The Regional Municipality of York

2019 Performance Management Plan Monitoring Report (Condition 10)

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A. Overview of the Objectives, Targets and Commitments of the Performance Management Plan

On March 31, 2010, the Ministry of the Environment, Conservation and Parks[1] (MECP) provided the proponents of the Southeast Collector Trunk Sewer (SeC) Individual Environmental Assessment, The Regional Municipality of York (York Region) and The Regional Municipality of Durham, with notice of approval to proceed with the project. This approval was subject to and outlined a number of stringent conditions (the Minister's Conditions).

The Performance Management Plan (PMP) was prepared in accordance with Condition 10 of the Minister's Conditions and relates to the objectives, targets and commitments set out in the Plans and Strategies developed under the following conditions:

- Condition 8 – Water Conservation & Efficiency and Inflow & Infiltration Reduction;
- Condition 9 – Odour Management and Mitigation; and
- Condition 11 – Ambient Air Monitoring and Reporting.

The PMP was provided to MECP on March 31st, 2011 and on October 14th, 2011 York Region received confirmation that the MECP was satisfied with the PMP. This Annual Performance Management Monitoring Report has been prepared in accordance with Condition 10.10 of the Minister's Conditions.

The following is a summary of the objectives, targets and commitments made in the programs covered by the PMP. The individual Plans and Strategies prepared in accordance with the conditions above should be consulted for the full details of the components of each program.

A.1. Condition 8 – Water Conservation & Efficiency Strategy Objectives, Targets and Commitments

York Region developed the Long-Term Water Conservation Strategy (LTWCS) in 2011 to satisfy Condition 8 of the Minister's Conditions. The LTWCS builds on York Region's commitment to sustainable development. The 2011 Strategy was updated in 2016; Table 1 below outlines the recommended measures for inclusion in the Region's 2016 LTWCS. York Region has initiated its 2021 LTWCS update in accordance with condition 8.10 of the Minister's Conditions.

[1] *Formerly Ministry of the Environment and Climate Change (MOECC) and Ministry of the Environment (MOE)*

Table 1: Long Term Water Conservation Strategy 5 Year Plan

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES
PROGRAM MANAGEMENT
1. Water Conservation Advisory Committee (WCAC)
• While the WCAC will continue to play similar role in the Region's Water Conservation programming as in the past, initiation of a new term and focus will begin in 2016. • Expanded representation to include local municipalities and business associations on the committee will be evaluated over 2016-2017. • The goal of expanded representation on WCAC is to align the membership with the Region's commitment to One Water and the identification and realization of conservation opportunities system-wide.
2. Tracking and Reporting Framework
• Expand on the existing Key Performance Indicator (KPI) mechanism currently in use in the Region to track and report water conservation KPIs on an annual basis. • A water conservation (or One Water) reporting framework could be updated on a regular basis to keep pace with Best in Class practices. • A format for a report to provide a summary of water conservation programming KPIs will be developed in 2016 with initial testing in 2017. • As programming evolves and changes, so too do performance indicators that are tracked, measured and reported without losing year over year comparability.
3. One Water Infrastructure Optimization
• The Region works closely with local municipalities via the Regional-Municipal Steering Committee to ensure greater coordination in the operation of the water systems. • With the goal of continuous improvement and recognition that through system optimization, opportunities for greater water conservation, energy savings and capture, water reuse, reduction of Inflow & Infiltration, etc., can be realized; the Region will investigate over the course of 2016 opportunities for optimization including establishing of an Infrastructure Optimization Steering Committee under the auspices of One Water. • Enhanced resiliency in light of climate change and potential increases in extreme and variable weather, changing market demands, significant planned growth and related new construction/re-development, evolving technologies, full-cost recovery, etc. These speak to the importance of a continued emphasis on efficiency and greater co-operation and co-ordination of planning, operation and management of the Regional-municipal water systems.
4. Expanded Analytics
• As part of the Region's commitment to continuous improvement, greater integration of data capture and analytics across key divisions to maximize water system efficiency and ensure a continued and growing focus on a One Water approach to planning and decision-making is a key objective over the next five years.
Note: Existing Programs New Programs New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES
• Continued work with local municipalities to enhance and coordinate water billing data collection for improved integrated decision-making in areas of importance – reducing water loss through leakage, preventing excessive flushing, reducing Inflow and Infiltration, monitoring demand trends, measuring and assessing program performance, planning for growth, optimizing operations protocols, etc. – will remain a priority for the Region in the near and longer terms.
5. One Water Innovation
• With rapid advances in physical and information technology and infrastructure, significant challenges and opportunities exist to bring the two together. • A One Water Innovation Group could work to identify, explore, test and develop new processes, equipment, and technologies related to water management. • The Innovation Group could bring together leading business, academic, and public sector expertise to create innovative solutions and expansion of the Regional Innovation Group to include key external stakeholders via an innovation incubator or innovation hub. This could significantly expand the scope and capacity for One Water innovation in the Region. • Incubators and innovation hubs in leading jurisdictions such as Chicago, Philadelphia, and San Jose stimulate the local economy, support innovation, develop local capabilities and expertise, and generate public sector-private sector-academic joint ventures. • The One Water Innovation Group would be responsible for identifying opportunities for innovation across the Regional and local municipal systems. • Linkages with the province's WaterTAP initiative, the Ontario Water Centre, the York University campus in Markham, the LSRCA and TRCA Living City Campus and the Sustainable Technologies Evaluation Program [STEP], and the Canadian Water Network could be made through a One Water Innovation Incubator.
6. Water Reuse Plan
• In the final quarter of 2015, the Region formed an internal team to develop a cross-functional water reuse plan. • Water reuse is part of the Region's long-term strategy for achieving its ambitious target of 150 litres per capita per day (LCD) over the next 35 years. • Under the Region's One Water program, research into leading water reuse technologies and practices, and the identification and exploration of potential water reuse opportunities across the Regional and local municipal systems will culminate in development of a water reuse plan. • This work commenced in 2015 and will continue over the next several years of the Strategy Update. • Region's Upper York Sewage Solution (UYSS) Individual Environmental Assessment (IEA) has proposed opportunities for water reuse to be undertaken as part of the cross-function water reuse plan development. • Substantial water reuse will be required to meet the Region's aspirational target of "No New Water" by 2051. Currently there is no provincial guidance for large scale water reuse. In order to develop large scale water reuse opportunities, the Region will work closely with the Ministry on regulatory and programming guidance.

Note: Existing Programs New Programs New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

7. Integrated Master Planning

- Integration of One Water and the Strategy Update in the master planning process is integral to maintaining continuity and ensuring full consideration of water conservation in all future infrastructure plans and projects.
- Over the past decade the Region has taken significant steps to integrate water conservation into infrastructure planning; this approach will continue with greater focus on system-level water efficiency and water reuse in the master planning process.

POLICY AND REGULATION

1. Building Code Standard for Water Efficiency Upgrades in New Construction

- The Region will investigate the potential to require water efficiency upgrades, specifically 4.0 litre toilets, on-demand hot water recirculation systems, increased top-soil depth and quality, and fusion landscaping in new construction - or to include these measures under the Sustainable
- Incentive Program (SIP) in 2016-2018.

2. Water Efficiency and Water Reuse Standards for all Regional Buildings

- Region to develop requirements for all new and redevelopment projects of Regional buildings to require 4.0 litre or less toilets, water efficient fixtures, fusion landscaping, and water reuse where viable and feasible.
- The Region will develop water conservation requirements and supporting guidance for all new and redevelopment projects of Region-owned buildings.

3. Requirement for all Facilities with In-ground Irrigation Systems to be Optimized

- Over the 2020-2021 period, the Region will investigate a requirement for ICI facilities with in-ground automatic irrigation systems to install smart (weather-based) controllers to reduce water wastage.

4. Water System Design Criteria Advisory Group

- The Region will investigate opportunities to bring key stakeholders from local municipalities, other GTA or Ontario municipalities and/or associations (American Water Works Association,
- Federation of Canadian Municipalities, Association of Municipalities of Ontario, Canadian Water Network, etc.) and relevant provincial ministries together. This advisory group will discuss design guidelines for water supply systems, including fire flow requirements, and to explore the efficacy of potential changes to the guidelines for enhanced efficiency, cost-effective operation and quality maintenance, and capital cost reduction.
- The key deliverable from this collaborative work is developing a recommendation for updating design criteria for water supply systems.

REBATES AND OTHER FINANCIAL INCENTIVES

1. Capacity Buyback (CBB) Program

- The Region continues to implement its Capacity Buyback program to ICI customers. The program offers financial incentives to ICI customers based on average daily water savings achieved.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

INFRASTRUCTURE

1. District Metered Areas (DMAs)

- The Region continues to offer support to local municipalities in implementing District Metered Areas to reduce system leakage.
- Localized DMA methodology involves comparing the theoretical demand of an isolated area of the system to the measured actual demand; a high actual demand compared to the theoretical demand can indicate leakage.
- The Region will determine the value of bringing the DMA program under the One Water Optimization Working Group.

2. Stand-Alone System Water Conservation Plan and Program

- The Region, in consultation with local municipalities in service areas supported by stand-alone systems such as Kleinburg where serviced population is generally less than 10,000 and peak demand is high, will develop targeted water conservation programming to reduce water demands in these communities.
- The plan will be developed over the next two years.

3. Risk-based Asset Management for Pipe Replacement

- The Region will enhance its risk-based pipe replacement program through adopting advanced condition assessment technology, improving data collection, partnering with other municipalities and educational institutions to research pipe deterioration curves, investing in pressure monitoring and developing a transient model to identify areas of vulnerability.
- A complex assessment risk methodology is used to identify pipes that are statistically more likely to fail, pipe clusters with higher than average or acceptable levels of failure (break) rates are targeted first for replacement, while deferring replacement of pipes in clusters with low failure rates.
- Risk-based pipe replacement reduces the likelihood of pipe failures and resulting water loss, reduces utility liability, and optimizes repair and replacement costs.

4. Pressure Management

- The Region has investigated the use of pressure reduction/management to reduce leakage in system pipes. Pressure management in the water supply system is achieved via the use of pressure-reducing valves and is generally done during low demand periods, usually overnight.
- As part of its One Water system-wide efficiency assessment, the Region will investigate the potential change in system pressure due to system expansion to minimize system pressures that may increase leakage. This investigation will be undertaken in the next three years.

Note: Existing Programs New Programs New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES
5. Water Energy Nexus
• The Region is currently evaluating energy recovery and operational optimization opportunities within the Regional water system. • This work will continue throughout the planning horizon of the 2016 Strategy, securing energy capture where viable and cost effective. • System-wide water conservation work will provide energy savings concurrent with water savings.
PILOT PROJECTS AND RESEARCH STUDIES*
1. Development-scale water reuse (greywater) and/or rainwater harvesting
• The Region will work with local municipalities and the local builder/developer industry to identify opportunities for development-scale water reuse or rainwater harvesting projects for non-potable purposes. Opportunities such as toilet flushing and irrigation in new residential developments and building-scale water reuse or rainwater harvesting for non-potable purposes such as toilet flushing, boiler systems, and irrigation for commercial and residential development/redevelopment projects. • Water reuse involves capturing of greywater (water from showers and sometimes laundry), on-site treatment, storage and subsequent reuse for non-potable purposes. • Pilot project opportunities will be identified during 2016-2017 with the goal of implementation in 2018 – 2020. • The goal of the pilot project is to assess the costs, potential savings and constraints of development-scale water reuse or rainwater harvesting for non-potable purposes.
2. Water Banking
• The Region will investigate the potential and value of water banking (aquifer recharge). • Water harvesting and/or reuse will be considered as potential sources of supply for aquifer recharge. • Given high water levels in some of the Regional wells, a determination as to the need, feasibility, efficacy and value of water banking is required. • The study of the potential of water banking to the long-term sustainability of Regional aquifers will be carried out over 2019 – 2021 of the Strategy Update.
3. Mains Flushing Public Outreach Campaign
• The Region will investigate the potential of co-ordinating water main flushing activities with a spring-time “fill your pools/water features and irrigate new plantings” public outreach and engagement campaign. • In areas where significant flushing is required to maintain water quality, the potential and viability of redirecting flush water to fill pools, hot tubs and ornamental water features and for irrigation of new plantings at a peak demand time for these activities (generally the 2nd and 3rd weekends of May), will be evaluated in 2018-2019.
Note: Existing Programs New Programs New Pilot Programs

* The new measures identified above involve completing pilot projects to assess the effectiveness of the measure and to modify or cancel as required.

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES

MARKET BASED PROGRAMS

1. Market-based Programming

- The Region will continue to pursue market-based programming to drive water conservation transformation in the marketplace.
- Market-based measures identified in the Peak Reduction and Average Annual Day Demand Implementation Plans developed in 2012 will continue through the pilot study phase and, where appropriate (based upon results from pilot studies), will be implemented Region-wide over the 2016-2020 period.

2. Water Smart Irrigation Professional (WSIP) Program

- A market-based program involving a 3-way collaboration of York Region, Peel Region and Landscape Ontario.
- Involves training and certification of irrigation contractors who then qualify for an incentive to optimize the efficiency of existing automatic irrigation systems.
- The potential average water saving for Industrial, Commercial, and Institutional facilities is in the range of 10,000 litres per day per acre of irrigated turf. WSIP is potentially a significant program for reducing peak demand and for tackling high outdoor water use.

3. Fusion Gardening Program

- A market-based program using landscape design/install and maintenance service providers.
- Involves training and certification of landscape designers/installers and landscape maintenance contractors in fusion gardening/landscaping.
- In 2015 the Region began implementing a pilot project in Kleinburg, a community with a significant percentage of high peak season residential water users.
- Fusion landscapes are water efficient and incorporate LID/green infrastructure features such as rain gardens, bioswales, increased vegetative cover (including tree canopy cover), dry river beds, and soak-away pits.
- Fusion landscapes require little or no supplemental irrigation once established, mitigate stormwater runoff and contaminant loadings to source waters, help reduce flooding, and enhance vegetative cover.
- The Fusion Gardening pilot program will continue in 2016 – 2018 and will be evaluated to determine if the program will be implemented Region-wide beginning in 2019.

EDUCATION AND OUTREACH

1. "Water Is" Campaign

- "Water Is" campaign rolled out in the fall of 2013.
- First phase of campaign created an emotional connection between residents and water and included multi-pronged communication tactics including ads (newspaper, bus shelter, and movie theatre), social media, event attendance, photo contest, posters, etc.
- The second phase of campaign is more informational – showcasing hidden infrastructure and how York Region keeps drinking water safe and clean and included videos, posters, social media,
- Water Hero campaign, advertorials.
- The "Water Is" program raises awareness about the importance of water. Making the connection between the value of water and the need to conserve is a key component of the Region's water conservation outreach program.

Note: Existing Programs | New Programs | New Pilot Programs

2016 STRATEGY WATER CONSERVATION PROGRAMS AND MEASURES
2. Children's Water Festival
• Grade 4 students across York Region learn about water conservation through interactive, curriculum-linked activities. • The Children's Water Festival is a five-day signature event that helps approximately 5,000 students understand how important a clean and plentiful water supply is. Children learn respect for a healthy environment and make a commitment to use natural resources wisely. The festival has been held for over ten years for schools in York Region where each teacher registers his/her own class separately. • The York Children's Water Festival is a major component of York Region's Water for *Tomorrow* program and is a partnership between York Region and the Toronto Region Conservation Authority.
3. Student Education Initiatives
• York Region offers a number of educational water conservation programs for elementary schools. • Teachers and students are encouraged to participate in events and activities linked to the Ontario curriculum. • The Region developed a new elementary-level, in-class presentation to demonstrate where water comes from and the systems that move it, and the safety and reliability of the Region's supply. The presentation features hands-on activities and engaging discussion about how water is needed and used. • The Region offers a calendar showing Grade 7 student drawings reflecting the students' views on water conservation, protection and responsibility. • Student drawings are first judged at each school and then submitted to York Region for final judging. • The 12 winning art pieces are printed in the Water for Tomorrow student calendar which is available online. Each winning artist is personally recognized for his/her contribution at his/her school.
INNOVATION
1. Water Reuse Pilot – development and implementation
• Water reuse is part of the Region's long-term strategy for achieving its ambitious targets. The Region's Upper York Sewage Solution Project has proposed exploring opportunities for water uses. • The Region will be piloting a project to utilize water reuse for irrigation purposes from a Regional Water Resource Recovery Facility from 2016- 2019.
Note: Existing Programs New Programs New Pilot Programs

The baseline is expressed in water use per capita per day and the base year for the LTWCS is 2011. A total system baseline has been established and has been divided into residential and Industrial, Commercial and Institutional (ICI). Water savings required to meet the aspirational goal of 150 litres per capita per day (LCD) by 2051, have been calculated and are expressed in five-year increments. In addition, new development and existing development, both residential and ICI, are treated separately and calculated as such. Current water conservation and efficiency measures to meet the desired targets have been identified and qualitatively screened and evaluated.

On-going measurement and evaluation throughout the LTWCS will be undertaken and modifications or adjustments may be made to the program as it progresses to reach the desired water saving targets.

A.2. Condition 8 – Inflow and Infiltration Reduction Strategy Objectives, Targets and Commitments

York Region developed the Inflow & Infiltration (I/I) Reduction Strategy to satisfy Condition 8 of the Minister's Conditions.

The I/I Reduction Strategy was submitted to the Minister on March 31, 2011. The Regional Director indicated satisfaction with the I/I Reduction Strategy to York Region on October 14, 2011. The reduction of I/I flows is a long-term program and commitment, one that York Region and its local municipalities are committed to addressing over the next twenty years.

In 2015, the Region embarked on the first update to the Inflow and Infiltration Reduction Strategy in consultation with the Region's local municipal partners. The Strategy Update (submitted to the Province on March 31, 2016) considered the success achieved between 2011 and 2015, opportunities for improvement, and advances made in best-in-class programs from other jurisdictions to ensure that long-term target reductions are achieved . The Region will continue to work closely with the nine local municipalities during the development of the 2021 Inflow and Infiltration Reduction Strategy Update.

A summary of the key enhancements under the 2016 Strategy Update are provided in Table 2 below.

TABLE 2: Key Enhancements To The 2011 Strategy

1. *PROGRAM OR INITIATIVE*	*DESCRIPTION*
Local Municipality Inflow and Infiltration Reduction Status Annual Report	Each local municipality will prepare its own Local Municipality Inflow and Infiltration Reduction Status Annual Report to document inflow and infiltration reduction activities, projects undertaken and annual expenditures. A draft standard template has been developed for these reports. These reports will form part of the Region's Annual Inflow and Infiltration Reduction Program Report submitted to the Ministry.
Data Analysis	The Region will continue to analyze long-term flow and rainfall monitoring data collected through the Inflow and Infiltration Audit and Flow Monitoring Program. Analysis results will be used to identify priority basins.
Mini-Basin Flow Monitoring	Flow monitoring will be undertaken in areas generally less than 100 hectares in size to assist in identifying sources of inflow and infiltration.
Sanitary Sewer Evaluation Surveys (SSES)	The Region will continue to investigate priority mini-basins using a variety of evaluation methods selected based on data analysis results. Inflow and infiltration sources will be identified and communicated to local municipalities for rehabilitation.
Private Property Programs	The Region will support the efforts of the local municipalities to establish and implement private property programs to address private property sources. Moving forward, a downspout disconnection program is one example of a private property action.
Innovative Pilot Projects	Piloting new and innovative technologies will be completed to achieve continuous improvement in the Inflow and Infiltration Reduction Program.
Update the Sanitary Sewer System Inspection, Testing and Acceptance Guideline	Working with the local municipalities, the Sanitary Sewer System Inspection, Testing and Acceptance Guideline will be updated to reflect new technologies and lessons learned.
Provincial Advocacy	The Region will continue to engage with the Province on a range of issues to support inflow and infiltration reduction including new development design standards and construction practices.

The targeted I/I reduction schedule as shown below (**Table 3: I/I Target Reduction Schedule**) and timeline for achieving the reduction goals will be updated over time as progress is being made through the implementation of the I/I Reduction Strategy. In many cases the activities form a critical path and are dependent upon one another in order to commence. So, the timing of activities is contingent upon successful implementation of the preceding activities. As information is gathered through the

implementation of the various programs, the reduction schedule (Table 3) will be updated to reflect baseline flows and removal targets.

Table 3: I/I Target Reduction Schedule

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021-2031
ACTIVITIES											
Municipal Remediation Project Implementation											
Servicing Incentive Programs											
Continued Improvement in Construction Practices for New Development											
Private Property Program Development & Implementation											
REDUCTION TARGETS											
Achieve Up to 25% of Target Reduction											
Achieve Up to 50% of Target Reduction											
Achieve 50-100% of Target Reduction											

Initiatives implemented as part of the Strategy between 2011 and 2019 have helped reduce 20.53 million litres per day of flow in the YDSS (based on a 24-hour period, 25-year storm event) representing 51.3% of the 2031 target reduction of 40 MLD and exceeding the 2020 interim reduction target of 20 MLD one year ahead of schedule.

A.3. Condition 9 – Odour Management and Mitigation Plan Objectives, Targets and Commitments

The Odour Management and Mitigation Plan (OMMP) was prepared to address Condition 9 of the Minister's Conditions in 2010. On December 5, 2014, an updated OMMP was provided to include the Operation Manuals for each of the four main components of the odour control system prior to SeC commissioning. The update to the OMMP was finalized in consultation with MECP in June 2016.

The complete SeC Odour Control System (OCS) includes the following main components (see **Fig. 1: Odour Control System Constructed at Southeast Collector Trunk Sewer**):

- **The Corrosion Control Facility (CCF) at Shaft 13:**
  The CCF located adjacent to the Diversion Facility on the north-east corner of

Rouge Bank Drive on Ninth Line, injects hydrogen peroxide under controlled conditions to the sewage flow of both the existing YDSS and the new SeC trunk sewer to limit the formation of odour causing compounds and restrict corrosion of the sewer lining and associated components.

- **The Odour Control Facility (OCF) at York-Durham Line (YDL):**
  The OCF located across from Shaft 9 on York-Durham Line, south of 4th Concession Road and north of Steeles Avenue East is the main treatment and collection site of odourous air from the trunk sewer headspace. The collected air is adjusted for humidity and treated through two stage bioscrubbers, a multi-celled biofilter bed, and then polished through activated carbon adsorption units. After three-stage treatment, air will be released to the atmosphere via a stack.

  The OCF caustic system is located at Shaft 9 across the road from the OCF Building. The caustic system was added into the system to ensure that all drainage from the bioscrubber/biofilter system meet the Regional Municipality of Durham's Sewer By-law as per the site location in Durham Region.

- **The Air Handling Facility (AHF) at Shaft 6/7:**
  The AHF at Shaft 6/7 located west of Altona Road, south of the Hydro Corridor between 3rd Concession and Finch Avenue provides headspace air movement against the gravity sewage flow toward the OCF for odour treatment. Shaft 6, which is located immediately downstream of Shaft 7, is a drop structure consisting of a series of horizontal concrete baffles that are used to diminish the force of falling wastewater.

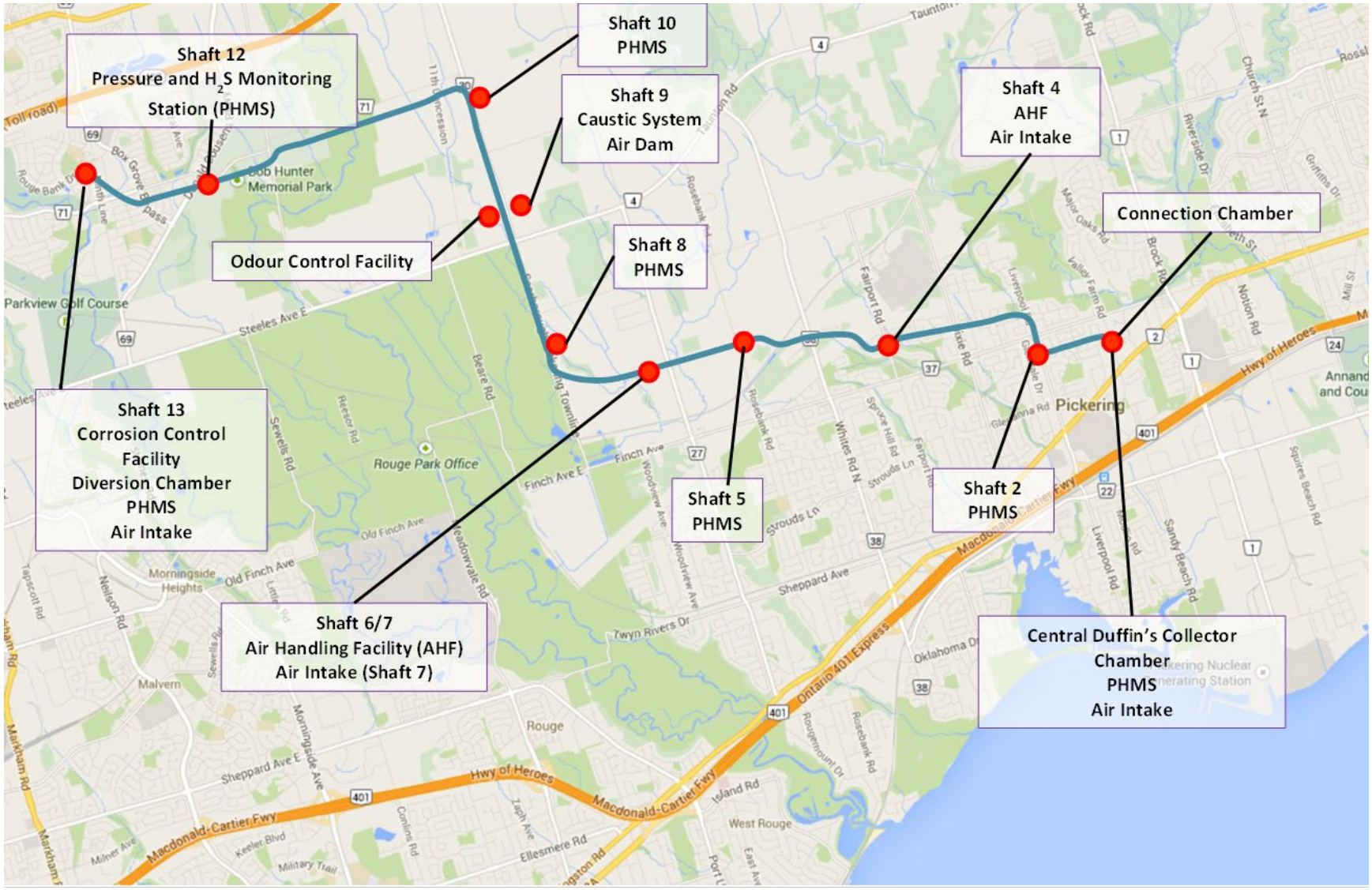
  This AHF conveys and controls the headspace air of the SeC Trunk Sewer from Shaft 4W (downstream) to Shaft 6 and then passes the air to Shaft 7. Between Shaft 7 and the OCF the headspace air is conveyed against gravity flow and controlled by the OCF induced draft fans (upstream of Shaft 6/7).

- **The Air Handling Facility (AHF) at Shaft 4:**
  Shaft 4E, located immediately downstream of Shaft 4W, is a drop structure consisting of a series of horizontal concrete baffles that are used to diminish the force of falling wastewater. The AHF conveys and controls the headspace air of the SeC Trunk Sewer from Connection Chamber to Shaft 4E and then passes air to Shaft 4W. From Shaft 4W to Shaft 6, the air is controlled and conveyed against the gravity flow by the AHF at Shaft 6/7.

The odour control process is equipped with additional components throughout the length of the SeC Trunk Sewer. These components assist with the operation and monitoring of the ventilation system, odour containment and process control data for the main facilities and include:

- Pressure and Hydrogen Sulphide Monitoring Stations (PHMS) at the Central Duffin's Collector (CDC) sewer, Shafts 2,5,8,10,12 and 13;
- Air intakes at CDC, Shafts 4,7,13B and 13C; and
- An air dam at Shaft 9 (to stop the air flow further upstream against the gravity sewage flow and send it to the OCF for treatment).

Figure 1: Odour Control System Constructed at Southeast Collector Trunk Sewer



The revised OMMP included the Operation Manuals for all the above four facilities including the Standard Operation Procedures and the system's maintenance /performance schedules incorporated into York Region's Integrated Management System. The new SeC trunk sewer is solely operated by York Region and must follow all York Region internal requirements.

Table 4: Performance Targets outlines the air emission targets for the operation of the SeC:

- Design Targets (modelled worst case scenario)
- Performance Targets (second warning sign)
- Compliance Targets (MECP limits)

Table 4: Performance Targets

Air Emission	Compound	Formula	Design Target Concentration	Performance Target Concentration	Compliance Target Concentration until February 1, 2020*	Compliance Target Concentration by February 1, 2020 onwards
Ammonia	Ammonia	NH_3	**0.0186 (µg/m^3)** 0.000027 (ppm)	**7 (µg/m^3)** 0.01 (ppm)	**300 (µg/m^3)** 0.43 (ppm)	**100 (µg/m^3) ***** 0.15 (ppm)
Total Reduced Sulphur (TRS)	Hydrogen Sulphide	H_2S	**0.0261 (µg/m^3)** 0.000019 (ppm)	**1.4 (µg/m^3)** 0.001 (ppm)	**10 (µg/m^3)** 0.0072 (ppm)	**13 (µg/m^3)**** 0.0094 (ppm) **7 (µg/m^3)***** 0.0050 (ppm)
	Methyl Mercaptan	CH_3SH				
	Dimethyl Sulphide	$(CH_3)_2S$				
	Dimethyl Disulphide	$C_2H_6S_2$				

*Note: * Schedule 2 standards based on 0.5-hour averaging time.*
*** Schedule 3 standard based on 10-minute averaging time.*
**** Schedule 3 standard based on 24-hour averaging time.*

Design targets were addressed during design and construction of each facility.

Performance targets are included in each facility's Operation Manual and incorporated into the Integrated Management System adopted by York Region as part of regular monitoring, inspection and maintenance. As such, the OCS and all sub-systems (CCF, OCF, AHFs) including PHMS stations are connected to a SCADA system that is used to monitor and record a variety of process parameters, and operate the process equipment at all facilities. The SCADA for the OCS and all sub-systems is integrated with York Region's SCADA system where operators have the capability to remotely monitor and control operations from York Region's Operations Centre. Staffs are also able to monitor and control operations locally through an Operator Interface Terminal (OIT) at the OCF and AHFs. The SCADA system provides an indication of the overall performance of the OCS and facility sub-systems. For the purposes of the OMMP, only the top-tier monitoring and control parameters related to odour management and mitigation are addressed for each facility. The top tier performance monitoring for each facility are as follows:

- **Top Tier OCS Performance Monitoring:**
  The overall OCS will contain odour emissions within the SeC Trunk Sewer and convey them for treatment at the OCF. The performance monitoring for the OCS is to ensure that the pressure sensors (PHMS) within the SeC Trunk Sewer record negative pressures.

- **Top Tier OCF Performance Monitoring:**
  The OCF is the central collection point for headspace air in the SeC Trunk Sewer and provides final treatment of odours through the use of bioscrubbers/ biofilters and carbon adsorbers. The performance monitoring is mainly based on the H_2S sensors installed at various inlets and outlets of the treatment trains.

- **Top Tier CCF Performance Monitoring:**
  The top-tier parameter at the CCF is directly related with its ability to dose an optimum amount of hydrogen peroxide into the SeC Trunk Sewer to reduce the generation of odorous and corrosive compounds within the trunk sewer. The performance of CCF system will be monitored as part of the monitoring program approved by MECP (odour and ambient air) by measuring the hydrogen sulfide level in the sewage (liquid sampling), before and after the dosing of hydrogen peroxide.

- **Top Tier AHF Performance Monitoring:**
  The AHFs at Shaft 4 and at Shaft 6/7 are similar in design and purpose. The performance monitoring for both facilities are based on ensuring that air is extracted from the SeC Trunk Sewer headspace and monitoring the H_2S concentration inside the fan room.

Compliance Targets are managed via the **Odour Monitoring and Mitigation Program and predictive odour modelling.**

Odour Monitoring and Mitigation Program follows the schedule in Table 5, which is identical to the schedule adopted by the Ambient Air Monitoring program (Condition 11) ongoing from 2012. Also, the Odour Monitoring is conducted at the same sensitive receptors that are used for Ambient Air Monitoring program (Table 6). At the first annual meeting in May 2015 it was agreed with the Ministry that both programs can be combined for more effective program implementation and reporting.

Table 5: Sampling Program Monitoring Schedule

PHASE	DESCRIPTION	YEAR	TOTAL NUMBER OF SAMPLING CAMPAIGNS	SAMPLING SEASONS
1A	Pre-Operation – Ambient Air Monitoring	2012	3	Spring, Summer, Fall – complete
		2013	3	Winter, Spring, Summer - complete
1B	Start-up Operations – Ambient Air Monitoring and Air Emissions Testing	One	3	Spring, Summer, Fall (2015) - complete
2	Post Operation – Ambient Air Monitoring and Air Emissions Testing	One	3	Spring, Summer, Fall (2015) - complete
		Two	3	Spring, Summer, Fall (2016) - complete
		Three	2	Early Spring, Summer (2017) - complete
		Four	1	Summer (2018) - complete
		Five	1	Summer (2019) - complete

Table 6: Sensitive Receptor Description

RECEPTOR	UTM EASTING (M)	UTM NORTHING (M)	DESCRIPTION	DISTANCE FROM FACILITY (M)
R65	646,958	4,857,619	Residence South of OCF near Shaft 9	325
R66	646,877	4,858,371	Residence North of OCF near Shaft 9	255
R78	651,557	4,856,578	Residence East of AHF at Shaft 4	85
R79	651,366	4,856,525	Residence Southwest of AHF at Shaft 4	110
R35	648,270	4,855,617	Residence Southwest of AHF at Shaft 6/7	400
R60	648,552	4,856,553	Residence North of AHF at Shaft 6/7	630

In addition to sampling of the air at each sensitive receptor (specific wind direction and temperature limits defined for each season), the OMMP includes sampling of odour at the OCF stack, which then is used for further modelling. The results of modelling confirms if the facility is within the Compliance Targets (see Table 4 above) at each sensitive receptor, or in other words the modelling defines the limits of odour that could be measured at each sensitive receptor and might be caused by the OCF.

Progress Reporting

Following consultation with the Ministry, the annual reports for both Conditions 9 and 11 were combined into one annual report for reporting efficiencies. The first annual report was submitted six months following the commencement of operation of the SeC Trunk Sewer (July 27, 2015). In accordance with the Minister's Conditions, York Region has to submit twice annually (January 31 and July 31) an Odour Management and Mitigation Monitoring Report detailing the results of the odour assessment, maintenance and monitoring program. The Odour Management and Mitigation Monitoring reports include a performance evaluation of the technology used for odour control at the OCF.

A.4. Condition 11 – Ambient Air Monitoring Program Objectives, Targets and Commitments

The air emission targets for the operation of the SeC are tabulated in **Table 4: Performance Targets**. To verify that the operation of the SeC is meeting its designed performance in respect to air emissions, York Region developed the Ambient Air Monitoring Program (AAMP) and submitted it to the MECP on September 24, 2010.

On May 19, 2015, the first annual meeting was conducted with the MECP Regional Director and staff to discuss the status of the project as well as to clarify the requirements under Conditions 9, and 11 which includes the schedule of the sampling program. The revised sampling schedule as agreed with MECP is provided in **Table 5: Sampling Program Monitoring Schedule**.

There are six sensitive receptors, chosen for air quality monitoring and sampling. Two receptors are nearest to the OCF and two receptors nearest to each of the air handling facilities at Shaft 4 and Shaft 6/7. Please refer to **Table 6: Sensitive Receptor Description**.

The program includes establishing the current ambient odour and other contaminant concentrations as well as ambient odour and other contaminant monitoring after the construction of the OCF facilities. The sampling and analysis are conducted by a

qualified sub-consultant approved by York Region and AECOM and accepted by MECP.

Progress Reporting

The first annual report was required six months following the commencement of operation of the SeC Trunk Sewer (July 27, 2015), York Region has to submit annually (July 31) an Ambient Air Monitoring Report detailing the results of the ambient air assessment.

1. Introduction

In accordance with Condition 10 of the Minister of the Environment, Conservation and Parks (MECP)[2] Notice of Approval to Proceed with the Undertaking of the Southeast Collector Trunk Sewer (SeC) project (Minister's Conditions) this report describes the activities carried out by The Regional Municipality of York (York Region) during the 2019 calendar year (January 1, 2019 to December 31, 2019) in relation to implementing the Performance Management Plan (PMP). Condition 10, which is specific to the PMP is as follows:

10.0 Performance Management Plan

10.1 The Regional Municipality of York shall prepare, to the satisfaction of the Regional Director, a Performance Management Plan related to increased water conservation, efficiency, and inflow/infiltration reduction associated with its Water Conservation and Efficiency Strategy, and odour management aspects of the undertaking in consultation with the ministry's Central Regional Office.

10.2 The Performance Management Plan shall be provided to the SeCAC for review prior to submission of the Performance Management Plan to the Regional Director.

10.3 The Regional Municipality of York shall submit to the Regional Director the Performance Management Plan within one year of approval of the undertaking.

10.4 The Performance Management Plan shall at minimum include:

a) Annual and five year performance targets for improvements to water conservation, efficiency, reductions in inflow/infiltration, and performance targets for odour management measures particularly at the odour control facility and the air handling facilities;

b) Dates by when performance targets will be reached; and,

c) Demonstration that resources are available to achieve the performance targets within the projected timelines.

10.5 The proponent shall post the Performance Management Plan submitted in accordance with Condition 10.1 on the proponent's web site for the undertaking.

[2] *Formerly Ministry of the Environment and Climate Change (MOECC) and Ministry of the Environment (MOE)*

10.6 The Regional Municipality of York shall carry out the Performance Management Plan.

10.7 The Regional Municipality of York shall notify the Regional Director within a reasonable time if it becomes aware that it has or will not meet a performance target identified in the Performance Management Plan.

10.8 Within three months of notifying the Regional Director that a performance target for water conservation, efficiency or inflow/infiltration reduction has not or will not be met, the Regional Municipality of York shall submit to the satisfaction of the Regional Director a plan that outlines enhanced initiatives that will be implemented to meet the targets, and the resources available.

10.9 Within three months of notifying the Regional Director that a performance target for odour measures has not been met, or within such other time as required by the Regional Director, the Regional Municipality of York shall submit to the satisfaction of the Regional Director a plan to enhance or remediate its odour control measures, and the resources available.

10.10 The proponent shall prepare and submit annually to the Director, the Regional Director and SeCAC (if applicable), a Performance Management Monitoring Report beginning one year of the Performance Management Plan being finalized.

10.11 The proponent shall post the Performance Management Monitoring Report submitted in accordance with Condition 10.10 on the proponent's web site for the undertaking.

The structure of this report is set up to follow the above Condition 10 for easy review of the document. The report provides an overview of the project activities and progress achieved during 2019 calendar year.

2. Conditions 10.1 through 10.5

In accordance with Minister's Conditions 10.1 – 10.5, York Region submitted the PMP to the MECP on March 31, 2011. The MECP provided notice of the Director's satisfaction with the PMP on October 14, 2011.

3. Condition 10.6

Performance Management Plan (Implementation)

Condition 10.6 of the Minister's Conditions directs York Region to carry out the PMP. This section describes the progress on implementation of the PMP with respect to the following programs:

Part I: .....Water Conservation and Efficiency
Part II: ....Inflow and Infiltration Reduction
Part III: ...Odour Management and Mitigation, and Ambient Air Monitoring

3.1 Part I: Water Conservation and Efficiency Implementation Progress

York Region developed the Long Term Water Conservation Strategy (LTWCS) to satisfy part of Condition 8 of the Minister's Conditions. The first LTWCS report was submitted to the MECP on March 31, 2011 and the Director indicated satisfaction with the LTWCS to York Region on October 14, 2011. The updated strategy was submitted on March 31, 2016 and the Director indicated satisfaction on May 13, 2016.

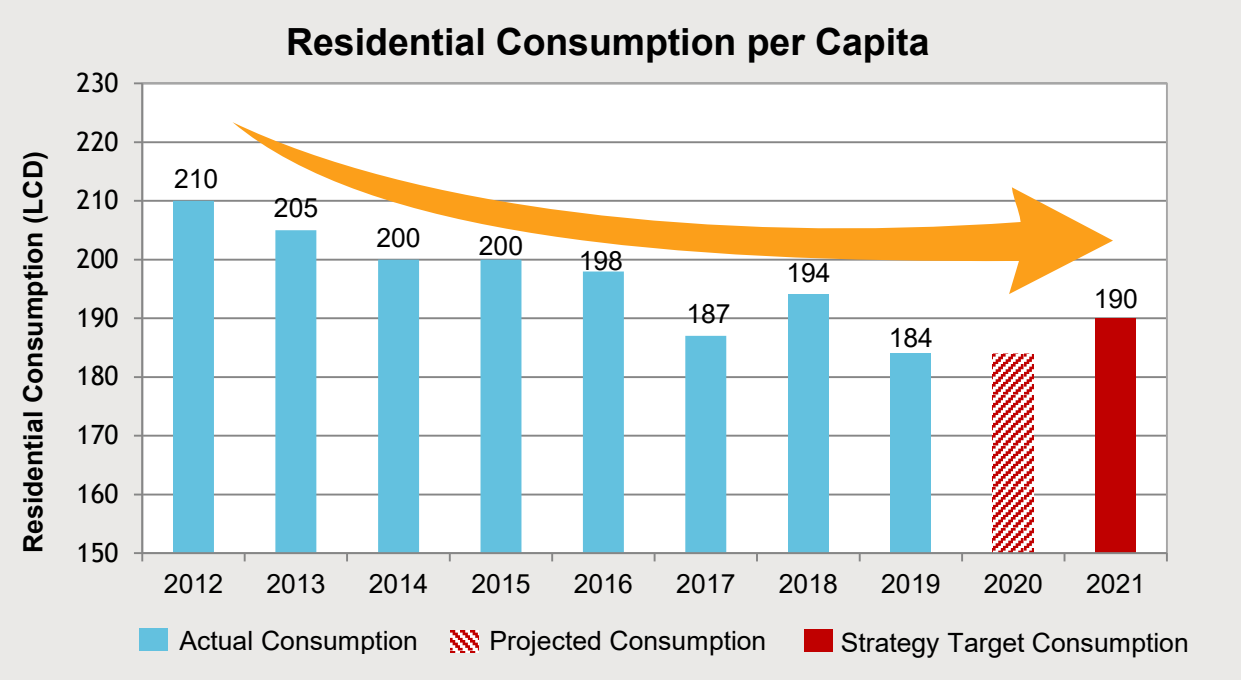
A separate annual progress report on implementation of the LTWCS for 2019 will be submitted to the MECP by March 31, 2020.

On July 4, 2019, the Central Region Director provided comments on and indicated satisfaction with the LTWCS Annual Report dated March 31, 2019; acknowledging York Region's progress on the implementation of the LTWCS . The letter from the MECP also noted that the report clearly identified how the average daily water demand in York Region is decreasing even though the population in the Region is increasing.

The Region has initiated its 2021 Long Term Water Conservation Strategy Update. The objective of this update is to refine the Region's long term water conservation goals and targets, develop an updated strategy, and lay out a framework for implementation of the updated strategy. It will review the attainability of the Region's existing residential water consumption target of 150 litres per capita per day by 2051, re-evaluate existing KPIs and develop new KPIs for monitoring and tracking success of the recommended water conservation programming, as needed. The 2021 Strategy Update will also evaluate the feasibility and level of effort required for the various programs in addition to their effectiveness.

York Region has a rapidly expanding population, with growth projected to 2041. This increasing growth puts pressure on the water supply system. Recognizing the need for smart water management, York Region has integrated water conservation into its sustainable growth plans and policies. Since implementing its Long Term Water Supply Master Plan in 1998, York Region has achieved overall savings of over 27 million liters per day (MLD). York Region's current LTWCS envisions a residential consumption rate of 150 litres per capita per day (LCD) by the year 2051, with a 2019 residential consumption rate of 184 LCD as shown in **Figure 2: Residential Daily Consumption per Capita (LCD)**. To achieve its 2019 successes, the Region continued to focus on nine program areas; an overview of the Region's 2019 programs, activities, and achievements are provided in Table 7.

Figure 2[3]: Residential Daily Consumption per Capita (LCD)



[3] *The 2020 LCD was estimated by using 2020 projected weather forecasts, data was obtained from the following sources:*
http://climate-scenarios.canada.ca/?page=cansips-prob,
https://weather.gc.ca/saisons/image_e.html?img=s234pfe1t_cal&bc=prob
https://www.almanac.com/weather/longrange/region/ca/3.
The 2021 LCD is based on the 2016 Long Term Water Conservation Strategy targets and timelines

Table 7: 2019 Long Term Water Conservation Strategy Achievements

PROGRAM COMPONENTS	PROGRAM SUMMARY	2019 PROGRESS UPDATE
1. *PROGRAMS FOR ICI HIGH WATER USERS*		
ICI Capacity Buyback Incentive Program	York Region offers water audits at no cost to high water using ICI facilities. These water audits are aimed at helping ICI facilities within York Region reduce their water consumption which can be high in many cases. Offering an incentive program and including water audit services can assist businesses with the cost of implementing identified water savings opportunities. Facilities which participated in the water audit within the last three years will qualify for the ICI Capacity Buyback incentive. Once eligible retrofit(s) are completed at the facility, York Region or its agent will conduct a verification audit to verify post-retrofit water savings. York Region will issue a one-time incentive of up to 50% of the cost to a maximum of $50,000.	Conducted seven ICI water audits in 2019; 73 cumulative audits to date (2009-2019). The 2021 Strategy Update will evaluate the level of effort required for the program in addition to program effectiveness. Demonstrating leadership in water efficiency, York Region won the 2019 OWWA Award of Excellence, Public Sector & Utilities for its ICI Capacity Buyback Incentive Program. This award recognizes outstanding initiatives in water efficiency in both the public and private sector. In 2018 York Region conducted a water audit at the Regional administrative building, and recommended water efficiency fixtures replacement for washroom renovations. In 2019 the design for the renovations was finalized; implementation will start in 2020. Completed three verification audits in 2019; 13 cumulative audits to date (2009-2019).
2. *PROGRAMS FOR SMALL TO MEDIUM ICI FACILITIES*		
Water Efficiency	The Water Efficiency Equipment Replacement	In 2019, the Region received one application from a multi-residential property for the

Equipment Replacement Incentives	Incentives Program was created to target small to medium ICI facilities and multi-unit residential buildings. This program offers financial incentives for replacing inefficient equipment with new water-efficient models.	replacement of 91 inefficient toilets to efficient 3.0 litres per flush models.
3. OUTDOOR PEAK DEMAND REDUCTION		
Water Smart Irrigation Professionals (WSIP)	To help reduce peak demands, York Region in collaboration with the Region of Peel and Landscape Ontario developed the Water Smart Irrigation Program (WSIP). This specialized training and certification program teaches irrigation contractors to conduct "water smart" irrigation system efficiency and maintenance services to clients in the Region of Peel, and York Region.	Completed 2019 training with 19 individual attendees from 12 irrigation companies. There are now 40 WSIP companies and 89 individuals certified to date in York Region and the Region of Peel. In 2019, WSIP contractors completed 126 assessments; savings of over 29,000 m^3 was achieved through schedule changes and controller upgrades. To date, 257 assessments have been completed (2015-2019). Demonstrating the success of the WSIP program, York Region in partnership with the Region of Peel won the 2019 Trillium Award at Landscape Ontario's Awards of Excellence Ceremony for its outstanding leadership and contribution to the irrigation sector through the development and delivery of the WSIP program. York Region in partnership with the Region of Peel also won the Smart Water Application Technologies, Outstanding Industry Partnership Award, which recognizes the efforts of programs or campaigns to increase partnerships with landscape professionals, irrigation contractors and other professionals with irrigation responsibilities to promote outdoor water conservation.
Fusion Gardening®	The Fusion program is another outdoor peak demand reduction program. Fusion Gardening® is a style of landscape design that creates beautiful	York Region worked with the Region of Peel and Landscape Ontario on a feature garden at Canada Blooms (March 2019) to show various low impact development features and their positive aesthetics. More than 5,500 people visited the demo garden. York Region received two awards for the Fusion demo garden at

	outdoor spaces while reducing watering needs. Fusion gardens include many different elements and concepts such as choosing the right plant for the right place, efficient irrigation systems, permeable pavement, rainwater harvesting and more.	Canada Blooms; Best Overall Creativity in Garden Design and Outstanding Educational Garden for Students. A total of 4 “Fusion Gardening” related social media posts and stories engaged more than 5,000 residents.
Fusion Landscape Professional (FLP)	The Fusion Landscape Professional Program (FLP) aims to transform the market by making Fusion landscapes an industry standard. This training and certification program was developed in partnership with Landscape Ontario and the Region of Peel. It aims to facilitate communication and collaboration between professionals involved in the design, installation, maintenance and irrigation of Fusion landscapes as part of the Fusion program.	Completed 2019 training with 19 attendees. There are now 34 FLP companies and 44 individuals certified to date in York Region and the Region of Peel. In 2019, York Region received two incentive applications; one for an installation of a Fusion garden and one for a design.
4. EDUCATION AND OUTREACH		
Water System, Conservation and Efficiency Outreach	Ongoing education and outreach aims to highlight the exemplary work York Region is doing to keep the water system one of the best in its class. With the continued goal of raising public awareness about water sources, water protection, water system integrity and water	Over 27,000 views of our various water system videos published on our YouTube channel , https://www.youtube.com/user/YorkRegionGovt. More than 900 visits to york.ca/waterplan where York Region’s water messaging is published. More than 300 visits to york.ca/longtermwater which provides the links to the 2011 and 2016 LTWCS strategies and annual progress reports. 2,205 elementary and 208 secondary students and 361 teacher/supervisors attended the York Children’s Water Festival. Three youth education events, 315 students

<table>
<tr><td></td><td>conservation. This showcases the value of water while highlighting the processes, people and infrastructure behind the scenes of our clean, safe, reliable, and affordable drinking water.</td><td>engaged.
14 public events with 3,150 people engaged.
165 participants in the 2021 Water and Wastewater Master Plan Update in-person Open Houses where York Region’s water messaging was available in multiple mediums. There were 713 viewings online version of Open House.
Seven presentations delivered at the New Canadian ‘Welcome Centres’ with a total of 197 participants. Presentations featured significant water system messaging.
Five articles published on various aspects of the municipal water infrastructure and supply system.</td></tr>
<tr><td colspan="3">5. NON-REVENUE WATER</td></tr>
<tr><td>IWA Water Audit/Balance</td><td>Annually, each local municipality completes a water balance review using the IWA/AWWA Water Audit software tool and submits it to the Region.</td><td>Received all municipal IWA audits for 2018. The reported levels of non-revenue water are logged and tracked by the Region.
<table><tr><th>Municipality</th><th>NRW %*</th><th>ILI*</th></tr><tr><td>Aurora</td><td>11.1</td><td>1.29</td></tr><tr><td>East Gwillimbury</td><td>23.9</td><td>1.65</td></tr><tr><td>Georgina</td><td>20.3</td><td>1.98</td></tr><tr><td>King</td><td>31.8</td><td>3.72</td></tr><tr><td>Markham</td><td>10.0</td><td>1.27</td></tr><tr><td>Newmarket</td><td>21.5</td><td>2.86</td></tr><tr><td>Richmond Hill</td><td>13.6</td><td>2.08</td></tr><tr><td>Vaughan</td><td>5.2</td><td>0.37</td></tr><tr><td>Whitchurch-Stouffville</td><td>14.0</td><td>1.54</td></tr></table>
*Non-revenue water percentages and the Infrastructure Leakage Index are reported by each municipality in the 2018 annual IWA/AWWA water audit summary and provided to the Region; the Region does not QA/QC the data provided.</td></tr>
<tr><td>Non-Revenue Water Management Program</td><td>Non-revenue water is defined as water that is not billable to the end user, and is comprised of losses (such as metering inaccuracies,</td><td>In 2018, HydraTek & Associates (HydraTek) approached the Region to partner in and support an IESO Conservation Fund Project: Reducing Municipal Water Loss and Energy Consumption through Pressure Management. The project involves the deployment of a mobile</td></tr>
</table>

	unauthorized consumption/water theft, data handling errors, and true water system leakage) and unbilled authorized consumption (for example, usage of water for infrastructure operation and maintenance such as flushing for water quality purposes and for emergency services, such as fire flow). The Region and its local municipalities have developed and implemented strategies to help minimize non-revenue water such as conducting leak detection inspections on their water infrastructure.	testing unit (MTU) across 20 district metered area (DMA) sites in several municipalities across Ontario. In 2019, York Region began work with HydraTek on the mobile flow metering and pressure regulating testing pilot. Three of York Region's local municipalities have participated to date, with one leak detection and remediation success story. Through the mobile testing at this site, a potential leak was suspected. Subsequently, the municipality conducted a leak survey and a significant leak was identified and repaired. Mobile testing was deployed again, post-leak repair and results showed an annual water savings of 139,000 m^3 (approximately $426,000) with other inherent savings related to energy consumption and reduction of GHG emissions. From the inception of the program in February of 2019, the MTU has been deployed at 7 of the project's 20 allocated DMA sites across Ontario. From the testing results, the overall concept has proven to be successful. Continued tracking both Regional and local municipal non-revenue water events. Issued quarterly reports to municipalities. In 2019 approximately 5km of York Region's Ductile Iron (DI) watermains were inspected using correlators/ground microphones; no leaks were detected. In 2017 and 2018 approximately 5km each year of DI watermains were inspected using correlators/ground microphones; no leaks were detected. Throughout 2016-2019 York Region undertook a valve chamber inspection program where every watermain and forcemain chamber was inspected. Several leaks were found and repaired throughout the years.
6. *RESIDENTIAL NEW DEVELOPMENT*		
Sustainable Development through	LEED® aims to reduce potable water demand within high density	To date, 13 buildings totaling 2,561 apartment units have been constructed through the LEED® program. An additional 4 buildings (total 835

LEED® (high-rise)	residential buildings. The Region has specific criteria that must be met in addition to the LEED® Canada mandatory requirements. Criteria include no potable water used for irrigation, an overall 40% reduction in water consumption, and WaterSense® plumbing fixtures installation.	units) enrolled in the LEED program are not yet constructed. A review of the LEED® program is underway as a continuous improvement initiative based on stakeholder feedback, changes in policies, integration with other initiatives and availability of monitoring data.
Servicing Incentive Program (SIP) (low-rise)	The Servicing Incentive Program aims to reduce water demands in new low-rise (up to three storeys) construction. The program allows developers to obtain additional capacity assignment through proposed implementation of new water efficiency control measures. This includes the use of high-efficiency plumbing fixtures and hot water delivery systems which are either “roughed-in” (installation of all the necessary wiring and piping for future connection) or fully connected.	To date, 2,556 single detached equivalent (SDE) units have either been Registered or Draft Approved through the Servicing Incentive Program. A review of the Servicing Incentive Program is underway as a continuous improvement initiative based on stakeholder feedback, changes in policies, integration with other initiatives and availability of monitoring data.
Servicing Development Incentive Program (SDIP)	Specific to East Gwillimbury, the Servicing Development Incentive Program allows developers to obtain additional capacity assignment through proposed implementation of new	To date, 6,002 single detached equivalent units have either been Registered or Draft Approved through the Servicing Development Incentive Program.

	water efficiency and inflow and infiltration control measures. The Servicing Development Incentive Program is broken out into ICI and residential; ICI criteria include plumbing fixtures, cooling equipment, landscaping, food preparation, swimming pools/non-process and ice rinks. Residential criteria include water efficient plumbing fixtures which includes an on-demand hot water delivery system and landscaping/outdoor measures.	
7. WATER REUSE STRATEGY		
Water Reuse	Development and research of water reuse applications. This includes a Water Reuse Research Demonstration project which began in 2017 and will be completed in 2020.	The second phase of the Water Reuse Research Demonstration Project was completed in 2019, this included preliminary evaluation of first growing season results and the completion of a second growing season. A workshop was held with stakeholders including MECP staff in May 2019 to review preliminary findings. Preliminary findings indicate good plant and soil health in the test plot with no significant differences between crop quality between test and control plots. MECP provided in-kind laboratory analysis for pharmaceuticals, personal care products and per/polyfluoroalkyl substances in irrigation and ground water for both growing seasons. The project will be completed in 2020 with a final stakeholder workshop. York Region is also developing an economic impact assessment for water reuse in 2020.
	To encourage implementation of water reuse in the ICI Sector,	Six reuse opportunities have been implemented at ICI facilities since 2012; 58 ML/year cumulative water savings to date.

	the Region offers a higher incentive rate through the ICI Capacity Buyback Incentive Program.	
8. *COLLABORATION AND ADVOCACY*		
Advocacy	York Region continuously advocates public policy to support its ability to provide sustainable water, wastewater, forestry and waste management services for York Region's growing population.	Conducted two Water Conservation Advisory Committee meetings. This committee is an advisory body that consists of a variety of stakeholders including the MECP, local municipalities, ICI businesses, school boards, TRCA, and LSRCA.
Stakeholder Collaboration	York Region continues to explore collaboration opportunities with other regions on water conservation programs and initiatives. York Region has partnered with Conservation Authorities on environmental programs covering multiple sectors and subjects.	Collaborated with the Region of Peel for WSIP and FLP training with Landscape Ontario. To help promote the benefits of Fusion to landscape professionals and to residents and businesses, York Region collaborated with the Toronto and Region Conservation Authority (TRCA) to develop a quantitative tool for estimating associated storm water runoff volume reductions, water savings, and greenhouse gas emission reductions. Development was completed December 2019. The Region also attended the Partners in Project Green Forum to discuss water conservation initiatives and partnership opportunities. York Region is also collaborating with the TRCA on their Sustainable Neighbourhood Action Program (SNAP). SNAP aims to accelerate the creation of sustainable neighbourhoods in older urban areas by providing a neighbourhood-based solution for achieving greater impact in urban renewal and climate action.
9. *BIG DATA ANALYTICS*		

Water Consumption Database (WCD)	The Water Consumption Database (WCD) is an application which collects and analyzes all local municipal water billing consumption.	Collected municipal billing data for 2019 which was uploaded into the Region's WCD. Using this data, 2019 water consumption per capita per day was generated; the Region's LCD in 2019 was 184. Raw municipal billing data is provided by each local municipality to the Region; preliminary QA/QC is conducted by the WCD using a set of business rules. While the WCD helps improve accuracy and consistency in the analysis of water billing data, there are still inaccuracies. York Region will continue to work with the local municipalities to improve data quality. Generated water consumption heat maps to help target future programming.
Energy Reduction	In recognition of the synergy between water and energy conservation, energy savings are tracked as a result of water conservation initiatives.	Tracked water and energy savings under the corporate Energy Conservation and Demand Management Plan (ECDMP). Approximately 161,125 ekWh/year has been saved in 2019 from water conservation programs.
Greenhouse Gas Reduction	As a result of water and energy use reductions, greenhouse gas emissions are tracked to give an overall picture of the broader benefits of water conservation.	Tracked equivalent greenhouse gas emissions reduction from water saved under corporate ECDMP. Approximately 6.61 tons CO_2e savings in 2019.

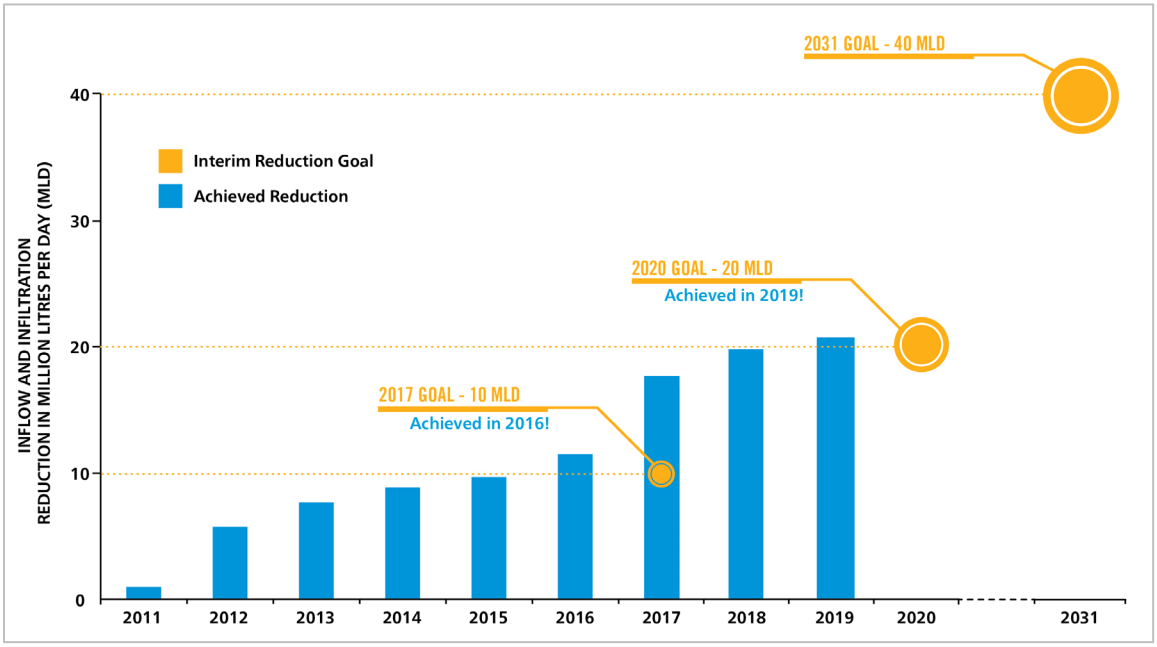
3.2 Part II: Inflow and Infiltration Reduction Implementation Progress

York Region developed the Inflow and Infiltration Reduction Strategy (I/I Reduction Strategy) to satisfy part of Condition 8 of the Minister's Conditions. The I/I Reduction Strategy was submitted to the MECP on March 31, 2011 and the Director provided a letter on October 14, 2011 indicating satisfaction with the I/I Reduction Strategy.
In 2016, the Region submitted an Updated Inflow and Infiltration Reduction Strategy in accordance with Condition 8.10 of the SEC IEA which documented the lessons learned from implementation of the 2011 Strategy and the results of the best-in-class review, updating a suite of measures and programs.

On July 4, 2019, the Province provided written comments to the Region acknowledging their satisfaction with the Region's 2018 Long Term Water Conservation Strategy (LTWCS) and Inflow and Infiltration Reduction Strategy Annual Reports submissions dated March 31, 2019.

Through a close partnership with its nine local municipalities and the development community in 2019, the Region continued to demonstrate leadership in inflow and infiltration reduction. Reductions of 1.07 million litres per day (MLD) of inflow and infiltration were achieved in the York Durham Sewage System (YDSS), bringing the overall total reduction since 2011 to 20.53 MLD (Figure 3). This represents 51.3 per cent of the 2031 reduction target of 40 MLD and exceeds the 2020 interim reduction target of 50 per cent (or 20 MLD) one year ahead of schedule.

Figure 3: Inflow and Infiltration Reduction Progress Chart and Reduction Goals



Over the course of 2019, the Region continued with detailed analysis work for both dry and wet weather conditions through quantifying Base-Infiltration (BI) and Rainfall Derived Inflow and Infiltration (RDII). Monitoring areas were prioritized for further investigation and/or rehabilitation based on a number of key performance indicators (KPI's) and thresholds developed in 2016. High impact rainfall events were investigated in 2019 for variability in frequency and volume as well as intensity. Colour-coded inflow and infiltration priority maps have been created for these thresholds and events and priority maps were shared with each of the nine local municipalities to help inform their remedial work plans for 2020. Furthermore, the Region continued its work including flow

and rainfall monitoring, sanitary sewer evaluation surveys (SSES), and various rehabilitation projects and programs. A number of key initiatives were initiated or continued in 2019 and are briefly summarized in Table 8.Further detailed description of these initiatives and the corresponding achievements and results are provided in the 2019 Annual Report: Inflow and Infiltration Reduction Activities and Accomplishments. Table 9-10.

Table 8: Brief Summary of Program Initiatives and Achievements Conducted by the Region in 2019

FLOW AND RAINFALL MONITORING AND ANALYSIS	The Flow and Rainfall Monitoring Program was developed in 2012 to meet various implementation needs; it consists of different levels of monitoring (audit basin, mini-basin and micro-basin – in a decreasing size order) depending on the monitoring area, rainfall response and monitoring duration. Monitoring in all levels continued in 2019 and new locations were installed to meet the program's needs and track inflow and infiltration reductions. Detailed analyses of wet and dry conditions were completed to evaluate the impact of rainfall storms and change in groundwater conditions that occurred in 2019 and in comparison to previous years. Inflow and infiltration priority mapping for each of the nine local municipalities were updated with the data set from 2019 to evaluate system performance and categorize high, medium and low priority areas.
INFLOW AND INFILTRATION STUDIES, INVESTIGATIONS & REHABILITATION	Reduction of inflow and infiltration from sources originating on private properties (e.g. downspouts, sump pumps, weeping tiles etc.) has been identified as a key activity to achieve the 2031 targets of the Region's Inflow and Infiltration Reduction Strategy. In 2019, the Region rolled out its first private side inflow and infiltration reduction pilot project in two sanitary sewer catchment areas in the Towns of Aurora and Newmarket and completed the first two phases of the program including communication with residents and internal and external sanitary sewer evaluation studies on private properties. Pick-holes in selected maintenance hole covers in three sanitary sewer catchment areas were plugged using permanent bolts.
DESIGN AND COMMISSIONING	The Region believes in the adoption of best practices for the management of inflow and infiltration in new developments as a proactive and cost effective means of avoiding future expenditures on reducing inflow and infiltration and to promote sustainable growth and development.

	In 2019, the Region continued working with the local municipalities and industry in an effort to develop best management practices and standards to address inflow and infiltration in new Development. The Region released a "*White Paper Inflow and Infiltration in New Development, a York Region Perspective*" in September of 2019 to the development community and the industry. In addition, two new development applications achieved conformity with lower inflow and infiltration allowance rates as part of the servicing incentive program.
INNOVATION AND ADAPTATION	A dashboard was developed using four years of flow and rainfall monitoring datasets and machine-learning model. A pilot tested for two study areas resulted in over 90 per cent accuracy in RDII analysis and 78 per cent decrease in staff time. In 2020, the Region will be addressing the benefits, needs and requirements for scaling-up the model to capture the whole Region. Model won the 2019 Excellence in Innovation in Civil Engineering – Regional Award for its proactive approach to managing I/I.

Table 9: Brief Summary of Program Initiatives and Achievements Conducted by the Local Municipalities in 2019

FLOW AND RAINFALL MONITORING	Sanitary sewer flow and rainfall monitoring programs lead by local municipalities such as the Cities of Markham and Vaughan continued in 2019. These local municipalities continued collecting flow and rainfall data from a number of short-term monitoring locations installed in their sanitary sewer system. Monitoring data is used to inform local initiatives and support the Region's ongoing flow monitoring program and Strategy implementation by targeting inflow and infiltration sources within the Region's larger monitoring area.
SEWER SYSTEM INSPECTION AND REHABLITATION	The rehabilitation and inspection of sanitary sewer mainlines, laterals and maintenance holes in the local municipal sanitary sewer system continued in 2019 within the nine local municipalities.
PRIVATE SIDE PROGRAMS	The Town of Newmarket and the Cities of Markham and Vaughan started/continued offering subsidy programs for sanitary backwater valve installations. The City of Markham continued with its Downspout Disconnection program on private properties aiming to reduce the risk of basement flooding and environmental concerns caused by the direct connection of downspouts to the sanitary sewer system. The City of Markham also continued with its Pilot Private Plumbing Protection Rebate Program in 2019 to encourage home owners to install basement flooding protection devices on residential properties, with

	financial assistance from the City.

Table 10: Brief Summary of Program Initiatives and Achievements Conducted by Public-Private Partnership (P3) in 2019

SERVICING INCENTIVE PROGRAM (SIP) AND SUSTAINABLE DEVELOPMENT INCENTIVE PROGRAM (SDIP)	Initiatives related to reducing inflow and infiltration in new developments such as the Leadership in Energy and Environmental Design (LEED) Incentive Program, Servicing Incentive Program (SIP) and Sustainable Development Incentive Program (SDIP) are ongoing. These programs include requirements for construction of new sanitary sewers and the installation of flow meters to monitor inflow and infiltration in new developments. In 2019, flow monitoring for new development in r local municipalities participating in SIP and SDIP programs were completed. Data collected will be used in 2020 to track accomplishments in meeting tighter allowable inflow and infiltration limits required by these programs.
DEVELOPER FUNDED INFLOW AND INFILTRATION REDUCTION PROJECTS	Since 2010, York Region, select local municipalities and private developers have been working in a partnership on Developer-funded Inflow and Infiltration Reduction Projects. Pilot project agreements executed since the start of the Public-Private Partnership (P3) are at varying stages of completion, from investigation and evaluation to monitoring, verification and capacity assignment.

3.3 Part III: Odour Management and Mitigation, and Ambient Air Monitoring Implementation Progress

3.3.1 2019 Odour Management and Mitigation Plan Progress

The Phase 2 Post-Operation Year Five sampling consists of Summer 2019 sampling, which was completed in 2019. With completion of the last sampling campaign this program has been implemented over the last seven years (2012-2019) and is now complete. The sampling program included sampling for odour, hydrogen sulphide (H_2S), ammonia (NH_3), and total reduced sulphur (TRS) compounds at the OCF stack in addition to sampling at the sensitive receptors. The updated sampling schedule is provided in Table 11 below.

Table 11: Updated Sampling Schedule

PHASE	DESCRIPTION	YEAR	TOTAL NUMBER OF SAMPLING CAMPAIGNS	SAMPLING SEASONS	STATUS
1a	Pre-Operation – Ambient Air Monitoring	2012	3	Spring, Summer, Fall	Complete
		2013	3	Winter, Spring, Summer	Complete
1b	Start-up Operations – Ambient Air Monitoring and Air Emissions Testing	One	3	Spring, Summer, Fall (2015)	Complete
2	Post Operation – Ambient Air Monitoring and Air Emissions Testing	One	3	Spring, Summer, Fall (2015)	Complete
		Two	3	Spring, Summer, Fall (2016)	Complete
		Three	2	Early Spring, Summer (2017)	Complete
		Four	1	Summer (2018)	Complete
		Five	1	Summer (2019)	Complete

Results of the dispersion modelling for Summer 2019 showed the following:

- Based on five-year meteorological data:
  - Odour concentrations from 0.01 OU to 0.23 OU (1% to 23% of the internal MECP guidance level of 1 OU);
  - NH3 concentration is 0.22 µg/m3 (0.22%of the limit);
  - TRS Compounds concentration based on 24-hour averaging period is <0.31 µg/m3 (<4.4% of the limit); and
  - TRS Compounds concentration based on 10-minute averaging period is <0.99 µg/m3 (<7.6% of the limit).

- The dispersion modelling results based on daily meteorological data for the Summer 2019 sampling are as follows:
  - Odour concentrations are 0 OU at all sensitive receptor locations (0% of the internal MECP guidance level of 1 OU).

Based on the results of the dispersion modelling for the Phase 2 Year Five sampling program, the modelled point of impingement (POI) concentration of each contaminant emitted from the OCF stack is well below the corresponding MECP criterion. For odour, dispersion modelling showed that the predicted POI is below the MECP internal guidance level of 1 OU. Details of the analysis were provided as part of the Condition 9 Semi-Annual Report submitted in December, 2019.

As noted in previous reports, the daily meteorological data for AERMOD version 16216 for Summer 2017 and 2018 was requested from the MECP but was not received in time to be included in previous semi-annual reports. The requested data for Summer 2017

and 2018 was received in March 2019 and therefore the results were included in the December 2019 semi-annual report.

- The dispersion modelling results based on daily meteorological data for Summer 2017 and 2018 sampling was as follows:
  - Odour concentrations are 0 OU at all sensitive receptor locations (0% of the internal MECP guidance level of 1 OU).

In 2017 in discussions with the MECP it was decided to move the meetings under Condition 9.3 (e) to quarterly liaison senior management meetings between Ministry and the Region staff. As such, there was no Director's meeting required in 2019.

3.3.2 2019 Ambient Air Monitoring and Reporting Plan Progress

The Phase 2 Post-Construction Year Five sampling which covers Summer 2019 was completed in 2019. With completion of the last sampling campaign this program has been implemented over last seven years (2012-2019) and is now complete. This sampling program included sampling for odour, H_2S, ammonia, and TRS compounds at the OCF stack in addition to sampling at the sensitive receptors.

Table 12: Phase 2 Year Five Summary of Odour Occurrences Above 1 OU below summarizes the results of ambient sampling at the sensitive receptors.

Table 12: Phase 2 Year Five Summary of Odour Occurrences Above 1 OU

RECEPTOR	DESCRIPTION	NUMBER OF OCCURRENCES > 1 OU		
		UPWIND	*DOWNWIND*	*TOTAL*
R65	Residence – South of OCF near Shaft 9	0	0	0
R66	Residence – North of OCF near Shaft 9	0	0	0
R78	Residence – East of AHF at Shaft 4	0	0	0
R79	Residence – Southwest of AHF at Shaft 4	0	0	0
R35	Residence – Southwest of AHF at Shaft 6/7	0	0	0
R60	Residence – North of AHF at Shaft 6/7	0	0	0
Total Occurrences		**0**	**0**	**0**
Total Number of Samples		**6***	**6****	**12*****
Percent of the number of Occurrences > 1 OU		**0%**	**0%**	**0%**

Notes: * *Calculated against six upwind receptor samples.*
** *Calculated against six downwind receptor samples.*
*** *Calculated against 12 total upwind and downwind receptor samples.*

As shown in Table 12, there were 0 occurrences out of 12 total samples where the odour concentrations were measured above 1 OU. The results of the Phase 2 Post-Construction Year Five sampling campaign for other contaminants showed:

- Ammonia concentrations measured from 0.043 to 0.156 ppm; and
- H_2S and TRS compounds concentrations measured below the instrument's detection limit of 0.01 ppm.

4. Conditions 10.7 through 10.9

In accordance with Minister's Conditions 10.7-10.9, York Region must notify the Regional Director within a reasonable time if it becomes aware that it has or will not meet a performance target identified in the PMP and, in the event this notification is required, York Region must take actions related to meeting the performance targets. No such situation occurred in 2019.

5. Condition 10.10

This Report was prepared to satisfy Minister's Condition 10.10 requiring the proponents to prepare, and submit annually, Annual Performance Management Monitoring Reports beginning one year after the PMP program was finalized. This Report was prepared to summarize the progress achieved in relation to the PMP during the 2019 calendar year.

6. Condition 10.11

In accordance with Minister's Condition 10.11, this Report must be posted on the proponent's website for the undertaking. The Report will be uploaded to the Region's website (York.ca) by April 1, 2020.

7. Statement of Accommodation

Accessible formats or communication supports for this report are available upon request. Please contact Environmental Services Reception Desk at 1-877-464-9675 ext. 73000.