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Onondaga County Department of
WATER ENVIRONMENT PROTECTION

Baldwinsville-Seneca Knolls Wastewater Treatment Plant

Wet Weather Operating Plan

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Section 1 – Introduction and Overview

Constructed in 1982, the Baldwinsville-Seneca Knolls (BSK) Wastewater Treatment Plant (WWTP) has a design flow of 9 MGD and provides advanced secondary treatment of wastewater using an Activated Sludge Processes. Wastewater is collected from portions of the Towns of Lysander, Van Buren, Geddes, and the Village of Baldwinsville.

Wastewater enters BSK's influent structure, Manhole No. 1, via a 48" RCP sewer from the northwest and via a 42" sewer from the southeast. Manhole No. 1 also contains a 12" drain for returning process flows from the facility back to the head of the plant and a chlorine solution pipe. Manhole No. 1 discharges wastewater to the plant via a 60" sewer that enters the Influent Building for preliminary screening. Manhole No.1 also provides a 48" sewer that can be utilized to convey wastewater to a controlled diversion structure in the event of an emergency influent bypass.

The wastewater undergoes screening in the Influent Building screening room, utilizing two (2) mechanical screen rakes. Wastewater then gravity flows to a lift station wet well. The wastewater is then pumped to a grit chamber distribution box and gravity flows into two (2) aerated grit chambers to remove coarse grit, which use a mechanical clamshell removal system. Wastewater exiting the grit chambers then flows to two (2) primary clarifier tanks. Settled solids in the primary clarifiers are pumped to two (2) cyclone degritters to remove the finer grit and the remaining sludge then gravity flows to the pre-thickener distribution box. Floating grease is also removed in the primary clarifiers. Wastewater then flows into the two (2) Covered Pure Oxygen Aeration tanks that make up the 1st Stage aeration process, where biological treatment occurs. The treated wastewater (mixed liquor) then flows to two (2) 1st Stage secondary clarifiers where settling occurs. Activated sludge collected in the 1st Stage secondary clarifiers is recirculated to the aeration tanks and/or wasted to the two (2) pre-thickener tanks.

Effluent from the 1st Stage clarifiers flows thru one (1) of three (3) 2nd Stage Aeration tanks that are operated primarily to raise effluent pH by stripping carbon dioxide rather than providing additional biological treatment. Effluent from the 2nd Stage aeration tanks flows into two (2) or three (3) 2nd Stage secondary clarifiers depending on the plant conditions. Sludge collected in the 2nd Stage Secondary Clarifiers is recirculated to the Aeration Tanks and/or wasted to the two (2) pre-thickener tanks.

Thickened sludge is pumped into one (1) of two (2) Thermophilic Aerobic (Pure Oxygen) Digesters for digestion. After sludge digestion, the sludge proceeds to one (1) of two (2) post-thickener tanks where it is held for processing by two (2) belt filter presses with cationic polymer addition. The dewatered sludge is currently transported to a landfill for disposal.

Effluent from the 2nd Stage Clarifiers flows to two (2) Chlorine Contact Tanks for seasonal disinfection using Sodium Hypochlorite. Effluent from the Chlorine Contact Tanks flows to two (2) Dechlorination Contact Tanks for seasonal dechlorination using Sodium Bisulfite, before discharge to the Seneca River via Outfall 099. Phosphorus is removed year round with the addition of Ferrous Chloride and seasonal nitrification occurs as a function of ambient temperatures. Odor control is provided by a mulch bed biofilter for the screening room and

covered influent channel locations.

- *Plant Bypass* – The BSK WWTP has the capability to bypass flows around the treatment facility, through a controlled diversion structure associated with Manhole No. 1. The structure is designed to surcharge the influent sewer prior to bypass, in accordance with regulations. The higher water level will force a spring-loaded gate valve to open, thereby bypassing the plant and discharging directly to the Seneca River via Outfall No. 103. Chlorine solution can be added at Manhole No. 1 via a pipe from the Disinfection Storage Building for disinfecting bypass flows. Additionally, wastewater into the plant is controlled by a sluice gate on the 60" sewer as it enters the Influent Building. The gate can be utilized to regulate flow protecting the treatment plant and equipment in the event of power or equipment failures. This diversion/bypass has <u>never</u> occurred and remains available for emergency use only.

<u>Performance Goals</u>

The overall goal of the wet weather operating plan is to provide the best possible treatment to high flows in an effort to maintain SPDES compliance, minimize the impact of high flows on the treatment process and to resume full treatment quickly as wet weather conditions abate.

- Maintain SPDES compliance.
- Minimize impact on treatment process units.
- Return facility to full treatment capabilities as soon as possible.

<u>Utilization of the Manual</u>

The purpose of this manual is to provide a set of operating guidelines to assist the BSK WWTP and collection system staff in making operational decisions which will best meet the performance goals and the requirements of the SPDES discharge permit. The BSK WWTP plant by design is operationally flexible. This manual was designed for its current configuration operating in series with a mixed liquor suspended solids target of 3,000 mg/L.

During a wet weather event, numerous operational decisions must be made to effectively manage high influent wastewater flow into the Baldwinsville-Seneca Knolls WWTP. Multiple control structures, varying conditions of the treatment processes, equipment service status and varying degrees of intensity and duration of the storm/snowmelt make each event and the reactive operational strategy potentially unique. No manual can describe the decision making process for every possible operating scenario. However, this manual will serve as a useful reference for both new and experienced operators to utilize during wet weather events. Covered specifically are preparations for a pending wet weather event and strategies for monitoring and processes control during the event.

This manual is designed to allow use as a quick reference during wet weather events. It is broken down into sections which cover major unit processes at the Baldwinsville-Seneca Knolls facility. Each section includes the following information:

- Operational Description – Overview of the designated treatment process and associated equipment.
- Pre-Wet Weather Event Activities – Activities to be performed in anticipation of pending wet-weather event.
- During Wet Weather Activities – Major activities to be performed during the wet-weather event.
- Post Wet Weather Activities – Activities to be performed following the wet weather event, and in anticipation of future events.

This manual is a living document. Users of the manual are encouraged to identify new steps, procedures, and recommendations to improve the overall utility of the manual. All recommendations shall be submitted to the user's immediate supervisor for consideration for inclusion in the manual.

Section 2 - Wet Weather Operational Strategy

a. Wet Weather Operation Condition # 1

This occurs when conditions are otherwise dry yet a heavy rain has fallen over a two or three hour period and subsided. Subsequently, plant influent flows (monitored on-site) will increase, but not rapidly, as the increase in flow is due to I/I issues, which would take time to build in the collection system. When observed to trend upward to 9 MGD, Proceed as follows:

1. Increase the oxygen feed to the aeration tanks in anticipation of solids being conveyed in the collection system that were previously settled out, causing a higher oxygen demand in the activated sludge system.
2. Ensure that all 1st and 2nd Stage clarifiers, not currently in use, are ready for service if needed.
3. Complete a visual observation of the 1st Stage clarifier weirs to ensure no significant loss of solids. In the event of solids loss, the 1st Stage aeration end mixers may be turned off if necessary. At this slightly elevated flow, solids loss is unlikely but may be a consequence of reduced plant capacity due to maintenance and current plant conditions (sludge blanket levels in the 1st Stage clarifiers and overall sludge volume in the system).
4. During disinfection season, the Sodium Hypochlorite feed may have to be increased to meet the higher demand.
5. During disinfection season, the Sodium Bisulfite feed may have to be increased to meet the potentially higher Chlorine Residual.

b. Wet Weather Operation Condition # 2

With the onset of heavy rains or snowmelt accompanied by rain, the flow would eventually climb above 9 MGD. These conditions will require extra steps to ensure the best treatment available, considering the decreased detention time throughout the facility. Proceed as follows:

1. Complete a visual observation of the 1st and 2nd Stage clarifier weirs to ensure no significant loss of solids. In the event of solids loss, the 1st Stage aeration end mixers can be turned off if not done so already.
2. Further options to reduced solids loss from the 1st Stage clarifiers include shutting down the middle set of 1st Stage aeration mixers.
3. Additionally, the 2nd Stage aeration end mixers may be turned off.
4. During disinfection season, the Sodium Hypochlorite feed may have to be increased to meet the higher demand.
5. During disinfection season, the Sodium Bisulfite feed may have to be increased to meet potentially higher Chlorine Residual.

c. Wet Weather Operation Condition # 3

This will occur with the onset of heavy extended rainfall coupled with a deep snowpack and rapid warming; however these conditions may also take place in the summer from an extended rain event. At the point of influent flow to the plant reaching 15 MGD or more, process becomes greatly inhibited. The large amount of solids, grit, and screenings that were washed from the collection system have generally subsided at this time, and the flow will be made up of much more rain water, than actual waste water. Operation becomes more of hydraulically handling of the flow than stemming issues from process or residuals entering the plant. Proceed as follows:

1. The screen rake in the Influent Building can be placed in continuous operation mode to keep screenings from building up and effecting flow and wet well levels at the plant. Running the screen rake continuously in hand also saves premature wear on electric motor brake on the screen rake motor, which may occur from the screen rake starting and stopping continuously in high flow conditions.
2. In an effort to retain as many solids as possible, the two (2) unused 2nd Stage aeration tanks may be placed into service.
3. Return activated sludge (RAS) flow rates from the 1st and/or 2nd Stage clarifiers can be increased and directed toward either the 1st and/or 2nd Stage aeration tanks as judged by visual observations of solids loss over the weir at the end of the 1st and 2nd Stage clarifiers and associated sludge blanket level measurements.
4. During disinfection season, the Sodium Hypochlorite feed may have to be increased to meet the higher demand.
5. During disinfection season, the Sodium Bisulfite feed may have to be increased to meet potentially higher Chlorine Residual.

Section 3 – Process Wet Weather Operation

In general, prior to any wet weather events, the operational staff monitors storm development via internet access to assist in predicting the onset of a wet weather event. This allows both the head operator and operator(s) the ability to review the personnel roster to ensure adequate staff is available and call in additional personnel as required. In addition, the monitoring of storm

development allows the operational and maintenance staff to begin pre-wet weather activities as identified herein.

At this time, the Department does not have a policy, mechanism or corresponding procedure for issuing wet weather related advisories to the municipalities that discharge to the County's collection system. The current inter-municipal agreement does not grant the Department authority to minimize, reduce, or even require the implementation of Best Management Practices (BMPs) by the municipalities that discharge to the Baldwinsville-Seneca Knolls service area.

a. Pumping and Screening & Grit Removal System

Screening occurs in the Screening Room located in the basement of the Influent Building which receives wastewater from Manhole No. 1 via a 60" sewer. Wastewater enters the Screening Room and flow is split so as to enter one (1) of two (2) mechanical screen rakes that lift and deposit screenings into a container located above the screens on the ground level of the Influent Building. Wastewater can also be bypassed around the screen rakes through bar rack. Wastewater gravity flows from the screen rakes or bar rack to two (2) wet wells associated with the plant's influent pump room. The influent pump room contains two (2) 150 HP and one (1) 100 HP raw waste water pumps for lifting wastewater to the grit chamber distribution box from where it can gravity feed through the rest of the treatment system. From the grit chamber distribution box, wastewater flows to two (2) Aerated Grit Chambers where course grit is removed prior to entering the Primary Clarifiers.

Pre-Wet Weather Event Activities

- Verify that mechanical screen rakes are operational.
- Verify adequate container capacity.
- Ensure all pumps are operational and ready for service

During Wet Weather Activities

- Wet Weather Condition # 1 – no action required.
- Wet weather Condition # 2 – no action required.
- Wet Weather Condition #3 – may place mechanical screen rakes into continuous operation mode.

Post Wet Weather Activities

- Return all equipment to dry weather operation.

b. Primary Clarifier System

Under normal operating conditions, wastewater is split evenly via gravity flow and distributed into two (2) primary clarifier trains. Solids are settled out and floating scum is

removed. Settled solids are collected and pumped to two (2) cyclone degritters for fine grit removal before proceeding to the pre-thickeners.

Pre-Wet Weather Event Activities

- Verify all primary sludge pumps are operational and ready for service.

During Wet Weather Activities

- Wet Weather Conditions #1, #2, and #3 – may turn on additional sludge pump or increase pumping rate dependent on solids conditions in the primary clarifiers.

Post Wet Weather Activities

- Return all equipment to dry weather operation.

c. 1st Stage Activated Sludge Treatment – Pure Oxygen Aeration Tanks

Under normal operating conditions, wastewater is split evenly between two (2) covered aeration tanks, where the activated sludge process is accomplished using a Pure Oxygen feed system along with aerators (mixers). Return activated sludge lines entering the 1st Stage aeration tanks are dosed with Ferrous Chloride to aid phosphorus removal. Wastewater then flows via gravity to the 1st Stage clarifiers.

Pre-Wet Weather Event Activities

- If needed, waste down excessive mixed liquor suspended solids.

During Wet Weather Activities

- Wet Weather Condition # 1 – Maintain aeration and maintain Ferrous Chloride dosing as needed, noting that 1st Stage aeration end mixers can be turned off dependent upon observations of solids exiting the 1st and 2nd Stage clarifiers.
- Wet Weather Condition # 2 – Maintain aeration and maintain Ferrous Chloride dosing as needed, noting that 1st Stage aeration end and/or middle mixers as well as 2nd Stage aeration end mixers can be turned off dependent upon observations of solids exiting the 1st and 2nd Stage clarifiers.
- Wet Weather Condition # 3 – Maintain aeration and maintain Ferrous Chloride dosing as needed, noting that 1st Stage aeration end and/or middle mixers as well as 2nd Stage aeration end mixers can be turned off dependent upon observations of solids exiting the 1st and 2nd Stage clarifiers.

Post Wet Weather Activities

- Return all equipment to dry weather operation.

d. 1st Stage Secondary Settling - Clarifiers

Mixed liquor flows via gravity to the respective rectangular clarifier via a dedicated channel. Settled activated sludge is collected in the cross collector channel and drawn from the clarifier via RAS pumps to a RAS distribution box. From there it flows to the 1st Stage aeration tanks. Skimmer arms collect and channel floatable materials into a trough/pit system to the under drain wet well. Treated/clarified water flows over a peripheral-mounted v-notch weir/lauder from each clarifier and flows into a common channel before entering one (1) 2nd Stage aeration tank.

Pre-Wet Weather Event Activities

- Keep weir v-notches clear to prevent short-circuiting.
- Keep weir launders free of build-up.
- Insure that floatable and settleable collection mechanisms are in working order.

During Wet Weather Activities

- Increase performance monitoring (sludge depth gauging and visual observation).
- May skim tank of floatables and grease more frequently.
- Wet Weather Condition # 3 – may increase RAS back to 1st Stage aeration tanks based on solids loss in 1st Stage secondary clarifier.

Post Wet Weather Activities

- Keep weir v-notches clear to prevent short-circuiting.
- Keep weir launders free of build-up.
- Insure that floatable and settleable collection mechanisms are in working order.

e. 2nd Stage Aeration – Atmospheric Oxygen Aeration Tanks

Treated water from the 1st Stage clarifiers flows via gravity from a common channel into one (1) aeration tank. The 2nd Stage aeration tank is not currently used for biological treatment; rather it is employed in stripping carbon dioxide to adjust effluent pH. Treated water then flows via gravity into the 2nd Stage clarifiers. Two (2) additional aeration tanks can be put into service to expand capacity if required but are normally unused and empty.

Pre-Wet Weather Event Activities

- None

During Wet Weather Activities

- Wet Weather Condition #1 – no action required.

- Wet Weather Condition #2 – may shut down 2nd Stage aeration end mixer.
- Wet Weather Condition #3 – may place into service additional 2nd Stage aeration tanks to increase hydraulic capacity and settling.

Post Wet Weather Activities

- Return all equipment to dry weather operation.

f. 2nd Stage Secondary Settling – Clarifiers

Treated water from the 2nd Stage aeration tank flows via gravity into three (3) 2nd Stage clarifiers. Settled activated sludge is collected in the cross collector channel and drawn from the clarifier via RAS pumps to a RAS distribution box. From there it flows to the 1st and/or 2nd Stage distribution box. Skimmer arms collect and channel floatable materials into a trough/pit system for later disposal. Treated water flows over a peripheral-mounted v-notch weir/lauder from each clarifier and flows into a common channel before entering the disinfection system.

Pre Wet Weather Event Activities

- Keep weir v-notches clear to prevent short-circuiting.
- Keep weir launders free of build-up.
- Insure that floatable and settleable collection mechanisms are in working order.

During Wet Weather Activities

- Increase performance monitoring (sludge depth gauging and visual observation).
- May skim tank of floatables and grease more frequently.
- Wet Weather Condition # 3 – may increase RAS back to 1st or 2nd Stage aeration tanks based on solids loss in 2nd Stage clarifier.

Post Wet Weather Activities

- Keep weir v-notches clear to prevent short-circuiting.
- Keep weir launders free of build-up.
- Insure that floatable and settleable collection mechanisms are in working order.

g. Disinfection/Dechlorination System

The disinfection system receives treated effluent from a common channel exiting the 2nd Stage clarifiers. Sodium Hypochlorite is introduced into the common channel and mixed with a flash mixer before the flow is split between two (2) parallel rectangular chlorine contact tanks. Effluent from the chlorine contact tanks flows into a common channel

where Sodium Bisulfite is introduced and mixed with a flash mixer before the flow is split between two (2) parallel rectangular dechlorination contact tanks. The disinfection system (Sodium Hypochlorite) and dechlorination system (Sodium Bisulfite) consist of dedicated chemical transfer systems, chemical storage and containment systems for the individual chemicals which are housed in a common chemical feed building. Disinfection is required seasonally from May 15th to October 15th. The dechlorination system is active during the disinfection season. Treated effluent from the dechlorination system passes through a Parshall Flume before discharge to the Seneca River via Outfall 099.

Pre Wet Weather Event Activities

- Ensure adequate supply of Sodium Hypochlorite and Sodium Bisulfite during the disinfection season.
- Maintain weirs and side walls of tanks.

During Wet Weather Activities

- Administer Sodium Hypochlorite for chlorination and monitor the disinfection system for proper operation. Feed rate may need to be increased to meet higher demand.
- Administer Sodium Bisulfite for dechlorination and monitor the dechlorination system for proper operation. Feed rate may need to be increased to meet potentially higher Chlorine Residual.

Post Wet Weather Activities

- Check disinfection/dechlorination system, chemical storage.
  Visual observation of the effluent.

h Sludge Handling Facilities

Primary sludge and waste activated sludge are collected from the clarifiers and pumped to two (2) pre-thickener tanks. Sludge is batch fed from the pre-thickener tank to one (1) of two (2) Pure Oxygen digesters. Sludge from the Pure Oxygen digesters then flows to the post-thickeners which thicken and store the sludge before dewatering by two (2) belt filter presses that discharge to a trailer and hauled to a landfill for final disposal.

Pre Wet Weather Event Activities

- None

During Wet Weather Activities

- May pump pre-thickener tanks to aerobic digesters more frequently.

Post Wet Weather Activities

- None

Appendix A

Baldwinsville-Seneca Knolls WWTP Site Plan with Sampling Locations

Baldwinsville-Seneca Knolls WWTP Site Plan - Process Units and Sampling Locations