Standard Operating Procedure for Wet Weather Operations for the Village of Clayton Wastewater Treatment Plant & Collection System

1.0 Purpose

The purpose of this document is to describe the processes and procedures for wet weather and contingency operations for the Village of Clayton wastewater treatment Plant and collection system. The Village collection system historically consisted of a combined storm water and sanitary sewer collection system. The Village has made significant efforts to eliminate storm sewer cross connections from the sanitary sewer system and has implemented an on-going program to continue to remove sources of stormwater.

Since it is impractical to assume that all sources of stormwater, infiltration and inflow may be eliminated, procedures are needed to minimize impacts to public health and the environment during wet weather events. Wet weather events are defined a periods of high rain intensity and/or duration and period when rapid snow melt conditions could dramatically increase the flows through the sanitary sewer collection and treatment system, in excess of design capacity.

This operating procedure outlines the steps currently in place to manage these conditions. The Village is implementing this plan to operate unit processes to treat maximum flows and minimize potential impacts on effluent quality. This plan will provide Village personnel with a functional guide to minimize the discharge of pollutants during wet weather, and to protect the facility from upset conditions.

2.0 General Process Overview

The Village of Clayton's WWTP discharges an average flow of 0.655 MGD into the St. Lawrence River. All previously permitted CSO outfalls, Riverside Drive Pump Station (#002), East Union Street Pump Station (#003) and the WWTP overflow (#004) were sealed and decommissioned between August and December of 2015. The Village has proactively pursued a program to reduce and eliminate excessive inflow and infiltration into the collection system and has made major improvements to the collection and pumping stations to reduce and eliminate the need for the outfalls.

3.0 Operating Procedures

There are interconnected components of the Village collection and treatment processes that are affected by wet weather conditions. Each must be regularly maintained and inspected to ensure operational effectiveness and readiness. The components and systems are listed below with detailed operational requirements.

The following guidelines outline operational procedures concerning major components at the wastewater facility. Ensuring that all components and equipment are properly maintained is a priority to prepare for wet weather events. Major

operating systems, equipment and inspections/operational requirements are as follows.

2.1 Collection System

The Village's Department of Public Works (DPW) employees perform periodic flushing to remove excessive solids that buildup during low flow conditions. DPW employees also inspect and clean stormwater catch basins and remove debris with a small clam shell on an annual basis.

This maintenance of the sanitary sewer collection system reduces the total strength and volume of "first flush" discharges to the WWTP and helps reduce odors generated from septic conditions that can occur in the collection system when organic material builds up over time. Additionally, flushing helps to ensure that pipes are not obstructed thereby restricting the available capacity of the sewer collection system to handle wet weather conditions. Additionally, annual manhole and collection system inspections are conducted by Water/Wastewater Operators to assess structural conditions, identify inflow/infiltration and determine the need for maintenance.

Annual maintenance of the stormwater collection system ensures that the system is flowing freely and not backing-up.

2.2 Riverside Dr. Pump Station

The Riverside Drive Pump Station contains three dry-pit submersible pumps, check valves and level control device. The station is equipped with a Programmable Logic Controller (PLC) that transmits key-operational data to the Supervisory, Control and Data Acquisition (SCADA) system, located at the WWTP. The SCADA is connected to an Auto-Dialer that will contact the Operators in the event of an emergency. Alarms are in place for: high/low wetwell level, power outage, pump overload, pump over temperature, pump seal and pump seal failure.

A. *Equipment List*
   1. Pump Control Device (1)
   2. Dry Pit – Wet Well/Dry Well Pumps (3)
   3. Auto Alarm Dialer (1)
   4. SCADA alarm and monitoring
   5. 4 inch Mag Flow Meter (1)
   6. Wet Well (1)
   7. Transfer Switch (1)

B. *Before Wet weather*
   1. Daily Check of pump operation and cycling
   2. Routine check of station valve operation
   3. Daily monitoring of SCADA station history

4. Routine O&M on standby generator and transfer switch
5. Removal of the wet well grease and floatables accumulation
6. Routine exercise of standby by-pass pump
7. Ensure hoses, fittings and valves for by-pass pumping are on-site and in good working order

C. *During Wet weather*

1. Monitor wet well level and pumping cycles
2. Prepare for by-pass pumping. Deploy by-pass pump to site.
3. During a high influent flow event to the pump station, when influent flow exceeds pumping capacity, a high level alarm will activate and notify operations staff through the SCADA system. The contingency plan for such an event is;
   1. Operator is called in for high level alarm
   2. Operator responds to pump station to evaluate if power available, generator operating, and pumps are operating properly.
   3. If no power and failure of generator, operator will place suction line of self-priming pump into wet well through exterior hatch.
   4. Connect discharge to exterior emergency by-pass piping.
   5. Close pump station discharge isolation valve inside pump station.
   6. Start self-priming pump to pump wet well directly into force main.

   In the event that that the pumps are pumping at capacity and not able to keep up with influent flow then the operator will;
   1. Respond to high level alarm as above.
   2. Notify Supervisor.
   3. Connect self-priming pump hoses to pump.
   4. Place suction line into wet well.
   5. Place discharge line in manhole with existing outfall pipe to St. Lawrence River.

      NOTE: This procedure is to done only if necessary to protect Village property and public health and not to be exercised in unless absolutely necessary.

4. Operate by-pass pump in the event pump station is unable control influent flow.
5. Monitor and record time of by-pass pumping.
6. Turn off by-pass pump when pump station is able to meet influent flow.

D. *After Wet weather*

1. Disconnect hoses and store hoses from by-pass pump

2. Ensure all three (3) pumps are operational

E. *Power Failure*

The pump station is equipped with standby generator power to operate pumps in the event of loss of electrical power. The standby generator is programmed to start upon the loss of line power however in the event of total failure of the station and electrical power;

1. Respond to power failure alarm.
2. Deploy by-pass pump to site.
3. Connect hoses
4. Connect influent hose, open wet well hatch and place suction into wet well
5. Connect discharge hose to pump and emergency by-pass connection on exterior wall of pump station.
6. Close pump station discharge isolation valve located in lower level of station.
7. Start by-pass pump which will discharge directly into force main to WWTP
8. Continue to by-pass pump until electrical power is restored.

2.3 WWTP Automatic Mechanical Bar Screen

The WWTP is equipped with an automatic mechanical bar screen. The bar screen operates on timer, turning on every 15 minutes. During high flows and capture of excessive screenings flow will divert to the manually cleaned bar screen. During a wet weather event, it is important for Operators to monitor the flow level in the screening room and remove debris so a restriction does not create a back-up.

A. *Equipment List*

1. Mechanically cleaned bar screen
2. Level Switch Floats (3)
3. Timer (1)

B. *Before Wet weather*

1. Routine lubrication and cleaning of the bar screen
2. Switch trash barrel to accommodate extra screening from high flows

C. *During Wet weather*

1. Check twice daily
2. Increase bar screen cleaning during peak flows
3. Provide additional trash barrel for extra screenings

D. *After Wet weather*

1. Return the operation of the mechanically cleaned bar screen to normal
2. Remove screenings accumulated from high flow event

2.4 WWTP Aerated Grit Chamber

Reduce and or turn off aeration and mixing velocity to grit chamber during peak flows to increase grit capture, and reduce grit carry-over into Pre-React Basins influent to the SBR tanks. Increase grit removal from aerated grit chamber to maximize full volume potential of tank operational capacity.

A. *Equipment List*
   1. Aerated Grit Chamber (1)
   2. Rectangular Weir without end contractions (1)
   3. Grit removal bucket system with grit hopper& screw feeder (1)
   4. Set of course bubble diffusers (1)
   5. Centrifugal Blowers (2)

B. *Before Wet weather*
   1. Periodic grit removal in aeration chamber
   2. Routine lubrication and maintenance on grit removal bucket
   3. Empty grit bucket to accommodate increased grit accumulation during wet weather flows

C. *During Wet weather*
   1. Blower operation controlled by SBR to shut off automatically during super storm (high flow) conditions which reduces the mix velocity in aeration chamber to reduce grit carry-over into Pre-React Basins
   2. Check twice daily

D. *After Wet weather*
   1. Return the operation of aeration system to normal
   2. Remove grit accumulation from high flow event

2.5 WWTP

2.5.1 WWTP – Parshall Flume

A. *Equipment List*
   1. 24” Parshall Flume (1)
   2. Stilling well for level transducer (1)

B. *Before Wet weather*
   1. Periodic stilling well cleaning to prevent erroneous level values
   2. Yearly calibration by certified equipment representative

C. *During Wet weather*
   1. Check twice daily clean stilling well as needed

D. *After Wet weather*

1. Periodic stilling well cleaning to prevent erroneous level values

2.5.2 WWTP – Sequencing Batch Reactor

A. *Equipment List*
   1. Sequencing Batch Reactors (3)
   2. Duff Norton VFD Decanter mechanisms (3)
   3. High Level Alarm floats (3)
   4. Chlorine control floats (3)
   5. Basin level transducers (3)
   6. Submersible ABS Waste Activated Sludge Pumps (3)
   7. Set of fine bubble diffusers (3)
   8. Centrifugal Blowers (2)

B. *Before Wet weather*
   1. Periodic manual net skimming of floating grease and debris to prevent escape in the decant flow to the chlorine contact chamber
   2. Routine lubrication and maintenance of Decanter mechanisms
   3. Routine maintenance of Submersible pumps
   4. Yearly diffuser inspection and maintenance
   5. Routine monitoring of mixed liquor suspended solids levels
   6. Routine monitoring of sludge blanket levels
   7. Routine microscopic observation of mixed liquor suspended solids levels

C. *During Wet weather*
   1. Blower operation is controlled by high level float which activates the programmable logic controls to shut off the blowers automatically during super storm (high flow) conditions which reduces the mix velocity and increases the settling time in aeration basing to reduce solids carry-over in to chlorine contact basins.
   2. Two storm cycles are provided should influent flow rates increase above the peak daily flow rate, (normal cycle). Shorter cycle times increase the number of cycles per day, which increases the flow capacity of the system. When a Basin is in the Storm Cycle, the aeration, settling, and decant times are proportionally identical to the normal cycle times except each “storm minute” is actually only 45 seconds of real time. The Super Storm Cycle is not proportional to the other cycles and has its own shortened timeline.
   3. Level transducers are provided in each basin to detect the increased flows. The storm cycle will be activated when the influent flow exceeds 1.36 MGD total flow. The Super Storm Cycle will be activated when the influent flow exceeds 1.81 MGD total flow. Each basin is provided with a float switch as a backup to the level transducers in case of failure.

D. *After Wet weather*

1. Automatic return to the Normal Cycle timeline and basin operation
2. Return to operations and maintenance procedures observed *Before Wet weather* conditions

2.5.3 WWTP – Chlorine Contact Tank & Disinfection

A. *Equipment List*
1. Chlorine Contact tanks (2)
2. 150 lb. Gas Chlorine cylinders (2)
3. Wooden Baffles (2)
4. ISCO Refrigerated Automatic Sampler (1)

B. *Before Wet Weather*
1. Periodic manual net skimming to prevent floatables from escaping in the effluent
2. Removal of sludge deposits and algae growth as needed to prevent high flow scour and discharge with effluent flow
3. Monitor Effluent settleable solids twice per day
4. Monitor Effluent pH and Temperature twice per day
5. Monitor Effluent chlorine residual twice per day

C. *During Wet weather*
1. Ensure that both tanks are operational and online to maintain design contact time.
2. Check twice daily to ensure S.P.D.E.S. Permit parameter limits are not exceeded.
3. Periodic manual net skimming to prevent floatables from escaping in the effluent.

D. *After Wet Weather*
1. Periodic manual net skimming to prevent floatable from escaping in the effluent

2.5.4 WWTP Effluent Outfall Surcharge

During extreme high flow event through the WWTP, SBR decanting cycles can surcharge the chlorine contact and effluent outfall manhole. Levels are set in SCADA for high flows through the WWTP for storm and super storm event set points. These set points for high flow will turn off aeration and/or bring the SBR decanters up to park position to maximize tank capacity and minimize solids washout into the chlorine contact tank as explained above.

However, should flows continue to rise within the WWTP due to the influent flow exceeding the capacity of the effluent discharge pipe, then it may become necessary for the following contingency plan measures to be put in place:

1. Notify Supervisor.
2. Operator responds to WWTP to evaluate if power available, generator operating, blowers and SBR equipment are operating properly.
3. Operator connects suction hose and places in chlorine contact tank effluent.
4. Operator connects discharge hoses to existing HDPE piping used for chlorine contact tank cleaning, which discharges directly to the Sludge Holding Tanks.
5. Operator starts pump and monitors SBR decanting, aerobic digester tank level and WWTP flows.
6. In the event the aerobic digester tanks are at full capacity and not able to decant back into the WWTP then the operator will disconnect discharge hoses from HDPE piping and place into St. Lawrence River for discharge.
7. Monitor and record time of by-pass pumping.
8. Turn off by-pass pump when pump station is able to meet influent flow.

7.0 Record of Changes

Revision	Description of Changes	Date
0	Procedure Created – Bernier Carr Group	07/2003
1	Procedure Revision – Jeff Overstrom	08/31/2015
2	Eliminated CSOs and added detail for emergency response procedures at WWTP and Riverside Drive Pump Station	01/11/2016