dam, flows measured by the gage may be augmented by the storage capacity behind the dam during periods of dry weather. Above the dam stream flows may have been more severely impacted by the dry conditions. This is supported by field observations on 7/25/12 when the sampling personnel observed dry conditions at all sampling sites except BLAK-09, BLAK-10 and BLOW-02.

6.5 Seasonal Variation

As this TMDL is focused on the growing season, substantial seasonal variation within this period is not anticipated during typical base flow conditions. These flows formed the basis upon which the macroinvertebrate response model, and therefore TP targets, was based upon. Those loads which are delivered during the June through September period each year were identified as having the greatest impact upon that year's macroinvertebrate community. Some seasonality is anticipated within the growing season time frame due to differing weather patterns from year to year. This is taken into account by using multiple years of modeled hydrology and phosphorus results within the analysis.

7.0 Implementation

One of the critical factors in the successful development and implementation of TMDLs is the identification of potential management alternatives, such as best management practices (BMPs) and the screening and selection of final alternatives in collaboration with the involved stakeholders. Development of this TMDL is aided by the parallel development of a Black Creek Watershed Management Plan by the Genesee/Finger Lakes Regional Planning Council[2]. The Black Creek Watershed Characterization Report was recently released (Genesee/Finger Lakes Regional Planning Council 2012) and work on the Management Plan in ongoing. The plan will serve to build consensus among watershed municipalities, State agencies, non-governmental organizations and the public on the short and long term actions needed to protect and restore water quality and quantity in the watershed. NYSDEC, in coordination with these local interests, will address the sources of impairment using regulatory and non-regulatory tools by matching management strategies with sources and aligning available resources to support implementation.

NYSDEC recognizes that TMDL designated load reductions alone may not be sufficient to address all concerns of nutrient driven impairment within streams. The TMDL establishes the required nutrient reduction targets and provides some regulatory framework to effect those reductions. However, the nutrient load only affects the potential for impairment. The implementation plan therefore calls for the collection of additional monitoring data, as discussed in Section 7.3, to determine the effectiveness of nutrient reduction management practices.

7.1 Stream Restoration Approach to Implementation

The macroinvertebrate response model (Section 3.2.4) indicates that the macroinvertebrate community, as assessed by the BAP score, is influenced by total phosphorus (TP) concentrations, total riparian width (TRW) and fraction of fines in the riffle (FFR). Restoration of the best uses

[2] http://www.gflrpc.org/blackoatka htm

of UBC may therefore be attained by influencing any or all of those parameters. Implementation of practices which, for example, reduce TP and increase TRW, may be more cost effective than practices which reduce TP alone.

Table 6 listed the TP targets in order to reach BAP ≥ 5 through TP reductions alone. A more holistic, watershed based approach would reduce TP while simultaneously increasing TRW and decrease FFR. Thus, for each site, improvements in TRW or FFR may reduce the amount of TP reduction needed. Conceptually, this is demonstrated in the following tables for BLAK-08 (Table 14), BLOW-02 (Table 15), and BLAK-10 (Table 16). In each table the current condition based upon the 2012 measured values for FFR, TP and TRW are in the upper right corner of the table in bold. Combinations of TP, TRW and FFR which result is BAP ≥ 5 are shaded in dark gray. At BLAK-08 (Table 14) for example, to achieve a BAP ≥ 5, TRW could be increased to 25 m, TP could be reduced to 0.048 mg/L, or some combination of both, such as increasing TRW to 25 m and decreasing TP to 0.08 mg/L.

Table 14: The macroinvertebrate response model indicates that the BAP score is influenced by the total phosphorus (TP) concentration, total riparian width (TRW) and fraction of fines in the riffle (FFR). The table indicates the degree to which TP, TRW, or both would need to be changed in order to achieve a BAP score of 5 or greater (cells shaded dark gray), assuming FFR remains constant. The position of BLAK-08 in the table as assessed in 2012 is TP = 0.093 mg/L, TRW = 18 m and FFR = 0.3 (upper right corner in bold). Light gray shaded cells indicate those additional cells which become acceptable restoration targets with a reduction of FFR by 0.05.

FFR = 0.30	**Total Phosphorus (mg/L)**						
Total Riparian Width (m)	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**	**0.093**
18	5.1	4.9	4.8	4.6	4.4	4.3	**4.21**
20	5.3	5.1	4.9	4.8	4.6	4.4	4.4
25	5.8	5.6	5.4	5.2	5.1	4.9	4.8
30	6.2	6.1	5.9	5.7	5.5	5.4	5.3

Table 15: Similar to Table 14, except for site BLOW-02. The 2012 assessment found this site to already have a BAP score greater than 5. Improvements to the stream corridor could still result in a greater BAP score as shown indicated.

FFR = 0.39	**Total Phosphorus (mg/L)**					
Total Riparian Width (m)	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.082**
20	6.0	5.8	5.6	5.4	5.3	**5.22**
25	6.4	6.2	6.1	5.9	5.7	5.7
30	6.9	6.7	6.5	6.3	6.2	6.1

Table 16: Similar to Table 14, except for site BLAK-10

FFR = 0.30	**Total Phosphorus (mg/L)**		
Total Riparian Width (m)	**0.11**	**0.12**	**0.124**
20	5.2	5.0	**4.95**
25	5.6	5.5	5.4

In all of the tables FFR is held constant at the value measured in 2012. However, as many management practices which reduce TP or increase TRW will also decrease FFR, additional combinations of TP and FFR result in BAP ≥ 5 if FFR is also reduced. In each of the tables, those additional cells which become acceptable restoration targets due to a reduction in FFR of 0.05 are shaded in light gray. At site BLAK-08 (Table 14) a reduction of FFR by 0.05 would make the following additional conditions viable restoration targets: (TP = 0.05 mg/L, TRW = 18 m, FFR = 0.25), (0.06 mg/L, 20 m, 0.25), (0.09 mg/L, 25 m, 0.25) and (0.093 mg/L, 25 m, 0.25).

NYSDEC was recently awarded a 2013 Sustain Our Great Lakes grant to support a “Trees for Tribs” program to restore 30,000 linear feet of riparian buffer. The program will plant a minimum of 15,000 trees and shrubs throughout high priority stretches of tributaries to the Genesee River basin. The stream restoration strategy outlined in this section aligns well with the goals of the “Trees for Tribs” program. All qualified parties are urged to take full advantage of the opportunity provided by this grant to establish or improve riparian buffers along Upper Black and Bigelow Creeks.

7.1.1 Implementation at BLAK-03

One site that were assessed during the 2012 field sampling should be noted specifically with respect to implementation, site BLAK-03. The macroinvertebrate population at BLAK-03 was found to be severely impacted (Figure 6) despite relatively low phosphorus concentrations (Table 4). The site overall had poor habitat. It was characterized by a deepened, straight, and over wide channel creating lentic (ponded) conditions favorable for stream warming and primary production. Large growths of filamentous green algae were observed throughout the summer growing season. Further, the site had little to no riparian buffer or canopy, undercut and eroding banks, and high amounts of fine sediment on the bed. The site was located just downstream of significant agricultural operations including a CAFO and row crops. The altered stream reach extends roughly 200 feet upstream and 400 feet downstream from the sampling location (Figure 5). Due to the location of BLAK-03 in the headwaters of UBC, this TMDL does not directly address this site. However, severe impacts were observed. The reach of river surrounding BLAK-03 would be an excellent candidate for an extensive stream restoration approach including riparian buffers, stream stabilization and agricultural practice BMPs.

7.2 Reasonable Assurance for Implementation

This TMDL was written with waste load allocations for one publically owned wastewater treatment plant and substantial load reductions from agriculture, onsite wastewater treatment (septic) systems and developed land above BLAK-08. Lesser nonpoint source reductions are also specified throughout the rest of the watershed. Meeting the necessary load reductions using this approach is the most technically achievable and financially viable. Reasonable assurance of meeting the TMDL is provided by requiring load reductions from the point sources, which are the most direct and verifiable, along with significant reductions from nonpoint sources. An adaptive management approach is proposed for the implementation, with an initial focus on nonpoint source controls and stream corridor restoration coupled with additional monitoring.

Load reduction from point source will require sufficient time to identify and implement an appropriate treatment. Point source loads will be held constant initially and stream corridor restoration may reduce the overall reduction required. With approval from NYSDEC, required point source reductions could be offset by additional nonpoint source controls and/or stream restoration practices. Monitoring will be needed to ensure sufficient amounts of phosphorus removal and stream corridor restoration occur in order to meet the endpoint of this TMDL.

7.2.1 Recommended Phosphorus Management Strategies for Onsite Wastewater Treatment (Septic) Systems

A systematic approach, such as the formation of a management district, may be beneficial to achieving the load reductions specified above. New York State had begun to offer funding for the abatement of inadequate onsite wastewater treatment systems through the development and implementation of a septic system management program by a responsible management entity. Municipal sewer system expansion should be investigated for high priority areas including those developed areas along the Black Creek stream corridor in the vicinity of the Byron and South Byron SDSTP, the remaining areas of development within the town of Batavia and those areas where a large number of failing onsite systems have been identified.

The New York State Household Detergent and Nutrient Runoff Law became effective on August 14, 2010 which prohibits the sale of automatic dishwasher detergent for household use that contains more than 0.5% phosphorus by weight. Similar prohibitions for commercial establishments became effective July 1, 2013 (Environmental Conservation Law [ECL] § 35). Studies show that this measure could reduce the phosphorus content of domestic sewage by approximately 10%.

Genesee County is developing a GIS database to track the location and maintenance information associated with these systems (Genesee/Finger Lakes Regional Planning Council 2012). Additional effort should be made to verify failing systems requiring replacement in accordance with the State Sanitary Code. State funding is also available for a voluntary septic system inspection and maintenance program or a septic system local law requiring inspection and repair. Property owners should be educated on proper maintenance of their septic systems and encouraged to make preventative repairs.

To further assist municipalities, NYSDEC in involved in the development of a statewide training program for onsite wastewater treatment system professionals. A largely volunteer industry group called the Onsite Wastewater Treatment Training Network (OTN) has been formed. NYSDEC provides financial support and staff support to OTN.

7.2.2 Recommended Phosphorus Management Strategies for Wastewater Treatment Facilities

WLAs for the Byron and S. Byron SDSTPs will be expressed in their SPDES permits as a seasonal (June – October) average load, expressed in pounds per day. It is recognized that the treatment processes at the South Bryon SDSTPs, household septic tanks followed by a communal sand filter, cannot easily incorporate phosphorus controls. However, the need to reduce phosphorus concentrations in the effluent from the STP is also clearly demonstrated in this TMDL. A compliance schedule will be built into the permit for this facility to allow time to identify and implement an appropriate phosphorus control (Table 17). Control measures could take the form of regionalization of the wastewater treatment, perhaps including the Byron, North Byron, South Byron and the Bergen treatment plants. Other options may include tertiary treatment wetlands, land application or other innovative phosphorus removal techniques.

The macroinvertebrate response model indicated that higher concentrations of TP in UBC may be allowable if improvements to the stream corridor are made, particularly increasing riparian buffer widths and decreasing the amount of fines found in riffles (Section 7.1). Sufficient restoration of the riparian corridor may alleviate some of the burden on the STP by allowing higher concentrations of TP than the targets indicated in Table 6, upon which the TMDL allocations of Table 11 are based. It is not expected that stream corridor restoration will remove the need for phosphorus reduction from the STP entirely, but it may be more cost effective to implement some intermediate form of phosphorus control coupled with stream corridor restoration activities rather than trying to reduce TP alone. As the goal of this TMDL is to restore best uses as assessed by the macroinvertebrate community, attainment of this goal and delisting from the 303(d) list will be based upon achieving a BAP score of 5 or greater. If this is demonstrated to have occurred to the satisfaction of NYSDEC prior to the STP achieving the Waste Load Allocations, NYSDEC can revise this TMDL to reduce the burden upon the STP. Such a revision would need to be approved by the U.S. EPA, and would only occur after substantial BMP implementation throughout the watershed.

As the South Byron SDSTP is upstream of the Byron SDSTP, reductions in phosphorus load from S. Byron beyond what is specified in Table 11 may be credited towards the WLA for the Byron SDSTP (Table 13) should additional capacity be needed now or in the future. Additional reductions from the S. Byron SDSTP will have benefits within the local area of the outfall as well as downstream at the outfall for the Bryon SDSTP, hence the allowable transfer of credits from the S. Byron SDSTP to the Byron SDSTP. Load reductions at Byron SDSTP may not be credited towards the S. Byron SDSTP as there would be no upstream benefit.

At this time there appears to be no reasonable options for reducing the phosphorus load from the Hanson Aggregate Stafford Quarry dewatering operations. Phosphorus concentrations in the water pumped out of the quarry, at approximately 20 µg/L, is already at the current limit of technology for phosphorus removal. Furthermore, no phosphorus is added to the water removed from the quarry, thus the concentration is reflective of background conditions for that area.

Table 17: Milestones for achieving the WLAs for the S. Byron SDSTPs.

Milestone	**S. Byron SDSTP (years following TMDL approval)**
Complete study of potential options	3
Submit final designs for approval	5
Achieve WLA	10

7.2.3 Recommended Phosphorus Management Strategies for Agricultural Runoff

The New York State Agricultural Environmental Management (AEM) Program was codified into law in 2000. Its goal is to support farmers in their efforts to protect water quality and conserve natural resources while enhancing farm viability. AEM provide a forum to showcase the soil and water conservation stewardship farmers provide. It also provides information to farmers about Concentrated Animal Feeding Operations (CAFO) regulatory requirements, which helps to assure compliance. Details of the AEM program can be found at the New York State Soil and Water Conservation Committee (SWCC) website, http://www.nys-soilandwater.org/aem/index.html.

Using a voluntary approach to meet local, state and national water quality objectives, AEM has become the primary program for agricultural conservation in New York. It also has become the umbrella program for integrating/coordinating all local, state and federal agricultural programs. For instance, farm eligibility for cost sharing under the SWCC Agricultural Non-point Source Abatement and Control Grants Program is contingent upon AEM participation.

AEM core concepts include a voluntary and incentive-based approach, attending to specific farm needs and reducing farmer liability by providing approved protocols to follow. AEM provides a locally led, coordinated and confidential planning and assessment method that addresses watershed needs. The assessment process increases farmer awareness of the impact farm activities have on the environment and by design encourages farmer participation which is an important overall goal of this implementation plan.

The AEM program relies on a five-tiered process:

- Tier 1 – Survey current activities, future plans and potential environmental concerns.
- Tier 2 – Document current land stewardship; identify and prioritize areas of concern.
- Tier 3 – Develop a conservation plan, by certified planners, addressing areas of concern tailored to farm economic and environmental goals.
- Tier 4 – Implement the plan using available financial, educational and technical assistance.
- Tier 5 – Conduct evaluations to ensure the protection of the environment and farm viability.

Estimates of BMP implementation on farms within Genesee County indicate more than 40% of AEM participating farms implement nutrient management, stream bank protection, barnyard management and some form of cropland management, including residue management, buffers, rotations and/or cover crops. Other BMPs are utilized in the county to a lesser extent including conservation tillage, strip cropping, grazing land management, terraces/diversions and agricultural land conversions (Genesee/Finger Lakes Regional Planning Council 2012).

The National Resources Conservation Service's Environmental Quality Incentives Program (EQIP) has also assisted with BMP implementation in the watershed. Approximately 270 BMPs have been put in place through the EQIP program. Black Creek is also one watershed targeted through a sediment reduction grant awarded by the Great Lakes Commission. Projects associated with this GLC grant are still being implemented. Any sediment reductions within UBC will have a positive benefit by reducing both sediment and phosphorus loads delivered to the creeks.

The Genesee and Wyoming County's Soil and Water Conservation Districts should continue to implement the AEM program on farms in the watershed, focusing on identification of management practices that reduce phosphorus loads. These practices would be eligible for state or federal funding and because they address a water quality impairment associated with this TMDL they should score well.

Tier 1 could be used to identify farmers that for economic or personal reasons may be changing or scaling back operations, or contemplating selling land. These farmers would be candidates for conservation easements or conversion of cropland to hay, as would farms indentified in Tier 2 with highly erodible soils and/or needing stream management. Ideally, Tier 3 would include a Comprehensive Nutrient Management Plan with phosphorus indexing at the appropriate state in the planning process. Additional practices could be fully implemented in Tier 4 to reduce phosphorus loads, such as conservation tillage, stream fencing, rotational grazing and cover crops. Also, riparian buffers reduce losses from upland fields and stabilize stream banks in addition to reducing load by taking land out of production.

Results from the macroinvertebrate model indicate that those BMPs which target stream corridor restoration may have the greatest impact upon improving the macroinvertebrate community. Implementation of forest stream buffers may prove the most beneficial as these will reduce phosphorus in overland flow, reduce the amount of fine sediment delivered to the creeks and increase total riparian width. Targeting all three of these factors should result in greater benefit to the macroinvertebrate community than targeting any one factor alone. Vegetative buffer strips, at a cost of $30/pound of phosphorus removal, were identified by CEI as the most cost effective BMP for reducing phosphorus loading in UBC (CEI 2011b).

The Water Quality Restoration Strategy also identified additional BMPs which may be cost effective to implement in UBC (CEI 2011b). The top eight, in terms of cost per pound of phosphorus removal, are listed in Table 18.

During public meetings associated with the Water Quality Restoration Strategy development agricultural interests in UBC indicated that cover crops are the most favorable agricultural BMP (CEI 2011b). There are some barriers to implementation, particularly cost, farmer buy-in, and weather. Meeting participants encouraged the agricultural entities to show more farmers the economic benefits of cover crops. Vegetative buffers were also discussed as potential BMPs but it was noted that farmers are reluctant to take acres out of production without adequate compensation. While vegetative buffers may have a greater benefit to the stream, both buffers and cover crops would have beneficial impacts on UBC by reducing phosphorus and decreasing the delivered sediment load. Cost shares for these practices may be available through the Genesee and Wyoming Counties' Soil and Water Conservation Districts.

Table 18: Cost effective BMPs for implementation in Upper Black Creek as identified by CEI (2011b). Shaded BMPs were less cost effective, but may also be of interest.

Best Management Practice	Scenario	Setup cost	5 year maintenance cost	5 Year total cost	Phosphorus Reduced (pounds)	$/pound of phosphorus reduced
Vegetative buffer strips	1 mile	$1,500	$3,025	$4,525	149	$30
AWMS runoff control	1 farm	$35,000	$1,750	$36,750	162	$227
Precision feed management	1 farm	$30,000	$50,000	$80,000	296	$270
Alternative manure use – composting	1 cow	$500	$25	$525	1.8	$286
Nutrient management	1 acre	$25	$25	$48	0.15	$343
Manure incorporation into soil	1 farm	$100,000	$40,000	$140,000	245	$571
Streambank fencing	1 mile	$23,000	$800	$23,800	32	$752
Cover crops	1 acre	$0	$175	$175	0.14	$1,288

The macroinvertebrate response model indicated BMPs which will improve the riparian corridor will positively impact the macroinvertebrate population. Riparian buffers may have the greatest impact as they will increase the riparian buffer width, filter out fines from overland flow and reduce phosphorus loading. Where possible, and particularly where little to no buffer currently exists or where erosion problems are already known, riparian buffers should be established.

The watershed model indicated row crops, particularly those situated on lands with shallow groundwater tables, are a significant contributor of soluble reactive phosphorus to UBC. BMPs which will reduce phosphorus loads from this land use category should be encouraged.

7.2.4 Recommended Phosphorus Management Strategies for Urban Stormwater Runoff

NYSDEC issued SPDES general permits GP-0-10-001 for construction activities, and GP-0-10-002 for stormwater discharges from municipal separate stormwater sewer systems (MS4s) in response to the federal Phase II Stormwater rules. GP-0-10-002 applies to urbanized areas of New York State, so it does not cover the Upper Black Creek watershed. The Black Creek Watershed Characterization (Genesee/Finger Lakes Regional Planning Council 2012) indicates that enforcement of the construction activities permit throughout the Black Creek watershed will be important for managing urban stormwater runoff. The report also recommends that local municipalities update their local regulatory framework to aid in the implementation of the 2010 updates to the NYS Stormwater Management Design Manual. The updates are intended to address runoff reduction and the planning and design of green infrastructure.

Additionally, stormwater management in rural areas can be addressed through Nonpoint Source Management Program. There are several measured which could directly or indirectly reduce phosphorus loads in stormwater discharges if implemented in the watershed.

- Public education regarding:
    - Lawn care, specifically reducing fertilizer use, using phosphorus-free products and the requirements of the NYS Household Detergent and Nutrient Runoff Law (ECL § 35) which restricts both the sale and application of fertilizers containing phosphorus.
    - Cleaning up pet waste.
    - Discouraging waterfowl congregation by restoring natural shoreline vegetation.
- Management practices to address any significant existing erosion sites.
- Construction site and post construction stormwater runoff control ordinance, inspection and enforcement programs.
- Pollution prevention practices for road and ditch maintenance.
- Management practices for the handling, storage and use of roadway deicing products.

The Dishwasher Detergent and Nutrient Runoff Law which went into effect January 1, 2012, restricts the sale and application residential fertilizers containing phosphorus (ECL Article 17, Title 21). The law prohibits the use of phosphorus containing lawn fertilizer unless establishing a new lawn or a soil tests shows the lawn does not have enough phosphorus. The law also prohibits the applications of lawn fertilizers on impervious surfaces and within certain distances from any surface waters. Application of fertilizers containing nitrogen, phosphorus or potassium between December 1st and April 1st is also prohibited. The law applies to all fertilizer for lawns and non-agricultural turf. The three golf courses within UBC are subject to the provisions of this law. While research is still ongoing, studies suggest that reductions of phosphorus in stormwater runoff from lawns may be as much as forty percent. While the law went into effect prior to the monitoring associated with this TMDL, substantial reductions are still expected as it may take several years before the reduced phosphorus loading rate is reflected in the load delivered to the creeks.

An additional report by the Genesee/Finger Lakes Regional Planning Council (2005) identified locations of stream bank erosion within the watershed. Surveys of the stream by Winslow (2012) also identified locations of stream bank erosion. These reports should be utilized to target remediation practices to reduce these sources of sediment and phosphorus.

7.2.5 Additional Protection Measures

Measures to further protect water quality and limit the increase of phosphorus load that would otherwise offset load reduction efforts should be considered. The basic protections afforded by local zoning ordinances could be enhanced to limit non-compatible development, preserve natural vegetation along stream banks and promote smart growth and low impact development. Identification of wildlife habitats, sensitive environmental areas and key open spaces within the watershed could lead to their preservation or protection by way of conservation easements or other voluntary controls.

In addition to preservation and protection, restoration of wetland, stream and riparian resources within the watershed would contribute to phosphorus load reductions. Easements and incentives for private land owners, combined with active restoration of riparian wetlands, riparian forest, stream meanders, in-stream structure and other lost or degraded aspects of stream systems would contribute to sediment and phosphorus retention within the watershed, as well as improve aesthetics, recreational use, aquatic habitat and potentially land values.

7.3 Follow-up Monitoring

Through a combination of NYSDEC programs, follow-up monitoring of UBC will be carried out every two years. The RIBS program is schedule to return to the Genesee River Basin in 2014 to 2016. Additional monitoring will be conducted through the Trees for Tribs grant recently awarded to NYSDEC for the Genesee River basin. Monitoring will be targeted at the assessment sites specified in this TMDL with additional efforts to characterize the stream before and after any upgrades to the S. Byron SDSTP.

In the long term NYSDEC's Rotating Integrated Basin Studies (RIBS) program will serve as the primary means for follow up monitoring. The RIBS program collects chemistry and macroinvertebrate samples throughout New York State on a rotating basis, returning to each basin every five years.

8.0 Public Participation

CEI, during the preparation of the Water Quality Restoration Strategy (WQRS), received written comments during the public comment period ending on November 18, 2011. Verbal comments were also received during a public meeting held on October 25, 2011. Comments relative to this work are summarized below. The full record of comments and responses can be found in the WQRS document (CEI 2011b).

Numerous comments were received regarding animal manure contributions of phosphorus both generally and specifically with regards to CAFOs. With substantial numbers of animals in the watershed, land application of manure at agronomic rates is a necessary practice to minimize the amount of phosphorus which reaches the UBC. The CAFOs listed in Table 9 are required to do this according to their Certified Nutrient Management Plans, but this is an applicable BMP for all sizes of operations.

Comments indicated cover crops were the preferred BMP. Analysis indicated that cover crops may not be the most cost effective means for phosphorus reductions (Table 18). Cover crops, however, may be part of a comprehensive effort to reduce phosphorus loading to UBC from the agricultural sector.

Vegetative (riparian) buffer strips were noted as quite effective if sited properly. However, it was pointed out that farmers are often reluctant to take land out of production. The analysis by CEI and the analysis conducted in this TMDL indicated that riparian buffer strips may be a particularly effective BMP for reducing phosphorus loads to UBC and for improving water quality conditions in UBC overall.

NYSDEC met with representatives from the Town of Byron and the operators of the Byron and S. Byron SDSTP on August 21, 2013. The meeting was held to inform the town representative of the TMDL and its potential implications and to solicit any feedback they may have had regarding the load reductions and implementation.

The availability of this TMDL for public review and comment was announced in the September 25, 2013 edition of the Environmental Notice Bulletin. Comments were accepted for 30 days following the notice, with all comments received by COB October 25, 2013 given consideration during the preparation of the final document. The comments received, and responses, are in the following section.

8.1 Public Comments

To be included following the close of the public comment period.

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Appendix A: Numeric Endpoint Development

The current water quality standard for nutrients (phosphorus and nitrogen) in New York State is a narrative standard: “none in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages” (NYSDEC 2008). The development of a TMDL requires a scientifically defensible numeric endpoint which will ensure the best uses of the waterbody are met. As part of the Upper Black Creek TMDL process, a numeric endpoint was developed for Upper Black Creek (UBC). The endpoint was developed based upon extensive field sampling, data analysis and modeling of the UBC and Little Tonawanda Creek (LTC) watersheds. The neighboring LTC watershed was selected as a best attainable reference site against which to compare UBC. Combined, these efforts were used to correlate water chemistry, habitat and macroinvertebrate use in order to identify a phosphorus concentration which would still be protective of all of the best uses indicated for UBC.

A.1 Conceptual Model

The U.S. EPA (2013) has put together a simple conceptual model diagram to relate anthropogenic impacts to impairment of biological assemblages (Figure 20). Text associated with the diagram explains:

> Enrichment of aquatic systems due to excess nutrient concentrations is a common cause of biological impairment. Although aquatic plants and microbes require nitrogen (N) and phosphorus (P) for growth and reproduction, excess nutrient inputs may adversely affect biotic communities. Often these excess inputs of N and P are related to human activities and sources in the watershed, which influence in-stream nutrient concentrations via six dominant pathways: (1) by increasing the delivery of N or P from the watershed; (2) by increasing the amount of N or P in soils transported into streams; (3) by increasing the amount of N or P in surface runoff; (4) by increasing the amount of N or P in subsurface waters; (5) by increasing the amount of N or P in wet or dry deposition; and (6) by increasing the amount of N or P in discharged waters (i.e., point source effluents). For example, many human activities (e.g., agricultural practices, residential and commercial development) lead to land cover alteration, with subsequent increases in surface runoff and watershed erosion; this land cover alteration can increase the mobilization of N and P bound to watershed soils, ultimately increasing nutrient delivery to streams. Other sources (e.g., fertilizers and animal wastes associated with agricultural and residential practices, geology of the landscape) may directly elevate N and P concentrations within the watershed. Increases in watershed N or P loading associated with these sources can eventually reach streams via surface runoff, via subsurface waters (e.g., groundwater inputs), or attached to washed-in particles.
>
> Once in the stream, N or P may occur in dissolved organic, dissolved inorganic or particulate forms, with transformations occurring among these forms depending on environmental conditions (e.g., dissolved oxygen concentrations). Although N and P may be considered candidate causes, excess nutrients are not proximate stressors. Fish and invertebrates are usually not directly adversely affected by excess nutrient concentrations, but rather are affected by other proximate stressors resulting from nutrient enrichment.

Nutrients can be associated with biological impairment by several pathways. Dissolved N and P can be taken up by primary producers (algae and macrophytes) and microbes, although whether primary producers respond to increased nutrient concentrations is dependent on adequate light levels. Increases in plant and microbial biomass or productivity may negatively impact aquatic fauna in multiple ways. For example, increases in microbial assemblages may lead to greater microbial infection of invertebrates or fish, or altered benthic organic matter processing (e.g., faster processing rates). Increased respiration of microbes and plants often leads to decreases in dissolved oxygen concentrations (see the dissolved oxygen module for more detailed information on this pathway), especially during times when photosynthesis is limited (e.g., at night). In addition, increased photosynthesis may lead to increased pH; this increase may be especially important when N is elevated, as unionized ammonia, a toxic form of N, is more prevalent at high pH. Blooms of certain algal taxa also may result in increased production and release of toxins that can affect fish or invertebrates.

Increased plant or algal production may translate to increased food resources, which can benefit herbivorous organisms but may adversely impact other taxa by altering the food resources derived from detritus. Changes in plant assemblage structure also may occur with enrichment, and these changes can affect aquatic fauna by altering habitat structure or by altering the quantity or quality of food resources. Changes in community structure may occur even without overall increases in primary producers, due to alterations of nutrient availability ratios. Increases in suspended organic matter (i.e., phytoplankton or suspended benthic algae) also can negatively affect aquatic biota, for example by increasing turbidity.

Within the Upper Black Creek watershed the most probable pathway of impact, and the conceptual model adopted for this project, begins with the most probable anthropogenic influences of agriculture, urban development and industry (sewage treatment plants). The result is an increased delivery of phosphorus to the stream. Increases nutrient delivery coupled with increased light availability due to land cover alterations increased the growth of macrophytes, periphyton and phytoplankton (proximate stressors). The interacting stressor, a change in dissolved oxygen, provides the link between the proximate stressors and the biotic response of biologically impaired invertebrate assemblages. As can be seen in the diagram (Figure 20) the conceptual model adopted for this project is a simplification of a complex ecological system.

The field work and subsequent analysis undertaken for this TMDL quantified several of the mechanisms which are known to potentially influence the relationship between increased nutrient delivery and impaired biological assemblages. Emphasis was placed upon quantifying the chemistry, habitat, and biological assemblages in UBC as described further in the following section.

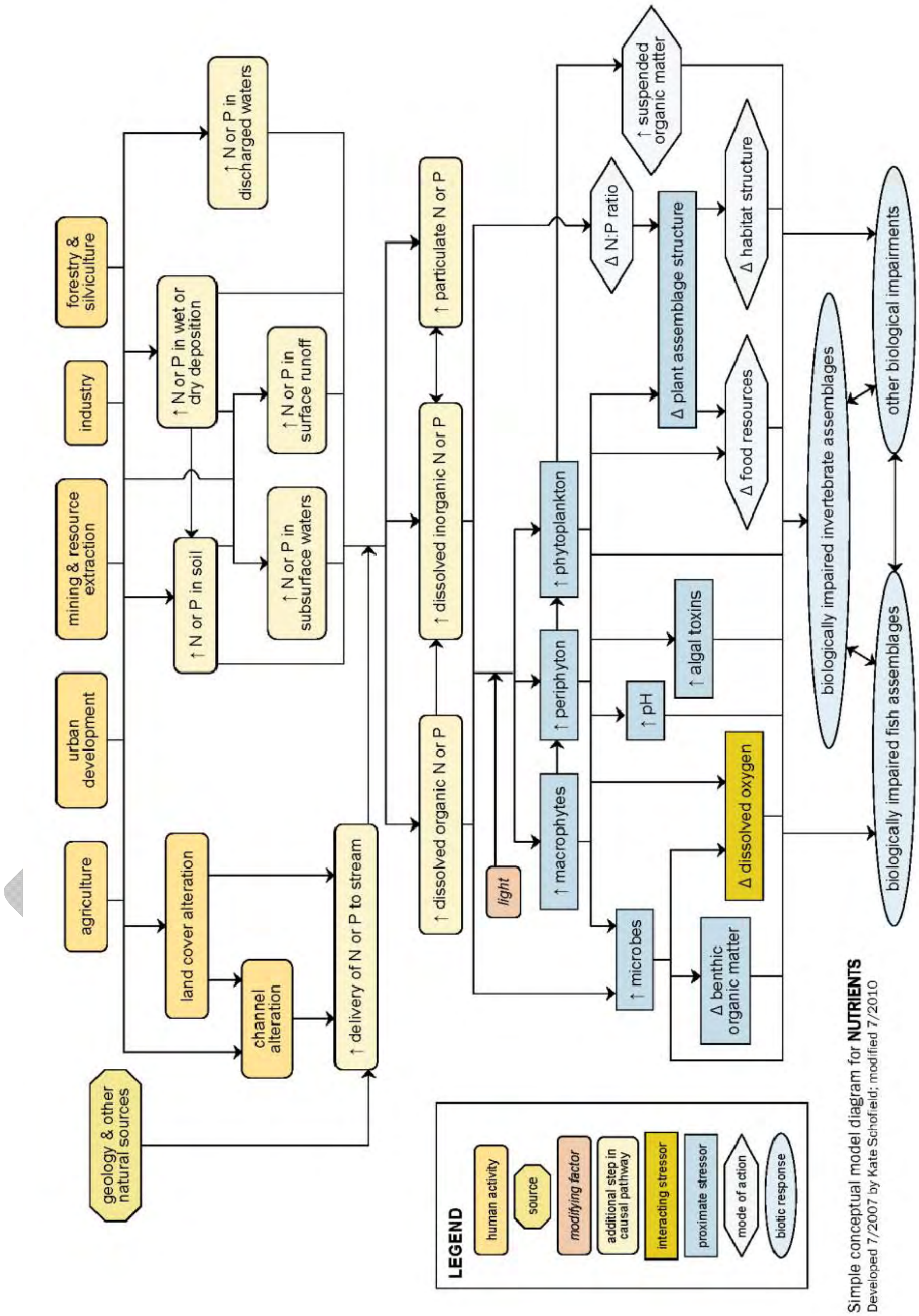

Figure 20: Simple conceptual model diagram for nutrients (U.S. EPA 2013).

A.2 Field Sampling

Field sampling was undertaken during the summer of 2012 to provide the data used to determine a relationship between water chemistry, habitat parameters and macroinvertebrate use impairment within the UBC watershed. Measurements made during the field sampling are shown in Table 19.

Chemistry samples were collected biweekly from May 14 to September 17 at 11 sites within the UBC watershed, including 1 within the Bigelow Creek sub-watershed, and at an additional 2 sites within the neighboring Little Tonawanda Creek watershed (Table 20, Figure 5). Samples were collected using a cross sectional, depth integrated methodology following the NYSDEC RIBS SOP (Smith, et al. 2012). Limited chemistry parameters were measured at BLAK-04, just upstream of a large escarpment while the full parameter set was measured on the downstream side, BLAK-05. These sites were selected to quantify any impacts groundwater entering the stream through the escarpment face may have had upon the chemistry of UBC.

Recent rains resulted in high flows during sample collection on June 12 and 13, 2012. Data from that sampling date was not used as it was deemed non-representative of the base flow conditions being used for this study. No flow conditions were encountered at all sites except BLAK-09, BLAK-10 and BLOW-02 during sample collection on July 25, 2012.

Table 19: Parameters measured during the field sampling

Chemistry	**Habitat Assessment**	**Biological**
Temperature (field and continuous)	Grain Size (Pebble count)	Macroinvertebrates (Traveling kick samples)
Dissolved Oxygen (field)	Silt cover	Suspended Chlorophyll *a* (lab**)
pH (field)	Percent embedded	Suspended Chlorophyll *a* (Hyrolab)
Conductivity (field)	Stream habitat cover	Benthic Diatoms (BenthoTorch)
Ammonia	Riparian closure	Benthic Green algae (BenthoTorch)
Nitrogen, Total Kjeldahl	Canopy angle	Benthic Cyanobacteria (BenthoTorch)
Nitrate	Bank characterization	
Nitrite	Nearby land use/ land cover	
Phosphorus, Total*	Channel morphology	
Phosphorus, Ortho*	Depth	
Turbidity	Velocity	
Suspended Solids, Total		
Dissolved Solids, Total		
Alkalinity, Total*		
Chloride		
Sulfate		

* Parameters indicated comprised the limited chemistry parameters measured at BLAK-04.
**Chlorophyll *a* samples sent to the analytical laboratory analysis were collected only at BLAK-10, LTON-00 and BLOW-02.

Table 20: Field sampling sites and parameters. Table 19 lists the individual measurements included in each parameter set.

Site ID	Watershed	Latitude	Longitude	Parameters
BLAK-01	Upper Black Creek	42.87935	-78.1185	Chemistry, Biology, Habitat
BLAK-02	Upper Black Creek	42.904	-78.1229	Chemistry. Biology, Habitat
BLAK-03	Upper Black Creek	42.9244	-78.1178	Chemistry, Biology, Habitat
BLAK-04	Upper Black Creek	43.00428	-78.0737	Limited Chemistry
BLAK-05	Upper Black Creek	43.00573	-78.075	Chemistry, Biology, Habitat
BLAK-06	Upper Black Creek	43.01557	-78.0802	Chemistry, Biology, Habitat
BLAK-07	Upper Black Creek	43.0341	-78.0754	Chemistry, Biology, Habitat
BLAK-08*	Upper Black Creek	43.06578	-78.0652	Chemistry, Biology, Habitat
BLAK-09	Upper Black Creek	43.082	-78.0685	Chemistry, Biology, Habitat
BLAK-10*	Upper Black Creek	43.08883	-78.0674	Chemistry, Biology, Habitat, Chl-*a*
LTON-00*	Little Tonawanda Creek	42.89305	-78.1667	Chemistry, Biology, Habitat, Chl-*a*
LTON-A	Little Tonawanda Creek	42.8155	-78.1677	Chemistry, Biology, Habitat
BLOW-02*	Bigelow Creek	43.06632	-78.0695	Chemistry, Biology, Habitat, Chl-*a*

*Previously sampled location. See section 2.4.

Habitat and periphyton measurements were made during the week of September 17, 2012. Habitat assessments were conducted using the NYSDEC habitat assessment procedures (Smith, et al. 2012) and a modified version of the USGS National Water Quality Assessment Program habitat assessment protocol (Fitzpatrick, et al. 1998). The NYSDEC method was used for consistency with program methods and for potential future integration into similar applications using these established methods. The modified NAWQA protocols were used to collect data using more quantitative methods. Habitat assessments and algal measurements were made and macroinvertebrate samples were collected at all locations except BLAK-04 (Figure 5).

Periphyton measurements were made using a bbe BenthoTorch, providing in situ quantification of Chlorophyll-a (Chl-a) fluorescence. Results are presented as surface density (µg/cm^2) of Chl-a, attributed to diatoms, green algae and cyanobacteria. Measurements were taken at one meter intervals, minimum of three measurements per transect, during each of the 5 transects completed at each site. The data, as a function of phosphorus concentrations, are shown in Figure 21. Shown are the averages of all chlorophyll-a measurement made at a site. The error bars are one standard deviation. No relationship between periphyton surface density and other measured parameters, e.g. SRP, TP, riparian cover, were evident. Site selection, measurement collection methods and time of year may all have contributed to the inconclusive results. The BenthoTorch had not previously been used by NYSDEC. The results obtained indicate that a more comprehensive assessment of the instrument and its output is needed before any meaningful conclusions can be drawn. Though collected, the data were not used in the development of this TMDL.

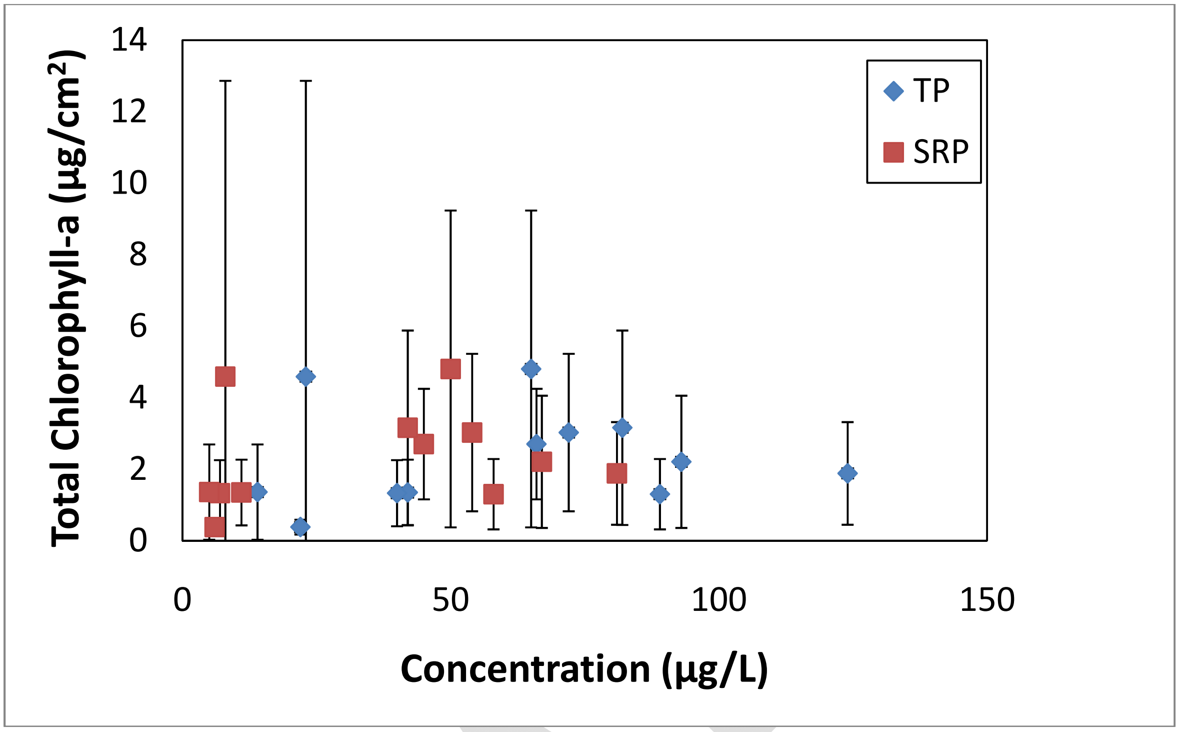

Figure 21: Average chlorophyll-a measurements made at each site during the September field assessment as a function of growing season average phosphorus concentrations. Error bars are ± 1 standard deviation.

Macroinvertebrate samples were collected in parallel with the habitat assessment. Six replicated macroinvertebrate samples were collected at each site using a two minute, five meter traveling kicknet sampling methodology (Smith, et al. 2012). Samples were collected from riffles with cobble and gravel substrate using an 800 × 900 micro mesh net, preserved in 95% ethanol and shipped to a contract laboratory for processing. One hundred organism subsamples were randomly sorted from each sample and identified to the lowest possible taxonomic level. New York State's multimetric index of biological integrity was used to determine water quality from each site (Smith, et al. 2012). In agreement with the draft numeric nutrient criteria currently being developed by NYSDEC (Smith and Tran 2010), this method calculates species richness (Spp), Ephemeroptera-Plecoptera-Tricoptera richness (EPT) (Lenat 1988), Hilsenhoff's biotic index score (HBI) (Hilsenhoff 1987), percent model affinity (PMA) (Novak and Bode 1992), and the nutrient biotic index for phosphorus (NBI-P) (Smith, Bode and Kleppel 2007). The result of each of the indices is placed on a common 10 scale and the mean of the adjusted values determined. The result, called the Biological Assessment Profile (BAP) score, is a single value for which a four-tiered scale of water quality impact (non-, slight, moderate or severe) has been established (Smith, Heitzman, et al. 2012).

A.3 Model Development

Averages for all water chemistry data, habitat, and biological metrics (Spp, EPT, HBI, PMA, BAP, NBI-P, nitrogen nutrient biotic index [NBI-N]) were analyzed together using a Spearman rank-order (Sprho) correlation to reduce the number of possible variables. Correlation thresholds between biological metrics and physical-chemical variables for the Sprho were R = 0.4 and p=0.05. The initial set of 80 variables was reduced to 15. Because the ultimate goal of this project was to yield variables influencing the biological endpoint, only variables that could directly be influenced through management activities were used for further analyses.

Non-metric multidimensional scaling and Bray-Curtis similarity analysis using square root transformed community assemblage data indicated a community shift in study sites with drainage areas greater than 10 square miles, referred to here as river sites (Figure 22). This ecological threshold for a community shift is consistent with state-wide analysis of headwater streams, defined as streams with drainage areas less than 10 square miles (unpublished data, B. Duffy). According to the data collected, factors other than nutrients appear to influence the biological community at the headwaters locations (BLAK-01, -02, -03, and LTON-A). Figure 22 shows similarities within the macroinvertebrate community assemblages, with those sites which plot near each other having similar communities. All of the headwaters sites plot separately from the rest of the Upper Black Creek and Bigelow Creek sites. The reference sites, LTON-00 and LTON-A, also plot apart from the other sites. Different community assemblages are expected between best attainable reference sites and those sites showing some impact. Figure 23 shows the relationship between total phosphorus and the mean BAP score from the September 2012 sampling. The river sites show a clear linear relationship, indicating BAP scores improves with decreasing phosphorus concentrations. The headwaters sites do not follow such a clear pattern. It is not clear that decreasing phosphorus concentrations at these sites would improve the BAP scores. There are likely other stressors affecting these sites. These headwaters sites were particularly susceptible to low flows during the 2012 growing season. With only four sites, however, there is insufficient data to draw any conclusions regarding the impacts of flow or other stressors on the macroinvertebrate communities at the headwaters sites. As a result, only the river sites were considered in subsequent analysis.

Variables retained for use in the development of the multiple regression model were total riparian width (TRW) in meters, total suspended solids (TSS) in mg/L, average riparian closure (ARC) in percent, soluble reactive phosphorus (SRP) in mg/L, total phosphorus (TP) in mg/L, and fraction fines in the riffle (FFR), where fines have a diameter less than 16 mm. This set of variables was analyzed using a best subset regression (BSR). BSR uses the best variables in combination to explain the greatest amount of variability in the response variable. To be consistent with NYSDEC assessment methodology the BAP score was chosen as the response variable.

The results from the BSR (Table 21) show how well the mean BAP scores are explained by the indicated different combinations of variables. In general, the fewest number of variables should be used while still achieving a high adjusted R^2 value. Fewer variables generally result in lower R^2 values while more variables increase the risk of over fitting the model. A model based upon total riparian width (TRW), fraction of fines in the riffle (FFR) and soluble reactive phosphorus (SRP) provided the best statistical metrics while minimizing the number of variables (shown in bold in Table 21). These variables were used to develop the model using multiple regression analysis (MRA).The resulting equation was:

$$\text{BAP (mean)} = 5.99 - 26.5\times\text{SRP} + 0.0837\times\text{TRW} - 3.78\times\text{FFR}$$

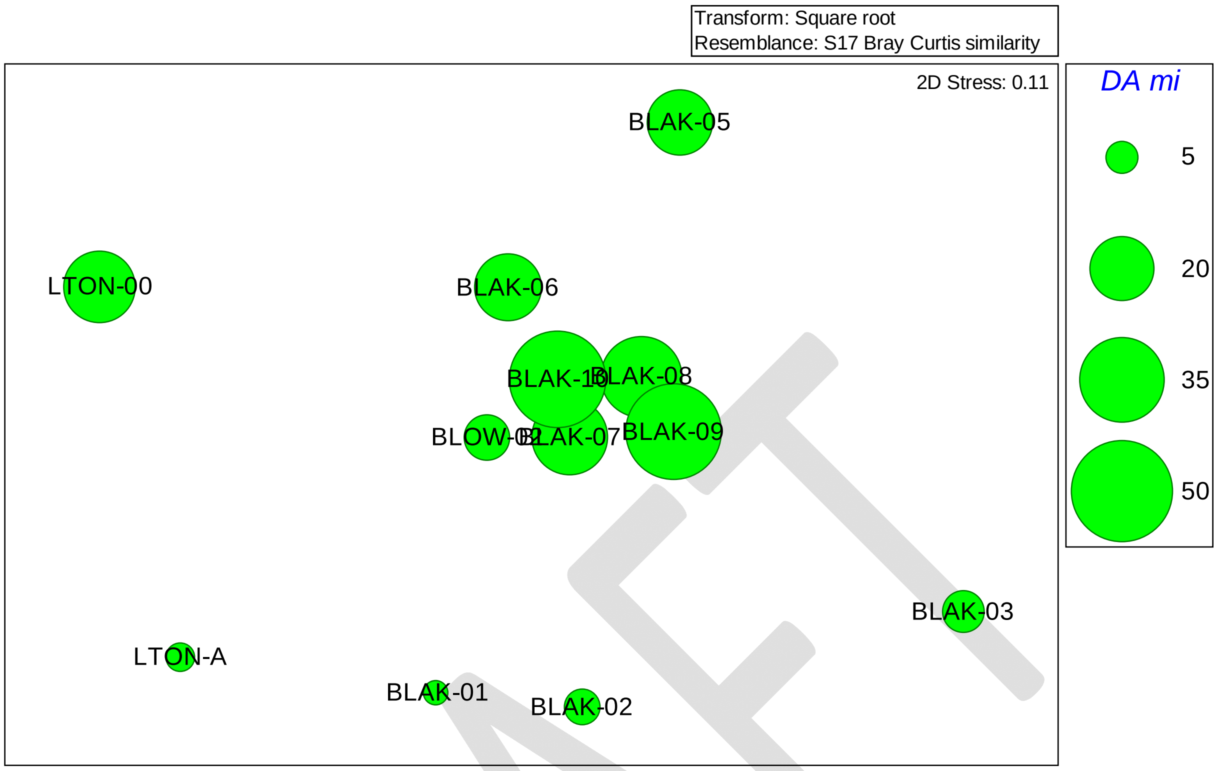

Figure 22: nMDS taxa ordination plot of sites for the Upper Black Creek TMDL. Locations with drainages areas (DA) less than 10 square miles separate from other sites in the study.

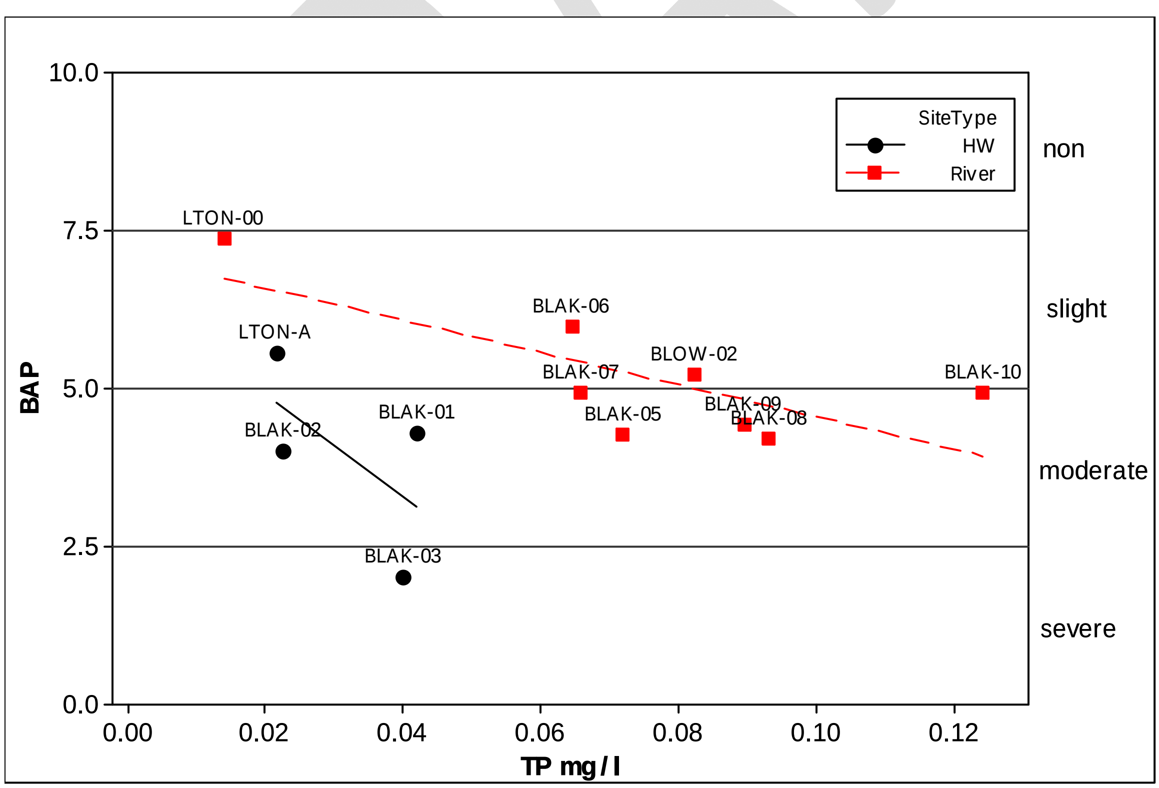

Figure 23: Scatter plot showing the relationship between total phosphorus (TP) and the mean BAP score for the headwaters sites (HW) and the river sites. HW sites are those with drainage areas less than 10 square miles.

Table 21: Results from the best subset regression of manageable variables in the Upper Black Creek study area.

Number of variables	R^2	Adjusted R^2	Mallows Cp	S	TRW	TSS	ARC	SRP	TP	FFR
1	61.9	55.6	26.6	0.70				X		
1	55.2	47.7	32.0	0.76					X	
2	70.7	59	21.5	0.68			X	X		
2	69.6	57.5	22.4	0.69				X		X
3	**88.4**	**80.4**	**9**	**0.46**	**X**			**X**		**X**
3	82.8	70.0	13.8	0.58		X	X	X		
4	91.0	78.9	9.2	0.48	X			X	X	X
4	90.5	77.8	9.6	0.49	X		X	X		X
5	97.7	91.9	5.9	0.30	X		X	X	X	X
5	95.3	83.5	7.8	0.43	X	X	X	X		X
6	98.8	91.3	7	.31	X	X	X	X	X	X

The equation has an adjusted R^2 = 80.4% and p = 0.023 and indicates that multiple factors influence the biological response in flowing waters. Achievement of BAP ≥ 5 can be achieved by SRP reductions alone, however increasing TRW or decreasing FFR would also have beneficial impacts.

A similar analysis was performed using total phosphorus (TP), rather than SRP. Similar conclusions were reached, with the explanatory variables of TRW and FFR again identified. The resulting equation was:

$$\text{BAP (mean)} = 5.59 - 17.4\times\text{TP} + 0.091\times\text{TRW} - 3.43\times\text{FFR}$$

Figure 24 shows the results of the MRA for calculated TP mean BAP scores plotted against the measured mean BAP scores. The TP equation was not as strong a predictor of BAP score, with an adjusted R^2 of 68.4% and p = 0.057. For consistency with SPDES permits and stream numeric nutrient criteria currently under development, however, the TP relationship was selected for the development of this TMDL.

There is some uncertainty surrounding the resulting equation from the MRA. In Figure 24 the 95^{th} percentile confidence interval for the regression equation is shown as red dashed lines. The 95^{th} percentile prediction interval is shown by the green dotted lines. Due to the uncertainty in the relationship, meeting restoration targets consisting of some combination of TP reductions, TRW increases and FFR decreases does not guarantee a BAP ≥ 5 will be attained. Conservative assumptions have been built into the analysis to make that outcome more likely (Section 6.3). The converse is also true which is supportive of using the BAP score as the endpoint for this TMDL rather than the nutrient loads specified in Tables 11, 12 and 13.

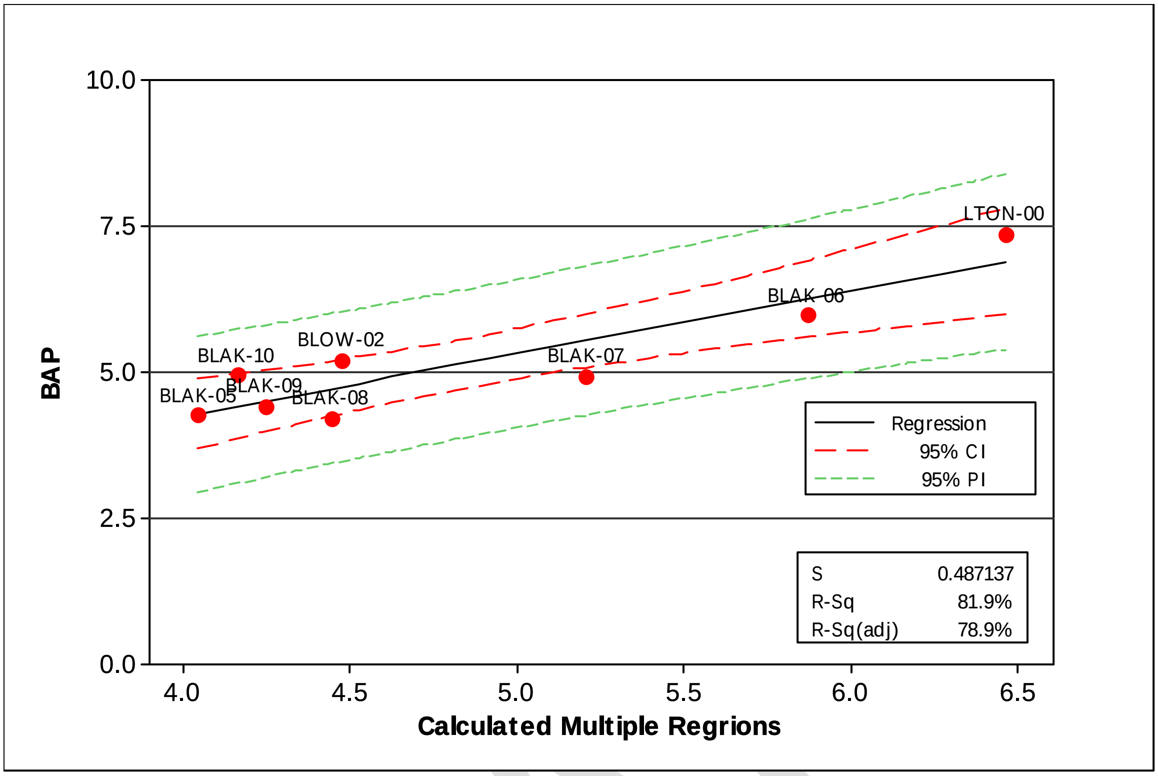

Figure 24: Results of the total phosphorus multiple regression analysis (MRA) showing the MRA mean BAP score against the measured mean BAP score. Shown are the total phosphorus regression line (black, solid), the 95th percentile confidence interval about the mean (red dashed) and the 95th percentile prediction interval (green dotted).

Phosphorus is generally the limiting nutrient in freshwater systems; however, it has been noted “that co-limitation by both nitrogen and phosphorus may be common in many systems and regions” (U.S. EPA 2010). Several species of nitrogen were measured during the field sampling.

During the Spearman rank-order analysis the nitrogen species ranked similar to the phosphorus species. When included in the best subset regression analysis phosphorus was found to be a better predictor of the BAP score than was nitrogen. While the inclusion of nitrogen into the regression model did improve the predictive power, it was only by a similar amount as when other variables were included as a fourth factor in the analysis. Based upon the analysis results phosphorus was determined to be the limiting factor and nitrogen was not considered further.

SRP and TP targets may be calculated from their respective equations above assuming a BAP score of 5 is to be achieved through phosphorus reductions alone. A strong relationship between SRP and TP was indicated by the 2012 data (Figure 25). Taking into consideration this relationship, meeting the reduction targets for TP would provide more than the needed amount of SRP reduction as well. For example, at BLAK-08, the TP reduction target is 0.048 mg/L. Applying the TP-SRP relationship, the equivalent SRP concentration would be 0.025 mg/L, less than the 0.037 mg/L SRP target determined from the SRP equation above. Basing the TMDL off of the TP relationship would therefore be a conservative measure.

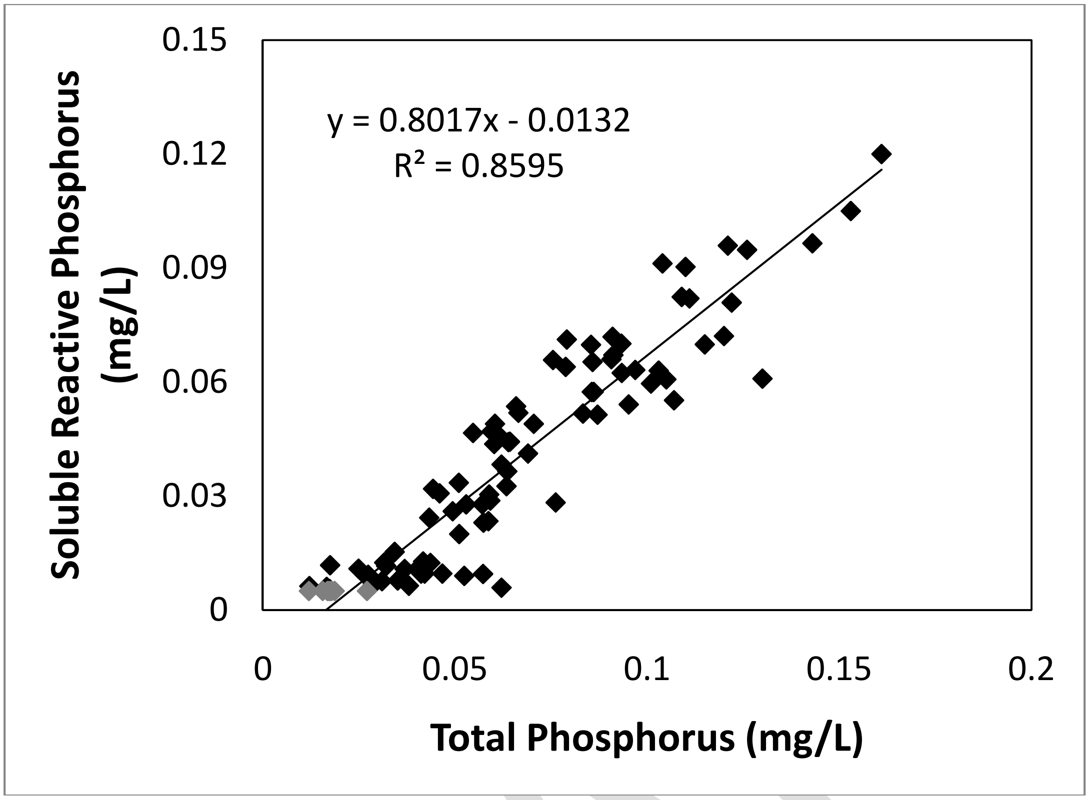

Figure 25: Relationship between TP and SRP in the data collected during summer 2012. Grey points were below the detection limit for SRP.

A.4 Model Application

Application of the macroinvertebrate response model developed in the previous section requires specification of how and when the model will be applied. The rational used to make decisions on how to account for assessed conditions within the model framework and how the target values will be expressed are described in the following sections.

A.4.1 Accounting for assessed conditions

The BAP scores predicted by the equation developed in the previous section under predicted the level of impairment at BLAK-08 relative to the value measured during field sampling, and over predicted the extent of impairment at BLAK-10 and BLOW-02 (Table 22). For example, the field assessment found BLOW-02 to be unimpaired (BAP > 5.0) while the regression equation predicted the site to be impaired (BAP < 5.0). Implementation of TP values derived from the above equations in the TMDL would likely result in insufficient reductions from BLAK-08 and an excessive amount of reduction from BLAK-10 and BLOW-02.

Table 22: Modeled and measured BAP scores

Site	Predicted mean BAP	Measured mean BAP
BLAK-08	4.58	4.21
BLAK-10	4.24	4.95
BLOW-02	4.65	5.22

Table 23: Measured and target total phosphorus values

site	Measured TP	Target TP
BLAK-08	0.093	0.048
BLAK-10	0.124	0.121
BLOW-02	0.082	0.082* (* held at measured)

To correct for the site specific differences between the measured BAP score and the model predicted BAP score the measured BAP score was used as the starting point of the analysis while retaining the regression analysis relationship between the three covariates and the BAP score. The relative improvement in the BAP score at each site is accomplished through changes in the covariates, each weighted by the respective prefactors from the regression equation.

For BLAK-08, the calculation is as follows:
Change in BAP score needed = Target BAP – Measured BAP = 5.0 – 4.21 = 0.79.

Change in regression covariates = Target covariate values – Measured covariate values

$$= [-17.4\times TP_t+0.091\times TRW_t-3.43\times FFR_t] - [-17.4\times TP_m+0.091\times TRW_m-3.43\times FFR_m]$$

$$= [-17.4\times TP_t+0.091\times TRW_t-3.43\times FFR_t] - [-17.4\times 0.093+0.091\times 18-3.43\times 0.3]$$

where the subscripts t and m are for the target and measured values of the covariates, respectively. The changes in BAP score is set equal to the change in regression covariates, thus allowing the following to be solved for any combination of target values for TP, TRW and FFR:

$$0.79 = [-17.4\times TP_t+0.091\times TRW_t-3.43\times FFR_t] - [-17.4\times 0.093+0.091\times 18-3.43\times 0.3]$$

In the case where TRW_t and FFR_t are unchanged from the measured values, TP_t may be solved for directly. For the TMDL, this would be equivalent to setting phosphorus reduction targets based upon achieving a BAP score of 5.0 through phosphorus reductions alone. The resulting TP targets are shown in Table 23. Note that for Bigelow Creek (site BLOW-02) the 2012 assessment was above the impairment threshold of a BAP score equal to 5. Therefore, the target TP concentration is set at the concentration measured for in 2012.

A.4.2 Application of the target concentrations

The macroinvertebrate response model (MRM) developed above provides a total phosphorus target endpoint which has been used for the development of this TMDL. The MRM does not specify how this endpoint is to be applied. The decision of how and when the endpoint is to be applied is, however, still informed by the science behind the development of the MRM.

The MRM was developed using average phosphorus concentrations from June through September (growing season). This was done because this was the identified critical period when phosphorus concentrations were high and flows in the stream were low, creating stressful condition for the macroinvertebrates. The applicability of the MRM is therefore the same: an average TP concentration calculated over the growing season. From the WLA and permitting perspective, the applicable period was extended to include the month of October as this aligns with other seasonal permit limits. This will require phosphorus reductions from the point sources to extend outside of the critical period.

Using the load duration approach (Section 5.2) requires the selection of where on the load duration curve the loading and therefore required reduction will be assessed. Consistent with concept of long term average phosphorus concentrations leading to the aquatic life use impairment, the median flow value on the load duration curve was used. The load duration curves were also developed using flow values only from the applicable MRM model period, June through September. On any given growing season day, the flow will have a 50% chance of being greater than the flow used to develop the TMDL, or the flow will have a 50% chance of being less than the value used to develop the TMDL. Use of the median flow value in combination with the growing season mean TP value, allows the TMDL to be developed using typical growing season conditions.

Appendix B: Phosphorus concentrations and loads from the Byron and South Byron Sewage District Sewage Treatment Plants

The Byron Sewage District Sewage Treatment Plant (SDSTP, NY0160971 outfall 001M) and the South Byron SDSTP (NY0160971 outfall 002M) do not regularly measure the amount of phosphorus in their effluents. NYSDEC, in cooperation with the facility operations staff, collected samples for phosphorus analysis on July 3, 2013. Concentrations of total phosphorus and soluble reactive phosphorus in the effluent samples are in Table 24.

Table 24: Results from effluents samples collected on 7/3/13.

	Soluble Reactive Phosphorus (mg/L)	Total Phosphorus (mg/L)
Bryon SDSTP	3.42	3.70
S. Byron SDSTP	2.72	2.85

These estimates agreed well with mass balance calculated concentrations based upon stream phosphorus concentrations, modeled flows and monthly average effluent flows: Byron TP = 5.2 mg/L, SRP = 4.2 mg/L and S. Byron TP = 3.0 mg/L, SRP = 2.94 mg/L. This provides assurance that the concentrations in Table 24 are representative of at least the May through September period. Since the mass balance approach can provides only an estimate of the phosphorus concentrations, the effluent sample results were used to characterize the STPs in the TMDL development.

Some seasonality exists in the STP flows with growing season flows on average less than the annual average flows. The loads attributed to each STP during the growing season and on an annual basis are shown in Table 25.

Table 25: Estimates phosphorus loads for the Byron and South Byron SDSTPs

	Growing Season			Annual		
	Average Flow (MGD)	Total Phosphorus Load (lb/d)	Soluble Reactive Phosphorus Load (lb/d)	Average Flow (MGD)	Total Phosphorus Load (lb/d)	Soluble Reactive Phosphorus Load (lb/d)
Byron SDSTP	0.026	0.81	0.75	0.030	0.93	0.85
S. Byron SDSTP	0.016	0.38	0.36	0.024	0.60	0.55

Appendix C: Watershed Numerical Modeling

The watershed model was developed and calibrated to the Upper Black Creek watershed by Cornell University. Presented here is an overview of the model and calibration results. Full details of the model development and calibration can be found in the final report (Pacenka, et al. 2013).

The watershed numerical modeling consisted of three separate components: a hydrology model, a sediment model and a phosphorus model. The hydrology model drives both the sediment and the phosphorus models and the sediment model feeds into the phosphorus model. Each model is described below.

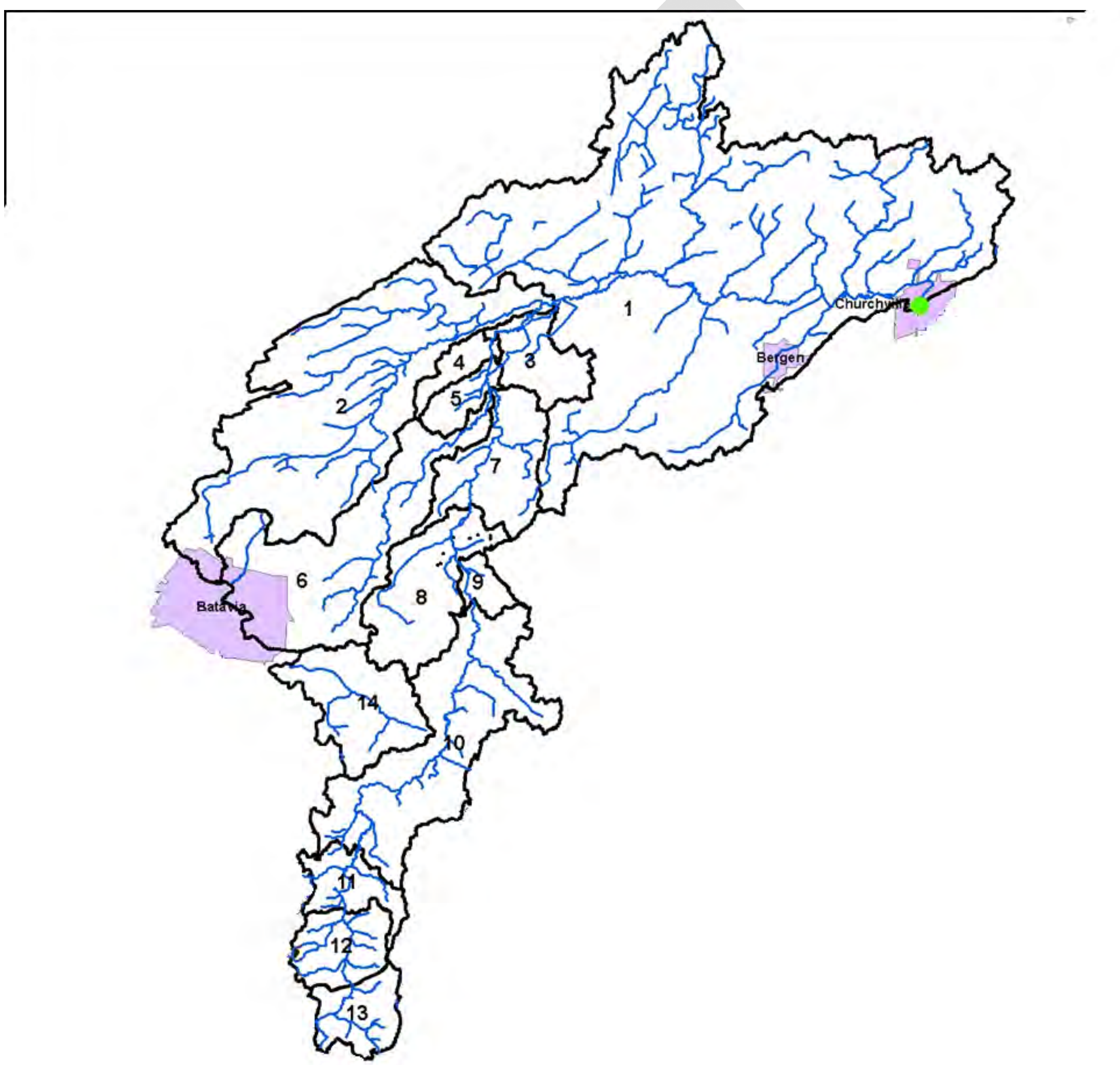

Figure 26: Model subbasins

The modeled watershed consisted of 14 subbasins extending from the headwaters of Black Creek to the USGS gage at Churchville (Figure 26). Subbasin delineations were dictated by sampling locations and stream confluences. The model was extended below the BLAK-10 sampling site (subbasin 3) to incorporate the USGS gage at Churchville into the model domain.

C.1 Hydrology

The Parameter Efficient Distributed (PED) model is a semi-distributed rainfall-runoff model based upon the Thornthwaite and Mather (1955) water balance procedure and can be run at daily, weekly, or monthly time steps (Collick, et al. 2009, Tesemma, Mohamed and Steenhuis 2010, Steenhuis, et al. 2009). Figure 27 provides an overview of the PED hydrology model, and Figure 28 presents its algebra. It represents a watershed as a hillslope containing three land surface areas: a restricted infiltration area anywhere along the slope, an infiltration area usually at midslope, and a frequently saturated area along the stream. Beneath the three surface zones are a shallow aquifer zone in the rendered bedrock, and the top of the aquifer constitutes an interflow zone into which the aquifer spills after it fills up. When incoming precipitation (P) fills either the restricted infiltration area or the downslope saturating area to capacity, they spill over into the stream immediately. The infiltration area spills into the aquifer. The aquifer spills into the interflow pathway. Each of the three surface areas has a slower outflow as well: they evaporate water back into the atmosphere following the classic Thornthwaite-Mather climatic water balance scheme.

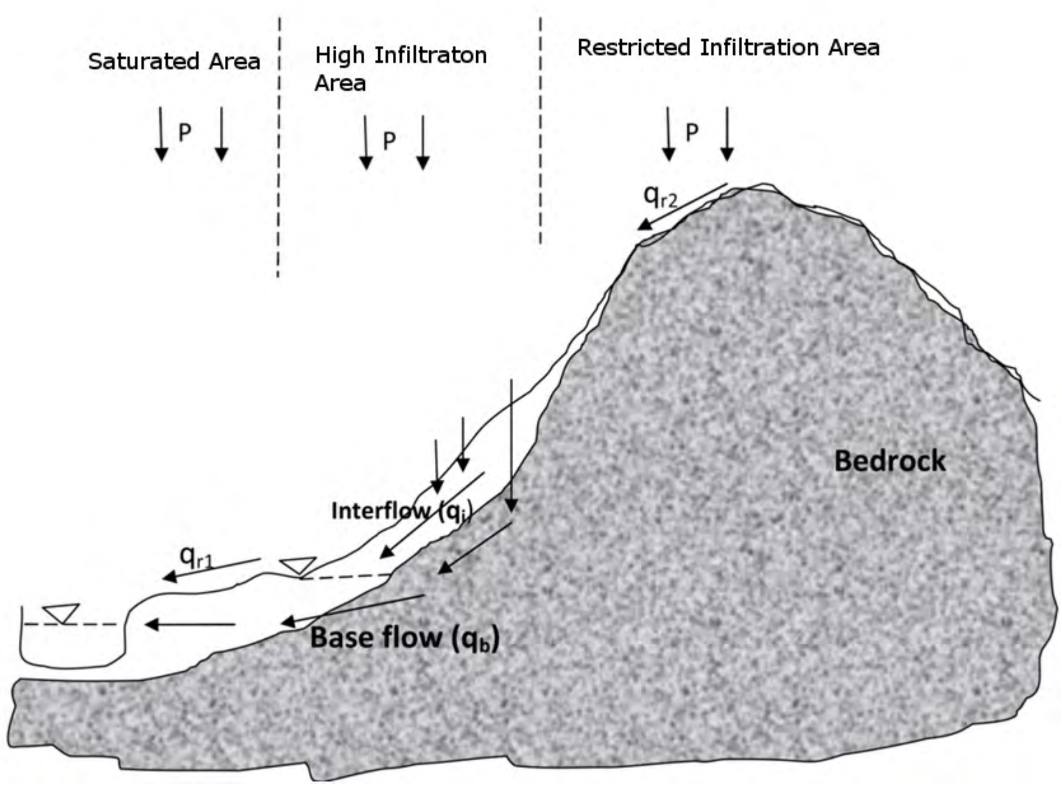

Figure 27: PED hydrology for a single basin

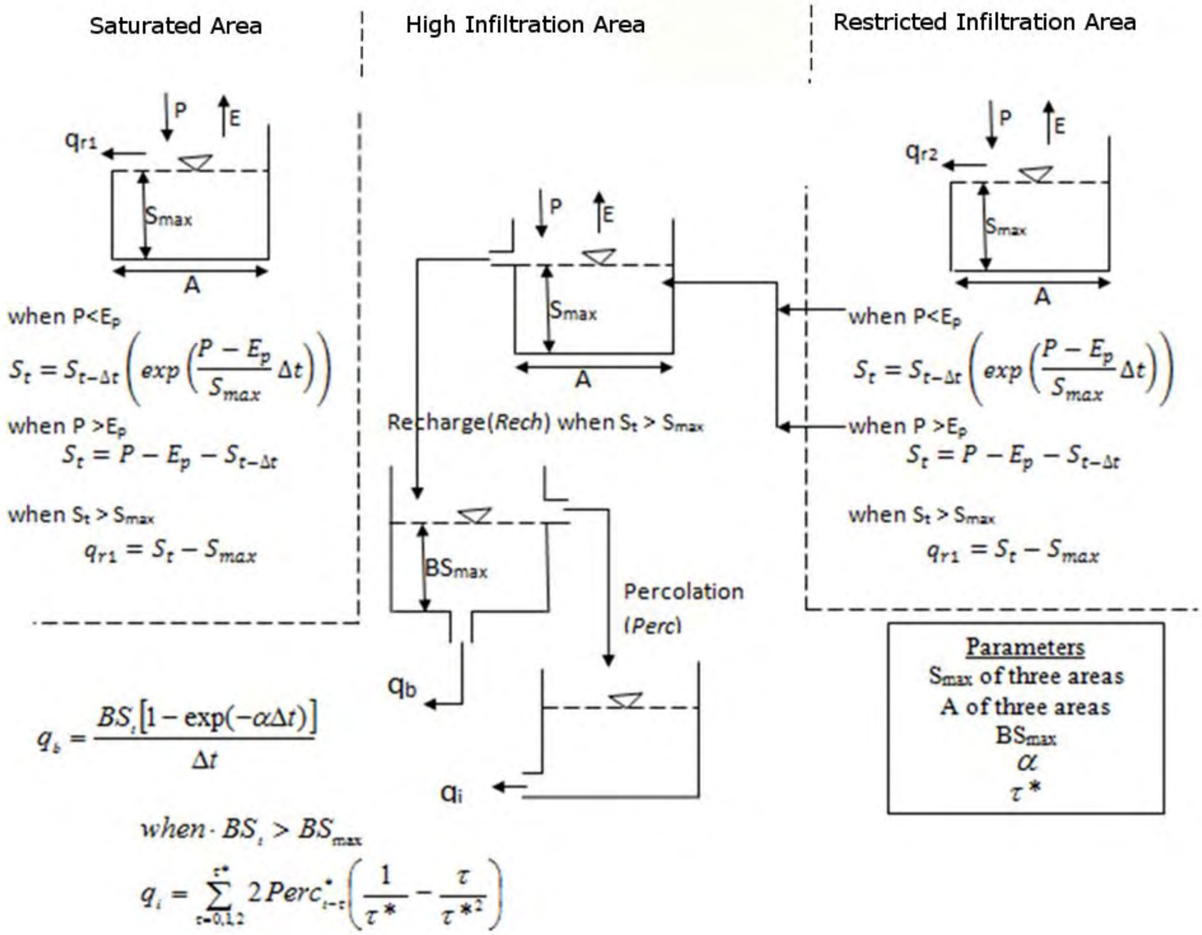

Figure 28: Five overflowing buckets of the PED hydrology model.

The aquifer zone slowly drains to the stream providing baseflow. The interflow zone's outlet is also to the stream; it drains faster than the aquifer and slower than the limited infiltration or saturated zones. Methods described by Walter, et al. (2005) were used to model snowmelt. Additional information including equations can be found in the referenced publications.

Each of the three surface storages and the aquifer have a maximum capacity parameter (in mm). The aquifer zone and the interflow zone additionally have time parameters (in days) which represent how rapidly they release water to the stream.

The fraction of the subbasin that each hydrologic land surface areas (restricted infiltration, infiltration and saturated area) constitutes needs to be specified for each subbasin. The aquifer and interflow zones are implicitly beneath the entire basin. In Figures 27 and 28 *P* is liquid precipitation (rainfall + snowmelt) (mm/d), *E* is evapotranspiration (mm/d), *q* are outbound fluxes (mm/d) and *S* is storage (mm). Subscripts indicate baseflow (*b*), interflow (*i*) and surface runoff (*r1* and *r2*). Initial values for storage in each zone are also required, except for the interflow zone which is assumed to start empty. Time series of precipitation and temperature are also required.

Table 26: Time-constant data used to characterize the wastewater treatment plants within the model.

Facility	Subbasin	Flow (cmd)	SRP load (kg/yr)	PP load (kg/yr)
Byron	4	100	130	10
South Byron	7	60	60	2
Batavia Country Club	6	7.6	6.4	0

Calculations within the model are carried out on a “per unit area” basis for each subbasin within the model (Figure 26). Subbasins are connected to form the entire watershed through a network of "nodes." To derive the water budget for a node, i.e. for all land upstream from that node, the network algebra model simply adds together the daily outflows of all subbasins topologically upstream from the node, weighting the PED outflows (in mm) by the subbasin sizes (in kilometers squared). The units of the nodal water budgets are for convenience cubic meters per day (cmd) which requires a multiplier of 1000 to convert from mm × km^2/day to cmd. WWTP discharges are included explicitly in the model by adding the discharge volume to each node downstream of the WWTP's subbasin. Details for each WWTP as modeled are shown in Table 26.

C.1.1 Hydrology Calibration

The entire Black Creek basin was assumed to have uniform meteorology identical to that occurring at the Rochester Airport, east of the watershed outlet, which represented the most complete dataset. Occasional missing data from the Airport weather station were filled in using data from the Batavia weather station. Potential evapotranspiration was fixed at a 3.5 mm/day summer maximum, which is scaled to the rest of the year using a sine wave having a zero value in early January.

The Black Creek watershed was divided into 13 subbasins (Figure 26) with subbasins 3-13 constituting Upper Black Creek. Subbasins 1, 2, 3 and auxiliary subbasin 14 fall outside of the Upper Black Creek (UBC) watershed but were included in the model domain for model calibration and validation purposes. Subbasin 1 covers the Black Creek watershed from Spring Creek, a tributary to Black Creek which joins Black Creek just below site BLAK-10, to the USGS gage at Churchville. Subbasin 2 is Spring Creek itself. Subbasin 3 is the small drainage area of Black Creek from Spring Creek upstream to the BLAK-10 site. Subbasin 14 was an added subbasin that could be used within the model framework to account for subsurface inter-basin transfers of water through the karst region of UBC; however, this was not used within the final implementation. Table 27 provides details on the subbasins. The nodal network is shown in Figure 29 with nodes prefixed by N and subbasins prefixed by S.

Candidate model parameter value sets were compared for how well modeled flow values fit to measured flow values, considering both June-September fit and annual overall fit. The Nash-Sutcliffe efficiency (NSE) and the coefficient of determination (R^2) were the primary statistics used with a goal of at least 0.4 for both measures. Values of NSE may vary from negative infinity to positive one. NSE = 1 corresponds to a perfect match of modeled data to the observed data. NSE = 0 indicates the model predictions are as accurate as using the mean of the observed data as a constant value. NSE values were also calculated from seven day average flows when

Table 27: Subbasins used in the Black Creek watershed model

No.	Primary Stream	Description	Area (km^2)
S1	Black Creek	Drainage of Black Creek from Spring Creek to the USGS gauge below the dam at Churchville	156.0
S2	Spring Creek	Entire drainage of Spring Creek, to mouth at Black Creek	58.1
S3	Black Creek	Drainage of Black Creek from Route NY 237 Byron to Spring Creek	7.8
S4	Black Creek	Drainage of Black Creek from Trestle Park bridge to Route NY 237 bridge.	3.3
S5	Black Creek	Drainage of Black Creek from junction with Bigelow Creek to Trestle Park bridge	3.8
S6	Bigelow Creek	Entire drainage of Bigelow Creek, to mouth at Black Creek	31.4
S7	Black Creek	Drainage of Black Creek from Griswold Rd. bridge to Bigelow Creek	13.6
S8	Black Creek	Drainage of Black Creek from Tyler Rd. bridge (abandoned) to Griswold Rd. bridge	15.7
S9	Black Creek	Drainage of Black Creek from brink of Morganville Falls to Tyler Rd. bridge	2.9
S10	Black Creek	Drainage of Black Creek from McLernon Rd. bridge to brink of Morganville Falls	31.8
S11	Black Creek	Drainage of Black Creek from Route US 20 bridge to McLernon Rd. bridge	6.4
S12	Black Creek	Drainage of Black Creek from foot bridge in Genesee County Park to Route US 20 bridge.	8.3
S13	Black Creek	Drainage of Black Creek from headwaters to foot bridge in Genesee County Park	7.2
S14	(unnamed sinking stream south of Rte 5 near Batavia and Stafford)	Area delineated by Richards and Boehm (2012)	9.5

daily observed data were available. R^2 is a measure of correlation between the modeled and measured values, with $R^2 = 1$ indicating a perfect correlation and $R^2 = 0$ indication no correlation. The percent bias was also calculated as an overall metric of the model tendency to over- or under-predict the measured values. Low values of percent bias indicate better model predictions. The optimal value of percent bias is zero but ±10% is generally acceptable. Fitting was done for the period of 2007 through 2012, and then the results were tested against the water quality monitoring period 2010 through 2012 as a dependent "calibration" period (Table 30).

Accurate modeling of base flows during the summer growing period became much more important as the macroinvertebrate response model began to revolve around the growing season phosphorus load.

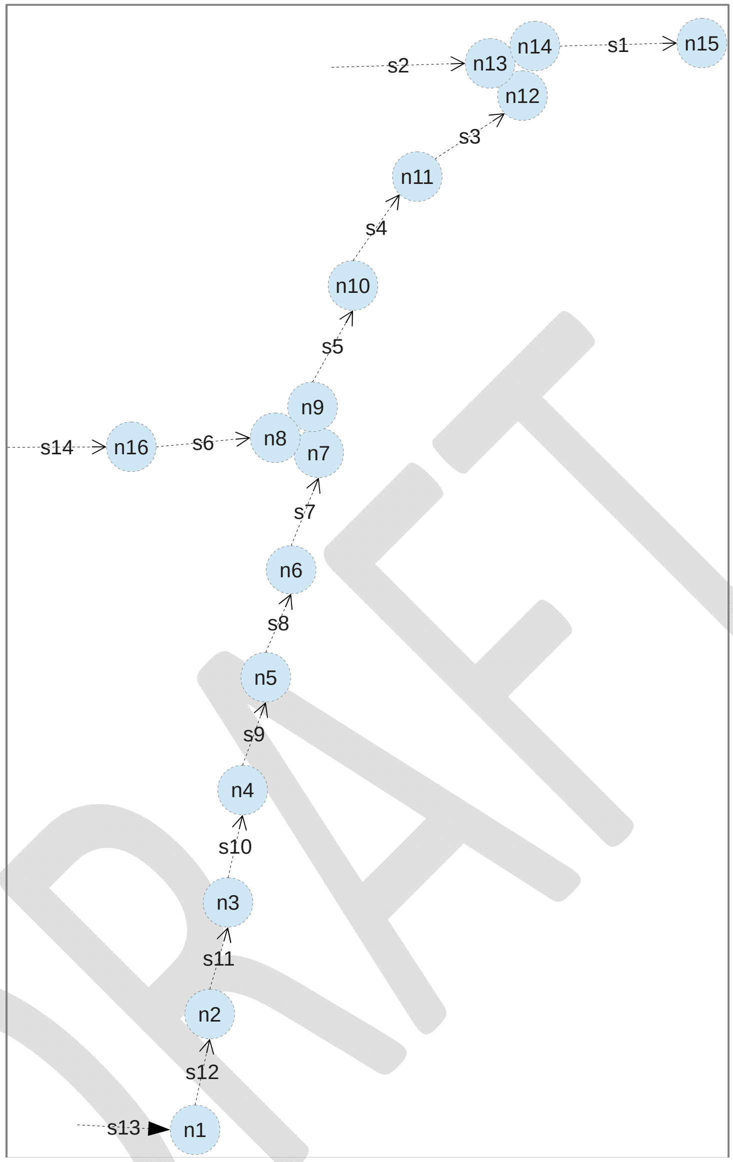

Figure 29: Subbasin nodal network for the Black Creek watershed model

The fitting results reflect a sequential approach. First, measurements of flow made by Winslow (2012) provided data for independent fitting for each of subbasins 2 (Spring Creek) and 6 (Bigelow Creek). With their fitted parameters frozen, parameters in the remaining subbasins were varied in attempts to obtain adequate fits to summer and year-round flows at the Churchville USGS gauge. During this third step, parameters for subbasin 1 (which is heavily influenced by the large Bergen-Byron swamp and an impoundment) were allowed to vary independently from parameters forced to be uniform across the remaining subbasins (3-5, 7-13). Final subbasin parameters are in Table 29. Modeled and measured flows at the Churchville gauge are shown in Figures 30 and 31.

Table 28: Nodes used within the Black Creek watershed model

No.	Stream	Location	Monitoring point	Contributing subbasins
N1	Black Creek	Footbridge in Genesee County Park	DEC BLAK-01	13
N2	Black Creek	Route US20 bridge	BLAK-02	12-13
N3	Black Creek	McLernon Road bridge	BLAK-03	11-13
N4	Black Creek	Brink of falls at Morganville	BLAK-04	10-13
N5	Black Creek	Tyler Rd. (abandoned) bridge	BLAK-06	9-13
N6	Black Creek	Griswold Rd. bridge	BLAK-07	8-13
N7	Black Creek	Above junction with Bigelow Creek	BLAK-08	7-13
N8	Bigelow Creek	Above junction with Black Creek	DEC BLOW-02, Brockport Bigelow	6 (+14 if used)
N9	Black Creek	Below junction with Bigelow Creek	(none)	6-13 (+14)
N10	Black Creek	Trestle Park foot bridge	BLAK-09	5-13 (+14)
N11	Black Creek	Route NY 237 bridge north of Byron	BLAK-10, Brockport Upper Black	4-13 (+14)
N12	Black Creek	Above junction with Spring Creek	(none)	3-13 (+14)
N13	Spring Creek	Above junction with Black Creek	Brockport Spring Creek	2
N14	Black Creek	Below junction with Spring Creek	(none)	2-13 (+14)
N15	Black Creek	USGS gauge at Churchville	USGS Churchville stream gauge	1-13 (+14)
N16	(Unnamed sinking stream)	Terminus of stream in sinkhole in wetland N 42.98060 W 78.14867	(none)	14

Table 29: Final subbasin hydrology parameters

Parameter group	Value
Saturated runoff producing area	Subbasin 6 (Bigelow Creek): 17% All other subbasins: 9%. Remainder of each subbasin is infiltration area.
Aquifer storage capacity	Subbasin 1: 65 mm All other subbasins: 45 mm
Aquifer drainage half life	Subbasin 1: 32 days Subbasins 2 and 6: 17 days All other subbasins: 19 days
Runoff1 soil moisture capacity and initial storage	120 mm Initially fully saturated
Runoff2 soil moisture capacity and initial storage	(Land type not used)
Recharge3 soil moisture capacity and initial storage	150 mm Initially fully saturated

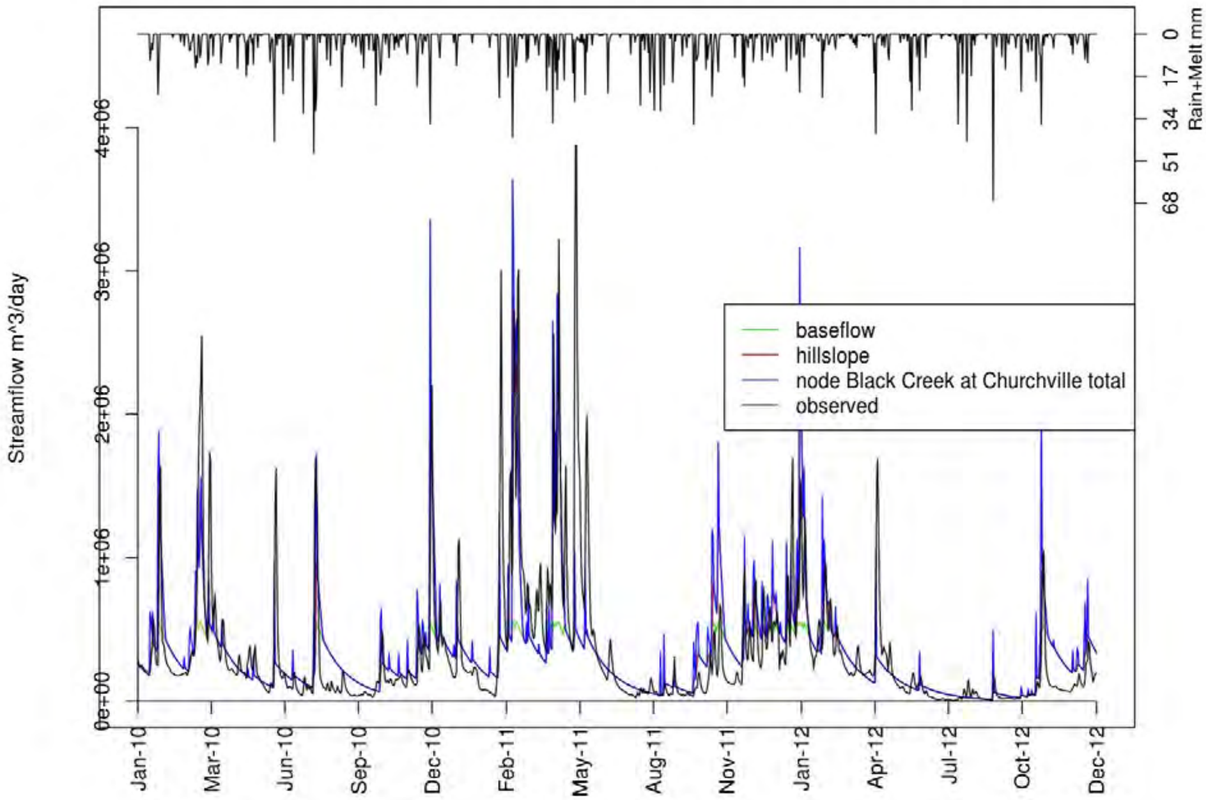

Figure 30: Measured and modeled flows at the Churchville gage for 2010 through 2012.

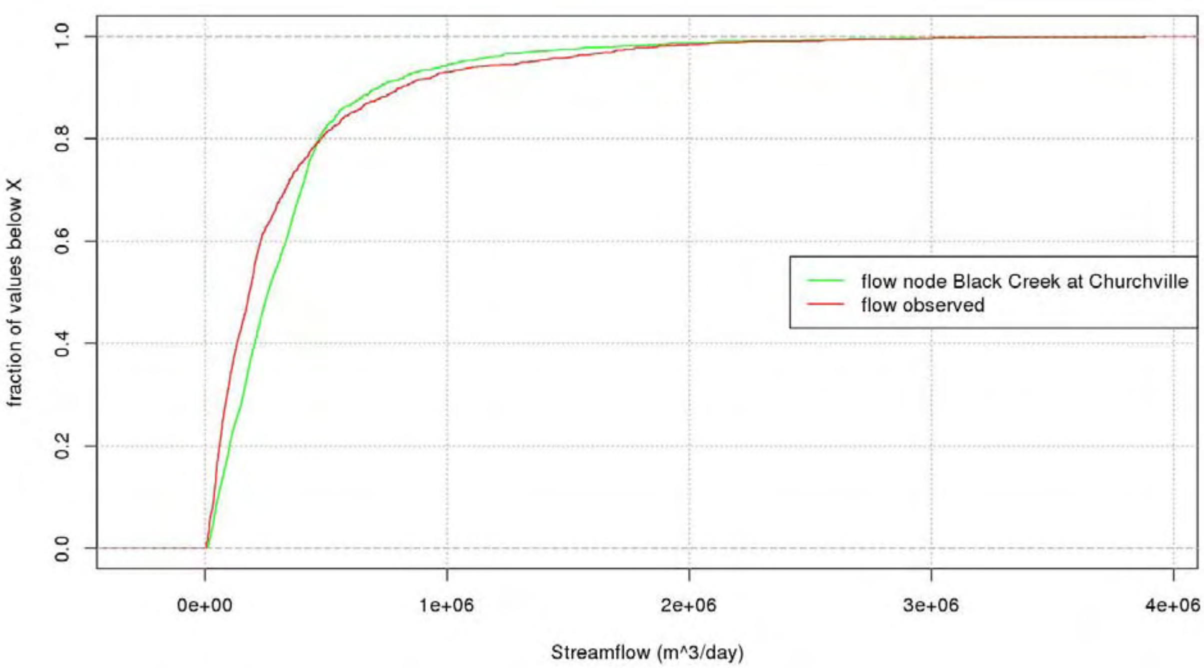

Figure 31: Cumulative frequency distribution of flow at Churchville for 2010 through 2012.

Table 30: Model calibration statistics. Calculation points are at the downstream end of the identified subbasin which corresponds to a node within the model framework.

2010-2012 Calibration period*	NSE 1 day	NSE 7 day	R^2	Percent bias
Subbasin 6 (Bigelow Creek)	0.57	-	0.59	-14
Subbasin 2 (Spring Creek)	0.56	-	0.56	-7
Subbasin 3 (BLAK-10)	0.10	-	0.63	+26
Subbasin 1 (Churchville gage full year)	0.36	0.57	0.41	+6
Subbasin 1 (Churchville gage June - September)	0.43	0.60	0.46	+23

* Most important subset of 2007-2012 parameter fitting period.

C.1.2 Hydrology Validation

Validation of the hydrology model used data from the USGS gage at Churchville, the only observed flow data source for the basin aside from Winslow's 2010-2011 set. The same statistical measures and targets were used for evaluation (Table 31). In most cases the model produces a reasonable approximation to the flow measured at Churchville. The modeled flows are biased high during the summer months, as they were during the calibration period. This reflects the dual pursuit of annual realism and summer realism in the modeling work. Summer hydrology cannot be modeled in isolation from the annual hydrologic cycle, most importantly because of the carryover of water in ground water which may drain to the stream months after it has been recharged. Since bias was a secondary parameter, hydrology fitting efforts were closed with the statistical bias intact and disclosed.

Table 31: Fit statistics for the hydrology model validation

Time period	Full Year			June - September		
	NSE 1 day	NSE 7 day	Percent Bias	NSE 1 day	NSE 7 day	Percent Bias
1979-1984	0.55	0.75	+3	-0.52	0.23	+26
1985-1989	0.44	0.70	-3	0.38	0.64	+16
2000-2004	0.39	-	0	0.56	-	+26

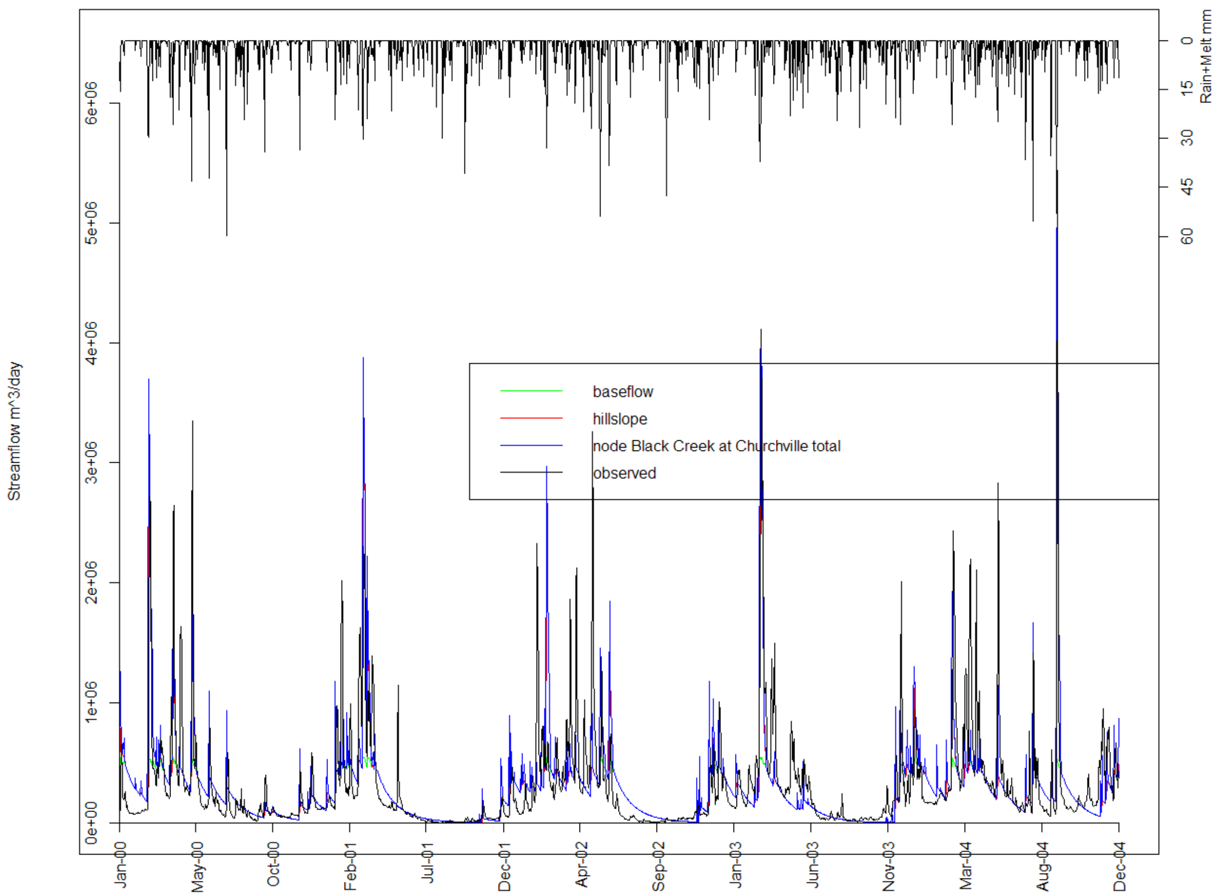

Figure 32: Measured and modeled flows at the USGS gage site in Churchville during the validation period.

C.2 Sediment

Sediment is modeled solely to enable development of a particulate phosphorus model, discussed in a later section. The sediment model builds upon the flow estimates of the hydrology model to predict sediment loading. The PED hydrology model provides four daily flow series per subbasin, of which the Black Creek flow model uses three: saturated area runoff (*r*), interflow (*i*), and baseflow (*b*). The PED sediment model employs these three flow series separately:

$$L_b = a_b Q_b^n$$
$$L_i = a_i Q_i^n$$
$$L_r = a_r Q_r^n$$

in which the *L* values are a subbasin's respective daily loads of sediment, eventually converted to kg/km^2/day. The three *Q* values are the corresponding daily flows (expressed in mm over the whole subbasin), *n* is an empirical exponent related to stream power (theoretical value=1.4), and the a_b, a_i and a_r are empirical multipliers. The three sediment time series may be added into a single series which represents the subbasin's total sediment yield.

The PED sediment model represents the watershed as a network of linked subbasins identical to that described for the hydrology component of the model. Total sediment loading to a node is calculated as the area-weighted sum of unit-area loadings for all subbasins upstream from the node and expressed in kg/day. A concentration at the node can be computed by dividing the total sediment load in kg/day by the flow in cubic meters per day and multiplying by a factor of 1000 to yield units of mg/L.

C.2.1 Sediment Model Fitting

The sediment model was fitted to total suspended solids (TSS, mg/L) measurements made by Winslow (2012), then cross-checked against NYS DEC data. Biweekly measurements of TSS by Winslow provided a time series from June 2010 to June 2011 at three locations: Black Creek at BLAK-10, Bigelow Creek at BLOW-02 and Spring Creek, a tributary to Black Creek, just downstream from BLAK-10. Estimated parameters which produced the best fit statistics at the three sites are listed in Table 32. Fit statistics to the NYSDEC data based on the same parameter set are also shown. Overall, the parameter value set which represented the Winslow dataset well represented the NYSDEC dataset poorly, and the parameter set which represented the DEC data well represented the Winslow data poorly. The Winslow dataset covered a reasonable range of baseflow and event flow conditions (Figure 33) and is can be used for fitting all model parameters. The NYSDEC dataset could not be used to calibrate the entire PED sediment model because only a single runoff event was sampled. The model provided quantitatively reasonable results when compared to the Winslow data, but only qualitatively representative results for the NYSDEC data (Figure 34).

Table 32: Sediment model parameters and fit statistics

	Winslow 2010-2011	**NYSDEC 2012**
tlimit – runoff1	30	
tlimit – interflow & baseflow	11	
exponent (*b*)	1.5	
BLAK-10 NSE	0.48	-0.37
BLAK-10 % bias	-9	-72
BLAK-10 R^2	0.49	0.10
BLOW-02 NSE	0.50	-1.3
BLOW-02 % bias	-9	13
BLOW-02 R^2	0.51	0.74
Spring Creek NSE	0.45	-
Spring Creek % bias	-12	-
Spring Creek R^2	0.48	-

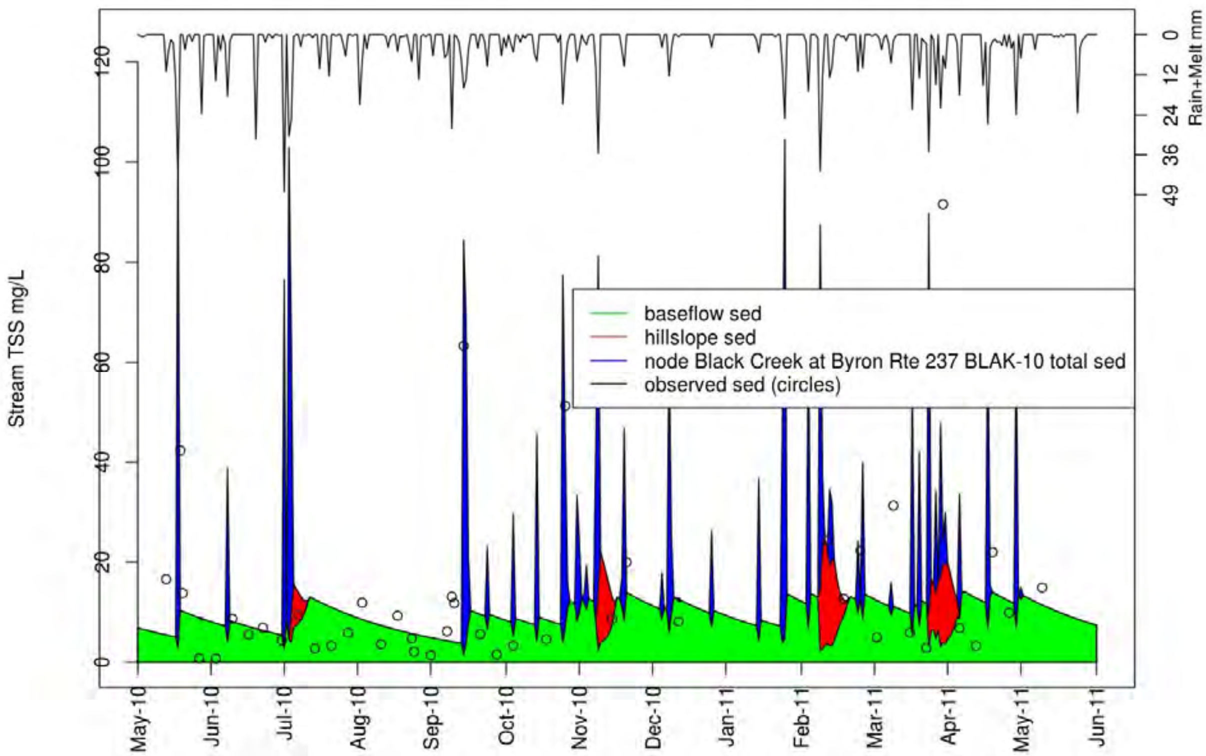

Figure 33: Measured TSS values from Winslow (circles) and modeled TSS at the BLAK-10 site.

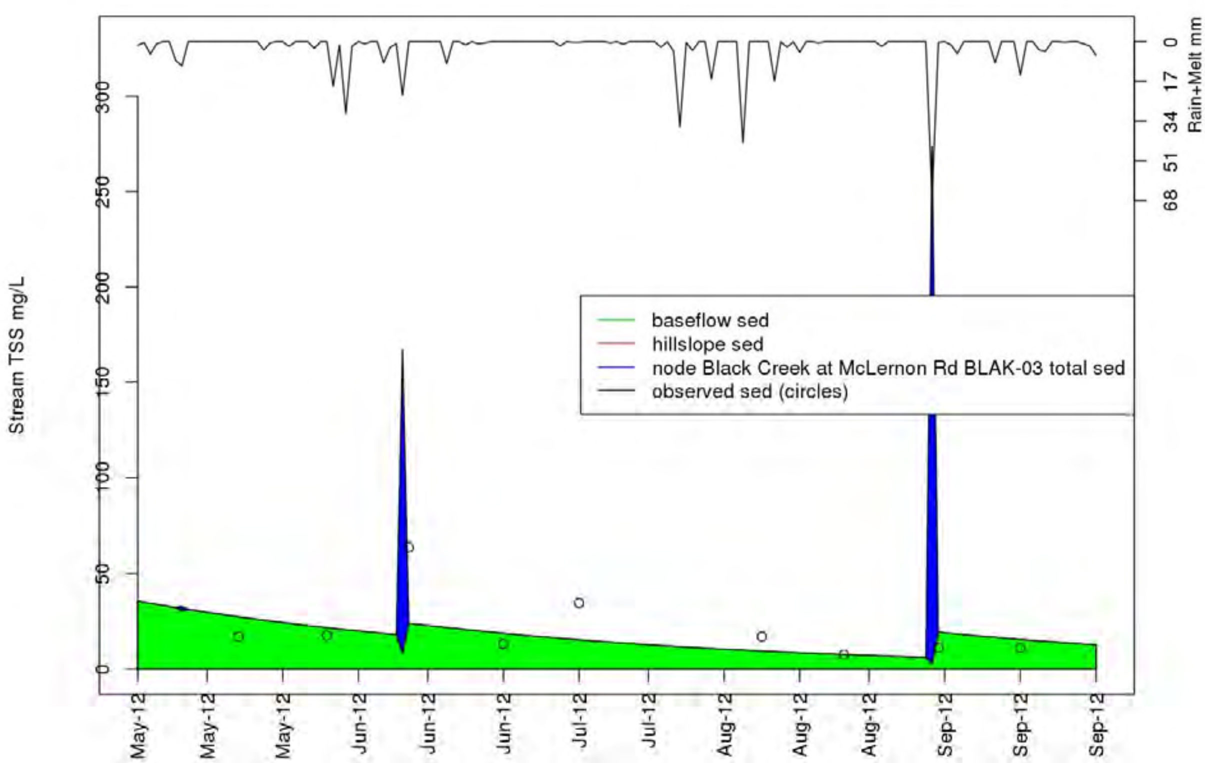

Figure 34: Measured TSS values from NYSDEC (circles) and modeled TSS at the BLAk-10 site.

C.3 Phosphorus

The phosphorus model is comprised of two parts, a soluble reactive phosphorus (SRP) model, and a particulate phosphorus (PP) model. SRP is a soluble form of phosphorus transported with water and is primarily present as orthophosphate. PP is phosphorus associated with and transported with particulates. The PP model builds off of the sediment transport model. Total phosphorus (TP) is the sum of SRP and PP.

C.3.1 Particulate Phosphorus

Particulate phosphorus (PP) is one constituent within TSS. A loading of PP is customarily modeled as a weight concentration of phosphorus within total sediment, times a sediment load. PED borrows this formulation, computing particular phosphorus load L (kg/day) as the product of the amount of delivered sediment (S), a phosphorus reference concentration (c_{pp}) and an enrichment ratio (E):

$$L = c_{pp} E \, S$$

Sediment delivery is a result of the sediment model and the reference concentration (mg P / kg sediment) is a calibration parameter having weight concentration units. The enrichment ratio (E) is calculated with the formula from USDA's Annual Phosphorus Loss Estimator (which cites Sharpley (1980) and Menzel (1980) for enrichment). Enrichment is a function of the sediment load (S, *kg/ha/day*) and takes the form:

$$E = 12.5S^{-0.35}$$

As the sediment load increases the enrichment factor decreases resulting in the transported particulate carrying a smaller concentration of phosphorus. This is physically sensible because only the smaller and lighter sediment particles, such as clay and organic matter, contain or carry phosphorus. Sand, gravel, and other larger particles that begin to appear when water velocities and sediment concentrations increase do not carry much phosphorus.

Below a sediment transport threshold of S = 0.5 kg/ha/day, enrichment is capped at E=15.9 ($=12.5*0.5^{-0.35}$). The PP reference concentration was set at 1.15×10^{-4} mg PP (kg sediment)$^{-1}$ to track the means of pooled Winslow and DEC sampling data. Output from the PP model is in kg PP/km^2 for each of the sediment generating land types.

Model results are shown in Figures 35 - 37 for site BLAK-10. Overall, the model fitted only using the midpoint of the Winslow and DEC data tracks lower than the Winslow data (low bias) and tracks higher than the DEC data (high bias). This is reflected in the model fit statistics (Table 33). As with the sediment model, a particulate P model intended to track annual and event dynamics will not reproduce low level fluctuations that occur during baseflow (red periods on the figures); at best it can be forced through their center.

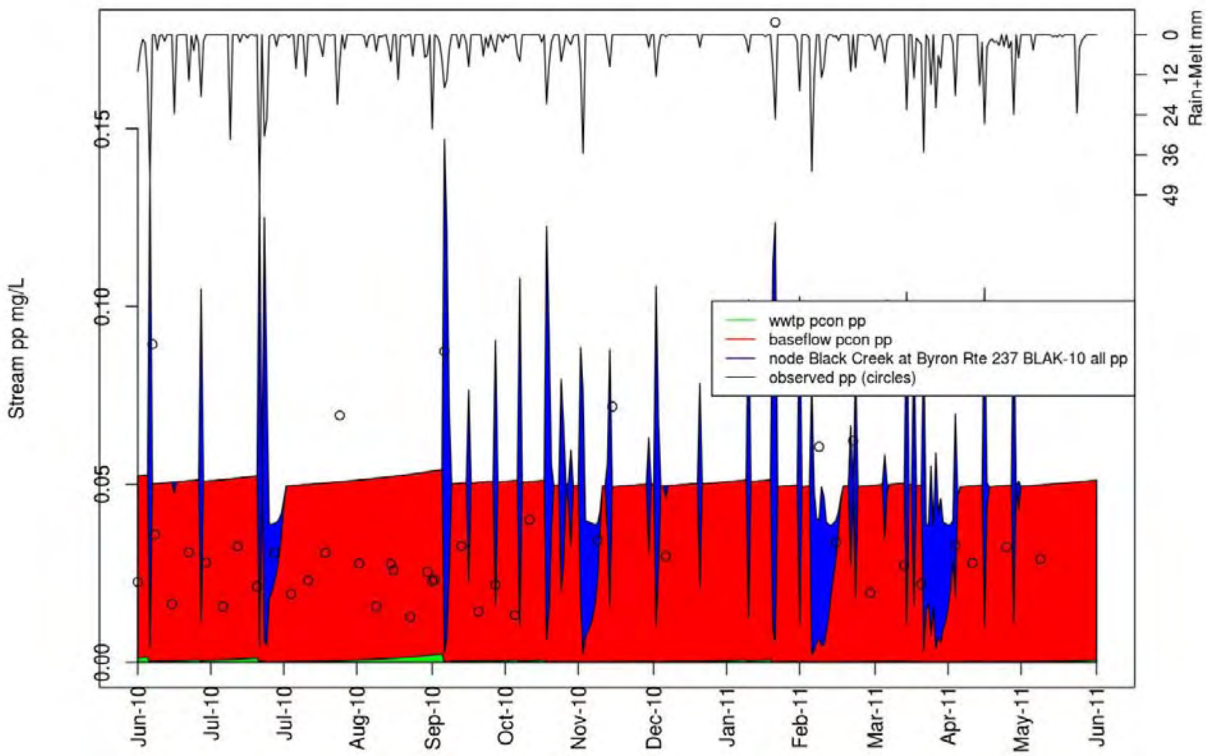

Figure 35: Model results for particulate phosphorus concentration at site BLAK-10.

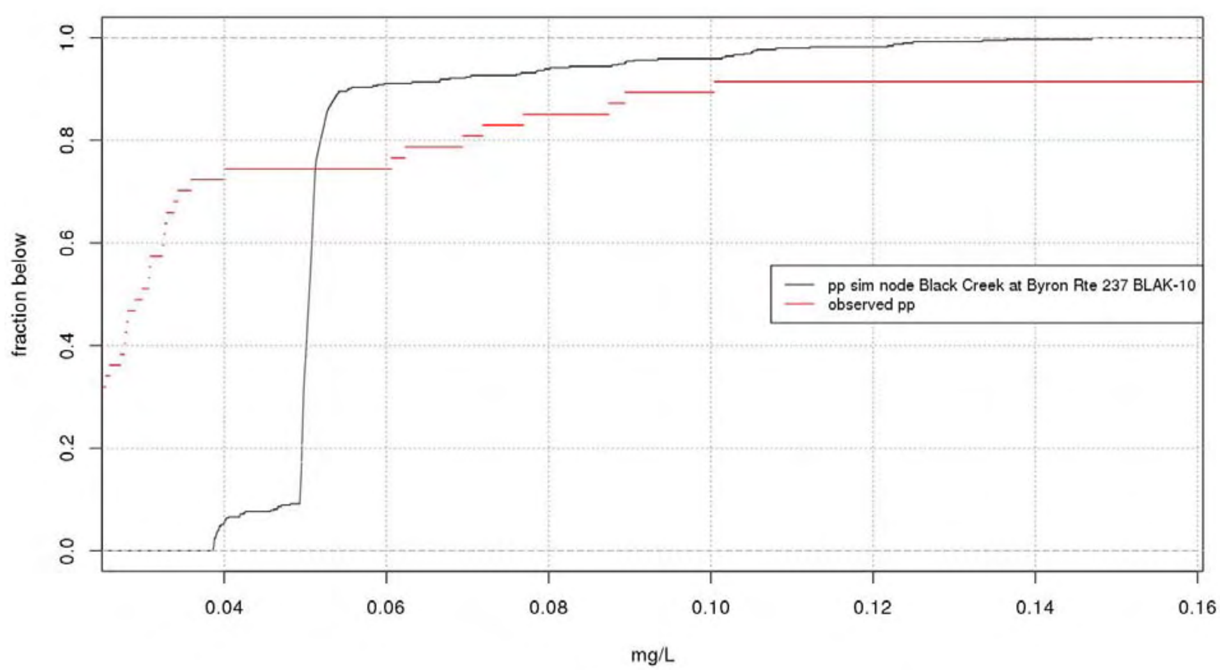

Figure 36: Cumulative frequency distribution of particulate phosphorus concentrations at site BLAK-10. Observed data are Winslow's from 2010-2011.

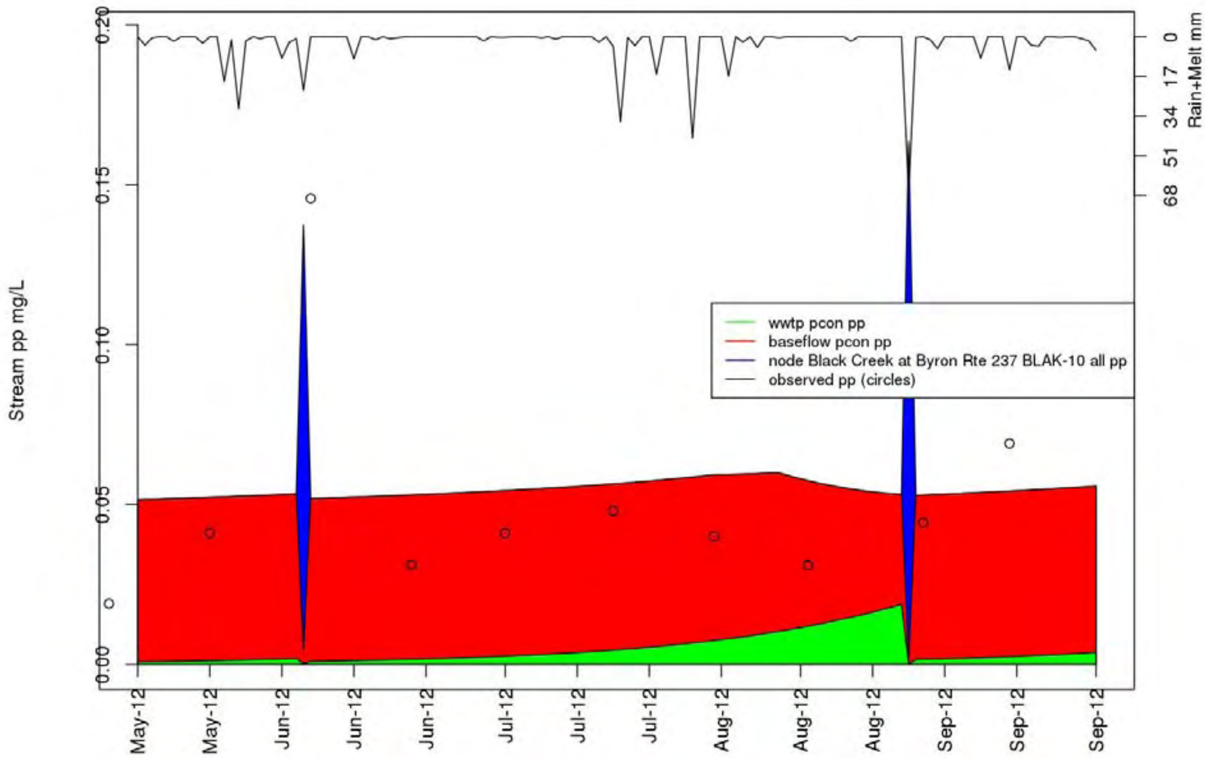

Figure 37: Model results for particulate phosphorus concentrations at site BLAK-10 during summer 2012.

Table 33: Particulate phosphorus model fit statistics

	Winslow data (2010-2012)			NYSDEC 2012		
Site	NSE 1 day	Percent Bias	R^2	NSE 1 day	Percent Bias	R^2
BLAK-10	+0.09	-5	0.11	-0.005	+6	0.06
Bigelow Creek	+0.09	-15	0.14	+0.15	+33	0.85*
Spring Creek	+0.09	0	0.11	-	-	-

* misleadingly high, NSE is more representative

C.3.2 Soluble Reactive Phosphorus

The SRP model centers on reference SRP concentrations for up to 32 combinations of SRP-oriented land use types (row crops, grass crops, developed land and other lands), shallow versus deeper water table, and the four hydrologic model outflow types (runoff1, runoff2, interflow, and baseflow). The 32 drops to 24 when the runoff2 type is eliminated as it was not used in this model implementation. For technical reasons the water table depth aspect did not need to be separated, thus there remained 12 distinct reference SRP concentrations to estimate in a way that reflects the spatial and time variations in observed SRP concentrations in streams.

Reference SRP concentrations (*c, in mg/L*) are calibration parameters. SRP loads from individual SRP land types are the product of amount of land in the subbasin within the land use and land type (i.e. row crops on shallow water table land), the associated reference concentration, and an amount of flow from the hydrology model (*q*).

For the interflow and baseflow types an additional temperature dependent factor (t_{adj}) is also included to provide seasonality in reference concentrations. The temperature seasonality takes the form:

$$t_{adj} = 2.5^{\frac{t_s - t_r}{10}}$$

where t_s is the soil temperature for the day of year, and t_r is a reference temperature equal to 9.0 °C. Soil temperature is itself modeled as an annual sine wave, modified by a time lag factor, and taking into account the temperature damping effect of a small depth of soil. Load (kg/km^2/day) calculations for a single type of SRP land among the eight choices take the form:

$$L_{r1} = c_{r1} \times q_{r1}$$

$$L_i = c_i \times t_{adj}(t) \times q_i$$
$$L_b = c_b \times t_{adj}(t) \times q_b$$

in which subscripts identify the different land types: runoff1 (*r1*), interflow (*i*) and baseflow (*b*). The separate Cornell modeling document describes how these three concentrations are selected from the twelve calibration parameters associated with the SRP land types.

Both the SRP and PP model components utilize the same basin and node network as the hydrology component. The network also incorporates the SRP and PP loadings from wastewater treatment plants, shown earlier in Table 26.

As with the sediment model, the SRP model was fitted first to the Brockport full-year data set (Winslow 2012), and then checked against the NYSDEC sampling done in 2012. Fitting was done by pooling all of Winslow’s observations at three locations, and using a constrained genetic algorithm to find the combinations of 12 parameters that yielded overall the best fit between simulated and observed space/time variation of SRP. This employed full-year Nash-Sutcliffe efficiency as the statistic to maximize. Unlike the sediment and PP models, the SRP model has enough parameters due to its land use overlay (12) to be able to track spatial differences in SRP concentrations in streams. (The different level of detail among SRP, PP, and sediment models was a strategic choice partly based on the relative importance of SRP versus PP in biological activity in the summer. SRP concentrations represent roughly two thirds of total P in the DEC monitoring data.)

Fitted values for the reference concentrations (*c*) resulting from the calibration to the Winslow station data are listed in Table 34. Model predictions of SRP are compared to measured values in Figures 38 and 39 for Bigelow Creek during Winslow's sampling period. The model accurately captures the seasonal variation in SRP concentration and is able to capture some of the higher concentration events. It over predicts concentrations during periods of low stream flow such as during July and August in 2010. Fit statistics are shown in Table 35. Again as with the DEC sediment and PP data, during baseflow periods there is no model mechanism to reproduce low level fluctuations in concentration, thus Nash-Sutcliffe values hover around zero. When there is a high flow event in the observed data, as in BLAK-06, a NSE is more meaningful as long as the modeled event day is the same as the observed event day. There are different levels of bias in at the DEC stations taken separately. The worst is at the most upstream Black Creek sites where simulated concentrations were much higher than observed. Farther downstream the bias is much lower. The companion Cornell modeling document includes additional graphics that evaluate the degree of model fit to spatial differences in the DEC 2012 monitoring data, concluding that even without calibration to the DEC data their spatial differences were still preserved.

Table 34: SRP reference concentrations (*c*) in the phosphorus model, fitted to Winslow data. Units are mg/L.

	Row Crops	Grass	Natural	Developed
Runoff1	0.192	0.544	0.103	0.227
Hillslope	0.040	0.016	0.116	0.118
Baseflow	0.025	0.00425	0.0212	0.0421

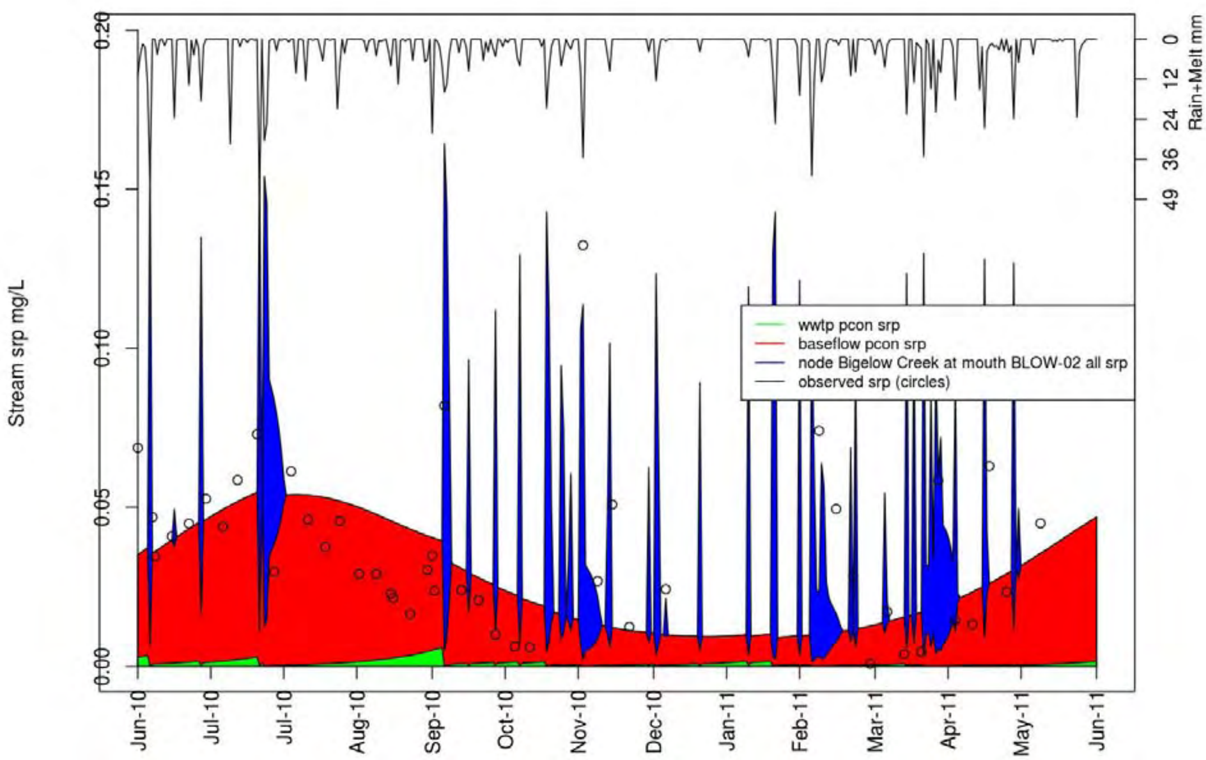

Figure 38: Soluble reactive phosphorus concentration model results and measured values at Bigelow Creek (BLOW-02)

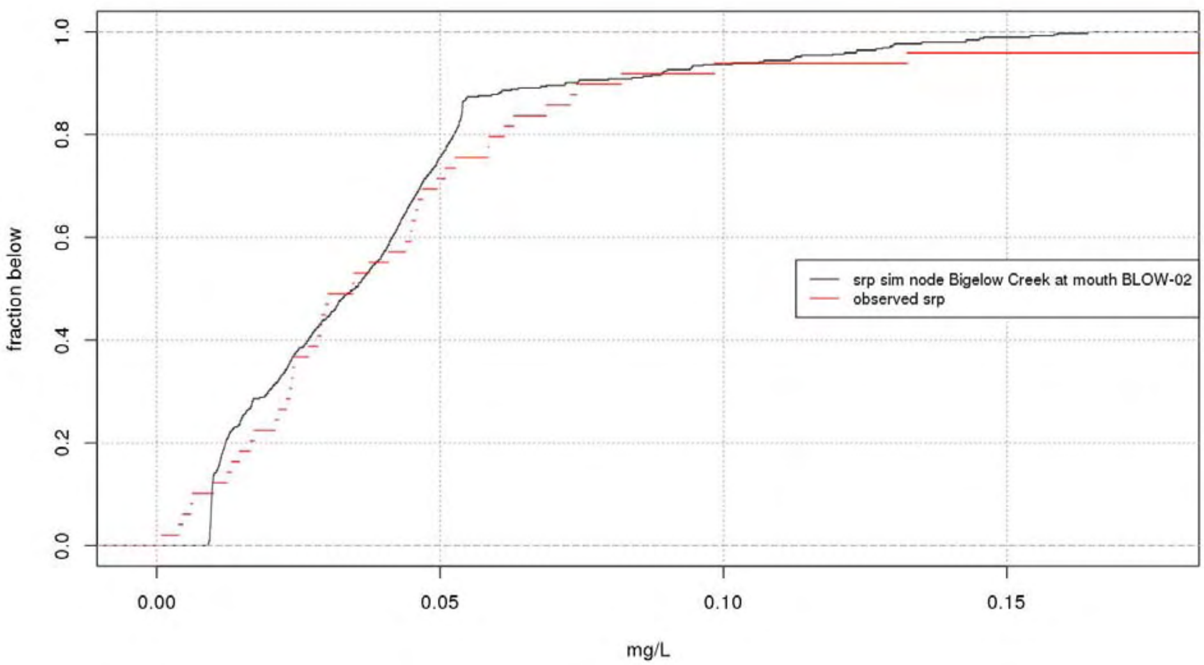

Figure 39: Cumulative frequency distribution of the measured and modeled soluble reactive phosphorus concentrations at the Bigelow Creek site (BLOW-02).

Table 35: Soluble reactive phosphorus model fit statistics

	Winslow data (2010-2011)			NYSDEC 2012		
Site	NSE 1 day	Percent Bias	R^2	NSE 1 day	Percent Bias	R^2
BLAK-01	-	-	-	-149	+156	0
BLAK-02	-	-	-	0.4	+97	0.96*
BLAK-03	-	-	-	-30	+18	0.13
BLAK-04	-	-	-	-0.4	-47	0.05
BLAK-06	-	-	-	0.67	-20	0.77*
BLAK-07	-	-	-	-3.4	+14	0.11
BLAK-08	-	-	-	-3.1	+19	0.01
BLAK-09	-	-	-	-1.4	+3	0.02
BLAK-10	0.45	-17	0.50	-5.0	+25	0.02
Bigelow Creek	0.31	-6	0.31	-4.3	+62	0.02
Spring Creek	0	3	0.21	-	-	-

* misleadingly high

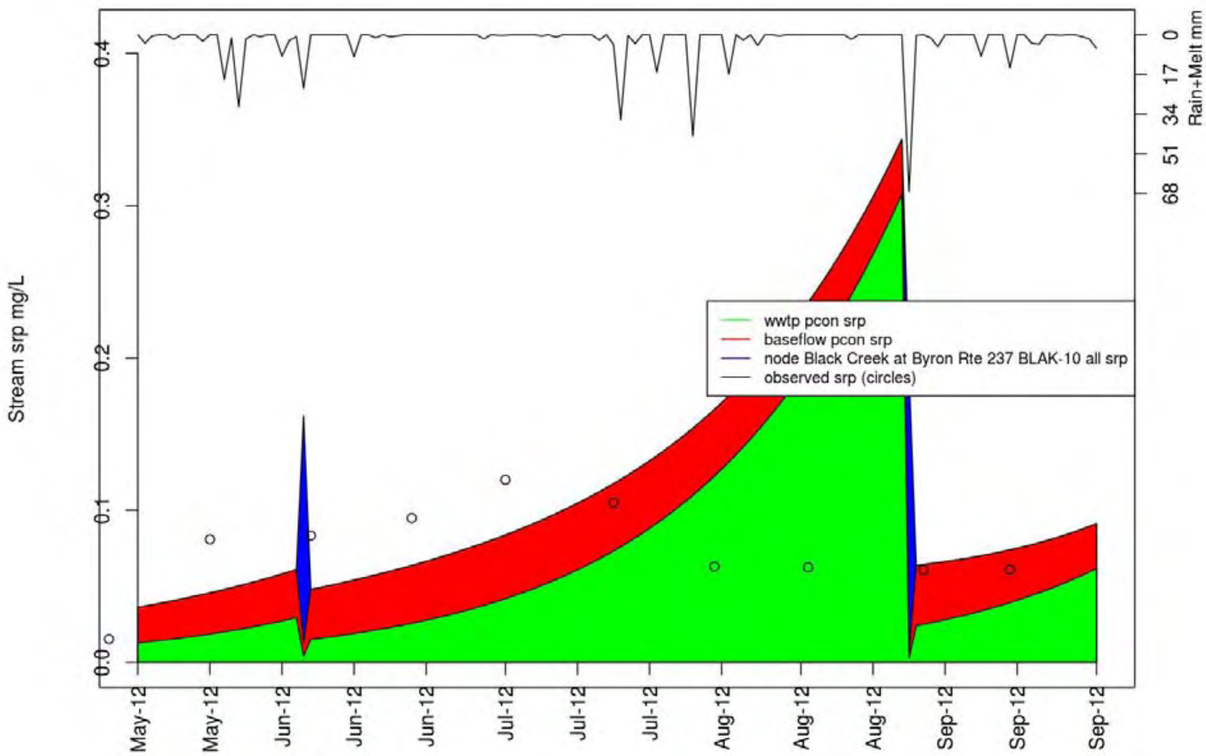

Figure 40: Model predictions of soluble reactive phosphorus concentrations at site BLAK-10.

Figure 40 shows the model predictions of SRP when the model calibrated to Winslow's data is applied Black Creek during the 2012 summer period. Again, there appears to be an over prediction of SRP concentration when the model predicts periods of low flow (August 2012).

Appendix D: Priority Waterbodies List

PWL listings for Upper Black Creek and Bigelow Creek are on the following pages.

Black Creek, Upper, and minor tribs (0402-0048) Impaired Seg

Waterbody Location Information

Revised: 01/02/02

Water Index No:	Ont 117- 19	**Drain Basin:**	Genesee River
Hydro Unit Code:	04130003/080 **Str Class:** C		Lower Genesee River
Waterbody Type:	River	**Reg/County:**	8/Genesee Co. (19)
Waterbody Size:	56.3 Miles	**Quad Map:**	BYRON (I-08-3) ...
Seg Description:	stream and tribs above Byron		

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
AQUATIC LIFE	Impaired	Known
Recreation	Stressed	Known

Type of Pollutant(s)

Known: NUTRIENTS, Silt/Sediment
Suspected: - - -
Possible: Pathogens

Source(s) of Pollutant(s)

Known: AGRICULTURE, MUNICIPAL (South Byron WWTP), Streambank Erosion
Suspected: - - -
Possible: Urban Runoff

Resolution/Management Information

Issue Resolvability: 1 (Needs Verification/Study (see STATUS))
Verification Status: 4 (Source Identified, Strategy Needed)
Lead Agency/Office: DOW/Reg8 **Resolution Potential:** Medium
TMDL/303d Status: (TMDL Not Required (No Impairment))

Further Details

Aquatic life support, recreation and aesthetics in Upper Black Creek are affected by municipal and industrial discharges to the creek. Nutrient enrichment, silt/sediment and other pollutants from nonpoint sources in this agricultural watershed also contribute to water quality problems.

NYSDEC Rotating Intensive Basin Studies (RIBS) Intensive Network monitoring of Black Creek in Byron (at State Route 237) was conducted in 2000. Overall water quality at this site, which is downstream of the Byron (T) wastewater treatment plant, is fair. The macroinvertebrate community is moderately impacted, with nutrient and toxic inputs identified as the most likely causes. Total dissolved solids in the water column and cadmium in the bottom sediments are present at concentrations above the levels of concern. However, no fish advisories are in effect, and no acute or chronic toxicity was apparent in the water column from the three tests conducted in 2000. (DEC/DOW, BWAR/RIBS, January 2003)

A biological (macroinvertebrate) assessment of Black Creek in South Byron was conducted in 1999. Sampling results indicated moderately impacted water quality conditions, with municipal and/or industrial waste discharges identified as the most likely causes. These findings were similar to those of a biomonitoring survey of Black Creek conducted in 1996. (Biological Assessment of Black Creek, Bode et al, DEC/DOW, SBU, June 1997) That survey found slight to moderate impacts from nutrient enrichment and organic wastes were indicated at sites along the reach. Prolific growths of algae in the stream were also noted. The Byron and South Byron WWTP discharges and nonpoint agricultural sources were identified as possible sources. (DEC/DOW, BWAR/SBU, January 2003)

This segment includes the entire stream and all tribs above Bigelow Creek (-30) near Byron. The waters of this segment are Class C. (May 2001)

Bigelow Creek and tribs (0402-0016) — Impaired Seg

Waterbody Location Information

Revised: 01/02/02

Water Index No:	Ont 117- 19-30			**Drain Basin:**	Genesee River
Hydro Unit Code:	04130003/080	**Str Class:**	C		Lower Genesee River
Waterbody Type:	River			**Reg/County:**	8/Genesee Co. (19)
Waterbody Size:	11.8 Miles			**Quad Map:**	BYRON (I-08-3) ...
Seg Description:	entire stream and tribs				

Water Quality Problem/Issue Information

(CAPS indicate MAJOR Use Impacts/Pollutants/Sources)

Use(s) Impacted	Severity	Problem Documentation
AQUATIC LIFE	Impaired	Known
Recreation	Stressed	Known

Type of Pollutant(s)

Known: NUTRIENTS
Suspected: Pathogens, Silt/Sediment, Unknown Toxicity
Possible: - - -

Source(s) of Pollutant(s)

Known: AGRICULTURE
Suspected: Streambank Erosion
Possible: - - -

Resolution/Management Information

Issue Resolvability: 1 (Needs Verification/Study (see STATUS))
Verification Status: 4 (Source Identified, Strategy Needed)
Lead Agency/Office: DOW/Reg8 — **Resolution Potential:** Medium
TMDL/303d Status: (TMDL Not Required (No Impairment))

Further Details

Aquatic life support, recreation and aesthetics in Bigelow Creek are affected by nutrient enrichment, silt/sediment and other pollutants from nonpoint sources in this agricultural watershed. Some indication of aquatic toxicity are also present.

A biological (macroinvertebrate) assessment of Bigelow Creek in South Byron was conducted in 1999. Sampling results indicated moderately impacted water quality conditions. Nutrient enrichment and toxic inputs were indicated by Impact Source Determination. (DEC/DOW, BWAR/SBU, January 2001)

Bathing beaches on Horseshoe Lake and Godfrey Pond (which are in this reach but listed separately) have been closed in the past due to high coliform counts. However beaches were reopened in 1987 and no closures have occurred recently. The problems had been attributed to poor agricultural management practices (barnyard runoff, livestock access to stream, manure spreading, etc) and have largely been corrected. (Genesee County WQCC, April 2001)

This segment includes the entire stream and all tribs. The waters of the segment, including Thornell Brook (-3), are Class C and C(T). Mill Pond (-16), Godfrey Pond (-17) and Horseshoe Lake (-18) are listed separately. (May 2001)

APPENDIX M

ANNUAL OPERATION AND MAINTENANCE COST ESTIMATES

Alternative 3 - New Treatment Plants (South and Central Byron) *Cost/Kw = $0.1200

Equipment	Asssumed HP	Quantity Running	KW	Hours of Operation Per Day	KW-Hr/year	Operation Cost Per year	Est. Annual Maintenance
Lift Pump #1	5	2	7.5	6	16331	$1,960	$1,000
Lift Pump #2	5	0	0.0		0	$0	$1,000
Flow EQ. Pump #1	5	2	7.5	6	16331	$1,960	$1,000
Flow EQ. Pump #2	5	0	0.0		0	$0	$1,000
Aeration Blower #1*	15	2	22.4	24	195970	$23,516	$1,000
Aeration Blower #2*	15	0	0.0	24	0	$0	$1,000
Final Clarifier Equipment #1	0.75	2	1.119	24	9798	$1,176	$500
Final Clarifier Equipment #2	0.75	2	1.119	24	9798	$1,176	$500
Final Clarifier Equipment #3	0.75	2	1.119	24	9798	$1,176	$500
Ultraviolet Disinfection Max Power Draw*	--	2	6.3	24	27216	$3,266	$400
Aerator	3	2	4.474	24	39194	$4,703	$300
					324437	**$39,000**	**$8,200**

*Assume blowers are on VFDs are required to operate at half-speed in ADF conditions
* Seasonal disinfection = 180 days

Proposed Operation Cost =	$39,000
Proposed Maintenance Cost =	$8,200
Proposed O&M Cost =	**$47,200**

2. GAS HEATING COSTS

a.	assumed gas billing rate	$ 1.25	/ccf
b.	Annual gas consumption	2000	ccf
c.	Total heating cost	$ 2,500	

3. SLUDGE DISPOSAL COSTS

a.	Liquid Sludge hauling	$ 13,000	LS
c.	Total	$ 13,000	

TOTAL COSTS

1	Equipment electrical and maintenance costs	$ 47,200
2	Natural gas heating costs	$ 2,500
3	Sludge disposal costs	$ 13,000
	Total costs	$ 62,700
	Rounded	**$ 63,000**

Alternative 4 - Consolidation of South and Central Byron with New Treatment Plant *Cost/Kw = $0.1200

Equipment	Asssumed HP	Quantity Running	KW	Hours of Operation Per Day	KW-Hr/year	Operation Cost Per year	Est. Annual Maintenance
Lift Pump #1	5	1	3.7	6	8165	$980	$500
Lift Pump #2	5	0	0.0		0	$0	$500
Flow EQ. Pump #1	5	1	3.7	6	8165	$980	$500
Flow EQ. Pump #2	5	0	0.0		0	$0	$500
South Byron Pump #1	15	1	11.2	6	24496	$2,940	$500
South Byron Pump #2	15	0	0.0		0	$0	$500
Aeration Blower #1*	15	1	11.2	24	97985	$11,758	$500
Aeration Blower #2*	15	0	0.0	24	0	$0	$500
Final Clarifier Equipment #1	0.75	1	0.559	24	4899	$588	$250
Final Clarifier Equipment #2	0.75	1	0.559	24	4899	$588	$250
Final Clarifier Equipment #3	0.75	1	0.559	24	4899	$588	$250
Ultraviolet Disinfection Max Power Draw*	--	1	6.3	24	27216	$3,266	$200
Aerator	3	1	2.237	24	19597	$2,352	$150
					200323	**$25,000**	**$5,100**

*Assume blowers are on VFDs are required to operate at half-speed in ADF conditions
* Seasonal disinfection = 180 days

Proposed Operation Cost =	$25,000
Proposed Maintenance Cost =	$5,100
Proposed O&M Cost =	**$30,100**

2. GAS HEATING COSTS

a.	assumed gas billing rate	$	1.25	/ccf
b.	Annual gas consumption		1000	ccf
c.	Total heating cost	$	1,250	

3. SLUDGE DISPOSAL COSTS

a.	Liquid Sludge hauling	$	13,000	LS
c.	Total	$	13,000	

TOTAL COSTS

1	Equipment electrical and maintenance costs	$	30,100
2	Natural gas heating costs	$	1,250
3	Sludge disposal costs	$	13,000
	Total costs	$	44,350
	Rounded	**$**	**44,000**

APPENDIX N

AMENDED MEDIAN HOUSEHOLD INCOME; CWSRF PROJECT NUMBER: C8-6514-01-00; TOWN OF BYRON; GENESEE COUNTY – LETTER FROM NYSEFC DATED MARCH 8, 2023

NEW YORK STATE OF OPPORTUNITY. | Environmental Facilities Corporation

KATHY HOCHUL
Governor

MAUREEN A. COLEMAN
President and CEO

March 8, 2023

The Honorable Peter Yasses
Town Supervisor
Town of Byron
P.O. Box 9
Byron, NY 14422

Re: Amended Median Household Income
CWSRF Project Number: C8-6514-01-00
Town of Byron
Genesee County

Dear Supervisor Yasses:

Thank you for submitting a Clean Water State Revolving Fund (CWSRF) Income Survey to the New York State Environmental Facilities Corporation (EFC) in accordance with the Hardship Financing and Grant Eligibility Policy. After evaluating the information presented in the Survey, I am pleased to inform you that the Median Household Income (MHI) submitted for consideration has been approved for use in the CWSRF program, and the revised MHI is $45,000.

This determination is based on the Income Survey received by EFC on December 6, 2022 and prepared by G&G Municipal Consulting and Grant Writing, which included the following data:

- Number of households surveyed was 282;
- Number of responses was 177 resulting in an acceptable response rate of approximately 62.77%; and
- A Median Household Income (MHI) is reflected at $45,000.

This letter is not a commitment by EFC to provide hardship financial assistance. Hardship eligibility is dependent on your project's ranking in the CWSRF Intended Use Plan relative to other projects in its respective category. The MHI will be valid through October 1, 2027. After that, EFC may revert to using the American Community Survey data. If you have any questions, please contact Máire Cunningham, at 518-402-6924 or Máire.Cunningham@efc.ny.gov.

Sincerely,

Maureen Coleman
President and Chief Executive Officer

Cc: G&G Municipal Consulting and Grant Writing - Jay Grasso
NYS Environmental Facilities Corporation – Haley Gallo