Welcome to the

NIAGARA REGION

Pollution Prevention Control Plan for the Town of Niagara-On-The-Lake Wastewater Collection System

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Public Information Centre

Please Sign In

October 4, 2011
Mary Snider Room, Centennial Arena Centennial Park
1565 Four Mile Creek Road, Virgil, ON
BACKGROUND

Past investigations reveal that there are significant “extraneous” infiltration and inflow issues affecting the wastewater collection systems in Virgil and Old Town during wet weather conditions. As a result, there is potential for sewer overflow structures at Regional Pump Stations to become overwhelmed under these conditions and discharge untreated wastewater to the environment.

PURPOSE OF MEETING

To present the assessment and findings of the wastewater collection system analysis and to outline alternative strategies to reduce infiltration and inflow and sewer overflows, and to enhance sanitary sewer performance in Virgil and Old Town. Your comments and suggestions are welcome and will be incorporated into the final Pollution Prevention Control Plan.

While this undertaking is independent and separate from the concurrent Water and Wastewater Master Servicing Plan Update and Wastewater Treatment Plant Class Environmental Assessment, the preliminary findings of each have been integrated.
STUDY OBJECTIVE

Niagara Region and Town of Niagara-on-the-Lake have initiated a Class Environmental Assessment (Class EA) to develop a cost effective, practical, and implementable Pollution Prevention Control Plan for the wastewater collection system in the Town of Niagara-on-the-Lake (NOTL). The study area comprises the communities of Virgil and Old Town.

PROJECT IMPLEMENTATION

The Study follows the approved master planning process as outlined in Section A.2.7 (Approach #1 in Appendix 4) of the Municipal Engineer’s Association (MEA) Municipal Class Environmental Assessment (October 2000, as amended in 2007). The Class EA process includes public and review agency consultation, an evaluation of alternatives, an assessment of the potential environmental effects of the proposed improvements, and identification of reasonable measures to mitigate any adverse impacts that may result. The plan will become the basis for future investigations of specific Schedule B and C projects.

EXHIBIT A.2  MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA
WHAT IS A POLLUTION PREVENTION AND CONTROL PLAN (PPCP)?

• A PPCP is a management strategy intended to meet the goals of the Ministry of Environment Procedure F-5-5, and generally includes the following:
  • An outline of the nature, cause and extent of pollution problems
  • An examination of alternative remedial measures
  • Recommendation of a staged implementation program
  • It is a living document that will periodically be updated and used as a benchmark for compliance with Regulatory Framework.

REGULATORY FRAMEWORK

• Ministry of the Environment (MOE) Partially Separated Sewer Overflow Policy: Procedure F-5-5
  • No overflows during dry (non-rainfall) periods.
  • Capture and treat at least 90% of the water generated from the partially-separated sewer area during a seven (7) month period starting in April. Treatment must be to a “primary” level of treatment.
  • Control the discharge of debris (floatables) to the environment.
• Region of Niagara
  • Master Plan recommended capture of the 2-year storm in recognition of potential future heightened regulations and/or impacts of climate change.

COMPONENTS of the PPCP

| The abatement of wastewater discharge to Town of Niagara-on-the-Lake waterways. |
| Compliance with regulatory requirements (both present and in the foreseeable future). |
| Environmental responsibility (natural environment, public health, energy use, waste production, etc…). |
| Improved operation of the collection system that accommodates growth and provides an acceptable level-of-service. |
| Affordable solutions that are cost-effective in both the short and long terms. |
| Minimization of impacts on recreational activities and waterfront aesthetics. |
| Minimization of disruptions to businesses and the general public. |

PPCP Long-Term Target
Zero Overflows Under Non-Emergency Conditions
Study Area and the Wastewater Collection System

- 7 Region-owned & operated Wastewater Pumping Stations (PS)
- Collection system owned, operated & maintained by Town of Niagara-on-the-Lake
### EXISTING SITES – OLD TOWN PUMPING STATIONS & OVERFLOW CONTROL FACILITY

<table>
<thead>
<tr>
<th>Location</th>
<th>Drainage Area</th>
<th>Population</th>
<th>Overflow Location</th>
<th>Average Sewage Flow</th>
<th>Rated Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Street SPS</td>
<td>41 ha</td>
<td>500</td>
<td>Storm Sewer to Lake Ontario</td>
<td>6 L/s</td>
<td>41.5 L/s</td>
</tr>
<tr>
<td>Ricardo Street SPS</td>
<td>25 ha</td>
<td>285</td>
<td>Ricardo St. Storm Sewer to Lake Ontario</td>
<td>3 L/s</td>
<td>17.6 L/s</td>
</tr>
<tr>
<td>William Street SPS &amp; SSO Tank</td>
<td>315 ha</td>
<td>4,300</td>
<td>One Mile Creek</td>
<td>41 L/s</td>
<td>250 L/s</td>
</tr>
</tbody>
</table>

- **Underground Storage Volume**: 900 m³
### EXISTING SITES – VIRGIL / GARRISON VILLAGE PUMPING STATIONS

<table>
<thead>
<tr>
<th>Site</th>
<th>Drainage Area</th>
<th>Population</th>
<th>Overflow</th>
<th>Average Sewage Flow</th>
<th>Rated Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niagara Stone Road SPS</td>
<td>13 ha</td>
<td>20</td>
<td>Two Mile Creek</td>
<td>0.8 L/s</td>
<td>24 L/s</td>
</tr>
<tr>
<td>Garrison Village SPS</td>
<td>60 ha</td>
<td>840</td>
<td>Manual Forcemain Bypass to Treatment Lagoons</td>
<td>6.5 L/s</td>
<td>34 L/s</td>
</tr>
<tr>
<td>Lakeshore Road</td>
<td>210 ha</td>
<td>2,250</td>
<td>Four Mile Creek</td>
<td>16.5 L/s</td>
<td>63 L/s</td>
</tr>
</tbody>
</table>
PRESENT SETTING

- There are two distinct collection systems separately servicing household/industry sewage flows (sanitary sewer) and the storm drainage network (storm sewer).
- The age of the NOTL system varies, as does the way in which the house plumbing connects to the municipal system.

- During wet weather conditions (i.e. rain or snowmelt), significant amounts of surface runoff (inflow) and groundwater (infiltration) can enter the wastewater collection system.
- Therefore, the NOTL wastewater collection system is considered a “partially-separated” sewer system as it relates to overflow control.
To evaluate the magnitude of the wet weather contributions, the Town conducted long-term sewer flow monitoring at 8 locations in Old Town (2008-2009) and 3 in Virgil (2010-2011).

- The collected data was used to characterize the collection system response.
- Very distinct increase in system response due to spring melt.
- All systems generate elevated extraneous flow, with Area 4 depicting higher than average groundwater infiltration.
- Several rain events captured with extreme wet weather response confirming presence of extraneous flow in the system.
- As expected, areas with newer development (e.g. Area 6 & 9) show reduced response.
SYSTEM CHARACTERIZATION THROUGH HYDRAULIC MODEL DEVELOPMENT

- A hydraulic simulation model was developed and calibrated using the measured flow monitoring data.
- Average Year and the 2 & 5-year Design Storms were simulated under existing and future 2031 conditions.
- Under dry weather conditions, the sewer system has capacity to accommodate 2031 growth.
- During spring, the wet weather response is at its peak, resulting in the 3 largest pump stations being incapable of conveying the peak wet weather flow.
- Sewers in the vicinity of the pump stations become surcharged with the potential for basement flooding.
- Overflow frequency and volumes were estimated for the average year, and design storms.
  - Only 1 overflow was simulated, occurring in spring, for 3 of the pump stations.
  - The current system captures and treats over 90% of the Total Wet Weather Flow Volume thus meeting MOE Procedure F-5-5

### Simulated 2031 Average Year Sanitary Sewer Overflow (SSO) Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Pump Station</th>
<th>Total Wet Weather Flow (m³)</th>
<th>Total Overflow Volume (m³)</th>
<th>% Capture</th>
</tr>
</thead>
<tbody>
<tr>
<td>2031</td>
<td>William St.</td>
<td>2,068</td>
<td>2,897</td>
<td>99%</td>
</tr>
<tr>
<td></td>
<td>Lakeshore</td>
<td>670</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Garrison²</td>
<td>159</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>284,500</td>
<td>2,897</td>
<td>99%</td>
</tr>
</tbody>
</table>

1. Based on 1976 Annual precipitation between April 1 and November 1 for 2031 Growth Conditions
2. Garrison Village PS has no automated overflow
Niagara Region and Niagara-on-the-Lake have a number of policies, procedures, and bylaws related to pollution prevention and control planning. These and other alternatives can be summarized as follows:

**Non-Structural**
- At-Source Controls
  - Rain Barrel/Water-Saving Programs
  - Roof Downspout Disconnection and/or Relocation to Grassed Surfaces
- Extraneous Infiltration/Inflow Reduction
  - Disconnection of Building Foundation Drains from the Sanitary Lateral
  - Sewer Pipe Rehabilitation/Lining
  - Maintenance Hole Rehabilitation
  - Sealing/Raising Low-Lying Sanitary Maintenance Hole Lids
- Operations & Maintenance Improvements
  - Monitoring Programs
  - Regular Cleaning and Maintenance
- Management and Policy
  - Sewer-Use By Law
  - Public Education
  - Growth Planning
  - Stormwater/Snow Management

**Structural**
- Collection System Improvements
  - Increase Sewer Pipe Capacity
  - Increase Pump Station Capacity
  - Sewer Pipe Replacement/Diversion
  - Overflow Structure Modification
- Storage Technologies
  - Underground Storage (Local versus Centralized)
- Treatment Technologies
  - Centralized High-Rate Treatment Facility
- Increase in Wastewater Treatment Plant Capacity
<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
</table>
| 0 • Do Nothing | • Maintains Status Quo with minimal cost impact | • Not compliant with MOE Regulations  
• Does not address negative environmental impact  
• Does not resolve potential basement flooding risk |
| 1 • Upgrade Pump Station Capacity to Convey Peak Wet Weather Flow | • Least structural impact at existing pump stations  
• Relatively easy construction  
• Controls flooding risk | • Increases flows to WWTP and may effect efficiency of treatment processes and require plant redesign  
• Significant pump capacity modifications may require PS and wet well expansion |
| 2 • Centralized Storage Facility | • Economies of scale versus individual storage  
• Reduces flows and treatment costs at WWTP  
• Controls flooding risk | • Requires pump station upgrades, new pump station, forcemain relocation and reconnection to treatment plant  
• Large property footprint (land availability)  
• Large capital and operational cost  
• Greatest disturbance potential to public |
| 3 • Individual Storage Facilities | • Supports staged implementation  
• Reduces flows and treatment costs at WWTP | • Multiple land requirements and potential availability issues  
• Large capital and operational cost |
| 4 • Extraneous Flow Reduction Program (Rehabilitation, Roof/ Foundation Drain Disconnection/ Sump Pump Programs, Dedicated Foundation Drain Collector Systems) | • Defers or eliminates the need for storage facilities and pump station upgrades  
• Reduces the amount of ‘clean’ groundwater treated at the WWTP  
• Most environmentally sensitive | • Limited potential for removal in publically-owned right-of-way  
• Private-side retrofits difficult to assess/access, and requires future monitoring to confirm success and long-term feasibility  
• Potential disturbance to private dwellings  
• Requires longer duration to implement |
| 5 • High Rate Treatment at Overflows | • Negates the need for pump station upgrades  
• Reduces the amount of storage requirement (EQ Tank only) | • Significant operational costs (electricity, chemical processing, sludge management)  
• Does not reduce flows to WWTP  
• Requires specialty staffing and training  
• Does not address local flooding risk  
• Greater design and approvals process |
| 6 • Management Initiatives, Public Education (Low Flush Toilets, Rain Barrels, Pesticide/ Sewer Use Bylaws, O&M, SWM Master Plan, Growth Planning) | • Reduces pollutant loadings to collection system  
• Engages public awareness and environmental stewardship  
• Integrated, holistic approach to wet weather flow management | • Not a large reduction in wet weather flows  
• Cannot eliminate overflows on its own  
• Time and cost investment required to collect and update storm drainage asset data |
OVERVIEW OF RESULTS AND RECOMMENDED POLLUTION PREVENTION CONTROL STRATEGY

• Sewer system has capacity for future 2031 dry weather flows.

• Overflows are limited in the collection system to an estimated once annually on average at the Lakeshore Road, William Street and Garrison Village Pumping Stations.

• 90% of the annual wet weather flow volume generated in the collection system is captured and treated at the Treatment Plant, thereby meeting the MOE criteria outlined by Procedure F-5-5 for Partially-Separated Sewer Systems.

• However, since it is intended that the collection system be classified as Nominally Separated, it is the long-term goal of the PPCP to eliminate all overflows at the pumping stations under non-emergency (i.e. pump failure/blockage) design conditions.

• The preferred approach is to reduce extraneous inflows at the source first, to offset or eliminate the need for costly end-of-pipe containment structures.

• The Town has been proactive in attempts to identify and eliminate extraneous flows to the collection system. Currently, quantification of the success of reduction efforts is unknown.

• It is proposed that the Town’s Extraneous Flow Reduction Program be formalized and enhanced to incorporate a pilot project on the Lakeshore PS drainage area, to establish the cost-benefits of implementing a strategic remediation strategy, and the feasibility of extending the program across the Town to eliminate overflow during non-emergency conditions.
OVERVIEW OF RECOMMENDED POLLUTION PREVENTION CONTROL STRATEGY

Short-Term

- Capital Projects
  - As per Region’s Water and Wastewater Master Plan
  - No immediate dry weather capacity constraints

- Non-Capital Works Initiatives
  - Extraneous Flow Reduction Pilot Study in Priority Lakeshore drainage area, including
    - Targeted field investigations *(Detailed Drainage Inventory, Lateral CCTV, Smoke/Dye Testing, Flow Monitoring, Groundwater Monitoring)*
    - Rehabilitation *(e.g. Pipe Relining, Pipe Spot Repairs, Seal Manhole Lids, Sump Pumps, Separate Foundation Drain Collection Pipe)*
    - Pre and Post flow monitoring to quantify success
    - Cost-Benefit Analysis to confirm feasibility of Rehabilitation
  - Complete a Storm Drainage Master Plan to assess the impacts of stormwater drainage on the performance of the sanitary collection system, the existing Ricardo and Front PS overflows, and contribution to pollution of receiving water bodies
  - Continuation of Public Education & Incentive Measures for At-Source Private Disconnection

Long-Term

- Rehabilitation Projects as defined by Extraneous Flow Reduction Pilot Study
- Continued Extraneous Flow Reduction Program Based on Success of Post-Rehabilitation Monitoring in Pilot Study
- Hydrologic/Hydraulic Model Maintenance
- Consideration for William Street Storage Tank Expansion
- Consideration for Lakeshore Pumping Station Storage
- Future PPCP Updates
THANK YOU FOR ATTENDING

PLEASE FILL OUT A COMMENT SHEET

STAFF ARE AVAILABLE TO DISCUSS THE PROJECT

OR

FOR FURTHER INFORMATION CONTACT:

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