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# **ANNUAL COMPLIANCE MONITORING REPORT**

## **(PORT HOPE PROJECT) ANNUAL COMPLIANCE MONITORING REPORT FOR 2020**

**UNDER LICENCE (WNSL-W1-  
2310.02/2022)**

**4501-508760-ACMR-003**

**Revision 0**

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**REVISION HISTORY**

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## EXECUTIVE SUMMARY

This annual compliance monitoring report for the 2020 calendar year has been prepared as per licence condition 2.3 of the Port Hope Long-Term Low-Level Radioactive Waste Management Project Licence WNSL-W1-2310.01/2022 [1] and Section 3.2.3 (e.) of the Port Hope Licence Conditions Handbook [2] as a summary report of annual compliance monitoring and operational performance.

The Port Hope Long-Term Low-Level Radioactive Waste Management Project is part of the larger Port Hope Area Initiative (PHAI). The PHAI is a community-based project designed to develop and implement a safe, local, long-term management solution for historic low-level radioactive waste (LLRW) within the Port Hope and Clarington municipalities. The PHAI is defined by *An Agreement for the Cleanup and Long-Term Safe Management of Low-Level Radioactive Waste Situated in The Town of Port Hope, The Township of Hope and the Municipality of Clarington*, [3] which took effect on 2001 March 29, between the Government of Canada and the municipalities of Port Hope and Clarington for the management of the LLRW within each of the communities. Canadian Nuclear Laboratories (CNL) is responsible for the direction and execution of the PHAI in compliance with the Legal Agreement [3], licences and Environmental Assessment decisions. CNL has overall responsibility for managing the PHAI on behalf of Atomic Energy of Canada Limited, a federal Crown corporation.

This report provides site-specific information to supplement information in the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* [4], which provides corporate updates to 14 Safety and Control Areas as they are applied across all CNL. Performance highlights for 2020 are outlined below.

### *Management system*

- CNL completed all required reporting as outlined in section 3.2.3, PHP Licence Conditions Handbook [2].
- In 2020, an annual Self-Assessment Plan for FY 2020/2021 stemming from the CNL Integrated Assessment Plan, was developed for all HWP MO sites.
- There was 1 external audit conducted by SAI Global for the maintenance of CNL's ISO 9001:2015 certification specific to the PHP in 2020.

### *Human performance management*

- A wide range of mandatory and other job-specific training activities were carried out in 2020 to ensure that all PHP employees and contractors acquired mandated training (including refresher training) as appropriate for their duties to ensure the safe operation of the PHP facility and to conduct work under the PHP Licence [1].
- The Curriculum Review Committee continued to meet throughout 2020 to support the PHAI's Systematic Approach to Training program.

### *Facility and Equipment*

- PH LTWMF: In 2020 work continued to support construction of temporary onsite infrastructure and support facilities including Cell 2a and 2b construction and a base-liner system for the mound; partial completion of additional layers of subgrade, Compacted Clay Layer, and an additional layer of winter protection was completed in 2020 summer; continued excavation of the 'Future Brush Area to be

Cleared'; continued placement of waste from other PHP sites into the PH LTWMF; initiated final design profile shaping verification of cell readiness for capping in cell 3.

- **Small Scale Sites:** characterization and design of properties and roads continued throughout 2020; progress included work to confirm 4602 properties with external lots have been characterized and 997 have been identified with LLRW; 4397 properties with interior spaces have been characterized and 196 have been identified with LLRW; secondary delineation activities for Road Allowances were completed. Characterization of internal properties was put on hold during 2020 due to COVID-19 Pandemic restrictions. Excavations of exterior historic LLRW was completed at 17 properties, 10 properties of which have completed backfill. Interior remediation was completed at 2 properties. 141 exterior property designs and 18 RA designs were completed with 278 exterior property designs and 77 RA designs in the queue resulting in an increase in design production despite limitations associated with COVID-19 Pandemic restrictions.
- **Temporary Storage Sites:** No Temporary Storage Site remediation activities were completed in 2020 as all Temporary Storage Sites have proceeded through the remediation phase.
- **Waterfront Area:** the Waterworks East site had all contaminated soils removed and the contractor removed as much contaminated sediment from the buried tanks as was feasibly safe; a special circumstance application for the sediments remaining in the tanks and for the tank walls was initiated and is in progress; Remediation work began at the 95 Mill Street site in 2020 October; A re-characterization on the CN/CP Viaducts was developed to provide more accurate site data prior to remediation; An updated characterization program was executed at the Strachan Street Ravine site; The contractor for the Port Hope Harbour and Centre Pier remediation continued preparation for production dredging operations for a 2020 spring season start-up however, in 2020 March, work was put on hold due to COVID-19 Pandemic restrictions and the site was held in a min-safe state until 2020 June. CNL maintained the site in a min-safe state until 2020 October to support transition to the new contractor's resumption of preparation work for production dredging and improvements to the site Portable Water Treatment System; CNL applied a special circumstance to the outer harbour and has submitted the special circumstance application to MPH. Discussion with the MPH on the special circumstances application were initiated and are in progress.
- **Highland Drive Area:** Pine Street Extension Consolidation Site work began in 2020 with upgrades to internal roads and construction of pads for trailers and parking. Trees were cleared around the consolidation site to advance the work and reduce the risk of overlapping with the bird nesting season. The design for the PS-N CS site remediation was finalized and the contract to execute the work was awarded; The Highland Drive Consolidation site waste movement will be completed in 2021 with a predicted project close-out in the first half of 2022. The Highland Drive Landfill is planned for 2023.
- **Industrial Sites:**
  - **Centre Pier:** Phase 2 Environmental Site Assessment (ESA) and PSF were completed and submitted to MPH for review and comment.
  - **Lions Park:** LLRW characterization and delineation was conducted at the site in 2020. Data from this sampling resulted in a requirement for additional industrial waste delineations, which were conducted in late 2020.

- Coal Gasification Plant: LLRW characterization and delineation was conducted at the site in 2020. Data from this sampling resulted in the need for additional industrial waste delineations, which were conducted in late 2020.
- Chemetron Lagoon: LLRW characterization and delineation was conducted at the site in 2020 followed up with additional sludge sampling in the lagoon to better determine its composition and distribution.
- Port Hope Waste Water Treatment Plant (PH WWTP): The PH WWTP operated normally in 2020 and process interruptions were related only to maintenance related activities, intermittent disruptions to the electrical power grid and operational restrictions of the PH LTWMF.

#### *Safety analysis*

- As per the PHP Licence Conditions Handbook [2], the Safety Analysis Program is not applicable to the PHP.

#### *Physical Design*

- The PH Waste Water Treatment Facility underwent the following upgrades to improve operations:
  - Optimization of the evaporator mechanical and process control systems to maximize operational efficiency.
  - Completed minor modifications to service water circulation process to improve performance of dependent sub-systems and to increase conservation of treated water usage.
  - Continued planning for installation of a supplemental Reverse Osmosis unit and larger storage tanks to hold an increased volume of soda-ash, sodium hydroxide, and sulphuric acid on site.
  - Implemented additional concentrate (brine) process modifications to further enhance salt removal and balance in pond return.
  - Completed installation and optimized the function of enhanced heat recovery processes.
- Revised release limits with regard to weekly composite sampling including removal of Boron from the PH LTWMF licence effluent release limits as of 2020 April [5].

#### *Fitness for service*

- As per the PHP Licence Conditions Handbook [2], the Fitness for Service Program is not applicable to the PHP.

#### *Radiation protection*

- As low as reasonably achievable (ALARA) initiatives and activities continued to be at the forefront of the PGP Radiation Protection Program.
- Radiation Protection doses for workers remained As Low As Reasonably Achievable (ALARA) and doses for public remain low. There were no exceedances of regulatory limits and action levels in the dose monitoring program.

- Provided refresher training on the efficacy of the radiation work planning process with inclusion of the Radiation Work Permitting process as applied to under the Integrated Work Control program.
- There were no exceedances of regulatory limits and action levels in the dose monitoring program.
- The annual sealed sources inventory confirmed that there were no lost or stolen sources registered at the PHP; all CNL and contractor sealed sources were categorised as described in CNSC REGDOC-2.12.3 [6]; and all sources were confirmed to be exempt and below category 5.

#### *Conventional health and safety*

- All licensed activities continued to be carried out safely and securely.
- The Historic Waste program Management Office Site Safety and Health Committee increased its focus on the importance of the COVID-19 Pandemic and resulting shift to remote work for the majority of workers at PHAI project sites.
- In 2020, informal oversight activities were completed and in-depth programmatic site level review and inspections were completed for all sites and contractors to ensure safe restart processes and compliance with COVID-19 Pandemic precautions.
- In addition to monitoring workplace efforts to mitigate the risks of the COVID-19 Pandemic, substantial efforts were made to develop supports to promote stress reduction and mental health wellness and awareness.
- The Historic Waste program Management Office Site Safety and Health Committee developed a work-from-home inspection template to support worker identification of hazards at the home / remote workspace. Efforts were also made to develop enhanced and site specific observation / inspection templates for PHP sites.
- Ergonomic work-at-home virtual assessments were completed to support staff setup of home-office space to manage ergonomic risk.

#### *Environmental protection*

- The aquatic environment monitoring program included surface water sampling at Port Granby Creek, surface water sampling at the Lake Ontario diffuser, and drainage water sampling.
- Environmental protection and mitigation continues to be effective; changes from the baseline are minimal and generally within the EA predictions. EA follow-up and operational monitoring continued in 2020 with no areas of concern.
- Real-time dust monitoring results from the Independent Dust Monitoring Program for the PG LTWMF construction continue to be available at [www.phai.ca](http://www.phai.ca). Weekly reports included daily real time dust measurements and a site map illustrating the locations of the independent real time dust monitors.
- In 2020, there were no dust exceedances of the 15-minute average action level of 120 µg/m<sup>3</sup> at the work site perimeter.

#### *Emergency management and fire protection*

- All required annual fire response drills, were completed as per program and regulatory requirements.

- Site emergency plans were updated in conjunction with changed personnel and processes impacted by COVID-19 Pandemic restrictions.
- Work continued on the development of a PHAI 5-year Exercise and Drill Plan to support improved planning and monitoring of annual drill expectations.
- Table-top exercises on COVID-19 Pandemic Contact Tracing and associated protocols were conducted.
- Comprehensive retraining for CNL Emergency Stewards and Officer in Charge Personnel was completed in conjunction with updated emergency plans.
- Staff training on emergency procedures was completed in parallel to improved emergency notification infrastructure upgrades.
- Fire screening assessments were completed in support of CNL's ECC process for capital and maintenance / repair projects.

#### *Waste management*

- The Port Hope Waste Water Treatment Plant processing of the solids that was started in 2018 April, continued on a full-time basis throughout 2020. A total of approximately 1,553 metric tonnes of sludge product have been produced and transferred to the PH LTWMF holding cells to date.
- The Port Hope Waste Water Treatment Plant operated 2 solid waste streams operated as designed in 2020. Key optimizations were made to improve the efficiency and throughput of these processes. A combined total of 743,600 kg of residual solid wastes were generated by the Port Hope Wastewater Treatment Plant in 2020. This represents an increase of 15% in production recorded in 2019.

#### *Security*

- Contractors continued to be in compliance with CNL's corporate security policies and programs including those requirements mandated in the *PHAI Security Plan* [7] as confirmed through CNL's oversight program.
- No reportable security events occurred at the PHP in 2020.

#### *Safeguards and Non-Proliferation*

- The PH LTWMF material balance area received and placed approximately 152 metric tonnes of safeguarded materials (74,921 KgU) from Cameco in accordance with the requirements of CNL's Nuclear Materials and Safeguards Management program.
- The International Atomic Energy Agency conducted a Physical Inventory Verification/Design Information Verification at the PH LTWMF in 2020 June and were granted a Complimentary Access to conduct various activities in 2020 November.

#### *Packaging and transport*

- The PHAI Transportation of Dangerous Goods Program continued to operate the safe off-site transport and shipment of dangerous goods by conforming to all applicable laws and regulations, including company policies and procedures. Shipments of dangerous goods occurred throughout 2020.



- Oversight of each Transportation of Dangerous Goods contract was performed to ensure continuous adherence to the PHAI Transportation of Dangerous Goods Plan [8].
- There were no reportable events related to the Transportation of Dangerous Goods Program in 2020.

*Other Matters of Regulatory Interest*

- Public consultation, and public stakeholder and indigenous community relations activities continued to be conducted in accordance with the PHAI Public Information Program.
- In 2020 February, CNL provided a presentation and tour of PHAI project sites for Métis Nation of Ontario representatives, staff and Region 5 and 6 Councillors.
- In March 2020, the PHAI Phase 2 Public Information Program Plan [9] was updated to include additional Target Audiences, Tactics and Key Stakeholder Relations details to more accurately reflect current outreach activities and ensure alignment with the CNL Company Wide Public Information Program.
- In September 2020, a 3-month targeted engagement campaign was launched in support of CNL's Application for Amendment of the Port Hope Long-Term Low-Level Radioactive Waste Management Project Waste Nuclear Substance Licence – WNSL-W1-2310.02/2022 to revise the PHAI clean-up criteria [10] and was followed up with a virtual Public Information Session in 2020 October.
- More than 4,340 interactions related to the PHAI Small Scale Site's project took place in 2020 including 3,881 phone calls and emails; 159 property owner meetings and 288 site visits.
- 4 Quarterly Agreement Monitoring Group meetings were held in 2020, 1 of which took place in person and 3 of which were hosted through a virtual platform due to COVID-19 Pandemic restrictions.

**CNL is committed to achieve high standards of operational safety and security. The information and data presented in this report support the conclusion that safe and secure performance is being achieved at the Port Hope Long-term Waste Management Facility site, while enhancements are being implemented to further improve results.**

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## INTRODUCTION

<b>Name:</b>	Port Hope Long-term Waste Management Facility
<b>Location:</b>	Plan 9R-734, Lots 13 and 14, Concession 2 Port Hope, Municipality of Hope, Northumberland County, Ontario L1A 3V7
<b>Ownership</b>	Canadian Nuclear Laboratories

### Licence Information and Reporting Period

This annual compliance monitoring report is produced to comply with licence condition 2.3 of the *Port-Hope Long-Term Low-Level Radioactive Waste Management Project Licence, WNSL-W1-2310.01/2022* [1], herein referred to as the Port Hope Project (PHP) Licence, in accordance with the compliance verification criteria Compliance Monitoring: Annual Report of the *Port Hope Long-Term Low-Level Radioactive Waste Management - Licence Conditions Handbook* (LCH) [2], herein referred to as the PHP LCH. Information included in this report is for the period of 2020 January 01 to December 31.

This report provides site-specific information to supplement information in the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* [4], which provides corporate updates to 14 Safety and Control Areas (SCA) as they are applied across all Canadian Nuclear Laboratories (CNL).

The intent of this report is to provide sufficient detail to demonstrate how PHP programs are meeting the regulatory requirements as it pertains to the PHP Licence [1] and the PHP LCH [2].

### Facilities Included in this Report

Facilities included in this report include the Port Hope Area Initiative (PHAI) Port Hope Long-Term Waste Management Facility (PH LTWMF), located at the Welcome Waste Management Facility (WWMF), as described in Appendix A of the PHP Licence [1].

The PHAI is defined by *An Agreement for the Cleanup and Long-Term Safe Management of Low-Level Radioactive Waste Situated in The Town of Port Hope, The Township of Hope and the Municipality of Clarington* [3], herein referred to as the Legal Agreement, which took effect on 2001 March 29, between the Government of Canada and the municipalities of Port Hope and Clarington for the management of Low-Level Radioactive Waste (LLRW) as prescribed under the PHP, and the Port Granby Long-Term Low-Level Radioactive Waste Management Project (PGP).

### Summary of Licenced Activities

The PHAI includes two distinct and separate projects:

- The Port Hope Long-Term Low-Level Radioactive Waste Management Project (the “Port Hope Project” (PHP)).
- The Port Granby Long-Term Low-Level Radioactive Waste Management Project (the “Port Granby Project” (PGP)) that comprises long-term management of the LLRW currently located at the existing Port Granby Waste Management Facility (PG WMF) in the Municipality of Clarington.

The PHP will:

- Remediate sites containing historic LLRW and other specified industrial waste located in the Municipality of Port Hope (MPH). These sites are described in the Legal Agreement [3].
- Consolidate and manage this waste in a new long-term waste management facility at Port Hope (PH LTWMF) developed on lands comprised of and adjacent to the former WWMF. The current contents of the WWMF will be incorporated into the new PH LTWMF.

The historic LLRW within the community currently exists within licensed temporary storage and management facilities and miscellaneous unlicensed remediation sites (including the Port Hope Harbour and the former municipal landfill site).

The PHP comprises:

- Phase 1 (complete):
  - Securing regulatory approvals.
  - The management of the waste in the WWMF, currently owned by the Government of Canada and operated by CNL on behalf of Atomic Energy of Canada Limited (AECL), a federal Crown corporation.
- Phase 2 (2012-2025):
  - Development of a new LTWMF on and adjacent to the present site of the WWMF.
  - Incorporation of the current inventory of waste from the WWMF into the new LTWMF.
  - Remediation of sites within the MPH that are contaminated with historic LLRW.
- Phase 3 (2025-2120):
  - Long-term maintenance and monitoring of the PH LTWMF.

### **Additional Licenced Activities**

A number of remediation sites in Port Hope are subjects of existing licences issued to CNL under the *Nuclear Safety and Control Act* (NSCA) [11]; each of which submit independent annual compliance reports to the Canadian Nuclear Safety Commission (CNSC) as per *Pine Street Extension Temporary Storage Site WNSL-W1-182.1/2021* [12] and *Port Hope Radioactive Waste Management Facility WNSL-W1-344-1.8/ind* [13] licence requirements. The associated licences are as follows:

- Pine Street Extension Temporary Storage Site (WNSL-W1-182.1/2021) [12]
- Pine Street North Extension Consolidation Site (CS), Strachan Street Consolidation Site and Sewage Treatment Plant Temporary Storage Site (WNSL-W1-344-1.8/ind. [13].

As with all the PHAI remediation sites, those subject to these licences will be remediated to the project specific clean-up criteria as part of the PHP Licence [1].

## **1 MANAGEMENT SYSTEM**

### **1.1 Management System Program**

The PHP adheres to the Corporate Management System. See Section 1 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* [4] for details.

The *Historic Waste Program Management Office (HWP MO) Quality Assurance (QA) Plan* [14] is consistent with the *CNL Management System Manual* (Management System) [15] and summarizes the processes and practices applicable to the PHAI licensed activities during execution of Phase 2. These processes and practices satisfy the requirements identified above and comply with the quality management system defined in the CAN/CSA-ISO 9001:2015. CNL's third party registrar conducted the annual ISO 9001 audit which resulted in CNL successfully retaining its ISO 9001:2015 certificate effective 2018 April 22.

The CNSC has previously been notified of revisions [16] to the HWP MO QA Plan [14], as per the PHP LCH [2]. One revision was made to the HWP MO QA Plan [14] in 2020.

#### **1.1.1 Audits, Inspections and Self-Assessments**

As per the requirements of the Management System [15], both SCAs and Facilities conduct various audits, inspections, and self-assessments to ensure that the management system is functioning in according to expectations and that any policy, programmatic, or procedural deficiencies are identified and appropriate actions taken to resolve any deficiencies.

##### **1.1.1.1 Audits**

See Section 1.2 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* [4] for a list of all CNL-wide Audits for the reporting year 2020.

#### **External Audits**

There was 1 external audit conducted by SAI Global for the maintenance of CNL's ISO 9001:2015 certification specific to the PH LTWMF in 2020. The audit resulted in 1 Opportunity for Improvement (OFI).

#### **Internal Quality Audits**

There was 1 internal audit completed by the Quality Audits and Processes branch specific to the PHP site in 2020. Due to COVID-19 Pandemic restrictions, the Internal Audit was divided into 2 parts. Part 1 - Desk Top Assessment of Records, was completed in 2020 August; Part 2 – Field Verification Assessment, is scheduled to take place in 2021 June. Part 1 of the audit resulted in 1 OFI.



### 1.1.1.2 Inspections

#### CNSC Inspections

The following CNSC Inspections were conducted at the PHP:

**Table 1: CNSC Inspections for 2020**

Inspection No.	Area Inspected	No. of Action Notices	No. of Actions Completed
CNL-PHAI-PHP-2020-01	PHP Waste Water Treatment Plant <u>Safety and Control Areas:</u> Conventional Health and Safety, Environmental Protection, Management System, Radiation Protection	1	1
CNL-PHAI-PHP-2020-02	PH LTWMF Cell 2B <u>Safety and Control Areas:</u> Physical Design	0	N/A

#### Inspections by Other Regulatory Bodies

There were no inspections conducted at the PHP by other regulatory bodies in 2020.

### 1.1.1.3 Self-Assessments

In 2020, an annual Self-Assessment Plan for FY 2020/2021, stemming from the CNL Integrated Assessment Plan was developed for all HWP MO sites that covered various aspects of the management system, including both SCAs, and various facilities. The self-assessment is being tracked internally through ImpAct<sup>1</sup> OPS-20-1133.

## 1.2 Compliance Oversight

An integrated approach to oversight, where all SCAs are streamlined into one process, is used by CNL to confirm the suitability, implementation, and effectiveness of processes applied to PHAI project activities in order to comply with contractual obligations, licensing requirements, Acts and Regulations, environmental management and protection plans, compliance plans, and technical specifications as outlined in the *Historic Waste Program Management Office Field Oversight Activities* (HWP MO Field Oversight Activities) procedure [17].

Activities performed by CNL and PHAI consultants, contractors, and service providers are subject to CNL's oversight. Recommendations for improvement raised from CNL's compliance oversight activities are dispositioned and implemented.

<sup>1</sup> ImpAct – Abbreviation for Improvement and Action. It is an internal process used to identify events, problems, non-conformities, opportunities for improvements, and personnel injuries. The process also identifies and tracks actions to correct or remediate problems.

## **2 HUMAN PERFORMANCE MANAGEMENT**

### **2.1 Human Performance Program**

The PHP adheres to the Corporate Human Performance (HU) Program. See Section 2 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* [4] for details.

All CNL employees receive mandatory Human Performance Training. A dedicated CNL Human Performance Branch provides programs and support that help reduce human error and, as a result, the frequency and severity of unplanned events at CNL.

The effectiveness of the HU program at the PHP has been enhanced through the following improvements:

- Addition of the Systematic Approach to Training (SAT) for the following positions:
  - CNL Safety Specialist,
  - Environmental Technologist,
  - Health Physicist, and
  - Transportation of Dangerous Goods (TDG) Shipper.

### **2.2 Training program**

#### **2.2.1 Required Training**

The *Port Hope Area Initiative Training Plan* (PHAI Training Plan) [18] defines the training processes applied during the work performed as part of the PHP and is consistent with CNL's corporate training policies and programs. The PHAI Training Plan [18] promotes safe and effective workplaces through the cooperation of management, employees, contractors and visitors. It also ensures that all project staff (including CNL employees and contractors) are qualified to perform their duties effectively and safely, using established processes and standards. There were no revisions made to the PHAI Training Plan [18] in 2020.

CNL employees and contractors must identify competencies for each position related to safety, conformity to product or service requirements, and required training. All workers assigned to the PHP are required to attend a PHAI Awareness session to gain general understanding of the project. Contractors are responsible to qualify staff as well as maintain and control their training. Records are inspected by CNL staff.

The PHP personnel, both employees and contractors, are adequately trained (and refreshed) to ensure the safe operation of the PHP facility and to conduct work under the PHP Licence [1]. PHAI has implemented a SAT-based training program, for the PH Waste Water Treatment Plant (WWTP) Operations Supervisor position and the PH WWTP Operations Technician position. The SAT-based training includes the development of a specific Training Analysis using the Task Analysis method and Training Plans. A Curriculum Review Committee, which includes PH WWTP management and training support, has been established and meets regularly.

A wide range of mandatory and other job-specific training activities were carried out in 2020 to ensure that all personnel have the level of training related to radiation safety, occupational safety and health, emergency preparedness, environmental protection and compliance, and chemical safety, as appropriate for their duties. Training delivery ceased from 2020 March 14 to 2020 April 06 due to COVID-19 Pandemic restrictions.

All PHP personnel, both employees and contractors are adequately trained (and refreshed) to ensure the safe operation of their facilities and to conduct work under the PHP Licence [1]. The table below provides a list of federally/provincially legislated training courses that appear in position-specific training plans at the PHP.

**Table 2: PHP Operating Staff Training in 2020**

Course Code	Course Title	No. of Attendees
DWM-9003	HAZWOPER 4 day course	15
ENG-1001	Engineering Change Control	10
HU-1038	Human Performance	14
MS-1002	IWC (Integrated Work Control) Overview	41
OSH-1004	Lock Out Tag Out	4
OSH-1005	Working at Heights	5
OSH-1006	Confined Space Entry	7
OSH-1028	Standard First Aid	9
OSH-1047	Spotter Safety	15
OSH-3002	Pallet Jack – WWTP's	28
OSH-3017	Electrical Safety Watcher	5
PHAI-1001	NEO, New Employee Orientation	30
PHAI-1004	Driver's Situational Awareness	19
PHAI-1006	OIC / ES, Officer in Charge, Emergency Steward	46
PHAI-1009	Construction Basics	18
PHAI-1009	Officer in Charge	6
PHAI-1011	Step up to Safety	47
PHAI-1016	HWP Field Oversight	4
PHAI-1053	Remediation Verification, RVSOP	3
PHAI-1055	Hauling a Trailer	2
PHAI-1056	Officer in Charge, WWTP	41
PHAI-2001	LOTO, WAH, and Pre-Job Brief Refresher	34
RP-G3	RP Group 3	24
RP-G3 R	RP Group 3 Refresher	8
RP-G4	RP Group 4	11
TD-1011	Conducting OJT Training	5
TD-1024	Teaching & Facilitating Learning	10
TD-1035	RISE Field Essentials	40
TDG-1007	TDG Handler	7

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Course Code	Course Title	No. of Attendees
N/A	IHSA Basics of Supervision	32
N/A	WORK ON REMOTE COURSES (PHAI and Corporate)	N/A

### 2.2.2 Contractor Training

Training records for all contractors are verified prior to work commencement, and are verified regularly through our Compliance Oversight activities.

### 2.2.3 Training Evaluations Summary

Training evaluations are completed for live course delivery, and reviewed by the Instructor and Training Officer to support continuous improvement.

### **3 OPERATING PERFORMANCE**

#### **3.1 Operating Program**

The PHP adheres to the Corporate Operating and Decommissioning Programs. See Sections 3.1 and 11.2 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* [4] for details.

##### **3.1.1 Environmental Remediation Operations**

###### **3.1.1.1 Enabling Infrastructure**

The Phase 2 enabling infrastructure activities described in this section must be undertaken for the respective projects before waste transfer can begin for the described projects.

###### **3.1.1.2 Port Hope Long-term Waste Management Facility**

Phase 2 project activities associated with the PH LTWMF located at the site of the former Welcome WWMF and adjacent lands, include construction of an engineered aboveground mound and associated infrastructure and support facilities. The following updates to this work include:

- Construct temporary on-site infrastructure and support facilities, as part of PH LTWMF operations (in progress)
  - Leachate transfer system installation (e.g. pump houses) was delayed due to COVID-19 Pandemic restrictions. Installation work is scheduled to commence in 2021.
- Preparation of site and construction of base liner system for mound (in progress)
  - Cell 2b construction started in 2019 fall and was terminated, with partial completion of subgrade and Compacted Clay Layer (CCL), in 2019 December. The subgrade and CCL was protected with a layer of ~1.2 m common fill for the winter months. Construction was delayed until 2020 July due to COVID-19 Pandemic restrictions. Partial completion of additional layers of subgrade, CCL, and an additional layer of winter protection was completed in 2020 summer. Final completion of subsequent layers is scheduled to take place in 2021 fall.
- Placement of waste from the WWMF site into the PH LTWMF (complete)
  - Continued with excavation of residual contaminated lands (plumes) from the low-lying swamp area west of the mound, area also known as the 'Future Brush Area to be Cleared' (FBAC). Excavation activities were interrupted due to COVID-19 Pandemic restrictions, therefore the schedule for completion of this activity has been moved from 2020 to 2021.
- Placement of waste from other PHP clean-up sites into the PH LTWMF (in progress).
  - Continued with the receipt and long-term storage of historic LLRW from various PHP sites which also required maintenance of the PH LTWMF facility in accordance with maintenance and operational procedures established by CNL and as outlined in Section 3.2 Operations Licence Conditions of the PHP LCH [2].

- Preparation of cover liner system and closure of mound (in progress)
  - Started to perform final design profile shaping and verify cell readiness for capping in cell 3, scheduled to complete in 2021 fall; work in cell 1 will commence 2021 to 2023 following capping strategies.

### **3.1.1.1 Small Scale Sites**

The PHAI Small-Scale Sites (SSS) project involves the radiological survey of all Urban Area (formerly Ward 1) properties and a select number of Rural Area (formerly Ward 2) properties in Port Hope (approximately 5511 properties and 409 Roads in total) for the presence of historic LLRW; the remediation of LLRW and/or radiological artefacts on properties where it is identified by the survey; the restoration of remediated properties; and the safe transportation of the waste to the PH LTWMF for storage. Properties identified with high levels of radon continued to be mitigated where required and when COVID-19 Pandemic restrictions were lifted (i.e., 9 month shut down period) to permit access to residences to perform work and installation of radon mitigation systems.

#### **3.1.1.1.1 Characterization of External Properties**

Of the 5,312 properties with external lots, 4,602 have been characterized and 997 have been identified with LLRW based on our current clean-up criteria. Of the remainder of the 710 exterior properties that have not been characterized, 236 are in some stage of characterization field work planning/execution or are waiting analytical results; 383 have refused to participate or have not been granted access by property owners; and 91 represent scope additions awaiting a funding approval (e.g. railway lands and laneway properties). The estimated total number of external properties with LLRW is 1,176 properties.

#### **3.1.1.1.2 Characterization of Internal Properties**

Of the 4,861 properties with interior spaces, 4,397 have been characterized and 196 have been identified with LLRW based on our current clean-up criteria. Of the remainder of the 464 interiors that have not been characterized, 33 are in-progress and 431 have not been granted access by property owners. The estimated total number of interior properties with LLRW is 217 properties. Characterization of internal properties was put on hold during 2020 due to COVID-19 Pandemic restrictions.

#### **3.1.1.1.3 Characterization of Roads**

Of the 409 roads in Port Hope, 163 road segments, referred to as Road Allowances (RAs), were found to have areas of elevated gamma and were included in the Road Allowance Contract 2 for subsurface investigation. 163 RAs were characterized with 98 identified as having LLRW. Initial characterization activities concluded in 2019. Secondary delineation activities were completed by the end of the first quarter of 2020.

Characterization of Properties work has revealed additional areas within Port Hope RAs that require further testing to confirm status in relation to PHAI Clean Up Criteria. CNL is currently reviewing opportunities to expedite this testing on additional RA sites that were not captured within the original 163 sites in Contract 2. A Request for Proposal (RFP) process was initiated in 2020 to progress some of this work with a contract award anticipated in early 2021.

#### **3.1.1.1.4 Design of Exterior Properties**

141 property designs have been completed and 278 are actively in the design queue (pre-design survey, 69% design, 80% design, etc.). Design production has been increased during 2020 despite limitations due to COVID-19 Pandemic restrictions.

#### **3.1.1.1.5 Design of Road Allowances**

A total of 18 RA designs were completed in 2020 and 77 RA designs are in progress. RA designs have been strategically planned to align with the remediation of neighbourhoods.

#### **3.1.1.1.6 Remediation of Small Scale Sites**

In 2020, excavations of exterior historic LLRW was completed at 17 properties and 10 properties had backfill completed.

Interior remediation was completed at 2 properties. Interior remediation was put on hold due to restricted access to interiors of homes associated with COVID-19 Pandemic restrictions.

#### **3.1.1.2 Major Sites**

##### **3.1.1.2.1 Temporary Storage Sites**

No Temporary Storage Site remediation activities were completed in 2020 as all Temporary Storage Sites have proceeded through the remediation phase. There remains 1 remedial verification sample location at TSS - WTP that requires additional excavation to remove LLRW. This final LLRW excavation will be scheduled as soon as it is added to another remedial contractor's scope.

##### **3.1.1.2.2 Waterfront Area**

The Waterfront Area consists of the following sites: West Beach (former Waterworks), Alexander Street Ravine, Centre Pier, Port Hope Harbour, 95 Mill Street South, Canadian National/Canadian Pacific (CN/CP) Viaducts area and Strachan Street. Strachan Street is part of the Waterfront Area - Waterfront Package B.

During the 2019/2020 winter season, the contractor for the Port Hope Harbour and Centre Pier remediation continued preparation for production dredging operations for a 2020 spring season start-up. In 2020 March, work was put on hold due to COVID-19 Pandemic restrictions and the site was held in a min-safe state until 2020 June.

In 2020 July, the Port Hope Harbour/Centre Pier contractor was terminated and demobilized from the site due to ongoing performance issues. CNL maintained the site in a min-safe state until 2020 October, at which time it was turned over to an interim contractor to resume the work of preparation for production dredging, which includes work to support improvements to the Portable Water Treatment System (PWTS) at site. Work has continued under the interim contract through 2020/21 winter. Production dredging is scheduled to start in 2021 spring.

CNL has applied a special circumstance to the outer harbour and has submitted the special circumstance application to MPH. CNL is in discussions with the MPH on the special circumstances application and efforts are being made to work towards a final resolution. During the 2020 fall and winter, CNL supported Cameco Corporation (Cameco) and MPH in MPH's dredging of clean sediment in Port Hope's outer harbour. CNL

support included sediment sampling through CNL's Construction Monitoring Program (CMP); engineering support for the design component of the dredging program; and assistance to enable Cameco temporary access to a backup cooling water intake located in the inner harbour.

Delays to the remediation of the former Waterworks (Waterworks East) site which occurred in 2019 as a result of ground water and the influx of lake water due to record levels of Lake Ontario were not recoverable. The COVID-19 Pandemic restrictions put the site into a min-safe state from 2020 March to 2020 June. At the end of FY 2019/2020, the Waterworks East site had all contaminated soils removed and by late 2020 summer, CNL and the contractor had removed as much contaminated sediment from the buried tanks as was feasibly safe. CNL has prepared a special circumstance application for the sediments remaining in the tanks and for the tank walls, which will be submitted to the MPH for consideration in 2021 February. Site restoration was 95% complete in 2020; the remaining site restoration is scheduled for completion in 2021 spring. A site closeout report is in progress.

In 2020 October, remediation work began at the 95 Mill Street site. CNL worked with the contractor to develop systems to mitigate groundwater issues without shoring. CNL is scheduled to remediate 40% of the site by 2021 February and to complete remediation by end of 2021 May, providing no significant groundwater issues are encountered that require significant mitigation efforts.

A re-characterization on the CN/CP Viaducts was developed to provide more accurate site data before remediation occurs. This characterization was proposed to start in 2020 summer however, it was delayed due to both COVID Pandemic restrictions and ongoing negotiations with CN/CP rail to support access to work on their lands and near to the railroad piers. Characterization drilling is scheduled to begin in 2021 February. Remediation at the CN/CP Viaducts is scheduled to begin following completion at 95 Mill Street.

In 2019/2020, an updated characterization program was executed at the Strachan Street Ravine site. This data was incorporated into an updated design package. The contract was awarded in 2020 November. Critical plan review progressed through 2020/2021 winter with mobilization expected in 2021 March. The Strachan Street site contains ~2500m<sup>3</sup> of LLRW, and is expected to be remediated and restored before 2021 winter.

In 2019, Package B work included additional characterization drilling for Waterworks West and completion of a preliminary design package for constructability review. The preliminary design package identified a need for further delineation to the west of the creek which bisects the property. Trees are scheduled to be removed from the west of the creek in 2021 winter to accommodate further delineation works and additional characterization. This package is expected to go to tender in 2021 summer, with mobilization scheduled to take place in 2021 fall.

Due to various environmental constraints, CNL will apply a special circumstance to a large portion of the original Alexander Street site and to residentially owned woodlot packages. CNL has begun socializing these applications with the landowners and MPH.

### **3.1.1.2.3 Highland Drive Area**

The Highland Drive Area consists of the following sites: Highland Drive Former Municipal Landfill, Highland Drive Roadbed, Highland Drive South Ravine, PS-NE Consolidation Site (CS), and PS-NE Roadbed. CNL has reviewed the approach and risks associated with the remediation plans. Consultant subject matter experts were retained to address specific risk concerns associated with remediating a landfill. The designs for Highland Drive Landfill are being updated as a result of this review, and are expected to be finalized in the spring of 2021.



Work at the PS-N CS began in 2020 with the upgrades to internal roads and construction of pads for trailers and parking. Trees were cleared around the consolidation site to advance the work and reduce the risk of overlapping with the bird nesting season.

The design for the PS-N CS site remediation was finalized and the contract to execute the work was awarded. The contractor will mobilize in the spring of 2021 and the approximately 50,000 m<sup>3</sup> of LLRW is expected to be removed from this consolidation site by the end of 2021.

CNL is reviewing the approach for the Highland Drive South Ravine. CNL is working with its consultants and subject matter experts to find the optimal balance between remediation of contaminated soils and the potential impact of removing a significant number of trees in a wild urban to reduce the impact on the residents surrounding the area. It should be noted that CNL purchased the property that contains the vast majority of the South Ravine.

CNL continues to maintain, monitor and inspect the PS NE CS and Strachan Street Ravine CS as per the PHP Licence [1].

#### **3.1.1.2.4 Industrial Sites**

In accordance with the Legal Agreement [3], the MPH and the Government of Canada have agreed that CNL will remediate a total volume of 51,250 m<sup>3</sup> of waste at specified industrial (non-radioactive) sites within the MPH. These sites are: Centre Pier, Lions Recreation Centre Park, Former Coal Gasification Plant, Chemetron Lagoon and the Sewage Treatment Plant Storage Cell (STPSC). Risk Assessment fieldwork was completed in 2019. The Risk Assessment and MECP Pre-Submission Forms (PSF) were submitted to the MPH in the first half of 2020. CNL expects to submit the PSFs for the Industrial Sites to MOECP in 2021 and to finalize the distribution of volume allocations. Remediation activities are planned to start in 2022.

The following activities were completed at the Industrial Sites in 2020:

- Centre Pier: Phase 2 Environmental Site Assessment (ESA) and PSF were completed and submitted to MPH for review and comment. Additional delineation was required in select areas of the pier as a result of the initial sample analysis. Remediation will be done after 2024 as part of the Harbour-Centre Pier works.
- Lions Park: LLRW characterization and delineation was conducted at the site in 2020. Data from this sampling resulted in the need for additional industrial waste delineations, which were conducted in late 2020. The updated Phase 2 ESA and PSF will be submitted to MPH in early 2021.
- Coal Gasification Plant: LLRW characterization and delineation was conducted at the site in 2020. Data from this sampling resulted in the need for additional industrial waste delineations, which were conducted in late 2020. The updated Phase 2 EA and PSF will be submitted to MPH in mid-2021.
- Chemetron Lagoon: LLRW characterization and delineation was conducted at the site in 2020. CNL conducted additional sludge sampling in the lagoon to better determine its composition and distribution. As a result of this the design for the remediation is being updated and is expected to be completed in mid-2021. CNL expects to start the remediation of this site in 2022 and then complete the ESA / RSC in subsequent years.
- STPSC: The Industrial Site portion of the work was completed on this site in previous years.

### **3.1.1.3 Continued Operation of New Port Hope Waste Water Treatment Plant**

The new PH WWTP operated on a fulltime basis throughout the 2020 period, other than the scheduled downtime associated with period maintenance. These activities required a full stop of the influent treatment system for a cumulative total of approximately 3 days. In general, the PH WWTP water treatment systems had an operational uptime of greater than 98%.

### **3.1.1.4 Water Collection and Treatment System**

The waste water collection and treatment system consists of interceptor ditches, a main collection pond, a treatment building, three settling ponds and twin discharge pipelines. The purpose of the former system was to capture groundwater and surface water that have come in contact with the waste, treat the water to reduce arsenic and uranium levels, and discharge the treated water to Lake Ontario.

The PH WWTP operated normally in 2020 and process interruptions were related only to maintenance related activities, intermittent disruptions to the electrical power grid and operational restrictions of the PH LTWMF (as noted in the preceding section).

A summary of analytical data of influent sampling is provided in Appendix B, Table B-3.

A total of 296,700 m<sup>3</sup> of influent was collected by the PH WWTP in 2020. This represents a decrease of 22% in volume from 2019 recorded volumes.

### **3.1.1.5 Operations of Residuals Management Systems**

Regular operations of the residual management systems occurred in conjunction with normal water treatment activities throughout 2020, with the exception of the shut-down period that was imposed by COVID-19 Pandemic restrictions from 2020 March to 2020 June. The residuals management equipment includes the clarifiers, evaporators, slurry dryers and belt press systems. Both sludge and slurry processing streams continue to be optimized, with this work continuing throughout 2020. The residual management systems are operated on an as-needed basis as demanded by influent chemistry conditions and contaminant loading levels require.

### **3.1.1.6 Off-Site Sampling**

Water samples were taken on a monthly basis from an off-site stream within the same watershed as the facility. Samples from this location are intended to detect any migration of contaminants via leachate or runoff from the PH LTWMF. Brand Creek is the main stream in the watershed and is located west of the PH LTWMF. Brand Creek is sampled at the location where the creek crosses Marsh Road. Water samples were analysed for the same parameters as the PH WWTP design objectives. In 2020, results were generally found to be below the Provincial Water Quality Objectives (PWQO) [19] and Canada Water Quality Guidelines (CWQG) [20], with the exception of Aluminum which exceeded both the PWQO [19] and the CWQG [20] from 2020 January to 2020 November. PWQO guidelines were exceeded for this parameter in 2020 December. Minor exceedances of CWQG [20] guidelines for Copper and Lead were reported in the 2020 July sample and Uranium slightly exceeded PWQO [19] guidelines in the sample taken in 2020 December. Additional details are provided in Appendix B, Table B-5.

### 3.1.2 Facility Staffing

There were no changes to the positions related to the PHP Licence [1] in 2020.

PH LTWMF: There were no changes to the PH LTWMF positions in 2020.

The PHP LTWMF continued to be maintain the minimum staffing requirements to provide the needed operational and safety support.

The HWP MO PH LTWMF Staff complement at the end of 2020 was a total of 11 (including 1 student).

The PH WWTP Staff complement at the end of 2020 was a total of 22 (including 1 student).

Recruitment efforts continue to ensure CNL is resourced appropriately throughout Phase 2 to reflect increased scope and oversight. Continued growth in headcount will occur in 2020/2021 as the Port Hope Project activities increase substantially.

## 3.2 Reporting Requirements

### 3.2.1 Reportable Events

In 2020, there were no events that occurred at **Error! Reference source not found.** that were deemed reportable to the CNSC.

### 3.2.2 Trending of Events Related to Operational Activities

As events at the PHP occur, they are recorded in the ImpAct system. This information is regularly reviewed to identify any trends.

A total of 1 ImpAct with cognitive trending analysis was opened in 2020 across all of the HWP, where trending searches were not limited to nor exclusive to the PHP or PGP project sites. The 2020 Trend ImpAct includes the following event type:

- “Minor spills / leaks” related to Hydro-Vac Box Trucks.

The ImpAct was reviewed and 3 corrective actions were assigned within to address the event type and any contributing factors, all of which are closed as of 2020 August.

The following table summarizes ImpActs raised over the past 5 years.

**Table 3: Number of ImpActs raised at Error! Reference source not found.**

Year	Level 0 <sup>a</sup>	Level 1	Level 2	Level 3	Level 4	Total
2016	0	0	0	12	127	139
2017	0	0	1	6	87	94
2018	7	0	1	38	155	203
2019Y	0	0	1	21	122	150
2020	3	0	0	5	81	89

<sup>a</sup> Level 0 will be assigned if the ImpAct is deemed to be a “non- problem” and a recommendation to close the Impact will be given.

### **3.2.3 Notification of Conflicts or Inconsistencies**

In 2020, there were no conflicts or inconsistencies identified between licence conditions, codes or standards, operations, programs, methods, or regulatory documents referenced in the PHP Licence [1] or PHP LCH [2].

## **4 SAFETY ANALYSIS**

### **4.1 Safety Analysis Program**

As per the PHP LCH [2], the Safety Analysis Program is not applicable to **Error! Reference source not found..**

## **5 PHYSICAL DESIGN**

### **5.1 Design Program**

The PHP adheres to the Corporate Design Program. See Section 5.1 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for details [4].

After continuous operations of the WTB ceased in 2016 December, the system has been inspected by CNL on a weekly basis throughout 2020 to ensure readiness for service in the event of an emergency.

Preventive maintenance orders are generated to ensure routine inspections are conducted on key waste water treatment system components. CNL keeps on retainer certified contractors to provide electrical and mechanical services as needed.

The following operational activities occurred during the reporting period:

- Weekly inspections on WTB to ensure building is ready for service.
- Routine outside maintenance work included grass cutting, road maintenance and snow removal.

#### **5.1.1 Port Hope Waste Water Treatment Plant**

A remote telemetry and data acquisition system, complete with notification alarms, allows for 24-hour monitoring of water levels and other critical system parameters. The treatment plant process equipment is interfaced with a Supervisory Control and Data Acquisition (SCADA) computer systems.

The new PH WWTP utilizes state of the art technologies to treat water to a higher standard than the former WTB.

The PH WWTP consists of:

- Primary water treatment processes (clarifiers, sand filters, reverse osmosis, building services).
- Residuals management process (evaporators, slurry dryers, belt press).

#### **5.1.2 PH WWTP Action Levels**

As of 2020, approved action levels [1] have been implemented at the PH WWTP and updated in the PHP Quarterly Effluent Reports. As per the written communication from the CNSC [21], revised release limits were communicated to CNL with regard to weekly composite sample results and the removal of Boron from the reported list of contaminants of concern [21].

#### **5.1.3 Engineering Upgrades**

In an effort to improve operation of the facility, CNL utilized CRL Design Engineering to implement fixes and upgrades to existing equipment following CNL's Engineering Change Control (ECC) process. These changes and planned upgrades included the following:

- Optimization of the evaporator mechanical and process control systems in order to maximize operational efficiency.
- Completed minor modifications to service water circulation process to improve performance of dependent sub-systems and to increase conservation of treated water usage.

- Further planned for the installation of a supplemental Reverse Osmosis unit to increase water treatment capacity.
- Continued planning for installation of larger storage tanks to hold an increased volume of soda-ash, sodium hydroxide, and sulphuric acid on site.
- Implemented additional concentrate (brine) process modifications to further enhance salt removal and balance in pond return.
- Completed installation and optimized the function of enhanced heat recovery processes. These changes have demonstrated very good results with respect to primary treatment efficiency and reduced fouling of the system in general.

## **6 FITNESS FOR SERVICE**

### **6.1 Fitness for Service Program**

As per the PHP LCH [2], the Fitness for Service Program is not applicable the PHP.



## **7 RADIATION PROTECTION**

### **7.1 Radiation Protection Program**

The PHP adheres to the Corporate Radiation Protection Program. See Section 7 of the Annual Compliance Monitoring Report for Canadian Nuclear Laboratories for details [4].

The *PHAI Radiation Protection Plan* (PHAI RP Plan) [22] defines the radiation protection measures applicable to PHAI projects at the PHP site and is consistent with CNL's *Radiation Protection Program Requirements* (RPP Requirements) [23]. The purpose of these radiation protection measures is to ensure that the execution of PHAI projects complies with the level of radiation safety required by the relevant regulations pursuant to the NSCA [11].

The PHP uses the Chalk River Laboratories (CRL) licensed Dosimetry Service Provider (DSP) for external and internal dosimetry for site/facility staff. While some of the contractor staff use the CRL licensed DSP, the majority use an external CNSC licensed DSP (e.g., Health Canada) for administration of their internal and external dosimetry. Dose to CNL staff is measured irrespective of the project site at which the person works (Port Hope or Port Granby) due to the continuous movement of staff between both sites. Dose to contractor staff is measured for the PHAI site where the contractor works.

PHP staff and contractors who work or frequently enter the Controlled Areas are assigned Thermoluminescent Dosimeters (TLDs) / Optically Stimulated Luminescence Dosimeters (OSLDs) to monitor for external radiation exposures.

There were no revisions to the PHAI RP Plan [22] in 2020.

#### **7.1.1 ALARA Initiatives and Activities**

As Low As Reasonably Achievable (ALARA) initiatives and activities continue to be at the forefront of the PHP Radiation Protection (RP) Program. The initiative to implement an ALARA self-assessment program in 2019 resulted in the identification of 1 ImpAct and 10 associated corrective actions all of which have been fully implemented. Corrective actions included the addition of training sessions to refresh staff on radiation protection requirements and the use of air monitoring systems. The self-assessment program also focused on ensuring Radiation Work Permits (RWP) are applied and ALARA doses are integrated into radiation protection work planning. In 2020, refresher training was provided to staff on the efficacy of the radiation work planning process which included the RWP under the Integrated Work Control (IWC) program.

ALARA initiatives and activities are practiced in every facet of the PHP activities and is specifically addressed through the implementation of the PHP environmental monitoring program's monthly and quarterly deployment of PHP Environmental Radon Monitors and TLDs. Results from the 2020 monitoring program confirm a public dose estimate to be < 3.3 % of the annual limit for non-Nuclear Energy Workers (NEWs). The integrity of the ALARA program is managed through routine monitoring and monthly reviews of dose records to confirm that no adverse trends or exceedances have occurred.

#### **7.1.2 Dose Control**

#### **7.1.3 Contamination Control**

Routine monitoring across the project has allowed us to confirm that current activities have been executed

while minimizing the spread of contamination. For the PHP, no skin contamination event was recorded. The maximum beta contamination was found on personal clothing was recorded to be 10% of CNL's zoning limits whereas alpha contamination was found to be 0% of the zoning limits keeping in line with the ALARA principle.

The following table outlines contamination events that occurred at the PHP in 2020:

**Table 4: Contamination Events**

	Skin and Clothing Contamination				Workplace Contamination	
	Skin <sup>a</sup>	Personal Clothing <sup>b</sup>	Radiological Work Clothing <sup>c</sup>	Total	Surface <sup>d</sup>	Vehicle / Materials <sup>e</sup>
<b>2017</b>	0	0	0	0	0	1
<b>2018</b>	1	0	0	1	2	0
<b>2019</b>	0	3	0	3	0	0
<b>2020</b>	0	1	1	2	4	0

- a Detectable contamination on skin above background (in 2018, 2019 & 2020); detectable contamination on skin above 4 Bq/cm<sup>2</sup> β/γ or 0.1 Bq/cm<sup>2</sup> α (in 2017).
- b Contamination detected above background on personal clothing
- c Detectable contamination on radiological work clothing above background (in 2018, 2019 and 2020); detectable contamination on radiological work clothing above 4 Bq/cm<sup>2</sup> β/γ or 0.1 Bq/cm<sup>2</sup> α (in 2017).
- d Fixed/loose contamination in excess of limits specified for the applicable radiological zone
- e Removable surface contamination detected above background.

The contamination events noted in the table above occurred during planned routine work and regular operations. The maximum contamination noted on a worker's personal clothing was found to be 0 Bq/cm<sup>2</sup> (α) and 0.4 Bq/cm<sup>2</sup> (βγ) above background while the maximum contamination noted on a radiological work clothing was found to be 2.05 Bq/cm<sup>2</sup> (α) and 4.02 Bq/cm<sup>2</sup> (βγ) above background.

No exceedances of Action levels or Administrative controls were noted.

#### **7.1.4 Sealed Sources**

As required by the PHAI RP Plan [22], all sealed sources used at the PHP project are mandated to be exempt. If a non-exempt radioactive source is required to be brought on site, the HWP MO RPP Manager will be informed and an approval provided as required. The main function of the sealed sources at the PHP is for RP instrument function checks and validation. All CNL and contractor controlled sources are required to be kept secure in a locked cabinet. A sealed source inventory is conducted a minimum of once per year.

Based on the 2020 sealed sources inventory conducted at the PHP, there are 16 exempt sources under CNL direct control while all the contractors have a total of 15 exempt sealed sources in their inventory. In 2020, the sealed sources used at the PHP were categorised as described in CNSC REGDOC-2.12.3 [6] and all sources were confirmed to be exempt and below category 5.

There were no lost or stolen sources registered at the PHP in 2020.

## **7.2 Dosimetry**

### **7.2.1 Interpretation of Reported Dose Quantities**

The PHAI uses the CRL licensed DSP for external and internal dosimetry for HWP MO staff and some contractors. HWP MO staff and contractors whose external and internal dosimetry are monitored using the CRL dosimeters are not measured independent of the site location worked (i.e., staff or contractor may work at more than one PHAI project site); only the total dose per person is recorded, irrespective of the site at which the person works. PHP project contractors who use an alternate CNL approved dosimetry service provider, have their dose monitored for the assigned PHAI PHP site where work is performed.

HWP MO staff who work within or frequently enter the Controlled Area, are assigned a TLD to monitor for external radiation exposures. Some HWP MO Contractors use OSLDs that are provided by CNSC licensed DSPs. All external dosimetry are read on a monthly or 4 week basis. Visitors and non-NEWs are typically given Electronic Personal Dosimeters to track dose and to ensure trigger limits identified within the PHAI RP Plan [22] are not exceeded.

The Internal Bioassay program, is primarily provided to the CNL Operations and RP staff who work in close proximity with radiological hazards within the PH WWTP. The bioassay is tested for the presence of uranium and thorium radionuclides through in-vivo submissions. All results for uranium bioassay reported were well below CNL's Bioassay Recommendation Level of Minor, which would typically indicate a potential for an intake of activity. The results of thorium submissions are all below minimum detectable activity indicating no intake of activity.

CNL's personnel radon exposure program for WWTP operations monitors employees and contractors, Occupational Safety and Health (OSH) and RP staff due to the increased work required to support Phase 2 construction. Phase 2 construction workers were assigned track-etch type Personal Radon detectors and doses are calculated and recorded if the monthly average exceeds CNL's trigger level of 150 Bq/m<sup>3</sup>.

PHP continues to ensure that doses to staff and contractors are kept ALARA by strict compliance to its Dosimetry program as stipulated in the PHAI RP Plan [22].

### **7.2.2 Radiation Doses to Personnel**

The dose data in all tables represent doses delivered at the PHP for all monitored persons, which includes employees (including those in temporary employment such as students), contractors and visitors.

Doses have not be broken down by individual facilities as employees, contractors and visitor routinely move between facilities without changing TLDs, making it difficult to accurately determine how much dose can be attributed to an employee, contractor or visitor at a single facility.

The maximum individual effective dose during the current 5-year period (2016 January 01 – 2020 December 31) is 0.67 mSv, received by a HWP MO staff in their role as a Quality Assurance Specialist working for the PHAI PHP and PGP.

**Table 5: Radiation Doses to PHAI Personnel**

Monitored Person Type		Maximum Individual Effective Dose (mSv)				
		2016	2017	2018	2019	2020
NEW	Employee	0.30	0.34	0.33	0.27	0.26
	Contractor1	0.01	0.39	2.01	0.79	0.27
Non-NEW	Contractor	0.00	0.00	0.00	0.02	0.20
	Visitor	0.00	0.00	0.00	0.00	0.00

**Table 6: Effective Dose for Error! Reference source not found.**

Monitored Person Type		Total # of Persons	Dose Range (mSv)							Individual Dose (mSv)			Collective Dose (person·mSv)
			0	0.01- 0.50	0.51- 1.00	1.01- 5.00	5.01- 10.00	10.01- 20.00	>20.00				
			Number of Persons							Max	Ø Avg <sup>a</sup>	Avg All <sup>b</sup>	
<b>NEW</b>	<b>Employee</b>	163	33	130	-	-	-	-	-	0.26	0.06	0.05	8.08
	<b>Contractor</b>	429	300	129	-	-	-	-	-	0.27	0.08	0.02	9.06
	<b>Visitor<sup>c</sup></b>	6	2	4	-	-	-	-	-	0.06	0.04	0.02	0.14
<b>Non-NEW</b>	<b>Contractor</b>	222	219	3	-	-	-	-	-	0.20	0.17	0.00	0.50
	<b>Visitor</b>	49	49	-	-	-	-	-	-	0.00	-	0.00	0.00
<b>Totals</b>		869	603	266	0	0	0	0	0	0.27	0.07	0.03	17.78

a Average of all measured doses that exclude the zero dose value, rounded to two decimal places.

b Average of all measured doses that include the zero dose value, rounded to two decimal places.

c Visitor NEWs are persons that were historically employee and/or contractor NEWs, but have returned to PHP as a visitor while retaining their historical NEW status.

**Table 7: Distribution of Equivalent Dose to the Skin for** Error! Reference source not found.

Monitored Person Type		Total # of Persons	Dose Range (mSv)							Individual Dose (mSv)			Collective Dose (person·mSv)
			0	0.01- 0.50	0.51- 1.00	1.01- 5.00	5.01- 10.00	10.01- 20.00	>20.00				
			Number of Persons							Max	Ø Avg <sup>a</sup>	Avg All <sup>b</sup>	
NEW	Employee	163	33	130	-	-	-	-	-	0.26	0.06	0.05	8.08
	Contractor	429	300	129	-	-	-	-	-	0.27	0.08	0.02	9.06
	Visitor <sup>c</sup>	6	2	4	-	-	-	-	-	0.06	0.04	0.02	0.14
Non-NEW	Contractor	222	219	3	-	-	-	-	-	0.20	0.17	0.00	0.50
	Visitor	49	49	-	-	-	-	-	-	0.00	-	0.00	0.00
Totals		869	603	266	0	0	0	0	0	0.27	0.07	0.03	17.78

<sup>a</sup> Average of all measured doses that exclude the zero dose value, rounded to two decimal places.

<sup>b</sup> Average of all measured doses that include the zero dose value, rounded to two decimal places.

<sup>c</sup> Visitor NEWs are persons that were historically employee and/or contractor NEWs, but have returned to PHP as a visitor while retaining their historical NEW status.

**Table 8: Summary of Dose Components Received as a Result of Licensed Activities for 2020<sup>a</sup>**

Monitored Person Type		External Penetrating Dose					External Surface Dose					Extremity Dose				
		Total # Persons	Collective (p·mSv)	Max	Ø Avg <sup>b</sup>	Avg All <sup>c</sup>	Total # Persons	Collective (p·mSv)	Max	Ø Avg <sup>b</sup>	Avg All <sup>c</sup>	Total # Persons	Collective (p·mSv)	Max	Ø Avg <sup>b</sup>	Avg All <sup>c</sup>
<b>NEWs</b>	<b>Employee</b>	163	8.08	0.26	0.06	0.05	163	8.08	0.26	0.06	0.05	-	-	-	-	-
	<b>Contractor</b>	429	9.06	0.27	0.08	0.04	429	9.06	0.27	0.08	0.04	-	-	-	-	-
	<b>Visitors<sup>d</sup></b>	6	0.14	0.06	0.04	0.02	6	0.14	0.06	0.04	0.02	-	-	-	-	-
<b>Non-NEWs</b>	<b>Contractor</b>	222	0.50	0.20	0.17	0.00	222	0.50	0.20	0.17	0.00	-	-	-	-	-
	<b>Visitor</b>	49	0.00	0.00	-	0.00	49	0.00	0.00	-	0.00	-	-	-	-	-
<b>Total</b>		869	17.78	0.27	0.07	0.03	869	17.78	0.27	0.07	0.03	-	-	-	-	-

<sup>a</sup> All quantities are measured in mSv unless otherwise noted.

<sup>b</sup> Average of all measured doses that exclude the zero dose value, rounded to two decimal places.

<sup>c</sup> Average of all measured doses that include the zero dose value, rounded to two decimal places.

<sup>d</sup> Visitor NEWs are persons that were historically employee and/or contractor NEWs, but have returned to PHP as a visitor while retaining their historical NEW status.

### **7.2.2.1 Discussion of Dose Data**

No anomalies were noticed in the data above. All doses were measured to be less than the assigned dose control point (1 mSv) for all individuals on the project and well below all Action Levels for the project.

### **7.2.2.2 Radiation Dose Changes or Trends**

As the project continued, Phase 2 Construction doses were expected to remain unchanged from the prior 2019 calendar year. The 2020 average dose to all workers (employees, contractors and students) was determined to be approximately 0.05 mSv for both worker categories, as compared to the 2019 calendar year's average dose of 0.03 mSv. These results are expected given no significant change in scope of work, other than an expansion of work sites resulting in an increase of worker presence, occurred at the PHP.

### **7.2.3 Program Exceedances**

There were no exceedances of regulatory limits and action levels in the dose monitoring program for the 2020 calendar year.



## **8 CONVENTIONAL HEALTH AND SAFETY**

### **8.1 Conventional Health and Safety Program**

The PHP adheres to the Corporate Conventional Health and Safety Program. See Section 8 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for details [4].

The *Port Hope Area Initiative Occupational Safety and Health Plan* (PHAI OSH Plan) [24] has been developed to define the OSH program applicable to PHAI projects and is consistent with CNL's corporate OSH Program. Contractors conducting work for the PHP project submit site specific health and safety plans for CNL's review and approval to ensure compliance with the PHAI OSH Plan [24].

Contractor compliance with their project-specific health and safety plan is examined as part of CNL's oversight program. Compliance oversight is a health and safety initiative that has been implemented to ensure consistency with the requirements of the PHAI OSH Plan [24]. CNL conducts routine oversights on contractor project activities to ensure compliance with the approved site specific health and safety plan.

There were no revisions to the PHAI OSH Plan [24] in 2020.

#### **8.1.1 Site Safety and Health Committee**

The Historic Waste Program Office (HWP MO) Site Safety and Health Committee (SSHC) is comprised of CNL workers and management staff who represent all PHAI PHP project sites.

In 2020, the HWP MO SSHC directed its focus on the importance of the COVID-19 Pandemic. Due to the COVID-19 pandemic, there was a shift to remote work for the majority of workers at PHAI project sites. As a result, in addition to monitoring workplace efforts to mitigate the risks of the pandemic, substantial efforts were placed on stress reduction and mental health wellness and awareness. SSHC workplace inspections were not able to occur on a regular basis in all areas due to COVID-19 Pandemic restrictions, however, inspections did continue in buildings that were in regular use and where operations permitted.

The SSHC met quarterly as per regulatory requirements and conducted routine inspections of workplaces under its jurisdiction where possible. In 2020, the SSHC conducted 6 physical inspections across the PHP sites which resulted in minor findings with all remedial actions completed. Where possible, components of the SSHC inspections were conducted through virtual platforms.

The SSHC developed a work-from-home inspection template to support worker identification of hazards at the home / remote workspace. Efforts were also made to develop enhanced and site specific observation / inspection templates for PHP sites.

#### **8.1.2 Inspections**

There were 210 site health and safety inspections completed in 2020.

CNL's conventional health and safety compliance oversight process directs various routine inspection programs and ongoing compliance oversight on PHP project sites. Daily site level touch points and work observations are conducted by dedicated and experienced CNL health and safety specialists across all project sites. Daily touch points are further complemented by formal programmatic oversight inspections to verify regulatory and program implementation in the field.

In 2020, informal oversight activities were completed and in-depth programmatic site level review and inspections were completed for all sites and contractors to ensure safe restart processes and compliance with COVID-19 Pandemic restrictions. Inspections resulted in numerous positive compliance confirmations and the identification of deficiencies which lead to CNL and contractor health and safety program improvements and revisions to contractors' health and safety procedures. In addition to standard safety program inspections, numerous ergonomic work-at-home virtual assessments were completed to support staff setup of home-office space to manage ergonomic risk.

### 8.1.3 Hazardous Occurrence Investigation Reports (HOIR) and Lost-Time Injuries

There were no hazardous occurrences at the PHP in 2020.

The following is a Summary of injury rate data for the last 5 years.

**Table 9: Summary of PHP Injury Rate Data**

	2016	2017	2018	2019	2020
<b>PHAI Employees</b>					
Person Hours Worked				298378	391875
Lost-Time Injuries	0	0	0	1	0
Working Days Lost	0	0	0	33	0
Frequency <sup>a</sup>	0	0	0	0.68	0
Severity <sup>b</sup>	0	0	0	22.57	0
<b>PHAI Contractors<sup>c, d</sup></b>					
Lost Time Injuries	0	0	0	0	0
Working Days Lost	0	0	0	0	0

a Frequency rate equals # of Lost-Time Injuries x 200 000 hrs of exposure divided by person hours worked (based on 100 Full Time workers).

b Severity rate equals # of Working Days Lost x 200 000 hrs of exposure divided by person hours worked (based on 100 Full Time workers).

c The Number of Person Hours worked are not divulged by Contractors, as such Frequency and Severity rates cannot be calculated.

d New reporting requirement initiated in 2020 as per CNSC request.

## **9 ENVIRONMENTAL PROTECTION**

### **9.1 Environmental Protection Program**

The PHP adheres to the Corporate Environmental Protection (EnvP) Program. See Section 9 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for details [4].

The *Port Hope Project Environmental and Biophysical Monitoring Plan* (PHP Environmental and Biophysical Monitoring Plan) [25] defines the methodologies and protocols followed in performing the environmental monitoring as outlined in section 9.2

### **9.2 Environmental Assessment Follow-Up and Monitoring**

#### **9.2.1 Environmental Monitoring**

##### **9.2.1.1 Methodology**

The monitoring activities reported in this section were led by CNL, including the collection of the field data.

Laboratory analytical services were provided by an accredited laboratory under contract to CNL. The laboratory is accredited to ISO/IEC 17025.

The methodologies and protocols followed in performing the environmental monitoring are described in the PH Project Environmental and Biophysical Monitoring Plan [25].

##### **9.2.1.1.1 Operational Groundwater Monitoring**

Seventeen on-site PH LTWMF observation wells were scheduled to be sampled in 2020, as identified in Appendix B, Table B-1. Observation well 1-75 was decommissioned in 2016 as it was within the footprint of the LTWMF, and it will not be replaced. Observation Well 9-75 was damaged and was replaced by WC-LTWMF MW-06 in 2017. Observation Wells 2-75, 12-75 and 18-76 were decommissioned in 2018 as part of the LTWMF activities, with no plans to replace. Observation Wells 2-87 and 5-79 were decommissioned in 2017. Reinstallation of these wells took place in 2019 May with WC-OW2-19 (2-87) and WC-OW5-19 (5-79). Observation Well 36-76 cannot be located with no plans to replace. The remaining 9 wells were sampled in 2019 spring and fall. The locations of the observation wells are shown in Appendix A, Figure A-6. A summary of the results of the analyses are included in Appendix B, Table B-1. Full results are provided in Appendix C. These results are consistent with historical data.

##### **9.2.1.1.2 Domestic Wells**

In 2020 November, CNL voluntarily sampled domestic wells on 12 residential properties near the WWMF and analysed the samples for arsenic, radium-226, uranium and nitrate concentrations as well as for pH. Residents will be notified in writing about the results. The results are currently being reviewed.

##### **9.2.1.2 EA Follow-Up and Environmental Monitoring**

Section 3.2.9, Environmental Protection and Monitoring, Conditions 2.9 to 2.11 of the PHP LCH [2] applies specifically to the natural environment and associated monitoring.

The purpose of an EA Follow-up Program and the associated Environmental Monitoring Program is to confirm that the environmental effects of a project are consistent with the predictions of the EA and, if they are not, to identify measures to further address those effects.

The primary objectives of the environmental monitoring program are the following:

- Confirm predicted effects by the EA by means of monitoring, sampling, measurements, and analysis.
- Demonstrate compliance with license requirements and follow-up program requirements as stipulated in the PHP Project Environmental Biophysical Monitoring Plan [25].
- Demonstrate the effectiveness of containment and effluent control, and provide public assurance of the effectiveness of containment and effluent control.
- Provide data to refine the EA predictions and identify any deviations, positive or negative, in environmental parameters and COPCs.

The secondary objectives of the program are the following:

- Provide data to support operations and plan future phases of the PHAI.
- Provide resources and data that will be of value in the event of an unplanned event.
- Demonstrate due diligence.
- Meet stakeholder commitments.

The EA monitoring program is structured using as a framework the six sub-programs of follow up actions. These programs collectively incorporate all of the individual activities required for tracking the follow-up actions prescribed in the *Screening Report for the Port Hope Long-Term Low-Level Radioactive Waste Management Project* (PHP Screening Report) [26] and involves monitoring the atmospheric environment (air pollution, noise pollution), geology and groundwater (groundwater flow and quality) and aquatic environment (surface water, drainage water quality). The details of the program can be found in the *Port Hope Project Environmental Assessment Follow-up Program* (PHP EA Follow-up Program) [27]. This report contains information collected during the 2020 monitoring programs; the status of the Environmental Assessment (EA) commitments for the biophysical effects follow-up monitoring are summarized in Appendix E.

#### **9.2.1.3 Methodology**

The monitoring activities reported in this section were led by CNL, including the collection of the field data.

Laboratory analytical services were provided by a laboratory accredited to ISO/IEC 17025, under contract to CNL.

The methodologies used and protocols followed in performing the environmental monitoring are described in the PHP Environmental and Biophysical Monitoring Plan [25].

#### **9.2.1.4 Atmospheric Environmental Monitoring**

The prescribed EA follow-up monitoring activities in the atmospheric environment include elements associated with air quality (radiological and non-radiological parameters) and noise.

#### 9.2.1.4.1 Suspended Particulate Matter (TSP and PM<sub>2.5</sub>)

Air quality monitoring addressed concentrations of suspended particulate that could have been caused by project activities. Two types of suspended particulate were measured:

- Total suspended particulate (TSP) comprising particle sizes < 44 µm in diameter.
- Particulate Matter 2.5 µm (PM<sub>2.5</sub>) comprising particulate matter with particle sizes < 2.5 µm in diameter.

##### **Port Hope LTWMF**

Air quality monitoring was conducted throughout 2020 around the PHP Site. A holiday shutdown took place from 2020 December 21 to 2021 January 04. The monitoring program used high-volume (Hi-Vol) air samplers operating at 4 locations for both TSP and PM<sub>2.5</sub>. The locations included Welcome South, Welcome Northwest, Welcome Weather Station and 192 Toronto Road. Air quality monitoring locations are provided in Appendix A, Figure A-1 for the PH LTWMF.

Between 136 and 170 samples were collected from each air sampler (TSP and PM<sub>2.5</sub>). A total of 1,305 samples were analyzed during the year. A summary of the sampling results is provided in Appendix B, Tables B-6, B-7, B-8 and B-9. The Overriding Limit of 120 µg/m<sup>3</sup> for TSP, as defined in the *Port Hope Area Initiative Dust Management Requirements and Plan* (PHAI Dust Management Requirements and Plan) [28] was exceeded once in 2020 at the Welcome Northwest location on 2020 January 17. The exceedance was likely due to off-site activities. This exceedance is believed to be from an off-site source based on the wind direction and the absence of real-time dust exceedances from contractor and independent real-time dust monitoring. A confirmed source could not be identified. The exceedance represents approximately 0.63% of the total TSP samples at the Weather Station location. Exceedances were reported through CNL's ImpAct system, and appropriate follow-up action was performed. CNL notes that the same criteria is found in *Ontario's Ambient Air Quality Criteria* (AAQC) [29].

It should be noted that in 2012, the Canadian Council of Ministers of the Environment (CCME) adopted the Air Quality Management System as a new comprehensive approach to managing air issues [30]. Canadian Ambient Air Quality Standards for Fine Particulate Matter are included, which replace the Canada-wide standards developed in 2000. A 2020 value of 27 µg/m<sup>3</sup> is proposed for PM<sub>2.5</sub>. The PM<sub>2.5</sub> results (98<sup>th</sup> percentile averaged over 3 years) were compared to this value as a proactive approach to current industry guidelines. PM<sub>2.5</sub> values were at or below this level. The *Port Hope Long-Term Low-Level Radioactive Waste Management Screening Report* (PHP Screening Report) [26] predicted that PM<sub>2.5</sub> will exceed the 24-hour AAQC [29] at some off-site locations.

##### **Additional Analysis – PH LTWMF**

The sample containing the highest net weight of TSP collected each week at each of the Hi-Vol monitoring stations was sent for additional analysis to determine the concentration of metals and radionuclides in suspended dust. The PHP Screening Report [26] predicted that the 24-hour AAQC [29] will be exceeded on occasion for arsenic and cobalt at off-site locations. There were no exceedances for arsenic or cobalt in 2020. There were no other exceedances of the AAQC [29] in 2020. A summary of the results is provided in Appendix B, Tables B-10, B-11, B-12 and B-13. It should be noted that elevated results for uranium and silver appear to be related to elevated detection limits with the new contract laboratory in 2020.

The PHP Screening Report [26] identified that predicted levels of radionuclides would be below Health Canada reference levels. Radium-226, thorium-232 and uranium exceeded the predicted values for some of the filters in 2020; however, they remained well below the Health Canada reference values. It should be noted that the exceedances of the predicted values appear to be related to laboratory detection limits (uncalculated laboratory results were less than the limit of detection for radium-226 and thorium-232). The predicted values were based on modeling PM<sub>10</sub> concentrations. Comparing particulate radioactivity on TSP filters to the modelled predictions is taking a conservative approach.

#### ***Pine Street Extension Consolidation Site Remediation***

In 2020, atmospheric monitoring was conducted as part of the baseline monitoring requirements prior to the anticipated remediation of the PSE CS scheduled for 2021. The locations for Hi-Vol stations were at the Jack Burger Sports Complex, Port Hope High School and Cavan Candies. Hi-Vol stations were deployed in 2020 October. PSE CS air quality monitoring locations are provided in Appendix A.

Between 34 and 36 samples were collected from each air sampler (TSP and PM<sub>2.5</sub>). A total of 213 Hi-Vol samples were analyzed at the PSNE CS in 2020. These include samples collected are additional baseline data collected prior to remediation anticipated for 2021. A summary of the sampling results is provided in Appendix B, Tables B-14, B-15 and B-16. There were no exceedances of the Overriding Limit of 120 µg/m<sup>3</sup> for TSP, as defined in the PHAI Dust Management Requirements and Plan [28].

#### ***Additional Analysis – Pine Street Extension Consolidation Site***

The sample containing the highest net weight of TSP collected each week at each of the Hi-Vol monitoring stations was sent for additional analysis to determine the concentration of metals and radionuclides in suspended dust. There were no exceedances for arsenic or cobalt in 2020. There were exceedances of the *PHP Screening Report* [26] predicted values for uranium on some of the filters in 2020 due to a detection limit issue with the contract laboratory; however, they remained well below the Health Canada reference values. A summary of the results is provided in Appendix B, Table B-17, B-18 and B-19.

The PHP Screening Report [26] identified that predicted levels of radionuclides would be below Health Canada Reference Levels. Thorium-232 exceeded the predicted values for some of the filters in 2020; however, they remained well below the Health Canada reference values. It should be noted that the exceedances of the predicted values appear to be related to laboratory detection limits (uncalculated laboratory results were less than the limit of detection for radium-226 and thorium-232). The predicted values were based on modeling PM<sub>10</sub> concentrations. Comparing particulate radioactivity on TSP filters to the modelled predictions is taking a conservative approach.

#### **9.2.1.4.2 Independent Dust Monitoring**

Per the PHAI Dust Management and Requirements Plan [28], an Independent Dust Monitoring Program is carried out in addition to that conducted by the prime contractor and CNL to ensure that perceived organizational conflicts regarding dust monitoring results and work activities are avoided. Continuous monitoring occurs during the work hours, and results are reported on a 15-minute interval.

The Independent Dust Monitoring Contractor uses real-time monitors to measure TSP at the work site perimeter. The PHAI Dust Management and Requirements Plan [28] identifies the dust Action Level (AL) for a TSP monitor reading at the work site perimeter to be > 120 µg/m<sup>3</sup> averaged over 15 minutes. An exceedance

of a dust AL triggers an immediate response by CNL and the prime contractor to initiate corrective action to reduce dust levels.

Throughout the year, there were 0 confirmed instances when the 15-minute average exceeded the AL that were attributed to site activities at the PH LTWMF.

Real-time dust monitoring results from the Independent Dust Monitoring Program for the PH LTWMF construction are available at [www.phai.ca](http://www.phai.ca). The weekly reports include daily real-time dust measurements and a site map illustrating the locations of the independent real-time dust monitors.

#### **9.2.1.4.3 Noise Monitoring**

Noise monitoring is performed quarterly at several locations around the PH LTWMF and at the intersection of the LTWMF Access Road and Toronto Road to confirm the accuracy of predictions made during the EA and the effectiveness of mitigation measures. Due to COVID-19 Pandemic restrictions, the number of monitoring campaigns that were conducted was reduced from 4 to 2 in 2020 (January, November). The results of the campaigns, averaged logarithmically over 3 working days, are provided in Appendix B, Table B-20. The noise monitoring locations are presented in Appendix A, Figure A-2.

The PHP Screening Report [26] predicted an increase in noise levels of 12 dBA for residents adjacent to the LTWMF during construction and development. In comparing 2020 results to the 2015 results prior to the start of the EW3a/EW1 construction (when levels of activity around the site were comparatively low), it can be observed that slight increases are observed in the 2020 results, however all values were below the predicted range of 12 dBA and the World Health Organization's *Guideline for Community Noise* (WHO Guideline for Community Noise) [31] level of 70 dB over a 24-hour period. The 2020 results are similar to 2019 with no notable increases.

Spot noise monitoring at 1-hour interval measurements, morning and evening, is required seasonally during peak transportation activities as discussed in the PHP Environmental and Biophysical Monitoring Plan [25]. Noise monitoring along the transportation routes took place in 2020 on the North Transportation Route, Central Transportation Route and South Transportation Route as outlined in Appendix B, B-21. The noise monitoring locations are presented in Appendix A, Figure A-3, A-4, A-5. Additional baseline data was collected prior to the transportation routes being used by CNL in 2018, as indicated in Appendix B, Table B-21. CNL collected hourly measurements from 7 am to 7 pm for each campaign. The daily averages are reported in Appendix B, Table B-21. Monitoring occurred during the following time periods: North Transportation and Central Routes (December) and South Transportation Route (February, August and December). In 2020, location NTR-002 from the Northern transportation was relocated due to the loss of location. The new location for NTR-002 is within a few metres of the previous location.

Monitoring results for the South Transportation Route showed little to no increase from the 2018 baseline monitoring. The Central Transportation Route showed little difference in the 2020 baseline monitoring when compared to the 2018 baseline. The Northern Transportation Route showed a slight increase in the 2020 baseline monitoring when compared to the 2018 baseline.

### **9.2.1.5 Geology and Groundwater Monitoring**

The prescribed follow-up monitoring activities in the geology and groundwater environment include elements associated with soil quality, groundwater quality, and drainage/leachate water quality. Results of the monitoring are summarized in the following sections.

#### **9.2.1.5.1 Groundwater (Flow and Quality) Monitoring**

Groundwater flow and quality monitoring is performed twice per year at both the PH LTWMF and Highland Drive as part of the PHP EA Follow-Up Program [27].

##### ***PH LTWMF***

Of the 26 monitoring wells located around the PH LTWMF and monitored as part of the PHP EA Follow-Up Program [27], 21 wells were suitable for monitoring (levels and/or quality). These wells are presented in Appendix A, Figure A-6 and Appendix C. Groundwater monitoring well WC-MW2-02 could not be located, as it is buried under the shoulder of Brand Road. WC-MW1-02 was not sampled in 2020 as it is in need of inspection. WC-OW12-75, WC-OW18-76, WC-OW36-76 and WC-OW2-75 were decommissioned as part of PH LTWMF activities in 2018 and will not be re-installed. CNL is currently developing a scope of work for well maintenance and repair. If WC-MW1-02 and WC-MW2-02 cannot be recovered they will be re-installed by the Maintenance and Monitoring Phase. Note that wells WC-OW2A-75, WC-OW2-87 and WC-OW5-79 were decommissioned as part of the pond expansion project. Reinstallation of these wells took place in 2019 May with WC-OW2-19 (WC-OW2-87), WC-OW2A-19 (WC-OW2A-75) and WC-OW5-19 (WC-OW5-79). In 2017, WC LTWMF-MW-06 was installed to replace WC-OW9-75, which was previously damaged and in-operational.

Groundwater samples were collected and analyzed for contaminants twice in 2020. Results of these monitoring campaigns are provided in Appendix C. The results were compared against water quality criteria for potable groundwater conditions listed in Table A2.5 of the PHP Screening Report [26]. This is taking a conservative approach, as water is not potable on site, and ensures consistency with reporting from previous years. In addition, results were compared to the Ministry of the Environment, Conservation and Parks (MECP) groundwater standards, specifically *Table 3 Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition* [32].

Exceedances are the result of the effects of the current waste management facility, which does not have a complete engineered liner or cover system in place. Monitoring of the groundwater conditions will continue through the phases of the project, and improvements to groundwater quality are expected to occur as the WWMF is remediated and through natural attenuation.

Groundwater monitoring locations are depicted in Appendix A, Figure A-6. Groundwater levels were measured quarterly in 2020 and are presented in Appendix B, Table B-22. The average groundwater levels in monitoring wells are generally comparable to previous years.

##### ***Highland Drive***

In 2020, groundwater monitoring at the Highland Drive site took place as baseline monitoring prior to remediation activities. Of the 28 monitoring wells located around the Highland Drive site and monitored as part of the PHP EA Follow-Up Program [27] for groundwater quality, 24 wells were located/suitable for groundwater quality monitoring (see Appendix A, Figure A-7), PH-95-18 was unable to be sampled in 2020 as it was damaged. Sampling took place twice in 2020, as required by the PHP EA Follow-Up Program [27].



Groundwater samples were collected and analyzed for contaminants twice in 2020. Results of these monitoring campaigns are provided in Appendix D. The results were compared against water quality criteria for non-potable groundwater conditions as discussed in the PHP Screening Report [26] specifically, those depicted in Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition [32].

Exceedances are the result of the effects of the LLRW wastes comingled with the municipal solid wastes at the Highland Drive Landfill site. Monitoring of the groundwater conditions will continue through the phases of the project, and improvements to groundwater quality are expected to occur as the site is remediated. Once remediated, the source of the effects on groundwater will be removed and the groundwater in the vicinity of and downgradient of the landfill will naturally clean up through flushing and attenuation mechanisms and the installation of a permeable reactive barrier downgradient of the Highland Drive Landfill site.

Groundwater levels were measured quarterly in 2020 and are presented in Appendix B, Table B-24. Of the 41 monitoring wells required to be monitored as part of the EA Follow-Up program, 34 wells were located and deemed suitable for groundwater level monitoring. 30 wells had calculated water levels as reference groundwater elevation data was not available for 5 wells. These wells are presented in Appendix A, Figure A-7 and Appendix D.

#### **9.2.1.5.2 Sentinel Well – PH LTWMF**

Groundwater samples are collected twice per year, fall and spring, for the in-place management of arsenic under Cell 1 and Cell 2A/B at the PH LTWMF. Results are compared to averages from previous years to identify trends, as discussed in the PHP Environmental and Biophysical Monitoring Plan [25].

A trigger level concentration for arsenic that is 50% of the PWQO [19] for arsenic has been established. The trigger levels have been created as the primary down-gradient receptor of groundwater leaving the site is the tributary to Brand Creek, and Brand Creek is located west of the PH LTWMF. The PWQO [19] for arsenic is 100 µg/L. Thus, the internal trigger level for arsenic groundwater monitoring at the sentinel wells at the PH LTWMF is 50 µg/L.

Monitoring results are presented in Appendix B, Table B-23. No groundwater results in 2020 reached the internal trigger level of 50 µg/L. Note that wells WC-OW2-87, WC-OW2A-75 and WC-OW5-79 were decommissioned in 2017 fall due to the pond expansion activities. Reinstallation of these wells took place in 2019 May with WC-OW2-19 (WC-OW2-87), WC-OW2A-75 (WC-OW2A-19) and WC-OW5-19 (WC-OW5-79).

#### **9.2.1.5.3 Soil Monitoring**

The soil monitoring activities involved the collection and analyses of surface soil samples at off site perimeter locations at the PH LTWMF and the Highland Drive remediation site to determine if there has been an increase in contaminant concentrations in these areas as a result of wind-blown dust deposition. Soil located around the PH LTWMF and Highland Drive Landfill was sampled and analyzed for metals and radionuclides in 2020 as presented in Appendix B, Tables B-25, B-26, B-27, B-28, B-29 and B-30. The soil sampling locations are depicted in Appendix A, Figures A-8 and A-9.

#### **PH LTWMF**

The PHP Screening Report [26] predicted maximum concentrations of arsenic and cobalt at the perimeter of the PH LTWMF of 4.7 µg/g and 6.67 µg/g, respectively. In 2020, concentrations of arsenic (4.8 µg/g) and cobalt

(8.2 µg/g) were greater than these predicted concentrations at PH-WWMF-SS-01. Cobalt was above the predicted concentration at PH-WWMF-SS-03 (7.5 µg/g). All other sampling location were below predicted concentrations. Values above the predicted concentrations have been observed in previous years at these locations.

The PHP Screening Report [26] also indicated that thorium-230 concentrations would increase 63% over baseline during the construction of the PH LTWMF, to a predicted mean concentration of 97.7 Bq/kg (0.0977 Bq/g), and a maximum predicted concentration of 141.9 Bq/kg (0.1419 Bq/g). Thorium-230 concentrations in 2020 are above predicted mean and maximum values at some locations due to the laboratory detection limite. Data is provided in Appendix B, Tables B-25 to B-29.

### ***Highland Drive***

Remediation activities have not commenced at the Highland Drive site, and therefore the data provided in Appendix B, Table B.30 and Table B.31 will be used to supplement existing baseline data. The 2020 results are similar to the data collected in previous years.

#### **9.2.1.6 Aquatic Environmental Monitoring**

The Aquatic Environment Monitoring Program includes sampling surface water at Brand Creek, and Lake Ontario to verify the accuracy of the predictions made during the EA. The likely long term environmental effect is the improved water quality of Brand Creek due to the expected decrease in the contaminated water that currently infiltrates from the underlying groundwater, which eventually discharges to the surface water. In addition, a considerable reduction in contaminant loading from the discharged leachate is considered a long-term beneficial environmental effect of the project. However, slight increases are expected during the construction and remediation phase of the project. As a result, monitoring continues on a quarterly basis for these locations to confirm the EA predictions.

In 2020, additional pre-construction monitoring data was obtained for Brewery Creek, Highland Drive South Creek and Alexander Creek in anticipation of upcoming remediation activities. Results of the monitoring are summarized in the following sections.

The detection limits for cadmium and selenium for surface water samples are elevated relative to the CWQG [20]. This is a laboratory issue and has been corrected moving forward for samples collected in 2020. All other detection limits provided meet the PWQO [19], which are referenced in the EA.

##### **9.2.1.6.1 Brand Creek Watershed**

###### **9.2.1.6.1.1 Surface Water Monitoring**

The water flowing in Brand Creek is sampled on a quarterly basis at 4 locations. Results were compared to the PWQO [19] and CWQG [20] where available. The 2020 laboratory results are provided in Appendix B, Tables B-32, B-33, B-34 and B-35. The surface water monitoring locations are presented in Appendix A, Figure A-10.

Results are generally consistent with the monitoring data from 2015 to 2020, suggesting that construction of the PH LTWMF is not having an adverse effect on Brand Creek water quality.

An increase in uranium concentrations were observed in one of the tributaries of Brand Creek (sample location BC-T) relative to the other locations. Exceedances of the PWQO [19] were noted in the 2020 January and 2020 May samples for uranium. This tributary is fed mainly by Clark's Ditch, which receives surface water runoff from the PH LTWMF. Exceedances for uranium have been observed in previous years, prior to the construction of the PH LTWMF. The water quality of this tributary is expected to improve over time as remediation progresses.

It should be noted that the provincial and/or federal criteria for iron, chloride and phosphorus were exceeded at both downstream and upstream locations in 2020; however, this is consistent with monitoring data from previous years. As discussed in the PHP Screening Report [26], the streams in the Local Study Area exceeded for phosphorus, iron and aluminum, which is typical for agricultural/urban watersheds in the region. This suggests that an off-site source may be responsible for these elevated levels. Elevated levels of chloride are consistent with monitoring from previous years. It is suspected that the elevated chloride concentration may be due to road salt as Highway 401 is located just to the north of the PH LTWMF.

At the upstream location in 2020 July, arsenic and fluoride were above CWQG [20] and cobalt was above PWQO [19]. Similar results were observed at the tributary (BC-T). Arsenic exceeded the CWQG [20] and cobalt and aluminum exceeded the PWQO [19] in 2020 July.

#### **9.2.1.6.1.2 Storm Event Monitoring**

Brand Creek was monitored hourly during 1 storm event in 2020. The contaminant concentrations were observed to peak as Total Suspended Solids (TSS) increased (Appendix B, Table B-36). Concentrations of phosphorus, chloride and iron were observed to exceed the PWQO [19] and/or CWQG [20] as TSS increased. As noted above, elevated concentrations of aluminum, phosphorus, chloride and iron are typical for agricultural/urban watersheds in the region. Concentrations of Contaminants of Potential Concern (COPC) associated with the PHAI are predicted to improve in surface water once the project is completed.

#### **9.2.1.6.2 Surface Water – Lake Ontario Diffuser**

The surface water quality of Lake Ontario is sampled at the PHAI diffuser to verify that the water quality in the vicinity of the PH LTWMF leachate discharge and the associated mixing zone is not affected by PH LTWMF operations. The mixing zone is approximately 12 m around the diffuser. Sampling is conducted at the diffuser (location BC-LO-D) and approximately 20 m east and west of the diffuser (location BC-LO-E and BC-LO-W respectively), as presented in Appendix A, Figure A-10. Results are provided in Appendix B, Table B-37, B-38 and B-39. Sampling was not conducted in 2020 spring due to COVID-19 Pandemic restrictions.

There were no exceedances of the PWQOs [19] or CWQGs [20], with the exception of fluoride. Fluoride was elevated in 2020 July and October at BC-LO-E and in 2020 October at BC-LO-D. As discussed in the PHP Screening Report [26], the elevated fluoride concentrations are typical for the nearshore zone of the lake in this region.

Other monitoring results are generally consistent with the monitoring data for the past few years, suggesting that PHAI operations are not having an adverse effect on water quality.

### **9.2.1.6.3 Drainage Water**

The leachate from the PH LTWMF mound (called drainage water) collected in the treatment ponds was sampled twice in 2020 (May and October). Results are presented in Appendix B, Tables B-40, B-41, B-42 and B-43. Locations are depicted in Appendix A, Figure A-11. The drainage water location WC-SW4-02 was unable to be sampled in 2020 at this location due to insufficient water. Historically, this location has had intermittent drainage water present, and samples cannot always be collected. Changes in drainage water quality and volume are expected to occur after remediation work commences. It should be noted that drainage water on site is treated prior to release to the environment.

### **9.2.1.6.4 Brewery Creek Watershed**

#### **9.2.1.6.4.1 Surface Water Monitoring**

The PHP Screening Report [26] predicted that the removal of contaminated materials from the remediation sites is expected to result in improvements to down-gradient surface water quality; for example, concentrations of arsenic and uranium in Brewery Creek should decrease by 78% to 88% in the longer term.

The water flowing in Brewery Creek is sampled on a quarterly basis at 2 locations. The sampling in 2020 is to be considered as pre-construction phase. Results were compared to the PWQO [19] and CWQG [20] where available. The 2020 laboratory results are provided in Appendix B, Tables B-44 and B-45, and the monitoring locations are presented in Appendix A, Figure A-12.

Results are all less than the PWQO [19] and CWQG [20] with the exception of chloride and iron. Chloride was elevated above the CWQG [20] for all monitoring campaigns in 2020, which as stated in the *PHP Screening Report* [26] is typical downstream of a landfill. Iron exceeded at the downstream location (GRT-3B) in 2020 January only, but the overall 2020 average for iron was below the PWQO [19] and CWQG [20]. No other exceedances of the PWQO [19] or CWQG [20] were noted in the Brewery Creek watershed.

### **9.2.1.6.5 Highland Drive South Creek Watershed**

#### **9.2.1.6.5.1 Surface Water Monitoring**

Highland Drive South Creek is subject to the influences of the Highland Drive Landfill as it is located downgradient. As discussed in the *Port Hope Project Environmental Assessment Study Report* (PHP EA Study Report) [33] the evaluation of water quality changes in Highland Drive South Creek based on expected changes in loadings from groundwater, indicated that concentrations of key contaminants in the creek, uranium and arsenic, would not be increased during the site remediation and would decrease by 78% to 88% in the longer term.

The water flowing in Highland Drive South Creek is sampled on a quarterly basis at 2 locations. Results were compared to the PWQO [19] and CWQG [20] where available. The 2020 laboratory results are provided in Appendix B, Table B-46 and B-47 and the monitoring locations are presented in Appendix A, Figure A-13.

Results are below the PWQO [19] and CWQG [20] with the exception of arsenic, boron, chloride, fluoride, iron, phosphorus and uranium at both the up- and down-stream locations and arsenic at the downstream location.

The sampling conducted in 2020 is considered to be pre-construction monitoring, as outlined in PHP Environmental and Biophysical Monitoring Plan [25]. Therefore, elevated results from the 2020 sampling have

not been impacted by remediation activities and are consistent with the results from the baseline sampling in 2013.

#### **9.2.1.6.5.2 Sediment Monitoring**

The sediments in Highland Drive South Creek are required to be sampled 2 times in 2020, as outlined in the pre-construction phase of the PHP Environmental and Biophysical Monitoring Plan [25]. Results were less than the *Provincial Sediment Quality Guidelines* (PSQG) [34] and the Canadian Council of Ministers of the Environment (CCME) *Sediment Quality Guidelines for the Protection of Aquatic Life* [35], with the exception of arsenic. Arsenic exceeded the PSQG [34] Lowest Effect Level (LEL) and CCME Interim Sediment Quality Guideline (ISQG) [35] for both sampling campaigns in 2020. The 2020 May sample exceeded the PSQG LEL [34] and CCME ISQG [35]. The 2020 October sample exceeded arsenic for the PSQG LEL and SEL [34] and CCME ISQG and Probably Effect Level (PEL) [35]. These exceedances were predicted in the *PHP EA Study Report* [33], due to the influence of the Highland Drive Landfill. The *PHP Screening Report* [26] states that the effects on sediment quality are directly related to the effects on the surface water, therefore, contaminant concentrations are expected to decrease in the longer term, after the remediation of the Highland Drive Landfill is complete. The 2020 laboratory results are provided in Appendix B, Tables B-48 and B-49, and the monitoring locations are presented in Appendix A, Figure A-13. Sediment samples were collected at the upstream location only (HC-U). Insufficient sediment was available at the downstream location to collect a sample.

#### **9.2.1.6.5.3 Storm Event**

Highland Drive South Creek was monitored hourly during one storm event in 2020. The sampling took place at the downstream location (HC-D) of the Highland Drive South Creek, as outlined in the pre-construction phase of the PHP Environmental Biophysical Monitoring Plan [25].

The contaminant concentrations were observed to peak as Total Suspended Solids (TSS) increased. Concentrations of fluoride, chloride, arsenic, boron, iron and uranium were observed to exceed the PWQO [19] and/or CWQG [20] as TSS increased. Concentrations subsequently reduced as TSS levels declined. COPCs associated with the PHAI are predicted to improve in surface water once the project is completed. The 2020 laboratory results are provided in Appendix B, Table B-50 and the monitoring locations are presented in Appendix A, Figure A-13.

#### **9.2.1.6.6 Alexander Creek Watershed**

##### **9.2.1.6.6.1 Surface Water Monitoring**

The Alexander Creek watershed surface is required to be sampled quarterly, as outlined in the PHP Environmental Biophysical Monitoring Plan [25]. The PHP EA Study Report [33] states that the removal of contaminated materials at the remediation sites, Alexander Street Ravine, is expected to result in a long-term improvement to the down-gradient surface water quality.

Results were compared to the PWQO [19] and CWQG [20], where available. The 2020 laboratory results are provided in Appendix B, Tables B-51 and B-52, and the monitoring locations are presented in Appendix A, Figure A-14.

Results are less than the PWQO [19] and CWQG [20] with the exception of phosphorus, chloride and iron at both sampling locations, AC-1 and AC-3. Uranium exceeded only at the downstream location, AC-3. As discussed in the PHP Screening Report [26], the streams in the Local Study Area exceeded for phosphorus and iron, which is typical for agricultural/urban watersheds in the region. As well, uranium is historically elevated in Alexander Creek, likely due to the influence from Alexander Street Ravine.

The sampling conducted in 2020 is considered to be pre-construction monitoring, as outlined in PHP Environmental and Biophysical Monitoring Plan [25]. Therefore, elevated results from the 2020 sampling have not been impacted by remediation activities.

#### **9.2.1.6.7 Surface Water – Port Hope Harbour**

Water quality was monitored at 3 locations in the Port Hope Harbour as shown in Appendix A, Figure A-15. The 2020 sampling results are provided in Appendix B, Tables B-53, B-54 and B-55. Sampling was not conducted in 2020 spring due to COVID-19 Pandemic restrictions.

No exceedances of the PWQO [19] or CWQGs [20] were observed from the surface water sampling in the Port Hope Harbour in 2020. Results of the 2020 sampling campaign remained relatively consistent to monitoring data collected in previous years. Once contaminated sediment is removed from the harbour, water quality is predicted to improve.

Turbidity monitoring was conducted by the Prime Contractor daily during in-water and near-water works in 2020 from January until March 12. Monitoring ceased after 2020 March 12, due to COVID-19 Pandemic restrictions. When work re-commenced, turbidity monitoring was re-initiated in 2020 December, under a new contractor. Turbidity was monitored at 3 locations (1 location upstream in the Ganaraska River and 2 locations south of the Wave Attenuator). Turbidity values in the harbour area turbidity values were observed up to 358.00 FNU in 2020. Large ranges in turbidity were observed due to seasonal and weather variances highly influenced by Lake Ontario and the Ganaraska River. There were no dredging activities that occurred in 2020. There were no sediment releases in 2020. Installation of remote turbidity monitors is scheduled for 2021 spring.

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## **10 EMERGENCY MANAGEMENT AND FIRE PROTECTION**

### **10.1 Emergency Preparedness Program**

The PHP adheres to the Corporate Emergency Preparedness Program. See Section 10.1 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for details [4].

The *Port Hope Area Initiative Emergency Plan* (PHAI Emergency Plan) [36] has been developed to describe the planning and operational requirements for the response to an emergency directly or indirectly affecting the PHAI projects. The PHAI Emergency Plan [36] is consistent with CNL's Corporate Emergency Preparedness Program which ensures all components of emergency preparedness and response are effectively maintained. Contractors conducting work as part of the PHAI submit emergency preparedness plans to CNL for review and approval to ensure contractor site plans meet the requirements of the PHAI Emergency Plan [36]. Contractor compliance with project-specific emergency preparedness plans are examined as part of CNL's Oversight Program.

There were no revisions to PHAI Emergency Plan [36] in 2020.

#### **10.1.1 Drills and Exercises**

All 2020 prescribed annual fire drills were completed as per program and regulatory requirements. Site emergency plans were updated in conjunction with changed personnel and processes impacted by COVID-19 Pandemic restrictions. Staff training on emergency procedures was completed in parallel to improved emergency notification infrastructure upgrades. In addition, local emergency services were dispatched to sites where faulty fire alarm switches were identified. Work continued on the development of a PHAI 5 year Exercise and Drill Plan to support improved planning and monitoring of annual drill expectations. The COVID-19 Pandemic triggered a need to complete table-top exercises on COVID-19 Pandemic Contact Tracing and associated protocols.

#### **10.1.2 Training**

In 2020, comprehensive retraining for CNL Emergency Stewards and Officer in Charge Personnel was completed in conjunction with updated emergency plans.

#### **10.1.3 External Collaborations**

In 2020, participation with external responders and local emergency authorities for response readiness were limited due to COVID-19 Pandemic restrictions associated with the mandatory requirement to avoid all non-essential field-level interactions.

#### **10.1.4 Unplanned Emergency Events**

No PHP incidents required activation of the EOC/SEP in 2020.

### **10.2 Fire Protection Program**

The PHP adheres to the Corporate Fire Protection Program. See Section 10.2 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for details [4].

The PHP program includes a combination of site level fire plans, fire notification and protection systems,

inspections and training on hazard identification, control, emergency response and fire extinguisher training. In 2020, several fire-screening assessment were completed in support of CNL's ECC process for capital and maintenance / repair projects.

There were no revisions to PHAI PHP Fire Protection documents in 2020.

#### **10.2.1 Fire Response Drills**

In 2020 all required annual fire response drills were completed across PHP sites. Drill responses identified requirements for updated notification processes, improved training and awareness on response procedures for previously newly assigned Emergency Stewards. Updated Officer In Charge and Emergency Steward training was conducted for all PHP sites to correct the deficiencies noted.

#### **10.2.2 External Collaborations**

In 2020, participation with external responders and local emergency authorities for response readiness were limited due to COVID-19 Pandemic restrictions associated with the mandatory requirement to avoid all non-essential field-level interactions.

#### **10.2.3 Third Party Audits and Inspections**

In 2020, all routine PHP fire-protection program required inspections were completed. Inspections were completed using standard inspection forms and processes with no significant deficiencies noted with respect to fire hazards and necessary protective measures.

#### **10.2.4 Fire Hazard Analysis**

In 2020, several fire screening assessments were completed for various maintenance and capital improvement projects in accordance with CNL's ECC program.



## **11 WASTE MANAGEMENT**

### **11.1 Waste Management Program**

The PHP adheres to the Corporate Waste Management Program. See Section 11.1 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for details [4].

Additionally, the PHP follows Waste Management Plans to ensure continued support to all waste generators in meeting the strategic priorities and CNL business needs:

- Management of Historic Artefact Recovery Program (HARP)
- Port Hope Project – Management of Historic LLRW
- Cameco Decommissioning Waste Management Plan
- Reconfiguration of Administration Building at 196 Toronto Road.

#### **11.1.1 Waste Management Operations**

The waste located at remediation sites in Port Hope will be transported to the PH LTWMF. The PH LTWMF site includes a wastewater treatment plant, an aboveground engineered storage mound under construction and supporting infrastructure under construction. The Facility will have a capacity of approximately 2 million cubic metres of LLRW and non-radioactive Industrial Waste.

The engineered aboveground mound at the PH LTWMF has been designed to isolate the historic LLRW that will be received from the remediation sites by securely encasing it on the top, bottom and sides with thick, multiple layers of natural and specially manufactured materials. These layers form components of the cover and baseliner that, independently, are robust enough to prevent contaminants from entering the environment.

The mound has a capacity of approximately 2,000,000 cubic metres of waste (including contingencies and daily clean soil cover materials). Systems will be installed within and around the mound that will monitor it for hundreds of years. Inspections and monitoring of the collection system for contaminated water (leachate) will confirm the effectiveness of the cover system. Sensors in both the cover and the baseliner will monitor performance, while groundwater quality will be monitored through ongoing testing of specially designed wells surrounding the base.

The waste is generated in accordance with the remediation project plans and is transported from the remediation sites to the PH LTWMF via tandem or triaxle dump trucks. The non-radiological waste is diverted from the PH LTWMF site, and is delivered to off-site facilities. The radioactive waste, or other waste deemed acceptable for receipt at the PH LTWMF is received and placed in accordance with standard operating procedures.

#### **11.1.2 Waste Inventory**

On-site waste movement occurred from 2020 January 01 to 2020 December 31. Off-site waste deliveries to the PH LTWMF from various sites which included Cameco, Waterfront Sites, SSS and the CMP, and other waste sources such as on-site waste transfers listed in the table below.

### 11.1.2.1 Changes to Waste Inventory

**Table 10: Stored Waste Inventory in Error!** Reference source not found.

Waste Type	Source	Total Estimated Quantity (volume/weight)	Total Estimated Radioactivity (Bq) [Calculated/ Measured]	Primary Radionuclides
Radioactive	PH WWTP	818 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	PH LTWMF – On-Site Waste Placement	0 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	PH LTWMF – Forested and Brush Area	39,986 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	Cameco – Supersacks and Drums	1,307 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	Cameco – Dump Trucks	5,548 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	TSS (STP, SC)	0 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	Small Scale Sites – Package 2, 3 and 4 Waste	27,935 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	Waterfront Sites	12,090 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	Harbour-Centre Pier	2,709 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	Construction Monitoring Program	518 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	Off-Site Waste Water	2,222 metric tonnes	N/A	Uranium and Uranium Progeny

### **11.1.3 Waste Processing**

The production and handling of residual wastes were generated from the water treatment process upon final active commissioning of the waste handling equipment (2017 December). Further testing and optimization of these and associated processes took place once commissioning activities were complete. Processing of the solids generated from the operation of the clarifiers (i.e., Belt Press sludges) began in 2018 April and have continued on a full-time basis since then. A total of approximately 1553 metric tonnes of sludge product have been produced and transferred to the PH LTWMF holding cells to date.

### **11.1.4 Water Treatment**

The waste water collection and treatment system consists of interceptor ditches, a main collection pond, a treatment building, three settling ponds and twin discharge pipelines. The purpose of the former system was to capture groundwater and surface water that have come in contact with the waste, treat the water to reduce arsenic and uranium levels, and discharge the treated water to Lake Ontario.

Ditches around the perimeter of the waste storage area collect surface runoff and direct it overland toward the northwest quadrant of the facility, where the surface water and groundwater are intercepted by a large ditch that leads to the collection pond. Formerly water was pumped from the collection pond to the treatment building where ferric chloride was added, creating a ferric hydroxide precipitate. The treated water flowed by gravity to treatment ponds (south, centre and north) where the ferric hydroxide precipitate settles and removes arsenic and radium from solution/suspension. The clarified water in the north treatment pond was fed to the treatment building and pumped through twin 4-inch (100-mm) diameter pipelines that extend three kilometres underground from the PH LTWMF to Lake Ontario.

The new PH WWTP which replaced the existing former system utilizes the same collection ditches and collection pond but also utilizes state of the art technologies including reverse osmosis, sand filtration, mechanical vapor recompression evaporators, slurry dryers and inclined plate clarifiers. The system utilizes these technologies to remove over 99% of the arsenic, uranium and other heavy metals in the influent water. The system discharges liquid effluent via the same twin 4-inch pipelines that were used from the former WTB.

#### **11.1.4.1 Water Treatment and Monitoring**

Influent and effluent samples were collected from the PH WWTP from fixed locations on weekly intervals throughout 2020. Grab samples were taken from a sample point on the pipeline feeding the treatment system and represented the treatment inflow. The treated effluent from the facility was sampled continuously by means of an interval sampler. A composite sample was collected to provide data on the effluent discharge.

The samples of treatment inflow and treated effluent water were submitted to a laboratory on a weekly basis to determine concentrations of the following parameters:

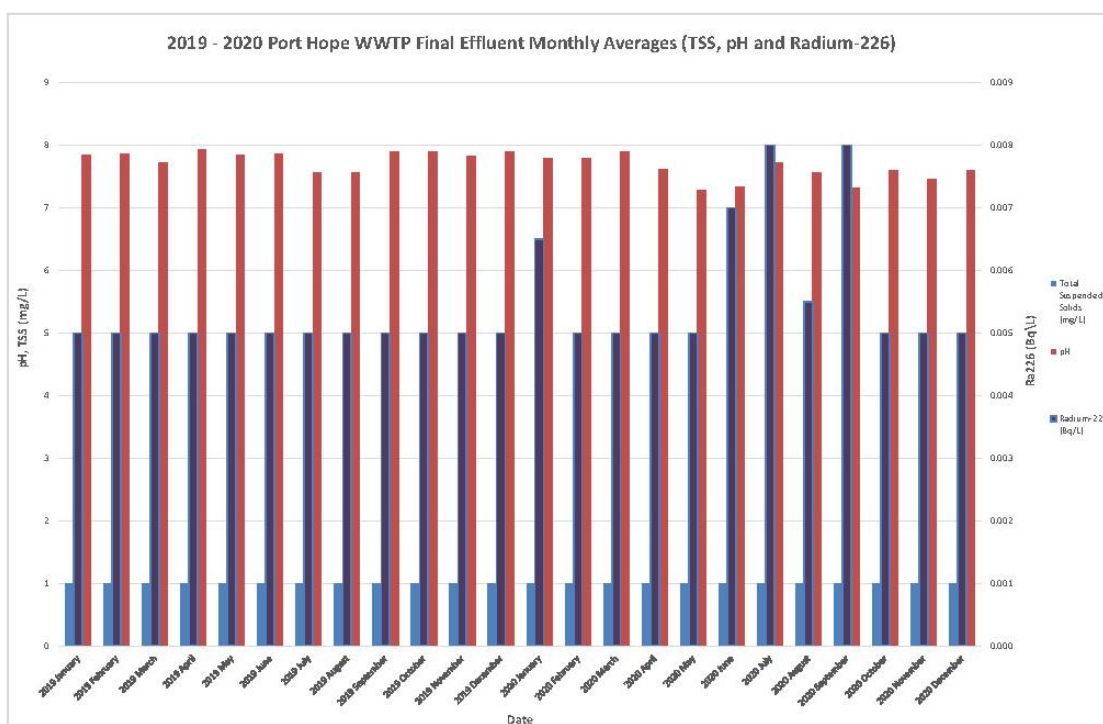
- Aluminum
- Arsenic
- Boron
- Copper
- Lead

- Uranium
- Zinc
- pH
- Total Suspended Solids
- Radium-226.

It is noted that the requirement to report concentrations of Boron was removed from the PH LTWMF license effluent release limits, as of 2020 April 20 [21].

For the reporting period, the monthly arithmetic mean values of the weekly analyses of the parameters listed above were calculated and are reported in Appendix B, Table B-2.

The Effluent Discharge Limits for the PH WWTP, as listed in Appendix B of the PHP Licence [1], specifies the monthly arithmetic mean concentration (total) of the contaminants of concern in the effluent discharge water shall not exceed the stated release limits. Additionally, effluent should not be acutely toxic as determined by monthly testing of the effluent. During the reporting period, none of the release limits were exceeded and the effluent was found not to be toxic. A summary of these analyses is provided in Appendix B, Tables B3 and B6. Histogram charts (Figures 1, 2, 3) have been prepared for the purposes of comparing year over year results of final effluent results from 2019 and 2020.



**Figure 1: 2019 to 2020 PH WWTP Final Effluent Monthly Averages (TSS, pH and Radium-226) Histogram**

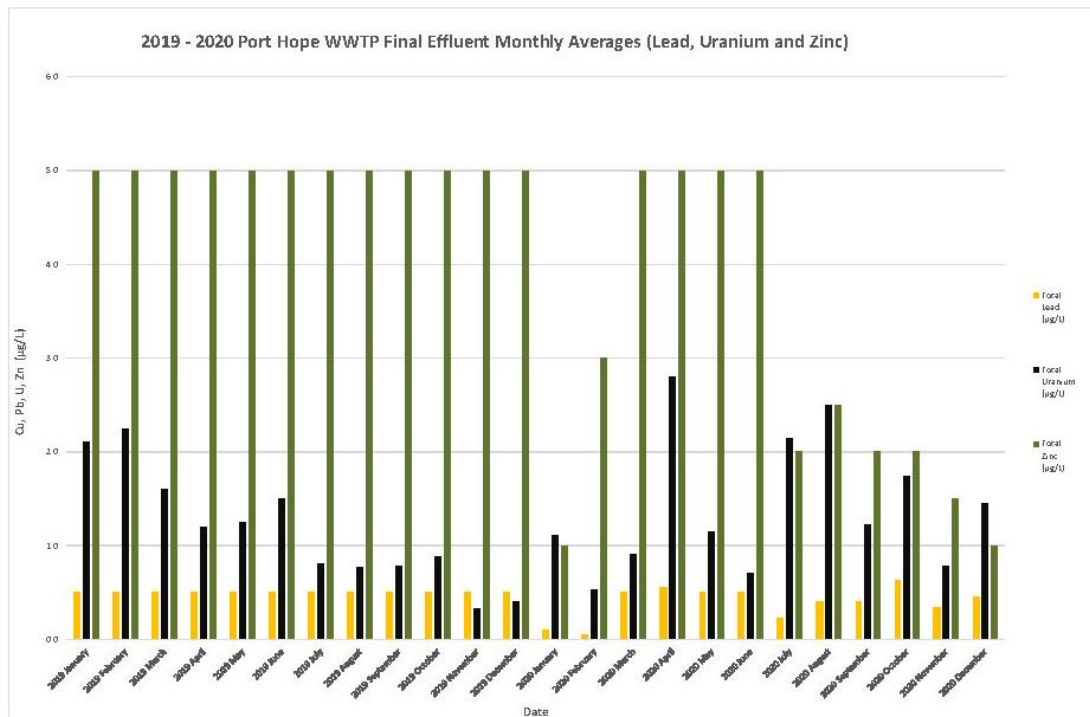


Figure 2: 2019 to 2020 PH WWTP Final Effluent Monthly Averages (Lead, Uranium and Zinc) Histogram

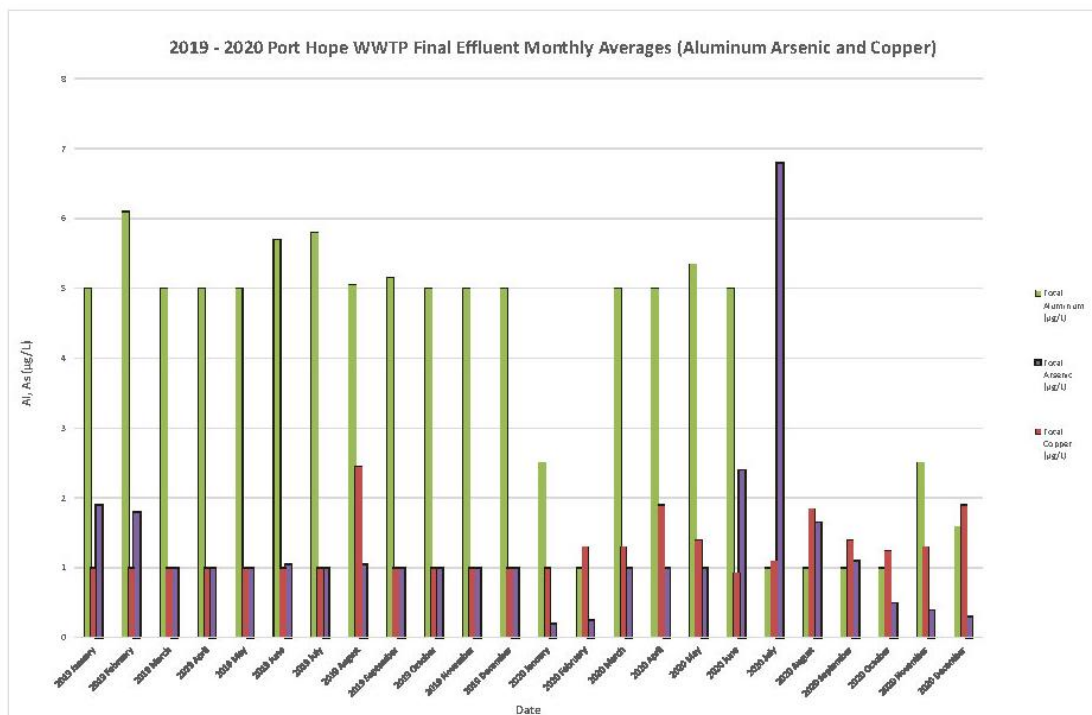


Figure 3: 2019 to 2020 PH WWTP Final Effluent Monthly Averages (Aluminum, Arsenic and Copper) Histogram

A total of 140,200 m<sup>3</sup> of effluent was discharged by the WWTP in 2020. This represents an increase of approximately 10 % in volume from 2019 recorded volumes.

#### **11.1.4.2 Residual Solids Treatment and Disposal**

The two solid waste streams operated as designed in 2020. As noted above, several key optimizations were made to improve the efficiency and throughput of these processes. The evaporators treat concentrate produced by the reverse osmosis systems and are designed to reduce the overall volume of this waste through the production of condensate. The condensate is combined with permeate generated from the reverse osmosis units and ultimately discharged to Lake Ontario. The evaporated concentrate (slurry) is fed to mechanical dryers for further dewatering. The dried slurry is transferred into bulk storage totes as a flowable solid which are transferred to the PH LTWMF for permanent disposal.

Dissolved solids in the influent liquid waste stream are chemically precipitated and collected as sludge in the clarifier vessels. These solids are stabilized using polymer compounds and held in batches prior to dewatering in the belt filter press. The filtration step removes excess water from the sludge prior to deposition into bulk storage totes which are then transferred to the PH LTWMF for permanent disposal. The decanted water is discharged back to the main collection pond for recirculating treatment.

A combined total of 743,600 kg of residual solid wastes were generated by the PH WWTP in 2020. This represents an increase of 15% in production recorded in 2019.

## **12 SECURITY**

### **12.1 Security Program**

The PHP adheres to the Corporate Security Program. See Section 12 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for details [4].

The *Port Hope Area Initiative Security Plan* (PHAI Security Plan) [7] has been implemented for the PHP. The plan establishes the security arrangements that are required for the PHAI projects. It addresses the responsibilities, linkages with local law enforcement, functions, and elements of the security plan such as training, drills, exercises and various physical security components. The purpose of the PHAI Security Plan [7] is to ensure the physical protection of the PHP assets and safeguarding of the public and personnel. The PHAI Security Plan [7] is based on applicable legislation, regulations and operating licences and is consistent with CNL's corporate security policies and programs.

Contractors conducting work as part of the PHAI submit security plans, which are consistent with the requirements of the PHAI Security Plan [7], for CNL's review and acceptance. Contractors' compliance with project-specific security plans is examined as part of CNL's oversight program.

There were no revisions made to the PHAI Security Plan [7] in 2020.

#### **12.1.1 Security Events**

In 2020, there were no security event(s) that affected the PHP.

## 13 SAFEGUARDS AND NON-PROLIFERATION

### 13.1 Safeguards Program

The PHP adheres to the Corporate Nuclear Materials and Safeguards Management (NM&SM) Program. See Chapter 13 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories - Part 1* for details [4].

CNL received concurrence from the CNSC that the project to dredge the harbour in Port Hope would not require the material to be tracked for the purposes of safeguards as it does not meet the criteria set forth in the *Comprehensive Safeguards Agreement* (INFCIRC/153 Article 34.c) [37] for the application of detailed nuclear material accountancy.

#### 13.1.1 Nuclear Materials Inventory

In 2020, the PH LTWMF (material balance area CNWF) received and placed approximately 152 metric tonnes of safeguarded materials (74,921 KgU) from Cameco (material balance area CNFN/CNWF) in accordance with the requirements of CNL's Nuclear Materials and Safeguards Management (NM&SM) program. See Table 11-2020 Nuclear Materials Inventory, PH LTWMF. The emplaced waste is categorised as retained waste. Part way through CY 2020, Cameco MBA code CNWE was setup for transfers of waste to the PH LTWMF (CNWF).

Due to changes in Safeguarded Material criteria, 2 accidental gains were accounted for during CY 2020 to account for the Natural Uranium that was previously shipped as non-safeguarded.

**Table 11: 2020 Nuclear Materials Inventory, Error! Reference source not found.**

Date	Shipment #	Cameco	PH LTWMF	Items	Safeguarded Waste kg U
1/23/2020	65677	CNFN	CNWF	17	452.500
1/30/2020	65705	CNFN	CNWF	16	1,645.400
2/19/2020	65788	CNFN	CNWF	23	2,620.800
2/19/2020	65790	CNFN	CNWF	15	5,571.100
2/21/2020	65791	CNFN	CNWF	18	5,775.500
3/6/2020	65830	CNFN	CNWF	4	358.000
7/23/2020	66501	CNWE	CNWF	40	7.874
8/6/2020	66562	CNWE	CNWF	29	7,212.300
8/6/2020	66563	CNWE	CNWF	40	307.100
10/20/2020	67002	CNWE	CNWF	28	7,672.400
10/15/2020	66964	CNWE	CNWF	24	10,740.900
10/15/2020	66965	CNWE	CNWF	24	10,020.600
10/20/2020	67033	CNWE	CNWF	24	10,564.200



Date	Shipment #	Cameco	PH LTWMF	Items	Safeguarded Waste kg U
10/20/2020	67015	CNWE	CNWF	24	11,952.800
10/14/2020	66967	CNWE	CNWF	48	9.844
10/14/2020	66966	CNWE	CNWF	48	10.672
Total				422	74,921.990

### 13.1.1 International Atomic Energy Agency Activities

The International Atomic Energy Agency (IAEA) conducted various activities at the PH LTWMF including the Physical Inventory Verification/Design Information Verification conducted on 2020 June 15 and the Complimentary Access that was completed on 2020 November 13.

A list of IAEA inspections conducted at all CNL sites can be found in Section 1.2, Management System of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for details [4].

## **14 PACKAGING AND TRANSPORT**

### **14.1 Packaging and Transport Program**

The PHP adheres to the Corporate Transportation of Dangerous Goods Program, which includes the requirements of the Packaging and Transport SCA. See Section 14 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for details [4].

The *Port Hope Area Initiative Transportation of Dangerous Goods Plan* (PHAI TDG Plan) [8] applies to any activities involving the transportation of dangerous goods to, or from, CNL sites. The TDG program provides an operational framework for the safe off-site transport of dangerous goods by conforming to all applicable laws and regulations, as well as company policies and procedures.

There were no revisions to the PHAI TDG Plan [8] in 2020.

#### **14.1.1 Shipments**

The implementation of the TDG program for the PHAI project is detailed in the *PHAI TDG Plan* [8]. Each contract is required to adhere to the PHAI TDG Plan [8], and project specific implementation is reviewed against the requirements of this plan. Shipments of dangerous goods have occurred throughout 2020. Furthermore, ongoing oversight of each contract is performed to ensure continuous adherence to the plan, or recommend incremental improvements to the means and methods to deliver a project.

There were no reportable events related to the TDG program in 2020.

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**15 OTHER MATTERS OF REGULATORY INTEREST****15.1 Public Information and Disclosure Program**

The PHP adheres to the Corporate Public Information Program. See Section 15 of the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for details [4].

CNL is committed to providing the public with effective access to timely information about the PHAI and the PHP. The objective of the PHAI Public Information Program (PHAI PIP) is to strengthen the community's understanding of and confidence in the project by ensuring the public and other stakeholders are informed about upcoming work and helping them understand project activities, programs, timing, environmental protection and mitigation measures, long-term benefits and economic opportunities. The PHAI PIP is undertaken in close cooperation with federal and municipal partners.

In March 2020, the *Port Hope Area Initiative Phase 2 Public Information Program Plan* (PHAI Phase 2 PIP Plan) [9] was updated to include additional Target Audiences, Tactics and Key Stakeholder Relations details to more accurately reflect current outreach activities and ensure alignment with the CNL Company Wide Public Information Program.

A number of previously planned activities scheduled for 2020 March to 2020 December could not be carried out due to COVID-19 Pandemic restrictions. The PHAI PIP was adapted wherever possible to conduct public interactions by phone, email and online through virtual meetings, presentations, community updates and information sessions.

CNL conducted 2 dedicated engagement campaigns in 2020. In 2020, CNL issued Last Chance to Participate letters to all Port Hope property owners who had not responded to multiple request for consent to conduct or continue Property Radiological Survey activities to confirm whether they wished to participate or be removed from the project. In 2020 September, a 3 month targeted engagement campaign was launched in support of CNL's *Application for Amendment of the Port Hope Long-Term Low-Level Radioactive Waste Management Project Waste Nuclear Substance Licence – WNSL-W1-2310.02/2022* [10] to revise the PHAI clean-up criteria (Application for Amendment to the PHP Licence Clean-Up Criteria). Details on these campaigns are provided under General Communications Tactics.

**15.1.1 Outreach and Stakeholder Engagement**

Strategic stakeholder relationships are developed and maintained through information exchange and feedback, to increase public support and cooperation as the PHP advances. CNL responds to specialized stakeholder needs, resulting in increased project awareness and enhanced relationship building.

**15.1.2 Communication****15.1.2.1 Website**

The PHAI website, PHAI.ca, provides information on the Port Hope and Port Granby projects, including descriptions of current and upcoming work, environmental monitoring reports, public disclosures and the

Property Value Protection (PVP) Program. The website also provides telephone and email points of contact for public enquiries.

The PHAI website received 23,617 visits and 65,160 page views in 2020.

#### **15.1.2.2 Social Media**

The PHAI Facebook, Twitter, LinkedIn and Instagram social media accounts are used to engage the community and drive users to the PHAI website for more complete information about current construction progress or events. CNL responds to questions or comments posted by members of the public on PHAI social media accounts as expeditiously as possible to reflect the rapid response of internet communications. Dialogue of relevance to the PHAI on other social media accounts is monitored and consideration given to posting timely corrections to inaccurate information about the PHAI.

In 2020, 25 inquiries were received via Facebook. CNL circulated 380 Facebook/Twitter posts and 35 Instagram posts covering subjects from project updates to interesting facts about project work, reaching an audience of more than 32,658.

#### **15.1.2.3 Public Information Office**

The PHAI Public Information Office, Port Hope, Ontario is open Monday to Friday, 8:30 a.m. to 4:30 p.m. Printed material provides information on the planning, design, implementation, environmental assessment, monitoring and mitigation of the projects, and on the Complaints Resolution and the PVP programs. Three-dimensional models of the Port Hope and Port Granby long-term waste management facilities are also on display. During COVID-19 Pandemic restrictions, the physical office space was and remains closed to the public; however, staff members are available to provide information and answer questions through email, telephone and social media. After-hours calls are received by an external agency and routed to a single-point of contact for follow-up.

#### **15.1.2.4 Dedicated Engagement Campaigns**

##### **15.1.2.4.1 Application to Amend Cleanup Criteria**

In September 2020, CNL launched a dedicated stakeholder engagement campaign in support of CNL's Application for Amendment to the PHP Licence Clean-Up Criteria [10]. The application resulted, in part, from community feedback on the impacts of the PHAI with property owners and other residents expressing strong frustration with timelines and the extent of cleanups in their neighborhoods and concern that PHAI work will result in significant undesirable changes to the urban tree canopy, the preservation of which is important to many citizens.

CNL implemented 51 engagement initiatives from 2020 September to December which included a dedicated web page, media releases and engagement, print, radio and social media advertising, community presentations, focus groups and a virtual information session.

##### **15.1.2.4.2 Decline-to-Participate Letter Campaigns**

In 2020, CNL issued 251 letters to Port Hope property owners who had not provided consent to participate in or continue the Property Radiological Survey to confirm whether or not they wished to be included in the

survey. By the 2020 December deadline, CNL had received confirmation of participation from 94 property owners and 34 requests to be removed from the PHP. Those who decline or do not respond receive *Removed from Project* letters indicating that they are no longer able to participate in the Small Scale Sites program.

#### **15.1.2.5 Project Newsletters**

PHP newsletters update the community on the status of the projects, upcoming work and changes to planned work or programs. Newsletters are distributed to every household in the MPH and to an extensive list of federal, provincial, regional and municipal stakeholders; newsletters are also available online at PHAI.ca.

The 2020 spring newsletter was distributed to approximately 8 000 homes, businesses and farms in the MPH and posted on the PHAI website.

The newsletter covered a range of topics including updates on CNL's response to COVID-19 Pandemic restrictions and subsequent return to work activities, clean-up choices for Port Hope property owners, CNL's Application for Amendment to the PHP Licence Clean-Up Criteria [10] and an update on remediation.

#### **15.1.2.6 Presentations**

Presentations on current and planned project activities and on the PVP Program, are provided to varied stakeholders including elected officials and staff at all levels of government, community groups, service clubs, Indigenous groups and local/national/international education, scientific, technical and business communities.

During the reporting period, 19 presentations were delivered on the PHAI and PHP.

#### **15.1.2.7 Site Tours**

Guided tours of project remediation sites and construction areas, led by expert CNL staff, provide a first-hand look at PHAI work, promoting a heightened understanding and appreciation for the complexity and importance of the projects. Tours illustrate the scope of project planning and implementation including environmental protection, compliance with occupational health and safety requirements, and conformance with EA monitoring obligations and adaptive management practices.

Tours are provided in response to requests from residents, all levels of government, community, local/national/international education and scientific/technical and business communities.

CNL delivered 1 public tour for 12 attendees in the months before COVID-19 Pandemic restrictions were implemented, after which time CNL provided video site tours using drone footage and photographs whenever possible.

#### **15.1.2.8 Information Sessions**

Information sessions are held as required to inform the community about upcoming PHAI work, provide updates on planned or changed project activity and programs, and receive feedback from the public. As remediation continues, information sessions are held for targeted, smaller groups to convey information and discuss concerns specific to the neighbourhood in proximity to the PHAI work.

A virtual Public Information Session was held in 2020 October as part of the public engagement campaign in support of CNL's Application for Amendment to the PHP Licence Clean-Up Criteria [10].

### **15.1.2.9 Participation in External Events**

As project ambassadors, CNL staff participates in external events to provide information about PHAI activities to a broader audience and increase awareness and understanding of the projects. With the impact of COVID-19 Pandemic restrictions, external events originally planned for 2020 were cancelled.

### **15.1.2.10 Media Releases**

CNL issued 4 media releases in 2020 to Port Hope-area media outlets including *Northumberland News* and *Classic Rock 107.9* to announce suspension and the subsequent restart of work activities due to COVID-19 Pandemic restrictions, the end of contract for work at the Port Hope Harbour, and the launch of the public engagement campaign in conjunction of CNL's Application for Amendment to the PHP Licence Clean-Up Criteria [10].

### **15.1.2.11 Community Notifications**

Residents and business owners in close proximity to PHAI-related activity are notified in advance of planned work and of notable changes to the schedule or nature of the work. Notification can occur through website postings, phone calls, emails or door-to-door visits / information drop-offs, depending on the timeframe and the capacity to receive the notification.

During the reporting period, CNL staff delivered notifications that reached more than 86 Port Hope properties through correspondence, phone calls, home or business visits to provide fieldwork updates and radiological survey results, and to discuss requirements and issues.

### **15.1.3 Small-Scale Site Communications**

All property owners in the urban Port Hope area receive a Consent and Scheduling Package explaining the Property Radiological Survey process and requesting written confirmation of their participation. Individual phone calls are made to schedule survey appointments and provide testing results for those properties with LLRW requiring remediation. Dedicated design meetings are then held with owners to review remediation and restoration plans for each property, explain the process and review the Remedial Action Plan. Prior to the start of work, a Neighbourhood Information Session is held for property owners and adjacent residents where CNL and contractor staff, explain work plans, answer questions and address concerns.

Communications staff is available by phone, email and in person to respond to property owner inquiries and concerns, and communications field staff are on site to address emerging issues.

More than 4,340 interactions related to the PHAI PHP SSS took place in 2020 including 3,881 phone calls and emails; 159 property owner meetings and 288 site visits.

On request by a property owner, CNL provides a Radiological Status Letter (RSL) confirming available results of any radiological investigation and remediation activities on the property to date. In 2020, CNL issued 341 RSLs for PHP properties.

#### **15.1.4 Key Stakeholder Relations**

##### **15.1.4.1 Municipal Liaison**

CNL regularly liaises with elected officials and staff of the host municipalities. As part of an agreed-upon framework for dialogue to keep municipalities abreast of PHAI plans and progress, CNL provides regular project and communications updates to municipal councils, committees and staff through a variety of media, as well as topical presentations upon request.

In 2020, CNL provided quarterly updates to the MPH on PHAI progress and provided updates on the Application for Amendment to the PHP Licence Clean-Up Criteria [10] as stakeholder engagement progressed.

##### **15.1.4.2 Agreement Monitoring Group**

Quarterly meetings of the Agreement Monitoring Group bring together representatives of both municipalities as signatories to the Legal Agreement [3], and representatives of AECL and CNL to provide updates on project activities, budget and schedule and to ensure project commitments outlined in the Legal Agreement [3] are reviewed and actioned. Four meetings were held in 2020, 3 of which were hosted through a virtual platform.

##### **15.1.4.3 Communications Working Groups**

The CNL/Port Hope Communications Working Group and the CNL/Cameco Communications Working Group meet on a quarterly basis as a forum to provide updates and ensure alignment on common communications interests of CNL and the MPH and CNL and Cameco.

##### **15.1.4.4 Business Community Liaison**

CNL is a member of the Port Hope and District Chamber of Commerce and staff provide monthly updates related to project progress, communications and Port Hope project-related economic opportunities. To provide access to CNL supply chain opportunities the PHAI website includes links to a Contractor Portal, Supply Chain Registration and Vendor Portal to connect potential or current suppliers with information on procurement opportunities for goods, services, equipment, decommissioning and construction.

PHAI communications staff participated in CNL's annual Industry Day providing a project overview and participating in 2 'Question and Answer' sessions during the day. Invitations were circulated to the Port Hope Chamber of Commerce and Indigenous groups.

#### **15.1.5 Education and Science & Technology Communities**

Presentations, site tours and program-specific information and demonstrations are provided to students at the elementary, high school, college and university level, and CNL participates on program advisory committees to provide industry perspective on the development of new programs and courses.

CNL actively participates in the annual Take Our Kids to Work Day event and other education events including the Junior Achievement World of Opportunity program and judging local science fairs. National and international education institutions, industry and professional groups also participate in PHAI presentations and site tours and CNL continues to develop outreach activities related to Science, technology, engineering, and mathematics (STEM) education.

Although these activities were limited due to COVID-19 Pandemic restrictions, a PHAI update and virtual tour was provided to the fourth-year nuclear engineering students at Ontario Tech University.

#### **15.1.6 Internal Communications**

As representatives of the PHAI, CNL employees must be aware of PHAI project activities on an ongoing basis. A wide variety of opportunities are provided to update employees on a weekly, monthly and quarterly basis.

In 2020, 61 internal communications initiatives were undertaken including weekly project updates, all-staff emails, virtual coffee chats with the General Manager, quarterly all-staff meetings and regular project update emails. In response to COVID-19 Pandemic restrictions, an internal web portal was developed to provide employees with quick access to online resources to support home schooling, entertainment and mental health concerns. Several new sections were added to the employee intranet in 2020, highlighting the work of individual departments including safety and IWC to provide quick access to resources.

#### **15.1.7 Atomic Energy of Canada Limited**

CNL's client, AECL, was kept apprised of CNL communications activities through ongoing engagement and weekly and monthly updates, and was informed of relevant communications issues and public disclosures as they arise.

In 2020, 26 notifications were provided to AECL staff on matters related to the PHP.

#### **15.1.8 Canadian Nuclear Safety Commission**

CNL keeps the CNSC apprised of activities through quarterly and annual reporting and ongoing engagement on relevant regulatory issues. CNL is required to notify the CNSC of any public disclosures at the same time as or prior to the disclosure. CNSC and CNL interactions are supplemented by regular meetings with regulatory, licensing, project and program staff.

In 2020, CNL provided quarterly reports on PHAI PHP and PGP communications activities.

#### **15.1.9 Questions and Issues Management**

##### **15.1.9.1 Complaints Resolution Program**

The PHAI Complaints Resolution Process (CRP) supports the resolution of public complaints arising from tangible, physical issues caused directly by the PHP and PGP. The process focusses on anticipating and proactively addressing concerns before they escalate into complaints.

In 2020, CNL received 7 official complaints related to the PHP, 5 of which were resolved at the CNL level. One complaint was escalated and resolved at the AECL level and 1 complaint was put on hold until 2021 spring to be re-assessed at that time, as agreed upon by the complainant and CNL.

#### **15.1.10 Reporting and Disclosure**

##### **15.1.10.1 Public Disclosure**

CNL is committed to providing open and transparent public disclosure, in alignment with CNSC regulatory document, REGDOC-3.2.1 *Public Information and Disclosure* [38] about unplanned project activities and non-



routine events that have off-site effects or could result in public interest and concern and/or media attention. Disclosure about unplanned project activities and events with little or no impact on people and the environment are posted on the PHAI website, typically within four business days, while key stakeholders may be notified through direct contact.

Consistent with REGDOC 3.2.1 [38], CNL informs the CNSC of disclosures made under this protocol at the time of or before the disclosure. In 2020, there were no public disclosures related to the PHP.

#### 15.1.10.2 Performance Reports

Information is posted on PHAI.ca regarding environmental impact including environmental monitoring program results. In addition to routine reporting, CNL summaries of its Annual Compliance Reports on PHAI.ca, with full reports being available upon request.

#### 15.1.10.3 Communications and Outreach Activities

Communication and outreach activities conducted for the PHP during 2020 are summarized in Table 12.

**Table 12: Port Hope Project – 2020 Communications outreach activities**

Tactic			Reach
Public Information Office <i>Phone, email, in-person meetings</i>	Port Hope Project		207
	Port Hope Area Initiatives		84
	TOTAL		291
Small-Scale Sites	Phone/Email		3,881
	In-Person Meetings		159
	Site Visits		288
	TOTAL		4,669
Public Engagement			Engagement
Presentations			19
Tours			1
Media Releases			5
Community Notifications			7
Key Stakeholder Relations			42
Indigenous Engagement			8
Internal Communications			61
Public Disclosures			0
Online Communications			Total
Website: PHAI.ca	Visits to website		23,617
	Pages viewed		65,160
Social Media	Facebook	Total Posts	Total Reach

		<b>380</b>	<b>31,302</b>
	Twitter	<b>Total Tweets</b>	<b>Total Visited</b>
		<b>399</b>	<b>1,529</b>
	Instagram	<b>Total Posts</b>	
		<b>35</b>	

## **15.2 Indigenous Engagement**

CNL provides project information and updates on a regular basis to local Indigenous groups – in particular to the Mississaugas of the Williams Treaties First Nations – who expressed interest in continuing to receive updates about the project when it moved from the planning to the implementation phase, namely: Hiawatha First Nation, Curve Lake First Nation, Mississaugas of Scugog Island First Nation and Alderville First Nation. Meetings and special engagement activities focus on themes of environmental protection, economic development and heritage resource protection, which are of particular interest to these communities. Agendas are coordinated to address these topics and site observations/demonstrations are offered as opportunities arise. In recent years CNL has also established contact, exchanged information and shared project details with representatives from the Anishinabek Nation and Métis Nation of Ontario.

In 2020 February, CNL provided a presentation and tour of PHAI project sites for Métis Nation of Ontario representatives, staff and Region 5 and 6 Councillors. In 2020 fall Indigenous engagement sessions and project updates were hosted virtually due to the pandemic. Information was provided to consultation staff representatives of Curve Lake, Hiawatha, Mississaugas of Scugog Island, and Alderville First Nations as well as staff, consultants and Grand Council representatives from Anishinabek Nation. CNL held additional meetings to focus on the CNSC licence amendment application to change the PHAI cleanup criteria.

CNL routinely distributes PHAI newsletters and invitations to special events routinely to all Indigenous groups; in 2020 invitations to Industry Day and Contractor Town Hall were also circulated to Indigenous contacts who have expressed interest in business opportunities and CNL contracting processes.

Other Indigenous groups including Mohawks of the Bay of Quinte, Chippewas of the Williams Treaties and local Métis Councils have been identified as potentially having interest in the project based on their proximity and inclusion in other projects in the area. Over the years, CNL has provided these groups with project information mailings to keep them up to date.

## 16 ACRONYMS

AAQC	Ambient Air Quality Criteria
AECL	Atomic Energy of Canada Limited
ALARA	As Low As Reasonably Achievable
CCL	Compacted Clay Layer
CCME	Canadian Council of Ministers of the Environment
CMP	Construction Monitoring Program
CN/CP	Canadian National/Canadian Pacific
CNL	Canadian Nuclear Laboratories
CNSC	Canadian Nuclear Safety Commission
COPC	Contaminants of Potential Concern
CRL	Chalk River Laboratories
CRP	Complaints Resolution Process
CS	Consolidation Site
CWQG	Canada Water Quality Guidelines
dBA	Decibels
DSP	Dosimetry Service Provider
EA	Environmental Assessment
ECA	Environmental Compliance Approval
ECC	Engineering Change Control
EGGC	East Gorge Groundwater Collection
ESA	Environmental Site Assessment
FBAC	Future Brush Area to be Cleared
HARP	Historic Artefact Recovery Program
Hi-Vol	High Volume
HOIR	Hazardous Occurrence Investigation Reports
HU	Human Performance
HWP MO	Historic Waste Program Management Office
IAEA	International Atomic Energy Agency
ImpAct	Improvement Action
ISQG	Interim Sediment Quality Guideline

IWC	Integrated Work Control
LCH	Licence Conditions Handbook
LCV	Lowest Chronic Value
LEL	Lowest Effect Level
LLRW	Low Level Radioactive Waste
LTWMF	Long-Term Waste Management Facility
MECP	Ministry of the Environment, Conservation and Parks
MPH	Municipality of Port Hope
NEW	Nuclear Energy Worker
NM&SM	Nuclear Materials and Safeguards Management
NSCA	Nuclear Safety and Control Act
OFI	Opportunity for Improvement
OSH	Occupational Safety and Health
OSLD	Optically Stimulated Luminescence Dosimetry
PCB	Polychlorinated biphenyl
PGP	Port Granby Long-Term Low-Level Radioactive Waste Management Project
PG WMF	Port Granby Waste Management Facility
PH	Port Hope
PHAI	Port Hope Area Initiative
PHP	Port Hope Long-Term Low-Level Radioactive Waste Management Project
PH LTWMF	Port Hope Long-term Waste Management Facility
PHP	Port Hope Project
PH WWTP	Port Hope Waste Water Treatment Plant
PIP	Public Information Program
PM	Particulate Matter
PS-NE	Pine Street North Extension
PSF	Pre-Submission Form
PSQG	Provincial Sediment Quality Guidelines
PVP	Property Value Protection
PWQO	Provincial Water Quality Objectives
PWTS	Portable Water Treatment System
QA	Quality Assurance
RA	Road Allowances

RFP	Request for Proposal
RP	Radiation Protection
RPP	Radiation Protection Program
RSL	Radiological Status Letter
RWP	Radiation Work Permits
SAT	Systematic Approach to Training
SCA	Safety Control Area
SCADA	Supervisory Control and Data Acquisition
SSHC	Site Safety and Health Committee
SSS	Small Scale Sites
STEM	Science, technology, engineering, and mathematics
STP	Sewage Treatment Plant
STPSC	Sewage Treatment Plant Storage Cell
TDG	Transportation of Dangerous Goods
TLD	Thermoluminescent Dosimeter
TSP	Total Suspended Particles
TSS	Total Suspended Solids
WTB	Waste Water Treatment Building
WWTP	Waste Water Treatment Plant
WWMF	Welcome Waste Management Facility

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## APPENDIX A EA MONITORING LOCATION MAPS

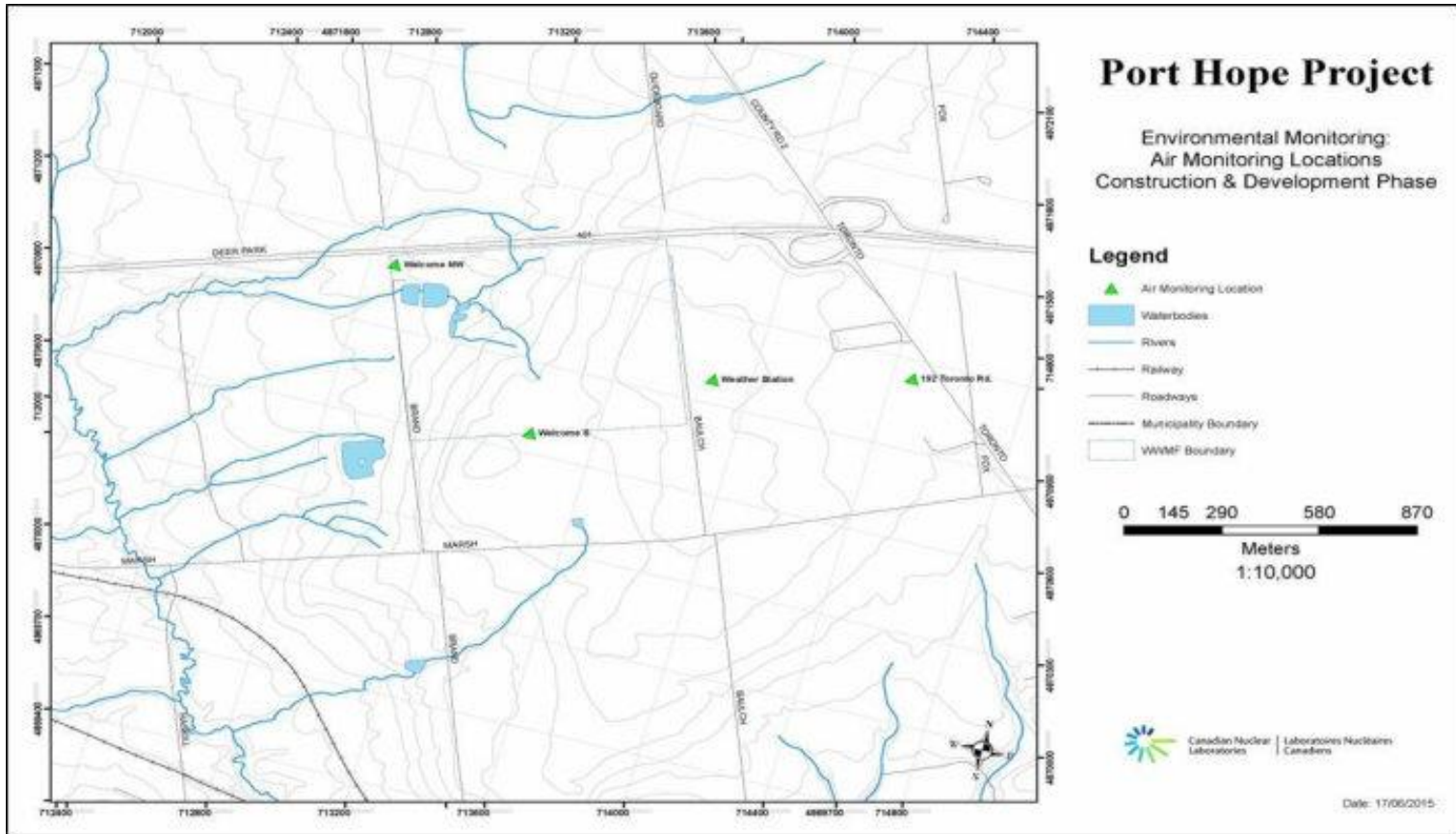


Figure A-1: PHP LTWMF high-volume air sampler locations.

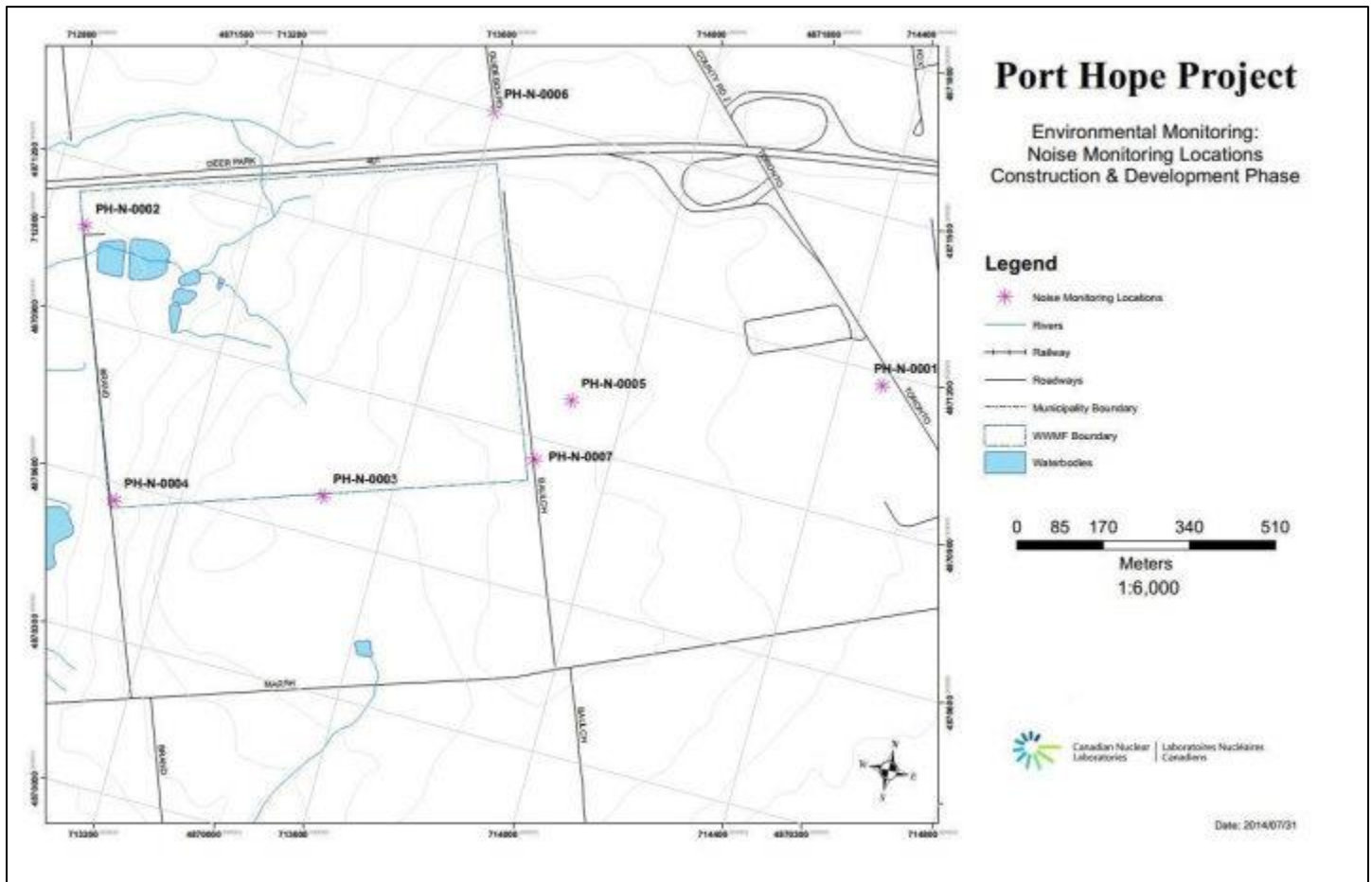


Figure A-2: PH LTWMP noise monitoring locations



**Figure A-3: Central Transportation Route noise monitoring locations**





Figure A-4: Northern Transportation Route noise monitoring locations





Figure A-5: Southern Transportation Route noise monitoring locations

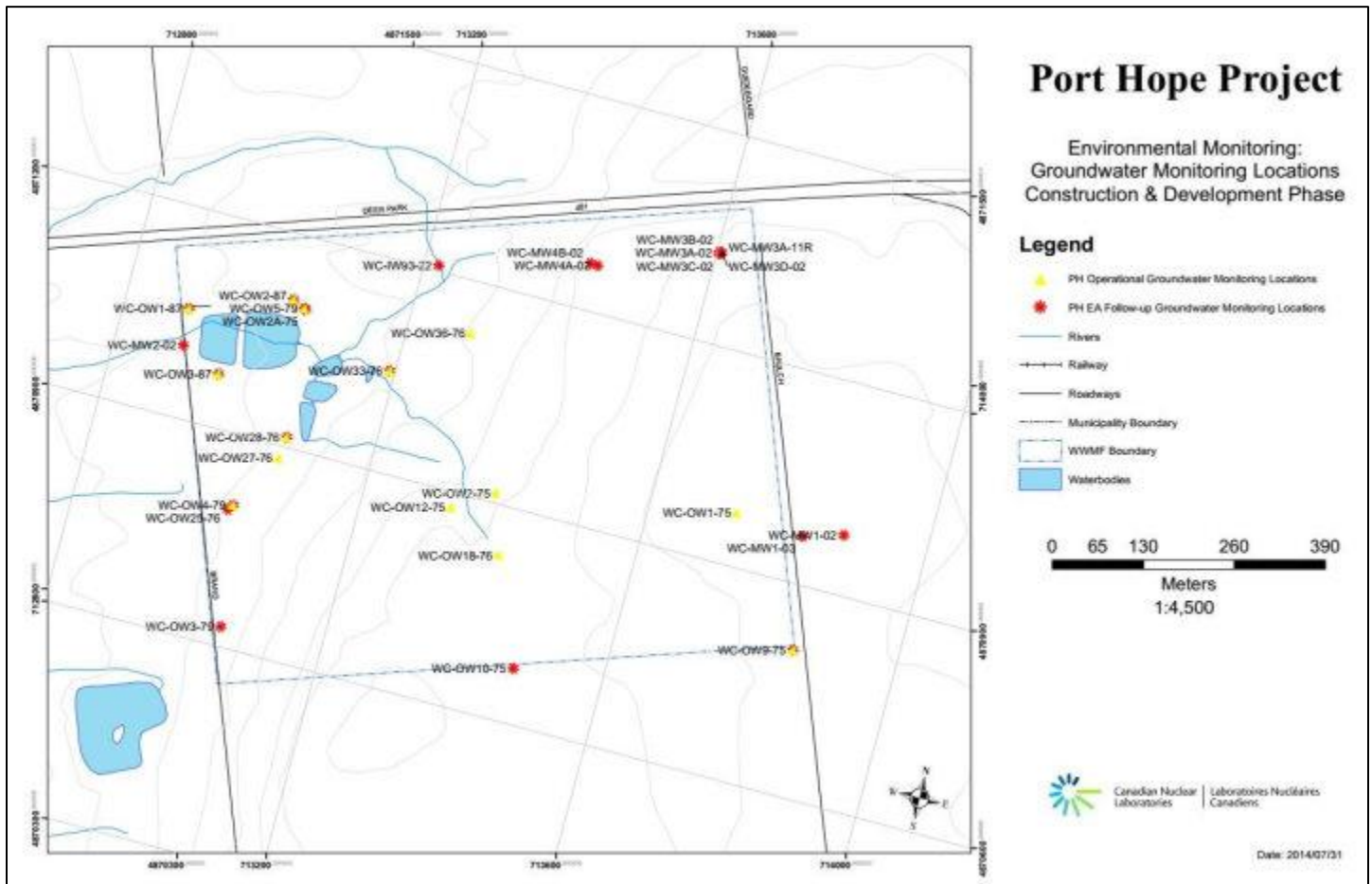
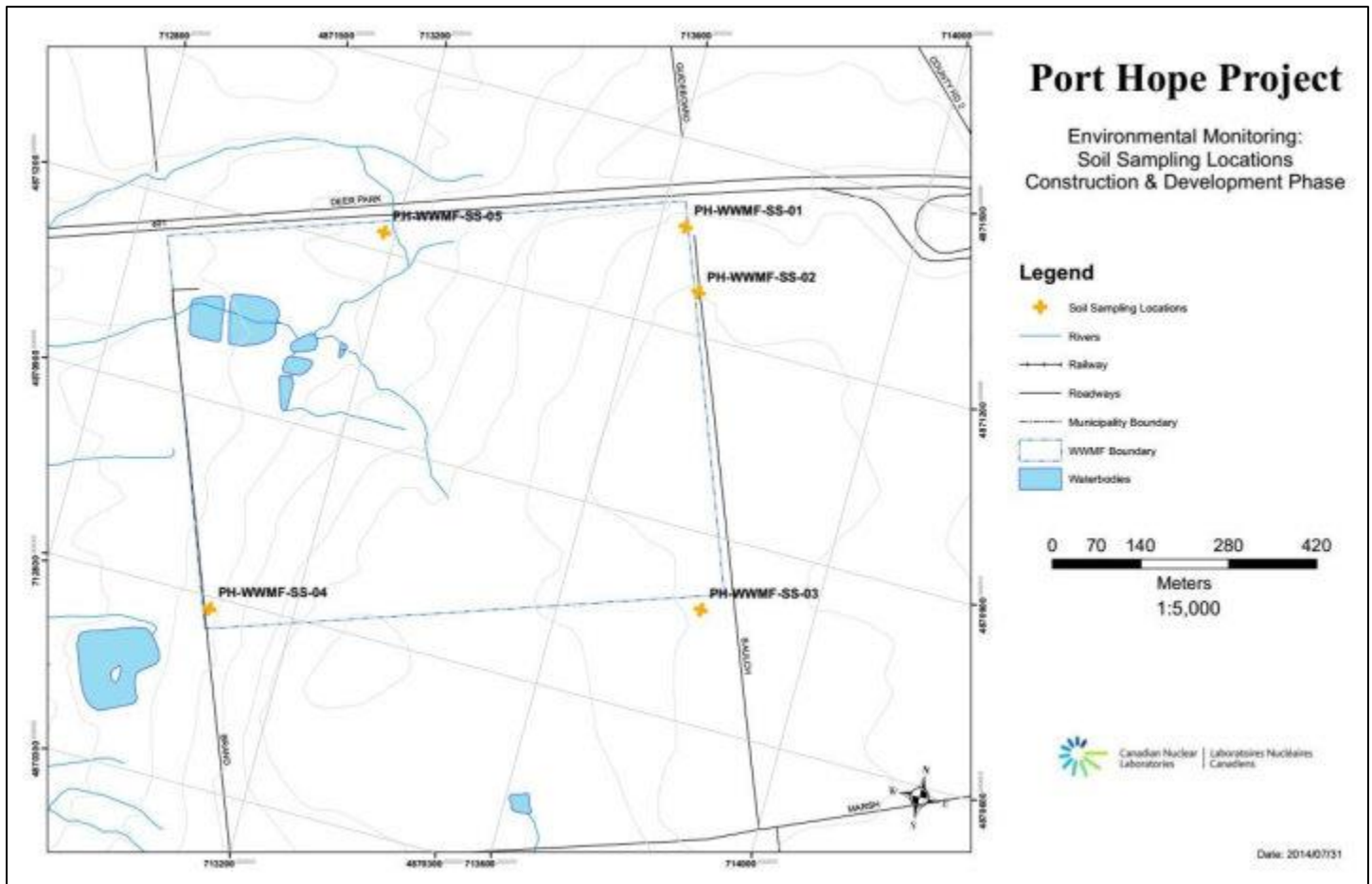


Figure A-6: PH LTWMF groundwater monitoring locations







**Figure A-8: PH LTWMF soil sampling locations**

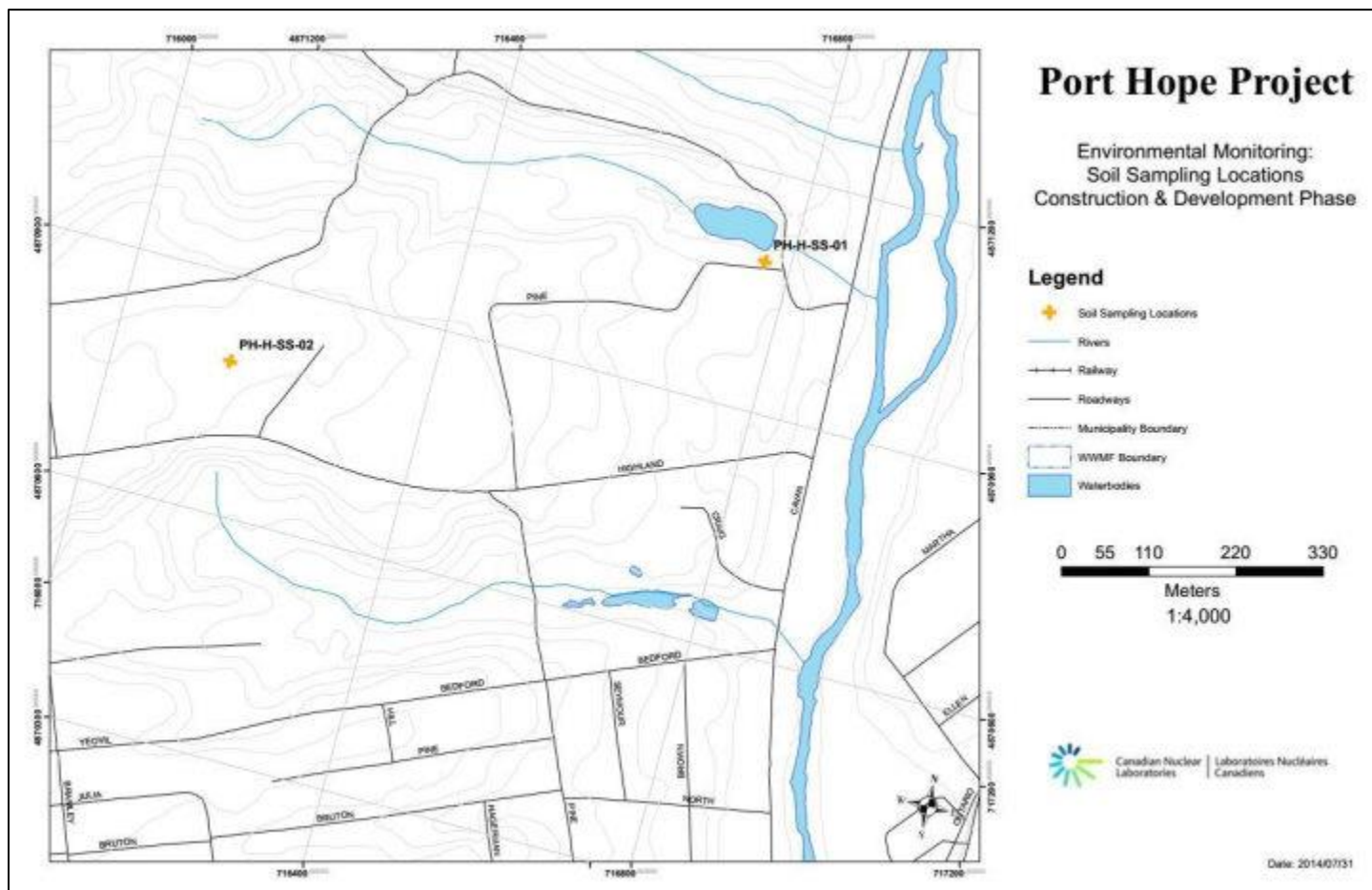


Figure A-9: Highland Drive Landfill soil sampling locations



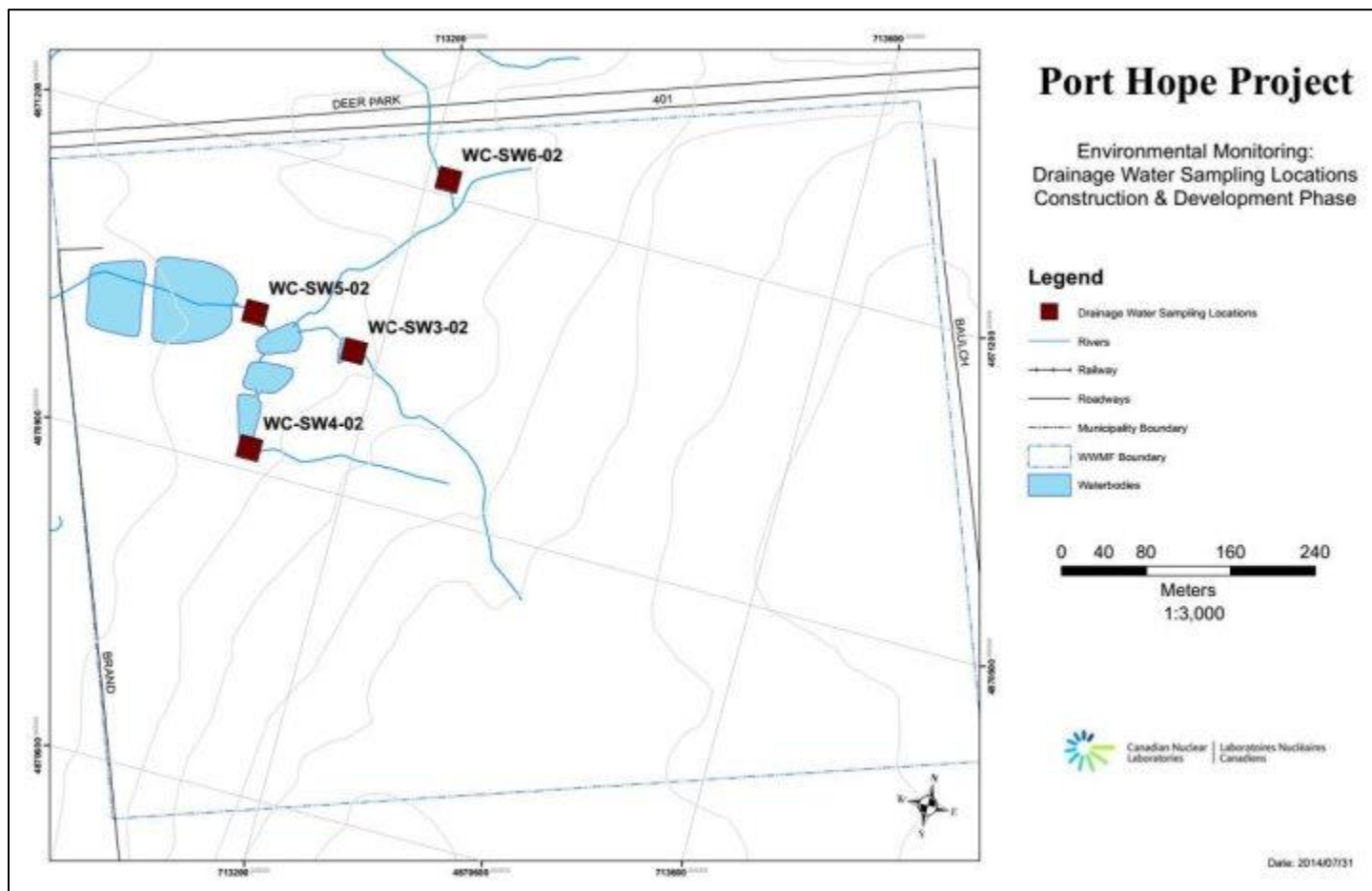


Figure A-11: PH LTWMF drainage water sampling locations





Figure A-12: Brewery Creek aquatic sampling locations

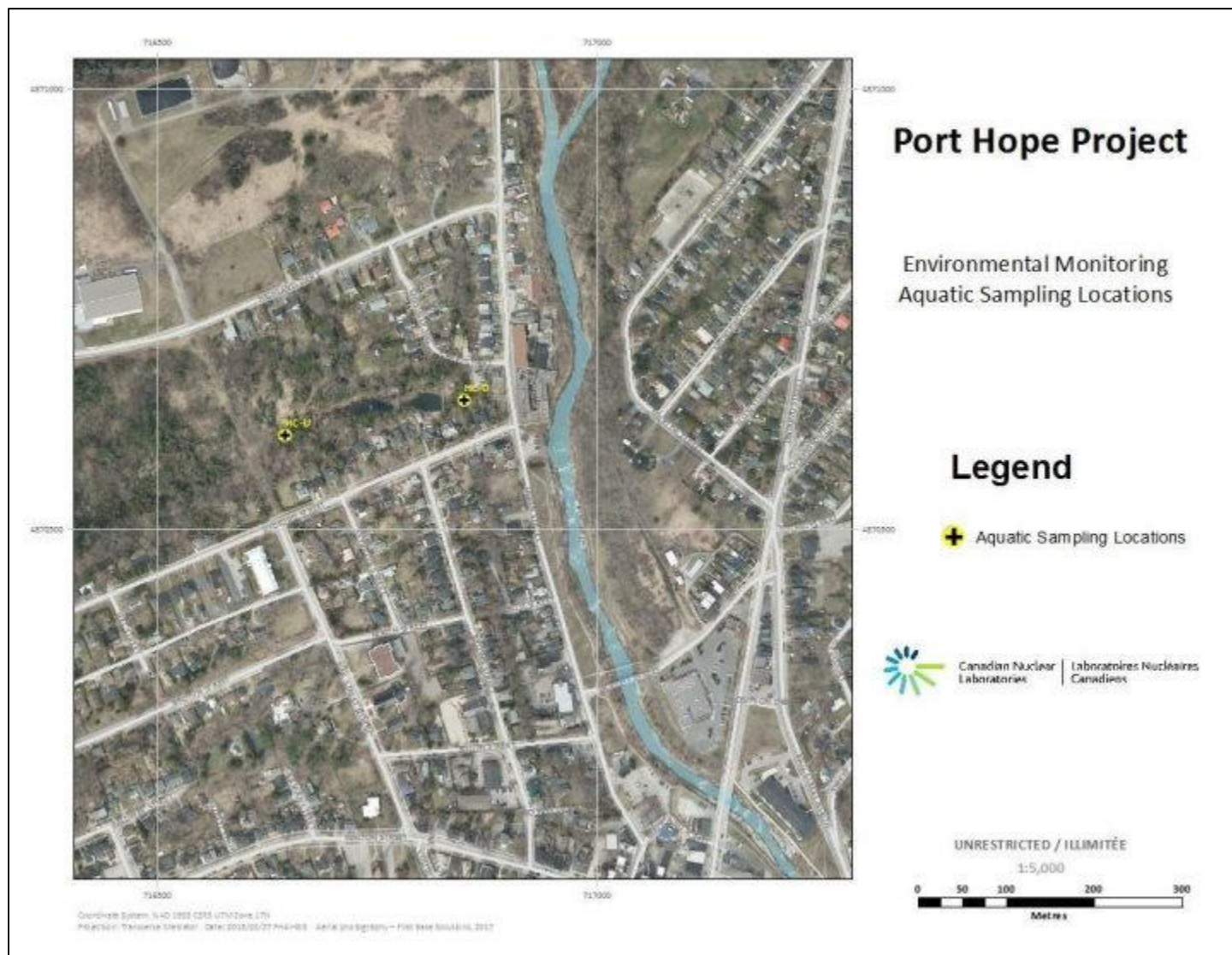


Figure A-13: Highland Drive South Creek aquatic sampling locations



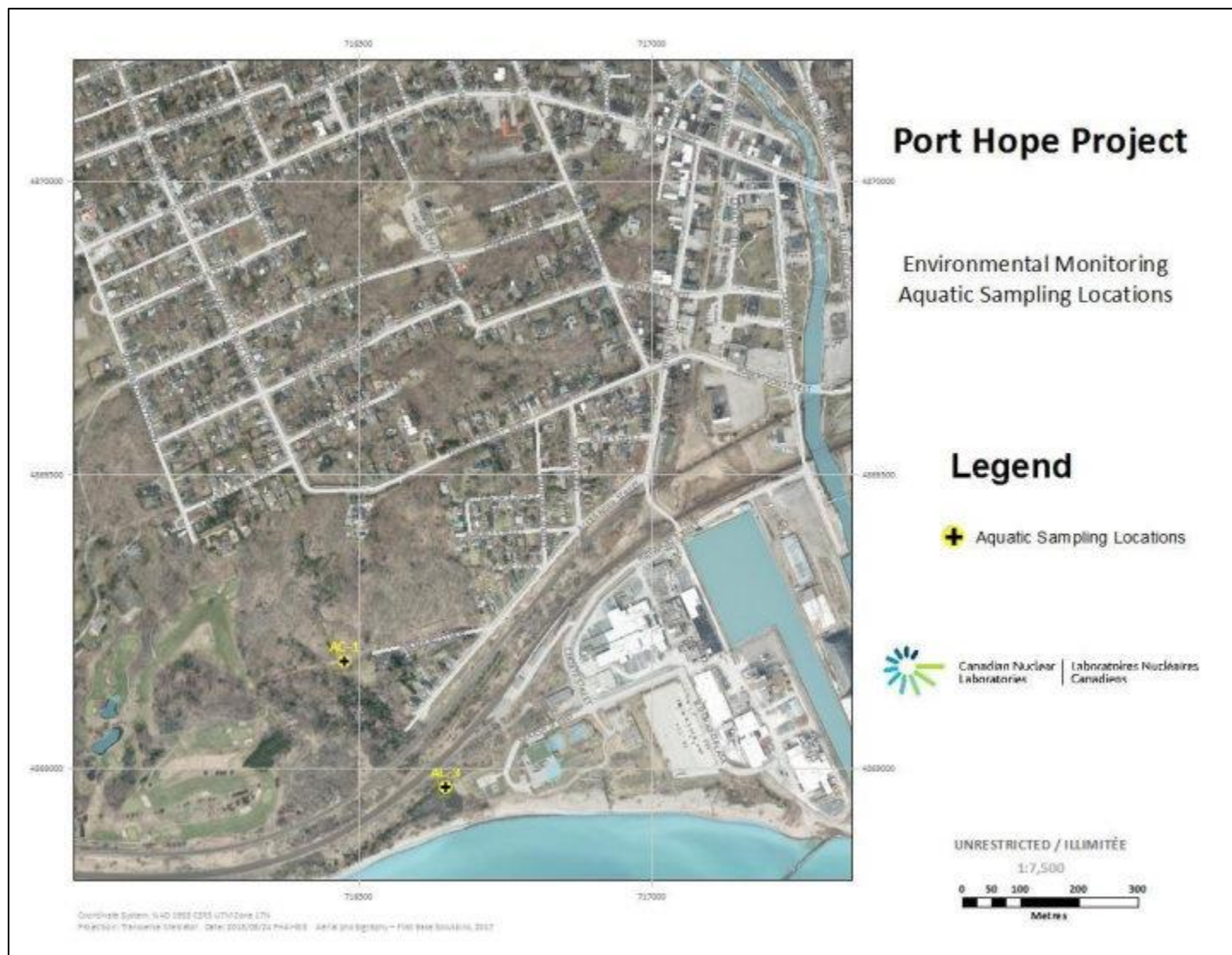


Figure A-14: Alexander Creek aquatic sampling locations

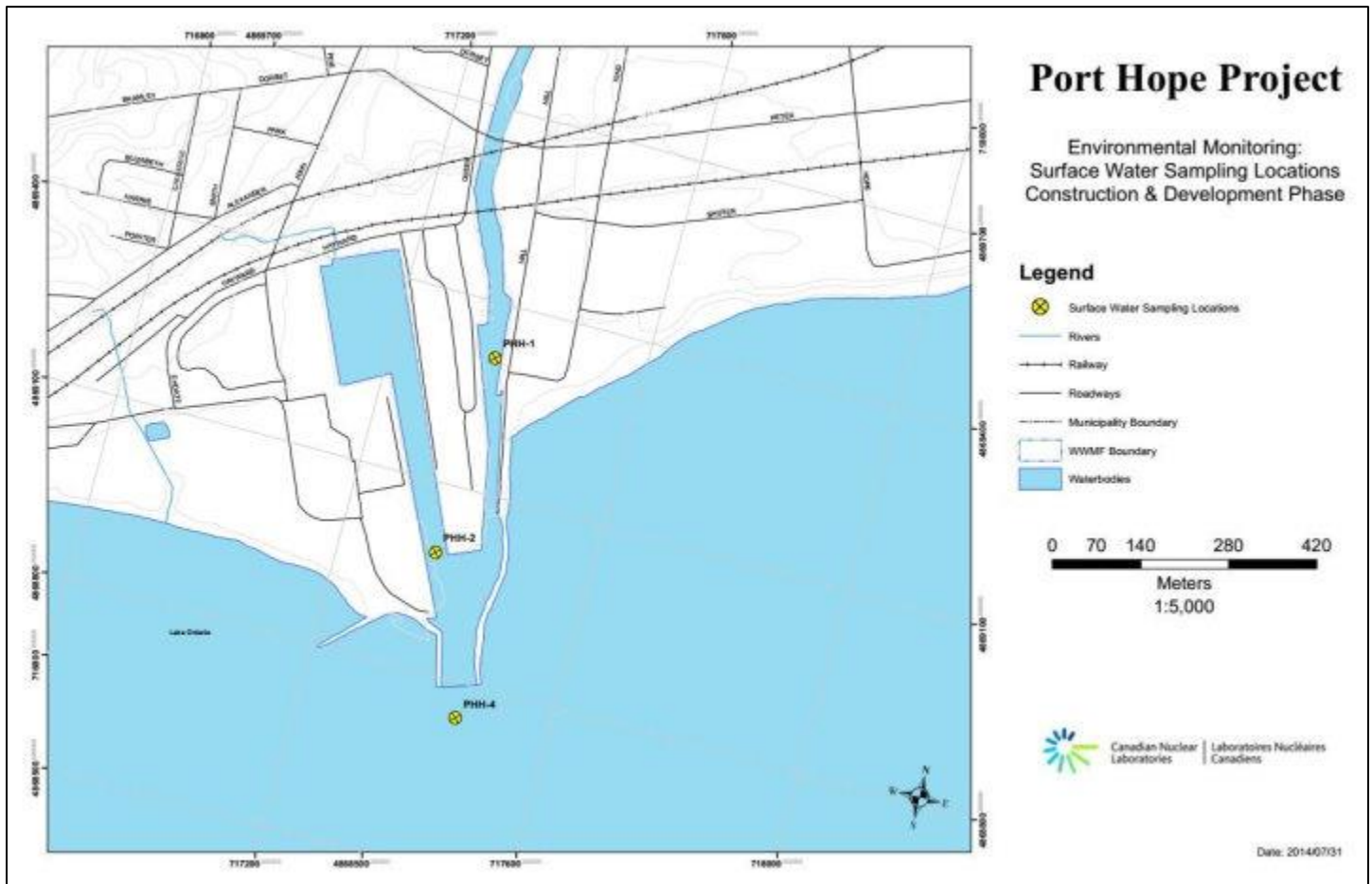


Figure A-15: Port Hope Harbour surface water sampling locations



**APPENDIX B PORT HOPE ENVIRONMENTAL MONITORING RESULTS****Table B-1: 2020 PH LTWMF operational observation well sampling results**

Observation Well Number	Arsenic (µg/L)	Uranium (µg/L)	Radium-226 (Bq/L)	pH	Notes
	<b>Average</b>				
1-75	--	--	--	--	<b>Well Decommissioned in 2016</b>
1-87	0.8	3.80	<0.01	7.58	--
2-75	--	--	--	--	<b>Well Decommissioned in 2018</b>
2-87	--	--	--	--	Replaced by WC-OW2-19 In 2019
WC-OW2-19	1.5	0.13	<0.01	7.66	--
3-87	5.1	0.15	0.01	7.99	--
4-79	0.7	0.09	<0.01	7.99	--
5-79	--	--	--	--	Replaced by WC-OW5-19 In 2019
WC-OW5-19	3.4	0.11	<0.01	7.20	--
9-75	--	--	--	--	Replaced by WC-LTWMF-MW-06 In 2017
WC-LTWMF-MW-06	1.3	0.33	<0.01	7.96	--
12-75	--	--	--	--	<b>Well Decommissioned in 2018</b>
18-76	--	--	--	--	<b>Well Decommissioned in 2018</b>
27-76	0.4	0.14	0.01	7.81	--
28-76	0.6	0.17	0.01	8.10	--
33-76	1.2	1.51	0.01	7.36	--
36-76	--	--	--	--	No sample – well not found

**Notes:**

Sampling is conducted semi-annually (spring and fall).

-- - No data.

**Table B-2: PH WWTP Operations, 2018 to 2020, Results of Water Sampling Analysis (Effluent)**

Final Effluent Sample Monthly Average	Total Suspended Solids (mg/L)	pH	Total Aluminum (µg/L)	Total Arsenic (µg/L)	Total Copper (µg/L)	Total Lead (µg/L)	Total Uranium (µg/L)	Total Zinc (µg/L)	Radium-226 (Bq/L)	Toxicity (Pass/Fail)	Totalized Effluent Volume (m³)
Design Objective	15	6 - 9	66	41	15	22.8	150	110	0.37	PASS	--
Action Level <sup>(1)</sup>	7.5	6.5 - 8.5	100	41	5	5	100	15	0.050	FAIL	--
2018 January	1	7.12	5	1.2	1.0	0.5	1.4	5.0	0.005	PASS	10,297
2018 February	1	7.38	6	1.7	1.0	0.5	1.65	5.0	0.005	PASS	9,998
2018 March	1	7.63	5	1.9	1.0	0.5	1.35	5.0	0.005	PASS	15,211
2018 April	1	7.63	5	1.3	1.0	0.5	2.2	5.0	0.005	PASS	15,309
2018 May	1	7.83	5	2.2	1.0	0.5	3.0	5.0	0.005	PASS	17,406
2018 June	1	7.61	5	23	1.0	0.5	7.15	5.0	0.005	PASS	8,883
2018 July	1	7.62	7	38	1.0	0.5	11	5.0	0.005	PASS	5,295
2018 August	1	7.73	7	8.3	1.0	0.5	6.7	5.0	0.005	PASS	9,499
2018 September	1	7.63	8	7.9	1.0	0.5	3.5	5.0	0.005	PASS	15,639
2018 October	1	7.75	5	3.8	1.0	0.5	3.3	5.0	0.005	PASS	12,136
2018 November	1	7.72	5	2.0	1.0	0.5	1.8	5.0	0.005	PASS	11,835
2018 December	1	7.78	5	2.0	1.0	0.5	1.65	5.0	0.005	PASS	17,898
2019 January	1	7.84	5	1.9	1.0	0.5	2.10	5.0	0.005	PASS	15,426
2019 February	1	7.86	6	1.8	1.0	0.5	2.25	5.0	0.005	PASS	15,034
2019 March	1	7.72	5	1.0	1.0	0.5	1.60	5.0	0.005	PASS	17,063
2019 April	1	7.93	5	1.0	1.0	0.5	1.20	5.0	0.005	PASS	16,039
2019 May	1	7.84	5	1.0	1.0	0.5	1.25	5.0	0.005	PASS	14,804
2019 June	1	7.86	6	1.1	1.0	0.5	1.50	5.0	0.005	PASS	14,845
2019 July	1	7.57	6	1.0	1.0	0.5	0.81	5.0	0.005	PASS	8,792
2019 August	1	7.56	5	1.1	2.5	0.5	0.78	5.0	0.005	PASS	10,799
2019 September	1	7.91	5	1.0	1.0	0.5	0.79	5.0	0.005	PASS	7,012
2019 October	1	7.89	5	1.0	1.0	0.5	0.89	5.0	0.005	PASS	9,507
2019 November	1	7.82	5	1.0	1.0	0.5	0.33	5.0	0.005	PASS	15,108
2019 December	1	7.90	5	1.0	1.0	0.5	0.41	5.0	0.005	PASS	11,872
2020 January	1	7.79	2.5	0.2	1.0	0.1	1.11	1.0	0.0065	PASS	19,382
2020 February	1	7.80	1	0.3	1.3	0.05	0.53	3.0	0.005	PASS	22,856
2020 March	1	7.90	5	1.0	1.3	0.5	0.91	5.0	0.005	PASS	22,756
2020 April	1	7.61	5	1.0	1.9	0.55	2.80	5.0	0.005	PASS	18,656
2020 May	1	7.28	5.35	1.0	1.4	0.5	1.15	5.0	0.005	PASS	8,221
2020 June	1	7.34	5	2.4	0.9	0.5	0.70	5.0	0.007	PASS	3,735
2020 July	1	7.73	1	6.8	1.1	0.23	2.15	2.0	0.008	PASS	7,600
2020 August	1	7.57	1	1.7	1.9	0.41	2.50	2.5	0.0055	PASS	10,621
2020 September	1	7.32	1	1.1	1.4	0.41	1.22	2.0	0.008	PASS	3,927
2020 October	1	7.59	1	0.5	1.3	0.64	1.75	2.0	0.005	PASS	9,591
2020 November	1	7.46	2.5	0.4	1.3	0.34	0.79	1.5	0.005	PASS	4,183
2020 December	1	7.60	1.58	0.3	1.9	0.46	1.45	1.0	0.005	PASS	8,689

Notes: [1] - The values shown are based on License Condition Handbook WNSL-W1-LCH-2310 R1. Revised values proposed by CNL were reviewed by the CNSC with formal acceptance provided on 202

Notes: [2] - Regulated monitoring of Baran was removed from the requirement of the Waste Nuclear Substance Licence WNSL-W1-2310.01/2022 as of 2020 April 20.

**Table B-3: PH WWTP Operations, 2018 to 2020, Results of Water Sampling Analysis (Influent)**

Influent Sample Monthly Average	Total Suspended Solids (mg/L)	pH	Total Aluminum (µg/L)	Total Arsenic (µg/L)	Total Copper (µg/L)	Total Lead (µg/L)	Total Uranium (µg/L)	Total Zinc (µg/L)	Radium-226 (Bq/L)	Totalized Influent Volume (m³)
2018 January	16	7.93	430	570	11	0.6	1100	56	0.120	19,574
2018 February	12	7.95	275	940	12	1.7	1600	57	0.260	23,490
2018 March	31	8.09	250	815	15	2.2	1100	46	0.425	31,165
2018 April	67	8.17	500	345	23	1.7	1100	46	0.210	33,631
2018 May	27	8.17	580	480	42	2.4	450	21	0.350	33,805
2018 June	174	8.59	725	1600	28	4.0	855	15	0.655	17,798
2018 July	35	8.28	550	3000	19	4.0	1500	15	0.560	12,964
2018 August	13	8.28	260	925	24	1.6	675	6	0.370	23,583
2018 September	6	8.45	56	835	8.9	0.5	410	6	0.180	32,724
2018 October	4	8.29	30	680	12	0.6	600	16	0.230	28,580
2018 November	3	8.31	45	435	13	0.9	355	16	0.074	27,603
2018 December	3	8.10	56	495	19	1.6	490	26	0.155	32,753
2019 January	3	8.09	31	510	24	2.3	630	37	0.180	30,945
2019 February	4	8.08	44	530	35	5.0	730	51	0.535	30,436
2019 March	3	7.99	32	320	35	5.5	620	45	0.590	36,253
2019 April	3	8.48	25	240	22	3.0	480	29	0.400	36,474
2019 May	3	8.90	23	245	11	0.8	390	13	0.335	37,738
2019 June	3	8.93	22	230	8	0.5	325	5	0.330	37,309
2019 July	5	9.04	45	250	8	0.6	150	5	0.570	30,558
2019 August	18	9.03	250	315	17	2.3	115	10	1.750	31,176
2019 September	14	9.21	195	145	20	9.1	130	15	1.300	27,258
2019 October	8	8.80	110	120	21	3.8	110	16	0.530	23,275
2019 November	8	8.47	73	57	41	4.9	110	32	0.605	33,021
2019 December	9	8.75	61	80	63	11.5	190	33	0.505	25,483
2020 January	3	8.51	25	119	11.2	25.1	309	50	0.555	38,083
2020 February	4	8.58	32	109	103	21.5	305	50	0.505	39,912
2020 March	7	8.41	37	110	230	46.0	340	68	0.420	40,817
2020 April	18	8.49	110	90	330	75.0	705	140	0.700	35,230
2020 May	13	8.39	85	68	180	37.5	485	71	0.475	17,601
2020 June	11	8.61	120	140	41	12.0	350	38	0.540	20,485
2020 July	7	9.26	38	377	22	17.6	340	27	0.455	20,938
2020 August	9	8.83	259	252	39	33.3	319	41	0.455	23,933
2020 September	7	8.75	190	202	54	45.2	298	45	0.240	10,499
2020 October	8	8.47	178	123	32	44.3	326	60	0.155	19,494
2020 November	5	8.46	87	112	19	30.7	291	47	0.150	11,154
2020 December	2	7.99	29	114	134	47.8	379	54	0.140	18,636

Notes: [1] - Regulated monitoring of Baran was removed from the requirement of the Waste Nuclear Substance Licence WSNL-W1-2310.61/2022 as of 2020 April 20.

**Table B-4: PH WWTP & Old WTB Operations, 2019 to 2020, Results of Water Sampling Analysis (Effluent Toxicity)**

Sample Date	48 Hour Result	96 Hour Result	Old WTB 48 Hour Result	Old WTP 96 Hour Result
2019 January 01	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2019 February 05	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2019 March 12	Pass (3.3% mortality)	Pass (0.0% mortality)	—	—
2019 April 02	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2019 April 09	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2019 April 24	NA	NA	Pass (0.0% mortality)	Pass (0.0% mortality)
2019 May 01	NA	NA	Pass (0.0% mortality)	Pass (0.0% mortality)
2019 May 07	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2019 May 08	NA	NA	Pass (0.0% mortality)	Pass (0.0% mortality)
2019 May 14	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2019 May 15	NA	NA	Pass (0.0% mortality)	Pass (0.0% mortality)
2019 May 22	NA	NA	Pass (0.0% mortality)	Pass (0.0% mortality)
2019 May 29	NA	NA	Pass (0.0% mortality)	Pass (0.0% mortality)
2019 June 04	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2019 June 05	NA	NA	Pass (0.0% mortality)	Pass (0.0% mortality)
2019 June 12	NA	NA	Pass (0.0% mortality)	Pass (0.0% mortality)
2019 June 19	NA	NA	Pass (0.0% mortality)	Pass (0.0% mortality)
2019 July 02	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2019 July 09	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2019 August 13	Pass (10% mortality)	Pass (0.0% mortality)	—	—
2019 September 10	Pass (6.7% mortality)	Pass (0.0% mortality)	—	—
2019 October 08	Pass (0.0% mortality)	Pass (10% mortality)	—	—
2019 November 12	Pass (10% mortality)	Pass (0.0% mortality)	—	—
2019 December 10	Pass (3.3% mortality)	Pass (0.0% mortality)	—	—
2020 January 14	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2020 February 11	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2020 March 10	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2020 April 07	Pass (3.3% mortality)	Pass (0.0% mortality)	—	—
2020 May 12	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2020 June 09	Pass (3.3% mortality)	Pass (0.0% mortality)	—	—
2020 July 07	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2020 August 11	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—
2020 September 08	Pass (3.3% mortality)	Pass (0.0% mortality)	—	—
2020 October 06	Pass (3.3% mortality)	Pass (0.0% mortality)	—	—
2020 November 10	Pass (0.0% mortality)	Pass (30% mortality)	—	—
2020 November 24	Pass (3.3% mortality)	Pass (20% mortality)	—	—
2020 December 08	Pass (0.0% mortality)	Pass (0.0% mortality)	—	—

**Table B-5: 2018-2019 Port Hope Waste Water Treatment Plant and Old Water Treatment Building Operations -  
Results of water sampling analysis (effluent toxicity)**

Parameter/Criteria	Total Suspended Solids (mg/L)	pH	Total Aluminum (µg/L)	Total Arsenic (µg/L)	Total Boron (µg/L)	Total Copper (µg/L)	Total Lead (µg/L)	Total Uranium (µg/L)	Total Zinc (µg/L)	Radium-226 (Bq/L)
PWQO <sup>(1)</sup>	NV	6.5-8.5	75	100	200	5	5	5	30	1
CCME FWA-LT <sup>(2)</sup>	NV	6.5-9.0	100	5	1,500	2	1	15	30	NV <sup>(3)</sup>
<b>Sample Date</b>										
2018 January 16	59	8.02	1,400	<1.0	<10	2.5	1.2	3.1	9	<0.0050
2018 February 27	37	8.11	700	<1.0	<10	1.8	0.61	2.5	15	<0.0050
2018 March 21	8	8.12	240	<1.0	12	<1.0	<0.50	2.9	<5.0	<0.0050
2018 April 24	8	8.21	190	<1.0	<10	<1.0	<0.50	2.5	<5.0	<0.0050
2018 May 22	3	8.24	130	1.2	11	<1.0	<0.50	3.1	<5.0	<0.0050
2018 June 19	27	8.2	1,200	2.7	15	2.1	0.98	2.7	7.9	<0.0050
2018 July 17	30	8.21	770	2.4	10	1.6	0.6	1.1	5.5	<0.0050
2018 August 28	21	8.21	550	2.5	11	1.4	<0.50	1.4	<5.0	<0.0050
2018 September 18	13	8.2	370	2.4	15	1.2	<0.50	1.4	<5.0	<0.0050
2018 October 09	11	8.24	230	2.0	18	1.3	<0.50	6.0	<5.0	<0.0050
2018 November 20	11	8.22	250	<1.0	12	<1.0	<0.50	4.1	<5.0	<0.0050
2018 December 04	19	8.06	420	<1.0	<10	<1.0	<0.50	2.2	<5.0	<0.0050
2018 December 25	18	8.2	420	<1.0	<10	2.1	<0.50	2.9	<5.0	<0.0050
2019 January 01	45	8.08	820	<1.0	10	1.7	0.7	2.3	<5.0	<0.0050
2019 February 12	22	8.27	440	<1.0	11	<1.0	<0.50	3.3	14	<0.0050
2019 March 05	13	8.03	250	<1.0	10	<1.0	<0.50	3.7	<5.0	<0.0050
2019 April 02	45	8.11	960	<1.0	<10	1.5	0.7	3	5	<0.0050
2019 May 07	24	8.28	480	1.1	11	1.4	<0.50	2.8	<5.0	<0.0050
2019 June 04	3	8.22	70	<1.0	12	<1.0	<0.50	2.2	<5.0	<0.0050
2019 July 09	93	8.18	1,700	2.7	15	2.7	1.3	1.3	9.5	<0.0050
2019 August 06	89	8.27	1,600	2.5	18	3.0	1.2	1.4	11	<0.0050
2019 September 10	33	8.17	470	1.6	11	1.0	<0.50	1.1	<5.0	<0.0050
2019 September 17	16	8.28	500	1.7	12	1.2	<0.50	1.4	<5.0	<0.0050
2019 September 24	25	8.28	710	1.9	13	1.3	0.53	1.2	<5.0	<0.0050
2019 October 01	130	8.26	1,900	2.6	12	2.2	1.4	1.2	9.3	<0.0050
2019 October 08	28	8.22	790	1.8	13	1.2	0.58	1.2	<5.0	<0.0050
2019 November 05	11	8.29	210	<1.0	12	1.4	<0.50	3.3	<5.0	<0.0050
2019 December 03	22	8.17	460	<1.0	<10	<1.0	<0.50	3.3	<5.0	<0.0050
2020 January 07	20	8.30	260	0.8	<20	1.4	0.32	3.4	<10	0.007
2020 February 04	33	8.22	798	0.8	8	1.2	0.57	3.0	4.0	0.008
2020 March 17	14	8.16	350	<1.0	<10	<1.0	<0.50	2.5	<5.0	<0.0050
2020 April 21	13	8.17	410	<1.0	13	<1.0	<0.50	2.1	<5.0	<0.0050
2020 May 19	56	8.19	230	<1.0	13	<1.0	<0.50	2.8	<5.0	<0.0050
2020 June 02	14	8.14	220	1.1	<10	1.2	<0.50	2.0	<5.0	<0.0050
2020 July 14	44	8.13	1,720	3.3	16	2.6	1.04	2.8	9.0	0.006
2020 August 11	15	8.19	570	3.2	21	1.6	0.45	2.7	7.0	0.01
2020 September 01	24	8.17	621	3.8	17	1.5	0.46	2.4	7.0	0.008
2020 October 13	7	8.31	304	2.4	18	1.1	0.133	2.3	4.0	0.008
2020 November 03	5	8.09	284	1.5	60	0.9	0.23	3.1	4.0	0.01
2020 December 15	4	8.2	95	1.5	13	1.0	0.293	3.7	2.0	<0.0050

**Notes:**

1. Ontario Ministry of the Environment and Energy Provincial Water Quality Objectives (1994)
2. Canadian Council of Ministers of the Environment - Protection of Fresh Water Aquatic Life (Long Term)
3. NA refers to "No Value" for selected criteria

**Legend:**

Bold: Exceedance of PWQO criteria

Bold and Underlined: Exceedance of CCME criteria

Shaded White Text: Exceedance of PWQO and CCME criteria

**Table B-6: Air quality monitoring – PH LTWMF Weather Station, 2015 – 2020**

	2015		2016		2017		2018		2019		2020	
	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP
	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
Observations	77	77	205	209	194	196	252	248	240	237	171	169
Geometric Mean	6	14	6	21	6	22	8	23	5	16	5	18
Arithmetic Mean	10	24	7	26	7	27	10	29	5	19	8	22
Median	6	13	6	23	7	22	9	25	4	17	6	19
98 <sup>th</sup> Percentile	28	-	27	-	25	-	20	-	18	-	20 <sup>1</sup>	-
Maximum	46	56	28	95	20	116	50	104	17	158	21	85
Exceedances (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.4%	0%	0%

**Note:**

<sup>1</sup>98<sup>th</sup> Percentile for PM<sub>2.5</sub> averaged over 3 years (2018, 2019, 2020).

TSP values are compared to Overriding Limit of 120 µg/m<sup>3</sup> as defined in the PHAI Dust Management and Requirements Plan and AAQC.

PM<sub>2.5</sub> 98<sup>th</sup> percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 µg/m<sup>3</sup> and the proposed 2020 value of 27 µg/m<sup>3</sup>.

**Table B-7: Air quality monitoring – PH LTWMF Northwest, 2015 – 2020**

	2015		2016		2017		2018		2019		2020	
	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP
	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
Observations	76	77	207	207	194	192	248	255	240	240	166	158
Geometric Mean	6	14	6	22	6	18	9	26	4	21	6	21
Arithmetic Mean	10	17	8	25	7	21	10	30	5	24	8	25
Median	5	13	7	23	7	18	9	26	4	19	6	22
98 <sup>th</sup> Percentile	29	-	28	-	24	-	19	-	18	-	19 <sup>1</sup>	-
Maximum	63	51	24	79	18	73	28	150	17	96	21	179
Exceedances (%)	0%	0%	0%	0%	0%	0%	0%	0.4%	0%	0%	0%	0.63%

**Note:**

<sup>1</sup>98<sup>th</sup> Percentile for PM<sub>2.5</sub> averaged over 3 years (2018, 2019, 2020).

TSP values are compared to Overriding Limit of 120 µg/m<sup>3</sup> as defined in the PHAI Dust Management and Requirements Plan and AAQC.

PM<sub>2.5</sub> 98<sup>th</sup> percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 µg/m<sup>3</sup> and the proposed 2020 value of 27 µg/m<sup>3</sup>.

**Table B-8: Air quality monitoring – PH LTWMF South, 2015 – 2020**

	2015		2016		2017		2018		2019		2020	
	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP
	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
Observations	74	77	205	205	196	194	259	253	240	240	136	169
Geometric Mean	6	14	6	16	6	14	9	20	5	14	6	15
Arithmetic Mean	9	17	8	19	7	16	10	23	5	17	8	18
Median	6	13	7	16	6	16	10	20	4	14	8	17
98 <sup>th</sup> Percentile	27	-	25	-	22	-	19	-	19	-	19 <sup>1</sup>	-
Maximum	48	51	25	85	31	53	37	162	22	85	22	73
Exceedances (%)	0%	0%	0%	0%	0%	0%	0%	0.4%	0%	0%	0%	0%

**Note:**

<sup>1</sup>98<sup>th</sup> Percentile for PM<sub>2.5</sub> averaged over 3 years (2018, 2019, 2020).

TSP values are compared to Overriding Limit of 120 µg/m<sup>3</sup> as defined in the PHAI Dust Management and Requirements Plan and AAQC.

PM<sub>2.5</sub> 98<sup>th</sup> percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 µg/m<sup>3</sup> and the proposed 2020 value of 27 µg/m<sup>3</sup>.

**Table B-9: Air quality monitoring – transportation route, 192 Toronto Road, 2015 – 2020**

	2015		2016		2017		2018		2019		2020	
	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP	PM <sub>2.5</sub>	TSP
	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
Observations	76	77	208	107	196	130	256	256	237	242	170	166
Geometric Mean	7	17	6	27	6	20	8	26	4	18	5	19
Arithmetic Mean	11	23	8	33	7	22	9	30	4	21	8	21
Median	7	17	7	27	6	20	9	28	3	18	6	21
98 <sup>th</sup> Percentile	-	-	-	-	27	-	18	-	17	-	19 <sup>1</sup>	-
Maximum	38	69	24	151	18	57	23	119	12	75	21	58
Exceedances (%)	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%

**Note:**

<sup>1</sup>98<sup>th</sup> Percentile for PM<sub>2.5</sub> averaged over 3 years (2018, 2019, 2020).

TSP values are compared to Overriding Limit of 120 µg/m<sup>3</sup> as defined in the PHAI Dust Management and Requirements Plan and AAQC.

PM<sub>2.5</sub> 98<sup>th</sup> percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 µg/m<sup>3</sup> and the proposed 2020 value of 27 µg/m<sup>3</sup>.

**Table B-10: Metals and radionuclides concentrations in total suspended particulates –  
PH LTWMF Weather Station, 2015 – 2020**

					Weather Station							
					2015		2016	2017	2018	2019	2020	
Number of Samples Analyzed					7	10	45	38	50	51	38	
					Pre-Early Works 3A	During Early Works 3A						
Analysis	Unit	AAQC	Predicted*	Health Canada Reference Levels*	Average						Average	Maximum
Total Mercury (Hg)	ng/m³	-					0.01	0.01	0.01	0.08	0.89	1.22
Silver	ng/m³	1000			8	2	4	3	3	4	23	48
Arsenic	ng/m³	300			1.2	1.5	2.0	3.5	3.7	3.8	3.1	6.0
Barium	ng/m³	10000			4	8	10	9	9	8	5	11
Beryllium	ng/m³	10			0.01	0.00	0.13	0.58	0.58	0.55	0.03	0.06
Boron	ng/m³	120000			11	11	9	4	4	4	12	24
Cadmium	ng/m³	25			0.1	0.1	0.4	1.2	1.2	1.1	0.3	0.6
Cobalt	ng/m³	100			0.1	0.1	0.5	1.2	1.6	1.5	0.3	0.6
Copper	ng/m³	50000			5	10	17	10	13	13	13	50
Molybdenum	ng/m³	120000			1.0	0.4	0.9	1.8	1.8	1.9	2.8	6.0
Nickel	ng/m³	200			1	1	2	2	2	2	1	2
Lead	ng/m³	500			3	3	3	3	3	3	3	8
Antimony	ng/m³	25000			3	2	3	6	6	6	7	18
Selenium	ng/m³	10000			3	1	2	6	6	6	4	18
Uranium	ng/m³	300	1.8	4070	1.6	0.3	0.8	0.3	0.3	0.5	3.0	6.0
Vanadium	ng/m³	2000			0.4	0.4	1.2	2.9	2.9	2.8	0.4	1.2
Zinc	ng/m³	12000			18	26	25	20	24	22	24	126
Lead-210	Bq/m³	-			0.0007	0.0006	0.1275	0.0005	0.0009	0.0009	0.0007	0.0019
Radium-226	Bq/m³	-	0.000049	0.05	0.000024	0.000025	0.000033	0.000058	0.000060	0.000072	0.000030	0.000060
Thorium-230	Bq/m³	-	0.00042	0.01	0.00006	0.00006	0.00011	0.00029	0.00030	0.00029	0.00006	0.00012
Thorium-232	Bq/m³	-	0.000057	0.006	0.000056	0.000056	0.000106	0.000289	0.000289	0.000278	0.000059	0.000120
Thorium, natural	Bq/m³	-									0.00012	0.00024
Uranium, natural (calc)	Bq/m³	-									0.000004	0.000031

Note:

AAQC = Ambient Air Quality Criteria

\*Predicted values and Health Canada reference levels obtained from Port Hope Screening Report (Table 12.1)

**Bold values** indicate an exceedance of the predicted values.

**Table B-11: Metals and radionuclides concentrations in total suspended particulates –  
PH LTWMF Northwest, 2015 – 2020**

					Welcome Northwest							
					2015		2016	2017	2018	2019	2020	
Number of Samples Analyzed					7	10	45	38	51	51	34	
					Pre-Early Works 3A	During Early Works 3A						
Analysis	Unit	AAQC	Predicted*	Health Canada Reference Levels*	Average						Average	Maximum
Total Mercury (Hg)	ng/m <sup>3</sup>	-					0.01	0.01	0.01	0.08	0.94	1.20
Silver	ng/m <sup>3</sup>	1000			8	2	2	3	3	4	22	24
Arsenic	ng/m <sup>3</sup>	300			1.3	1.7	1.6	3.4	4.2	3.4	3.1	8.6
Barium	ng/m <sup>2</sup>	10000			10	20	19	17	20	26	11	36
Beryllium	ng/m <sup>3</sup>	10			0.01	0.01	0.14	0.56	0.56	0.54	0.03	0.03
Boron	ng/m <sup>3</sup>	120000			11	11	10	4	3	4	11	12
Cadmium	ng/m <sup>3</sup>	25			0.2	0.2	0.4	1.1	1.1	1.2	0.3	1.3
Cobalt	ng/m <sup>3</sup>	100			0.1	0.1	0.3	1.1	2.5	1.1	0.4	4.1
Copper	ng/m <sup>2</sup>	50000			6	12	12	9	11	12	11	31
Molybdenum	ng/m <sup>3</sup>	120000			1.4	0.8	0.9	1.7	1.7	1.8	2.8	3.0
Nickel	ng/m <sup>3</sup>	200			1	1	1	2	3	2	1	5
Lead	ng/m <sup>3</sup>	500			2	4	3	3	3	2	3	7
Antimony	ng/m <sup>3</sup>	25000			3	3	3	6	6	6	8	29
Selenium	ng/m <sup>2</sup>	10000			2	2	2	6	6	6	4	12
Uranium	ng/m <sup>3</sup>	300	1.8	4070	1.0	0.6	0.3	0.3	0.3	0.4	3.0	6.3
Vanadium	ng/m <sup>3</sup>	2000			0.5	0.5	1.0	2.8	2.8	2.7	0.4	1.9
Zinc	ng/m <sup>2</sup>	12000			17	31	29	22	26	26	23	61
Lead-210	Bq/m <sup>3</sup>	-			0.0006	0.0006	0.0004	0.0006	0.0009	0.0007	0.0006	0.0019
Radium-226	Bq/m <sup>3</sup>	-	0.000049	0.05	0.000024	0.000025	0.000040	0.000056	0.000059	0.000060	0.000030	0.000057
Thorium-230	Bq/m <sup>3</sup>	-	0.00042	0.01	0.00006	0.00007	0.00011	0.00028	0.00030	0.00027	0.00006	0.00029
Thorium-232	Bq/m <sup>3</sup>	-	0.000057	0.006	0.000056	0.000057	0.000108	0.000281	0.000281	0.000274	0.000056	0.000060
Thorium, natural	Bq/m <sup>3</sup>	-									0.00011	0.00012
Uranium, natural (calc)	Bq/m <sup>2</sup>	-									0.000003	0.000032

Note:

AAQC = Ambient Air Quality Criteria

\*Predicted values and Health Canada reference levels obtained from Port Hope Screening Report (Table 12.1)

**Bold values** indicate an exceedance of the predicted values.



**Table B-12: Metals and radionuclides concentrations in total suspended particulates –  
PH LTWMF South, 2015 – 2020**

					Welcome South							
					2015		2016	2017	2018	2019	2020	
Number of Samples Analyzed					7	10	45	38	50	51	38	
Analysis	Unit	AAQC	Predicted*	Health Canada Reference Levels*	Pre-Early Works 3A	During Early Works 3A					Average	Maximum
					Average							
Total Mercury (Hg)	ng/m <sup>3</sup>	-					0.01	0.01	0.01	0.08	0.87	1.21
Silver	ng/m <sup>3</sup>	1000			8	2	2	3	3	4	21	24
Arsenic	ng/m <sup>3</sup>	300			1.1	0.8	1.6	3.4	3.8	3.4	3.0	6.8
Barium	ng/m <sup>3</sup>	10000			3	9	8	6	7	7	5	16
Beryllium	ng/m <sup>3</sup>	10			0.01	0.00	0.13	0.57	0.57	0.54	0.03	0.03
Boron	ng/m <sup>3</sup>	120000			11	11	9	4	4	4	11	12
Cadmium	ng/m <sup>3</sup>	25			0.1	0.1	0.4	1.1	1.1	1.1	0.3	0.3
Cobalt	ng/m <sup>3</sup>	100			0.1	0.1	0.4	1.1	1.9	1.1	0.3	0.6
Copper	ng/m <sup>3</sup>	50000			4	10	21	8	11	12	12	33
Molybdenum	ng/m <sup>3</sup>	120000			1.0	0.5	1.0	1.7	1.7	1.9	3.4	15.8
Nickel	ng/m <sup>3</sup>	200			1	1	2	2	2	2	1	2
Lead	ng/m <sup>3</sup>	500			3	3	3	3	3	2	3	6
Antimony	ng/m <sup>3</sup>	25000			2	1	3	6	6	6	7	17
Selenium	ng/m <sup>3</sup>	10000			2	1	2	6	6	6	4	20
Uranium	ng/m <sup>3</sup>	300	1.8	4070	1.4	0.5	0.4	0.3	0.3	0.4	2.7	3.0
Vanadium	ng/m <sup>3</sup>	2000			0.2	0.4	1.1	2.8	2.8	2.7	0.3	0.8
Zinc	ng/m <sup>3</sup>	12000			12	25	29	17	20	19	19	79
Lead-210	Bq/m <sup>3</sup>	-			0.0006	0.0005	0.0004	0.0005	0.0009	0.0008	0.0007	0.0018
Radium-226	Bq/m <sup>3</sup>	-	0.000049	0.05	0.000026	0.000030	0.000032	0.000057	0.000059	0.000060	0.000028	0.000030
Thorium-230	Bq/m <sup>3</sup>	-	0.00042	0.01	0.00006	0.00006	0.00011	0.00028	0.00029	0.00027	0.00006	0.00017
Thorium-232	Bq/m <sup>3</sup>	-	0.000057	0.006	0.000056	0.000057	0.000107	0.000283	0.000284	0.000271	0.000056	0.000060
Thorium, natural	Bq/m <sup>3</sup>	-									0.00011	0.00012
Uranium, natural (calc)	Bq/m <sup>3</sup>	-									0.000002	0.000017

Note:

AAQC = Ambient Air Quality Criteria

\*Predicted values and Health Canada reference levels obtained from Port Hope Screening Report (Table 12.1)

**Bold values** indicate an exceedance of the predicted values.

**Table B-13: Metals and radionuclides concentrations in total suspended particulates –  
192 Toronto Road, 2015 – 2020**

					192 Toronto Rd							
					2015		2016	2017	2018	2019	2020	
Number of Samples Analyzed					7	10	45	38	50	51	38	
Analysis	Unit	AAQC	Predicted*	Health Canada Reference Levels*	Pre-Early Works 3A	During Early Works 3A					Average	Maximum
					Average							
Total Mercury (Hg)	ng/m³	-					0.01	0.01	0.01	0.08	0.87	1.20
Silver	ng/m³	1000			8	2	2	3	3	4	21	24
Arsenic	ng/m³	300			1.0	1.6	1.7	3.5	3.4	3.4	2.8	4.2
Barium	ng/m³	10000			4	9	7	7	9	9	6	11
Beryllium	ng/m³	10			0.01	0.01	0.15	0.58	0.57	0.54	0.03	0.03
Boron	ng/m³	120000			11	11	10	4	4	4	11	12
Cadmium	ng/m³	25			0.1	0.1	0.4	1.2	1.1	1.1	0.3	0.3
Cobalt	ng/m³	100			0.1	0.1	0.4	1.2	1.1	1.1	0.3	0.3
Copper	ng/m³	50000			5	12	15	9	10	14	12	26
Molybdenum	ng/m³	120000			1.0	0.4	0.9	1.8	1.7	1.8	2.9	10.9
Nickel	ng/m³	200			1	2	1	2	2	2	1	1
Lead	ng/m³	500			3	4	2	2	2	2	3	6
Antimony	ng/m³	25000			2	1	3	6	6	6	10	71
Selenium	ng/m³	10000			2	1	2	6	6	6	4	14
Uranium	ng/m³	300	1.8	4070	1.1	0.8	0.7	0.3	0.3	0.4	2.8	3.5
Vanadium	ng/m³	2000			0.4	0.5	1.3	2.9	2.8	2.7	0.3	0.7
Zinc	ng/m³	12000			16	27	21	19	23	22	23	121
Lead-210	Bq/m³	-			0.0007	0.0005	0.0004	0.0005	0.0008	0.0008	0.0007	0.0021
Radium-226	Bq/m³	-	0.000049	0.05	0.000024	0.000033	0.000034	0.000058	0.000057	0.000056	0.000030	0.000114
Thorium-230	Bq/m³	-	0.00042	0.01	0.00006	0.00006	0.00011	0.00029	0.00028	0.00027	0.00006	0.00011
Thorium-232	Bq/m³	-	0.000057	0.006	0.000055	0.000057	0.000111	0.000285	0.000283	0.000271	0.000056	0.000060
Thorium, natural	Bq/m³	-									0.00011	0.00016
Uranium, natural (calc)	Bq/m³	-									0.000003	0.000039

Note:

AAQC = Ambient Air Quality Criteria

\*Predicted values and Health Canada reference levels obtained from Port Hope Screening Report (Table 12.1)

**Bold values** indicate an exceedance of the predicted values.

**Table B-14: Air quality monitoring – Pine Street Extension Consolidation Site, Cavan Candies, 2020**

	2020	
	PM <sub>2.5</sub>	TSP
	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
Observations	36	36
Geometric Mean	3	9
Arithmetic Mean	4	11
Median	3	10
98 <sup>th</sup> Percentile	10 <sup>1</sup>	-
Maximum	11	22
Exceedances (%)	0%	0%

**Note:**

<sup>1</sup>98<sup>th</sup> Percentile for PM<sub>2.5</sub> averaged over 1 year (2020).

TSP values are compared to Overriding Limit of 120 µg/m<sup>3</sup> as defined in the PHAI Dust Management and Requirements Plan and AAQC.

PM<sub>2.5</sub> 98<sup>th</sup> percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 µg/m<sup>3</sup> and the proposed 2020 value of 27 µg/m<sup>3</sup>.

**Table B-15: Air quality monitoring – Pine Street Extension Consolidation Site, Jack Burger Sports Complex**

	2020	
	PM <sub>2.5</sub>	TSP
	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
Observations	36	35
Geometric Mean	2	10
Arithmetic Mean	3	12
Median	2	11
98 <sup>th</sup> Percentile	10 <sup>1</sup>	-
Maximum	13	45
Exceedances (%)	0%	0%

**Note:**

<sup>1</sup>98<sup>th</sup> Percentile for PM<sub>2.5</sub> averaged over 1 year (2020).

TSP values are compared to Overriding Limit of 120 µg/m<sup>3</sup> as defined in the PHAI Dust Management and Requirements Plan and AAQC.

PM<sub>2.5</sub> 98<sup>th</sup> percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 µg/m<sup>3</sup> and the proposed 2020 value of 27 µg/m<sup>3</sup>.

**Table B-16: Air quality monitoring – Pine Street Extension Consolidation Site, Port Hope High School, 2020**

	2020	
	PM <sub>2.5</sub>	TSP
	(µg/m <sup>3</sup> )	(µg/m <sup>3</sup> )
Observations	36	34
Geometric Mean	3	9
Arithmetic Mean	4	11
Median	2	9
98 <sup>th</sup> Percentile	12 <sup>1</sup>	-
Maximum	13	26
Exceedances (%)	0%	0%

**Note:**

<sup>1</sup>98<sup>th</sup> Percentile for PM<sub>2.5</sub> averaged over 1 year (2020).

TSP values are compared to Overriding Limit of 120 µg/m<sup>3</sup> as defined in the PHAI Dust Management and Requirements Plan and AAQC.

PM<sub>2.5</sub> 98<sup>th</sup> percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 µg/m<sup>3</sup> and the proposed 2020 value of 27 µg/m<sup>3</sup>.

**Table B-17: Metals and radionuclides concentrations in total suspended particulates – Pine Street Extension Consolidation Site, Cavan Candies, 2020**

					Cavan Candies	
					2020	
Number of Samples Analyzed					9	
Analysis	Unit	AAQC	Predicted*	Health Canada Reference Levels*	Average	Maximum
Total Mercury (Hg)	ng/m <sup>3</sup>	-			1.14	1.21
Silver	ng/m <sup>3</sup>	<b>1000</b>			23	24
Arsenic	ng/m <sup>3</sup>	<b>300</b>			2.8	3.0
Barium	ng/m <sup>3</sup>	<b>10000</b>			4	10
Beryllium	ng/m <sup>3</sup>	<b>10</b>			0.03	0.03
Boron	ng/m <sup>3</sup>	<b>120000</b>			11	12
Cadmium	ng/m <sup>3</sup>	<b>25</b>			0.3	0.3
Cobalt	ng/m <sup>3</sup>	<b>100</b>			0.3	0.3
Copper	ng/m <sup>3</sup>	<b>50000</b>			4	7
Molybdenum	ng/m <sup>3</sup>	<b>120000</b>			4.1	13.2
Nickel	ng/m <sup>3</sup>	<b>200</b>			1	1
Lead	ng/m <sup>3</sup>	<b>500</b>			3	4
Antimony	ng/m <sup>3</sup>	<b>25000</b>			11	27
Selenium	ng/m <sup>3</sup>	<b>10000</b>			3	3
Uranium	ng/m <sup>3</sup>	<b>300</b>	1.8	<b>4070</b>	<b>3.0</b>	<b>3.8</b>
Vanadium	ng/m <sup>3</sup>	<b>2000</b>			0.3	0.5
Zinc	ng/m <sup>3</sup>	<b>12000</b>			12	19
Lead-210	Bq/m <sup>3</sup>	-			0.0008	0.0017
Radium-226	Bq/m <sup>3</sup>	-	<b>0.000049</b>	<b>0.05</b>	0.000028	0.000030
Thorium-230	Bq/m <sup>3</sup>	-	<b>0.00042</b>	<b>0.01</b>	0.00006	0.00006
Thorium-232	Bq/m <sup>3</sup>	-	<b>0.000057</b>	<b>0.006</b>	0.000057	<b>0.000060</b>
Thorium, natural	Bq/m <sup>3</sup>	-			0.00011	0.00012
Uranium, natural (calc)	Bq/m <sup>3</sup>	-			0.000001	0.000005

Note:

AAQC = Ambient Air Quality Criteria

\*Predicted values and Health Canada reference levels obtained from Port Hope Screening Report (Table 12.1)

**Bold values** indicate an exceedance of the predicted values.

**Table B-18: Metals and radionuclides concentrations in total suspended particulates –  
 Pine Street Extension Consolidation Site, Jack Burger Sports Complex, 2020**

					Jack Burger Sports Complex		
					2018	2020	
Number of Samples Analyzed					15	9	
Analysis	Unit	AAQC	Predicted*	Health Canada Reference Levels*	Average	Average	Maximum
Total Mercury (Hg)	ng/m <sup>3</sup>	-			0.01	1.14	1.21
Silver	ng/m <sup>3</sup>	<b>1000</b>			3	23	24
Arsenic	ng/m <sup>3</sup>	<b>300</b>			3.3	2.8	3.0
Barium	ng/m <sup>3</sup>	<b>10000</b>			5	3	5
Beryllium	ng/m <sup>3</sup>	<b>10</b>			0.55	0.03	0.03
Boron	ng/m <sup>3</sup>	<b>120000</b>			3	11	12
Cadmium	ng/m <sup>3</sup>	<b>25</b>			1.1	0.3	0.3
Cobalt	ng/m <sup>3</sup>	<b>100</b>			1.1	0.3	0.3
Copper	ng/m <sup>3</sup>	<b>50000</b>			5	3	4
Molybdenum	ng/m <sup>3</sup>	<b>120000</b>			1.7	2.9	3.5
Nickel	ng/m <sup>3</sup>	<b>200</b>			2	1	1
Lead	ng/m <sup>3</sup>	<b>500</b>			2	3	3
Antimony	ng/m <sup>3</sup>	<b>25000</b>			6	11	18
Selenium	ng/m <sup>3</sup>	<b>10000</b>			6	3	3
Uranium	ng/m <sup>3</sup>	<b>300</b>	<b>1.8</b>	<b>4070</b>	0.3	<b>2.8</b>	<b>3.0</b>
Vanadium	ng/m <sup>3</sup>	<b>2000</b>			2.8	0.3	0.5
Zinc	ng/m <sup>3</sup>	<b>12000</b>			15	12	17
Lead-210	Bq/m <sup>3</sup>	-			0.0008	0.0009	0.0017
Radium-226	Bq/m <sup>3</sup>	-	<b>0.000049</b>	<b>0.05</b>	<b>0.000055</b>	0.000028	0.000030
Thorium-230	Bq/m <sup>3</sup>	-	<b>0.00042</b>	<b>0.01</b>	0.00028	0.00006	0.00006
Thorium-232	Bq/m <sup>3</sup>	-	<b>0.000057</b>	<b>0.006</b>	<b>0.000277</b>	0.000057	<b>0.000061</b>
Thorium, natural	Bq/m <sup>3</sup>	-			-	0.00011	0.00012
Uranium, natural (calc)	Bq/m <sup>3</sup>	-			-	0.000001	0.000002

Note:

AAQC = Ambient Air Quality Criteria

\*Predicted values and Health Canada reference levels obtained from Port Hope Screening Report (Table 12.1)

**Bold values** indicate an exceedance of the predicted values.

**Table B-19: Metals and radionuclides concentrations in total suspended particulates –  
Pine Street Extension Consolidation Site, Port Hope High School, 2020**

					Port Hope High School		
					2018	2020	
Number of Samples Analyzed					20	9	
Analysis	Unit	AAQC	Predicted*	Health Canada Reference Levels*	Average	Average	Maximum
Total Mercury (Hg)	ng/m <sup>3</sup>	-			0.01	1.14	1.20
Silver	ng/m <sup>3</sup>	1000			3	23	24
Arsenic	ng/m <sup>3</sup>	300			3.4	2.9	3.0
Barium	ng/m <sup>3</sup>	10000			6	3	4
Beryllium	ng/m <sup>3</sup>	10			0.56	0.03	0.03
Boron	ng/m <sup>3</sup>	120000			3	11	12
Cadmium	ng/m <sup>3</sup>	25			1.1	0.3	0.3
Cobalt	ng/m <sup>3</sup>	100			1.1	0.3	0.3
Copper	ng/m <sup>3</sup>	50000			6	9	15
Molybdenum	ng/m <sup>3</sup>	120000			1.7	2.9	3.0
Nickel	ng/m <sup>3</sup>	200			2	1	1
Lead	ng/m <sup>3</sup>	500			2	3	4
Antimony	ng/m <sup>3</sup>	25000			6	10	17
Selenium	ng/m <sup>3</sup>	10000			6	3	3
Uranium	ng/m <sup>3</sup>	300	1.8	4070	0.3	3.0	4.0
Vanadium	ng/m <sup>3</sup>	2000			2.8	0.3	0.4
Zinc	ng/m <sup>3</sup>	12000			16	14	23
Lead-210	Bq/m <sup>3</sup>	-			0.0009	0.0007	0.0015
Radium-226	Bq/m <sup>3</sup>	-	0.000049	0.05	0.000056	0.000029	0.000030
Thorium-230	Bq/m <sup>3</sup>	-	0.00042	0.01	0.00028	0.00006	0.00006
Thorium-232	Bq/m <sup>3</sup>	-	0.000057	0.006	0.000282	0.000057	0.000060
Thorium, natural	Bq/m <sup>3</sup>	-			-	0.00011	0.00012
Uranium, natural (calc)	Bq/m <sup>3</sup>	-			-	0.000001	0.000006

Note:

AAQC = Ambient Air Quality Criteria

\*Predicted values and Health Canada reference levels obtained from Port Hope Screening Report (Table 12.1)

**Bold values** indicate an exceedance of the predicted values.

**Table B-20: Noise monitoring levels – PH LTWMF, 2015 – 2020**

Monitoring Location	2015 Average L <sub>eq</sub> (dBA) Pre-Early Works 3a			2016 Average L <sub>eq</sub> (dBA) During Early Works 3a/Early Works 1			2017 Average L <sub>eq</sub> (dBA) During Early Works 1			2018 Average L <sub>eq</sub> (dBA)			2019 Average L <sub>eq</sub> (dBA)			2020 Average L <sub>eq</sub> (dBA)		
	Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)	Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)	Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)	Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)	Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)	Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)
192 Toronto Rd	63	61	59	66	62	61	67	63	61	66	63	60	67	62	61	65	62	59
NW WWMF, Brand Rd	66	67	64	---	---	---	66	67	64	66	66	64	66	66	64	65	66	63
South WWMF	52	53	52	62	54	52	54	54	53	58	55	53	58	54	51	53	52	49
SW WWMF, Brand Rd	56	55	53	57	57	55	58	55	55	58	56	55	56	57	55	56	58	55
Weather Station	54	54	52	63	55	53	63	54	54	65	56	55	62	55	56	57	52	50
Welcome North	62	61	58	62	62	61	67	67	65	67	67	65	66	65	63	64	65	63
SE Corner WWMF	---	---	---	54	54	52	59	56	52	56	55	53	58	56	55	56	52	52

Note:

--- = Data not available

Noise monitoring results are compared to:

1. 12 dBA difference from Baseline (2015) monitoring results

2. 70 dB over a 24 hour period as per the World Health Organization's *Guideline for Community Noise*, 1999

**Table B-21: Noise monitoring levels – Southern, Northern and Central transportation routes, 2018 – 2020**

Central Transportation Route	Yearly Average Hourly Measurements Leq (dBA)		March Hourly Measurements Leq (dBA)	June Hourly Measurements Leq (dBA)	August Hourly Measurements Leq (dBA)	December Hourly Measurements Leq (dBA)	
	2018	2019	2020				Yearly Average
Monitoring Location	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)
C-TR-N-001	61	64	--	--	--	62	62
C-TR-N-002	69	71	--	--	--	69	69

-- = Data not available

North Transportation Route	Yearly Average Hourly Measurements Leq (dBA)		February Hourly Measurements Leq (dBA)	June Hourly Measurements Leq (dBA)	September Hourly Measurements Leq (dBA)	December Hourly Measurements Leq (dBA)	
	2018	2019	2020				Yearly Average
Monitoring Location	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)
N-TR-N-001	63	61	62	--	62	62	62
N-TR-N-002	62	61	59	--	68	68	65

-- = Data not available

South Transportation Route	Yearly Average Hourly Measurements Leq (dBA)		February Hourly Measurements Leq (dBA)	June Hourly Measurements Leq (dBA)	August Hourly Measurements Leq (dBA)	December Hourly Measurements Leq (dBA)	
	2018	2019	2020				Yearly Average
Monitoring Location	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)	Day (07:00-19:00)
S-TR-N-001	70	70	70	--	69	71	70
S-TR-N-002	69	70	70	--	70	70	70
S-TR-N-003	68	68	70	--	67	68	68
S-TR-N-004	63	65	--	--	66	64	65
S-TR-N-005	61	60	61	--	60	61	61

-- = Data not available

**Table B-22: PH LTWMF groundwater levels, 2015 – 2020**

Well ID	2015	2016	2017	2018	2019	2020		
	Average					Min	Max	Average
	(mASL)							
WC-IW93-22	123.97	123.44	123.94	123.81	123.74	123.31	123.76	123.47
WC-MW1-02	127.45	127.37	127.87	128.57	Well Damaged			
WC-MW1-03	148.11	148.14	148.26	148.30	148.48	147.64	148.50	148.16
WC-MW2-02	116.17	Well Not Found						
WC-MW3A-02 <sup>1</sup>	--	--	--	--	--	--	--	--
WC-MW3A-11R	--	--	--	--	--	--	--	--
WC-MW3B-02	124.01	129.48	129.57	129.66	130.93	130.41	131.08	130.72
WC-MW3C-02	135.30	135.34	135.52	135.98	136.15	134.99	136.54	135.81
WC-MW3D-02	136.42	136.39	136.53	136.91	136.85	135.87	137.56	136.86
WC-MW4A-02	127.48	127.29	127.03	127.15	127.09	126.48	127.08	126.87
WC-MW4B-02	127.26	127.09	127.18	127.25	127.17	126.54	127.25	126.92
WC-OW1-75	148.45	Well Decommissioned						
WC-OW1-87	116.73	116.45	116.80	116.67	116.57	115.85	117.23	116.42
WC-OW2-75	134.23	133.60	134.86	Well Decommissioned				
WC-OW2A-75	120.23	119.87	120.23	Well Decommissioned				
WC-OW2A-19 <sup>2</sup>	--				120.14	119.07	120.66	119.76
WC-OW2-87	119.92	119.46	119.63	Well Decommissioned				
WC-OW2-19 <sup>3</sup>	--				120.02	119.81	121.27	120.38
WC-OW3-79	119.29	119.18	119.47	119.50	119.31	116.23	117.43	116.73
WC-OW3-87	117.03	116.77	117.08	117.01	117.00	118.36	119.18	118.76
WC-OW4-79	119.03	118.78	119.16	119.14	119.20	119.68	121.19	120.23
WC-OW5-79	120.23	119.91	119.68	Well Decommissioned				
WC-OW5-19 <sup>4</sup>	--				120.22	119.68	121.19	120.23
WC-OW9-75	Well Damaged		Well Decommissioned					
LTWMF-MW-06 <sup>5</sup>	--	--	148.40	148.58	148.30	147.77	148.35	148.06
WC-OW10-75	140.45	139.92	140.33	140.56	140.30	139.24	141.23	140.14
WC-OW12-75	133.64	133.18	133.45	Well Decommissioned				
WC-OW18-76	136.14	136.14	136.39	Well Decommissioned				
WC-OW25-76	118.80	118.42	118.75	118.74	118.76	118.28	118.84	118.66
WC-OW27-76	120.71	120.28	120.80	120.58	120.83	120.20	121.07	120.71
WC-OW28-76	120.39	119.73	120.66	120.51	120.55	119.88	120.68	120.36
WC-OW33-76	123.88	123.59	123.87	124.04	123.81	123.31	124.03	123.54

**Note:**

mASL – meters above sea level

- = Data not available

<sup>1</sup> WC-MW3A-11R was installed in 2011 to replace WC-MW3A-02<sup>2</sup> WC-OW2A-19 was installed in 2019 to replace WC-OW2A-75<sup>3</sup> WC-OW2-19 was installed in 2019 to replace WC-OW2-87<sup>4</sup> WC-OW5-19 was installed in 2019 to replace WC-OW5-79<sup>5</sup> LTWMF-MW-06 was installed in 2017 to replace WC-OW9-75

**Table B-23: PH LTWMF sentinel well monitoring program, 2018 – 2020**

Arsenic (dissolved) PWQO Trigger Level 50 (µg/L)					
Well ID	2018	2019	2020		Average
	Average		Sample Dates		
WC-IW93-22	1.4	1.3	2020-06-02 2.0	2020-11-26 1.0	1.5
WC-OW1-87	<1.0	<1.0	2020-06-03 0.8	2020-11-18 0.8	0.8
WC-OW2-75	WELL DECOMMISSIONED	--			
WC-OW2A-75	WELL DECOMMISSIONED	--			
WC-OW2A-19 <sup>1</sup>		1.4	2020-06-02 0.6	2020-11-19 0.5	0.6
WC-OW2-87	WELL DECOMMISSIONED	--			
WC-OW2-19 <sup>2</sup>		<1.0	2020-06-02 1.5	2020-11-12 1.5	1.5
WC-OW3-79	3.1	3.2	2020-06-05 3.8	2020-11-20 3.7	3.8
WC-OW3-87	4.5	4.2	2020-06-03 5.3	2020-11-18 4.8	5.1
WC-OW4-79	1.1	<1.0	2020-06-02 0.5	2020-11-26 0.8	0.7
WC-OW5-79	WELL DECOMMISSIONED	--			
WC-OW5-19 <sup>3</sup>		2.8	2020-06-10 3.4	2020-11-19 3.3	3.4
WC-OW25-76	<1.0	<1.0	2020-06-02 0.8	2020-11-26 0.7	0.8
WC-OW27-76	<1.0	<1.0	2020-06-02 0.4	2020-11-26 0.3	0.4
WC-OW28-76	<1.0	<1.0	2020-06-02 0.7	2020-11-26 0.5	0.6
WC-OW33-76	<1.0	<1.0	2020-06-24 1.7	2020-11-26 0.7	1.2

PWQO Trigger Level based on 50% of the Provincial Water Quality Objective of 100 µg/L for arsenic

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<sup>1</sup> WC-OW2A-19 was installed in 2019 to replace WC-OW2A-75

<sup>2</sup> WC-OW2-19 was installed in 2019 to replace WC-OW2-87

<sup>3</sup> WC-OW5-19 was installed in 2019 to replace WC-OW5-79



**Table B-24: Highland Drive groundwater levels, 2018 – 2020**

Well ID	2018	2019	2020		
	Average		Min	Max	Average
	(mASL)				
PH-02-01	104.08	104.20	103.98	104.29	104.13
PH-02-02	104.07	104.29	103.98	104.27	104.11
PH-02-03	104.08	105.58	103.97	104.25	104.11
PH-90-3-I	110.16	110.00	110.13	110.21	110.19
PH-90-3-II	--	119.54	119.54	120.93	120.19
PH-90-4-W	107.29	107.67	107.63	107.92	107.77
PH-90-4-I	106.38	106.38	106.23	106.77	106.43
PH-90-4-II	107.27	--	--	--	--
PH-90-4-III	115.58	115.50	115.34	115.63	115.47
PH-90-6-I	107.36	111.34	107.15	107.48	107.30
PH-90-6-II	114.16	114.70	107.59	116.26	109.94
PH-90-6-III	115.92	116.25	115.48	116.13	115.88
PH-90-7-I	--	105.01	105.01	105.01	105.01
PH-90-7-II	105.42	105.48	105.22	105.59	105.36
PH-90-7-III	112.49	112.79	112.28	112.88	112.57
PH-90-8-I	104.03	104.07	103.82	104.16	103.99
PH-90-8-II	104.08	104.15	103.81	104.25	104.09
PH-90-9-I	Well Not Found				
PH-90-9-II	--	94.77	90.40	90.40	90.40
PH-90-9-III	95.18	96.85	94.75	97.37	96.18
PH-93-3-I	--	106.09	106.04	106.32	106.21
PH-93-3-II	105.98	106.09	105.79	106.32	106.06
PH-93-3-III	112.46	112.58	112.12	112.90	112.50
PH-93-6-I	--	--	--	--	--
PH-93-6-II	--	--	--	--	--
PH-93-6-III	--	--	--	--	--
PH-93-9-I	--	--	--	--	--
PH-93-9-II	--	--	--	--	--
PH-93-10-I	105.39	105.50	105.19	105.72	105.48
PH-93-10-II	105.44	105.50	105.20	105.74	105.49
PH-93-10-IIIA	--	109.80	110.08	110.08	110.08
PH-93-10-IIIB	--	110.15	109.92	110.47	110.19
PH-93-12-I	Well Not Found				
PH-93-12-II	--	--	--	--	--
PH-93-12-III	Well Not Found				
PH-95-I	105.37	105.53	105.21	105.72	105.49
PH-95-7	--	--	--	--	--
PH-95-17-I	106.04	106.13	105.79	106.35	106.09
PH-95-17-II	112.91	113.00	112.66	113.34	113.00
PH-95-18	106.11	106.16	106.07	106.40	106.22
PH-M-19	100.17	100.17	100.15	100.18	100.16

**Note:**

mASL – meters above sea level

-- = Data not available

**Table B-25: Soil monitoring- PH LTWMF – Location 1 (PH-WWMF-SS-01), 2015 – 2020**

Parameter	Units	PH-WWMF-SS-01					
		2015	2016	2017	2018	2019	2020
Water Soluble Boron	µg/g	- <sup>1</sup>	- <sup>1</sup>	0.50	0.51	0.54	< 0.50
Mercury	µg/g	< 0.05	< 0.05	0.067	< 0.05	< 0.05	0.06
Silver	µg/g	1.20	0.98	< 0.40	0.22	0.25	0.47
Arsenic	µg/g	4.3	3.5	5.7	4.0	4.1	4.8
Barium	µg/g	50	54	52	48	53	66
Beryllium	µg/g	0.35	0.39	0.43	0.37	0.45	0.40
Boron	µg/g	5.0	6.0	< 5.0	5.6	6.4	5.0
Cadmium	µg/g	0.92	0.84	0.34	0.35	0.31	0.49
Cobalt	µg/g	5.4	5.2	8.8	6.0	6.7	8.2
Copper	µg/g	9.2	9.4	13	11	11	18
Molybdenum	µg/g	0.40	0.40	< 0.50	0.53	< 0.50	0.60
Nickel	µg/g	7.9	8.2	11	8.3	9.1	12
Lead	µg/g	18	18	20	20	20	23
Selenium	µg/g	< 0.70	< 0.70	< 0.50	< 0.50	< 0.50	< 0.70
Antimony	µg/g	< 0.80	< 0.80	0.24	0.22	< 0.20	< 0.80
Uranium	µg/g	2.4	2.1	3.1	2.4	3.4	4.1
Vanadium	µg/g	15	17	22	22	27	23
Zinc	µg/g	58	<b>380</b>	75	<b>510</b>	310	80
<b>Radionuclides</b>							
Lead-210	Bq/g	0.07	0.04	0.10	0.14	0.10	0.40
Radium-226	Bq/g	0.08	0.10	< 0.10	< 0.05	0.06	0.10
Thorium-230	Bq/g	0.08	< 0.02	< 0.50	< 0.40	< 0.40	< 0.40
Thorium-232	Bq/g	- <sup>1</sup>	- <sup>1</sup>	< 0.30	< 0.04	< 0.30	0.019

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Predicted values obtained from the Port Hope Screening Report:

Thorium-230 Mean Predicted Concentration = 0.0977 Bq/g

Thorium-230 Maximum Predicted Concentration = 0.1419 Bq/g

Arsenic Maximum Predicted Concentration = 4.7 µg/g

Cobalt Maximum Predicted Concentration = 6.67 µg/g

**Table B-26: Soil monitoring- PH LTWMF – Location 2 (PH-WWMF-SS-02), 2015 – 2020**

Parameter	Units	PH-WWMF-SS-02					
		2015	2016	2017	2018	2019	2020
Water Soluble Boron	µg/g	- <sup>1</sup>	- <sup>1</sup>	0.75	0.69	0.70	< 0.50
Mercury	µg/g	< 0.05	0.06	0.052	< 0.05	< 0.05	0.05
Silver	µg/g	0.08	0.29	< 0.20	< 0.20	< 0.20	0.15
Arsenic	µg/g	3.1	2.6	2.4	3.3	3.8	3.5
Barium	µg/g	42	41	30	36	39	40
Beryllium	µg/g	0.31	0.29	0.25	0.29	0.32	0.26
Boron	µg/g	4.0	3.0	< 5.0	< 5.0	< 5.0	3.0
Cadmium	µg/g	0.28	0.35	0.20	0.27	0.22	0.26
Cobalt	µg/g	4.0	3.4	3.4	4.1	4.8	4.9
Copper	µg/g	5.9	6.1	5.3	6.7	7.5	8
Molybdenum	µg/g	0.30	0.30	< 0.50	< 0.50	< 0.50	0.30
Nickel	µg/g	5.7	5.4	5.2	6.0	6.8	7
Lead	µg/g	20	19	14	17	16	17
Selenium	µg/g	< 0.70	< 0.70	< 0.50	< 0.50	< 0.50	< 0.70
Antimony	µg/g	< 0.80	< 0.80	< 0.20	< 0.20	< 0.20	< 0.80
Uranium	µg/g	0.9	2.2	0.9	1.2	1.3	1.4
Vanadium	µg/g	16	15	18	20	24	19
Zinc	µg/g	35	47	37	38	44	44
<b>Radionuclides</b>							
Lead-210	Bq/g	0.06	0.08	< 0.05	0.06	0.08	0.08
Radium-226	Bq/g	0.07	0.06	< 0.10	< 0.05	< 0.05	0.13
Thorium-230	Bq/g	0.03	0.03	< 0.50	< 0.40	< 0.40	< 0.08
Thorium-232	Bq/g	- <sup>1</sup>	- <sup>1</sup>	< 0.30	< 0.04	< 0.30	0.012

<sup>1</sup> Analysis not included in laboratory contract.

<sup>2</sup> Predicted values obtained from the Port Hope Screening Report:

Thorium-230 Mean Predicted Concentration = 0.0977 Bq/g

Thorium-230 Maximum Predicted Concentration = 0.1419 Bq/g

Arsenic Maximum Predicted Concentration = 4.7 µg/g

Cobalt Maximum Predicted Concentration = 6.67 µg/g

**Table B-27: Soil monitoring- PH LTWMF – Location 3 (PH-WWMF-SS-03), 2015 – 2020**

Parameter	Units	PH-WWMF-SS-03					
		2015	2016	2017	2018	2019	2020
Water Soluble Boron	µg/g	- <sup>1</sup>	- <sup>1</sup>	0.42	0.57	0.59	< 0.50
Mercury	µg/g	< 0.05	< 0.05	0.064	0.05	< 0.05	< 0.05
Silver	µg/g	0.06	0.07	< 0.20	< 0.20	< 0.20	0.08
Arsenic	µg/g	3.0	2.9	3.2	3.5	3.8	3.4
Barium	µg/g	96	95	87	110	98	100
Beryllium	µg/g	0.49	0.50	0.54	0.57	0.56	0.50
Boron	µg/g	4.0	5.0	< 5.0	6.6	7.3	5.0
Cadmium	µg/g	0.24	0.23	0.20	0.22	0.23	0.28
Cobalt	µg/g	5.8	5.8	6.1	7.1	6.5	7.5
Copper	µg/g	11	11	11	13	13	14
Molybdenum	µg/g	0.30	0.40	< 0.50	< 0.50	< 0.50	0.40
Nickel	µg/g	10	11	12	13	13	14
Lead	µg/g	12	11	11	13	13	12
Selenium	µg/g	< 0.70	< 0.70	< 0.50	< 0.50	< 0.50	< 0.70
Antimony	µg/g	< 0.80	< 0.80	0.22	< 0.20	< 0.20	< 0.80
Uranium	µg/g	1.2	1.2	1.1	1.3	1.3	1.4
Vanadium	µg/g	27	27	31	35	35	35
Zinc	µg/g	43	53	54	62	58	63
<b>Radionuclides</b>							
Lead-210	Bq/g	< 0.04	0.13	0.06	0.07	< 0.05	0.10
Radium-226	Bq/g	0.06	0.04	< 0.10	< 0.05	< 0.05	0.08
Thorium-230	Bq/g	< 0.02	0.04	< 0.50	< 0.40	< 0.40	< 0.20
Thorium-232	Bq/g	- <sup>1</sup>	- <sup>1</sup>	< 0.30	< 0.04	< 0.30	0.019

<sup>1</sup> Analysis not included in laboratory contract.

<sup>2</sup> Predicted values obtained from the Port Hope Screening Report:

Thorium-230 Mean Predicted Concentration = 0.0977 Bq/g

Thorium-230 Maximum Predicted Concentration = 0.1419 Bq/g

Arsenic Maximum Predicted Concentration = 4.7 µg/g

Cobalt Maximum Predicted Concentration = 6.67 µg/g

**Table B-28: Soil monitoring- PH LTWMF – Location 4 (PH-WWMF-SS-04), 2015 – 2020**

Parameter	Units	PH-WWMF-SS-04					
		2015	2016	2017	2018	2019	2020
Water Soluble Boron	µg/g	- <sup>1</sup>	- <sup>1</sup>	0.58	0.59	0.58	< 0.50
Mercury	µg/g	< 0.05	< 0.05	< 0.050	< 0.05	< 0.05	< 0.05
Silver	µg/g	0.04	0.04	< 0.20	< 0.20	< 0.20	< 0.05
Arsenic	µg/g	2.4	2.1	1.8	2.1	1.4	2.5
Barium	µg/g	25	23	21	34	20	28
Beryllium	µg/g	0.21	0.26	< 0.20	< 0.20	< 0.20	0.22
Boron	µg/g	3.0	4.0	< 5.0	< 5.0	< 5.0	4.0
Cadmium	µg/g	0.18	0.21	0.22	0.19	0.12	0.21
Cobalt	µg/g	2.2	2.5	2.2	2.4	1.8	3.0
Copper	µg/g	4.5	5.3	4.0	4.6	4.1	7
Molybdenum	µg/g	0.20	0.30	< 0.50	< 0.50	< 0.50	0.30
Nickel	µg/g	3.6	4.2	3.7	4.1	3.2	5
Lead	µg/g	16	11	11	40	10	11
Selenium	µg/g	< 0.70	0.80	< 0.50	< 0.50	< 0.50	< 0.70
Antimony	µg/g	< 0.80	< 0.80	< 0.20	< 0.20	0.23	< 0.80
Uranium	µg/g	0.68	0.66	0.56	0.50	0.43	0.67
Vanadium	µg/g	11	13	14	13	15	15
Zinc	µg/g	58	310	140	220	<b>550</b>	260
<b>Radionuclides</b>							
Lead-210	Bq/g	< 0.04	< 0.04	< 0.05	0.07	< 0.05	0.08
Radium-226	Bq/g	0.03	0.04	< 0.10	< 0.05	< 0.05	< 0.04
Thorium-230	Bq/g	0.05	0.03	< 0.50	< 0.40	< 0.40	< 0.30
Thorium-232	Bq/g	- <sup>1</sup>	- <sup>1</sup>	< 0.30	< 0.04	< 0.30	0.009

<sup>1</sup> Analysis not included in laboratory contract.

<sup>2</sup> Predicted values obtained from the Port Hope Screening Report:

Thorium-230 Mean Predicted Concentration = 0.0977 Bq/g

Thorium-230 Maximum Predicted Concentration = 0.1419 Bq/g

Arsenic Maximum Predicted Concentration = 4.7 µg/g

Cobalt Maximum Predicted Concentration = 6.67 µg/g

**Table B-29: Soil monitoring- PH LTWMF – Location 5 (PH-WWMF-SS-05), 2015 – 2020**

Parameter	Units	PH-WWMF-SS-05					
		2015	2016	2017	2018	2019	2020
Water Soluble Boron	µg/g	- <sup>1</sup>	- <sup>1</sup>	0.54	0.71	0.46	< 0.50
Mercury	µg/g	< 0.05	< 0.05	< 0.050	< 0.05	< 0.05	< 0.05
Silver	µg/g	0.04	0.04	< 0.20	< 0.20	< 0.20	< 0.05
Arsenic	µg/g	16	<b>57</b>	<b>50</b>	34	30	2.0
Barium	µg/g	140	100	50	62	69	81
Beryllium	µg/g	0.45	0.36	0.31	0.33	0.36	0.41
Boron	µg/g	7.0	7.0	< 5.0	6.4	7.0	6.0
Cadmium	µg/g	0.15	0.16	0.24	0.22	0.19	0.26
Cobalt	µg/g	6.6	5.3	3.4	4.1	4.4	6.3
Copper	µg/g	16	13	8.3	11	9.6	14
Molybdenum	µg/g	0.30	0.40	< 0.50	< 0.50	< 0.50	0.40
Nickel	µg/g	14	11	6.9	7.6	8.3	12
Lead	µg/g	17	12	19	24	22	34
Selenium	µg/g	< 0.70	< 0.70	< 0.50	< 0.50	< 0.50	< 0.70
Antimony	µg/g	< 0.80	< 0.80	< 0.20	0.21	< 0.20	< 0.80
Uranium	µg/g	6.6	9.6	9.5	8.9	6.5	0.6
Vanadium	µg/g	31	24	20	22	25	29
Zinc	µg/g	75	62	45	180	59	84
<b>Radionuclides</b>							
Lead-210	Bq/g	< 0.04	0.04	0.07	0.06	0.06	0.08
Radium-226	Bq/g	< 0.01	0.03	< 0.10	< 0.05	< 0.05	0.09
Thorium-230	Bq/g	< 0.02	0.03	< 0.50	< 0.40	< 0.40	< 0.20
Thorium-232	Bq/g	- <sup>1</sup>	- <sup>1</sup>	< 0.30	< 0.04	< 0.30	0.016

<sup>1</sup> Analysis not included in laboratory contract.

<sup>2</sup> Predicted values obtained from the Port Hope Screening Report:

Thorium-230 Mean Predicted Concentration = 0.0977 Bq/g

Thorium-230 Maximum Predicted Concentration = 0.1419 Bq/g

Arsenic Maximum Predicted Concentration = 4.7 µg/g

Cobalt Maximum Predicted Concentration = 6.67 µg/g

**Table B-30: Soil monitoring- Highland Drive – Location 1 (PH-H-SS-01), 2015 – 2020**

Parameter	Units	PH-H-SS-01					
		2015	2016	2017	2018	2019	2020
Hot Water Ext. Boron (B)	µg/g	- <sup>1</sup>	- <sup>1</sup>	0.42	0.34	0.30	< 0.50
Acid Extractable Mercury (Hg)	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acid Extractable Silver (Ag)	µg/g	0.07	0.07	< 0.20	< 0.20	< 0.20	0.07
Acid Extractable Arsenic (As)	µg/g	1.9	2.1	1.6	2.0	2.3	2.4
Acid Extractable Barium (Ba)	µg/g	110	100	66	120	110	140
Acid Extractable Beryllium (Be)	µg/g	0.46	0.49	0.34	0.56	0.52	0.50
Acid Extractable Boron (B)	µg/g	5.0	5.0	5.8	7.1	6.6	6.0
Acid Extractable Cadmium (Cd)	µg/g	0.17	0.17	0.14	0.14	0.19	0.22
Acid Extractable Cobalt (Co)	µg/g	6.1	5.9	4.7	7.2	7.0	8.9
Acid Extractable Copper (Cu)	µg/g	12	13	10	15	14	19
Acid Extractable Molybdenum (Mo)	µg/g	0.30	0.30	< 0.50	< 0.50	< 0.50	0.40
Acid Extractable Nickel (Ni)	µg/g	12	12	8.7	15	13	18
Acid Extractable Lead (Pb)	µg/g	11	15	8.4	16	14	14
Acid Extractable Selenium (Se)	µg/g	< 0.70	< 0.70	< 0.50	< 0.50	< 0.50	< 0.70
Acid Extractable Antimony (Sb)	µg/g	< 0.80	< 0.80	< 0.20	0.25	< 0.20	< 0.80
Acid Extractable Uranium (U)	µg/g	0.67	0.71	0.51	0.78	0.70	0.89
Acid Extractable Vanadium (V)	µg/g	31	31	25	38	36	44
Acid Extractable Zinc (Zn)	µg/g	48	54	43	87	71	89
<b>Radionuclides</b>							
Lead-210	Bq/g	0.05	< 0.04	0.06	< 0.05	0.06	< 0.20
Radium-226	Bq/g	0.01	0.03	< 0.10	< 0.05	< 0.05	0.08
Thorium-230	Bq/g	< 0.02	< 0.02	< 0.5	< 0.40	< 0.40	0.07
Thorium-232	Bq/g	- <sup>1</sup>	- <sup>1</sup>	< 0.30	< 0.04	< 0.30	0.020

<sup>1</sup> Analysis not included in laboratory contract.**Table B-31: Soil monitoring- Highland Drive – Location 2 (PH-H-SS-02), 2015 – 2020**

Parameter	Units	PH-H-SS-02					
		2015	2016	2017	2018	2019	2020
Hot Water Ext. Boron (B)	µg/g	- <sup>1</sup>	- <sup>1</sup>	0.57	0.47	0.40	< 0.50
Acid Extractable Mercury (Hg)	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acid Extractable Silver (Ag)	µg/g	0.13	0.12	< 0.20	< 0.20	< 0.20	0.10
Acid Extractable Arsenic (As)	µg/g	3.3	4.8	3.1	3.9	3.2	4.2
Acid Extractable Barium (Ba)	µg/g	120	110	82	99	96	95
Acid Extractable Beryllium (Be)	µg/g	0.48	0.48	0.44	0.52	0.45	0.38
Acid Extractable Boron (B)	µg/g	5.0	5.0	6.2	6.3	6.5	5.0
Acid Extractable Cadmium (Cd)	µg/g	0.19	0.19	0.19	0.22	0.19	0.19
Acid Extractable Cobalt (Co)	µg/g	6.5	6.1	5.8	6.9	6.2	6.5
Acid Extractable Copper (Cu)	µg/g	14	14	13	15	13	15
Acid Extractable Molybdenum (Mo)	µg/g	0.30	0.40	< 0.50	0.52	< 0.50	0.40
Acid Extractable Nickel (Ni)	µg/g	12	12	11	13	12	13
Acid Extractable Lead (Pb)	µg/g	15	18	12	15	13	19
Acid Extractable Selenium (Se)	µg/g	< 0.70	< 0.70	< 0.50	< 0.50	< 0.50	< 0.70
Acid Extractable Antimony (Sb)	µg/g	< 0.80	< 0.80	0.21	0.24	0.21	< 0.80
Acid Extractable Uranium (U)	µg/g	2.2	2.3	1.4	2.3	2.0	1.7
Acid Extractable Vanadium (V)	µg/g	32	31	30	34	33	31
Acid Extractable Zinc (Zn)	µg/g	46	55	54	53	49	54
<b>Radionuclides</b>							
Lead-210	Bq/g	< 0.04	< 0.04	0.05	0.06	0.07	< 0.20
Radium-226	Bq/g	0.03	0.05	< 0.10	< 0.05	< 0.05	< 0.03
Thorium-230	Bq/g	0.03	0.04	< 0.5	< 0.40	< 0.40	0.10
Thorium-232	Bq/g	- <sup>1</sup>	- <sup>1</sup>	< 0.30	< 0.04	< 0.30	0.007

<sup>1</sup> Analysis not included in laboratory contract.

**Table B32: Surface water quality – Brand Creek – downstream of PH LTWMF (BC-D), 2015 – 2020**

		Criteria		BC-D									
				2015	2016	2017	2018	2019	2020				
Parameter	Units	PWQO	CWQG	Average					2020-01-03	2020-05-14	2020-07-09	2020-10-14	Average
Total Suspended Solids	mg/L			38	52	13	72	24	13	19	40	13	21
pH	no unit	6.5-8.5	6.5-9.0	8.07	8.00	8.18	8.11	8.14	8.15	8.24	7.92	7.97	8.07
Alkalinity	mg/L as CaCO3			249	258	275	285	273	265	268	270	246	262
Carbonate	mg/L as CaCO3			5	4	3.9	3.4	3.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			244	256	273	278	265	265	268	270	246	262
Total Dissolved Solids	mg/L			526	667	505	620	609	480	554	771	714	630
Fluoride	mg/L		0.12	0.08	0.11	0.10	< 0.10	0.10	0.10	0.07	0.09	0.07	0.08
Total Organic Carbon	mg/L			6.4	3.1	3.3	3.6	2.9	2	2	2	4	3
Ammonia+Ammonium (N)	as N mg/L			0.23	0.06	< 0.05	0.06	0.07	< 0.04	< 0.04	0.11	0.06	0.06
Chloride (Dissolved)	mg/L		120	125	193	100	165	159	71	150	260	330	203
Sulphate (dissolved)	mg/L			20	33	21	22	22	19	20	30	31	25
Bromide (dissolved)	mg/L			< 0.3	0.5	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	0.4	0.3
Nitrite (as N)	as N mg/L			< 0.030	< 0.025	< 0.010	< 0.010	0.017	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L		13	4.14	3.37	4.19	3.65	3.36	6.06	4.05	4.01	2.18	4.08
Nitrate + Nitrite (as N)	as N mg/L			4.14	3.37	4.20	3.65	3.37	6.06	4.05	4.01	2.18	4.08
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			311	366	315	340	360	323	386	435	390	384
Silver (total)	µg/L	0.1	0.25	0.01	0.03	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aluminum (Al)	µg/L			239	265	288	813	480	108	328	971	328	434
Aluminum (0.2µm)	µg/L	75	100	- <sup>1</sup>	- <sup>1</sup>	< 5	< 5	< 5	16	9	40	37	26
Arsenic (total)	µg/L	100	5	1.5	1.5	1.5	1.7	1.4	0.4	0.7	3.0	2.3	1.6
Barium (total)	µg/L			68	80	59	83	78	49	66.5	127	113	89
Beryllium (total)	µg/L	1100		0.03	0.1	< 0.5	< 0.5	< 0.5	0.014	0.012	0.030	0.017	0.018
Boron (total)	µg/L	200	1500	14	11	16	10	12	9	11	19	15	14
Bismuth (total)	µg/L			0.01	0.3	< 1.0	< 1.0	< 1.0	0.008	0.044	< 0.007	0.102	0.040
Calcium (total)	µg/L			105350	120750	106750	117500	112500	110000	131000	138000	121000	125000
Cadmium (total)	µg/L	0.2	0.09	0.03	0.03	< 0.10	< 0.10	< 0.10	0.01	0.03	0.03	0.02	0.02
Cobalt (total)	µg/L	0.9		0.4	0.3	< 0.5	0.6	< 0.5	0.116	0.188	0.609	0.289	0.301
Chromium (total)	µg/L			0.9	2.0	< 5.0	< 5.0	< 5.0	0.29	0.70	1.80	0.83	0.91
Copper (total)	µg/L	5		2.1	1.2	< 1.1	1.7	1.2	2.6	0.8	2.0	1.5	1.7
Iron (total)	µg/L	300	300	739	492	343	968	565	94	321	1130	391	484
Potassium (total)	µg/L			4918	1725	1575	1600	1700	1370	1480	1730	2360	1735
Magnesium (total)	µg/L			12333	15650	11650	15000	14750	11600	14400	21800	21400	17300
Manganese (total)	µg/L			79	56	30	79	47	25	64.1	119.0	67.8	69
Molybdenum (total)	µg/L	40	73	0.38	0.44	< 0.50	0.51	< 0.50	0.19	0.33	0.62	0.59	0.43
Sodium (total)	µg/L			69625	101650	57500	96250	93750	35400	79700	135000	136000	96525
Nickel (total)	µg/L	25	25	0.9	0.7	1.1	1.4	1.0	0.2	0.5	1.2	0.7	0.7
Phosphorus (total)	mg/L	0.01-0.03		0.11	0.04	0.04	0.08	0.05	0.02	0.025	0.06	0.034	0.04
Lead (total)	µg/L	5	7	0.68	0.36	< 0.50	0.83	0.56	0.23	0.20	0.77	0.27	0.37
Antimony (total)	µg/L	20		0.3	0.3	< 0.5	< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	100	1	0.4	0.6	< 2.0	< 2.0	< 2.0	0.30	0.19	0.15	0.13	0.19
Tin (total)	µg/L			0.1	0.3	< 1.0	< 1.0	< 1.0	< 0.06	0.08	0.12	0.11	0.09
Strontium (total)	µg/L			262	323	258	295	285	264	302	378	396	335
Titanium (total)	µg/L			- <sup>1</sup>	24	17	46	30	3.99	17	49.80	15	21.45
Thallium (total)	µg/L	0.3	0.8	0.01	0.02	< 0.05	< 0.05	< 0.05	< 0.005	< 0.005	0.014	0.007	0.008
Uranium (total)	µg/L	5	15	1.5	2.0	2.3	2.0	1.6	2.13	1.56	1.46	2.91	2.02
Vanadium (total)	µg/L	6		2.0	1.4	1.3	2.1	1.6	0.66	1.01	3.10	1.28	1.51
Zinc (total)	µg/L	30	30	5.8	3.8	< 5.0	8.4	5.4	6	3	8	4	5
Lead-210	Bq/L			< 0.02	< 0.02	0.03	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	0.02	0.02
Radium-226	Bq/L	1		0.01	0.02	0.03	< 0.04	< 0.04	< 0.005	< 0.005	0.020	0.020	0.013
Thorium-230	Bq/L			< 0.02	0.03	< 0.06	< 0.07	< 0.07	< 0.01	< 0.02	< 0.02	0.04	0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.06	< 0.06	< 0.06	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
Field Parameters													
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	95.6	103.5	84.4	79.5	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	103.5	206.2	193.2	238.6	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	693	998	1339	1277	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	3.999	6.457	16.681	8.732	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	38.27	3.87	19.83	22.49	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	7.52	7.99	7.77	7.68	--
Staff Gauge	cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--	--	--	--	--

**Note:**

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999.

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015.

**Bold values** indicate an exceedance of a PWQO or CWQG value

-- - No data.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Insufficient surface water at this location for sample collection



**Table B-33: Surface water quality – Brand Creek – upstream of PH LTWMF (BC-U), 2015 – 2020**

Parameter	Units	Criteria		BC-U									
				2015	2016	2017	2018	2019	2020				
		PWQO	CWQG	Average					2020-01-03	2020-05-14	2020-07-09	2020-10-14	Average
Total Suspended Solids	mg/L			43	48	9	34	165	13	5	31	No Sample <sup>3</sup>	16
pH	no unit	6.5-8.5	6.5-9.0	8.09	7.86	8.11	8.06	8.06	8.17	8.24	7.69		8.03
Alkalinity	mg/L as CaCO <sub>3</sub>			258	244	275	255	250	264	274	196		245
Carbonate	mg/L as CaCO <sub>3</sub>			3	2	3.3	3.1	3.0	< 1.0	< 1.0	< 1.0		< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			256	243	268	250	248	264	274	196		245
Total Dissolved Solids	mg/L			445	638	438	554	469	423	397	434		418
Fluoride	mg/L	0.12		0.09	0.09	0.11	0.11	< 0.10	0.11	0.08	0.12		0.10
Total Organic Carbon	mg/L			6.1	5.2	2.9	4.3	8.6	2	2	14		6
Ammonia+Ammonium (N)	as N mg/L			0.21	0.05	0.05	0.08	0.27	< 0.04	< 0.04	0.25		0.11
Chloride (Dissolved)	mg/L	120		86	169	59	138	103	35	70	120		75
Sulphate (dissolved)	mg/L			17	33	20	21	13	16	16	2		11
Bromide (dissolved)	mg/L			< 0.3	0.5	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3		< 0.3
Nitrite (as N)	as N mg/L			< 0.030	0.023	0.011	< 0.011	0.022	< 0.030	< 0.030	< 0.030		< 0.030
Nitrate (as N)	as N mg/L	13		4.23	2.87	4.37	3.27	2.72	6.75	4.42	< 0.06		3.74
Nitrate + Nitrite (as N)	as N mg/L			4.23	2.87	4.37	3.27	2.74	6.75	4.42	< 0.06		3.74
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01		0.01
Hardness	mg/L as CaCO <sub>3</sub>			300	334	305	300	305	308	365	229		301
Silver (total)	µg/L	0.1	0.25	0.01	0.04	< 0.10	< 0.10	0.11	< 0.05	< 0.05	< 0.05		< 0.05
Total Aluminum (Al)	µg/L			483	252	182	685	6200	88	130	1050		423
Aluminum (0.2µm)	µg/L	75	100	- <sup>1</sup>	- <sup>1</sup>	5	54	< 5	13	6	28		16
Arsenic (total)	µg/L	100	5	0.7	0.6	< 1.0	1.1	1.7	< 0.2	0.2	5.7		2.0
Barium (total)	µg/L			57	62	49	59	114	42	45.2	53		47
Beryllium (total)	µg/L	1100		0.04	0.2	< 0.5	< 0.5	0.6	0.010	< 0.007	0.037		0.018
Boron (total)	µg/L	200	1500	16	11	16	12	17	11	16	22		16
Bismuth (total)	µg/L			0.01	0.3	< 1.0	< 1.0	< 1.0	0.017	0.027	< 0.007		0.017
Calcium (total)	µg/L			102025	113333	108250	103000	112250	105000	125000	71400		100467
Cadmium (total)	µg/L	0.2	0.09	0.03	0.04	< 0.10	< 0.10	0.22	0.01	0.01	0.03		0.02
Cobalt (total)	µg/L	0.9		0.5	0.3	< 0.5	0.6	3.6	0.082	0.110	1.140		0.444
Chromium (total)	µg/L			1.3	2.3	< 5.0	< 5.0	12.3	0.43	0.37	1.87		0.89
Copper (total)	µg/L	5		2.2	1.4	1.7	1.9	7.5	2.5	0.7	2.6		1.9
Iron (total)	µg/L	300	300	923	406	220	853	7478	76	142	1490		569
Potassium (total)	µg/L			5355	2680	1700	1775	3085	1380	1580	2520		1827
Magnesium (total)	µg/L			11585	12000	11600	11500	12500	10800	12600	12400		11933
Manganese (total)	µg/L			88	151	29	96	776	21	68.9	1720.0		603
Molybdenum (total)	µg/L	40	73	0.34	0.41	< 0.50	2.03	0.63	0.18	0.24	0.88		0.43
Sodium (total)	µg/L			49150	104933	34250	79500	57500	17700	36000	67700		40467
Nickel (total)	µg/L	25	25	1.1	0.7	1.2	1.4	6.8	0.2	0.3	2.4		1.0
Phosphorus (total)	mg/L	0.01-0.03		0.12	0.07	0.04	0.07	0.60	0.03	0.02	0.18		0.07
Lead (total)	µg/L	5	7	0.78	0.38	< 0.50	0.63	5.13	0.20	0.10	0.99		0.43
Antimony (total)	µg/L	20		0.3	0.3	< 0.5	< 0.5	< 0.5	< 0.9	< 0.9	< 0.9		< 0.9
Selenium (total)	µg/L	100	1	0.4	0.8	< 2.0	< 2.0	< 2.0	0.28	0.17	0.39		0.28
Tin (total)	µg/L			< 0.1	< 0.5	< 1.0	< 1.0	1.1	0.08	0.06	0.10		0.08
Strontium (total)	µg/L			243	284	248	263	250	238	260	237		245
Titanium (total)	µg/L			- <sup>1</sup>	< 14	13	38	287	3.37	7	45.90		18.75
Thallium (total)	µg/L	0.3	0.8	0.01	0.02	< 0.05	< 0.05	0.10	< 0.005	< 0.005	0.010		0.007
Uranium (total)	µg/L	5	15	0.8	1.1	1.1	0.5	0.7	0.53	0.49	0.44		0.49
Vanadium (total)	µg/L	6		2.4	1.3	1.1	2.0	13.1	0.62	0.70	3.72		1.68
Zinc (total)	µg/L	30	30	6.0	3.7	< 5.2	5.9	36.3	5	< 2	9		5
Lead-210	Bq/L			< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02		< 0.02
Radium-226	Bq/L	1		< 0.01	0.02	< 0.03	< 0.04	< 0.04	0.008	< 0.005	< 0.005		0.006
Thorium-230	Bq/L			< 0.02	0.04	< 0.06	< 0.07	< 0.07	< 0.01	< 0.02	< 0.02		< 0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.06	< 0.06	< 0.06	< 0.01	< 0.02	< 0.02		< 0.02
<b>Field Parameters</b>													
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	97	114.4	66.3		--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	103.4	200	184.2		--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	609	740	740		--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	3.943	6.634	22.578		--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	5.41	6.1	78.22		--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	7.59	8.06	7.71		--
Staff Gauge	cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--	--	--		--

**Note:**

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999.

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015.

**Bold values** indicate an exceedance of a PWQO or CWQG value

-- - No data.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Insufficient surface water at this location for sample collection

**Table B-34: Surface water quality – Brand Creek – Marsh Road (BC-M), 2015 – 2020**

		Criteria		BC-M									
				2015	2016	2017	2018	2019	2020				
Parameter	Units	PWQO	CWQG	Average					2020-01-03	2020-05-14	2020-07-09	2020-10-14	Average
Total Suspended Solids	mg/L			41	27	20	26	32	48	31	47	52	45
pH	no unit	6.5-8.5	6.5-9.0	8.35	7.94	8.18	8.14	8.19	8.19	8.24	8.06	8.01	8.13
Alkalinity	mg/L as CaCO3			247	258	275	280	268	256	258	272	230	254
Carbonate	mg/L as CaCO3			4	6	3.9	3.6	3.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			245	254	270	280	265	256	258	272	230	254
Total Dissolved Solids	mg/L			475	802	482	575	574	437	506	646	589	545
Fluoride	mg/L		0.12	0.08	0.10	< 0.10	< 0.10	< 0.10	0.10	0.07	0.09	0.06	0.08
Total Organic Carbon	mg/L			5.1	3.0	3.4	2.5	3.1	2	2	2	4	3
Ammonia+Ammonium (N)	as N mg/L			0.21	0.06	< 0.05	0.06	0.08	< 0.04	0.05	0.08	0.06	0.06
Chloride (Dissolved)	mg/L		120	99	151	84	129	135	62	160	180	240	161
Sulphate (dissolved)	mg/L			19	29	21	22	22	18	18	28	28	23
Bromide (dissolved)	mg/L			< 0.3	1.5	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	0.4	0.3
Nitrite (as N)	as N mg/L			< 0.030	< 0.025	0.010	0.012	0.014	< 0.030	< 0.030	0.050	< 0.030	0.035
Nitrate (as N)	as N mg/L		13	4.20	3.70	4.14	3.81	3.60	5.71	3.78	4.32	2.19	4.00
Nitrate + Nitrite (as N)	as N mg/L			4.20	3.70	4.15	3.82	3.60	5.71	3.78	4.37	2.19	4.01
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	0.01
Hardness	mg/L as CaCO3			306	351	310	335	360	321	392	422	359	374
Silver (total)	µg/L	0.1	0.25	0.00	0.03	< 0.10	< 0.10	< 0.10	< 0.05	0.09	< 0.05	< 0.05	0.06
Total Aluminum (Al)	µg/L			248	281	538	473	635	857	88	805	568	580
Aluminum (0.2µm)	µg/L	75	100	- <sup>1</sup>	- <sup>1</sup>	5	< 5	< 5	3	4	68	99	44
Arsenic (total)	µg/L	100	5	1.4	1.3	1.5	1.3	1.4	0.8	0.7	2.4	2.2	1.5
Barium (total)	µg/L			61	71	59	68	75	55	61.6	101	95	78
Beryllium (total)	µg/L	1100		0.03	0.1	< 0.5	< 0.5	< 0.5	0.044	< 0.007	0.032	0.029	0.028
Boron (total)	µg/L	200	1500	14	11	15	< 10	13	10	13	17	16	14
Bismuth (total)	µg/L			0.01	0.3	< 1.0	< 1.0	< 1.0	0.020	0.031	< 0.007	0.069	0.032
Calcium (total)	µg/L			103325	116750	108500	110000	115000	109000	133000	136000	112000	122500
Cadmium (total)	µg/L	0.2	0.09	0.03	0.04	< 0.10	< 0.10	< 0.10	0.03	0.02	0.03	0.03	0.03
Cobalt (total)	µg/L	0.9		0.4	0.4	0.6	< 0.5	0.5	0.504	0.128	0.626	0.481	0.435
Chromium (total)	µg/L			1.0	2.1	< 5.0	< 5.0	< 5.0	1.39	0.51	1.61	1.45	1.24
Copper (total)	µg/L	5		2.2	1.0	2.2	1.2	1.3	3.3	0.6	1.7	1.9	1.9
Iron (total)	µg/L	300	300	766	550	653	575	780	913	122	961	694	673
Potassium (total)	µg/L			4450	1790	1625	1550	1875	1490	1430	2110	3160	2048
Magnesium (total)	µg/L			12255	15000	12150	14250	14250	11700	14800	19800	19200	16375
Manganese (total)	µg/L			70	65	48	50	59	64	45.9	85.4	90.9	72
Molybdenum (total)	µg/L	40	73	0.32	0.34	< 0.50	0.54	< 0.50	0.21	0.31	0.50	0.58	0.40
Sodium (total)	µg/L			54375	77125	48250	75750	76000	30900	67500	92700	87900	69750
Nickel (total)	µg/L	25	25	0.9	0.8	1.1	1.1	1.1	0.9	0.3	1.1	0.9	0.8
Phosphorus (total)	mg/L	0.01-0.03		0.10	0.04	0.05	0.05	0.06	0.07	0.01	0.06	0.06	0.05
Lead (total)	µg/L	5	7	0.67	0.46	0.62	0.54	0.57	0.86	0.11	0.76	0.57	0.58
Antimony (total)	µg/L	20		0.2	0.3	< 0.5	< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	100	1	0.4	0.6	< 2.0	< 2.0	< 2.0	0.30	0.10	0.14	0.15	0.17
Tin (total)	µg/L			0.1	0.3	< 1.0	< 1.0	< 1.0	< 0.06	0.07	0.16	0.13	0.11
Strontium (total)	µg/L			252	304	253	280	280	264	297	358	354	318
Titanium (total)	µg/L			- <sup>1</sup>	13	32	28	37	43.30	5	41.60	26	28.88
Thallium (total)	µg/L	0.3	0.8	0.01	0.02	0.05	< 0.05	< 0.05	0.006	0.037	0.012	0.008	0.016
Uranium (total)	µg/L	5	15	1.7	1.9	2.7	2.4	2.0	2.63	2.07	1.33	2.85	2.22
Vanadium (total)	µg/L	6		2.1	1.6	1.9	1.6	2.1	2.09	0.60	3.18	2.11	2.00
Zinc (total)	µg/L	30	30	5.3	4.0	7.0	< 5.0	5.5	10	2	7	6	6
Lead-210	Bq/L			< 0.02	< 0.02	0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	1		0.01	0.02	0.03	< 0.04	< 0.04	< 0.005	< 0.005	< 0.005	< 0.010	0.006
Thorium-230	Bq/L			< 0.02	0.03	0.06	< 0.07	< 0.07	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.06	< 0.06	< 0.06	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
Field Parameters													
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	93.7	108	89.2	79.6	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	87	192.4	189	232.6	--
SFC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	677	915	1119	1036	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	3.618	6.202	17.806	8.252	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	15.88	5.28	34.16	25.6	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	7.85	8.13	7.94	7.74	--
Staff Gauge	cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	37	--	--	--	--

**Note:**

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999.

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015.

**Bold values** indicate an exceedance of a PWQO or CWQG value

-- - No data.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Insufficient surface water at this location for sample collection

**Table B-35: Surface Water Quality – Brand Creek – tributary of Brand Creek (BC-T), 2015 – 2020**

Parameter	Units	Criteria		BC-T									
				2015	2016	2017	2018	2019	2020				
		PWQO	CWQG	Average					2020-01-03	2020-05-14	2020-07-09	2020-10-14	Average
Total Suspended Solids	mg/L			20	23	9	20	27	6	16	75	27	31
pH	no unit	6.5-8.5	6.5-9.0	8.23	8.06	8.22	8.13	8.23	8.17	8.24	8.2	8.21	8.21
Alkalinity	mg/L as CaCO <sub>3</sub>			246	249	285	285	270	242	255	257	243	249
Carbonate	mg/L as CaCO <sub>3</sub>			5	5	4.3	3.8	4.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			242	245	280	283	265	242	255	257	243	249
Total Dissolved Solids	mg/L			762	825	803	958	874	749	900	820	797	817
Fluoride	mg/L		0.12	0.08	0.10	0.11	< 0.10	< 0.10	0.09	0.09	0.10	0.10	0.10
Total Organic Carbon	mg/L			5.7	3.4	4.8	3.5	3.5	3	3	2	4	3
Ammonia+Ammonium (N)	as N mg/L			0.08	0.05	< 0.05	0.06	0.12	< 0.04	< 0.04	0.07	< 0.04	0.05
Chloride (Dissolved)	mg/L		120	303	300	280	368	323	260	420	310	390	345
Sulphate (dissolved)	mg/L			24	38	27	29	29	28	27	33	33	30
Bromide (dissolved)	mg/L			< 0.3	0.5	2.3	< 1.0	< 5.0	0.4	< 0.3	< 0.3	< 0.3	0.33
Nitrite (as N)	as N mg/L			< 0.030	0.025	< 0.010	< 0.010	0.012	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L		13	1.25	1.74	1.48	1.43	1.37	2.33	1.78	3.08	1.62	2.20
Nitrate + Nitrite (as N)	as N mg/L			1.25	1.74	1.48	1.43	1.37	2.33	1.78	3.08	1.62	2.20
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			318	357	330	358	368	333	435	427	409	401
Silver (total)	µg/L	0.1	0.25	0.01	0.03	< 0.10	< 0.10	< 0.10	< 0.05	0.10	< 0.05	< 0.05	0.06
Total Aluminum (Al)	µg/L			168	90	183	714	284	73	229	2380	637	830
Aluminum (0.2µm)	µg/L	75	100	- <sup>1</sup>	- <sup>1</sup>	< 5	< 5	< 5	16	13	138	44	53
Arsenic (total)	µg/L	100	5	4.3	2.7	5.3	4.2	3.3	1.5	2.1	6.4	3.9	3.5
Barium (total)	µg/L			84	98	88	115	101	65	121.0	138	125	112
Beryllium (total)	µg/L	1100		0.02	0.1	< 0.5	< 0.5	< 0.5	< 0.007	0.007	0.064	0.030	0.027
Boron (total)	µg/L	200	1500	14	11	15	12	14	10	14	14	16	14
Bismuth (total)	µg/L			0.02	0.3	< 1.0	< 1.0	< 1.0	< 0.007	0.046	0.051	0.020	0.031
Calcium (total)	µg/L			108125	118750	120000	132500	122500	114000	147000	136000	130000	131750
Cadmium (total)	µg/L	0.2	0.09	0.02	0.03	< 0.10	< 0.10	< 0.10	0.01	0.01	0.04	0.03	0.02
Cobalt (total)	µg/L	0.9		0.3	0.3	< 0.5	0.8	< 0.5	0.131	0.241	1.320	0.536	0.557
Chromium (total)	µg/L			1.3	1.9	< 5.0	< 5.0	< 5.0	0.44	0.51	3.98	1.49	1.61
Copper (total)	µg/L	5		1.7	1.2	1.4	2.1	1.6	2.7	1.0	3.5	2.5	2.4
Iron (total)	µg/L	300	300	501	419	288	945	378	109	269	2630	835	961
Potassium (total)	µg/L			2283	1598	1348	1700	1675	968	1450	2440	2500	1840
Magnesium (total)	µg/L			12235	15580	13000	16500	16500	12100	16700	21400	20800	17750
Manganese (total)	µg/L			55	36	39	73	34	25	45.0	116.0	64.2	63
Molybdenum (total)	µg/L	40	73	0.56	0.51	0.64	0.61	0.57	0.37	0.58	0.80	0.65	0.60
Sodium (total)	µg/L			175750	156750	170000	232500	192500	109000	204000	166000	165000	161000
Nickel (total)	µg/L	25	25	0.8	2.4	< 1.0	1.5	< 1.0	0.3	0.6	2.7	1.1	1.2
Phosphorus (total)	mg/L	0.01-0.03		0.04	0.03	0.02	0.02	0.07	0.01	0.02	0.11	0.06	0.05
Lead (total)	µg/L	5	7	0.40	0.32	< 0.50	0.90	< 0.50	0.12	0.22	1.56	0.81	0.68
Antimony (total)	µg/L	20		0.3	0.3	< 0.5	< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	100	1	0.4	0.6	< 2.0	< 2.0	< 2.0	0.18	0.12	0.11	0.12	0.13
Tin (total)	µg/L			0.1	0.3	< 1.0	< 1.0	< 1.0	< 0.06	0.06	0.15	0.13	0.10
Strontium (total)	µg/L			322	361	340	393	353	359	401	406	420	397
Titanium (total)	µg/L			- <sup>1</sup>	15	12	40	18	3.07	13	115.00	31	40.62
Thallium (total)	µg/L	0.3	0.8	0.01	0.02	< 0.05	< 0.05	< 0.05	< 0.005	0.044	0.031	0.008	0.022
Uranium (total)	µg/L	5	15	5.7	4.3	9.4	7.2	5.5	11.08	6.19	1.78	2.94	5.50
Vanadium (total)	µg/L	6		1.4	1.2	1.0	1.9	1.1	0.51	0.81	5.73	1.98	2.26
Zinc (total)	µg/L	30	30	4.8	4.5	< 5.0	8.3	5.5	6	3	16	9	9
Lead-210	Bq/L			< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	1		< 0.01	0.02	< 0.03	< 0.04	< 0.04	< 0.005	< 0.005	< 0.005	0.020	0.009
Thorium-230	Bq/L			< 0.02	< 0.03	< 0.06	< 0.07	< 0.07	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.06	< 0.06	< 0.06	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>													
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	97.6	105	90.9	93.9	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	101.9	204.5	179.4	225.8	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	1083	1613	1461	1420	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	3.915	7.012	20.21	9.675	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	3.75	5.75	108.73	24.67	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	7.64	8.13	8.09	8.06	--
Staff Gauge	cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--	--	--	--	--

**Note:**

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999.

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015.

**Bold values** indicate an exceedance of a PWQO or CWQG value

-- - No data.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Insufficient surface water at this location for sample collection

**Table B-36: Storm event sampling – Brand Creek Watershed (BC-M), 2020**

Analysis	Units	Criteria		BC-M					
		PWQO	CWQG	2019/06/20 9:05AM	2019/06/20 10:10AM	2019/06/20 11:10AM	2019/06/20 12:15PM	2019/06/20 1:20PM	2019/06/20 2:20PM
Total Suspended Solids	mg/L			16	39	21	26	16	44
pH	no unit	<b>6.5-8.5</b>	<b>6.5-9.0</b>	8.10	8.02	8.04	8.17	8.07	7.98
Alkalinity	mg/L as CaCO <sub>3</sub>			287	257	278	271	236	212
Carbonate	mg/L as CaCO <sub>3</sub>			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			287	257	278	271	236	212
Total Dissolved Solids	mg/L			649	643	657	657	671	554
Fluoride	mg/L		<b>0.12</b>	0.10	0.07	0.08	0.08	0.07	0.06
Total Organic Carbon	mg/L			6	6	6	5	6	6
Ammonia+Ammonium (N)	as N mg/L			0.05	0.04	0.05	0.04	0.04	0.04
Chloride (Dissolved)	mg/L		<b>120</b>	<b>220</b>	<b>230</b>	<b>220</b>	<b>210</b>	<b>260</b>	<b>220</b>
Sulphate (dissolved)	mg/L			27	27	27	26	24	19
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		<b>13</b>	2.55	2.45	2.53	3.00	1.80	1.41
Nitrate + Nitrite (as N)	as N mg/L			2.55	2.45	2.53	3.00	1.80	1.41
Mercury (dissolved)	µg/L	<b>0.2</b>	<b>0.026</b>	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			357	353	377	366	333	277
Silver (total)	µg/L	<b>0.1</b>	<b>0.25</b>	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			359	683	259	394	263	763
Aluminum (0.2µm)	µg/L	<b>75</b>	<b>100</b>	57	70	57	73	67	<b>77</b>
Arsenic (total)	µg/L	<b>100</b>	<b>5</b>	1.8	1.8	1.7	1.8	1.6	1.9
Barium (total)	µg/L			84.1	84.6	86.9	84.0	80.6	76.5
Beryllium (total)	µg/L	<b>1100</b>		0.018	0.037	0.018	0.020	0.020	0.046
Boron (total)	µg/L	<b>200</b>	<b>1500</b>	21	19	20	17	16	16
Bismuth (total)	µg/L			0.019	0.024	0.014	< 0.007	0.084	0.022
Calcium (total)	µg/L			118000	118000	125000	122000	112000	93800
Cadmium (total)	µg/L	<b>0.2</b>	<b>0.09</b>	0.023	0.030	0.017	0.017	0.008	0.027
Cobalt (total)	µg/L	<b>0.9</b>		0.35	0.53	0.37	0.41	0.32	0.58
Chromium (total)	µg/L			0.80	1.12	0.61	0.77	0.92	1.67
Copper (total)	µg/L	<b>5</b>		1.4	1.8	1.7	2.0	2.0	2.5
Iron (total)	µg/L	<b>300</b>	<b>300</b>	<b>427</b>	<b>767</b>	<b>356</b>	<b>476</b>	<b>361</b>	<b>854</b>
Potassium (total)	µg/L			2760	2950	2980	2950	2680	2340
Magnesium (total)	µg/L			15000	14300	15500	14700	12800	10400
Manganese (total)	µg/L			59.1	83.3	62.9	58.9	46.4	80.2
Molybdenum (total)	µg/L	<b>40</b>	<b>73</b>	0.50	0.48	0.52	0.46	0.77	0.73
Sodium (total)	µg/L			91200	86900	96300	92100	120000	100000
Nickel (total)	µg/L	<b>25</b>	<b>25</b>	1.0	1.1	0.8	0.8	0.8	1.2
Phosphorus (total)	mg/L	<b>0.01-0.03</b>		<b>0.061</b>	<b>0.084</b>	<b>0.064</b>	<b>0.071</b>	<b>0.053</b>	<b>0.078</b>
Lead (total)	µg/L	<b>5</b>	<b>7</b>	0.33	0.69	0.38	0.43	0.35	0.83
Antimony (total)	µg/L	<b>20</b>		< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	<b>100</b>	<b>1</b>	0.19	0.21	0.17	0.19	0.17	0.13
Tin (total)	µg/L			0.09	0.09	0.09	0.07	0.19	0.10
Strontium (total)	µg/L			339	335	355	352	334	268
Titanium (total)	µg/L			17.5	32.6	12.6	19.4	12.7	35.4
Thallium (total)	µg/L	<b>0.3</b>	<b>0.8</b>	0.008	0.009	0.005	0.005	0.005	0.007
Uranium (total)	µg/L	<b>5</b>	<b>15</b>	2.72	2.69	2.90	2.59	2.59	1.98
Vanadium (total)	µg/L	<b>6</b>		1.51	2.10	1.48	1.65	1.45	2.38
Zinc (total)	µg/L	<b>30</b>	<b>30</b>	3	6	6	4	5	8
Lead-210	Bq/L			< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	<b>1.0</b>		< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L			< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>									
ODO % Sat	mg/L			82	82.7	84.3	85.6	87.6	88.5
ORP	mV			121.6	119.8	125.6	129.5	129.5	124.5
SPC	us/cm			989.8	1013.4	1038.8	1043.9	1097.4	788.5
Temperature	°C			9.446	9.921	10.383	10.697	10.988	11.531
Turbidity	FNU			13.72	24.76	16.63	24.35	18.4	29.22
pH	Units			7.90	7.87	7.89	7.96	7.93	7.93
Staff Gauge	cm			14.5	14.5	15	20	20	23

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life

**Bold values** indicate an exceedance of a PWQO or CWQG value

**Table B-37: Surface water – Lake Ontario diffuser (BC-LO-D), 2015 – 2020**

		Criteria		BC-LO-D								
				2015	2016	2017	2018	2019	2020			
Parameter	Units	PWQO	CWQG	Average					2020-06-19	2020-08-07	2020-10-08	Average
Total Suspended Solids	mg/L			4	2	3	< 1	2	No Sample <sup>3</sup>	< 2	4	3
pH	no unit	6.5-8.5	6.5-9.0	8.37	8.45	8.14	8.15	8.21		8.03	8.00	8.02
Alkalinity	mg/L as CaCO3			98	94	97	99	95		93	91	92
Carbonate	mg/L as CaCO3			< 2.0	< 2.0	1.3	1.3	1.5		< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			98	94	95	98	93		93	91	92
Total Dissolved Solids	mg/L			173	167	185	135	177		220	149	185
Fluoride	mg/L		0.12	0.12	0.12	0.12	0.12	0.10		0.11	0.12	0.12
Total Organic Carbon	mg/L			2.1	2.4	2.4	2.3	2.1		2.0	1.0	1.5
Ammonia+Ammonium (N)	as N mg/L			< 0.04	< 0.04	< 0.05	< 0.05	< 0.05		0.06	0.06	0.06
Chloride (Dissolved)	mg/L		120	26	24	22	26	23		23	25	24
Sulphate (dissolved)	mg/L			24	24	23	31	23		22.3	21	21.7
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 1.0	< 1.0	< 1.0		< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.03	< 0.03	< 0.01	< 0.01	< 0.01		< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		13	0.36	0.25	0.24	0.29	0.26		0.27	0.35	0.31
Nitrate + Nitrite (as N)	as N mg/L			0.36	0.25	0.24	0.29	0.26		0.27	0.35	0.31
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			137	125	125	130	130		116	122	119
Silver (total)	µg/L	0.1	0.25	0.02	0.003	< 0.10	< 0.10	< 0.10		< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			51	5	48	18	43		13	51	32
Aluminum (0.2µm)	µg/L	75	100	- <sup>1</sup>	- <sup>1</sup>	< 5	< 5	< 5		3	5	4
Arsenic (total)	µg/L	100	5	0.8	0.9	< 1.0	2.4	< 1.0		0.8	0.8	0.8
Barium (total)	µg/L			24	22	23	22	21		23.9	22.4	23.2
Beryllium (total)	µg/L	1100		< 0.01	< 0.01	< 0.5	< 0.5	< 0.5		< 0.007	< 0.007	< 0.007
Boron (total)	µg/L	200	1500	23	29	23	22	23		20	19	20
Bismuth (total)	µg/L			0.01	< 0.01	< 1.0	< 1.0	< 1.0		< 0.007	0.015	0.011
Calcium (total)	µg/L			39733	35300	33500	34500	36333		33100	35200	34150
Cadmium (total)	µg/L	0.2	0.09	0.01	0.01	< 0.10	< 0.10	< 0.10		0.004	0.008	0.006
Cobalt (total)	µg/L	0.9		0.05	0.08	< 0.50	< 0.50	< 0.50		0.016	0.108	0.062
Chromium (total)	µg/L			0.2	0.4	< 5.0	< 5.0	< 5.0		0.23	0.19	0.21
Copper (total)	µg/L	5		1.0	1.0	1.7	1.5	< 1.0		0.8	0.9	0.9
Iron (total)	µg/L	300	300	58	18	< 100	< 100	< 100		11	74	43
Potassium (total)	µg/L			1667	1625	1700	1550	1533		1520	1640	1580
Magnesium (total)	µg/L			9543	8865	8700	8800	8733		8090	8320	8205
Manganese (total)	µg/L			3.9	0.9	3.9	3.2	3.4		0.95	5.27	3.11
Molybdenum (total)	µg/L	40	73	1.2	1.4	1.2	1.2	1.1		1.07	1.28	1.18
Sodium (total)	µg/L			15000	13650	13500	17500	14667		12300	12800	12550
Nickel (total)	µg/L	25	25	0.7	0.6	< 1.0	1.2	< 1.0		0.5	1.0	0.8
Phosphorus (total)	mg/L	0.01-0.03		0.007	0.005	0.008	0.006	0.010		< 0.003	0.017	0.010
Lead (total)	µg/L	5	7	0.06	0.02	< 0.50	< 0.50	< 0.50		< 0.01	0.17	0.09
Antimony (total)	µg/L	20		0.4	0.3	< 0.5	< 0.5	< 0.5		< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	100	1	0.4	0.2	< 2.0	< 2.0	< 2.0		0.11	0.11	0.11
Tin (total)	µg/L			0.09	0.03	< 1.0	< 1.0	< 1.0		0.10	0.08	0.09
Strontium (total)	µg/L			195	176	165	170	163		185	182	184
Titanium (total)	µg/L			- <sup>1</sup>	- <sup>1</sup>	5.1	< 5.0	5.7		0.59	2.31	1.45
Thallium (total)	µg/L	0.3	0.8	0.01	0.01	< 0.05	< 0.05	< 0.05		0.007	0.008	0.008
Uranium (total)	µg/L	5	15	2.71	0.36	0.35	9.69	0.38		0.33	0.37	0.35
Vanadium (total)	µg/L	6		0.40	0.20	0.51	< 0.50	0.59		0.22	0.27	0.25
Zinc (total)	µg/L	30	30	< 2.0	2.5	< 5.0	< 5.0	< 5.0		< 2.0	4.0	3.0
Lead-210	Bq/L			< 0.02	< 0.02	< 0.02	< 0.10	< 0.10		< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	1		< 0.01	0.02	< 0.04	< 0.04	< 0.04		0.01	< 0.01	0.01
Thorium-230	Bq/L			< 0.02	< 0.02	< 0.07	< 0.07	< 0.07		< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.06	< 0.06	< 0.06		< 0.02	< 0.02	< 0.02
Field Parameters												
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		105.2	86.5	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		127	185	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		310.9	294.4	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		17.837	11.162	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		-0.25	7.22	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		8.31	7.85	--
Staff Gauge	cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		--	--	--

**Notes:**

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999.

CWQG = Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015.

**Bold values** indicate an exceedance of a PWQO or CWQG value.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Due to COVID-19 restrictions

-- = No data.

**Table B-38: Surface water – Lake Ontario diffuser – outside eastern edge of mixing zone (BC-LO-E), 2015 – 2020**

		Criteria		BC-LO-E								
				2015	2016	2017	2018	2019	2020			
Parameter	Units	PWQO	CWQG	Average					2020-06-19	2020-08-07	2020-10-08	Average
Total Suspended Solids	mg/L			11	2	3	< 1	2	No Sample <sup>3</sup>	2	5	4
pH	no unit	6.5-8.5	6.5-9.0	8.34	8.41	8.20	8.18	8.21		8.14	7.98	8.06
Alkalinity	mg/L as CaCO3			99	96	97	98	98		87	90	89
Carbonate	mg/L as CaCO3			< 2.0	< 2.0	1.4	1.4	1.5	< 1.0	< 1.0	< 1.0	
Bicarbonate	mg/L as CaCO3			98	95	95	96	94		87	90	89
Total Dissolved Solids	mg/L			172	182	157	113	235		200	163	182
Fluoride	mg/L		0.12	0.13	0.12	0.11	0.12	0.11		0.13	0.12	0.13
Total Organic Carbon	mg/L			1.9	1.6	2.4	2.0	2.1		2.0	1.0	1.5
Ammonia+Ammonium (N)	as N mg/L			< 0.04	< 0.04	< 0.05	< 0.05	< 0.05		0.05	0.05	0.05
Chloride (Dissolved)	mg/L		120	25	24	22	22	23		24	25	25
Sulphate (dissolved)	mg/L			24	24	23	23	23		22.3	21	21.7
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 1.0	< 1.0	< 1.0		< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.03	< 0.03	< 0.01	< 0.01	< 0.01		< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		13	0.37	0.24	0.24	0.28	0.27		0.25	0.35	0.30
Nitrate + Nitrite (as N)	as N mg/L			0.37	0.24	0.24	0.28	0.27		0.25	0.35	0.30
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			129	128	125	120	130		127	122	125
Silver (total)	µg/L	0.1	0.25	0.01	0.002	< 0.10	< 0.10	< 0.10		< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			38	6	65	12	35		19	60	40
Aluminum (0.2µm)	µg/L	75	100	- <sup>1</sup>	- <sup>1</sup>	< 5	< 5	< 5		4	18	11
Arsenic (total)	µg/L	100	5	0.8	0.9	< 1.0	< 1.0	< 1.0		0.9	0.9	0.9
Barium (total)	µg/L			25	22	23	22	23		25.0	24.1	24.6
Beryllium (total)	µg/L	1100		< 0.01	< 0.01	< 0.5	< 0.5	< 0.5	< 0.007	< 0.007	< 0.007	
Boron (total)	µg/L	200	1500	24	27	23	22	22		21	23	22
Bismuth (total)	µg/L			< 0.01	< 0.01	< 1.0	< 1.0	< 1.0		0.007	< 0.007	< 0.007
Calcium (total)	µg/L			37167	36800	34500	32500	36667		36600	35700	36150
Cadmium (total)	µg/L	0.2	0.09	0.01	0.01	< 0.10	< 0.10	< 0.10		0.004	0.003	0.004
Cobalt (total)	µg/L	0.9		0.03	0.79	< 0.50	< 0.50	< 0.50		0.021	0.097	0.059
Chromium (total)	µg/L			0.1	0.4	< 5.0	< 5.0	< 5.0		0.25	1.23	0.74
Copper (total)	µg/L	5		0.9	0.9	2.0	1.4	1.0		0.9	1.0	1.0
Iron (total)	µg/L	300	300	36	14	120	< 100	< 100		14	72	43
Potassium (total)	µg/L			1600	1630	1650	1500	1533		1680	1630	1655
Magnesium (total)	µg/L			9153	8635	8800	8550	8933		8560	7940	8250
Manganese (total)	µg/L			2.6	1.2	5.6	< 2.0	3.0		1.08	4.14	2.61
Molybdenum (total)	µg/L	40	73	1.2	1.5	1.2	1.2	1.2		1.26	2.65	1.96
Sodium (total)	µg/L			14633	13300	13500	13500	14000		13000	12600	12800
Nickel (total)	µg/L	25	25	0.6	0.6	< 1.0	< 1.0	< 1.0		0.6	0.6	0.6
Phosphorus (total)	mg/L	0.01-0.03		0.012	0.007	0.011	0.005	0.008		0.004	0.011	0.008
Lead (total)	µg/L	5	7	0.05	0.03	< 0.50	< 0.50	< 0.50	< 0.01	0.03		0.02
Antimony (total)	µg/L	20		0.3	0.2	< 0.5	< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	
Selenium (total)	µg/L	100	1	0.4	0.2	< 2.0	< 2.0	< 2.0		0.15	0.13	0.14
Tin (total)	µg/L			0.12	0.04	< 1.0	< 1.0	< 1.0		0.07	0.11	0.09
Strontium (total)	µg/L			184	178	165	165	163		200	210	205
Titanium (total)	µg/L			- <sup>1</sup>	- <sup>1</sup>	5.6	< 5.0	5.3		0.71	2.84	1.78
Thallium (total)	µg/L	0.3	0.8	0.01	0.01	< 0.05	< 0.05	< 0.05		0.005	0.008	0.007
Uranium (total)	µg/L	5	15	0.42	0.45	0.36	0.54	0.38		0.35	0.41	0.38
Vanadium (total)	µg/L	6		0.38	0.19	0.58	< 0.50	0.62		0.24	0.66	0.45
Zinc (total)	µg/L	30	30	< 2.0	2.5	< 5.0	< 5.0	< 5.0	< 2.0	< 2.0	< 2.0	
Lead-210	Bq/L			< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	
Radium-226	Bq/L	1		< 0.01	0.01	< 0.04	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01	
Thorium-230	Bq/L			< 0.02	< 0.02	< 0.07	< 0.07	< 0.07	< 0.02	< 0.02	< 0.02	
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.06	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02	
Field Parameters												
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		107.6	87.5	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		132	182.2	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		311.7	294	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		18.786	11.214	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		-0.41	7.88	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		8.26	7.72	--
Staff Gauge	cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		--	--	--

**Notes:**

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999.

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015.

**Bold values** indicate an exceedance of a PWQO or CWQG value.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Due to COVID-19 restrictions

-- = No data.

**Table B-39: Surface water – Lake Ontario diffuser – outside western edge of mixing zone (BC-LO-W), 2015 – 2020**

		Criteria		BC-LO-W								
				2015	2016	2017	2018	2019	2020			
Parameter	Units	PWQO	CWQG	Average					2020-06-19	2020-08-07	2020-10-08	Average
Total Suspended Solids	mg/L			2	2	4	1	2	No Sample <sup>3</sup>	< 2	4	3
pH	no unit	6.5-8.5	6.5-9.0	8.29	8.43	8.18	8.16	8.26		8.18	8.00	8.09
Alkalinity	mg/L as CaCO3			98	93	97	98	99		93	96	95
Carbonate	mg/L as CaCO3			< 2.0	< 2.0	1.4	1.3	1.6	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			97	93	95	96	94		93	96	95
Total Dissolved Solids	mg/L			172	176	199	143	162		250	177	214
Fluoride	mg/L		0.12	0.11	0.13	0.11	0.13	0.10		0.11	0.11	0.11
Total Organic Carbon	mg/L			1.9	2.1	2.3	2.1	2.3		2.0	1.0	1.5
Ammonia+Ammonium (N)	as N mg/L			< 0.04	< 0.04	< 0.05	< 0.05	0.05		0.04	0.05	0.05
Chloride (Dissolved)	mg/L		120	25	24	22	22	22		23	25	24
Sulphate (dissolved)	mg/L			24	24	23	24	23		22.1	21	21.6
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.03	< 0.03	< 0.01	< 0.01	0.01	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		13	0.36	0.23	0.23	0.30	0.28		0.24	0.35	0.30
Nitrate + Nitrite (as N)	as N mg/L			0.36	0.23	0.23	0.30	0.28		0.24	0.35	0.30
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			129	125	125	120	137		124	125	125
Silver (total)	µg/L	0.1	0.25	0.01	0.002	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			32	5	45	12	43		15	85	50
Aluminum (0.2µm)	µg/L	75	100	- <sup>1</sup>	- <sup>1</sup>	< 5	< 5	< 5		5	4	5
Arsenic (total)	µg/L	100	5	1.0	0.8	< 1.0	< 1.0	< 1.0		0.9	0.8	0.9
Barium (total)	µg/L			25	22	22	23	22		24.5	22.0	23.3
Beryllium (total)	µg/L	1100		< 0.01	< 0.01	< 0.5	< 0.5	< 0.5	< 0.007	< 0.007	< 0.007	< 0.007
Boron (total)	µg/L	200	1500	26	27	24	22	23		21	18	20
Bismuth (total)	µg/L			0.01	< 0.01	< 1.0	< 1.0	< 1.0	< 0.007	0.012	0.010	0.010
Calcium (total)	µg/L			37233	35800	33500	32000	36667		35800	36300	36050
Cadmium (total)	µg/L	0.2	0.09	0.01	0.01	< 0.10	< 0.10	< 0.10		0.004	0.010	0.007
Cobalt (total)	µg/L	0.9		0.03	0.25	< 0.50	< 0.50	< 0.50		0.017	0.077	0.047
Chromium (total)	µg/L			0.1	0.4	< 5.0	< 5.0	< 5.0		0.26	0.24	0.25
Copper (total)	µg/L	5		0.9	0.8	1.7	2.0	< 1.0		0.9	1.2	1.1
Iron (total)	µg/L	300	300	28	11	< 100	< 100	< 100		14	111	63
Potassium (total)	µg/L			1613	1610	1600	1500	1533		1640	1640	1640
Magnesium (total)	µg/L			9090	8660	8750	8350	9000		8310	8460	8385
Manganese (total)	µg/L			2.0	0.7	3.8	< 2.0	3.0		1.12	7.96	4.54
Molybdenum (total)	µg/L	40	73	1.4	1.3	1.2	1.2	1.1		1.22	1.25	1.24
Sodium (total)	µg/L			14333	13350	14000	13500	13667		12700	12500	12600
Nickel (total)	µg/L	25	25	0.6	0.6	< 1.0	< 1.0	< 1.0		0.6	0.9	0.8
Phosphorus (total)	mg/L	0.01-0.03		0.008	0.005	0.009	0.005	0.009	< 0.003	0.014	0.009	0.009
Lead (total)	µg/L	5	7	0.04	0.02	< 0.50	< 0.50	< 0.50	< 0.01	0.16	0.09	0.09
Antimony (total)	µg/L	20		0.3	0.3	< 0.5	< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	100	1	0.4	0.2	< 2.0	< 2.0	< 2.0		0.12	0.13	0.13
Tin (total)	µg/L			0.06	< 0.01	< 1.0	< 1.0	< 1.0		0.09	0.09	0.09
Strontium (total)	µg/L			188	173	165	160	167		199	182	191
Titanium (total)	µg/L			- <sup>1</sup>	- <sup>1</sup>	< 5.0	< 5.0	< 5.4		0.69	3.98	2.34
Thallium (total)	µg/L	0.3	0.8	0.01	0.01	< 0.05	< 0.05	< 0.05		0.006	0.008	0.007
Uranium (total)	µg/L	5	15	1.36	0.35	0.36	0.33	0.38		0.35	0.35	0.35
Vanadium (total)	µg/L	6		0.34	0.20	0.55	< 0.50	< 0.59		0.24	0.37	0.31
Zinc (total)	µg/L	30	30	< 2.0	2.5	< 5.0	< 5.0	< 5.0	< 2.0	3.0	2.5	2.5
Lead-210	Bq/L			< 0.02	0.03	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	1		0.02	0.02	< 0.04	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L			< 0.02	< 0.02	< 0.07	< 0.07	< 0.07	< 0.02	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.06	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02	< 0.02
Field Parameters												
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		105.7	88.5	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		125.1	182.8	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		309.5	295	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		17.788	11.015	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		-0.42	7.41	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		8.29	7.87	--
Staff Gauge	cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		--	--	--

**Notes:**

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CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015.

**Bold values** indicate an exceedance of a PWQO or CWQG value.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Due to COVID-19 restrictions

-- = No data.

**Table B-40: Drainage water quality – PH LTWMF – Location 1 (WC-SW3-02), 2015 – 2020**

		WC-SW3-02							
		2015	2016	2017	2018	2019	2020		
Parameter	Units	Average					2020-05-06	2020-10-29	Average
Total Suspended Solids	mg/L	4	11	5	190	11	8	67	38
pH	no unit	8.20	8.26	8.17	8.16	8.07	8.17	8.02	8.10
Alkalinity	mg/L as CaCO3	321	285	305	300	265	235	276	256
Carbonate	mg/L as CaCO3	3.5	3.6	4.2	4.2	3.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3	318	280	300	300	255	235	276	256
Total Dissolved Solids	mg/L	389	371	337	610	1190	1280	1140	1210
Fluoride	mg/L	0.08	0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L	4.5	4.6	3.5	4.3	3.3	3.0	3.0	3.0
Ammonia+Ammonium (N)	as N mg/L	< 0.04	0.05	< 0.05	0.06	< 0.05	< 0.04	0.06	0.05
Chloride (Dissolved)	mg/L	14.5	11.4	15	99	385	510	400	455
Sulphate (dissolved)	mg/L	23	29	25	40	64	62	73	68
Bromide (dissolved)	mg/L	< 0.3	0.7	< 1	2	7	8.2	6.9	8
Nitrite (as N)	as N mg/L	< 0.030	0.023	< 0.014	< 0.010	< 0.020	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L	0.33	0.51	1.41	1.56	2.21	2.08	1.19	1.64
Nitrate + Nitrite (as N)	as N mg/L	0.33	0.52	1.41	1.56	2.23	2.08	1.19	1.64
Mercury (dissolved)	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3	311	304	310	455	780	958	871	915
Silver (total)	µg/L	0.01	0.08	< 0.10	0.23	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L	35	192	130	3000	81	78	59	69
Aluminum (0.2µm)	µg/L	- <sup>1</sup>	- <sup>1</sup>	< 5	21	6	8	3	6
Arsenic (total)	µg/L	898	1425	830	890	335	392	468	430
Barium (total)	µg/L	23.7	29.7	30	81	106	85	95	90
Beryllium (total)	µg/L	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (total)	µg/L	32	42	32	42	51	59	67	63
Bismuth (total)	µg/L	0.02	0.5	< 1.0	5.5	< 1.0	0.2	0.3	0.3
Calcium (total)	µg/L	100350	99050	107500	170000	220000	274000	260000	267000
Cadmium (total)	µg/L	0.01	0.05	< 0.10	< 0.10	< 0.10	0.05	0.13	0.09
Cobalt (total)	µg/L	3.5	5.5	1.4	54.1	3.0	30.7	47.3	39.0
Chromium (total)	µg/L	0.2	2.7	< 5.0	< 5.0	< 5.0	0.3	0.8	0.6
Copper (total)	µg/L	2.8	4.5	1.4	52.6	2.9	33.0	12.5	22.8
Iron (total)	µg/L	108	377	200	3150	140	212	654	433
Potassium (total)	µg/L	359	1112	870	1650	2150	1990	1830	1910
Magnesium (total)	µg/L	14550	12550	13500	20500	51500	66400	54000	60200
Manganese (total)	µg/L	23	65	58	175	75	160	263	212
Molybdenum (total)	µg/L	2.6	3.7	2.6	3.2	2.0	2.6	3.1	2.8
Sodium (total)	µg/L	28300	28400	23000	36000	53500	58000	56200	57100
Nickel (total)	µg/L	5.6	6.4	3.6	41.7	4.7	16.7	35.3	26.0
Phosphorus (total)	mg/L	0.070	0.096	0.040	0.215	0.043	0.015	< 0.003	0.009
Lead (total)	µg/L	0.24	0.88	< 0.50	9.75	< 0.50	5.73	3.50	4.62
Antimony (total)	µg/L	4.4	5.3	2.5	3.8	2.6	2.4	2.6	2.5
Selenium (total)	µg/L	1.4	3.1	< 2.0	< 2.0	< 2.0	1.8	1.9	1.9
Tin (total)	µg/L	0.1	0.5	< 1.0	< 1.0	< 1.0	0.1	0.1	0.1
Strontium (total)	µg/L	181	188	200	405	635	866	739	803
Titanium (total)	µg/L	- <sup>1</sup>	16	7.6	145	7	3.1	2.6	2.8
Thallium (total)	µg/L	< 0.005	0.03	< 0.05	0.05	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (total)	µg/L	434	542	450	425	445	439	617	528
Vanadium (total)	µg/L	2.4	2.7	1.9	7.3	1.5	1.5	1.7	1.6
Zinc (total)	µg/L	2.0	3.6	8.5	21.5	8.1	18	12	15
Lead-210	Bq/L	< 0.02	< 0.02	0.03	0.15	< 0.10	0.22	0.14	0.18
Radium-226	Bq/L	0.18	0.11	< 0.04	0.28	0.16	0.09	0.06	0.08
Thorium-230	Bq/L	< 0.02	0.05	< 0.07	0.28	< 0.07	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	< 0.02	- <sup>1</sup>	< 0.06	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02
Field Parameters									
ODO % Sat	%	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	112.6	93.1	--
ORP	mV	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	137.1	77.4	--
SPC	us/cm	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	2107	1531	--
Temperature	°C	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	12.912	5.056	--
Turbidity	FNU	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	3.48	7.48	--
pH	Units	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	7.93	7.79	--
Staff Gauge	cm	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--	--	--

**Note:**<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

n/a – Not Applicable.

-- - No data.



**Table B-41: Drainage water quality – PH LTWMF – Location 2 (WC-SW4-02), 2015 – 2020**

		WC-SW4-02					
		2015	2016	2017	2018	2019	2020
Parameter	Units	No Sample	Average		No Sample	No Sample	No Sample
Total Suspended Solids	mg/L		9	310			
pH	no unit		8.09	7.92			
Alkalinity	mg/L as CaCO <sub>3</sub>		250	310			
Carbonate	mg/L as CaCO <sub>3</sub>		2.8	2.4			
Bicarbonate	mg/L as CaCO <sub>3</sub>		250	300			
Total Dissolved Solids	mg/L		452	492			
Fluoride	mg/L		0.10	< 0.10			
Total Organic Carbon	mg/L		4.6	12.0			
Ammonia+Ammonium (N)	as N mg/L		< 0.05	< 0.05			
Chloride (Dissolved)	mg/L		61.0	80			
Sulphate (dissolved)	mg/L		65	56			
Bromide (dissolved)	mg/L		< 1.0	< 1			
Nitrite (as N)	as N mg/L		0.012	< 0.010			
Nitrate (as N)	as N mg/L		< 0.10	< 0.10			
Nitrate + Nitrite (as N)	as N mg/L		< 0.10	< 0.10			
Mercury (dissolved)	µg/L		< 0.01	< 0.01			
Hardness	mg/L as CaCO <sub>3</sub>		310	360			
Silver (total)	µg/L		< 0.10	< 0.10			
Aluminum (total)	µg/L		36	1500			
Aluminum (0.2µm)	µg/L		- <sup>1</sup>	< 5.0			
Arsenic (total)	µg/L		< 1	23			
Barium (total)	µg/L		23.0	44			
Beryllium (total)	µg/L		< 0.50	< 0.50			
Boron (total)	µg/L		11	19			
Bismuth (total)	µg/L		< 1.0	< 1.0			
Calcium (total)	µg/L		110000	140000			
Cadmium (total)	µg/L		< 0.10	< 0.10			
Cobalt (total)	µg/L		< 0.5	6.8			
Chromium (total)	µg/L		< 5.0	< 5.0			
Copper (total)	µg/L		< 1.0	5.7			
Iron (total)	µg/L		210	4400			
Potassium (total)	µg/L		1700	420			
Magnesium (total)	µg/L		5800	6800			
Manganese (total)	µg/L		7	420			
Molybdenum (total)	µg/L		< 0.5	< 0.5			
Sodium (total)	µg/L		42000	48000			
Nickel (total)	µg/L		< 1.0	4.7			
Phosphorus (total)	mg/L		0.01	0.11			
Lead (total)	µg/L		< 0.50	3.10			
Antimony (total)	µg/L		< 0.5	< 0.5			
Selenium (total)	µg/L		< 2.0	< 2.0			
Tin (total)	µg/L		< 1.0	< 1.0			
Strontium (total)	µg/L		260	330			
Titanium (total)	µg/L		< 5	64.0			
Thallium (total)	µg/L		< 0.05	< 0.05			
Uranium (total)	µg/L		1	2			
Vanadium (total)	µg/L		< 0.5	3.1			
Zinc (total)	µg/L		< 5.0	9.3			
Lead-210	Bq/L		< 0.02	0.08			
Radium-226	Bq/L		< 0.04	0.15			
Thorium-230	Bq/L		< 0.07	0.31			
Thorium-232	Bq/L		- <sup>1</sup>	< 0.06			
<b>Field Parameters</b>							
ODO % Sat	%		- <sup>2</sup>	- <sup>2</sup>			
ORP	mV		- <sup>2</sup>	- <sup>2</sup>			
SPC	us/cm		- <sup>2</sup>	- <sup>2</sup>			
Temperature	°C		- <sup>2</sup>	- <sup>2</sup>			
Turbidity	FNU		- <sup>2</sup>	- <sup>2</sup>			
pH	Units		- <sup>2</sup>	- <sup>2</sup>			
Staff Gauge	cm		- <sup>2</sup>	- <sup>2</sup>			

**Note:**<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

n/a – Not Applicable.

--- No data.

**Table B-42: Drainage water quality – PH LTWMF – Location 3 (WC-SW5-02), 2015 – 2020**

		WC-SW5-02							
		2015	2016	2017	2018	2019	2020		
Parameter	Units	Average					2020-05-06	2020-10-29	Average
Total Suspended Solids	mg/L	9	7	7	68	31	23	8	16
pH	no unit	8.21	8.13	8.10	8.16	7.66	8.21	7.94	8.08
Alkalinity	mg/L as CaCO3	271	244	245	270	158	332	271	302
Carbonate	mg/L as CaCO3	3.0	5.4	3.0	3.9	2.4	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3	269	240	240	260	158	332	271	302
Total Dissolved Solids	mg/L	323	315	1347	663	1650	5080	1400	3240
Fluoride	mg/L	0.08	0.10	0.18	0.10	< 0.10	0.10	< 0.06	0.08
Total Organic Carbon	mg/L	6	8	11	6	6	24	2	13
Ammonia+Ammonium (N)	as N mg/L	0.95	0.05	0.06	0.08	0.10	< 0.04	< 0.04	< 0.04
Chloride (Dissolved)	mg/L	11.5	8.7	330	125	890	1300	320	810
Sulphate (dissolved)	mg/L	15	25	415	81	732	1400	85	743
Bromide (dissolved)	mg/L	< 0.3	0.7	< 1.0	2.5	9.5	15.0	4.8	9.9
Nitrite (as N)	as N mg/L	< 0.03	0.02	< 0.01	< 0.01	0.02	< 0.30	< 0.03	0.17
Nitrate (as N)	as N mg/L	0.19	0.24	0.34	1.10	0.99	1.71	1.31	1.51
Nitrate + Nitrite (as N)	as N mg/L	0.19	0.24	0.34	1.10	1.01	1.71	1.33	1.52
Mercury (dissolved)	µg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3	257	268	795	450	555	913	752	833
Silver (total)	µg/L	0.00	0.06	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L	65	107	150	1590	466	648	83	366
Aluminum (0.2µm)	µg/L	- <sup>1</sup>	- <sup>1</sup>	5.5	21	< 7	34	7	21
Arsenic (total)	µg/L	545	1155	170	585	168	178	232	205
Barium (total)	µg/L	25	29	56	83	81	83	91	87
Beryllium (total)	µg/L	< 0.01	0.25	< 0.50	< 0.50	< 0.50	0.021	< 0.007	0.014
Boron (total)	µg/L	25	39	47	42	63	60	56	58
Bismuth (total)	µg/L	0.02	0.53	< 1.0	1.6	< 1.0	0.19	0.22	0.21
Calcium (total)	µg/L	86300	88500	285000	135000	160000	246000	234000	240000
Cadmium (total)	µg/L	0.01	0.06	< 0.10	< 0.10	< 0.10	0.29	0.07	0.18
Cobalt (total)	µg/L	2.0	2.3	2.2	19.5	11.5	171.0	38.5	104.8
Chromium (total)	µg/L	0.3	2.7	< 5.0	< 5.0	< 5.0	1.85	0.88	1.37
Copper (total)	µg/L	1.9	2.5	9.5	20.0	18.4	112.0	10.9	61.5
Iron (total)	µg/L	169	192	275	1625	865	1460	345	903
Potassium (total)	µg/L	553	928	6900	2150	5750	10200	1660	5930
Magnesium (total)	µg/L	10095	9950	36000	23500	39500	72500	40500	56500
Manganese (total)	µg/L	30	30	122	145	219	664	114	389
Molybdenum (total)	µg/L	1.9	3.4	5.0	2.9	1.4	9.2	2.2	5.7
Sodium (total)	µg/L	22950	25550	132500	54000	724500	1165000	57600	611300
Nickel (total)	µg/L	3.0	3.3	16.3	16.2	35.6	126	30	78
Phosphorus (total)	mg/L	0.05	0.08	0.04	0.09	0.05	0.05	< 0.003	0.03
Lead (total)	µg/L	0.47	0.43	< 0.50	4.05	1.49	23.50	2.37	12.94
Antimony (total)	µg/L	2.3	3.3	1.3	2.3	1.3	2.1	1.3	1.7
Selenium (total)	µg/L	1.0	2.0	< 2.0	< 2.0	< 2.0	2.3	1.9	2.1
Tin (total)	µg/L	0.1	0.5	< 1.0	< 1.0	< 1.0	0.24	0.11	0.18
Strontium (total)	µg/L	158	166	570	410	500	1010	623	817
Titanium (total)	µg/L	- <sup>1</sup>	7.7	9.1	67	25	35.7	4.5	20.1
Thallium (total)	µg/L	< 0.005	0.03	< 0.05	< 0.05	< 0.05	0.011	0.008	0.010
Uranium (total)	µg/L	254	323	460	295	246	404	372	388
Vanadium (total)	µg/L	2.0	2.2	0.9	3.9	1.8	2.51	1.36	1.94
Zinc (total)	µg/L	9	4	39	15	16	47	10	29
Lead-210	Bq/L	< 0.02	0.03	0.02	0.12	0.46	1.20	0.10	0.65
Radium-226	Bq/L	0.10	0.07	0.06	0.27	0.36	0.20	0.03	0.12
Thorium-230	Bq/L	< 0.02	0.05	< 0.07	0.26	0.18	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	< 0.02	- <sup>1</sup>	< 0.06	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02
Field Parameters									
ODO % Sat	%	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	111.3	92.1	--
ORP	mV	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	202.2	37.3	--
SPC	us/cm	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	1699	1247	--
Temperature	°C	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	12.16	4.947	--
Turbidity	FNU	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	22.46	2.89	--
pH	Units	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	8.07	7.90	--
Staff Gauge	cm	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--	--	--

**Note:**<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

n/a – Not Applicable.

-- - No data.

**Table B-43: Drainage water quality – PH LTWMF – Location 4 (WC-SW6-02), 2015 – 2020**

		WC-SW6-02							
		2015	2016	2017	2018	2019	2020		
Parameter	Units	Average					2020-05-06	2020-10-29	Average
Total Suspended Solids	mg/L	22	28	19	29	7	511	106	309
pH	no unit	8.01	8.06	8.05	8.04	8.01	8.12	7.73	7.93
Alkalinity	mg/L as CaCO3	205	181	190	190	220	377	211	294
Carbonate	mg/L as CaCO3	< 2.0	4.0	2.0	2.0	2.1	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3	205	178	185	185	215	377	211	294
Total Dissolved Solids	mg/L	238	236	231	315	353	434	663	549
Fluoride	mg/L	0.08	0.11	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L	7.6	8.5	5.8	6.9	7.8	2.0	2.0	2.0
Ammonia+Ammonium (N)	as N mg/L	0.21	0.05	< 0.05	0.08	< 0.05	< 0.04	0.04	0.04
Chloride (Dissolved)	mg/L	5.9	5.2	16	31	36	84	190	137
Sulphate (dissolved)	mg/L	6	15	10	16	21	35	47	41
Bromide (dissolved)	mg/L	< 0.3	0.7	< 1	< 1	< 1	1.0	2.6	1.8
Nitrite (as N)	as N mg/L	< 0.030	0.020	< 0.010	< 0.010	< 0.010	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L	0.10	0.14	0.45	0.50	0.72	2.16	1.78	1.97
Nitrate + Nitrite (as N)	as N mg/L	0.10	0.14	0.45	0.50	0.72	2.16	1.78	1.97
Mercury (dissolved)	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3	205	205	210	250	280	460	580	520
Silver (total)	µg/L	0.01	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L	200	156	340	129	50	8210	1350	4780
Aluminum (0.2µm)	µg/L	- <sup>1</sup>	- <sup>1</sup>	6.0	6.5	6.0	8.0	10.0	9.0
Arsenic (total)	µg/L	85	176	81	126	83	47	39	43
Barium (total)	µg/L	29	30	29	32	37	175	99	137
Beryllium (total)	µg/L	0.01	0.26	< 0.50	< 0.50	< 0.50	0.28	0.06	0.17
Boron (total)	µg/L	23	35	26	25	24	31	37	34
Bismuth (total)	µg/L	0.02	0.5	< 1.0	< 1.0	< 1.0	0.04	0.02	0.03
Calcium (total)	µg/L	72500	71450	75000	78500	89000	156000	199000	177500
Cadmium (total)	µg/L	0.04	0.07	< 0.10	< 0.10	< 0.10	0.035	0.008	0.022
Cobalt (total)	µg/L	0.2	0.3	< 0.5	< 0.5	< 0.5	4.1	1.3	2.7
Chromium (total)	µg/L	0.5	2.9	< 5.0	< 5.0	< 5.0	10.4	3.2	6.8
Copper (total)	µg/L	1.0	1.2	< 1.1	< 1.0	< 1.1	13.4	2.4	7.9
Iron (total)	µg/L	496	321	415	295	140	8880	1520	5200
Potassium (total)	µg/L	891	790	710	685	890	3920	1580	2750
Magnesium (total)	µg/L	5705	5635	6150	7100	8100	17000	20400	18700
Manganese (total)	µg/L	87	32	25	30	18	276	89	182
Molybdenum (total)	µg/L	1.2	1.8	1.2	1.3	1.2	1.6	1.0	1.3
Sodium (total)	µg/L	8510	8705	7850	10200	13000	19200	23400	21300
Nickel (total)	µg/L	0.6	1.5	< 1.0	1.1	< 1.0	7.6	1.1	4.4
Phosphorus (total)	mg/L	0.06	0.07	0.04	0.04	0.04	0.37	0.16	0.26
Lead (total)	µg/L	1.74	1.29	0.87	0.80	< 0.50	3.60	0.62	2.11
Antimony (total)	µg/L	< 0.20	0.35	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (total)	µg/L	0.7	1.2	< 2.0	< 2.0	< 2.0	1.1	1.2	1.2
Tin (total)	µg/L	0.1	0.6	< 1.0	< 1.0	< 1.0	0.2	0.2	0.2
Strontium (total)	µg/L	128	123	125	130	160	389	415	402
Titanium (total)	µg/L	- <sup>1</sup>	6	16.4	9	< 5	429	83	256
Thallium (total)	µg/L	0.007	0.03	< 0.05	< 0.05	< 0.05	0.11	0.02	0.06
Uranium (total)	µg/L	51	61	42	57	75	78	53	66
Vanadium (total)	µg/L	1.4	1.7	1.4	1.3	1.0	18.1	3.5	10.8
Zinc (total)	µg/L	6.5	13.5	< 5.0	< 5.0	< 5.0	22	5	14
Lead-210	Bq/L	< 0.02	0.02	0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	< 0.01	0.03	< 0.04	< 0.04	< 0.04	< 0.01	0.01	0.01
Thorium-230	Bq/L	< 0.02	0.05	< 0.07	< 0.07	< 0.07	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	< 0.02	- <sup>1</sup>	< 0.06	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02
Field Parameters									
ODO % Sat	%	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	96.7	97.6	--
ORP	mV	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	123.3	95.2	--
SPC	us/cm	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	768	936	--
Temperature	°C	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	21.012	5.584	--
Turbidity	FNU	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	200.78	38.45	--
pH	Units	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	8.25	8.16	--
Staff Gauge	cm	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--	--	--

**Note:**<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

n/a – Not Applicable.

-- - No data.

**Table B-44: Surface water quality – Brewery Creek – upstream – (GRT-3), 2018 – 2020**

Analysis	Units	Criteria		GRT-3						
		PWQO	CWQG	2018	2019	2020				
				Average		2020-01-08	2020-05-12	2020-06-25	2020-09-23	Average
Total Suspended Solids	mg/L			12	12	25	7	15	5	13
pH	no unit	<b>6.5-8.5</b>	<b>6.5-9.0</b>	8.20	8.21	8.28	8.25	8.15	8.27	8.24
Alkalinity	mg/L as CaCO <sub>3</sub>			258	248	237	243	261	252	248
Carbonate	mg/L as CaCO <sub>3</sub>			3.8	3.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			258	243	237	243	261	252	248
Total Dissolved Solids	mg/L			560	584	586	566	571	557	570
Fluoride	mg/L		<b>0.12</b>	< 0.1	0.1	0.070	< 0.060	< 0.060	< 0.060	0.063
Total Organic Carbon	mg/L			2	2	< 1.0	1.0	1.0	2.0	1.3
Ammonia+Ammonium (N)	as N mg/L			0.06	0.06	< 0.04	< 0.04	0.04	0.04	0.04
Chloride (Dissolved)	mg/L		<b>120</b>	<b>145</b>	<b>150</b>	<b>160</b>	<b>190</b>	<b>170</b>	<b>168</b>	<b>172</b>
Sulphate (dissolved)	mg/L			24	25	25.3	23.0	24.4	24.9	24.4
Bromide (dissolved)	mg/L			< 1	< 1	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.01	< 0.01	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		<b>13</b>	3.34	3.43	3.78	3.90	3.84	3.78	3.83
Nitrate + Nitrite (as N)	as N mg/L			3.34	3.43	3.78	3.90	3.84	3.78	3.83
Mercury (dissolved)	µg/L	<b>0.2</b>	<b>0.026</b>	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.01
Hardness	mg/L as CaCO <sub>3</sub>			313	330	343	356	347	373	355
Silver (total)	µg/L	<b>0.1</b>	<b>0.25</b>	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			82	68	255	68	80	39	111
Aluminum (0.2µm)	µg/L	<b>75</b>	<b>100</b>	6	5	4	3	4	2	3
Arsenic (total)	µg/L	<b>100</b>	<b>5</b>	< 1	< 1	0.5	0.3	0.4	0.5	0.4
Barium (total)	µg/L			120	115	120	122	126	124	123
Beryllium (total)	µg/L	<b>1100</b>		< 0.5	< 0.5	0.013	< 0.007	< 0.007	< 0.007	0.009
Boron (total)	µg/L	<b>200</b>	<b>1500</b>	33	32	28	31	33	29	30
Bismuth (total)	µg/L			< 1	< 1	0.011	0.008	< 0.007	< 0.007	0.008
Calcium (total)	µg/L			99000	99250	108000	113000	109000	119000	112250
Cadmium (total)	µg/L	<b>0.2</b>	<b>0.09</b>	< 0.1	< 0.1	0.023	0.004	0.006	0.015	0.012
Cobalt (total)	µg/L	<b>0.9</b>		< 0.5	< 0.5	0.182	0.083	0.081	0.061	0.102
Chromium (total)	µg/L			< 5	< 5	3.17	1.71	1.71	1.09	1.92
Copper (total)	µg/L	<b>5</b>		< 1	< 1	3.0	0.5	0.6	0.4	1.1
Iron (total)	µg/L	<b>300</b>	<b>300</b>	170	138	<b>356</b>	116	114	84	168
Potassium (total)	µg/L			1125	1150	1280	1280	1140	1300	1250
Magnesium (total)	µg/L			18750	17750	18100	17800	18200	18700	18200
Manganese (total)	µg/L			18	16	24.8	13.2	15.9	14.8	17.2
Molybdenum (total)	µg/L	<b>40</b>	<b>73</b>	< 0.5	< 0.5	0.27	0.19	0.20	0.31	0.24
Sodium (total)	µg/L			85500	80500	80500	83000	85000	85100	83400
Nickel (total)	µg/L	<b>25</b>	<b>25</b>	< 1	< 1	0.5	0.3	0.3	0.3	0.4
Phosphorus (total)	mg/L	<b>0.01-0.03</b>		0.02	0.02	0.03	0.01	0.02	0.02	0.02
Lead (total)	µg/L	<b>5</b>	<b>7</b>	0.54	0.51	1.02	< 0.01	0.32	< 0.01	0.34
Antimony (total)	µg/L	<b>20</b>		< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	<b>100</b>	<b>1</b>	< 2	< 2	0.45	0.30	0.33	0.29	0.34
Tin (total)	µg/L			< 1	< 1	0.07	0.07	0.08	0.12	0.09
Strontium (total)	µg/L			230	228	250	247	246	247	248
Titanium (total)	µg/L			5.7	6.1	9.66	2.59	3.02	1.16	4.11
Thallium (total)	µg/L	<b>0.3</b>	<b>0.8</b>	< 0.05	< 0.05	0.006	< 0.005	0.005	0.007	0.006
Uranium (total)	µg/L	<b>5</b>	<b>15</b>	1.1	1.0	1.23	1.02	0.89	0.81	0.99
Vanadium (total)	µg/L	<b>6</b>		0.94	0.90	1.27	0.77	0.87	0.65	0.89
Zinc (total)	µg/L	<b>30</b>	<b>30</b>	< 5	< 5	8	< 2	< 2	< 2	4
Lead-210	Bq/L			< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	<b>1</b>		< 0.04	< 0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L			< 0.07	< 0.07	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.06	< 0.06	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>										
ODO % Sat	mg/L			- <sup>1</sup>	- <sup>1</sup>	96.8	100	100.7	98.2	--
ORP	mV			- <sup>1</sup>	- <sup>1</sup>	52.1	182.6	143.4	248.6	--
SPC	µs/cm			- <sup>1</sup>	- <sup>1</sup>	902	1007	1030	1037	--
Temperature	°C			- <sup>1</sup>	- <sup>1</sup>	4.632	7.28	14.342	10.332	--
Turbidity	FNU			- <sup>1</sup>	- <sup>1</sup>	9.1	1.91	5.15	1.04	--
pH	Units			- <sup>1</sup>	- <sup>1</sup>	8.24	8.10	8.10	8.05	--
Staff Gauge	cm			- <sup>1</sup>	- <sup>1</sup>	--	--	--	--	--

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life

**Bold values** indicate an exceedance of a PWQO or CWQG value

-- - No data.

<sup>1</sup> Field parameters included for current sampling year only.

**Table B-45: Surface water quality – Brewery Creek – downstream – (GRT-3B), 2018 – 2020**

Analysis	Units	Criteria		GRT-3B						
		PWQO	CWQG	2018	2019	2020				
				Average		2020-01-08	2020-05-12	2020-06-25	2020-09-23	Average
Total Suspended Solids	mg/L			1	6	3	2	2	< 2	2
pH	no unit	<b>6.5-8.5</b>	<b>6.5-9.0</b>	8.09	8.17	8.26	8.26	7.99	8.2	8.18
Alkalinity	mg/L as CaCO <sub>3</sub>			253	233	240	242	246	246	244
Carbonate	mg/L as CaCO <sub>3</sub>			2.9	3.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			248	228	240	242	246	246	244
Total Dissolved Solids	mg/L			551	535	606	531	563	560	565
Fluoride	mg/L		<b>0.12</b>	< 0.1	< 0.1	0.070	< 0.060	< 0.060	< 0.060	0.063
Total Organic Carbon	mg/L			1.8	3.1	2.0	1.0	2.0	2.0	1.8
Ammonia+Ammonium (N)	as N mg/L			0.09	0.11	< 0.04	< 0.04	0.04	0.06	0.05
Chloride (Dissolved)	mg/L		<b>120</b>	<b>145</b>	<b>145</b>	<b>150</b>	<b>190</b>	<b>160</b>	<b>164</b>	<b>166</b>
Sulphate (dissolved)	mg/L			38	23	21.8	22.0	23.3	24.2	22.8
Bromide (dissolved)	mg/L			< 1	< 1	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			0.02	0.01	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		<b>13</b>	2.71	2.67	3.53	3.47	3.15	3.46	3.40
Nitrate + Nitrite (as N)	as N mg/L			2.72	2.68	3.53	3.47	3.15	3.46	3.40
Mercury (dissolved)	µg/L	<b>0.2</b>	<b>0.026</b>	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.01
Hardness	mg/L as CaCO <sub>3</sub>			305	313	349	359	323	377	352
Silver (total)	µg/L	<b>0.1</b>	<b>0.25</b>	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			17	71	34	13	6	5	15
Aluminum (0.2µm)	µg/L	<b>75</b>	<b>100</b>	< 5	5	6	3	4	2	4
Arsenic (total)	µg/L	<b>100</b>	<b>5</b>	< 1	< 1	0.3	0.3	0.3	0.5	0.4
Barium (total)	µg/L			110	109	110	118	114	129	118
Beryllium (total)	µg/L	<b>1100</b>		< 0.5	< 0.5	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Boron (total)	µg/L	<b>200</b>	<b>1500</b>	34	35	37	36	36	31	35
Bismuth (total)	µg/L			< 1	< 1	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Calcium (total)	µg/L			92750	95000	111000	115000	99300	118000	110825
Cadmium (total)	µg/L	<b>0.2</b>	<b>0.09</b>	< 0.1	< 0.1	0.006	0.009	< 0.003	< 0.003	0.005
Cobalt (total)	µg/L	<b>0.9</b>		< 0.5	< 0.5	0.055	0.053	0.049	0.045	0.051
Chromium (total)	µg/L			< 5	< 5	0.94	1.02	0.92	0.83	0.93
Copper (total)	µg/L	<b>5</b>		1	1	2.4	0.4	0.3	0.3	0.9
Iron (total)	µg/L	<b>300</b>	<b>300</b>	100	193	69	45	26	37	44
Potassium (total)	µg/L			1173	1300	1370	1390	1190	1360	1328
Magnesium (total)	µg/L			18500	17250	17400	17600	18200	20300	18375
Manganese (total)	µg/L			25	42	17.8	11.2	15.5	10.0	13.6
Molybdenum (total)	µg/L	<b>40</b>	<b>73</b>	< 0.5	< 0.5	0.21	0.18	0.18	0.27	0.21
Sodium (total)	µg/L			83750	80750	77300	81700	82700	92000	83425
Nickel (total)	µg/L	<b>25</b>	<b>25</b>	< 1	< 1	0.2	0.3	0.2	0.2	0.2
Phosphorus (total)	mg/L	<b>0.01-0.03</b>		0.01	0.02	< 0.003	0.01	0.01	0.01	0.01
Lead (total)	µg/L	<b>5</b>	<b>7</b>	< 0.5	0.6	0.14	< 0.01	0.03	< 0.01	0.05
Antimony (total)	µg/L	<b>20</b>		< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	<b>100</b>	<b>1</b>	< 2	< 2	0.32	0.23	0.24	0.24	0.26
Tin (total)	µg/L			< 1	< 1	< 0.06	0.09	< 0.06	0.08	0.07
Strontium (total)	µg/L			223	213	249	250	244	255	250
Titanium (total)	µg/L			< 5	6	1.15	0.46	0.42	< 0.05	0.52
Thallium (total)	µg/L	<b>0.3</b>	<b>0.8</b>	< 0.05	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium (total)	µg/L	<b>5</b>	<b>15</b>	1.9	1.9	2.02	1.90	1.21	1.09	1.56
Vanadium (total)	µg/L	<b>6</b>		0.7	0.9	0.75	0.64	0.62	0.55	0.64
Zinc (total)	µg/L	<b>30</b>	<b>30</b>	5.2	< 5.0	6	< 2	< 2	< 2	3
Lead-210	Bq/L			< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	<b>1</b>		< 0.04	< 0.04	0.01	< 0.01	< 0.01	0.01	0.01
Thorium-230	Bq/L			< 0.07	< 0.07	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.06	< 0.06	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>										
ODO % Sat	mg/L			- <sup>1</sup>	- <sup>1</sup>	93.5	107.4	117	99.4	--
ORP	mV			- <sup>1</sup>	- <sup>1</sup>	64.6	180	152.2	240.9	--
SPC	µs/cm			- <sup>1</sup>	- <sup>1</sup>	891	982	1001	1023	--
Temperature	°C			- <sup>1</sup>	- <sup>1</sup>	3.302	6.73	17.048	10.347	--
Turbidity	FNU			- <sup>1</sup>	- <sup>1</sup>	5.3	0.25	0.39	-0.9	--
pH	Units			- <sup>1</sup>	- <sup>1</sup>	7.93	8.09	7.95	7.95	--
Staff Gauge	cm			- <sup>1</sup>	- <sup>1</sup>	--	--	--	--	--

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life

**Bold values** indicate an exceedance of a PWQO or CWQG value

-- - No data.

<sup>1</sup> Field parameters included for current sampling year only.

**Table B-46: Surface water quality – Highland Drive South Creek – upstream – (HC-U), 2018 – 2020**

		Criteria		HC-U						
				2018	2019	2020				
Analysis	Units	PWQO	CWQG	Average		2020-01-10	2020-05-13	2020-06-30	2020-10-23	Average
Total Suspended Solids	mg/L			5	6	9	11	8	7	9
pH	no unit	6.5-8.5	6.5-9.0	8.07	8.17	8.07	8.04	8.02	8.05	8.05
Alkalinity	mg/L as CaCO3			295	278	275	265	288	280	277
Carbonate	mg/L as CaCO3			3.2	3.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			288	275	275	265	288	280	277
Total Dissolved Solids	mg/L			666	695	771	657	660	683	693
Fluoride	mg/L		0.12	0.13	0.12	0.12	0.13	0.14	0.17	0.14
Total Organic Carbon	mg/L			2.6	2.7	2	2	2	2	2
Ammonia+Ammonium (N)	as N mg/L			0.07	0.06	0.04	< 0.04	0.06	0.04	0.05
Chloride (Dissolved)	mg/L		120	152	173	250	220	200	180	213
Sulphate (dissolved)	mg/L			30	35	36	34	36	36	36
Bromide (dissolved)	mg/L			< 1.0	2.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Nitrite (as N)	as N mg/L			< 0.010	< 0.010	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		13	3.75	3.64	4.18	4.19	3.80	3.80	3.99
Nitrate + Nitrite (as N)	as N mg/L			3.75	3.64	4.18	4.19	3.80	3.80	3.99
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	< 0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hardness	mg/L as CaCO3			398	393	458	443	480	420	450
Silver (total)	µg/L	0.1	0.25	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			35	34	15	30	49	13	27
Aluminum (0.2µm)	µg/L	75	100	8	< 5	7	< 1	5	< 1	4
Arsenic (total)	µg/L	100	5	4.6	2.9	2.8	3.2	5.1	4.3	3.9
Barium (total)	µg/L			200	190	215	209	230	213	217
Beryllium (total)	µg/L	1100		< 0.5	< 0.5	< 0.007	< 0.007	< 0.007	0.020	0.010
Boron (total)	µg/L	200	1500	490	433	420	430	437	559	462
Bismuth (total)	µg/L			< 1.0	< 1.0	< 0.007	0.045	0.012	< 0.007	0.018
Calcium (total)	µg/L			125000	122500	140000	137000	147000	130000	138500
Cadmium (total)	µg/L	0.2	0.09	< 0.10	< 0.10	< 0.003	0.007	0.003	0.019	0.008
Cobalt (total)	µg/L	0.9		< 0.50	< 0.50	0.184	0.150	0.207	0.374	0.229
Chromium (total)	µg/L			< 5.0	< 5.0	0.38	0.73	0.49	0.90	0.63
Copper (total)	µg/L	5		< 1.0	< 1.0	2.8	0.5	< 0.2	2.6	1.5
Iron (total)	µg/L	300	300	503	445	342	503	623	339	452
Potassium (total)	µg/L			2675	2550	3140	2920	2800	5200	3515
Magnesium (total)	µg/L			26250	25000	26300	24800	27400	22900	25350
Manganese (total)	µg/L			52	47	44.8	42.6	83.6	45.0	54.0
Molybdenum (total)	µg/L	40	73	0.69	0.65	0.51	0.62	0.75	32.00	8.47
Sodium (total)	µg/L			81250	84500	117000	83100	88700	96400	96300
Nickel (total)	µg/L	25	25	1.2	1.1	1.1	1.0	1.0	1.2	1.1
Phosphorus (total)	mg/L	0.01-0.03		0.01	0.01	0.01	0.014	0.019	0.10	0.04
Lead (total)	µg/L	5	7	< 0.50	< 0.50	0.05	< 0.01	0.41	0.25	0.18
Antimony (total)	µg/L	20		< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	100	1	< 2.0	< 2.0	0.37	0.33	0.27	6.31	1.82
Tin (total)	µg/L			< 1.0	< 1.0	0.08	0.09	0.18	0.33	0.17
Strontium (total)	µg/L			315	300	342	322	332	365	340
Titanium (total)	µg/L			5.2	5.1	0.54	1.53	2.57	5.76	2.60
Thallium (total)	µg/L	0.3	0.8	< 0.05	< 0.05	0.005	0.009	0.006	0.040	0.015
Uranium (total)	µg/L	5	15	8.7	8.8	9.96	9.5	7.7	7.7	8.7
Vanadium (total)	µg/L	6		0.67	0.74	0.46	0.46	0.65	0.69	0.57
Zinc (total)	µg/L	30	30	< 5.0	5.2	4	3	4	5	4
Lead-210	Bq/L			< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	1		< 0.04	< 0.04	< 0.01	0.01	< 0.01	< 0.01	0.01
Thorium-230	Bq/L			< 0.07	< 0.07	< 0.02	< 0.02	< 0.02	0.04	0.03
Thorium-232	Bq/L			< 0.06	< 0.06	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Field Parameters										
ODO % Sat	mg/L			- <sup>1</sup>	- <sup>1</sup>		94.2	92	87.2	--
ORP	mV			- <sup>1</sup>	- <sup>1</sup>		11	831	24.9	--
SPC	µs/cm			- <sup>1</sup>	- <sup>1</sup>		1155	1173	1051	--
Temperature	°C			- <sup>1</sup>	- <sup>1</sup>		7.951	12.633	11.014	--
Turbidity	FNU			- <sup>1</sup>	- <sup>1</sup>		2.65	4.07	2.33	--
pH	Units			- <sup>1</sup>	- <sup>1</sup>		7.85	7.83	7.84	--
Staff Gauge	cm			- <sup>1</sup>	- <sup>1</sup>		--	--	--	--

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life

**Bold values** indicate an exceedance of a PWQO or CWQG value

-- = No data.

<sup>1</sup> Field parameters included for current sampling year only.

**Table B-47: Surface water quality – Highland Drive South Creek – downstream – (HC-D), 2018 – 2020**

		Criteria		HC-D						
				2018	2019	2020				
Analysis	Units	PWQO	CWQG	Average		2020-01-10	2020-05-13	2020-06-30	2020-10-23	Average
Total Suspended Solids	mg/L			2	8	4	3	2	10	5
pH	no unit	6.5-8.5	6.5-9.0	8.14	8.19	8.27	8.16	8.16	8.10	8.17
Alkalinity	mg/L as CaCO3			295	280	260	281	277	299	279
Carbonate	mg/L as CaCO3			3.8	4.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			293	275	260	281	277	299	279
Total Dissolved Solids	mg/L			670	673	689	657	654	637	659
Fluoride	mg/L		0.12	0.14	0.11	0.11	0.12	0.12	0.18	0.13
Total Organic Carbon	mg/L			2.4	3.2	2	2	3	3	3
Ammonia+Ammonium (N)	as N mg/L			0.10	0.11	0.11	0.04	0.06	0.09	0.08
Chloride (Dissolved)	mg/L		120	175	173	190	210	200	180	195
Sulphate (dissolved)	mg/L			35	32	34	33	34	35	34
Bromide (dissolved)	mg/L			< 1.0	1.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Nitrite (as N)	as N mg/L			0.023	0.027	< 0.03	< 0.03	0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		13	3.54	3.16	4.22	3.94	3.44	3.54	3.79
Nitrate + Nitrite (as N)	as N mg/L			3.56	3.19	4.22	3.94	3.47	3.54	3.79
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	< 0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hardness	mg/L as CaCO3			400	395	472	434	469	415	448
Silver (total)	µg/L	0.1	0.25	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			16	40	14	10	14	86	31
Aluminum (0.2µm)	µg/L	75	100	5	< 5	3	< 1	2	2	2
Arsenic (total)	µg/L	100	5	7.9	8.4	6.3	6.4	9.0	10.2	8.0
Barium (total)	µg/L			195	180	201	195	227	208	208
Beryllium (total)	µg/L	1100		< 0.5	< 0.5	< 0.007	< 0.007	< 0.007	0.044	0.016
Boron (total)	µg/L	200	1500	460	458	408	469	501	558	484
Bismuth (total)	µg/L			< 1.0	< 1.0	< 0.007	0.018	< 0.007	< 0.007	0.010
Calcium (total)	µg/L			120000	117500	144000	133000	144000	128000	137250
Cadmium (total)	µg/L	0.2	0.09	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003	0.014	0.006
Cobalt (total)	µg/L	0.9		< 0.50	< 0.50	0.165	0.140	0.162	0.417	0.221
Chromium (total)	µg/L			< 5.0	< 5.0	0.34	0.26	0.21	1.12	0.48
Copper (total)	µg/L	5		< 1.0	< 1.0	2.8	0.5	< 0.2	1.0	1.1
Iron (total)	µg/L	300	300	228	315	280	256	221	401	290
Potassium (total)	µg/L			3025	3175	3590	3410	3480	4850	3833
Magnesium (total)	µg/L			25250	24000	27600	24700	26400	23100	25450
Manganese (total)	µg/L			37	52	40.7	33.0	31.3	47.9	38.2
Molybdenum (total)	µg/L	40	73	0.94	0.67	0.65	0.89	0.76	6.54	2.21
Sodium (total)	µg/L			80250	88250	92400	83600	88100	86400	87625
Nickel (total)	µg/L	25	25	1.2	< 1.0	1.1	0.9	1.0	1.3	1.1
Phosphorus (total)	mg/L	0.01-0.03		0.01	0.02	0.01	0.007	0.017	0.10	0.035
Lead (total)	µg/L	5	7	< 0.50	< 0.50	0.37	< 0.01	0.10	1.09	0.39
Antimony (total)	µg/L	20		< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	100	1	< 2.0	< 2.0	0.37	0.28	0.27	1.66	0.65
Tin (total)	µg/L			< 1.0	< 1.0	0.09	0.09	0.12	0.17	0.12
Strontium (total)	µg/L			313	298	365	327	334	361	347
Titanium (total)	µg/L			< 5.0	< 5.4	2.38	0.89	0.71	8.06	3.01
Thallium (total)	µg/L	0.3	0.8	< 0.05	< 0.05	< 0.005	< 0.005	0.005	0.076	0.023
Uranium (total)	µg/L	5	15	36	34	37.6	41.4	34.6	27.6	35.3
Vanadium (total)	µg/L	6		0.55	0.74	0.40	0.38	0.51	0.82	0.53
Zinc (total)	µg/L	30	30	< 5.0	5.1	4	2	2	5	3
Lead-210	Bq/L			< 0.10	0.11	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	1		< 0.04	< 0.04	< 0.01	0.02	0.01	0.01	0.01
Thorium-230	Bq/L			< 0.07	< 0.07	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.06	< 0.06	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Field Parameters										
ODO % Sat	mg/L			- <sup>1</sup>	- <sup>1</sup>	98.8	103.3	99.2	94.3	--
ORP	mV			- <sup>1</sup>	- <sup>1</sup>	89.7	189.6	110	117.3	--
SPC	µs/cm			- <sup>1</sup>	- <sup>1</sup>	1036	1157	1163	1065	--
Temperature	°C			- <sup>1</sup>	- <sup>1</sup>	2.814	6.759	15.851	11.234	--
Turbidity	FNU			- <sup>1</sup>	- <sup>1</sup>	0.46	1.55	2.63	5.37	--
pH	Units			- <sup>1</sup>	- <sup>1</sup>	7.72	8.04	7.97	7.97	--
Staff Gauge	cm			- <sup>1</sup>	- <sup>1</sup>	18	1.9	--	--	--

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life

**Bold values** indicate an exceedance of a PWQO or CWQG value

-- = No data.

<sup>1</sup> Field parameters included for current sampling year only.

**Table B-48: Sediment quality – Highland Drive South Creek (HC-U)**

		Criteria				HC-U						
		PSQG		CCME		2010	2012	2018	2019	2020		
Parameter	Units	LEL	SEL	ISQG	PEL	Average				2020-05-13	2020-10-23	Average
Hot Water Ext. Boron (B)	µg/g					- <sup>1</sup>	3.9	0.4	0.7	1.9	< 0.5	1.2
Acid Extractable Mercury (Hg)	µg/g	<b>0.2</b>	<b>2</b>	<b>0.17</b>	<b>0.486</b>	- <sup>1</sup>	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Acid Extractable Silver (Ag)	µg/g					< 0.20	< 0.20	< 0.20	< 0.20	< 0.05	< 0.05	0.05
Acid Extractable Arsenic (As)	µg/g	<b>6</b>	<b>33</b>	<b>5.9</b>	<b>17</b>	<b>11</b>	<b>23</b>	<b>6</b>	<b>10</b>	<b>11</b>	<b>53</b>	<b>32</b>
Acid Extractable Barium (Ba)	µg/g					34	79	28	39	56	140	98
Acid Extractable Beryllium (Be)	µg/g					< 0.20	< 0.20	< 0.20	< 0.20	0.11	0.20	0.16
Acid Extractable Boron (B)	µg/g					7	- <sup>1</sup>	< 5	< 5	6	6	6
Acid Extractable Cadmium (Cd)	µg/g	<b>0.6</b>	<b>10</b>	<b>0.6</b>	<b>3.5</b>	< 0.10	0.16	< 0.10	< 0.10	0.07	0.14	0.11
Acid Extractable Cobalt (Co)	µg/g					1.6	2.2	1.2	1.4	1.9	3.3	2.6
Acid Extractable Copper (Cu)	µg/g	<b>16</b>	<b>110</b>	<b>35.7</b>	<b>197</b>	3.8	5.7	1.7	2.3	3.5	6.8	5.2
Acid Extractable Molybdenum (Mo)	µg/g					< 0.50	< 0.50	< 0.50	< 0.50	0.4	2.0	1.20
Acid Extractable Nickel (Ni)	µg/g	<b>16</b>	<b>75</b>			2.4	3.5	2.0	2.3	2.9	5.0	4.0
Acid Extractable Lead (Pb)	µg/g	<b>31</b>	<b>250</b>	<b>35</b>	<b>91.3</b>	6.0	9.5	4.0	4.5	6.3	13.0	9.7
Acid Extractable Antimony (Sb)	µg/g					< 0.20	0.38	< 0.20	< 0.20	< 0.80	< 0.80	< 0.80
Acid Extractable Selenium (Se)	µg/g					< 0.50	0.62	< 0.50	< 0.50	< 0.70	< 0.70	< 0.70
Acid Extractable Uranium (U)	µg/g					0.71	1.10	0.46	0.64	0.96	1.40	1.18
Acid Extractable Vanadium (V)	µg/g					11	12	11	11	9	18	14
Acid Extractable Zinc (Zn)	µg/g					26	37	17	18	22	120	71
Acid Extractable Aluminum (Al)	µg/g					1500	1700	1500	1950	2100	2900	2500
Acid Extractable Bismuth (Bi)	µg/g					< 1.0	- <sup>1</sup>	< 1.0	< 1.0	< 0.09	< 0.09	< 0.09
Acid Extractable Calcium (Ca)	µg/g					65000	65000	71000	67000	64000	140000	102000
Acid Extractable Chromium (Cr)	µg/g					7.0	10	5.3	6.1	7.3	15.0	11.2
Acid Extractable Iron (Fe)	µg/g					8600	13000	8650	8900	9700	28000	18850
Acid Extractable Lithium (Li)	µg/g					- <sup>1</sup>	- <sup>1</sup>	2.2	2.7	3	4	3.5
Acid Extractable Magnesium (Mg)	µg/g					3000	3200	2700	3350	3700	3800	3750
Acid Extractable Manganese (Mn)	µg/g					250	500	135	195	320	620	470
Acid Extractable Phosphorus (P)	µg/g					690	700	630	675	640	540	590
Acid Extractable Potassium (K)	µg/g					< 200	< 200	< 200	245	270	370	320
Acid Extractable Sodium (Na)	µg/g					110	140	86	175	140	170	155
Acid Extractable Strontium (Sr)	µg/g					95	110	100	93	94	180	137
Acid Extractable Thallium (Tl)	µg/g					< 0.05	0.25	< 0.05	< 0.05	0.03	0.07	0.05
Acid Extractable Tin (Sn)	µg/g					< 5.0	- <sup>1</sup>	< 1.0	2.8	0.7	4.1	2.4
Acid Extractable Titanium (Ti)	µg/g					- <sup>1</sup>	- <sup>1</sup>	245	255	170	170	170
Lead-210	Bq/g					< 0.10	< 0.50	< 0.05	< 0.05	< 0.20	0.04	0.12
Radium-226	Bq/g					0.04	< 0.10	0.08	< 0.05	< 0.02	< 0.05	0.04
Thorium-230	Bq/g					0.02	< 0.10	0.45	< 0.40	0.04	< 0.30	0.17
Thorium-232	Bq/g					0.03	< 0.01	< 0.04	< 0.04	0.01	0.01	0.01

**Note:**

PSQG = Provincial Sediment Quality Guidelines, LEL - lowest effect level, SEL - severe effect level

CCME = Canadian Council of Ministers of the Environment, Sediment Quality Guidelines for the Protection of Aquatic Life,

ISQG = Interim Sediment Quality Guidelines, PEL = Probable Effect Level

**Bold values** indicate an exceedance of a PSQG or CCME value.<sup>1</sup> Analysis not included in laboratory contract.



**Table B-49: Sediment quality – Highland Drive South Creek (HC-D)**

		Criteria				HC-D				
		PSQG		CCME		2010	2012	2018	2019	2020
Parameter	Units	LEL	SEL	ISQG	PEL	Average				
Hot Water Ext. Boron (B)	µg/g					- <sup>1</sup>	8.8	No Sample	No Sample	No Sample
Acid Extractable Mercury (Hg)	µg/g	<b>0.2</b>	<b>2</b>	<b>0.17</b>	<b>0.486</b>	- <sup>1</sup>	0.07			
Acid Extractable Silver (Ag)	µg/g					< 0.20	< 0.20			
Acid Extractable Arsenic (As)	µg/g	<b>6</b>	<b>33</b>	<b>5.9</b>	<b>17</b>	<b>27</b>	<b>28</b>			
Acid Extractable Barium (Ba)	µg/g					150	150			
Acid Extractable Beryllium (Be)	µg/g					0.20	0.20			
Acid Extractable Boron (B)	µg/g					21	- <sup>1</sup>			
Acid Extractable Cadmium (Cd)	µg/g	<b>0.6</b>	<b>10</b>	<b>0.6</b>	<b>3.5</b>	0.20	0.38			
Acid Extractable Cobalt (Co)	µg/g					3.9	4.4			
Acid Extractable Copper (Cu)	µg/g	<b>16</b>	<b>110</b>	<b>35.7</b>	<b>197</b>	10	12			
Acid Extractable Molybdenum (Mo)	µg/g					< 0.50	0.59			
Acid Extractable Nickel (Ni)	µg/g	<b>16</b>	<b>75</b>			5.3	6.0			
Acid Extractable Lead (Pb)	µg/g	<b>31</b>	<b>250</b>	<b>35</b>	<b>91.3</b>	21	24			
Acid Extractable Antimony (Sb)	µg/g					0.40	0.81			
Acid Extractable Selenium (Se)	µg/g					1.2	1.6			
Acid Extractable Uranium (U)	µg/g					23	29			
Acid Extractable Vanadium (V)	µg/g					18	19			
Acid Extractable Zinc (Zn)	µg/g					110	120			
Acid Extractable Aluminum (Al)	µg/g					3500	3800			
Acid Extractable Bismuth (Bi)	µg/g					< 1.0	- <sup>1</sup>			
Acid Extractable Calcium (Ca)	µg/g					120000	120000			
Acid Extractable Chromium (Cr)	µg/g					14	15			
Acid Extractable Iron (Fe)	µg/g					13000	14000			
Acid Extractable Lithium (Li)	µg/g					- <sup>1</sup>	- <sup>1</sup>			
Acid Extractable Magnesium (Mg)	µg/g					3100	3400			
Acid Extractable Manganese (Mn)	µg/g					720	810			
Acid Extractable Phosphorus (P)	µg/g					740	760			
Acid Extractable Potassium (K)	µg/g					440	420			
Acid Extractable Sodium (Na)	µg/g					260	300			
Acid Extractable Strontium (Sr)	µg/g					130	140			
Acid Extractable Thallium (Tl)	µg/g					0.06	0.10			
Acid Extractable Tin (Sn)	µg/g					< 5.0	- <sup>1</sup>			
Acid Extractable Titanium (Ti)	µg/g					- <sup>1</sup>	- <sup>1</sup>			
Lead-210	Bq/g					0.10	< 0.50			
Radium-226	Bq/g					0.03	0.10			
Thorium-230	Bq/g					0.01	0.10			
Thorium-232	Bq/g					0.03	< 0.01			

**Note:**

PSQG = Provincial Sediment Quality Guidelines, LEL - lowest effect level, SEL - severe effect level

CCME = Canadian Council of Ministers of the Environment, Sediment Quality Guidelines for the Protection of Aquatic Life,

ISQG = Interim Sediment Quality Guidelines, PEL = Probable Effect Level

**Bold values** indicate an exceedance of a PSQG or CCME value.

<sup>1</sup> Analysis not included in laboratory contract.

**Table B-50: 2020 Storm event sampling – Highland Drive South Creek watershed (HC-D)**

Analysis	Units	Criteria		HC-D					
		PWQO	CWQG	2020/11/30 8:45AM	2020/11/30 9:45AM	2020/11/30 10:45AM	2020/11/30 11:45AM	2020/11/30 12:45PM	2020/11/30 1:45PM
Total Suspended Solids	mg/L			2	4	3	3	< 2	5
pH	no unit	<b>6.5-8.5</b>	<b>6.5-9.0</b>	8.19	8.21	8.22	8.21	8.2	8.18
Alkalinity	mg/L as CaCO <sub>3</sub>			282	286	282	290	276	290
Carbonate	mg/L as CaCO <sub>3</sub>			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			282	286	282	290	276	290
Total Dissolved Solids	mg/L			694	709	703	683	671	657
Fluoride	mg/L		<b>0.12</b>	<b>0.12</b>	<b>0.12</b>	<b>0.12</b>	0.11	<b>0.12</b>	<b>0.12</b>
Total Organic Carbon	mg/L			2.0	2.0	2.0	2.0	2.0	2.0
Ammonia+Ammonium (N)	as N mg/L			< 0.04	< 0.04	0.08	< 0.04	< 0.04	0.10
Chloride (Dissolved)	mg/L		<b>120</b>	<b>200</b>	<b>190</b>	<b>190</b>	<b>180</b>	<b>190</b>	<b>180</b>
Sulphate (dissolved)	mg/L			33	33	33	33	32	32
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		<b>13</b>	3.78	3.78	3.77	3.76	3.74	3.70
Nitrate + Nitrite (as N)	as N mg/L			3.78	3.78	3.77	3.76	3.74	3.70
Mercury (dissolved)	µg/L	<b>0.2</b>	<b>0.026</b>	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			425	439	445	434	443	424
Silver (total)	µg/L	<b>0.1</b>	<b>0.25</b>	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			14	7	13	6	12	21
Aluminum (0.2µm)	µg/L	<b>75</b>	<b>100</b>	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic (total)	µg/L	<b>100</b>	<b>5</b>	<b>6.9</b>	<b>6.8</b>	<b>7.2</b>	<b>7.0</b>	<b>7.4</b>	<b>7.5</b>
Barium (total)	µg/L			205	210	194	212	206	201
Beryllium (total)	µg/L	<b>1100</b>		< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Boron (total)	µg/L	<b>200</b>	<b>1500</b>	<b>534</b>	<b>545</b>	<b>513</b>	<b>559</b>	<b>525</b>	<b>532</b>
Bismuth (total)	µg/L			0.038	0.024	0.011	0.016	0.012	< 0.007
Calcium (total)	µg/L			129000	134000	136000	132000	134000	130000
Cadmium (total)	µg/L	<b>0.2</b>	<b>0.09</b>	0.004	< 0.003	0.005	< 0.003	0.007	0.008
Cobalt (total)	µg/L	<b>0.9</b>		0.151	0.148	0.145	0.152	0.161	0.169
Chromium (total)	µg/L			0.52	0.41	0.55	0.56	0.56	0.57
Copper (total)	µg/L	<b>5</b>		0.5	0.6	0.6	0.4	0.5	0.6
Iron (total)	µg/L	<b>300</b>	<b>300</b>	253	240	274	249	284	<b>342</b>
Potassium (total)	µg/L			3700	3750	3790	3700	3720	3540
Magnesium (total)	µg/L			24900	25400	25700	25400	26200	24300
Manganese (total)	µg/L			42.5	42.7	45.3	43.7	48.3	53.4
Molybdenum (total)	µg/L	<b>40</b>	<b>73</b>	0.36	0.39	0.37	0.33	0.38	0.33
Sodium (total)	µg/L			86500	88600	91200	89700	90600	84900
Nickel (total)	µg/L	<b>25</b>	<b>25</b>	1.0	1.0	1.0	1.0	1.0	1.0
Phosphorus (total)	mg/L	<b>0.01-0.03</b>		0.009	0.009	0.015	0.008	0.010	0.012
Lead (total)	µg/L	<b>5</b>	<b>7</b>	0.19	0.09	0.14	0.10	0.13	0.26
Antimony (total)	µg/L	<b>20</b>		< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	<b>100</b>	<b>1</b>	0.3	0.3	0.3	0.3	0.3	0.3
Tin (total)	µg/L			0.17	0.14	0.14	0.22	0.14	0.16
Strontium (total)	µg/L			352	351	360	354	365	344
Titanium (total)	µg/L			0.66	0.41	0.70	0.42	0.57	1.03
Thallium (total)	µg/L	<b>0.3</b>	<b>0.8</b>	< 0.005	< 0.005	< 0.005	0.005	0.005	< 0.005
Uranium (total)	µg/L	<b>5</b>	<b>15</b>	<b>35.5</b>	<b>37.5</b>	<b>34.3</b>	<b>37.6</b>	<b>36.8</b>	<b>35.2</b>
Vanadium (total)	µg/L	<b>6</b>		0.36	0.34	0.40	0.34	0.36	0.43
Zinc (total)	µg/L	<b>30</b>	<b>30</b>	4	3	4	4	3	4
Cation sum	meq/L			12.32	12.70	12.94	12.64	12.84	12.24
Anion Sum	meq/L			12.03	11.82	11.74	11.62	11.60	11.60
Anion-Cation Balance	% difference			1.19	3.57	4.83	4.21	5.07	2.69
Ion Ratio				1.02	1.07	1.10	1.09	1.11	1.06
Lead-210	Bq/L			< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	<b>1</b>		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L			< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>									
ODO % Sat	mg/L			91.3	93.1	94.4	93.6	94.7	94.8
ORP	mV			141.7	141.3	155.6	155.8	160.2	164
SPC	us/cm			1222	1214	1196	1242	1203	1205
Temperature	°C			6.181	6.160	5.921	6.184	6.071	6.146
Turbidity	FNU			6.65	4.67	1.74	5.47	2.42	3.17
pH	Units			8.15	8.13	7.98	8.09	8.08	8.08
Staff Gauge	cm			20	21	22	23	23	25

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life

**Bold values** indicate an exceedance of a PWQO or CWQG value

**Table B-51: Surface water quality – Alexander Creek – upstream (AC-1), 2018 – 2020**

Analysis	Units	Criteria		AC-1						
		PWQO	CWQG	2018	2019	2020				
				Average		2020-01-08	2020-05-12	2020-06-25	2020-09-23	Average
Total Suspended Solids	mg/L			22	32	59	7	39	13	30
pH	no unit	<b>6.5-8.5</b>	<b>6.5-9.0</b>	8.00	8.09	8.06	8.07	7.83	8.1	8.015
Alkalinity	mg/L as CaCO <sub>3</sub>			295	278	280	264	286	276	277
Carbonate	mg/L as CaCO <sub>3</sub>			2.7	3.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			288	278	280	264	286	276	277
Total Dissolved Solids	mg/L			711	713	740	640	703	706	697
Fluoride	mg/L		<b>0.12</b>	< 0.10	< 0.10	0.070	< 0.060	< 0.060	< 0.060	0.063
Total Organic Carbon	mg/L			2.3	2.2	1.0	2.0	2.0	2.0	1.8
Ammonia+Ammonium (N)	as N mg/L			0.06	0.06	< 0.04	< 0.04	0.04	0.07	0.05
Chloride (Dissolved)	mg/L		<b>120</b>	<b>193</b>	<b>190</b>	<b>200</b>	<b>220</b>	<b>210</b>	<b>220</b>	<b>213</b>
Sulphate (dissolved)	mg/L			31	30	29.2	29.0	30.8	31.4	30.1
Bromide (dissolved)	mg/L			< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.01	< 0.01	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		<b>13</b>	4.04	3.95	4.36	4.16	4.15	4.19	4.22
Nitrate + Nitrite (as N)	as N mg/L			4.04	3.95	4.36	4.16	4.15	4.19	4.22
Mercury (dissolved)	µg/L	<b>0.2</b>	<b>0.026</b>	< 0.010	< 0.010	< 0.010	< 0.010	0.020	< 0.010	0.013
Hardness	mg/L as CaCO <sub>3</sub>			400	408	456	424	413	458	438
Silver (total)	µg/L	<b>0.1</b>	<b>0.25</b>	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			183	164	388	166	347	103	251
Aluminum (0.2µm)	µg/L	<b>75</b>	<b>100</b>	< 5	< 5	2	2	6	2	3
Arsenic (total)	µg/L	<b>100</b>	<b>5</b>	2.0	1.9	2.8	1.6	2.3	1.9	2.2
Barium (total)	µg/L			138	130	141	131	140	149	140
Beryllium (total)	µg/L	<b>1100</b>		< 0.50	< 0.50	0.023	0.008	0.015	< 0.007	0.013
Boron (total)	µg/L	<b>200</b>	<b>1500</b>	53	51	54	56	51	49	53
Bismuth (total)	µg/L			< 1.0	< 1.0	0.051	0.028	0.027	< 0.007	0.028
Calcium (total)	µg/L			120000	125000	143000	133000	128000	143000	136750
Cadmium (total)	µg/L	<b>0.2</b>	<b>0.09</b>	< 0.10	< 0.10	0.021	0.008	0.016	0.006	0.013
Cobalt (total)	µg/L	<b>0.9</b>		< 0.50	< 0.50	0.313	0.127	0.233	0.099	0.193
Chromium (total)	µg/L			< 5.0	< 5.0	2.38	1.18	2.30	1.07	1.73
Copper (total)	µg/L	<b>5</b>		1.0	< 1.0	3.3	0.7	1.0	0.6	1.4
Iron (total)	µg/L	<b>300</b>	<b>300</b>	<b>348</b>	<b>303</b>	<b>665</b>	249	<b>553</b>	210	<b>419</b>
Potassium (total)	µg/L			1425	1500	1730	1450	1410	1730	1580
Magnesium (total)	µg/L			23750	22500	23800	22100	23100	24800	23450
Manganese (total)	µg/L			26	25	48.4	18.1	38.2	24.7	32.4
Molybdenum (total)	µg/L	<b>40</b>	<b>73</b>	< 0.50	< 0.50	0.22	0.18	0.20	0.19	0.20
Sodium (total)	µg/L			93000	90750	93700	90900	94300	101000	94975
Nickel (total)	µg/L	<b>25</b>	<b>25</b>	< 1.0	< 1.0	0.7	0.4	0.5	0.4	0.5
Phosphorus (total)	mg/L	<b>0.01-0.03</b>		<b>0.04</b>	<b>0.03</b>	<b>0.06</b>	<b>0.04</b>	<b>0.05</b>	<b>0.034</b>	<b>0.05</b>
Lead (total)	µg/L	<b>5</b>	<b>7</b>	0.80	0.69	1.42	< 0.01	1.15	0.18	0.69
Antimony (total)	µg/L	<b>20</b>		< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	<b>100</b>	<b>1</b>	< 2.0	< 2.0	0.990	0.65	0.86	0.83	0.833
Tin (total)	µg/L			< 1.0	< 1.0	< 0.06	< 0.06	0.08	0.08	0.07
Strontium (total)	µg/L			288	278	338	294	303	303	310
Titanium (total)	µg/L			11	11	17	8.9	15.3	4.9	12
Thallium (total)	µg/L	<b>0.3</b>	<b>0.8</b>	< 0.05	< 0.05	0.007	0.006	0.009	0.005	0.007
Uranium (total)	µg/L	<b>5</b>	<b>15</b>	3.05	3.30	3.73	2.94	2.69	2.44	2.95
Vanadium (total)	µg/L	<b>6</b>		1.23	1.25	1.59	1.00	1.45	0.90	1.24
Zinc (total)	µg/L	<b>30</b>	<b>30</b>	5	6	10	2	3	2	4
Lead-210	µg/L			< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	<b>1</b>		< 0.04	< 0.04	0.02	< 0.01	< 0.01	< 0.01	0.01
Thorium-230	Bq/L			< 0.07	< 0.07	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.06	< 0.06	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>										
ODO % Sat	mg/L			- <sup>1</sup>	- <sup>1</sup>	88	89.8	84.8	85.4	--
ORP	mV			- <sup>1</sup>	- <sup>1</sup>	76.7	181.9	176.5	241.4	--
SPC	µs/cm			- <sup>1</sup>	- <sup>1</sup>	1038	1164	1219	1238	--
Temperature	°C			- <sup>1</sup>	- <sup>1</sup>	4.121	8.772	13.346	12.306	--
Turbidity	FNU			- <sup>1</sup>	- <sup>1</sup>	10.53	2.95	10.53	3.37	--
pH	Units			- <sup>1</sup>	- <sup>1</sup>	7.87	7.78	7.71	7.76	--
Staff Gauge	cm			- <sup>1</sup>	- <sup>1</sup>	--	--	--	--	--

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life

**Bold values** indicate an exceedance of a PWQO or CWQG value

-- - No data.

<sup>1</sup> Field parameters included for current sampling year only.

**Table B-52: Surface Water Quality – Alexander Creek – downstream (AC-3), 2018 – 2020**

Analysis	Units	Criteria		AC-3						
		PWQO	CWQG	2018	2019	2020				
				Average		2020-01-08	2020-05-12	2020-06-25	2020-09-23	Average
Total Suspended Solids	mg/L			14	20	17	49	21	69	39
pH	no unit	<b>6.5-8.5</b>	<b>6.5-9.0</b>	8.17	8.21	8.29	8.24	8.17	8.25	8.2375
Alkalinity	mg/L as CaCO <sub>3</sub>			288	270	268	267	287	256	270
Carbonate	mg/L as CaCO <sub>3</sub>			4.0	4.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			283	265	268	267	287	256	270
Total Dissolved Solids	mg/L			675	656	689	603	631	663	647
Fluoride	mg/L		<b>0.12</b>	< 0.1	< 0.1	0.08	< 0.060	< 0.060	< 0.060	0.065
Total Organic Carbon	mg/L			2.1	2.7	1.0	2.0	2.0	2.0	1.8
Ammonia+Ammonium (N)	as N mg/L			0.06	0.08	< 0.04	< 0.04	< 0.04	0.06	0.05
Chloride (Dissolved)	mg/L		<b>120</b>	<b>163</b>	<b>165</b>	<b>170</b>	<b>200</b>	<b>180</b>	<b>185</b>	<b>184</b>
Sulphate (dissolved)	mg/L			31	32	29.3	30.0	31.6	32.4	30.8
Bromide (dissolved)	mg/L			< 1	< 1	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.01	< 0.01	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		<b>13</b>	3.67	3.65	4.05	3.80	3.71	3.69	3.81
Nitrate + Nitrite (as N)	as N mg/L			3.67	3.65	4.05	3.80	3.71	3.69	3.81
Mercury (dissolved)	µg/L	<b>0.2</b>	<b>0.026</b>	< 0.01	< 0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Hardness	mg/L as CaCO <sub>3</sub>			403	405	442	449	404	451	437
Silver (total)	µg/L	<b>0.1</b>	<b>0.25</b>	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			125	177	158	107	317	334	229
Aluminum (0.2µm)	µg/L	<b>75</b>	<b>100</b>	5	< 5.0	3	5	10	3	5
Arsenic (total)	µg/L	<b>100</b>	<b>5</b>	2.3	2.4	2.2	1.8	3.7	4.2	3.0
Barium (total)	µg/L			140	138	138	143	152	186	155
Beryllium (total)	µg/L	<b>1100</b>		< 0.5	< 0.5	0.007	0.010	0.019	0.020	0.014
Boron (total)	µg/L	<b>200</b>	<b>1500</b>	47	47	46	67	47	45	51
Bismuth (total)	µg/L			< 1	< 1	0.026	0.033	0.039	0.023	0.030
Calcium (total)	µg/L			117500	122500	139000	142000	123000	141000	136250
Cadmium (total)	µg/L	<b>0.2</b>	<b>0.09</b>	< 0.1	< 0.1	0.014	0.018	0.014	0.020	0.017
Cobalt (total)	µg/L	<b>0.9</b>		< 0.5	< 0.5	0.171	0.166	0.336	0.359	0.258
Chromium (total)	µg/L			< 5	< 5	1.03	0.96	1.89	1.61	1.37
Copper (total)	µg/L	<b>5</b>		1.6	1.7	3.0	1.0	1.5	1.4	1.7
Iron (total)	µg/L	<b>300</b>	<b>300</b>	<b>540</b>	<b>375</b>	<b>349</b>	<b>285</b>	<b>742</b>	<b>841</b>	<b>554</b>
Potassium (total)	µg/L			1400	1500	1700	1560	1370	1660	1573
Magnesium (total)	µg/L			23250	22750	23200	22900	23500	23800	23350
Manganese (total)	µg/L			26	30	26.8	28.9	72.9	107.0	58.9
Molybdenum (total)	µg/L	<b>40</b>	<b>73</b>	< 0.5	< 0.5	0.27	0.25	0.24	0.24	0.25
Sodium (total)	µg/L			73500	73000	75600	76200	77500	79800	77275
Nickel (total)	µg/L	<b>25</b>	<b>25</b>	1.1	1.3	0.6	0.5	0.7	0.7	0.6
Phosphorus (total)	mg/L	<b>0.01-0.03</b>		0.026	<b>0.04</b>	0.02	0.025	<b>0.06</b>	<b>0.07</b>	<b>0.05</b>
Lead (total)	µg/L	<b>5</b>	<b>7</b>	0.63	0.99	0.83	< 0.01	1.94	1.88	1.17
Antimony (total)	µg/L	<b>20</b>		< 0.5	< 0.5	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	<b>100</b>	<b>1</b>	< 2	< 2	0.790	0.68	0.69	0.72	0.720
Tin (total)	µg/L			4	< 1	< 0.06	0.09	0.11	0.12	0.10
Strontium (total)	µg/L			275	270	321	304	305	294	306
Titanium (total)	µg/L			8.5	11.7	7	5.3	14.9	15.1	11
Thallium (total)	µg/L	<b>0.3</b>	<b>0.8</b>	< 0.05	< 0.05	< 0.005	0.006	0.009	0.009	0.007
Uranium (total)	µg/L	<b>5</b>	<b>15</b>	<b>7.10</b>	<b>8.78</b>	<b>8.06</b>	<b>8.72</b>	<b>6.43</b>	4.89	<b>7.03</b>
Vanadium (total)	µg/L	<b>6</b>		1	1	0.97	0.94	1.56	1.41	1.22
Zinc (total)	µg/L	<b>30</b>	<b>30</b>	5.2	5.8	9	4	7	7	7
Lead-210	µg/L			< 0.10	< 0.10	< 0.02	< 0.02	0.04	< 0.02	0.03
Radium-226	Bq/L	<b>1</b>		< 0.04	< 0.04	0.02	0.01	< 0.01	0.02	0.02
Thorium-230	Bq/L			< 0.07	< 0.07	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.06	< 0.06	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>										
ODO % Sat	mg/L			- <sup>1</sup>	- <sup>1</sup>	99.7	93.5	36.7	100	--
ORP	mV			- <sup>1</sup>	- <sup>1</sup>	69.6	182	163.3	239.1	--
SPC	µs/cm			- <sup>1</sup>	- <sup>1</sup>	974	1081	1126	1133	--
Temperature	°C			- <sup>1</sup>	- <sup>1</sup>	3.95	8.285	13.873	12.21	--
Turbidity	FNU			- <sup>1</sup>	- <sup>1</sup>	4.48	142.2	13.07	6.36	--
pH	Units			- <sup>1</sup>	- <sup>1</sup>	7.91	7.92	7.97	8.10	--
Staff Gauge	cm			- <sup>1</sup>	- <sup>1</sup>	--	--	--	--	--

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life

**Bold values** indicate an exceedance of a PWQO or CWQG value

-- = No data.

<sup>1</sup> Field parameters included for current sampling year only.

**Table B-53: Surface water quality – Lake Ontario Port Hope Harbour – Location 1 (PHH-1), 2015 – 2020**

Parameter	Units	Criteria		PHH-1							
				2015	2016	2017	2018	2019	2020		
		PWQO	CWQG	Average					2020-06-19	2020-08-07	2020-10-08
Total Suspended Solids	mg/L			2	6	11	5	3	No Sample <sup>3</sup>	3	5
pH	no unit	<b>6.5-8.5</b>	<b>6.5-9.0</b>	8.48	8.39	8.29	8.36	8.38		8.41	8.30
Alkalinity	mg/L as CaCO <sub>3</sub>			205	188	205	203	200		195	198
Carbonate	mg/L as CaCO <sub>3</sub>			8.3	8.5	3.8	4.3	4.4		6.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			196	179	205	203	193		189	198
Total Dissolved Solids	mg/L			278	236	326	207	245		300	240
Fluoride	mg/L		<b>0.12</b>	0.08	0.08	0.10	< 0.10	< 0.10		< 0.06	0.08
Total Organic Carbon	mg/L			2.7	1.7	4.8	3.2	2.8		3.0	1.0
Ammonia+Ammonium (N)	as N mg/L			0.06	0.05	0.06	< 0.05	0.16		0.04	0.15
Chloride (Dissolved)	mg/L			17	14	15	22	14		15	15
Sulphate (dissolved)	mg/L			15	15	13	15	13		12.9	13.0
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 1	< 1	< 1		< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.03	< 0.03	0.01	< 0.01	0.02		< 0.03	< 0.03
Nitrate (as N)	as N mg/L		<b>13</b>	0.87	0.58	0.71	1.09	0.77		0.48	0.83
Nitrate + Nitrite (as N)	as N mg/L			0.87	0.58	0.72	1.09	0.79		0.48	0.83
Mercury (dissolved)	µg/L	<b>0.2</b>	<b>0.026</b>	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			228	219	225	220	237		215	221
Silver (total)	µg/L	<b>0.1</b>	<b>0.25</b>	0.01	0.003	< 0.1	< 0.1	< 0.1		< 0.05	< 0.05
Aluminum (total)	µg/L			60	16	162	75	44		84	51
Aluminum (0.2µm)	µg/L	<b>75</b>	<b>100</b>	- <sup>1</sup>	- <sup>1</sup>	8	< 5	6		12	4
Arsenic (total)	µg/L	<b>100</b>	<b>5</b>	0.4	0.6	< 1	< 1	< 1		0.8	0.6
Barium (total)	µg/L			56	57	60	51	54		64.6	65.4
Beryllium (total)	µg/L	<b>1100</b>		< 0.01	< 0.01	< 0.5	< 0.5	< 0.5		< 0.007	< 0.007
Boron (total)	µg/L	<b>200</b>	<b>1500</b>	17	20	17	15	15		16	17
Bismuth (total)	µg/L			0.02	< 0.01	< 1	< 1	< 1		< 0.007	< 0.007
Calcium (total)	µg/L			77233	67300	73000	66000	70000		67800	69600
Cadmium (total)	µg/L	<b>0.2</b>	<b>0.09</b>	0.01	0.01	< 0.1	< 0.1	< 0.1		0.004	0.008
Cobalt (total)	µg/L	<b>0.9</b>		0.1	0.2	< 0.5	< 0.5	< 0.5		0.067	0.060
Chromium (total)	µg/L			2	0.5	< 5	< 5	< 5		0.36	1.04
Copper (total)	µg/L	<b>5</b>		0.5	2.6	1.5	1.1	< 1.0		0.9	0.6
Iron (total)	µg/L	<b>300</b>	<b>300</b>	137	109	290	167	117		134	147
Potassium (total)	µg/L			1184	1085	1550	1083	1013		1060	1250
Magnesium (total)	µg/L			12100	12450	11000	10700	11667		11100	11600
Manganese (total)	µg/L			23	18	32	22	23		22.1	23
Molybdenum (total)	µg/L	<b>40</b>	<b>73</b>	0.42	0.6	< 0.5	0.5	< 0.5		0.45	1.73
Sodium (total)	µg/L			10377	8425	9650	9833	9533		8440	8140
Nickel (total)	µg/L	<b>25</b>	<b>25</b>	0.2	0.3	< 1	< 1	< 1		0.2	0.1
Phosphorus (total)	mg/L	<b>0.01-0.03</b>		0.01	0.01	<b>0.04</b>	0.02	<b>0.04</b>		0.01	0.03
Lead (total)	µg/L	<b>5</b>	<b>7</b>	0.2	0.1	< 0.5	< 0.5	< 0.5		0.15	0.13
Antimony (total)	µg/L	<b>20</b>		< 0.2	0.2	< 0.5	< 0.5	< 0.5		< 0.9	< 0.9
Selenium (total)	µg/L	<b>100</b>	<b>1</b>	0.4	0.1	< 2	< 2	< 2		0.09	0.09
Tin (total)	µg/L			0.1	0.01	< 1	< 1	< 1		0.11	< 0.06
Strontium (total)	µg/L			189	174	170	160	163		186	217
Titanium (total)	µg/L			- <sup>1</sup>	- <sup>1</sup>	9	6	6		3.48	2.14
Thallium (total)	µg/L	<b>0.3</b>	<b>0.8</b>	0.01	< 0.01	< 0.05	< 0.05	< 0.05		< 0.005	0.006
Uranium (total)	µg/L	<b>5</b>	<b>15</b>	0.8	0.8	0.75	0.84	0.74		0.77	0.79
Vanadium (total)	µg/L	<b>6</b>		0.7	0.6	1.1	0.7	0.9		0.82	0.94
Zinc (total)	µg/L	<b>30</b>	<b>30</b>	2	2	< 5	< 5	< 5		2	< 2
Lead-210	Bq/L			< 0.02	0.02	0.03	< 0.10	< 0.10		< 0.02	< 0.02
Radium-226	Bq/L	<b>1</b>		< 0.01	< 0.01	< 0.04	< 0.04	< 0.04		< 0.01	< 0.01
Thorium-230	Bq/L			< 0.02	< 0.02	< 0.07	< 0.07	< 0.07		< 0.02	< 0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.06	< 0.06	< 0.06		< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		120.4	104.5
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		153.2	175.7
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		423.3	402.1
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		19.862	10.436
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		2	6.13
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		8.46	8.26
Staff Gauge	cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		--	--

**Note:**

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999.

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015.

**Bold values** indicate an exceedance of a PWQO or CWQG value.

-- = No data.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Due to COVID-19 restrictions

**Table B-54: Surface water quality – Lake Ontario Port Hope Harbour – Location 2 (PHH-2), 2015 – 2020**

Parameter	Units	Criteria		PHH-2					2020			
				2015	2016	2017	2018	2019	2020			
		PWQO	CWQG	Average					2020-06-19	2020-08-07	2020-10-08	Average
Total Suspended Solids	mg/L			3	3	5	18	2	No Sample <sup>3</sup>	4	No Sample <sup>4</sup>	4
pH	no unit	6.5-8.5	6.5-9.0	8.33	8.05	8.22	8.25	8.32		8.19		8.19
Alkalinity	mg/L as CaCO <sub>3</sub>			175	153	185	190	150		188		188
Carbonate	mg/L as CaCO <sub>3</sub>			3.3	< 2	2.9	3.2	2.9		< 1.0		< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			173	152	185	187	147		188		188
Total Dissolved Solids	mg/L			264	223	270	215	200		270		270
Fluoride	mg/L		0.12	0.09	0.10	< 0.10	< 0.10	< 0.10		< 0.06		< 0.06
Total Organic Carbon	mg/L			2.5	1.6	3.5	3.8	2.7		3.0		3.0
Ammonia+Ammonium (N)	as N mg/L			0.13	0.12	0.12	0.06	0.11		0.04		0.04
Chloride (Dissolved)	mg/L			21	19	18	20	19		15		15
Sulphate (dissolved)	mg/L			17	19	14	16	18		12.8		12.8
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 1	< 1	< 1		< 0.3		< 0.3
Nitrite (as N)	as N mg/L			< 0.03	< 0.03	0.02	< 0.01	0.03		< 0.03		< 0.03
Nitrate (as N)	as N mg/L		13	0.78	0.40	0.57	0.94	0.49		0.47		0.47
Nitrate + Nitrite (as N)	as N mg/L			0.78	0.40	0.58	0.94	0.51		0.47		0.47
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01		< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			212	182	200	203	193		224		224
Silver (total)	µg/L	0.1	0.25	0.01	< 0.002	< 0.1	< 0.1	< 0.1		< 0.05		< 0.05
Aluminum (total)	µg/L			84	14	84	157	40		158		158
Aluminum (0.2µm)	µg/L	75	100	- <sup>1</sup>	- <sup>1</sup>	< 5	< 5	5		10		10
Arsenic (total)	µg/L	100	5	1.3	1.9	2	3	2		2.3		2.3
Barium (total)	µg/L			50	47	53	52	41		65.5		65.5
Beryllium (total)	µg/L	1100		< 0.01	< 0.01	< 0.5	< 0.5	< 0.5		< 0.007		< 0.007
Boron (total)	µg/L	200	1500	21	24	23	18	20		18		18
Bismuth (total)	µg/L			0.07	0.03	< 1	< 1	< 1		0.009		0.009
Calcium (total)	µg/L			66933	54450	62500	63000	53000		71100		71100
Cadmium (total)	µg/L	0.2	0.09	0.004	0.003	< 0.1	< 0.1	< 0.1		0.005		0.005
Cobalt (total)	µg/L	0.9		0.1	0.1	< 0.5	< 0.5	< 0.5		0.129		0.129
Chromium (total)	µg/L			0.2	0.4	< 5	< 5	< 5		0.54		0.54
Copper (total)	µg/L	5		1.1	1.3	2.4	2.3	< 1.5		0.8		0.8
Iron (total)	µg/L	300	300	146	75	185	297	< 100		253		253
Potassium (total)	µg/L			1543	1370	1600	1267	1333		1280		1280
Magnesium (total)	µg/L			11233	11180	10500	10367	10267		11200		11200
Manganese (total)	µg/L			33	21	31	40	17		50.6		50.6
Molybdenum (total)	µg/L	40	73	0.64	0.9	0.56	0.56	0.76		0.48		0.48
Sodium (total)	µg/L			12467	10830	11500	10833	12333		8660		8660
Nickel (total)	µg/L	25	25	0.4	0.3	< 1	< 1	< 1		0.3		0.3
Phosphorus (total)	mg/L	0.01-0.03		0.02	0.02	0.03	0.04	0.02		0.02		0.02
Lead (total)	µg/L	5	7	0.4	0.2	0.6	1.4	< 0.5		0.35		0.35
Antimony (total)	µg/L	20		< 0.2	< 0.2	< 0.5	< 0.5	< 0.5		< 0.9		< 0.9
Selenium (total)	µg/L	100	1	0.4	0.1	< 2	< 2	< 2		0.10		0.10
Tin (total)	µg/L			0.3	< 0.01	< 1	< 1	< 1		0.12		0.12
Strontium (total)	µg/L			197	172	160	163	167		190		190
Titanium (total)	µg/L			- <sup>1</sup>	- <sup>1</sup>	7	10	< 5		6.53		6.53
Thallium (total)	µg/L	0.3	0.8	0.01	< 0.01	< 0.05	< 0.05	< 0.05		< 0.005		< 0.005
Uranium (total)	µg/L	5	15	2.1	1.8	3.8	2.7	2.3		1.67		1.67
Vanadium (total)	µg/L	6		0.7	0.5	0.91	0.91	0.84		0.96		0.96
Zinc (total)	µg/L	30	30	2	2	< 5	< 5	< 5		3		3
Lead-210	Bq/L			< 0.02	< 0.02	< 0.02	< 0.10	< 0.10		< 0.02		< 0.02
Radium-226	Bq/L	1		0.01	0.02	< 0.04	0.05	< 0.04		0.03		0.03
Thorium-230	Bq/L			< 0.02	< 0.02	< 0.07	0.10	< 0.07		< 0.02		< 0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.06	< 0.06	< 0.06		< 0.02		< 0.02
<b>Field Parameters</b>												
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		100.1		--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		143		--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		432.4		--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		18.869		--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		3.05		--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		8.16		--
Staff Gauge	cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		--		--

**Note:**

PWQO = Provincial Water Quality Objectives, Ministry of the Environment, February 1999.

CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015.

**Bold values** indicate an exceedance of a PWQO or CWQG value.

-- - No data.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Due to COVID-19 restrictions<sup>4</sup> Insufficient surface water at this location for sample collection

**Table B-55: Surface water quality – Lake Ontario Port Hope Harbour – Location 3 (PHH-4), 2015 – 2020**

Parameter	Units	Criteria		PHH-4								
				2015	2016	2017	2018	2019	2020			
		PWQO	CWQG	Average					2020-06-19	2020-08-07	2020-10-08	Average
Total Suspended Solids	mg/L			3	2	1	2	2	No Sample <sup>3</sup>	< 2	4	3
pH	no unit	6.5-8.5	6.5-9.0	8.31	8.37	8.18	8.34	8.31		8.17	8.13	8.15
Alkalinity	mg/L as CaCO <sub>3</sub>			166	126	94	144	122		95	96	96
Carbonate	mg/L as CaCO <sub>3</sub>			3.7	4.5	1.3	3.4	2.2		< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			163	123	93	143	118		95	96	96
Total Dissolved Solids	mg/L			236	193	255	158	185		200	160	180
Fluoride	mg/L		0.12	0.09	0.11	0.13	0.11	< 0.10		0.11	0.11	0.11
Total Organic Carbon	mg/L			2.1	1.3	2.3	2.6	2.4		2.0	1.0	1.5
Ammonia+Ammonium (N)	as N mg/L			0.04	0.06	< 0.05	< 0.05	0.05		< 0.04	0.06	0.05
Chloride (Dissolved)	mg/L			20	21	22	20	21		23	25	24
Sulphate (dissolved)	mg/L			19	21	23	19	20		21.8	21.0	21.4
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 1	< 1	< 1		< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.03	< 0.03	< 0.01	< 0.01	0.01		< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L		13	0.58	0.35	0.20	0.50	0.36		0.23	0.34	0.29
Nitrate + Nitrite (as N)	as N mg/L			0.58	0.35	0.20	0.50	0.36		0.23	0.34	0.29
Mercury (dissolved)	µg/L	0.2	0.026	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			191	159	120	165	160		124	127	126
Silver (total)	µg/L	0.1	0.25	0.01	< 0.002	< 0.1	< 0.1	< 0.1		< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			274	16	20	26	76		20	69	45
Aluminum (0.2µm)	µg/L	75	100	- <sup>1</sup>	- <sup>1</sup>	< 5	< 5	< 5		3	6	5
Arsenic (total)	µg/L	100	5	0.9	0.8	< 1	< 1	1		0.9	0.9	0.9
Barium (total)	µg/L			46	34	22	36	28		25.4	25.8	25.6
Beryllium (total)	µg/L	1100		0.01	< 0.01	< 0.5	< 0.5	< 0.5		< 0.007	< 0.007	< 0.007
Boron (total)	µg/L	200	1500	32	25	21	19	21		21	22	22
Bismuth (total)	µg/L			0.02	< 0.01	< 1	< 1	< 1		< 0.007	< 0.007	< 0.007
Calcium (total)	µg/L			59200	47000	32500	45500	45333		35500	37600	36550
Cadmium (total)	µg/L	0.2	0.09	0.02	0.01	< 0.1	< 0.1	< 0.1		0.004	0.006	0.005
Cobalt (total)	µg/L	0.9		0.2	0.2	< 0.5	< 0.5	< 0.5		0.025	0.047	0.036
Chromium (total)	µg/L			1	0.5	< 5	< 5	< 5		0.26	1.22	0.74
Copper (total)	µg/L	5		1.2	0.9	1.6	1.1	< 1.1		0.9	0.8	0.9
Iron (total)	µg/L	300	300	386	47	< 100	105	< 163		17	80	49
Potassium (total)	µg/L			1420	1415	1500	1200	1400		1630	1640	1635
Magnesium (total)	µg/L			10807	9985	8500	9100	9100		8570	8020	8295
Manganese (total)	µg/L			39	10	< 2	13	12		1.3	4	2.8
Molybdenum (total)	µg/L	40	73	0.78	1.4	1	1	1		1.20	2.51	1.86
Sodium (total)	µg/L			12033	12100	13500	11500	13333		12600	11800	12200
Nickel (total)	µg/L	25	25	0.7	0.5	< 1	< 1	< 1		0.6	0.5	0.6
Phosphorus (total)	mg/L	0.01-0.03		0.03	0.01	0.01	0.01	0.01		< 0.003	0.01	0.008
Lead (total)	µg/L	5	7	0.5	0.1	< 0.5	< 0.5	< 0.5		0.04	0.07	0.06
Antimony (total)	µg/L	20		< 0.2	< 0.2	< 0.5	< 0.5	< 0.5		< 0.9	< 0.9	< 0.9
Selenium (total)	µg/L	100	1	0.4	0.1	< 2	< 2	< 2		0.12	0.12	0.12
Tin (total)	µg/L			0.1	< 0.01	< 1	< 1	< 1		0.29	0.07	0.18
Strontium (total)	µg/L			189	181	160	160	163		200	210	205
Titanium (total)	µg/L			- <sup>1</sup>	- <sup>1</sup>	< 5	5	< 5		0.85	2.89	1.87
Thallium (total)	µg/L	0.3	0.8	0.01	0.01	< 0.05	< 0.05	< 0.05		0.006	0.006	0.006
Uranium (total)	µg/L	5	15	1.0	0.7	0.35	0.62	0.45		0.35	0.45	0.40
Vanadium (total)	µg/L	6		1.1	0.4	< 0.5	0.5	0.8		0.27	0.65	0.46
Zinc (total)	µg/L	30	30	2	< 2	< 5	< 5	< 5		< 2	< 2	< 2
Lead-210	Bq/L			< 0.02	< 0.02	0.11	< 0.10	< 0.10		< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	1		< 0.01	0.01	< 0.04	< 0.04	< 0.04		< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L			< 0.02	< 0.02	< 0.07	< 0.07	< 0.07		< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.02	< 0.02	< 0.06	< 0.06	< 0.06		< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>												
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		104.3	98.3	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		127.9	177	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		308.4	299.2	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		18.845	12.24	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		-0.34	7.03	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		8.34	8.05	--
Staff Gauge	cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		--	--	--

**Note:**

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CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015.

**Bold values** indicate an exceedance of a PWQO or CWQG value.

-- = No data.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Due to COVID-19 restrictions

**APPENDIX C WMF GROUNDWATER RESULTS****Table C-1 WC-IW93-22**

		Criteria		WC-IW93-22							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-02	2020-11-26	Average
pH	pH			8.31	8.14	8.26	8.24	8.23	8.30	8.30	8.30
Alkalinity	mg/L as CaCO <sub>3</sub>			102	97	100	100	98	99	98	99
Carbonate	mg/L as CaCO <sub>3</sub>			< 2.0	1.7	1.7	1.6	1.6	2.0	< 1.0	1.5
Bicarbonate	mg/L as CaCO <sub>3</sub>			102	96	98	99	96	97	98	97.5
Total Dissolved Solids	mg/L			142	91	131	78	80	137	117	127
Fluoride	mg/L	1.5		0.31	0.33	0.33	0.30	0.32	0.33	0.33	0.33
Total Organic Carbon	mg/L			< 1.00	0.87	0.49	0.57	0.62	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L			- <sup>1</sup>	0.53	0.43	0.52	0.59	< 1.0	< 1.0	< 1.0
Ammonia+Ammonium (N)	as N mg/L			- <sup>1</sup>	0.26	0.16	0.26	0.20	0.17	0.18	0.18
Chloride (dissolved)	mg/L			0.5	0.8	< 1.0	< 1.0	< 1.0	0.60	0.60	0.60
Sulphate (dissolved)	mg/L			9.9	9.0	8.9	9.1	9.2	10	10	10
Bromide (dissolved)	mg/L			< 0.3	1.3	< 1.0	< 1.0	< 1.0	< 0.30	< 0.30	< 0.30
Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.010	< 0.010	< 0.010	0.012	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	0.02	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			77	75	76	75	75	81.7	73.3	77.5
Silver (dissolved)	µg/L		1.5	0.002	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			10.6	3.0	< 5.0	< 5.0	< 5.0	2	6	4
Arsenic (dissolved)	µg/L	25	1900	1.6	1.4	1.3	1.4	1.3	2	1	2
Barium (dissolved)	µg/L	1000	29000	52	51	52	54	54	56.7	57.7	57.2
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	76	73	70	73	73	74	65	70
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			12000	11450	12000	12000	12000	14100	12700	13400
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.01	0.50	< 0.50	< 0.50	< 0.50	0.007	0.015	0.011
Chromium (dissolved)	µg/L		810	< 0.03	2.7	< 5.0	< 5.0	< 5.0	0.27	0.56	0.42
Copper (dissolved)	µg/L	1000	87	0.5	0.3	< 1.0	< 1.0	< 1.0	< 0.20	< 0.20	< 0.20
Iron (dissolved)	µg/L			28	71	< 100	< 100	< 100	32	33	33
Potassium (dissolved)	µg/L			610	620	595	610	580	644	579	612
Magnesium (dissolved)	µg/L			11500	11100	11500	11000	11000	12100	10500	11300
Manganese (dissolved)	µg/L			1.2	1.8	< 2.0	< 2.0	< 2.0	1.29	2.24	1.77
Molybdenum (dissolved)	µg/L		9200	1.8	1.8	1.8	1.9	1.9	1.86	1.74	1.80
Sodium (dissolved)	µg/L			14300	14100	15000	14000	14000	15100	12900	14000
Nickel (dissolved)	µg/L		490	< 0.1	0.6	< 1.0	< 1.0	< 1.0	< 0.10	< 0.10	< 0.10
Phosphorus (dissolved)	mg/L			< 0.03	0.02	0.01	0.01	0.01	0.003	< 0.003	0.003
Lead (dissolved)	µg/L	10	25	0.08	0.26	< 0.50	< 0.50	< 0.50	< 0.01	0.01	0.01
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.35	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.01	0.6	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06	< 0.06
Strontium (dissolved)	µg/L			532	494	480	490	490	575	602	589
Titanium (dissolved)	µg/L			0.1	2.5	< 5.0	< 5.0	< 5.0	0.06	0.06	0.06
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.01	0.06	< 0.10	< 0.10	< 0.10	0.009	0.047	0.028
Vanadium (dissolved)	µg/L		250	0.10	0.26	< 0.50	< 0.50	< 0.50	< 0.01	0.01	0.01
Zinc (dissolved)	µg/L		1100	2.2	3.5	< 5.0	< 5.0	< 5.0	< 2.0	< 2.0	< 2.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	0.06	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.02	0.03	< 0.03	< 0.04	< 0.04	0.01	< 0.01	0.01
Thorium-230	Bq/L	0.65		< 0.01	< 0.01	< 0.04	< 0.07	< 0.07	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		- <sup>1</sup>	- <sup>1</sup>	- <sup>1</sup>	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>											
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	22.9	27.9	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	21.6	19	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	209.0	268.7	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	10.643	9.397	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	0.74	1.63	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	8.45	8.45	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.



**Table C-2: WC-MW1-02**

		Criteria		WC-MW1-02					
		COPC	Table 3	2015	2016	2017	2018	2019	2020
Parameter	Units			Average					
pH	pH			8.39	8.27	8.26	8.31	No Sample	
Alkalinity	mg/L as CaCO <sub>3</sub>			159	155	160	200	Well	
Carbonate	mg/L as CaCO <sub>3</sub>			2.0	5.4	2.7	3.8	Damaged	
Bicarbonate	mg/L as CaCO <sub>3</sub>			157	146	155	200		
Total Dissolved Solids	mg/L			212	195	197	200		
Fluoride	mg/L	1.5		0.85	0.80	0.68	0.76		
Total Organic Carbon	mg/L			1.45	1.67	1.08	1.10		
Dissolved Organic Carbon	mg/L			- <sup>1</sup>	0.83	0.83	0.78		
Ammonia+Ammonium (N)	as N mg/L			- <sup>1</sup>	0.57	0.63	0.60		
Chloride (dissolved)	mg/L			7.7	7.9	8.8	8.1		
Sulphate (dissolved)	mg/L			9.8	10.0	9.9	9.3		
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	< 1.0		
Nitrite (as N)	as N mg/L			- <sup>1</sup>	0.010	< 0.010	< 0.010		
Nitrate (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	< 0.10		
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	< 0.10		
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.06	< 0.10	< 0.10		
Hardness	mg/L as CaCO <sub>3</sub>			52	59	59	54		
Silver (dissolved)	µg/L		1.5	0.019	0.05	< 0.10	< 0.10		
Aluminum (dissolved)	µg/L			20.8	7.5	44.5	16.0		
Arsenic (dissolved)	µg/L	25	1900	< 0.2	0.6	< 1.0	< 1.0		
Barium (dissolved)	µg/L	1000	29000	91	93	78	81		
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50		
Boron (dissolved)	µg/L	5000	45000	269	270	270	250		
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0		
Calcium (dissolved)	µg/L			10650	11500	12000	11000		
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10	< 0.10		
Cobalt (dissolved)	µg/L		66	0.01	0.54	< 0.50	< 0.50		
Chromium (dissolved)	µg/L		810	< 0.03	2.7	< 5.0	< 5.0		
Copper (dissolved)	µg/L	1000	87	0.2	0.3	< 1.0	< 1.0		
Iron (dissolved)	µg/L			5	54	< 100	< 100		
Potassium (dissolved)	µg/L			2635	2920	2550	2600		
Magnesium (dissolved)	µg/L			6290	7255	6800	6500		
Manganese (dissolved)	µg/L			1.3	1.7	6.3	2.9		
Molybdenum (dissolved)	µg/L		9200	2.0	2.4	2.2	2.2		
Sodium (dissolved)	µg/L			48850	49950	49500	47000		
Nickel (dissolved)	µg/L		490	< 0.1	0.6	< 1.0	< 1.0		
Phosphorus (dissolved)	mg/L			0.04	0.07	0.27	0.19		
Lead (dissolved)	µg/L	10	25	< 0.01	0.26	< 0.50	< 0.50		
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.35	< 0.50	< 0.50		
Selenium (dissolved)	µg/L	10	63	0.5	1.1	< 2.0	< 2.0		
Tin (dissolved)	µg/L			0.08	0.5	< 1.0	< 1.0		
Strontium (dissolved)	µg/L			854	894	760	770		
Titanium (dissolved)	µg/L			0.1	2.5	< 5.0	< 5.0		
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	< 0.050		
Uranium (dissolved)	µg/L	20	420	0.02	0.06	0.14	< 0.10		
Vanadium (dissolved)	µg/L		250	0.14	0.26	< 0.50	< 0.50		
Zinc (dissolved)	µg/L		1100	< 2.0	3.5	< 5.0	< 5.0		
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02	< 0.10		
Radium-226	Bq/L	0.49		< 0.010	0.030	< 0.040	< 0.040		
Thorium-230	Bq/L	0.65		< 0.010	< 0.010	< 0.070	< 0.070		
Thorium-232	Bq/L	0.60		- <sup>1</sup>	- <sup>1</sup>	< 0.060	< 0.060		
<b>Field Parameters</b>									
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and C

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-3: WC-MW1-03**

		Criteria		WC-MW1-03							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-09	2020-11-26	Average
pH	pH			7.24	7.94	7.90	7.62	7.70	7.49	7.54	7.52
Alkalinity	mg/L as CaCO3			535	494	430	450	400	433	486	460
Carbonate	mg/L as CaCO3			< 2.0	3.0	3.2	1.8	2.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			535	494	425	450	400	433	486	460
Total Dissolved Solids	mg/L			552	595	496	678	648	680	749	715
Fluoride	mg/L	1.5		0.24	0.25	0.24	0.21	0.19	0.25	0.24	0.25
Total Organic Carbon	mg/L			3.4	8.6	9.0	3.7	4.2	3.0	2.0	2.5
Dissolved Organic Carbon	mg/L			~ <sup>1</sup>	2.9	3.4	2.7	2.3	2.0	3.0	2.5
Ammonia+Ammonium (N)	as N mg/L			~ <sup>1</sup>	< 0.05	0.11	0.09	0.09	0.07	0.04	0.06
Chloride (dissolved)	mg/L			47	43	51	61	85	99	130	115
Sulphate (dissolved)	mg/L			23	30	16	71	67	87	120	104
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	< 1.0	< 1.0	0.30	< 0.30	0.30
Nitrite (as N)	as N mg/L			~ <sup>1</sup>	< 0.010	< 0.010	< 0.010	< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			~ <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			~ <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.06	< 0.10	< 0.10	< 0.10	< 0.01	~ <sup>3</sup>	0.01
Hardness	mg/L as CaCO3			474	520	455	560	540	301	747	524
Silver (dissolved)	µg/L		1.5	0.008	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			19.1	3.0	132.5	< 31.0	< 5.0	< 1.0	2.0	1.5
Arsenic (dissolved)	µg/L	25	1900	0.5	< 1.0	1.2	1.3	1.2	1.0	0.7	0.9
Barium (dissolved)	µg/L	1000	29000	111	119	115	140	160	115	165	140
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	49	45	26	38	29	25	22	24
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			135500	133000	130000	160000	155000	48200	174000	111100
Cadmium (dissolved)	µg/L	5	2.7	0.013	0.05	< 0.10	< 0.10	< 0.10	0.006	< 0.003	0.005
Cobalt (dissolved)	µg/L		66	0.37	1.13	0.62	0.87	< 0.50	0.016	0.281	0.149
Chromium (dissolved)	µg/L		810	0.05	2.7	< 5.0	< 5.0	< 5.0	0.12	0.70	0.41
Copper (dissolved)	µg/L	1000	87	0.5	0.3	< 1.0	< 1.0	< 1.0	0.30	0.50	0.40
Iron (dissolved)	µg/L			10	224	750	1510	560	< 7	42	25
Potassium (dissolved)	µg/L			1824	2130	1030	1500	2200	2590	1680	2135
Magnesium (dissolved)	µg/L			32900	44400	32000	38500	37500	23200	27200	25200
Manganese (dissolved)	µg/L			33	88	94	127	145	0.43	68.70	34.57
Molybdenum (dissolved)	µg/L		9200	4.8	8.5	5.4	1.9	3.7	16	4.0	10
Sodium (dissolved)	µg/L			27800	31700	33000	33500	36000	22700	36000	29350
Nickel (dissolved)	µg/L		490	1.1	1.8	1.7	1.4	< 1.0	0.30	0.90	0.60
Phosphorus (dissolved)	mg/L			0.145	0.120	1.450	0.185	0.182	< 0.003	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	0.10	0.26	0.51	< 0.50	< 0.50	< 0.01	0.02	0.02
Antimony (dissolved)	µg/L	6	20000	0.25	0.35	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.6	1.0	< 2.0	< 2.0	< 2.0	< 0.04	0.05	0.05
Tin (dissolved)	µg/L			0.06	0.5	< 1.0	< 1.0	< 1.0	< 0.06	0.09	0.08
Strontium (dissolved)	µg/L			638	784	550	670	755	404	1120	762
Titanium (dissolved)	µg/L			0.2	2.5	7.5	< 5.0	< 5.0	< 0.05	0.13	0.09
Thallium (dissolved)	µg/L		510	0.013	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	6.5	9.0	7.6	4.2	4.9	1.4	9.740	5.575
Vanadium (dissolved)	µg/L		250	4.0	1.2	0.8	< 0.5	1.0	0.8	1.60	1.20
Zinc (dissolved)	µg/L		1100	3.0	4.0	< 5.0	< 5.0	< 5.0	< 2.0	4.0	3.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	0.05	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.02	< 0.01	< 0.04	< 0.04	< 0.04	0.01	< 0.01	0.01
Thorium-230	Bq/L	0.65		< 0.01	< 0.01	< 0.07	< 0.07	< 0.07	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		~ <sup>1</sup>	~ <sup>1</sup>	< 0.06	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	56.7	94.7	--
ORP	mV			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	-61.8	-63.8	--
SPC	µs/cm			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	1181	1191.0	--
Temperature	°C			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	13.102	10.130	--
Turbidity	FNU			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	40.03	226.24	--
pH	Units			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	7.18	7.40	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Mercury sample not collected

**Table C-4: WC-MW2-02**

		Criteria		WC-MW2-02					
		COPC	Table 3	2015	2016	2017	2018	2019	2020
Parameter	Units			Average	WELL NOT FOUND				
pH	pH			8.17					
Alkalinity	mg/L as CaCO <sub>3</sub>			202					
Carbonate	mg/L as CaCO <sub>3</sub>			< 2					
Bicarbonate	mg/L as CaCO <sub>3</sub>			202					
Total Dissolved Solids	mg/L			351					
Fluoride	mg/L	1.5		0.91					
Total Organic Carbon	mg/L			< 1					
Dissolved Organic Carbon	mg/L			~ <sup>1</sup>					
Ammonia+Ammonium (N)	as N mg/L			~ <sup>1</sup>					
Chloride (dissolved)	mg/L			85					
Sulphate (dissolved)	mg/L			6.9					
Bromide (dissolved)	mg/L			1.3					
Nitrite (as N)	as N mg/L			~ <sup>1</sup>					
Nitrate (as N)	as N mg/L			~ <sup>1</sup>					
Nitrate + Nitrite (as N)	as N mg/L			~ <sup>1</sup>					
Mercury (dissolved)	µg/L	1	0.29	0.02					
Hardness	mg/L as CaCO <sub>3</sub>			107					
Silver (dissolved)	µg/L		1.5	0.003					
Aluminum (dissolved)	µg/L			9.3					
Arsenic (dissolved)	µg/L	25	1900	0.9					
Barium (dissolved)	µg/L	1000	29000	40.6					
Beryllium (dissolved)	µg/L		67	< 0.007					
Boron (dissolved)	µg/L	5000	45000	161					
Bismuth (dissolved)	µg/L			< 0.007					
Calcium (dissolved)	µg/L			27900					
Cadmium (dissolved)	µg/L	5	2.7	< 0.003					
Cobalt (dissolved)	µg/L		66	0.09					
Chromium (dissolved)	µg/L		810	< 0.03					
Copper (dissolved)	µg/L	1000	87	0.1					
Iron (dissolved)	µg/L			8					
Potassium (dissolved)	µg/L			1830					
Magnesium (dissolved)	µg/L			9160					
Manganese (dissolved)	µg/L			51.7					
Molybdenum (dissolved)	µg/L		9200	6.86					
Sodium (dissolved)	µg/L			93800					
Nickel (dissolved)	µg/L		490	0.3					
Phosphorus (dissolved)	mg/L			0.15					
Lead (dissolved)	µg/L	10	25	0.07					
Antimony (dissolved)	µg/L	6	20000	0.2					
Selenium (dissolved)	µg/L	10	63	< 1					
Tin (dissolved)	µg/L			0.05					
Strontium (dissolved)	µg/L			1130					
Titanium (dissolved)	µg/L			0.11					
Thallium (dissolved)	µg/L		510	< 0.005					
Uranium (dissolved)	µg/L	20	420	0.115					
Vanadium (dissolved)	µg/L		250	0.42					
Zinc (dissolved)	µg/L		1100	< 2					
Lead-210	Bq/L	0.20		< 0.02					
Radium-226	Bq/L	0.49		< 0.01					
Thorium-230	Bq/L	0.65		< 0.01					
Thorium-232	Bq/L	0.60		~ <sup>1</sup>					
<b>Field Parameters</b>									
ODO % Sat	%			~ <sup>2</sup>					
ORP	mV			~ <sup>2</sup>					
SPC	µs/cm			~ <sup>2</sup>					
Temperature	°C			~ <sup>2</sup>					
Turbidity	FNU			~ <sup>2</sup>					
pH	Units			~ <sup>2</sup>					

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.

<sup>1</sup> Analysis not included in laboratory contract.

<sup>2</sup> Field parameters included for current sampling year only.

**Table C-5: WC-MW3A-11R**

		Criteria		WC-MW3A-11R <sup>3</sup>							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-08 <sup>4</sup>	2020-11-10	Average
pH	pH			7.61	7.50	7.63	7.64	7.65	7.55	7.73	7.64
Alkalinity	mg/L as CaCO3			142	123	130	140	145	144	160	152
Carbonate	mg/L as CaCO3			< 2.0	1.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			142	123	130	140	145	144	160	152
Total Dissolved Solids	mg/L			3695	7445	7980	4210	4010	6320	3450	4885
Fluoride	mg/L	1.5		0.37	0.28	0.28	0.29	0.37	0.42	0.55	0.49
Total Organic Carbon	mg/L		< 1.0	1.1	1.5	1.5	1.4	1.0	1.0	1.0	1.0
Dissolved Organic Carbon	mg/L		- <sup>1</sup>	0.95	0.90	1.23	0.87	1.0	1.0	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L		- <sup>1</sup>	7.2	4.9	4.5	4.0	5.1	3.75	4.4	
Chloride (dissolved)	mg/L			1900	4150	2800	2300	2050	3200	2000	2600
Sulphate (dissolved)	mg/L			8	27	12	< 2	< 10	0.2	< 2	1.1
Bromide (dissolved)	mg/L			25	54	35	38	32	44	25.00	34
Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.010	< 0.010	< 0.010	< 0.010	< 0.30	< 0.30	< 0.30
Nitrate (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.60	< 0.60	< 0.60
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.60	< 0.60	< 0.60
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			1178	3350	2300	1850	1600	2880	1560	2220
Silver (dissolved)	µg/L		1.5	0.030	0.25	< 0.10	< 0.10	< 0.10	< 0.50	< 0.05	0.28
Aluminum (dissolved)	µg/L			5	13	< 5	< 5	33	< 10	7	9
Arsenic (dissolved)	µg/L	25	1900	13.5	2.6	< 1.0	< 1.0	< 1.0	< 2.0	0.8	1.4
Barium (dissolved)	µg/L	1000	29000	1615	6180	3550	2800	2650	4060	2060	3060
Beryllium (dissolved)	µg/L		67	< 0.01	1.25	< 0.50	< 0.50	< 0.50	< 0.07	< 0.007	0.04
Boron (dissolved)	µg/L	5000	45000	217	457	440	380	455	470	435	453
Bismuth (dissolved)	µg/L			0.02	2.5	< 1.0	< 1.0	< 1.0	< 0.07	< 0.007	0.04
Calcium (dissolved)	µg/L			279000	706000	485000	390000	340000	683000	344000	513500
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.25	< 0.10	< 0.10	< 0.10	< 0.03	< 0.003	0.02
Cobalt (dissolved)	µg/L		66	0.32	2.53	< 0.50	< 0.50	< 0.50	0.04	0.036	0.04
Chromium (dissolved)	µg/L		810	0.06	12.7	< 5.0	< 5.0	< 5.0	< 0.8	0.46	0.6
Copper (dissolved)	µg/L	1000	87	2.8	1.3	< 1.0	< 1.0	< 1.0	< 2.0	0.20	1.1
Iron (dissolved)	µg/L			536	1155	800	440	520	820	491	656
Potassium (dissolved)	µg/L			18100	33900	26500	22000	19500	26400	15800	21100
Magnesium (dissolved)	µg/L			159500	385000	270000	215000	180000	288000	139000	213500
Manganese (dissolved)	µg/L			17	51	46	34	23	43	14.9	29
Molybdenum (dissolved)	µg/L		9200	1.9	1.8	0.7	0.5	< 0.5	< 0.4	0.6	0.5
Sodium (dissolved)	µg/L			600000	1106500	850000	665000	605000	822000	451000	636500
Nickel (dissolved)	µg/L		490	2.6	2.6	< 1.0	< 1.0	< 1.0	< 1.0	< 0.10	0.6
Phosphorus (dissolved)	mg/L			0.075	0.056	0.081	0.034	0.056	0.030	< 0.003	0.017
Lead (dissolved)	µg/L	10	25	0.03	1.26	< 0.50	< 0.50	< 0.50	< 0.10	< 0.01	0.06
Antimony (dissolved)	µg/L	6	20000	0.65	1.35	< 0.50	< 0.50	< 0.50	< 9	< 0.9	5
Selenium (dissolved)	µg/L	10	63	57.0	5.0	< 2.0	< 2.0	< 2.0	< 0.4	< 0.04	0.2
Tin (dissolved)	µg/L			0.12	2.6	< 1.0	< 1.0	< 1.0	< 0.6	< 0.06	0.3
Strontium (dissolved)	µg/L			22850	60350	42000	32500	31000	47000	23700	35350
Titanium (dissolved)	µg/L			0.5	12.5	< 5.0	< 5.0	< 5.0	< 0.5	< 0.05	0.3
Thallium (dissolved)	µg/L		510	0.008	0.128	< 0.050	< 0.050	< 0.050	< 0.050	< 0.005	< 0.028
Uranium (dissolved)	µg/L	20	420	0.0	0.3	< 0.1	< 0.1	< 0.1	< 0.02	0.013	0.017
Vanadium (dissolved)	µg/L		250	0.1	2.6	0.5	< 0.5	< 0.5	0.20	0.14	0.17
Zinc (dissolved)	µg/L		1100	17.5	13.5	< 5.0	< 5.0	< 5.0	< 20	< 2.0	11
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02	0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.04	0.10	0.11	< 0.04	0.07	0.01	0.02	0.02
Thorium-230	Bq/L	0.65		< 0.01	0.04	< 0.07	< 0.07	< 0.07	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		- <sup>1</sup>	- <sup>1</sup>	< 0.06	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	24.5	61.7	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	-0.3	78.4	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	9810	5692.0	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	12.672	13.406	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	41.75	27.60	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	7.28	7.81	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Installation took place in 2011 to replace WC-MW3A-02.<sup>4</sup> Elevated detection limits due to contract laboratory method used in analysis

**Table C-6: WC-MW3B-02**

		Criteria		WC-MW3B-02							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-05	2020-11-11	Average
pH	pH			8.48	No Sample	8.19	8.24	8.29	8.42	8.29	8.36
Alkalinity	mg/L as CaCO3			157		120	140	150	214	552	383
Carbonate	mg/L as CaCO3			< 2.0		1.8	2.3	2.8	4.0	< 1.0	2.5
Bicarbonate	mg/L as CaCO3			157		120	140	145	210	552	381
Total Dissolved Solids	mg/L			210			480	480	217	343	280
Fluoride	mg/L	1.5		0.41		0.44	0.38	0.43	0.43	0.47	0.45
Total Organic Carbon	mg/L			< 1.0			1.9	9.2	1.0	1.0	1.0
Dissolved Organic Carbon	mg/L			- <sup>1</sup>			0.75	1.35	1.0	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			- <sup>1</sup>			0.230	0.062	0.07	0.04	0.06
Chloride (dissolved)	mg/L			2.7		2.5	2.1	4.3	2.0	3.7	2.9
Sulphate (dissolved)	mg/L			17		14	13	18	12	15	14
Bromide (dissolved)	mg/L			< 0.3		< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			- <sup>1</sup>		< 0.010	< 0.010	0.011	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			- <sup>1</sup>		< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>		< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	0.01		< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			72		53	55	56	394	1580	987
Silver (dissolved)	µg/L		1.5	0.004		< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			7.3		< 5.0	< 5.0	5.5	4.0	2.0	3.0
Arsenic (dissolved)	µg/L	25	1900	2.2		1.2	< 1.0	1.4	1.7	1.0	1.4
Barium (dissolved)	µg/L	1000	29000	45		34	39	34	30	29	30
Beryllium (dissolved)	µg/L		67	< 0.01		< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	89		97	98	110	104	96	100
Bismuth (dissolved)	µg/L			0.01		< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			12350		11000	12000	12400	18000	14900	16450
Cadmium (dissolved)	µg/L	5	2.7	< 0.003		< 0.10	< 0.10	< 0.10	0.015	0.003	0.009
Cobalt (dissolved)	µg/L		66	0.08		< 0.50	< 0.50	< 0.50	0.078	0.011	0.045
Chromium (dissolved)	µg/L		810	0.07		< 5.0	< 5.0	< 5.0	0.12	0.51	0.32
Copper (dissolved)	µg/L	1000	87	0.4		< 1.0	< 1.0	3.6	0.5	< 0.2	0.4
Iron (dissolved)	µg/L			16		< 100	< 100	< 100	7	12	10
Potassium (dissolved)	µg/L			1209		920	860	815	1060	820	940
Magnesium (dissolved)	µg/L			10090		6000	6300	5950	6260	6140	6200
Manganese (dissolved)	µg/L			2.9		< 2.0	4.2	2.1	6.3	0.2	3.2
Molybdenum (dissolved)	µg/L		9200	6		9	8	13	7.83	4.87	6.35
Sodium (dissolved)	µg/L			42300		37000	34000	36000	32300	29600	30950
Nickel (dissolved)	µg/L		490	0.2		< 1.0	< 1.0	1.1	0.3	< 0.1	0.2
Phosphorus (dissolved)	mg/L			0.15			1.70	2.28	0.006	< 0.003	0.005
Lead (dissolved)	µg/L	10	25	0.02		< 0.50	< 0.50	< 0.50	< 0.01	0.03	0.02
Antimony (dissolved)	µg/L	6	20000	0.7		3.4	1.3	1.6	1.1	1.1	1.1
Selenium (dissolved)	µg/L	10	63	< 1.0		< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.18		< 1.0	< 1.0	< 1.0	0.46	0.24	0.35
Strontium (dissolved)	µg/L			317		340	370	350	381	415	398
Titanium (dissolved)	µg/L			0.1		< 5.0	< 5.0	< 5.0	0.11	0.42	0.27
Thallium (dissolved)	µg/L		510	< 0.005		< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.38		0.49	0.45	0.71	0.41	0.201	0.306
Vanadium (dissolved)	µg/L		250	0.6		0.5	0.7	1.5	0.32	0.11	0.22
Zinc (dissolved)	µg/L		1100	9.5		< 5.0	< 5.0	5.3	3.0	< 2.0	2.5
Lead-210	Bq/L	0.20		< 0.02		0.03	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.02		< 0.04	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.02		< 0.07	< 0.07	< 0.07	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		- <sup>1</sup>		< 0.06	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	44.8	57.9	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	109	118.5	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	240.4	303.2	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	15.204	11.470	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	295.79	8205.8	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	8.43	8.87	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-7: WC-MW3C-02**

		Criteria		WC-MW3C-02							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-05	2020-11-11	Average
pH	pH			8.29	8.17	8.19	8.23	8.21	8.07	7.83	7.95
Alkalinity	mg/L as CaCO3			202	194	180	180	195	635	808	722
Carbonate	mg/L as CaCO3			< 2.0	5.3	2.5	2.9	2.9	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			200	190	175	175	190	635	808	722
Total Dissolved Solids	mg/L			300	294	195	210	273	497	449	473
Fluoride	mg/L	1.5		0.34	0.38	0.29	0.26	0.30	0.25	0.25	0.25
Total Organic Carbon	mg/L			1.1	1.2	1.4	4.2	2.0	2.0	3.0	2.5
Dissolved Organic Carbon	mg/L			^1	0.8	0.8	0.8	1.4	2.0	4.0	3.0
Ammonia+Ammonium (N)	as N mg/L			^1	0.16	0.26	0.34	0.09	0.12	0.14	0.13
Chloride (dissolved)	mg/L			2.2	2.3	2.2	2.4	3.0	14	25	20
Sulphate (dissolved)	mg/L			30	29	25	24	25	21	23	22
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			^1	< 0.010	0.031	< 0.010	< 0.010	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			^1	0.16	< 0.10	< 0.10	< 0.11	0.08	0.15	0.12
Nitrate + Nitrite (as N)	as N mg/L			^1	0.16	< 0.10	< 0.10	< 0.11	0.10	0.15	0.13
Mercury (dissolved)	µg/L	1	0.29	0.01	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			123	123	130	135	140	1770	1580	1675
Silver (dissolved)	µg/L		1.5	0.002	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			8.9	3.5	< 5.0	< 5.0	< 5.0	22.0	21.0	21.5
Arsenic (dissolved)	µg/L	25	1900	4.5	6.1	4.4	4.4	3.0	4.4	4.1	4.3
Barium (dissolved)	µg/L	1000	29000	83	77	82	97	95	92	139	116
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	47	43	48	38	38	41	47	44
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			18550	18600	20000	19500	21000	23700	29700	26700
Cadmium (dissolved)	µg/L	5	2.7	0.014	0.05	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.03	0.51	< 0.50	< 0.50	< 0.50	0.014	0.117	0.066
Chromium (dissolved)	µg/L		810	0.04	2.7	< 5.0	< 5.0	< 5.0	0.17	0.68	0.43
Copper (dissolved)	µg/L	1000	87	0.8	0.3	< 1.0	< 1.0	< 1.0	0.2	0.3	0.3
Iron (dissolved)	µg/L			6	55	< 100	< 100	< 100	12	34	23
Potassium (dissolved)	µg/L			1705	1410	1500	1350	1400	1470	1660	1565
Magnesium (dissolved)	µg/L			18650	18030	19500	20500	20500	19700	24900	22300
Manganese (dissolved)	µg/L			2.2	1.7	5.9	5.9	3.7	0.3	6.2	3.3
Molybdenum (dissolved)	µg/L		9200	14.4	16.9	10.3	6.2	11.6	8.38	5.03	6.71
Sodium (dissolved)	µg/L			45100	44150	34500	24500	35500	33000	94800	63900
Nickel (dissolved)	µg/L		490	0.2	0.6	< 1.0	< 1.0	< 1.0	0.2	< 0.1	0.2
Phosphorus (dissolved)	mg/L			0.5	1.3	2.3	4.2	2.2	0.007	< 0.003	0.005
Lead (dissolved)	µg/L	10	25	0.02	0.26	< 0.50	< 0.50	< 0.50	0.01	< 0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	0.35	0.50	0.80	< 0.50	0.55	< 0.9	< 0.9	< 0.9
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0	< 2.0	< 2.0	< 0.04	0.08	0.06
Tin (dissolved)	µg/L			0.15	0.5	< 1.0	< 1.0	< 1.0	0.06	< 0.06	0.06
Strontium (dissolved)	µg/L			412	420	440	460	435	475	668	572
Titanium (dissolved)	µg/L			0.1	2.5	< 5.0	< 5.0	< 5.0	0.15	1.06	0.61
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	2.43	2.30	1.35	0.76	1.67	0.90	3.420	2.158
Vanadium (dissolved)	µg/L		250	2.1	1.7	1.1	0.6	1.7	0.84	1.22	1.03
Zinc (dissolved)	µg/L		1100	< 2.0	3.5	< 5.0	< 5.0	< 5.0	3.0	3.0	3.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.010	0.025	< 0.040	< 0.040	< 0.040	0.04	< 0.01	0.03
Thorium-230	Bq/L	0.65		< 0.010	0.040	< 0.070	< 0.070	< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		^1	^1	< 0.060	< 0.060	< 0.060	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			^2	^2	^2	^2	^2	58.6	69.3	--
ORP	mV			^2	^2	^2	^2	^2	126	157.7	--
SPC	µs/cm			^2	^2	^2	^2	^2	614	710.0	--
Temperature	°C			^2	^2	^2	^2	^2	13.842	11.690	--
Turbidity	FNU			^2	^2	^2	^2	^2	1186.3	2323.8	--
pH	Units			^2	^2	^2	^2	^2	7.84	7.90	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

Bold values indicate an exceedance of the COPC or Table 3 criteria.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-8: WC-MW3D-02**

		Criteria		WC-MW3D-02							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-05	2020-11-11	Average
pH	pH			8.11	8.08	8.24	8.11	8.00	7.67	7.74	7.71
Alkalinity	mg/L as CaCO3			310	310	310	445	510	784	791	788
Carbonate	mg/L as CaCO3			3.5	10.0	4.9	5.4	4.7	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			308	300	300	440	500	784	791	788
Total Dissolved Solids	mg/L			366	383	291	498	600	689	754	722
Fluoride	mg/L	1.5		0.32	0.31	0.29	0.23	0.19	0.17	0.19	0.18
Total Organic Carbon	mg/L			1.6	1.8	3.3	6.8	8.5	8.0	10.0	9.0
Dissolved Organic Carbon	mg/L			-. <sup>1</sup>	-. <sup>1</sup>	2.4	5.9	7.6	8.0	9.0	8.5
Ammonia+Ammonium (N)	as N mg/L			-. <sup>1</sup>	-. <sup>1</sup>	0.065	0.120	0.074	0.34	0.17	0.26
Chloride (dissolved)	mg/L			13	14	15	25	33	49	77	63
Sulphate (dissolved)	mg/L			33	32	23	18	14	13	20	16
Bromide (dissolved)	mg/L			< 0.3	0.3	< 1.0	< 1.0	< 1.0	0.7	0.9	0.8
Nitrite (as N)	as N mg/L			-. <sup>1</sup>	-. <sup>1</sup>	< 0.010	< 0.010	< 0.010	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			-. <sup>1</sup>	-. <sup>1</sup>	0.13	0.17	0.17	0.07	0.44	0.26
Nitrate + Nitrite (as N)	as N mg/L			-. <sup>1</sup>	-. <sup>1</sup>	0.13	0.17	0.17	0.08	0.44	0.26
Mercury (dissolved)	µg/L	1	0.29	0.02	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			166	157	160	240	285	841	1300	1071
Silver (dissolved)	µg/L		1.5	< 0.002	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			7.5	3.0	26.5	< 5.0	< 5.0	16	< 1	9
Arsenic (dissolved)	µg/L	25	1900	3.9	4.5	4.4	3.4	2.8	6.3	2.8	4.6
Barium (dissolved)	µg/L	1000	29000	76	64	83	140	155	209	206	208
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	48	47	53	48	51	49	57	53
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			20150	20750	20500	31500	36500	58400	54500	56450
Cadmium (dissolved)	µg/L	5	2.7	0.004	0.05	< 0.10	< 0.10	< 0.10	< 0.003	0.008	0.006
Cobalt (dissolved)	µg/L		66	0.05	0.52	< 0.50	< 0.50	< 0.50	0.238	0.195	0.217
Chromium (dissolved)	µg/L		810	0.03	2.7	< 5.0	< 5.0	< 5.0	0.12	0.42	0.27
Copper (dissolved)	µg/L	1000	87	0.2	0.3	< 1.0	< 1.0	< 1.0	< 0.2	0.2	0.2
Iron (dissolved)	µg/L			6	58	< 100	< 100	< 100	297	18	158
Potassium (dissolved)	µg/L			2155	1939	1950	2300	2450	3280	2960	3120
Magnesium (dissolved)	µg/L			28200	25400	26500	39500	47000	61900	62800	62350
Manganese (dissolved)	µg/L			1.4	1.4	10.1	8.9	17.7	20.7	18.5	19.6
Molybdenum (dissolved)	µg/L		9200	7.9	9.5	6.2	4.9	5.0	3.80	6.48	5.14
Sodium (dissolved)	µg/L			80100	75850	87500	97500	120000	122000	98600	110300
Nickel (dissolved)	µg/L		490	0.3	0.7	< 1.0	< 1.0	< 1.1	1.4	0.5	1.0
Phosphorus (dissolved)	mg/L			0.48	0.45	0.26	0.35	0.67	0.060	< 0.003	0.032
Lead (dissolved)	µg/L	10	25	0.02	0.26	< 0.50	< 0.50	< 0.50	0.03	< 0.01	0.02
Antimony (dissolved)	µg/L	6	20000	0.40	0.55	0.58	0.61	0.75	< 0.9	1.8	1.4
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0	< 2.0	< 2.0	0.13	0.24	0.19
Tin (dissolved)	µg/L			0.06	0.5	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06	< 0.06
Strontium (dissolved)	µg/L			712	723	685	1075	1200	1650	1810	1730
Titanium (dissolved)	µg/L			0.2	2.5	5.5	< 5.0	< 5.0	0.92	0.19	0.56
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	1.7	2.6	3.1	2.6	3.4	2.70	3.650	3.175
Vanadium (dissolved)	µg/L		250	2.6	1.2	1.4	1.6	0.8	0.57	3.84	2.21
Zinc (dissolved)	µg/L		1100	< 2.0	3.5	< 5.0	< 5.0	< 5.0	< 2.0	2.0	2.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.015	0.025	< 0.040	< 0.040	< 0.040	0.02	0.02	0.02
Thorium-230	Bq/L	0.65		< 0.010	0.040	< 0.070	< 0.070	< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		-. <sup>1</sup>	-. <sup>1</sup>	< 0.060	< 0.060	< 0.060	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	79.9	27.3	--
ORP	mV			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-15.3	-19.5	--
SPC	µs/cm			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	589	1159.0	--
Temperature	°C			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	15.957	11.950	--
Turbidity	FNU			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	307.27	249.02	--
pH	Units			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	7.41	7.35	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

Bold values indicate an exceedance of the COPC or Table 3 criteria.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-9: WC-MW4A-02**

		Criteria		WC-MW4A-02							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-04	2020-11-24	Average
pH	pH			8.01	7.99	8.09	7.92	8.07	8.06	7.86	7.96
Alkalinity	mg/L as CaCO3			188	190	190	190	180	181	251	216
Carbonate	mg/L as CaCO3			< 2.0	1.9	2.2	1.5	2.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			188	190	190	185	180	181	251	216
Total Dissolved Solids	mg/L			220	233	224	233	215	223	263	243
Fluoride	mg/L	1.5		0.19	0.20	0.19	0.17	0.16	0.20	0.21	0.21
Total Organic Carbon	mg/L			1.0	0.84	0.77	0.78	1.19	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L			- <sup>1</sup>	0.61	0.60	0.56	< 0.50	< 1.0	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			- <sup>1</sup>	0.062	0.078	0.093	0.078	0.11	< 0.04	0.08
Chloride (dissolved)	mg/L			5	5	6	6	14	5	7	6
Sulphate (dissolved)	mg/L			33	31	31	29	28	27	44	36
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.010	< 0.010	< 0.010	0.010	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	0.11	< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	0.11	< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	0.01	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			234	211	200	200	190	211	282	247
Silver (dissolved)	µg/L		1.5	0.005	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			6.1	3.0	5.9	10.5	< 5.0	11	< 1	6
Arsenic (dissolved)	µg/L	25	1900	4.8	3.6	3.7	4.6	6.1	5.7	5.2	5.5
Barium (dissolved)	µg/L	1000	29000	100	101	100	100	88	99	95	97
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	25	26	28	19	18	20	19	20
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			40250	44750	42500	43000	41000	43800	46200	45000
Cadmium (dissolved)	µg/L	5	2.7	0.003	0.05	< 0.10	< 0.10	< 0.10	0.006	< 0.003	0.005
Cobalt (dissolved)	µg/L		66	0.07	0.50	< 0.50	< 0.50	< 0.50	0.031	0.022	0.027
Chromium (dissolved)	µg/L		810	0.07	2.6	< 5.0	< 5.0	< 5.0	0.10	0.09	0.10
Copper (dissolved)	µg/L	1000	87	0.8	0.3	< 1.0	< 1.0	< 1.0	< 0.2	< 0.2	< 0.2
Iron (dissolved)	µg/L			284	272	255	175	< 100	91	78	85
Potassium (dissolved)	µg/L			1850	1740	1700	1700	1700	1730	1700	1715
Magnesium (dissolved)	µg/L			23250	23650	22500	22000	21500	22500	20400	21450
Manganese (dissolved)	µg/L			6.6	6.8	7.1	37.0	13.0	10.7	10.7	10.7
Molybdenum (dissolved)	µg/L		9200	1.8	1.7	1.7	1.8	2.6	1.67	1.31	1.49
Sodium (dissolved)	µg/L			9785	9015	9400	9450	11100	9660	8660	9160
Nickel (dissolved)	µg/L		490	0.5	0.6	< 1.0	< 1.0	1.1	0.1	< 0.1	0.1
Phosphorus (dissolved)	mg/L			0.030	0.038	0.077	0.257	0.069	0.010	< 0.003	0.007
Lead (dissolved)	µg/L	10	25	< 0.01	0.26	< 0.50	< 0.50	< 0.50	0.01	0.04	0.03
Antimony (dissolved)	µg/L	6	20000	0.65	0.35	< 0.50	< 0.50	< 0.50	< 0.9	< 0.9	< 0.9
Selenium (dissolved)	µg/L	10	63	< 1.0	1.0	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.08	0.5	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06	< 0.06
Strontium (dissolved)	µg/L			286	348	325	325	285	328	370	349
Titanium (dissolved)	µg/L			0.1	2.5	< 5.0	< 5.0	< 5.0	0.55	0.08	0.32
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	1.0	0.1	0.2	0.4	2.7	1.04	0.524	0.782
Vanadium (dissolved)	µg/L		250	0.11	0.28	< 0.50	< 0.50	< 0.50	0.06	0.05	0.06
Zinc (dissolved)	µg/L		1100	5.0	3.5	< 5.0	< 5.0	< 5.0	3.0	< 2.0	2.5
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.015	0.030	< 0.040	< 0.040	< 0.040	0.01	< 0.01	0.01
Thorium-230	Bq/L	0.65		< 0.010	0.040	< 0.070	< 0.070	< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		- <sup>1</sup>	- <sup>1</sup>	< 0.060	< 0.060	< 0.060	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	17.6	52.8	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	40.1	100.1	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	415.7	451.8	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	12.943	9.163	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	9.46	263.84	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	7.77	7.82	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.



**Table C-10: WC-MW4B-02**

		Criteria		WC-MW4B-02						
		COPC	Table 3	2015	2016	2017	2018	2019	2020	
Parameter	Units			Average					2020-06-09	2020-11-24
pH	pH			8.12	8.02	8.04	7.94	8.05	8.07	7.99
Alkalinity	mg/L as CaCO <sub>3</sub>			248	215	195	160	170	196	244
Carbonate	mg/L as CaCO <sub>3</sub>			< 2.0	2.1	2.0	1.3	1.8	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			248	215	195	155	170	196	244
Total Dissolved Solids	mg/L			305	274	240	318	303	263	254
Fluoride	mg/L	1.5		0.20	0.18	0.18	0.18	0.17	0.19	0.18
Total Organic Carbon	mg/L			1.1	< 1.0	2.3	2.2	2.0	1.0	< 1.0
Dissolved Organic Carbon	mg/L			1 <sup>1</sup>	1 <sup>1</sup>	1.37	1.04	0.79	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			1 <sup>1</sup>	1 <sup>1</sup>	0.050	0.081	< 0.050	< 0.04	< 0.04
Chloride (dissolved)	mg/L			7	7	8	59	28	19	20
Sulphate (dissolved)	mg/L			54	39	36	62	49	50	46
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			1 <sup>1</sup>	< 0.010	< 0.010	< 0.010	< 0.010	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			1 <sup>1</sup>	< 0.10	< 0.10	0.10	< 0.10	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			1 <sup>1</sup>	< 0.10	< 0.10	0.10	< 0.10	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			253	226	205	195	205	577	212
Silver (dissolved)	µg/L		1.5	0.002	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			7.8	3.0	7.1	< 5.0	< 5.0	2	2
Arsenic (dissolved)	µg/L	25	1900	1.3	1.8	1.4	< 1.0	1.1	0.9	1.0
Barium (dissolved)	µg/L	1000	29000	113	120	109	85	105	157	124
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	28	23	28	30	24	38	22
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007
Calcium (dissolved)	µg/L			50450	46000	43500	51500	47500	143000	50700
Cadmium (dissolved)	µg/L	5	2.7	0.005	0.06	< 0.10	< 0.10	< 0.10	< 0.003	0.011
Cobalt (dissolved)	µg/L		66	0.15	0.53	< 0.50	< 0.50	< 0.50	0.619	0.069
Chromium (dissolved)	µg/L		810	0.10	2.7	< 5.0	< 5.0	< 5.0	0.16	0.68
Copper (dissolved)	µg/L	1000	87	0.7	0.3	< 1.0	< 1.0	< 1.0	0.3	0.4
Iron (dissolved)	µg/L			5	55	< 100	< 100	< 100	1300	< 7
Potassium (dissolved)	µg/L			2435	2420	2350	3250	2750	2380	2650
Magnesium (dissolved)	µg/L			30650	26850	23000	16500	20500	40500	22700
Manganese (dissolved)	µg/L			7.9	10.2	5.0	4.3	2.6	232.0	8.1
Molybdenum (dissolved)	µg/L		9200	22	17	13	19	13	2.61	12.80
Sodium (dissolved)	µg/L			17300	13500	11500	50500	27000	32900	19200
Nickel (dissolved)	µg/L		490	0.8	0.7	< 1.0	< 1.0	< 1.0	1.3	0.3
Phosphorus (dissolved)	mg/L			< 0.03	0.56	1.25	0.38	0.62	0.014	< 0.003
Lead (dissolved)	µg/L	10	25	0.02	0.26	< 0.50	< 0.50	< 0.50	0.02	0.02
Antimony (dissolved)	µg/L	6	20000	0.75	0.35	< 0.50	0.55	< 0.50	< 0.9	< 0.9
Selenium (dissolved)	µg/L	10	63	0.8	1.0	< 2.0	< 2.0	< 2.0	0.06	< 0.04
Tin (dissolved)	µg/L			0.14	0.5	< 1.0	< 1.0	< 1.0	< 0.06	0.07
Strontium (dissolved)	µg/L			349	440	350	330	380	898	474
Titanium (dissolved)	µg/L			0.2	2.5	< 5.0	< 5.0	< 5.0	0.06	0.10
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.6	0.4	0.4	2.2	1.6	4.99	1.280
Vanadium (dissolved)	µg/L		250	1.14	1.20	0.85	0.64	0.60	0.19	0.88
Zinc (dissolved)	µg/L		1100	11.5	3.5	< 5.0	< 5.0	< 5.0	< 2.0	3.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.010	0.030	< 0.040	< 0.040	< 0.040	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.010	0.040	< 0.070	< 0.070	< 0.070	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		1 <sup>1</sup>	1 <sup>1</sup>	< 0.060	< 0.060	< 0.060	< 0.02	< 0.02
<b>Field Parameters</b>										
ODO % Sat	%			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	74.1
ORP	mV			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	101.8
SPC	µs/cm			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	456.1
Temperature	°C			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	10.696
Turbidity	FNU			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	255.54
pH	Units			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	7.98

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Insufficient volume of groundwater for field parameters

**Table C-11: WC-OW1-87**

		Criteria		WC-OW1-87							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-02	2020-11-18	Average
pH	pH			7.64	7.75	7.94	7.80	7.82	7.63	7.52	7.58
Alkalinity	mg/L as CaCO3			342	307	345	325	320	325	320	323
Carbonate	mg/L as CaCO3			< 2.0	1.8	2.9	1.9	2.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			342	307	345	325	315	325	320	323
Total Dissolved Solids	mg/L			374	370	403	345	468	440	463	452
Fluoride	mg/L	1.5		0.08	0.09	< 0.10	0.12	0.10	0.10	0.07	0.09
Total Organic Carbon	mg/L			1.4	1.9	2.1	1.7	2.0	1.0	2.0	1.5
Dissolved Organic Carbon	mg/L			1 <sup>-1</sup>	2.1	1.7	1.6	1.7	2.0	2.0	2.0
Ammonia+Ammonium (N)	as N mg/L			1 <sup>-1</sup>	< 0.050	< 0.050	0.095	< 0.050	< 0.04	< 0.04	< 0.04
Chloride (dissolved)	mg/L			13	16	12	14	31	24	38	31
Sulphate (dissolved)	mg/L			13	25	11	26	46	53	59	56
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			1 <sup>-1</sup>	< 0.010	< 0.010	< 0.010	< 0.010	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			1 <sup>-1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			1 <sup>-1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	0.02	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			305	330	325	325	360	471	455	463
Silver (dissolved)	µg/L		1.5	< 0.002	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			6.2	3.7	< 5.0	< 5.0	< 5.0	< 1	< 1	< 1
Arsenic (dissolved)	µg/L	25	1900	0.9	1.0	< 1.0	< 1.0	< 1.0	0.8	0.8	0.8
Barium (dissolved)	µg/L	1000	29000	71	67	80	79	84	90	88	89
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	40	20	28	21	15	14	17	16
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			99150	106000	105000	103000	110000	115000	118000	116500
Cadmium (dissolved)	µg/L	5	2.7	0.005	0.05	< 0.10	< 0.10	< 0.10	< 0.003	0.005	0.004
Cobalt (dissolved)	µg/L		66	0.40	0.59	< 0.50	< 0.51	0.51	0.476	0.414	0.445
Chromium (dissolved)	µg/L		810	< 0.03	2.5	< 5.0	< 5.0	< 5.0	< 0.08	0.13	0.11
Copper (dissolved)	µg/L	1000	87	0.5	0.4	< 1.0	< 1.0	1.8	0.3	0.3	0.3
Iron (dissolved)	µg/L			170	135	190	175	200	194	211	203
Potassium (dissolved)	µg/L			679	668	705	615	580	661	652	657
Magnesium (dissolved)	µg/L			13650	15550	16500	16500	20500	21200	20900	21050
Manganese (dissolved)	µg/L			48	48	55	55	61	62.8	63.4	63.1
Molybdenum (dissolved)	µg/L		9200	0.45	0.77	0.51	< 0.50	< 0.50	0.38	0.31	0.35
Sodium (dissolved)	µg/L			27000	18200	26000	18000	17000	21300	21500	21400
Nickel (dissolved)	µg/L		490	0.6	0.7	< 1.0	< 1.0	< 1.0	0.5	0.7	0.6
Phosphorus (dissolved)	mg/L			0.035	0.052	0.130	0.071	0.046	< 0.003	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	0.11	0.26	< 0.50	< 0.50	< 0.50	< 0.01	0.03	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.35	< 0.50	< 0.50	< 0.50	< 0.9	< 0.9	< 0.9
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.07	0.5	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06	< 0.06
Strontium (dissolved)	µg/L			220	225	225	220	245	260	276	268
Titanium (dissolved)	µg/L			0.1	2.5	< 5.0	< 5.0	< 5.0	< 0.05	0.06	0.06
Thallium (dissolved)	µg/L		510	0.009	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	6.3	7.7	8.1	5.8	5.0	3.58	4.050	3.815
Vanadium (dissolved)	µg/L		250	0.18	0.27	< 0.50	< 0.50	< 0.50	0.09	0.13	0.11
Zinc (dissolved)	µg/L		1100	< 2.0	3.5	< 5.0	5.5	5.2	2.0	< 2.0	2.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.06	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.01	0.03	< 0.03	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.01	0.04	0.04	0.04	< 0.07	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		1 <sup>-1</sup>	1 <sup>-1</sup>	1 <sup>-1</sup>	0.04	< 0.06	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	26.0	37.2	--
ORP	mV			1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	0.4	-19	--
SPC	µs/cm			1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	743	855	--
Temperature	°C			1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	11.372	10.094	--
Turbidity	FNU			1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	50.15	85.99	--
pH	Units			1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	1 <sup>-2</sup>	7.22	7.35	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-12: WC-OW2-75**

		Criteria		WC-OW2-75			
		COPC	Table 3	2015	2016	2017	2018
Parameter	Units			Average			WELL DECOMMISSIONED
pH	pH			7.96	8.09	8.06	
Alkalinity	mg/L as CaCO <sub>3</sub>			222	254	185	
Carbonate	mg/L as CaCO <sub>3</sub>			< 2.0	2.6	2.1	
Bicarbonate	mg/L as CaCO <sub>3</sub>			222	254	185	
Total Dissolved Solids	mg/L			291	309	234	
Fluoride	mg/L	1.5		0.06	0.08	< 0.10	
Total Organic Carbon	mg/L			1.5	1.2	1.5	
Dissolved Organic Carbon	mg/L			- <sup>1</sup>	1.3	1.5	
Ammonia+Ammonium (N)	as N mg/L			- <sup>1</sup>	< 0.050	< 0.050	
Chloride (dissolved)	mg/L			28.0	13.0	10.3	
Sulphate (dissolved)	mg/L			12	15	7	
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	
Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.010	< 0.010	
Nitrate (as N)	as N mg/L			- <sup>1</sup>	0.72	0.60	
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>	0.72	0.60	
Mercury (dissolved)	µg/L	1	0.29	0.01	0.06	< 0.10	
Hardness	mg/L as CaCO <sub>3</sub>			208	235	170	
Silver (dissolved)	µg/L		1.5	0.16	0.05	< 0.10	
Aluminum (dissolved)	µg/L			7.8	3.5	10.3	
Arsenic (dissolved)	µg/L	25	1900	384	359	310	
Barium (dissolved)	µg/L	1000	29000	16	19	13	
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	
Boron (dissolved)	µg/L	5000	45000	11	13	15	
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	
Calcium (dissolved)	µg/L			73300	84000	60000	
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10	
Cobalt (dissolved)	µg/L		66	0.14	0.88	1.05	
Chromium (dissolved)	µg/L		810	0.40	2.8	< 5.0	
Copper (dissolved)	µg/L	1000	87	1.0	0.3	< 0.5	
Iron (dissolved)	µg/L			51	56	< 100	
Potassium (dissolved)	µg/L			506	506	400	
Magnesium (dissolved)	µg/L			5895	5775	3900	
Manganese (dissolved)	µg/L			0.3	1	< 2	
Molybdenum (dissolved)	µg/L		9200	2.1	1.6	1.5	
Sodium (dissolved)	µg/L			45300	31400	15500	
Nickel (dissolved)	µg/L		490	0.6	0.6	< 1.0	
Phosphorus (dissolved)	mg/L			0.115	0.150	0.032	
Lead (dissolved)	µg/L	10	25	0.01	0.26	< 0.50	
Antimony (dissolved)	µg/L	6	20000	5.8	4.5	3.7	
Selenium (dissolved)	µg/L	10	63	2.0	2.1	< 2.0	
Tin (dissolved)	µg/L			0.1	0.5	< 1.0	
Strontium (dissolved)	µg/L			122	149	101	
Titanium (dissolved)	µg/L			0.1	2.5	< 5.0	
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	
Uranium (dissolved)	µg/L	20	420	159	182	130	
Vanadium (dissolved)	µg/L		250	1.29	1.05	0.92	
Zinc (dissolved)	µg/L		1100	9.0	3.5	< 5.0	
Lead-210	Bq/L	0.20		< 0.02	0.02	< 0.02	
Radium-226	Bq/L	0.49		0.010	0.025	< 0.040	
Thorium-230	Bq/L	0.65		< 0.010	0.040	< 0.070	
Thorium-232	Bq/L	0.60		- <sup>1</sup>	- <sup>1</sup>	- <sup>1</sup>	
<b>Field Parameters</b>							
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.  
 Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.

<sup>1</sup> Analysis not included in laboratory contract.

<sup>2</sup> Field parameters included for current sampling year only.

**Table C-13: WC-O**

		Criteria		WC-OW2A-75				WC-OW2A-19			
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average			WELL DECOMMISSIONED Replaced by WC-OW2A-19	Average	2020-06-02	2020-11-19	Average
pH	pH			7.36	7.90	7.82		7.76	7.56	7.43	7.50
Alkalinity	mg/L as CaCO <sub>3</sub>			487	486	470		420	466	490	478
Carbonate	mg/L as CaCO <sub>3</sub>			< 2.0	2.9	3.1		2.3	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			487	486	470		420	466	490	478
Total Dissolved Solids	mg/L			556	576	610		450	491	503	497
Fluoride	mg/L	1.5		0.08	0.09	< 0.10		< 0.10	0.07	< 0.06	0.07
Total Organic Carbon	mg/L			2.7	3.6	2.7		1.7	2.0	1.0	1.5
Dissolved Organic Carbon	mg/L			- <sup>1</sup>	2.2	2.1		1.1	1.0	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			- <sup>1</sup>	< 0.050	0.076		0.061	< 0.04	< 0.04	< 0.04
Chloride (dissolved)	mg/L			5.3	4.3	4.6		6.6	7	6	7
Sulphate (dissolved)	mg/L			63	57	58		31	30	25	28
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0		< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.010	< 0.010		< 0.010	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10		< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10		< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.06	< 0.10		< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			392	399	385		465	1593	1150	1372
Silver (dissolved)	µg/L	1.5		< 0.06	0.05	< 0.10		< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			8.4	3.0	< 5.0		< 5.0	< 1	< 1	< 1
Arsenic (dissolved)	µg/L	25	1900	1.9	1.6	1.5		< 1.0	0.6	0.5	0.6
Barium (dissolved)	µg/L	1000	29000	234	234	240		135	152	140	146
Beryllium (dissolved)	µg/L	67		< 0.01	0.25	< 0.50		< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	10	9	11		11	10	11	11
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0		< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			111000	114500	110000		125000	133000	127000	130000
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10		< 0.10	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L	66		0.09	0.52	< 0.50		0.97	0.468	0.347	0.408
Chromium (dissolved)	µg/L	810		< 0.03	2.7	< 5.0		< 5.0	0.13	0.70	0.42
Copper (dissolved)	µg/L	1000	87	0.1	0.3	< 1.0		< 1.0	0.7	< 0.2	0.5
Iron (dissolved)	µg/L			1725	1740	1750		355	553	351	452
Potassium (dissolved)	µg/L			1680	1760	1700		1150	1090	1110	1100
Magnesium (dissolved)	µg/L			27900	28950	28000		36500	36900	33800	35350
Manganese (dissolved)	µg/L			22	22	22		51	21.2	18.6	19.9
Molybdenum (dissolved)	µg/L	9200		0.62	0.73	0.68		0.68	0.50	0.27	0.39
Sodium (dissolved)	µg/L			64000	72700	68500		11000	11200	10800	11000
Nickel (dissolved)	µg/L	490		0.1	0.6	< 1.0		1.5	0.7	0.7	0.7
Phosphorus (dissolved)	mg/L			1.06	0.26	0.15		1.17	< 0.003	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	< 0.01	0.26	< 0.50		< 0.50	0.04	0.01	0.03
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.35	< 0.50		< 0.50	< 0.9	< 0.9	< 0.9
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0		< 2.0	< 0.04	0.07	0.06
Tin (dissolved)	µg/L			0.0	0.5	< 1.0		< 1.0	< 0.06	< 0.06	< 0.06
Strontium (dissolved)	µg/L			319	307	300		320	335	353	344
Titanium (dissolved)	µg/L			0.2	2.5	< 5.0		< 5.0	0.07	0.14	0.11
Thallium (dissolved)	µg/L	510		< 0.005	0.028	< 0.050		< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.02	0.1	< 0.1		4.1	2.90	2.44	2.67
Vanadium (dissolved)	µg/L	250		0.16	0.27	< 0.50		< 0.50	0.21	0.21	0.21
Zinc (dissolved)	µg/L	1100		< 2.0	3.5	< 5.0		< 5.0	2.0	< 2.0	2.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	0.03		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.010	0.030	< 0.040		< 0.040	0.01	< 0.01	0.01
Thorium-230	Bq/L	0.65		< 0.010	0.040	< 0.070		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		- <sup>1</sup>	- <sup>1</sup>	< 0.060		< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>											
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	89.4	72.9	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	-35.9	18.5	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	808	839	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	11.724	11.735	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	248.98	182.92	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	7.39	7.25	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-14: WC-OW2-87 and WC-OW2-19**

		Criteria		WC-OW2-87				WC-OW2-19			
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average			WELL DECOMMISSIONED Replaced by WC-OW2-19	Average	2020-06-02	2020-11-12	Average
pH	pH			7.73	7.84	7.77		7.77	7.67	7.64	7.66
Alkalinity	mg/L as CaCO <sub>3</sub>			502	501	495		440	416	410	413
Carbonate	mg/L as CaCO <sub>3</sub>			< 2.0	2.6	2.7		2.5	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			502	501	495		440	416	410	413
Total Dissolved Solids	mg/L			642	639	631		680	629	663	646
Fluoride	mg/L	1.5		0.07	0.09	< 0.10		< 0.10	0.10	< 0.06	0.08
Total Organic Carbon	mg/L			2.5	10.1	2.8		3.0	2.0	3.0	2.5
Dissolved Organic Carbon	mg/L			- <sup>1</sup>	2.7	2.5		2.8	2.0	3.0	2.5
Ammonia+Ammonium (N)	as N mg/L			- <sup>1</sup>	< 0.050	0.105		0.050	< 0.04	0.05	0.05
Chloride (dissolved)	mg/L			6.5	5.2	6.6		4.8	4	5	5
Sulphate (dissolved)	mg/L			86	74	79		150	140	130	135
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0		< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.010	< 0.010		< 0.010	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10		< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10		< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	0.02	0.06	< 0.10		< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			356	328	320		305	281	242	262
Silver (dissolved)	µg/L		1.5	0.00	0.05	< 0.10		< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			6.0	3.0	< 5.0		< 5.0	1	9	5
Arsenic (dissolved)	µg/L	25	1900	1.1	1.2	1.3		1.4	1.5	1.5	1.5
Barium (dissolved)	µg/L	1000	29000	168	130	135		27	27	24	25
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50		< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	11	10	< 10		< 10	10	7	9
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0		< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			107000	98000	95000		90500	84700	72900	78800
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10		< 0.10	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.62	0.52	< 0.50		< 0.50	0.070	0.045	0.058
Chromium (dissolved)	µg/L		810	< 0.03	2.7	< 5.0		< 5.0	< 0.08	< 0.08	< 0.08
Copper (dissolved)	µg/L	1000	87	0.2	0.5	< 1.0		< 1.0	< 0.2	< 0.2	< 0.2
Iron (dissolved)	µg/L			1410	1655	1650		1350	1210	1120	1165
Potassium (dissolved)	µg/L			1650	1515	1600		1600	1540	1350	1445
Magnesium (dissolved)	µg/L			21450	19800	20000		19500	17900	15600	16750
Manganese (dissolved)	µg/L			31	26	19		18	16.8	14.3	15.6
Molybdenum (dissolved)	µg/L		9200	0.83	0.89	1.15		8.2	9.86	9.05	9.46
Sodium (dissolved)	µg/L			116000	110500	115000		150000	147000	128000	137500
Nickel (dissolved)	µg/L		490	0.1	0.6	< 1.0		< 1.0	0.2	< 0.1	0.2
Phosphorus (dissolved)	mg/L			0.04	0.04	0.05		0.009	0.005	< 0.003	0.004
Lead (dissolved)	µg/L	10	25	0.13	0.26	< 0.50		< 0.50	< 0.01	0.03	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.35	< 0.50		< 0.50	< 0.9	< 0.9	< 0.9
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0		< 2.0	0.06	0.06	0.06
Tin (dissolved)	µg/L			0.04	0.51	< 1.0		< 1.0	< 0.06	0.07	0.07
Strontium (dissolved)	µg/L			255	237	225		150	142	134	138
Titanium (dissolved)	µg/L			0.1	2.5	< 5.0		< 5.0	0.08	< 0.05	0.07
Thallium (dissolved)	µg/L		510	0.009	0.028	< 0.050		< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.09	0.09	0.11		0.14	0.19	0.076	0.132
Vanadium (dissolved)	µg/L		250	0.18	0.29	< 0.50		< 0.50	0.08	0.08	0.08
Zinc (dissolved)	µg/L		1100	3.0	3.5	< 5.0		< 5.0	< 2.0	< 2.0	< 2.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.010	0.025	< 0.040		< 0.04	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.010	0.040	< 0.070		< 0.07	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		- <sup>1</sup>	- <sup>1</sup>	< 0.060		< 0.06	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>											
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	24.1	37.7	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	-69.7	60.2	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	1045	1028.7	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	11.383	10.537	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	3.12	4.12	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	7.3	7.43	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

Bold values indicate an exceedance of the COPC or Table 3 criteria.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-15: WC-OW3-79**

		Criteria		WC-OW3-79							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-05	2020-11-20	Average
pH	pH			8.01	7.90	8.05	7.95	8.06	8.15	8.18	8.17
Alkalinity	mg/L as CaCO3			173	167	170	175	170	164	179	172
Carbonate	mg/L as CaCO3			< 2.0	1.6	1.8	1.5	1.8	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			173	167	170	175	170	164	179	172
Total Dissolved Solids	mg/L			226	184	172	158	213	217	240	229
Fluoride	mg/L	1.5		0.20	0.20	0.18	0.21	0.17	0.17	0.19	0.18
Total Organic Carbon	mg/L			1.10	1.05	0.59	0.68	0.71	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L			- <sup>1</sup>	0.69	0.54	0.59	0.55	< 1.0	< 1.0	< 1.0
Ammonia+Ammonium (N)	as N mg/L			- <sup>1</sup>	< 0.050	0.060	0.080	0.068	0.07	< 0.04	0.06
Chloride (dissolved)	mg/L			1.8	1.6	1.5	1.7	1.8	2	2	2
Sulphate (dissolved)	mg/L			27	25	25	26	26	26	24	25
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.010	< 0.010	< 0.010	< 0.010	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	0.02	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			174	183	133	170	180	176	175	176
Silver (dissolved)	µg/L		1.5	0.006	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			5.8	3.0	127.5	< 5.0	< 5.0	1	2	2
Arsenic (dissolved)	µg/L	25	1900	3.3	2.9	1.9	3.1	3.2	3.8	3.7	3.8
Barium (dissolved)	µg/L	1000	29000	121	127	85	135	140	132	138	135
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	21	37	15	20	19	18	21	20
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			37535	39850	33000	37000	40000	39700	42600	41150
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10	< 0.10	< 0.10	< 0.003	0.005	0.004
Cobalt (dissolved)	µg/L		66	0.01	0.52	< 0.50	< 0.50	< 0.50	0.004	0.006	0.005
Chromium (dissolved)	µg/L		810	< 0.03	2.6	< 5.0	< 5.0	< 5.0	0.12	0.66	0.39
Copper (dissolved)	µg/L	1000	87	0.7	0.3	2.5	< 1.0	< 1.0	< 0.2	0.5	0.4
Iron (dissolved)	µg/L			135	161	160	200	215	183	246	215
Potassium (dissolved)	µg/L			1420	1515	985	1400	1400	1420	1510	1465
Magnesium (dissolved)	µg/L			19450	19700	12650	19000	19500	18500	20400	19450
Manganese (dissolved)	µg/L			13	19	23	15	14	15.1	17.0	16.0
Molybdenum (dissolved)	µg/L		9200	1.2	1.1	0.9	1.2	1.2	1.18	1.24	1.21
Sodium (dissolved)	µg/L			8543	9050	7900	8300	8500	8360	9060	8710
Nickel (dissolved)	µg/L		490	0.2	0.6	1.1	< 1.0	< 1.0	< 0.1	< 0.1	< 0.1
Phosphorus (dissolved)	mg/L			< 0.030	0.029	0.018	0.012	0.019	0.011	0.005	0.008
Lead (dissolved)	µg/L	10	25	< 0.01	0.26	0.74	< 0.50	< 0.50	< 0.01	0.07	0.04
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.35	< 0.50	< 0.50	< 0.50	< 0.9	< 0.9	< 0.9
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.3	0.5	< 1.0	< 1.0	< 1.0	< 0.06	0.08	0.07
Strontium (dissolved)	µg/L			392	368	240	385	380	389	444	417
Titanium (dissolved)	µg/L			0.1	2.5	< 5.0	< 5.0	< 5.0	0.06	0.06	0.06
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.0	0.1	0.4	< 0.1	< 0.1	0.04	0.040	0.042
Vanadium (dissolved)	µg/L		250	0.11	0.26	0.62	< 0.50	< 0.50	0.02	0.02	0.02
Zinc (dissolved)	µg/L		1100	1.4	3.5	23	< 5.0	< 5.0	5.0	2.0	3.5
Lead-210	Bq/L	0.20		0.03	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.02	0.03	< 0.04	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.01	< 0.01	< 0.07	< 0.07	< 0.07	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		- <sup>1</sup>	- <sup>1</sup>	< 0.06	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	27.3	38.7	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	88.7	-46.9	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	396.5	230	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	16.244	11.127	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	0.84	1.32	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	7.8	7.9	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-16: WC-OW3-87**

		Criteria		WC-OW3-87						
		COPC	Table 3	2015	2016	2017	2018	2019	2020	
Parameter	Units			Average					2020-06-03	2020-11-18
pH	pH			7.98	8.04	8.07	7.92	8.10	8.01	7.97
Alkalinity	mg/L as CaCO <sub>3</sub>			198	207	185	195	185	184	186
Carbonate	mg/L as CaCO <sub>3</sub>			< 2.0	2.2	2.1	1.5	2.2	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			198	207	185	195	185	184	186
Total Dissolved Solids	mg/L			243	241	190	235	265	226	263
Fluoride	mg/L	1.5		0.11	0.11	0.12	0.12	0.11	0.12	0.10
Total Organic Carbon	mg/L			2.2	1.8	1.8	1.8	2.0	1.0	2.0
Dissolved Organic Carbon	mg/L			1.1	1.90	1.55	1.70	1.70	2.0	2.0
Ammonia+Ammonium (N)	as N mg/L			1.1	< 0.050	< 0.050	0.075	0.052	0.08	< 0.04
Chloride (dissolved)	mg/L			3.7	6.1	4.1	4.0	6.0	5	5
Sulphate (dissolved)	mg/L			10.2	12.6	9.2	7.9	8.7	8	9
Bromide (dissolved)	mg/L			< 0.3	0.7	3.0	< 1.0	< 1.0	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			1.1	< 0.010	0.010	< 0.010	< 0.010	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			1.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			1.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	0.01	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			203	217	180	180	190	202	190
Silver (dissolved)	µg/L		1.5	0.140	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			8.2	3.0	< 5.0	< 5.0	< 5.0	11	< 1
Arsenic (dissolved)	µg/L	25	1900	4.1	4.4	5.0	4.5	4.2	5.3	4.8
Barium (dissolved)	µg/L	1000	29000	156	165	160	155	165	167	153
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	12	15	12	10	11	12	12
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007
Calcium (dissolved)	µg/L			63200	66400	54500	54000	58500	60400	60900
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10	< 0.10	< 0.10	0.004	< 0.003
Cobalt (dissolved)	µg/L		66	0.06	0.52	< 0.50	< 0.50	< 0.50	0.040	< 0.004
Chromium (dissolved)	µg/L		810	< 0.03	2.6	< 5.0	< 5.0	< 5.0	< 0.08	0.60
Copper (dissolved)	µg/L	1000	87	0.1	0.3	< 1.0	< 1.0	2.1	0.2	< 0.2
Iron (dissolved)	µg/L			82	171	200	155	< 155	195	129
Potassium (dissolved)	µg/L			1080	1070	1000	970	975	1080	1050
Magnesium (dissolved)	µg/L			10950	11650	10500	10000	10450	10500	10400
Manganese (dissolved)	µg/L			12.5	10.6	9.9	10.1	10.8	10.4	8.7
Molybdenum (dissolved)	µg/L		9200	0.3	0.4	< 0.5	< 0.5	< 0.5	0.26	0.23
Sodium (dissolved)	µg/L			5570	8005	5000	5000	5600	5120	5380
Nickel (dissolved)	µg/L		490	0.2	0.6	< 1.0	< 1.0	< 1.0	0.1	0.2
Phosphorus (dissolved)	mg/L			0.030	0.027	0.027	0.043	0.023	0.004	< 0.003
Lead (dissolved)	µg/L	10	25	0.06	0.26	< 0.50	< 0.50	< 0.50	0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.35	< 0.50	< 0.50	< 0.50	< 0.9	< 0.9
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.0	0.5	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06
Strontium (dissolved)	µg/L			213	215	195	195	205	210	204
Titanium (dissolved)	µg/L			0.2	2.5	< 5.0	< 5.0	< 5.0	0.51	0.11
Thallium (dissolved)	µg/L		510	0.011	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.91	0.66	0.14	0.16	0.30	0.10	0.208
Vanadium (dissolved)	µg/L		250	0.16	0.26	< 0.50	< 0.50	< 0.50	0.06	0.07
Zinc (dissolved)	µg/L		1100	2.5	3.5	< 5	< 5.0	< 5.0	3.0	< 2.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.01	0.03	< 0.04	< 0.04	< 0.04	0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.01	0.04	< 0.07	< 0.07	< 0.07	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		1.1	1.1	< 0.06	< 0.06	< 0.06	< 0.02	< 0.02
<b>Field Parameters</b>										
ODO % Sat	%			1.2	1.2	1.2	1.2	1.2	44.1	1.3
ORP	mV			1.2	1.2	1.2	1.2	1.2	-26.9	1.3
SPC	µs/cm			1.2	1.2	1.2	1.2	1.2	387.5	1.3
Temperature	°C			1.2	1.2	1.2	1.2	1.2	14.996	1.3
Turbidity	FNU			1.2	1.2	1.2	1.2	1.2	20.3	1.3
pH	Units			1.2	1.2	1.2	1.2	1.2	7.65	1.3

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

Bold values indicate an exceedance of the COPC or Table 3 criteria.

1 Analysis not included in laboratory contract.

2 Field parameters included for current sampling year only.

3 Insufficient volume of groundwater for field parameters

**Table C-17: WC-OW4-79**

		Criteria		WC-OW4-79							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-02	2020-11-26	Average
pH	pH			7.98	7.97	8.09	7.85	8.17	7.99	- <sup>4</sup>	7.99
Alkalinity	mg/L as CaCO3			149	149	150	150	145	162	- <sup>4</sup>	162
Carbonate	mg/L as CaCO3			< 2.0	1.7	1.7	1.2	2.0	< 1.0	- <sup>4</sup>	1.0
Bicarbonate	mg/L as CaCO3			149	144	145	150	140	162	- <sup>4</sup>	162
Total Dissolved Solids	mg/L			156	156	101	158	183	151	- <sup>4</sup>	151
Fluoride	mg/L	1.5		0.21	0.21	0.21	0.20	0.21	0.23	- <sup>4</sup>	0.23
Total Organic Carbon	mg/L			< 1.0	1.0	0.8	1.1	1.3	< 1.0	- <sup>4</sup>	1.0
Dissolved Organic Carbon	mg/L			- <sup>1</sup>	0.82	0.62	0.77	0.83	1.0	- <sup>4</sup>	1.0
Ammonia+Ammonium (N)	as N mg/L			- <sup>1</sup>	0.10	0.10	0.11	0.12	0.09	- <sup>4</sup>	0.09
Chloride (dissolved)	mg/L			1.8	1.8	1.3	1.8	1.6	2	- <sup>4</sup>	2
Sulphate (dissolved)	mg/L			11.5	11.0	9.1	13.5	10.9	13	- <sup>4</sup>	13
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	< 1.0	< 1.0	< 0.3	- <sup>4</sup>	0.3
Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.010	< 0.010	< 0.010	< 0.010	< 0.030	- <sup>4</sup>	0.030
Nitrate (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	- <sup>4</sup>	0.06
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	- <sup>4</sup>	0.06
Mercury (dissolved)	µg/L	1	0.29	0.02	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			167	142	135	140	140	232	- <sup>4</sup>	232
Silver (dissolved)	µg/L		1.5	0.003	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			2.4	3.0	< 5.0	< 5.0	< 5.0	< 1	13	7
Arsenic (dissolved)	µg/L	25	1900	1.0	2.8	< 1.0	1.1	< 1.0	0.5	0.8	0.7
Barium (dissolved)	µg/L	1000	29000	102	107	102	110	91	107	41	74
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	36	30	24	24	22	26	57	42
Bismuth (dissolved)	µg/L			0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			29000	31000	28500	30500	30000	31300	33500	32400
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.09	1.00	< 0.50	< 0.50	< 0.50	0.156	0.047	0.102
Chromium (dissolved)	µg/L		810	0.07	2.6	< 5.0	< 5.0	< 5.0	0.08	0.60	0.34
Copper (dissolved)	µg/L	1000	87	0.4	0.3	< 1.0	< 1.0	< 1.0	< 0.2	0.6	0.4
Iron (dissolved)	µg/L			2570	3660	2600	2950	1765	657	24	341
Potassium (dissolved)	µg/L			963	972	900	950	1025	936	735	836
Magnesium (dissolved)	µg/L			16100	15950	15000	15500	15000	15100	12600	13850
Manganese (dissolved)	µg/L			71	67	78	69	53	34.2	15.9	25.1
Molybdenum (dissolved)	µg/L		9200	1.4	1.4	1.4	1.2	2.0	1.08	1.21	1.15
Sodium (dissolved)	µg/L			9500	9620	8900	9350	9500	9210	9890	9550
Nickel (dissolved)	µg/L		490	0.5	0.6	< 1.0	< 1.0	< 1.0	0.5	0.1	0.3
Phosphorus (dissolved)	mg/L			0.030	0.017	0.008	0.012	0.039	< 0.003	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	0.02	0.40	< 0.50	< 0.50	< 0.50	0.02	0.02	0.02
Antimony (dissolved)	µg/L	6	20000	0.60	0.40	< 0.50	< 0.50	< 0.50	< 0.9	< 0.9	< 0.9
Selenium (dissolved)	µg/L	10	63	< 1.0	1.0	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.1	0.5	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06	< 0.06
Strontium (dissolved)	µg/L			300	302	305	320	315	308	627	468
Titanium (dissolved)	µg/L			0.1	2.5	< 5.0	< 5.0	< 5.0	< 0.05	0.80	0.43
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.02	1.12	< 0.10	< 0.10	0.18	0.04	0.136	0.089
Vanadium (dissolved)	µg/L		250	0.07	0.26	< 0.50	< 0.50	< 0.50	< 0.01	1.78	0.90
Zinc (dissolved)	µg/L		1100	4.5	4.5	< 5	< 5.0	< 5.0	17.0	7.0	12.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.015	0.030	< 0.040	< 0.040	< 0.040	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.010	0.010	< 0.070	< 0.070	< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		- <sup>1</sup>	- <sup>1</sup>	< 0.060	< 0.060	< 0.060	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>3</sup>	- <sup>3</sup>	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>3</sup>	- <sup>3</sup>	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>3</sup>	- <sup>3</sup>	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>3</sup>	- <sup>3</sup>	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>3</sup>	- <sup>3</sup>	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>3</sup>	- <sup>3</sup>	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Insufficient volume of groundwater for field parameters<sup>4</sup> Insufficient volume of groundwater for full sample collection



**Table C-18: WC-OW5-79 and WC-OW5-19**

		Criteria		WC-OW5-79				WC-OW5-19			
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average			WELL DECOMMISSIONED	Average	2020-06-10	2020-11-19	Average
pH	pH			7.80	7.95	7.85	Replaced by WC-OW5-19	7.44	7.14	7.26	7.20
Alkalinity	mg/L as CaCO <sub>3</sub>			256	253	260		280	327	327	327
Carbonate	mg/L as CaCO <sub>3</sub>			< 2.0	2.1	1.7		< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			256	253	255		280	327	327	327
Total Dissolved Solids	mg/L			430	458	412		1620	1590	1523	1557
Fluoride	mg/L	1.5		0.13	0.13	0.15		< 0.10	0.08	< 0.06	0.07
Total Organic Carbon	mg/L			3	3	2		14	8.0	9.0	8.5
Dissolved Organic Carbon	mg/L			- <sup>1</sup>	2	2		12	8.0	8.0	8.0
Ammonia+Ammonium (N)	as N mg/L			- <sup>1</sup>	0.13	0.15		0.20	0.11	0.15	0.13
Chloride (dissolved)	mg/L			3.0	3.3	2.9		8.5	6	6	6
Sulphate (dissolved)	mg/L			120	108	99		885	780	780	780
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0		< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.010	< 0.010		< 0.010	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10		< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			- <sup>1</sup>	< 0.10	< 0.10		< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	0.02	0.06	< 0.10		< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			301	286	290		1000	834	959	897
Silver (dissolved)	µg/L		1.5	0.06	0.05	< 0.10		< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			5.9	3.0	< 5.0		< 5.0	7	< 1	4
Arsenic (dissolved)	µg/L	25	1900	2.3	1.8	1.5		2.8	3.4	3.3	3.4
Barium (dissolved)	µg/L	1000	29000	184	172	165		29	23	25	24
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50		< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	20	26	21		22	17	18	18
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0		< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			81450	77850	76000		335000	291000	308000	299500
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10		< 0.10	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.04	0.53	< 0.50		< 0.51	0.390	0.303	0.347
Chromium (dissolved)	µg/L		810	< 0.03	2.7	< 5.0		< 5.0	0.14	0.11	0.13
Copper (dissolved)	µg/L	1000	87	0.1	0.3	< 1.0		< 1.0	< 0.2	< 0.2	< 0.2
Iron (dissolved)	µg/L			1085	1050	695		5300	5360	5320	5340
Potassium (dissolved)	µg/L			1155	1085	1150		1500	1380	1260	1320
Magnesium (dissolved)	µg/L			23600	21950	23000		48000	43800	42800	43300
Manganese (dissolved)	µg/L			16	15	15		79	72.8	72.3	72.6
Molybdenum (dissolved)	µg/L		9200	0.9	1.1	1.3		1.8	0.63	0.56	0.60
Sodium (dissolved)	µg/L			30350	31350	33500		120000	115000	109000	112000
Nickel (dissolved)	µg/L		490	< 0.1	0.6	< 1.0		< 1.0	0.7	0.8	0.8
Phosphorus (dissolved)	mg/L			< 0.030	0.020	0.009		0.020	0.012	0.007	0.010
Lead (dissolved)	µg/L	10	25	< 0.01	0.26	< 0.50		< 0.50	< 0.01	0.01	0.01
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.35	< 0.50		< 0.50	< 0.9	< 0.9	< 0.9
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0		< 2.0	0.23	0.27	0.25
Tin (dissolved)	µg/L			0.0	0.5	< 1.0		< 1.0	< 0.06	0.10	0.08
Strontium (dissolved)	µg/L			526	501	475		460	456	486	471
Titanium (dissolved)	µg/L			0.2	2.5	< 5.0		< 5.0	0.77	0.15	0.46
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050		< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.05	0.06	< 0.10		1.23	0.12	0.103	0.111
Vanadium (dissolved)	µg/L		250	0.14	0.27	< 0.50		< 0.50	0.20	0.20	0.20
Zinc (dissolved)	µg/L		1100	< 2.0	3.5	10.0		< 5.0	< 2.0	< 2.0	< 2.0
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.010	0.025	< 0.040		< 0.040	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.010	0.040	< 0.070		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		- <sup>1</sup>	- <sup>1</sup>	< 0.060		< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>											
ODO % Sat	%			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	28.6	37.7	--
ORP	mV			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	-104.8	-87.1	--
SPC	µs/cm			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	1984	1903	--
Temperature	°C			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	14.321	9.787	--
Turbidity	FNU			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	6.24	11.53	--
pH	Units			- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>		- <sup>2</sup>	7.04	7.26	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-19: WC-OW9-75 and WC-LTWMF-MW-06**

		Criteria		WC-OW9-75		WC-LTWMF-MW-06					
Parameter	Units	COPC	Table 3	2015	2016	2017	2018	2019	2020		
				NO SAMPLE	WELL DAMAGED	Average			2020-06-24	2020-11-10	Average
pH	pH				Replaced by	8.15	8.14	8.25	7.69	8.23	7.96
Alkalinity	mg/L as CaCO <sub>3</sub>				WC-LTWMF-MW-06	145	140	135	180	137	159
Carbonate	mg/L as CaCO <sub>3</sub>					1.9	1.8	2.3	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>					135	140	135	180	137	159
Total Dissolved Solids	mg/L					223	213	263	271	229	250
Fluoride	mg/L	1.5				0.79	0.70	0.68	0.74	0.77	0.76
Total Organic Carbon	mg/L					0.88	1.03	0.88	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L					0.6	0.6	0.6	< 1.0	< 1.0	< 1.0
Ammonia+Ammonium (N)	as N mg/L					0.184	0.068	0.073	0.06	0.04	0.05
Chloride (dissolved)	mg/L					22	20	26	33	36	35
Sulphate (dissolved)	mg/L					34	38	41	42	44	43
Bromide (dissolved)	mg/L					< 1.0	< 1.0	< 1.0	< 0.30	< 0.30	< 0.30
Nitrite (as N)	as N mg/L					< 0.010	< 0.010	0.011	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L					< 0.10	< 0.10	< 0.10	0.09	< 0.06	0.08
Nitrate + Nitrite (as N)	as N mg/L					< 0.10	< 0.10	< 0.10	0.09	< 0.06	0.08
Mercury (dissolved)	µg/L	1	0.29			< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>					115	115	120	328	137	233
Silver (dissolved)	µg/L		1.5			< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L					56.5	9.8	8.3	1.0	5.0	3.0
Arsenic (dissolved)	µg/L	25	1900			1.6	2.1	1.9	< 0.2	2.3	1.3
Barium (dissolved)	µg/L	1000	29000			60	54	59	0.88	70.00	35.44
Beryllium (dissolved)	µg/L		67			< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000			165	165	155	4	183	94
Bismuth (dissolved)	µg/L					< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L					22000	17000	17500	10800	19300	15050
Cadmium (dissolved)	µg/L	5	2.7			< 0.10	< 0.10	< 0.10	0.037	< 0.003	0.020
Cobalt (dissolved)	µg/L		66			< 0.50	< 0.50	< 0.50	0.006	0.004	0.005
Chromium (dissolved)	µg/L		810			< 5.0	< 5.0	< 5.0	0.09	0.13	0.11
Copper (dissolved)	µg/L	1000	87			< 1.0	< 1.0	< 1.0	0.40	0.60	0.50
Iron (dissolved)	µg/L					115	< 100	< 100	< 7	< 7	< 7
Potassium (dissolved)	µg/L					3900	1950	1800	643	1890	1267
Magnesium (dissolved)	µg/L					14000	17500	18500	1630	18700	10165
Manganese (dissolved)	µg/L					13.4	< 2.0	< 2.0	0.21	0.51	0.36
Molybdenum (dissolved)	µg/L		9200			17.5	10.1	8.8	0.40	5.95	3.18
Sodium (dissolved)	µg/L					42500	42500	43500	2220	41100	21660
Nickel (dissolved)	µg/L		490			< 1.0	< 1.0	< 1.0	24.7	< 0.1	12.4
Phosphorus (dissolved)	mg/L					0.076	0.075	0.103	0.007	< 0.003	0.005
Lead (dissolved)	µg/L	10	25			< 0.50	< 0.50	< 0.50	0.02	0.04	0.03
Antimony (dissolved)	µg/L	6	20000			< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63			< 2.0	< 2.0	< 2.0	0.05	0.05	0.05
Tin (dissolved)	µg/L					< 1.0	< 1.0	< 1.0	< 0.06	0.25	0.16
Strontium (dissolved)	µg/L					490	625	695	19.2	729.0	374.1
Titanium (dissolved)	µg/L					5.6	< 5.0	< 5.0	< 0.05	< 0.05	< 0.05
Thallium (dissolved)	µg/L		510			< 0.050	< 0.050	< 0.050	0.009	0.007	0.008
Uranium (dissolved)	µg/L	20	420			1.40	0.95	0.79	< 0.002	0.657	0.330
Vanadium (dissolved)	µg/L		250			1.7	1.8	1.5	< 0.01	1.26	0.64
Zinc (dissolved)	µg/L		1100			< 5.0	< 5.0	< 5.0	43	< 2	23
Lead-210	Bq/L	0.20				0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49				< 0.04	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65				< 0.07	< 0.07	< 0.07	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60				- <sup>1</sup>	< 0.06	< 0.06	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>											
ODO % Sat	%			--		- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	67.3	31.0	--
ORP	mV			--		- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	119	178.9	--
SPC	µs/cm			--		- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	455	497.0	--
Temperature	°C			--		- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	13.159	12.837	--
Turbidity	FNU			--		- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	233.55	178.2	--
pH	Units			--		- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	8.22	8.01	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-20: WC-OW10-75**

		Criteria		WC-OW10-75							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-04	2020-11-24	Average
pH	pH			8.03	8.04	8.08	8.05	8.05	8.07	7.95	8.01
Alkalinity	mg/L as CaCO3			209	174	170	180	170	160	170	165
Carbonate	mg/L as CaCO3			< 2.0	1.9	1.9	1.9	1.8	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			209	169	170	180	170	160	170	165
Total Dissolved Solids	mg/L			271	242	183	555	230	237	283	260
Fluoride	mg/L	1.5		0.15	0.19	0.19	0.15	0.13	0.14	0.15	0.15
Total Organic Carbon	mg/L			< 1.0	1.50	1.15	1.09	0.84	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L			-. <sup>1</sup>	0.86	0.72	0.71	0.57	< 1.0	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			-. <sup>1</sup>	0.050	0.065	0.145	0.069	0.09	< 0.04	0.07
Chloride (dissolved)	mg/L			3.6	2.6	2.5	3.6	4.2	4.5	3.9	4.2
Sulphate (dissolved)	mg/L			40	28	28	35	39	41	38	39
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	< 1.0	< 1.0	< 0.30	< 0.30	< 0.30
Nitrite (as N)	as N mg/L			-. <sup>1</sup>	< 0.010	< 0.010	< 0.010	< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			-. <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			-. <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			202	177	170	190	195	211	203	207
Silver (dissolved)	µg/L		1.5	0.003	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			19.6	3.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0
Arsenic (dissolved)	µg/L	25	1900	2.8	1.6	1.5	2.0	2.6	2.8	2.8	2.8
Barium (dissolved)	µg/L	1000	29000	144	123	125	135	135	161	146	154
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	17	27	23	15	16	11	13	12
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			38770	33650	31000	35500	39500	43900	43200	43550
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.01	0.53	< 0.50	< 0.50	< 0.50	0.012	0.009	0.011
Chromium (dissolved)	µg/L		810	< 0.03	2.6	< 5.0	< 5.0	< 5.0	< 0.08	0.43	0.26
Copper (dissolved)	µg/L	1000	87	0.0	0.3	< 1.0	< 1.0	< 1.0	< 0.20	< 0.20	< 0.20
Iron (dissolved)	µg/L			223	65	< 100	125	245	232	283	258
Potassium (dissolved)	µg/L			1320	1310	1200	1250	1200	1250	1260	1255
Magnesium (dissolved)	µg/L			25450	23100	22500	24500	24500	24200	21800	23000
Manganese (dissolved)	µg/L			11.2	12.8	12.5	11.5	10.4	9.02	9.43	9.23
Molybdenum (dissolved)	µg/L		9200	0.91	1.05	1.15	0.99	0.85	0.89	0.60	0.75
Sodium (dissolved)	µg/L			6524	9115	9200	7350	5950	5790	5690	5740
Nickel (dissolved)	µg/L		490	0.1	0.6	< 1.0	1.7	< 1.0	< 0.1	< 0.1	< 0.1
Phosphorus (dissolved)	mg/L			0.210	0.024	0.034	1.041	0.018	0.003	< 0.003	0.003
Lead (dissolved)	µg/L	10	25	< 0.01	0.26	< 0.50	< 0.50	< 0.50	< 0.01	0.02	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.35	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			< 0.0	0.5	< 1.0	< 1.0	< 1.0	< 0.06	0.07	0.07
Strontium (dissolved)	µg/L			402	399	380	390	360	320	380	350
Titanium (dissolved)	µg/L			0.2	2.5	< 5.0	< 5.0	< 5.0	< 0.05	0.19	0.12
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.03	0.07	< 0.10	< 0.10	< 0.10	0.027	0.025	0.026
Vanadium (dissolved)	µg/L		250	0.21	0.29	< 0.50	< 0.50	< 0.50	< 0.01	< 0.01	< 0.01
Zinc (dissolved)	µg/L		1100	2.7	5.0	< 5	< 5.0	< 5.0	< 2	< 2	< 2
Lead-210	Bq/L	0.20		< 0.02	0.03	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.025	0.025	< 0.040	< 0.040	< 0.040	0.02	< 0.01	0.02
Thorium-230	Bq/L	0.65		< 0.015	0.040	< 0.070	< 0.070	< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		-. <sup>1</sup>	-. <sup>1</sup>	< 0.060	< 0.060	< 0.060	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	46.8	48.8	--
ORP	mV			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-102.1	11.5	--
SPC	µs/cm			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	434.5	472.4	--
Temperature	°C			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	15.29	8.427	--
Turbidity	FNU			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	2.08	42.9	--
pH	Units			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	7.79	7.94	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-21: WC-OW12-75**

		Criteria		WC-OW12-75			
		COPC	Table 3	2015	2016	2017	2018
Parameter	Units			Average			WELL DECOMMISSIONED
pH	pH			7.64	8.00	7.84	
Alkalinity	mg/L as CaCO <sub>3</sub>			252	299	220	
Carbonate	mg/L as CaCO <sub>3</sub>			< 2.0	2.3	1.5	
Bicarbonate	mg/L as CaCO <sub>3</sub>			252	294	220	
Total Dissolved Solids	mg/L			424	536	309	
Fluoride	mg/L	1.5		< 0.06	0.08	< 0.10	
Total Organic Carbon	mg/L			1.65	1.20	1.00	
Dissolved Organic Carbon	mg/L			-. <sup>1</sup>	1.50	0.97	
Ammonia+Ammonium (N)	as N mg/L			-. <sup>1</sup>	< 0.050	< 0.050	
Chloride (dissolved)	mg/L			47.0	26.0	16.0	
Sulphate (dissolved)	mg/L			35	80	28	
Bromide (dissolved)	mg/L			0.4	0.7	< 1.0	
Nitrite (as N)	as N mg/L			-. <sup>1</sup>	< 0.010	< 0.010	
Nitrate (as N)	as N mg/L			-. <sup>1</sup>	13.10	2.93	
Nitrate + Nitrite (as N)	as N mg/L			-. <sup>1</sup>	13.10	2.93	
Mercury (dissolved)	µg/L	1	0.29	0.01	0.06	< 0.10	
Hardness	mg/L as CaCO <sub>3</sub>			413	423	255	
Silver (dissolved)	µg/L		1.5	0.03	0.06	< 0.10	
Aluminum (dissolved)	µg/L			6.8	3.0	< 5.0	
Arsenic (dissolved)	µg/L	25	1900	1.2	0.6	< 1.0	
Barium (dissolved)	µg/L	1000	29000	30	44	26	
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	
Boron (dissolved)	µg/L	5000	45000	12	23	11	
Bismuth (dissolved)	µg/L			0.1	0.5	< 1.0	
Calcium (dissolved)	µg/L			120000	153500	93500	
Cadmium (dissolved)	µg/L	5	2.7	0.01	0.05	< 0.10	
Cobalt (dissolved)	µg/L		66	0.17	0.84	< 0.50	
Chromium (dissolved)	µg/L		810	0.4	2.8	< 5.0	
Copper (dissolved)	µg/L	1000	87	1.0	0.3	< 1.0	
Iron (dissolved)	µg/L			112	67	< 100	
Potassium (dissolved)	µg/L			538	729	575	
Magnesium (dissolved)	µg/L			7220	8405	5000	
Manganese (dissolved)	µg/L			0.1	1.0	< 2.0	
Molybdenum (dissolved)	µg/L		9200	0.19	0.35	< 0.50	
Sodium (dissolved)	µg/L			7225	20250	7850	
Nickel (dissolved)	µg/L		490	1.2	0.6	< 1.0	
Phosphorus (dissolved)	mg/L			< 0.030	0.017	0.006	
Lead (dissolved)	µg/L	10	25	0.02	0.26	< 0.50	
Antimony (dissolved)	µg/L	6	20000	0.65	0.40	< 0.50	
Selenium (dissolved)	µg/L	10	63	1.5	1.2	< 2.0	
Tin (dissolved)	µg/L			0.2	0.5	< 1.0	
Strontium (dissolved)	µg/L			215	281	170	
Titanium (dissolved)	µg/L			0.2	2.5	< 5.0	
Thallium (dissolved)	µg/L		510	0.007	0.028	< 0.050	
Uranium (dissolved)	µg/L	20	420	1.12	0.87	0.60	
Vanadium (dissolved)	µg/L		250	0.52	0.45	< 0.50	
Zinc (dissolved)	µg/L		1100	10.0	3.5	< 5.0	
Lead-210	Bq/L	0.20		< 0.02	0.02	< 0.02	
Radium-226	Bq/L	0.49		< 0.010	0.030	< 0.040	
Thorium-230	Bq/L	0.65		< 0.010	0.040	< 0.070	
Thorium-232	Bq/L	0.60		-. <sup>1</sup>	-. <sup>1</sup>	-. <sup>1</sup>	
<b>Field Parameters</b>							
ODO % Sat	%			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	
ORP	mV			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	
SPC	µs/cm			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	
Temperature	°C			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	
Turbidity	FNU			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	
pH	Units			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-22: WC-OW18-76**

		Criteria		WC-OW18-76			
		COPC	Table 3	2015	2016	2017	2018
Parameter	Units			Average			WELL DECOMMISSIONED
pH	pH			--	---	7.97	
Alkalinity	mg/L as CaCO <sub>3</sub>			---	---	200	
Carbonate	mg/L as CaCO <sub>3</sub>					1.7	
Bicarbonate	mg/L as CaCO <sub>3</sub>			---	---	200	
Total Dissolved Solids	mg/L			---	---	246	
Fluoride	mg/L	1.5		---	---	< 0.10	
Total Organic Carbon	mg/L			---	---	5.70	
Dissolved Organic Carbon	mg/L			-. <sup>1</sup>	-. <sup>1</sup>	0.91	
Ammonia+Ammonium (N)	as N mg/L			-. <sup>1</sup>	-. <sup>1</sup>	< 0.050	
Chloride (dissolved)	mg/L			---	---	19.0	
Sulphate (dissolved)	mg/L			---	---	12	
Bromide (dissolved)	mg/L			---	---	< 1.0	
Nitrite (as N)	as N mg/L			---	---	< 0.010	
Nitrate (as N)	as N mg/L			-. <sup>1</sup>	-. <sup>1</sup>	< 0.10	
Nitrate + Nitrite (as N)	as N mg/L			-. <sup>1</sup>	-. <sup>1</sup>	< 0.10	
Mercury (dissolved)	µg/L	1	0.29	---	---	< 0.10	
Hardness	mg/L as CaCO <sub>3</sub>			---	199	200	
Silver (dissolved)	µg/L		1.5	---	0.05	< 0.10	
Aluminum (dissolved)	µg/L			---	3.0	< 5.0	
Arsenic (dissolved)	µg/L	25	1900	---	2.0	4.0	
Barium (dissolved)	µg/L	1000	29000	---	23	27	
Beryllium (dissolved)	µg/L		67	---	0.3	< 0.50	
Boron (dissolved)	µg/L	5000	45000	---	10	< 10	
Bismuth (dissolved)	µg/L			---	0.5	< 1.0	
Calcium (dissolved)	µg/L			---	58700	65000	
Cadmium (dissolved)	µg/L	5	2.7	---	0.06	< 0.10	
Cobalt (dissolved)	µg/L		66	---	0.72	< 0.50	
Chromium (dissolved)	µg/L		810	---	2.7	< 5.0	
Copper (dissolved)	µg/L	1000	87	---	0.85	< 1.0	
Iron (dissolved)	µg/L			---	447	2100	
Potassium (dissolved)	µg/L			---	980	770	
Magnesium (dissolved)	µg/L			---	7405	8500	
Manganese (dissolved)	µg/L			---	147	55	
Molybdenum (dissolved)	µg/L		9200	---	3.0	0.97	
Sodium (dissolved)	µg/L			---	19900	20000	
Nickel (dissolved)	µg/L		490	---	5.1	3.2	
Phosphorus (dissolved)	mg/L			---	---	0.850	
Lead (dissolved)	µg/L	10	25	---	0.3	< 0.50	
Antimony (dissolved)	µg/L	6	20000	---	0.4	< 0.50	
Selenium (dissolved)	µg/L	10	63	---	1.1	< 2.0	
Tin (dissolved)	µg/L			---	0.5	< 1.0	
Strontium (dissolved)	µg/L			---	161	170	
Titanium (dissolved)	µg/L			---	2.5	< 5.0	
Thallium (dissolved)	µg/L		510	---	0.03	< 0.050	
Uranium (dissolved)	µg/L	20	420	---	99	120	
Vanadium (dissolved)	µg/L		250	---	0.3	< 0.50	
Zinc (dissolved)	µg/L		1100	---	739	1200	
Lead-210	Bq/L	0.20		< 0.04	< 0.02	< 0.02	
Radium-226	Bq/L	0.49		0.030	0.035	< 0.040	
Thorium-230	Bq/L	0.65		0.035	0.040	< 0.070	
Thorium-232	Bq/L	0.60		-. <sup>1</sup>	-. <sup>1</sup>	< 0.060	
<b>Field Parameters</b>							
ODO % Sat	%			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	
ORP	mV			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	
SPC	µs/cm			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	
Temperature	°C			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	
Turbidity	FNU			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	
pH	Units			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.

**Table C-23: WC-OW25-76**

		Criteria		WC-OW25-76							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-02	2020-11-26	Average
pH	pH			--	---	7.77	---	8.19	-. <sup>4</sup>	7.75	7.75
Alkalinity	mg/L as CaCO3			---	---	160	---	140	-. <sup>4</sup>	163	163
Carbonate	mg/L as CaCO3			---	---	< 1.0	---	2	-. <sup>4</sup>	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			---	---	---	---	140	-. <sup>4</sup>	163	163
Total Dissolved Solids	mg/L			---	---	---	---	---	-. <sup>4</sup>	160	160
Fluoride	mg/L	1.5		---	---	---	---	---	-. <sup>4</sup>	0.24	0.24
Total Organic Carbon	mg/L			---	---	2.3	---	---	-. <sup>4</sup>	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L			---	---	2.9	---	---	-. <sup>4</sup>	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			---	---	1.7	---	---	-. <sup>4</sup>	0.07	0.07
Chloride (dissolved)	mg/L			---	---	---	---	---	-. <sup>4</sup>	1.9	1.9
Sulphate (dissolved)	mg/L			---	---	---	---	---	-. <sup>4</sup>	14	14
Bromide (dissolved)	mg/L			---	---	---	---	---	-. <sup>4</sup>	< 0.30	< 0.30
Nitrite (as N)	as N mg/L			---	---	---	---	---	-. <sup>4</sup>	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			---	---	---	---	---	-. <sup>4</sup>	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			---	---	---	---	---	-. <sup>4</sup>	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.06	< 0.10	---	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			163	123	---	110	115	-. <sup>4</sup>	159	159
Silver (dissolved)	µg/L		1.5	0.00	0.01	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			16.0	2.0	8.0	< 5.0	< 5.0	2.0	2.0	2.0
Arsenic (dissolved)	µg/L	25	1900	0.8	1.6	< 1.0	< 1.0	< 1.0	0.8	0.7	0.8
Barium (dissolved)	µg/L	1000	29000	34	27	30	25	35	29.00	110.00	69.50
Beryllium (dissolved)	µg/L		67	< 0.01	< 0.01	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	69	71	70	62	63	60	22	41
Bismuth (dissolved)	µg/L			0.0	< 0.0	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			36900	30000	28000	26500	25500	26400	29000	27700
Cadmium (dissolved)	µg/L	5	2.7	0.00	0.01	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.44	0.20	< 0.50	< 0.50	< 0.50	0.031	0.163	0.097
Chromium (dissolved)	µg/L		810	0.1	0.3	< 5.0	< 5.0	< 5.0	< 0.08	0.55	0.32
Copper (dissolved)	µg/L	1000	87	1.6	0.1	< 1.0	< 1.0	< 1.0	0.30	< 0.20	0.25
Iron (dissolved)	µg/L			80	34	< 100	< 100	< 100	< 7	2570	1289
Potassium (dissolved)	µg/L			1140	696	955	695	715	667	852	760
Magnesium (dissolved)	µg/L			17200	11700	11000	11500	11500	11500	13700	12600
Manganese (dissolved)	µg/L			68	4	30	5	12	3.31	52.80	28.06
Molybdenum (dissolved)	µg/L		9200	1.9	1.7	1.6	1.5	1.7	1.44	1.26	1.35
Sodium (dissolved)	µg/L			14300	11200	11000	11000	10500	10500	8270	9385
Nickel (dissolved)	µg/L		490	1.1	0.2	< 1.0	< 1.0	< 1.0	< 0.1	0.4	0.3
Phosphorus (dissolved)	mg/L			---	---	0.41	---	---	0.008	< 0.003	0.006
Lead (dissolved)	µg/L	10	25	0.09	0.01	< 0.50	< 0.50	< 0.50	< 0.01	0.12	0.07
Antimony (dissolved)	µg/L	6	20000	1.30	0.30	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 1.0	0.1	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.3	0.1	< 1.0	< 1.0	< 1.0	< 0.06	0.10	0.08
Strontium (dissolved)	µg/L			348	444	420	430	425	436	367	402
Titanium (dissolved)	µg/L			0.1	0.1	< 5.0	< 5.0	< 5.0	0.07	0.06	0.07
Thallium (dissolved)	µg/L		510	< 0.005	0.005	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.11	0.31	0.12	0.11	0.14	0.092	0.191	0.142
Vanadium (dissolved)	µg/L		250	0.9	1.6	1.4	1.5	3.2	1.75	0.01	0.88
Zinc (dissolved)	µg/L		1100	49.0	2.0	< 5.0	< 5.0	< 5.0	2	17	10
Lead-210	Bq/L	0.20		< 0.02	0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.020	0.035	< 0.040	< 0.040	< 0.040	0.01	< 0.01	0.01
Thorium-230	Bq/L	0.65		< 0.010	0.010	< 0.070	< 0.070	< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		-. <sup>1</sup>	-. <sup>1</sup>	< 0.060	< 0.060	< 0.060	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	26.1	-. <sup>3</sup>	--
ORP	mV			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-147.1	-. <sup>3</sup>	--
SPC	µs/cm			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	310	-. <sup>3</sup>	--
Temperature	°C			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	10.687	-. <sup>3</sup>	--
Turbidity	FNU			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	69.54	-. <sup>3</sup>	--
pH	Units			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	7.78	-. <sup>3</sup>	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Insufficient volume of groundwater for field parameters<sup>4</sup> Insufficient volume of groundwater for full sample collection

**Table C-24: WC-OW27-76**

		Criteria		WC-OW27-76						
		COPC	Table 3	2015	2016	2017	2018	2019	2020	
Parameter	Units			Average					2020-06-02	2020-11-26
pH	pH			--	---	8.00	7.88	8.04	7.93	7.69
Alkalinity	mg/L as CaCO <sub>3</sub>			210	205	215	210	210	212	297
Carbonate	mg/L as CaCO <sub>3</sub>			< 2.0	< 2.0	2.1	1.5	2.1	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			210	205	210	210	205	212	297
Total Dissolved Solids	mg/L			280	292	338	680	390	314	391
Fluoride	mg/L	1.5		0.14	0.14	0.14	0.13	0.11	0.14	0.13
Total Organic Carbon	mg/L			1.6	< 1.0	1.4	9.4	1.6	< 1.0	1.0
Dissolved Organic Carbon	mg/L			1 <sup>1</sup>	1 <sup>1</sup>	1.2	1.3	1.3	1.0	2.0
Ammonia+Ammonium (N)	as N mg/L			1 <sup>1</sup>	1 <sup>1</sup>	0.093	0.210	0.077	0.06	0.07
Chloride (dissolved)	mg/L			13	20	28	31	46	48	60
Sulphate (dissolved)	mg/L			33	31	29	26	31	31	33
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 1.0	< 1.0	< 1.0	< 0.30	< 0.30
Nitrite (as N)	as N mg/L			1 <sup>1</sup>	1 <sup>1</sup>	< 0.010	0.022	0.023	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			1 <sup>1</sup>	---	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			1 <sup>1</sup>	---	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	0.01	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01
Hardness	mg/L as CaCO <sub>3</sub>			275	255	270	250	305	377	457
Silver (dissolved)	µg/L		1.5	0.003	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			6.8	3.0	< 5.0	< 5.0	< 5.0	3.0	1.0
Arsenic (dissolved)	µg/L	25	1900	0.5	0.9	< 1.0	< 1.0	< 1.0	0.4	0.3
Barium (dissolved)	µg/L	1000	29000	118	113	125	110	155	158	158
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	49	51	45	46	40	38	40
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007
Calcium (dissolved)	µg/L			74150	67000	70000	65500	82500	82500	94100
Cadmium (dissolved)	µg/L	5	2.7	0.005	0.05	< 0.10	< 0.10	< 0.10	0.011	0.005
Cobalt (dissolved)	µg/L		66	0.06	0.61	< 0.50	< 0.50	< 0.50	0.030	0.063
Chromium (dissolved)	µg/L		810	< 0.03	2.6	< 5.0	< 5.0	< 5.0	< 0.08	0.54
Copper (dissolved)	µg/L	1000	87	0.2	0.3	< 1.0	< 1.0	< 1.0	0.30	0.30
Iron (dissolved)	µg/L			5	55	< 100	< 100	< 100	8	7
Potassium (dissolved)	µg/L			778	802	820	810	885	928	949
Magnesium (dissolved)	µg/L			21900	21500	22000	21500	23500	24600	24800
Manganese (dissolved)	µg/L			24	20	19	78	46	12.90	59.40
Molybdenum (dissolved)	µg/L		9200	0.93	0.70	0.56	0.55	0.51	0.51	0.53
Sodium (dissolved)	µg/L			9510	9320	9650	9700	11000	11900	13000
Nickel (dissolved)	µg/L		490	0.4	0.7	< 1.0	< 1.0	1.2	0.3	0.6
Phosphorus (dissolved)	mg/L			0.060	0.030	0.047	18.00	0.04	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	0.07	0.26	< 0.50	< 0.50	< 0.50	< 0.01	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.35	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.5	1.0	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.0	0.5	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06
Strontium (dissolved)	µg/L			741	688	695	715	765	845	1010
Titanium (dissolved)	µg/L			0.1	2.5	< 5.0	< 5.0	< 5.0	0.19	0.10
Thallium (dissolved)	µg/L		510	0.009	0.028	< 0.050	< 0.050	< 0.050	0.006	< 0.005
Uranium (dissolved)	µg/L	20	420	0.19	0.16	0.14	0.15	0.13	0.136	0.153
Vanadium (dissolved)	µg/L		250	0.56	0.60	0.54	< 0.50	< 0.50	0.54	0.58
Zinc (dissolved)	µg/L		1100	2.0	3.5	< 5.0	< 5.0	< 5.0	< 2	2
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.010	0.040	< 0.040	< 0.040	< 0.040	0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.010	< 0.010	< 0.070	< 0.070	< 0.070	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		1 <sup>1</sup>	1 <sup>1</sup>	< 0.060	< 0.060	< 0.060	< 0.02	< 0.02
<b>Field Parameters</b>										
ODO % Sat	%			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	3 <sup>3</sup>
ORP	mV			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	3 <sup>3</sup>
SPC	µs/cm			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	3 <sup>3</sup>
Temperature	°C			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	3 <sup>3</sup>
Turbidity	FNU			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	3 <sup>3</sup>
pH	Units			2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>3</sup>	3 <sup>3</sup>

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

Bold values indicate an exceedance of the COPC or Table 3 criteria.

<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Insufficient volume of groundwater for field parameters

**Table C-25: WC-OW28-76**

		Criteria		WC-OW28-76							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-02	2020-11-26	Average
pH	pH			---	---	---	---	8	8.14	8.05	8.10
Alkalinity	mg/L as CaCO3			---	---	---	---	140	132	132	132
Carbonate	mg/L as CaCO3			---	---	---	---	2.05	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			---	---	---	---	140	132	132	132
Total Dissolved Solids	mg/L			---	---	---	---	205	154	177	166
Fluoride	mg/L	1.5		---	---	---	---	0.22	0.25	0.23	0.24
Total Organic Carbon	mg/L			---	---	1.2	---	1.3	< 1.0	1.0	1.0
Dissolved Organic Carbon	mg/L			---	---	---	---	1	< 1.0	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			---	---	0.079	---	0.067	< 0.04	< 0.04	< 0.04
Chloride (dissolved)	mg/L			---	---	---	---	16	17	19	18
Sulphate (dissolved)	mg/L			---	---	---	---	13	12	12	12
Bromide (dissolved)	mg/L			---	---	---	---	1	< 0.30	< 0.30	< 0.30
Nitrite (as N)	as N mg/L			---	---	---	---	0	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			---	---	---	---	< 0	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			---	---	---	---	0	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	< 0.01	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			151	156	---	120	130	148	144	146
Silver (dissolved)	µg/L		1.5	0.164	< 0.00	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			8.0	< 1.0	< 5.0	6.7	< 5.0	1.0	2.0	1.5
Arsenic (dissolved)	µg/L	25	1900	0.7	1.0	< 1.0	< 1.0	< 1.0	0.7	0.5	0.6
Barium (dissolved)	µg/L	1000	29000	79	67	64	63	73	77.60	83.70	80.65
Beryllium (dissolved)	µg/L		67	< 0.01	< 0.01	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	85	89	81	74	80	115	71	93
Bismuth (dissolved)	µg/L			< 0.01	< 0.0	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			34300	36000	29500	28000	30000	33900	35300	34600
Cadmium (dissolved)	µg/L	5	2.7	0.004	< 0.00	< 0.10	< 0.10	< 0.10	0.006	< 0.003	0.005
Cobalt (dissolved)	µg/L		66	0.04	0.23	< 0.50	< 0.50	< 0.50	0.030	0.025	0.028
Chromium (dissolved)	µg/L		810	< 0.03	0.4	< 5.0	< 5.0	< 5.0	0.11	0.65	0.38
Copper (dissolved)	µg/L	1000	87	1.0	0.1	< 1.0	< 1.0	< 1.0	0.40	0.50	0.45
Iron (dissolved)	µg/L			8	14	< 100	< 100	< 100	< 7	< 7	< 7
Potassium (dissolved)	µg/L			760	760	710	690	715	763	730	747
Magnesium (dissolved)	µg/L			15700	16000	13500	12500	13500	15000	14200	14600
Manganese (dissolved)	µg/L			5.5	9.4	6.5	3.0	< 2.4	2.83	3.18	3.01
Molybdenum (dissolved)	µg/L		9200	1.2	1.5	1.6	1.5	1.6	1.19	1.12	1.16
Sodium (dissolved)	µg/L			11550	12200	11000	11000	11000	12300	11200	11750
Nickel (dissolved)	µg/L		490	0.6	0.4	< 1.0	< 1.0	< 1.0	0.3	0.4	0.4
Phosphorus (dissolved)	mg/L			---	---	0.009	---	0.01	0.005	< 0.003	0.004
Lead (dissolved)	µg/L	10	25	0.36	0.14	< 0.50	< 0.50	< 0.50	0.05	0.05	0.05
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.20	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.5	< 0.0	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.1	0.1	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06	< 0.06
Strontium (dissolved)	µg/L			649	653	500	520	525	650	721	686
Titanium (dissolved)	µg/L			0.3	< 0.1	< 5.0	< 5.0	< 5.0	0.07	0.09	0.08
Thallium (dissolved)	µg/L		510	0.009	< 0.005	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.21	0.26	0.17	0.17	0.16	0.144	0.187	0.166
Vanadium (dissolved)	µg/L		250	1.62	0.63	< 0.50	< 0.50	2.76	0.89	0.79	0.84
Zinc (dissolved)	µg/L		1100	3.0	4.0	< 5.0	< 5.0	< 5.0	< 2	5	4
Lead-210	Bq/L	0.20		0.05	< 0.02	< 0.02	< 0.10	< 0.10	0.02	< 0.02	0.02
Radium-226	Bq/L	0.49		< 0.020	0.030	< 0.040	< 0.040	< 0.040	< 0.01	0.01	0.01
Thorium-230	Bq/L	0.65		0.035	0.010	< 0.070	< 0.070	< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		-. <sup>1</sup>	-. <sup>1</sup>	< 0.060	< 0.060	< 0.060	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>3</sup>	-. <sup>3</sup>	--
ORP	mV			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>3</sup>	-. <sup>3</sup>	--
SPC	µs/cm			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>3</sup>	-. <sup>3</sup>	--
Temperature	°C			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>3</sup>	-. <sup>3</sup>	--
Turbidity	FNU			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>3</sup>	-. <sup>3</sup>	--
pH	Units			-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>2</sup>	-. <sup>3</sup>	-. <sup>3</sup>	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Insufficient volume of groundwater for field parameters



**Table C-26: WC-OW33-76**

		Criteria		WC-OW33-76							
		COPC	Table 3	2015	2016	2017	2018	2019	2020		
Parameter	Units			Average					2020-06-24	2020-11-26	Average
pH	pH			7.93	7.62	7.82	7.85	7.63	7.28	7.43	7.36
Alkalinity	mg/L as CaCO3			411	390	380	385	370	385	375	380
Carbonate	mg/L as CaCO3			< 2.0	1.8	2.4	2.7	1.5	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			411	385	380	385	370	385	375	380
Total Dissolved Solids	mg/L			462	438	445	423	435	437	483	460
Fluoride	mg/L	1.5		0.07	0.10	< 0.10	< 0.10	< 0.10	0.08	< 0.06	0.07
Total Organic Carbon	mg/L			2.4	2.5	2.9	2.6	2.5	2.0	2.0	2.0
Dissolved Organic Carbon	mg/L			~ <sup>1</sup>	2.40	2.2	2.2	2.0	3.0	2.0	2.5
Ammonia+Ammonium (N)	as N mg/L			~ <sup>1</sup>	< 0.050	< 0.050	0.058	< 0.050	0.04	< 0.04	0.04
Chloride (dissolved)	mg/L			4.1	2.7	4.8	5.0	6.8	10	37	24
Sulphate (dissolved)	mg/L			37	30	34	30	30	28	26	27
Bromide (dissolved)	mg/L			< 0.3	0.7	< 1.0	< 1.0	< 1.0	< 0.30	0.40	0.35
Nitrite (as N)	as N mg/L			~ <sup>1</sup>	< 0.010	< 0.010	< 0.010	< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			~ <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			~ <sup>1</sup>	< 0.10	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.06	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			275	253	265	265	295	349	325	337
Silver (dissolved)	µg/L		1.5	0.008	0.05	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			4.5	3.5	< 5.0	< 5.0	5.7	186.0	1.0	93.5
Arsenic (dissolved)	µg/L	25	1900	2.2	2.0	1.4	< 1.0	< 1.0	1.7	0.7	1.2
Barium (dissolved)	µg/L	1000	29000	68	74	78	78	77	63.40	88.80	76.10
Beryllium (dissolved)	µg/L		67	< 0.01	0.25	< 0.50	< 0.50	< 0.50	0.008	< 0.007	0.008
Boron (dissolved)	µg/L	5000	45000	43	46	38	38	43	139	44	92
Bismuth (dissolved)	µg/L			< 0.01	0.5	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			94600	87500	91000	92500	99500	26900	110000	68450
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.05	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.12	0.58	< 0.50	< 0.50	< 0.50	0.152	0.084	0.118
Chromium (dissolved)	µg/L		810	0.12	2.7	< 5.0	< 5.0	< 5.0	0.72	0.66	0.69
Copper (dissolved)	µg/L	1000	87	1.0	0.3	< 1.0	< 1.0	< 1.0	0.70	0.30	0.50
Iron (dissolved)	µg/L			1057	1335	910	240	410	223	55	139
Potassium (dissolved)	µg/L			1040	1145	1100	1100	1150	1770	1320	1545
Magnesium (dissolved)	µg/L			9495	8865	9050	9000	10000	19800	10100	14950
Manganese (dissolved)	µg/L			53	63	64	65	87	13.50	102.00	57.75
Molybdenum (dissolved)	µg/L		9200	3.1	3.1	2.9	2.8	3.0	7.18	2.65	4.92
Sodium (dissolved)	µg/L			98500	75300	69000	61000	61000	44000	50500	47250
Nickel (dissolved)	µg/L		490	3.6	1.4	1.3	< 1.0	< 1.0	0.3	0.3	0.3
Phosphorus (dissolved)	mg/L			0.070	0.031	0.264	0.04	0.05	0.030	< 0.003	0.017
Lead (dissolved)	µg/L	10	25	0.18	0.26	< 0.50	< 0.50	< 0.50	0.26	0.06	0.16
Antimony (dissolved)	µg/L	6	20000	0.65	0.35	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	1.1	1.0	< 2.0	< 2.0	< 2.0	0.07	< 0.04	0.06
Tin (dissolved)	µg/L			0.1	0.5	< 1.0	< 1.0	< 1.0	0.10	< 0.06	0.08
Strontium (dissolved)	µg/L			164	195	195	200	205	785	290	538
Titanium (dissolved)	µg/L			0.2	2.6	< 5.0	< 5.0	< 5.0	9.91	0.07	4.99
Thallium (dissolved)	µg/L		510	< 0.005	0.028	< 0.050	< 0.050	< 0.050	0.020	< 0.005	0.013
Uranium (dissolved)	µg/L	20	420	2.2	2.6	2.5	2.1	2.0	0.741	2.270	1.506
Vanadium (dissolved)	µg/L		250	0.13	0.28	< 0.50	< 0.50	< 0.50	1.74	0.02	0.88
Zinc (dissolved)	µg/L		1100	26.0	7.0	7.2	6.2	< 5.0	< 2	< 2	< 2
Lead-210	Bq/L	0.20		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.015	0.025	< 0.040	< 0.040	< 0.040	0.01	0.01	0.01
Thorium-230	Bq/L	0.65		< 0.010	0.040	< 0.070	< 0.070	< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L	0.60		~ <sup>1</sup>	~ <sup>1</sup>	~ <sup>1</sup>	< 0.060	< 0.060	< 0.02	< 0.02	< 0.02
Field Parameters											
ODO % Sat	%			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	87.5	~ <sup>3</sup>	--
ORP	mV			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	31.3	~ <sup>3</sup>	--
SPC	µs/cm			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	771	~ <sup>3</sup>	--
Temperature	°C			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	13.559	~ <sup>3</sup>	--
Turbidity	FNU			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	104.02	~ <sup>3</sup>	--
pH	Units			~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	~ <sup>2</sup>	7.46	~ <sup>3</sup>	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment and Climate Change, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria.<sup>1</sup> Analysis not included in laboratory contract.<sup>2</sup> Field parameters included for current sampling year only.<sup>3</sup> Insufficient volume of groundwater for field parameters

**APPENDIX D HIGHLAND DRIVE GROUNDWATER RESULTS****Table D-1: PH-02-01**

		Criteria		PH-02-01			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
		6.5-8.5	6.5-9.0	Average	2020-05-28	2020-10-30	Average
pH	pH			7.46	7.31	7.55	7.43
Alkalinity	mg/L as CaCO <sub>3</sub>			325	293	342	318
Carbonate	mg/L as CaCO <sub>3</sub>			1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			325	293	342	318
Total Dissolved Solids	mg/L			423	323	389	356
Fluoride	mg/L	1.5		< 0.10	0.06	0.06	0.06
Total Organic Carbon	mg/L			3.4	2.0	2.0	2.0
Dissolved Organic Carbon	mg/L			2.3	2.0	2.0	2.0
Total Ammonia-N	mg/l			0.10	< 0.04	< 0.04	< 0.04
Chloride	mg/L			15	6.2	9	7.7
Sulphate	mg/L			6.4	5.6	6	6.0
Bromide	mg/L			< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			< 0.010	< 0.03	1.42	0.73
Nitrate (N)	mg/L			0.81	1.16	< 0.06	0.61
Nitrate + Nitrite (N)	mg/L			0.81	1.16	1.42	1.29
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			350	394	386	390
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5	10	< 1	6
Arsenic (dissolved)	µg/L	25	1900	< 1.0	< 0.2	0.2	0.2
Barium (dissolved)	µg/L	1000	29000	24	21	24	22
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	27	31	19	25
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			130000	120000	125000	122500
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	< 0.50	0.051	0.040	0.046
Chromium (dissolved)	µg/L		810	< 5.0	0.24	0.17	0.21
Copper (dissolved)	µg/L	1000	87	1.3	1.8	1.3	1.6
Iron (dissolved)	µg/L			< 100	12	< 7	10
Potassium (dissolved)	µg/L			2050	2120	2470	2295
Magnesium (dissolved)	µg/L			7100	5830	7140	6485
Manganese (dissolved)	µg/L			< 2.0	3.08	0.81	1.95
Molybdenum (dissolved)	µg/L		9200	0.50	0.55	0.33	0.44
Sodium (dissolved)	µg/L			3450	4960	5800	5380
Nickel (dissolved)	µg/L		490	< 1.0	< 0.1	0.4	0.3
Phosphorus (total)	mg/L			0.22	0.012	< 0.003	0.008
Lead (dissolved)	µg/L	10	25	< 0.50	0.03	< 0.01	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.65	0.48	0.57
Tin (dissolved)	µg/L			< 1.0	0.09	0.08	0.09
Strontium (dissolved)	µg/L			200	193	226	210
Titanium (dissolved)	µg/L			< 5.0	0.48	< 0.05	0.27
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	< 3.4	3.25	2.56	2.91
Vanadium (dissolved)	µg/L		250	< 0.50	0.29	0.33	0.31
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	< 2	< 2
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	0.02	0.02
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	60.8	41.3	--
ORP	mV			- <sup>1</sup>	57.1	132.2	--
SPC	us/cm			- <sup>1</sup>	546.0	592	--
Temperature	°C			- <sup>1</sup>	8.767	11.752	--
Turbidity	FNU			- <sup>1</sup>	55.84	41.97	--
pH	Units			- <sup>1</sup>	7.21	7.00	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Port Hope Screening Report.

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Ontario Ministry of the Environment, 2011.

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-2: PH-02-02**

		Criteria		PH-02-02			
Analysis	Units	COPC	Table 3 (MECP)	2019 Average	2020-05-26	2020-10-30	2020 Average
		6.5-8.5	6.5-9.0				
pH	pH			7.47	7.13	7.60	7.37
Alkalinity	mg/L as CaCO <sub>3</sub>			335	412	281	347
Carbonate	mg/L as CaCO <sub>3</sub>			1.2	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			335	412	281	347
Total Dissolved Solids	mg/L			415	446	303	375
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			2.6	2.0	2.0	2.0
Dissolved Organic Carbon	mg/L			2.0	3.0	2.0	2.5
Total Ammonia-N	mg/l			0.08	0.06	0.18	0.12
Chloride	mg/L			14	4	5	4.3
Sulphate	mg/L			5.6	7	4	5.5
Bromide	mg/L			< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			0.017	< 0.03	0.97	0.50
Nitrate (N)	mg/L			0.81	1.27	< 0.06	0.67
Nitrate + Nitrite (N)	mg/L			0.82	1.27	0.97	1.12
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			360	636	310	473
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			5	40	< 1	21
Arsenic (dissolved)	µg/L	25	1900	< 1.0	0.3	< 0.2	0.3
Barium (dissolved)	µg/L	1000	29000	37	35	32	33
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	34	39	24	32
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			130000	159000	103000	131000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	0.005	0.005	0.005
Cobalt (dissolved)	µg/L		66	< 0.50	0.169	0.086	0.128
Chromium (dissolved)	µg/L		810	< 5.0	0.19	0.10	0.15
Copper (dissolved)	µg/L	1000	87	1.6	1.8	1.8	1.8
Iron (dissolved)	µg/L			< 100	66	< 7	37
Potassium (dissolved)	µg/L			2400	2330	3290	2810
Magnesium (dissolved)	µg/L			7950	11100	5220	8160
Manganese (dissolved)	µg/L			70	230	159	195
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.22	0.33	0.28
Sodium (dissolved)	µg/L			5700	4670	3840	4255
Nickel (dissolved)	µg/L		490	< 1.0	0.9	0.6	0.8
Phosphorus (total)	mg/L			0.07	< 0.003	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	< 0.50	0.08	< 0.01	< 0.05
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.31	0.23	0.27
Tin (dissolved)	µg/L			< 1.0	0.07	< 0.06	0.07
Strontium (dissolved)	µg/L			205	236	176	206
Titanium (dissolved)	µg/L			< 5.0	2.05	< 0.05	1.05
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	2.2	2.47	1.69	2.08
Vanadium (dissolved)	µg/L		250	< 0.50	0.56	0.29	0.43
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	< 2	< 2
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	30.9	34.7	--
ORP	mV			- <sup>1</sup>	112.4	130.4	--
SPC	us/cm			- <sup>1</sup>	741	475.8	--
Temperature	°C			- <sup>1</sup>	9.897	10.923	--
Turbidity	FNU			- <sup>1</sup>	96.06	40.45	--
pH	Units			- <sup>1</sup>	6.86	7.12	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-3: PH-02-03**

		Criteria		PH-02-03			
		COPC	Table 3 (MECP)	2019 Average	2020-05-26	2020-10-30	2020 Average
<b>Analysis</b>	<b>Units</b>						
pH	pH	6.5-8.5	6.5-9.0	7.65	7.30	7.56	7.43
Alkalinity	mg/L as CaCO <sub>3</sub>			300	303	266	285
Carbonate	mg/L as CaCO <sub>3</sub>			1.3	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			295	303	266	285
Total Dissolved Solids	mg/L			403	331	314	323
Fluoride	mg/L	1.5		< 0.10	< 0.06	0.08	0.07
Total Organic Carbon	mg/L			2.5	2.0	2.0	2.0
Dissolved Organic Carbon	mg/L			2.1	2.0	2.0	2.0
Total Ammonia-N	mg/l			0.13	0.06	0.13	0.10
Chloride	mg/L			11	7	6	7
Sulphate	mg/L			6.9	3.7	2.8	3.3
Bromide	mg/L			< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			< 0.010	< 0.03	0.63	0.33
Nitrate (N)	mg/L			0.24	0.30	< 0.06	0.18
Nitrate + Nitrite (N)	mg/L			0.24	0.30	0.63	0.47
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			325	374	315	345
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5	< 1	< 1	< 1
Arsenic (dissolved)	µg/L	25	1900	< 1.0	< 0.2	< 0.2	< 0.2
Barium (dissolved)	µg/L	1000	29000	23	17	23	20
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	30	26	18	22
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			120000	120000	109000	114500
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	< 0.50	0.115	0.154	0.135
Chromium (dissolved)	µg/L		810	< 5.0	0.10	< 0.08	0.09
Copper (dissolved)	µg/L	1000	87	1.7	1.4	1.6	1.5
Iron (dissolved)	µg/L			< 100	< 7	< 7	< 7
Potassium (dissolved)	µg/L			1850	1930	2230	2080
Magnesium (dissolved)	µg/L			5700	6560	4100	5330
Manganese (dissolved)	µg/L			475.0	103	284	194
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.23	0.23	0.23
Sodium (dissolved)	µg/L			5450	3690	3160	3425
Nickel (dissolved)	µg/L		490	< 1.0	0.6	0.7	0.7
Phosphorus (total)	mg/L			0.01	< 0.003	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	< 0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.10	0.05	0.08
Tin (dissolved)	µg/L			< 1.0	< 0.06	0.08	0.07
Strontium (dissolved)	µg/L			185	198	198	198
Titanium (dissolved)	µg/L			< 5.0	< 0.05	0.07	0.06
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	13.5	9.56	11.40	10.48
Vanadium (dissolved)	µg/L		250	< 0.50	0.15	0.16	0.16
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	< 2	< 2
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	0.01	0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	30.9	26.9	--
ORP	mV			- <sup>1</sup>	115.5	131.6	--
SPC	us/cm			- <sup>1</sup>	617.0	477.6	--
Temperature	°C			- <sup>1</sup>	10.0	10.84	--
Turbidity	FNU			- <sup>1</sup>	23.4	34.19	--
pH	Units			- <sup>1</sup>	7.04	7.06	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-4: PH-90-3-I**

		Criteria		PH-90-3-I			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-25	2020-10-20	Average
pH	pH	6.5-8.5	6.5-9.0	8.02	7.77	7.98	7.88
Alkalinity	mg/L as CaCO <sub>3</sub>			210	230	289	260
Carbonate	mg/L as CaCO <sub>3</sub>			2.1	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			205	230	289	260
Total Dissolved Solids	mg/L			465	557	600	579
Fluoride	mg/L	1.5		< 0.10	0.07	< 0.06	0.07
Total Organic Carbon	mg/L			1.0	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L			0.5	< 1.0	< 1.0	< 1.0
Total Ammonia-N	mg/l			0.09	< 0.04	< 0.04	< 0.04
Chloride	mg/L			104	120	160	140
Sulphate	mg/L			37.5	38	41	40
Bromide	mg/L			< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			1.56	1.81	2.06	1.94
Nitrate + Nitrite (N)	mg/L			1.56	1.81	2.06	1.94
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			330	1210	403	807
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5	2	7	5
Arsenic (dissolved)	µg/L	25	1900	< 1.0	< 0.2	< 0.2	< 0.2
Barium (dissolved)	µg/L	1000	29000	275	298	276	287
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	15	12	13	13
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			84500	95500	102000	98750
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	< 0.50	0.093	0.254	0.174
Chromium (dissolved)	µg/L		810	< 5.0	0.15	0.15	0.15
Copper (dissolved)	µg/L	1000	87	< 1.0	0.5	< 0.2	0.4
Iron (dissolved)	µg/L			170	105	197	151
Potassium (dissolved)	µg/L			1800	1740	1820	1780
Magnesium (dissolved)	µg/L			28000	31400	30600	31000
Manganese (dissolved)	µg/L			15.0	9	19	14
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.54	0.27	0.41
Sodium (dissolved)	µg/L			35000	33200	25800	29500
Nickel (dissolved)	µg/L		490	< 1.0	0.1	< 0.1	< 0.1
Phosphorus (total)	mg/L			4.15	< 0.003	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	< 0.50	0.01	0.06	0.04
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.36	0.31	0.34
Tin (dissolved)	µg/L			< 1.0	0.11	0.12	0.12
Strontium (dissolved)	µg/L			395	395	463	429
Titanium (dissolved)	µg/L			< 5.0	0.09	0.36	0.23
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	1.7	1.96	2.08	2.02
Vanadium (dissolved)	µg/L		250	< 0.50	0.22	0.19	0.21
Zinc (dissolved)	µg/L		1100	< 5.0	6	< 2	4
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	24.8	30.9	--
ORP	mV			- <sup>1</sup>	42.5	83.7	--
SPC	us/cm			- <sup>1</sup>	888.0	865.0	--
Temperature	°C			- <sup>1</sup>	11.1	10.33	--
Turbidity	FNU			- <sup>1</sup>	128.8	334.52	--
pH	Units			- <sup>1</sup>	7.44	7.50	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

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<sup>1</sup> Field parameters included for current sampling year only.

**Table D-5: PH-90-4-III**

		Criteria		PH-90-4-III			
Analysis	Units	COPC	Table 3 (MECP)	2019 Average	2020-05-25	2020-10-27	2020 Average
		6.5-8.5	6.5-9.0				
pH	pH			6.81	6.61	6.90	6.76
Alkalinity	mg/L as CaCO <sub>3</sub>			740	697	641	669
Carbonate	mg/L as CaCO <sub>3</sub>			< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			740	697	641	669
Total Dissolved Solids	mg/L			2735	3360	4480	3920
Fluoride	mg/L	1.5		< 0.10	0.98	< 0.06	0.52
Total Organic Carbon	mg/L			3.8	2.0	3.0	2.5
Dissolved Organic Carbon	mg/L			3.2	3.0	4.0	3.5
Total Ammonia-N	mg/l			0.48	0.44	0.44	0.44
Chloride	mg/L			1215	1300	2300	1800
Sulphate	mg/L			19	24	32	28
Bromide	mg/L			7.5	0.4	0.4	0.4
Nitrite (N)	mg/L			0.023	< 0.30	< 0.30	< 0.30
Nitrate (N)	mg/L			< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (N)	mg/L			< 0.10	< 0.30	< 0.60	< 0.45
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			1300	1450	1777	1614
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5	< 1	2	2
Arsenic (dissolved)	µg/L	25	1900	7.3	7.6	8.6	8.1
Barium (dissolved)	µg/L	1000	29000	305	321	383	352
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	0.016	0.012
Boron (dissolved)	µg/L	5000	45000	300	83	919	501
Bismuth (dissolved)	µg/L			< 1.0	0.040	< 0.007	0.024
Calcium (dissolved)	µg/L			450000	452000	637000	544500
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	0.010	< 0.003	0.007
Cobalt (dissolved)	µg/L		66	15	9.86	23.6	16.7
Chromium (dissolved)	µg/L		810	< 5.0	0.16	0.50	0.33
Copper (dissolved)	µg/L	1000	87	< 1.0	2.6	0.8	1.7
Iron (dissolved)	µg/L			48500	34000	60300	47150
Potassium (dissolved)	µg/L			2050	2130	2600	2365
Magnesium (dissolved)	µg/L			41500	29700	46600	38150
Manganese (dissolved)	µg/L			4150.0	4130	5670	4900
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.40	0.31	0.36
Sodium (dissolved)	µg/L			525000	696000	735000	715500
Nickel (dissolved)	µg/L		490	4.3	3.2	8.4	5.8
Phosphorus (total)	mg/L			0.02	0.010	< 0.003	0.007
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	< 0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.08	0.33	0.21
Tin (dissolved)	µg/L			< 1.0	0.10	0.16	0.13
Strontium (dissolved)	µg/L			1010	1090	1620	1355
Titanium (dissolved)	µg/L			< 5.0	0.18	0.50	0.34
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	30.0	31.08	48	39.54
Vanadium (dissolved)	µg/L		250	< 0.50	0.35	0.43	0.39
Zinc (dissolved)	µg/L		1100	< 5.0	3	< 2	3
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	0.02	0.03	0.03
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	20.3	42.3	--
ORP	mV			- <sup>1</sup>	-36.5	-42.8	--
SPC	us/cm			- <sup>1</sup>	5611.0	5422.0	--
Temperature	°C			- <sup>1</sup>	13.1	10.73	--
Turbidity	FNU			- <sup>1</sup>	2.7	10.09	--
pH	Units			- <sup>1</sup>	6.35	6.48	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-6: PH-90-6-I**

		Criteria		PH-90-6-I			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-06-01	2020-10-29	Average
pH	pH	6.5-8.5	6.5-9.0	7.69	7.45	7.84	7.65
Alkalinity	mg/L as CaCO <sub>3</sub>			155	154	176	165
Carbonate	mg/L as CaCO <sub>3</sub>			1.1	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			150	154	176	165
Total Dissolved Solids	mg/L			2960	3200	3010	3105
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			0.7	< 1.0	1.0	1.0
Dissolved Organic Carbon	mg/L			0.57	< 1.0	1.0	1.0
Total Ammonia-N	mg/l			0.10	0.06	0.08	0.07
Chloride	mg/L			1750	1800	1800	1800
Sulphate	mg/L			36	36	39	38
Bromide	mg/L			3	< 0.3	< 3.0	1.7
Nitrite (N)	mg/L			< 0.010	< 0.30	< 0.30	< 0.30
Nitrate (N)	mg/L			< 0.10	< 0.06	< 0.60	0.33
Nitrate + Nitrite (N)	mg/L			< 0.10	< 0.06	< 0.60	0.33
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			1200	1150	1220	1185
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5	< 1	< 1	< 1
Arsenic (dissolved)	µg/L	25	1900	< 1.0	0.5	1.1	0.8
Barium (dissolved)	µg/L	1000	29000	575	599	502	551
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	17	14	25	20
Bismuth (dissolved)	µg/L			< 1.0	0.007	0.015	0.011
Calcium (dissolved)	µg/L			300000	334000	305000	319500
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	< 1	0.245	0.264	0.255
Chromium (dissolved)	µg/L		810	< 5.0	0.28	1.63	0.96
Copper (dissolved)	µg/L	1000	87	< 1.0	< 0.2	0.2	0.2
Iron (dissolved)	µg/L			1500	1570	1450	1510
Potassium (dissolved)	µg/L			4150	4590	4520	4555
Magnesium (dissolved)	µg/L			105000	103000	90600	96800
Manganese (dissolved)	µg/L			47	47.7	44.9	46
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.34	0.29	0.32
Sodium (dissolved)	µg/L			620000	678000	592000	635000
Nickel (dissolved)	µg/L		490	< 1.0	0.2	0.4	0.3
Phosphorus (total)	mg/L			0.016	0.006	0.007	0.007
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	< 0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	< 0.04	0.07	0.06
Tin (dissolved)	µg/L			< 1.0	< 0.06	0.70	0.38
Strontium (dissolved)	µg/L			1700	1830	1710	1770
Titanium (dissolved)	µg/L			< 5.0	0.06	0.06	0.06
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	1	1.42	1.29	1.36
Vanadium (dissolved)	µg/L		250	< 0.50	0.08	0.41	0.25
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	< 2	< 2
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	0.03	0.03	0.03
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	44.9	61.9	--
ORP	mV			- <sup>1</sup>	-54.7	-61.0	--
SPC	us/cm			- <sup>1</sup>	5605	4571.0	--
Temperature	°C			- <sup>1</sup>	10.806	9.979	--
Turbidity	FNU			- <sup>1</sup>	46.19	166.7	--
pH	Units			- <sup>1</sup>	7.29	7.53	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-7: PH-90-6-II**

		Criteria		PH-90-6-II			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-06-01	2020-10-29	Average
pH	pH	6.5-8.5	6.5-9.0	7.55	7.01	7.81	7.41
Alkalinity	mg/L as CaCO <sub>3</sub>			765	528	384	456
Carbonate	mg/L as CaCO <sub>3</sub>			3.5	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			765	528	384	456
Total Dissolved Solids	mg/L			880	737	597	667
Fluoride	mg/L	1.5		0.11	0.14	0.11	0.13
Total Organic Carbon	mg/L			20	11	5	8
Dissolved Organic Carbon	mg/L			20	10	4	7
Total Ammonia-N	mg/l			44	24	15.9	20
Chloride	mg/L			133	120	110	115
Sulphate	mg/L			14	19	36	28
Bromide	mg/L			< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (N)	mg/L			< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			540	471	391	431
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	< 1	< 1	< 1
Arsenic (dissolved)	µg/L	25	1900	9.9	9.1	11.7	10.4
Barium (dissolved)	µg/L	1000	29000	910	639	315	477
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	605	191	88	140
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			140000	145000	105000	125000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	1.22	0.496	0.256	0.376
Chromium (dissolved)	µg/L		810	< 5.0	0.22	0.29	0.26
Copper (dissolved)	µg/L	1000	87	< 1.0	< 0.2	< 0.2	< 0.2
Iron (dissolved)	µg/L			13700	14100	6540	10320
Potassium (dissolved)	µg/L			35500	19800	12700	16250
Magnesium (dissolved)	µg/L			49000	45800	34500	40150
Manganese (dissolved)	µg/L			235	285.0	153.0	219
Molybdenum (dissolved)	µg/L		9200	0.50	0.40	0.54	0.47
Sodium (dissolved)	µg/L			109000	65700	40600	53150
Nickel (dissolved)	µg/L		490	12.6	5.7	1.6	3.7
Phosphorus (total)	mg/L			0.255	0.025	0.010	0.018
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	< 0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.09	0.07	0.08
Tin (dissolved)	µg/L			< 1.0	0.19	0.78	0.49
Strontium (dissolved)	µg/L			745	644	443	544
Titanium (dissolved)	µg/L			< 5.0	0.13	0.12	0.13
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	< 0.1	0.19	0.04	0.12
Vanadium (dissolved)	µg/L		250	< 0.61	0.30	0.17	0.24
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	< 2	< 2
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	0.06	0.03	0.05
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	26	33.4	--
ORP	mV			- <sup>1</sup>	-80.1	-101.9	--
SPC	us/cm			- <sup>1</sup>	1455	1044.0	--
Temperature	°C			- <sup>1</sup>	10.597	10.155	--
Turbidity	FNU			- <sup>1</sup>	110.49	6.9	--
pH	Units			- <sup>1</sup>	6.81	7.25	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.



**Table D-8: PH-90-6-III**

		Criteria		PH-90-6-III			
		COPC	Table 3 (MECP)	2019 Average	2020		
Analysis	Units				2020-06-01	2020-10-29	Average
pH	pH	6.5-8.5	6.5-9.0	6.99	6.86	7.45	7.16
Alkalinity	mg/L as CaCO3			485	429	566	498
Carbonate	mg/L as CaCO3			< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			485	429	566	498
Total Dissolved Solids	mg/L			535	471	700	586
Fluoride	mg/L	1.5		0.52	0.69	0.57	0.63
Total Organic Carbon	mg/L			13	4	8	6
Dissolved Organic Carbon	mg/L			5	3	8	6
Total Ammonia-N	mg/l			14	10	11.0	10
Chloride	mg/L			48	51	60	56
Sulphate	mg/L			1	1	1	1
Bromide	mg/L			< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			0.12	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (N)	mg/L			0.12	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	µg/L as CaCO3			440	438	550	494
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			9.2	8	2	5
Arsenic (dissolved)	µg/L	25	1900	6.6	7.8	7.8	7.8
Barium (dissolved)	µg/L	1000	29000	660	451	715	583
Beryllium (dissolved)	µg/L		67	< 0.50	0.008	0.009	0.009
Boron (dissolved)	µg/L	5000	45000	545	471	540	506
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			155000	157000	203000	180000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.80	0.721	1.050	0.886
Chromium (dissolved)	µg/L		810	< 5.0	0.95	1.36	1.16
Copper (dissolved)	µg/L	1000	87	< 1.0	0.2	0.2	0.2
Iron (dissolved)	µg/L			29500	24500	34000	29250
Potassium (dissolved)	µg/L			9850	11700	8650	10175
Magnesium (dissolved)	µg/L			10950	11400	12100	11750
Manganese (dissolved)	µg/L			515	467.0	637.0	552
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.15	0.10	0.13
Sodium (dissolved)	µg/L			31500	26400	39200	32800
Nickel (dissolved)	µg/L		490	< 1.0	0.5	1.5	1.0
Phosphorus (total)	mg/L			0.285	0.221	0.215	0.218
Lead (dissolved)	µg/L	10	25	< 0.50	0.02	0.04	0.03
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.07	0.13	0.10
Tin (dissolved)	µg/L			< 1.0	0.14	0.42	0.28
Strontium (dissolved)	µg/L			340	369	473	421
Titanium (dissolved)	µg/L			< 5.0	0.80	0.39	0.60
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.5	0.46	1.07	0.77
Vanadium (dissolved)	µg/L		250	0.70	0.59	1.12	0.86
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	4	3
Lead-210	Bq/L	0.20		< 0.10	< 0.02	0.02	0.02
Radium-226	Bq/L	0.49		0.084	0.06	0.08	0.07
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
Field Parameters							
ODO % Sat	mg/L			- <sup>1</sup>	29.1	32.6	--
ORP	mV			- <sup>1</sup>	-82.7	-84.3	--
SPC	us/cm			- <sup>1</sup>	1050	1113.0	--
Temperature	°C			- <sup>1</sup>	10.656	10.094	--
Turbidity	FNU			- <sup>1</sup>	10.27	15.7	--
pH	Units			- <sup>1</sup>	6.75	6.75	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

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<sup>1</sup> Field parameters included for current sampling year only.

**Table D-9: PH-90-7-III**

		Criteria		PH-90-7-III			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-26	2020-10-16	Average
pH	pH	6.5-8.5	6.5-9.0	7.41	7.07	7.27	7.17
Alkalinity	mg/L as CaCO <sub>3</sub>			505	738	628	683
Carbonate	mg/L as CaCO <sub>3</sub>			1.3	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			505	738	628	683
Total Dissolved Solids	mg/L			1195	737	923	830
Fluoride	mg/L	1.5		< 0.10	0.11	0.07	0.09
Total Organic Carbon	mg/L			8	4	7	6
Dissolved Organic Carbon	mg/L			4	4	7	6
Total Ammonia-N	mg/l			0.08	< 0.04	0.04	0.04
Chloride	mg/L			395	160	210	185
Sulphate	mg/L			18	11	31	21
Bromide	mg/L			3.0	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			0.15	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (N)	mg/L			0.15	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			755	3140	5020	4080
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	< 1	20	11
Arsenic (dissolved)	µg/L	25	1900	31.5	53.1	48.7	50.9
Barium (dissolved)	µg/L	1000	29000	135	110	108	109
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	19	25	9	17
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			255000	167000	231000	199000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	0.004	0.004
Cobalt (dissolved)	µg/L		66	1.60	1.130	2.010	1.570
Chromium (dissolved)	µg/L		810	< 5.0	0.11	0.82	0.47
Copper (dissolved)	µg/L	1000	87	< 1.0	0.4	0.5	0.5
Iron (dissolved)	µg/L			1700	1710	911	1311
Potassium (dissolved)	µg/L			1055	1170	1220	1195
Magnesium (dissolved)	µg/L			28000	17800	22300	20050
Manganese (dissolved)	µg/L			465	343.0	572.0	458
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.19	0.18	0.19
Sodium (dissolved)	µg/L			165000	155000	123000	139000
Nickel (dissolved)	µg/L		490	1.2	0.7	1.0	0.9
Phosphorus (total)	mg/L			8.300	0.008	< 0.003	0.006
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	0.03	0.02
Antimony (dissolved)	µg/L	6	20000	1.45	0.90	1.00	0.95
Selenium (dissolved)	µg/L	10	63	< 2.0	0.06	0.08	0.07
Tin (dissolved)	µg/L			< 1.0	0.07	< 0.06	0.07
Strontium (dissolved)	µg/L			435	287	397	342
Titanium (dissolved)	µg/L			< 5.0	0.16	0.84	0.50
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	0.006	0.006
Uranium (dissolved)	µg/L	20	420	14.5	9.37	38	23.7
Vanadium (dissolved)	µg/L		250	1.34	0.77	1.02	0.90
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	4	3
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		0.042	0.06	0.04	0.05
Thorium-230	Bq/L	0.65		< 0.070	0.08	< 0.02	0.05
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	79.7	58	--
ORP	mV			- <sup>1</sup>	-47.0	30.2	--
SPC	us/cm			- <sup>1</sup>	1436.0	1709	--
Temperature	°C			- <sup>1</sup>	10.051	11.119	--
Turbidity	FNU			- <sup>1</sup>	855.71	779.52	--
pH	Units			- <sup>1</sup>	6.98	6.92	--

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<sup>1</sup> Field parameters included for current sampling year only.

**Table D-10: PH-90-8-I**

		Criteria		PH-90-8-I			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-28	2020-11-03	Average
pH	pH	6.5-8.5	6.5-9.0	7.64	7.53	7.47	7.50
Alkalinity	mg/L as CaCO <sub>3</sub>			220	264	597	431
Carbonate	mg/L as CaCO <sub>3</sub>			< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			220	264	597	431
Total Dissolved Solids	mg/L			1700	1680	1780	1730
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			2.3	< 1	1	1
Dissolved Organic Carbon	mg/L			0.9	1	1	1
Total Ammonia-N	mg/l			0.095	0.04	0.04	0.04
Chloride	mg/L			840	830	890	860
Sulphate	mg/L			48	48	50	49
Bromide	mg/L			5.5	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			0.050	< 0.30	< 0.30	< 0.30
Nitrate (N)	mg/L			0.55	0.79	0.37	0.58
Nitrate + Nitrite (N)	mg/L			0.60	0.78	0.37	0.58
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			725	1230	1690	1460
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	2	5	4
Arsenic (dissolved)	µg/L	25	1900	< 1	4.8	0.6	2.7
Barium (dissolved)	µg/L	1000	29000	520	492	409	451
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	27	31	27	29
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			205000	231000	188000	209500
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	< 0.5	0.236	0.168	0.202
Chromium (dissolved)	µg/L		810	< 5.0	0.10	1.12	0.61
Copper (dissolved)	µg/L	1000	87	< 1.0	0.3	0.4	0.4
Iron (dissolved)	µg/L			575	354	482	418
Potassium (dissolved)	µg/L			3350	3840	3530	3685
Magnesium (dissolved)	µg/L			54500	56800	51300	54050
Manganese (dissolved)	µg/L			36	37.7	31.8	34.8
Molybdenum (dissolved)	µg/L		9200	0.57	0.54	0.48	0.51
Sodium (dissolved)	µg/L			280000	355000	298000	326500
Nickel (dissolved)	µg/L		490	< 1.0	0.7	0.1	0.4
Phosphorus (total)	mg/L			2.1	0.017	< 0.003	0.010
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	< 0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.5	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			< 1.0	0.06	0.06	0.06
Strontium (dissolved)	µg/L			835	903	793	848
Titanium (dissolved)	µg/L			< 5.0	0.15	0.19	0.17
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	26.5	39	32.3	35.7
Vanadium (dissolved)	µg/L		250	< 0.50	0.06	0.18	0.12
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	4	3
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	0.02	0.02	0.02
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	28.7	35.8	--
ORP	mV			- <sup>1</sup>	6.9	7.0	--
SPC	us/cm			- <sup>1</sup>	3041	2465.0	--
Temperature	°C			- <sup>1</sup>	11.296	9.684	--
Turbidity	FNU			- <sup>1</sup>	726.99	1391.5	--
pH	Units			- <sup>1</sup>	7.16	7.17	--

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**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-11: PH-90-8-II**

		Criteria		PH-90-8-II			
		COPC	Table 3 (MECP)	2019	2020		
Analysis	Units			Average	2020-05-26	2020-11-03	Average
pH	pH	6.5-8.5	6.5-9.0	7.40	7.26	7.23	7.25
Alkalinity	mg/L as CaCO3			390	374	384	379
Carbonate	mg/L as CaCO3			1.1	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			390	374	384	379
Total Dissolved Solids	mg/L			543	623	551	587
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			2.7	2	2	2
Dissolved Organic Carbon	mg/L			1.4	2	1	2
Total Ammonia-N	mg/l			0.066	< 0.04	0.04	0.04
Chloride	mg/L			43	59	73	66
Sulphate	mg/L			14	26	20	23
Bromide	mg/L			< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			4.58	8.23	5.59	6.91
Nitrate + Nitrite (N)	mg/L			4.58	8.23	5.59	6.91
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO3			475	548	504	526
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	3	4	4
Arsenic (dissolved)	µg/L	25	1900	< 1.0	< 0.2	< 0.2	< 0.2
Barium (dissolved)	µg/L	1000	29000	63	73	68	70
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	44	51	37	44
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	0.007	0.007
Calcium (dissolved)	µg/L			165000	202000	165000	183500
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	< 0.50	0.106	0.205	0.156
Chromium (dissolved)	µg/L		810	< 5.0	0.21	0.91	0.56
Copper (dissolved)	µg/L	1000	87	< 1.0	0.7	0.8	0.8
Iron (dissolved)	µg/L			< 100	22	7	15
Potassium (dissolved)	µg/L			5950	6400	6860	6630
Magnesium (dissolved)	µg/L			15000	18200	14700	16450
Manganese (dissolved)	µg/L			2.0	3.1	12.7	7.9
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.07	0.06	0.07
Sodium (dissolved)	µg/L			7250	10400	10100	10250
Nickel (dissolved)	µg/L		490	< 1.0	0.5	< 0.1	0.3
Phosphorus (total)	mg/L			0.051	0.003	0.010	0.007
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	< 0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.55	0.39	0.47
Tin (dissolved)	µg/L			< 1.0	< 0.06	< 0.06	< 0.06
Strontium (dissolved)	µg/L			290	375	328	352
Titanium (dissolved)	µg/L			< 5.0	0.41	0.22	0.32
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	5.4	6	3.6	4.6
Vanadium (dissolved)	µg/L		250	< 0.50	0.31	0.05	0.18
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	4	3
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
Field Parameters							
ODO % Sat	mg/L			- <sup>1</sup>	64.4	80.9	--
ORP	mV			- <sup>1</sup>	121.0	148.5	--
SPC	us/cm			- <sup>1</sup>	1064.0	784.0	--
Temperature	°C			- <sup>1</sup>	11.469	10.0	--
Turbidity	FNU			- <sup>1</sup>	7.51	19.9	--
pH	Units			- <sup>1</sup>	6.85	7.10	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-12: PH-90-9-III**

		Criteria		PH-90-9-III			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-29	2020-10-19	Average
pH	pH	6.5-8.5	6.5-9.0	7.60	7.6	7.79	7.70
Alkalinity	mg/L as CaCO <sub>3</sub>			305	294	2380	1337
Carbonate	mg/L as CaCO <sub>3</sub>			1.2	< 1.0	190	95.5
Bicarbonate	mg/L as CaCO <sub>3</sub>			305	294	2190	1242
Total Dissolved Solids	mg/L			343	329	909	619
Fluoride	mg/L	1.5		< 0.10	0.10	0.11	0.11
Total Organic Carbon	mg/L			4.3	1	1	1
Dissolved Organic Carbon	mg/L			1.4	1	1	1
Total Ammonia-N	mg/l			< 0.050	< 0.04	0.07	0.06
Chloride	mg/L			3.6	4	5	5
Sulphate	mg/L			17	14	20	17
Bromide	mg/L			< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			0.013	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (N)	mg/L			< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			320	5540	329	2935
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			6.1	< 1	34	18
Arsenic (dissolved)	µg/L	25	1900	< 1.0	< 0.2	< 0.2	< 0.2
Barium (dissolved)	µg/L	1000	29000	60	57	60	58
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	20	17	18	18
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			96500	93400	99000	96200
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	0.003	0.003
Cobalt (dissolved)	µg/L		66	< 0.50	0.067	< 0.004	0.036
Chromium (dissolved)	µg/L		810	< 5.0	0.84	0.81	0.83
Copper (dissolved)	µg/L	1000	87	< 1.0	0.4	0.6	0.5
Iron (dissolved)	µg/L			< 100	< 7	39	23
Potassium (dissolved)	µg/L			710	625	761	693
Magnesium (dissolved)	µg/L			19500	18700	19900	19300
Manganese (dissolved)	µg/L			9.1	0.6	2.7	1.6
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.11	0.16	0.14
Sodium (dissolved)	µg/L			5450	5300	4930	5115
Nickel (dissolved)	µg/L		490	< 1.0	< 0.1	< 0.1	< 0.1
Phosphorus (total)	mg/L			9.3	0.004	< 0.003	0.004
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	0.09	0.05
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.23	0.17	0.20
Tin (dissolved)	µg/L			< 1.0	0.10	0.10	0.10
Strontium (dissolved)	µg/L			215	212	225	219
Titanium (dissolved)	µg/L			< 5.0	< 0.05	1.74	0.90
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	0.006	0.006
Uranium (dissolved)	µg/L	20	420	2.8	2	3.6	2.9
Vanadium (dissolved)	µg/L		250	< 0.50	0.34	0.38	0.36
Zinc (dissolved)	µg/L		1100	< 5.0	6	< 2	4
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	71.8	92.5	--
ORP	mV			- <sup>1</sup>	165.6	229.4	--
SPC	us/cm			- <sup>1</sup>	583.0	584.0	--
Temperature	°C			- <sup>1</sup>	9.209	9.0	--
Turbidity	FNU			- <sup>1</sup>	2533.3	8903.0	--
pH	Units			- <sup>1</sup>	7.22	7.49	--

COPC = Contaminants of Potential Concern criteria for Potable  
 Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-  
 Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-13: PH-93-3-III**

		Criteria		PH-93-3-III			
Analysis	Units	COPC	Table 3 (MECP)	2019 Average	2020-05-27	2020-10-27	Average
		6.5-8.5	6.5-9.0			No Sample <sup>2</sup>	
pH	pH			7.70	7.35		7.35
Alkalinity	mg/L as CaCO <sub>3</sub>			370	352		352
Carbonate	mg/L as CaCO <sub>3</sub>			1.7	< 1.0		< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			370	352		352
Total Dissolved Solids	mg/L			440	374		374
Fluoride	mg/L	1.5		< 0.10	< 0.06		< 0.06
Total Organic Carbon	mg/L			1.3	1.0		1.0
Dissolved Organic Carbon	mg/L			1.2	1.0		1.0
Total Ammonia-N	mg/l			0.54	2.90		2.90
Chloride	mg/L			12	29		29
Sulphate	mg/L			3.7	4		4
Bromide	mg/L			< 1.0	< 0.30		< 0.30
Nitrite (N)	mg/L			0.166	0.08		0.08
Nitrate (N)	mg/L			2.22	1.61		1.61
Nitrate + Nitrite (N)	mg/L			2.39	1.69		1.69
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01		< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			360	425		425
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05		< 0.05
Aluminum (dissolved)	µg/L			< 5.0	6.0		6.0
Arsenic (dissolved)	µg/L	25	1900	< 1.0	< 0.2		< 0.2
Barium (dissolved)	µg/L	1000	29000	45	52		52
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007		< 0.007
Boron (dissolved)	µg/L	5000	45000	250	243		243
Bismuth (dissolved)	µg/L			< 1.0	< 0.007		< 0.007
Calcium (dissolved)	µg/L			130000	129000		129000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003		< 0.003
Cobalt (dissolved)	µg/L		66	< 0.50	0.180		0.180
Chromium (dissolved)	µg/L		810	< 5.0	0.28		0.28
Copper (dissolved)	µg/L	1000	87	< 1.0	0.5		0.5
Iron (dissolved)	µg/L			< 100	12		12
Potassium (dissolved)	µg/L			3800	5420		5420
Magnesium (dissolved)	µg/L			10000	10400		10400
Manganese (dissolved)	µg/L			< 2	3.86		3.86
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.06		0.06
Sodium (dissolved)	µg/L			12000	10800		10800
Nickel (dissolved)	µg/L		490	< 1.0	0.10		0.10
Phosphorus (total)	mg/L			0.033	0.008		0.008
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01		< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90		< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.41		0.41
Tin (dissolved)	µg/L			< 1.0	0.07		0.07
Strontium (dissolved)	µg/L			230	226		226
Titanium (dissolved)	µg/L			< 5.0	0.60		0.60
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005		< 0.005
Uranium (dissolved)	µg/L	20	420	9	9.03		9.03
Vanadium (dissolved)	µg/L		250	0.56	0.53		0.53
Zinc (dissolved)	µg/L		1100	< 5.0	< 2		< 2
Lead-210	Bq/L	0.20		< 0.10	< 0.02		< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01		< 0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02		< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02		< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	50.1		--
ORP	mV			- <sup>1</sup>	69.5		--
SPC	us/cm			- <sup>1</sup>	647.0		--
Temperature	°C			- <sup>1</sup>	10.929		--
Turbidity	FNU			- <sup>1</sup>	1.11		--
pH	Units			- <sup>1</sup>	7.20		--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

<sup>2</sup> Insufficient volume of groundwater for sample collection

**Table D-14: PH-93-6-I**

		Criteria		PH-93-6-I			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-28	2020-10-27	Average
pH	pH	6.5-8.5	6.5-9.0	7.89	7.35	7.86	7.61
Alkalinity	mg/L as CaCO <sub>3</sub>			290	324	247	286
Carbonate	mg/L as CaCO <sub>3</sub>			2.6	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			290	324	247	286
Total Dissolved Solids	mg/L			1635	1210	1703	1457
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			6.4	2	1	2
Dissolved Organic Carbon	mg/L			5.7	3	1	2
Total Ammonia-N	mg/l			23.55	0.62	0.51	0.57
Chloride	mg/L			795	610	990	800
Sulphate	mg/L			37.5	30	38	34
Bromide	mg/L			< 5.5	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			0.041	< 0.03	1.03	0.53
Nitrate (N)	mg/L			1.46	0.37	1.02	0.70
Nitrate + Nitrite (N)	mg/L			1.50	0.37	2.05	1.21
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			520	672	663	668
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			5.1	2	2	2
Arsenic (dissolved)	µg/L	25	1900	1.4	0.6	0.7	0.7
Barium (dissolved)	µg/L	1000	29000	320	334	334	334
Beryllium (dissolved)	µg/L	67		< 0.50	< 0.007	0.009	0.008
Boron (dissolved)	µg/L	5000	45000	47	84	89	87
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			145000	165000	185000	175000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	0.063	0.033	0.048
Cobalt (dissolved)	µg/L		66	0.71	1.150	1.050	1.100
Chromium (dissolved)	µg/L		810	< 5.0	0.19	0.61	0.40
Copper (dissolved)	µg/L	1000	87	< 1.0	0.8	0.7	0.8
Iron (dissolved)	µg/L			225	110	129	120
Potassium (dissolved)	µg/L			36500	4570	5040	4805
Magnesium (dissolved)	µg/L			39500	36100	39300	37700
Manganese (dissolved)	µg/L			400	699.0	631.0	665.0
Molybdenum (dissolved)	µg/L		9200	0.67	0.45	0.45	0.45
Sodium (dissolved)	µg/L			335000	268000	329000	298500
Nickel (dissolved)	µg/L		490	2.0	2.6	1.5	2.1
Phosphorus (total)	mg/L			0.605	0.060	< 0.003	0.032
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	0.03	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.29	0.45	0.37
Tin (dissolved)	µg/L			< 1.0	0.10	0.14	0.12
Strontium (dissolved)	µg/L			535	547	676	612
Titanium (dissolved)	µg/L			< 5.0	0.14	0.14	0.14
Thallium (dissolved)	µg/L		510	< 0.05	0.005	< 0.005	0.005
Uranium (dissolved)	µg/L	20	420	2	2.11	2.0	2.1
Vanadium (dissolved)	µg/L		250	0.73	0.34	0.71	0.53
Zinc (dissolved)	µg/L		1100	74.0	59	26	43
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	0.03	0.02
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	53.5	64.6	--
ORP	mV			- <sup>1</sup>	35	95.0	--
SPC	us/cm			- <sup>1</sup>	1311	2484.0	--
Temperature	°C			- <sup>1</sup>	11.575	8.674	--
Turbidity	FNU			- <sup>1</sup>	58	42.9	--
pH	Units			- <sup>1</sup>	7.14	7.51	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-15: PH-93-6-II**

		Criteria		PH-93-6-II			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-28	2020-10-27	Average
pH	pH	6.5-8.5	6.5-9.0	7.37	6.96	7.63	7.30
Alkalinity	mg/L as CaCO <sub>3</sub>			525	452	404	428
Carbonate	mg/L as CaCO <sub>3</sub>			1.2	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			520	452	404	428
Total Dissolved Solids	mg/L			598	517	426	472
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			13.3	2	3	3
Dissolved Organic Carbon	mg/L			3.9	3	3	3
Total Ammonia-N	mg/l			1.53	0.09	0.04	0.07
Chloride	mg/L			10	10	6	8
Sulphate	mg/L			20.5	14	16	15
Bromide	mg/L			< 1.0	< 0.3	< 0.3	< 0.3
Nitrite (N)	mg/L			0.053	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			0.41	0.94	1.74	1.34
Nitrate + Nitrite (N)	mg/L			0.46	0.94	1.74	1.34
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	0.02	0.02
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			570	586	446	516
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			8.0	1	5	3
Arsenic (dissolved)	µg/L	25	1900	< 1.0	0.5	< 0.2	0.4
Barium (dissolved)	µg/L	1000	29000	58	61	39	50
Beryllium (dissolved)	µg/L	67		< 0.50	< 0.007	0.009	0.008
Boron (dissolved)	µg/L	5000	45000	26	29	61	45
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			200000	207000	155000	181000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	0.006	0.005
Cobalt (dissolved)	µg/L		66	1.00	0.493	0.274	0.384
Chromium (dissolved)	µg/L		810	< 5.0	0.15	< 0.08	0.12
Copper (dissolved)	µg/L	1000	87	2.6	0.6	1.4	1.0
Iron (dissolved)	µg/L			1500	344	60	202
Potassium (dissolved)	µg/L			3350	2780	3090	2935
Magnesium (dissolved)	µg/L			16000	14700	9830	12265
Manganese (dissolved)	µg/L			211	233	193	213
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.12	0.13	0.13
Sodium (dissolved)	µg/L			5850	7740	5020	6380
Nickel (dissolved)	µg/L		490	1.2	1.0	0.6	0.8
Phosphorus (total)	mg/L			1.028	0.072	< 0.003	0.038
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	0.03	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.18	0.14	0.16
Tin (dissolved)	µg/L			< 1.0	0.07	0.13	0.10
Strontium (dissolved)	µg/L			350	331	262	297
Titanium (dissolved)	µg/L			< 5.0	0.13	0.25	0.19
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	13	<b>37.7</b>	<b>33.9</b>	<b>35.8</b>
Vanadium (dissolved)	µg/L		250	< 0.50	0.24	0.29	0.27
Zinc (dissolved)	µg/L		1100	< 5.0	2	3	3
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	40.9	59.5	--
ORP	mV			- <sup>1</sup>	-23.9	57.0	--
SPC	us/cm			- <sup>1</sup>	905.0	368.6	--
Temperature	°C			- <sup>1</sup>	10.8	8.8	--
Turbidity	FNU			- <sup>1</sup>	1.6	4.28	--
pH	Units			- <sup>1</sup>	6.80	7.25	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.



**Table D-16: PH-93-9-I**

		Criteria		PH-93-9-I			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-28	2020-10-22	Average
pH	pH	6.5-8.5	6.5-9.0	7.26	6.97	7.19	7.08
Alkalinity	mg/L as CaCO <sub>3</sub>			600	610	598	604
Carbonate	mg/L as CaCO <sub>3</sub>			1.2	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			600	610	598	604
Total Dissolved Solids	mg/L			905	851	874	863
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			6.0	6.0	6.0	6.0
Dissolved Organic Carbon	mg/L			5.6	6.0	6.0	6.0
Total Ammonia-N	mg/l			11	8.4	14.5	11.5
Chloride	mg/L			175	170	150	160
Sulphate	mg/L			34.5	32	36	34
Bromide	mg/L			1.2	0.30	0.30	0.30
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			0.43	0.12	< 0.06	< 0.09
Nitrate + Nitrite (N)	mg/L			0.43	0.12	< 0.06	< 0.09
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			645	959	638	799
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			12.5	< 1.0	1.0	1.0
Arsenic (dissolved)	µg/L	25	1900	1.4	0.6	0.5	0.6
Barium (dissolved)	µg/L	1000	29000	180	165	167	166
Beryllium (dissolved)	µg/L	67		< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	1100	878	1020	949
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			185000	198000	186000	192000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	0.007	0.005
Cobalt (dissolved)	µg/L		66	2.35	2.640	2.681	2.7
Chromium (dissolved)	µg/L		810	< 5.0	0.35	0.40	0.38
Copper (dissolved)	µg/L	1000	87	3.6	3.8	4.8	4.3
Iron (dissolved)	µg/L			115	70	68	69
Potassium (dissolved)	µg/L			21000	21900	22600	22250
Magnesium (dissolved)	µg/L			43000	43900	39000	41450
Manganese (dissolved)	µg/L			390	465.00	493.00	479
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.25	0.22	0.24
Sodium (dissolved)	µg/L			87000	86800	73800	80300
Nickel (dissolved)	µg/L		490	7.7	9.00	8.70	8.9
Phosphorus (total)	mg/L			0.102	0.024	< 0.003	0.014
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	0.04	0.03
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.16	0.18	0.2
Tin (dissolved)	µg/L			< 1.0	0.23	0.33	0.3
Strontium (dissolved)	µg/L			745	846	813	830
Titanium (dissolved)	µg/L			< 5.0	0.10	0.15	0.1
Thallium (dissolved)	µg/L		510	< 0.05	0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	2200	2510	1640	2075
Vanadium (dissolved)	µg/L		250	< 0.50	0.38	0.27	0.33
Zinc (dissolved)	µg/L		1100	< 17.0	< 2	8	5
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	0.01	0.02	0.02
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	27.9	50.9	--
ORP	mV			- <sup>1</sup>	117.6	100	--
SPC	us/cm			- <sup>1</sup>	1724.0	1377	--
Temperature	°C			- <sup>1</sup>	11.268	11.012	--
Turbidity	FNU			- <sup>1</sup>	59.27	73.4	--
pH	Units			- <sup>1</sup>	6.65	6.74	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-17: PH-93-9-II**

		Criteria		PH-93-9-II			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-27	2020-10-22	Average
pH	pH	6.5-8.5	6.5-9.0	7.51	7.13	7.53	7.33
Alkalinity	mg/L as CaCO <sub>3</sub>			390	476	349	413
Carbonate	mg/L as CaCO <sub>3</sub>			1.2	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			390	476	349	413
Total Dissolved Solids	mg/L			448	474	609	542
Fluoride	mg/L	1.5		< 0.10	< 0.06	0.11	0.09
Total Organic Carbon	mg/L			2.9	1.0	1.0	1.0
Dissolved Organic Carbon	mg/L			1.5	2.0	1.0	1.5
Total Ammonia-N	mg/l			0.63	< 0.04	< 0.04	< 0.04
Chloride	mg/L			25	33	130	82
Sulphate	mg/L			6.4	9	15	12
Bromide	mg/L			< 1.0	< 0.30	< 0.30	< 0.30
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			0.54	3.57	3.92	3.75
Nitrate + Nitrite (N)	mg/L			0.54	3.57	3.92	3.75
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			410	552	424	488
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	49	< 1.0	25
Arsenic (dissolved)	µg/L	25	1900	< 1.0	0.2	< 0.2	0.2
Barium (dissolved)	µg/L	1000	29000	29	43	50	46
Beryllium (dissolved)	µg/L	67		< 0.50	0.008	< 0.007	0.008
Boron (dissolved)	µg/L	5000	45000	12	41	28	35
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			155000	193000	156000	174500
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	0.011	0.010	0.011
Cobalt (dissolved)	µg/L		66	< 0.50	0.242	0.049	0.146
Chromium (dissolved)	µg/L		810	< 5.0	0.60	0.93	0.77
Copper (dissolved)	µg/L	1000	87	< 1.0	0.7	0.5	0.6
Iron (dissolved)	µg/L			< 100	79	< 7	43
Potassium (dissolved)	µg/L			580	831	927	879
Magnesium (dissolved)	µg/L			5300	8430	5970	7200
Manganese (dissolved)	µg/L			12	4.79	< 0.01	2.4
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.22	1.30	0.76
Sodium (dissolved)	µg/L			8050	27300	71400	49350
Nickel (dissolved)	µg/L		490	< 1.0	< 0.1	< 0.1	< 0.1
Phosphorus (total)	mg/L			0.320	0.021	< 0.003	0.012
Lead (dissolved)	µg/L	10	25	< 0.50	0.03	< 0.01	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.80	0.79	0.8
Tin (dissolved)	µg/L			< 1.0	< 0.06	< 0.06	< 0.06
Strontium (dissolved)	µg/L			255	322	330	326
Titanium (dissolved)	µg/L			< 5.0	4.21	0.07	2.14
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	3	7.33	8.13	7.73
Vanadium (dissolved)	µg/L		250	< 0.50	0.42	0.28	0.35
Zinc (dissolved)	µg/L		1100	8.5	5	2	4
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	53.6	78.4	--
ORP	mV			- <sup>1</sup>	168.8	86.6	--
SPC	us/cm			- <sup>1</sup>	1073	922.0	--
Temperature	°C			- <sup>1</sup>	8.939	12.612	--
Turbidity	FNU			- <sup>1</sup>	181.74	210.8	--
pH	Units			- <sup>1</sup>	6.83	7.13	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-18: PH-93-10-I**

		Criteria		PH-93-10-I			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-26	2020-10-16	Average
pH	pH	6.5-8.5	6.5-9.0	7.22	7.06	7.16	7.11
Alkalinity	mg/L as CaCO <sub>3</sub>			620	598	578	588
Carbonate	mg/L as CaCO <sub>3</sub>			< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			620	598	578	588
Total Dissolved Solids	mg/L			898	846	837	842
Fluoride	mg/L	1.5		< 0.10	0.06	0.07	0.07
Total Organic Carbon	mg/L			13	10	12	11
Dissolved Organic Carbon	mg/L			12	10	11	11
Total Ammonia-N	mg/l			8.8	12.2	13.6	12.9
Chloride	mg/L			150	140	170	155
Sulphate	mg/L			15.0	33	17	25
Bromide	mg/L			< 1.0	< 0.30	0.30	0.30
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (N)	mg/L			< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			575	722	655	689
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	890	4	447
Arsenic (dissolved)	µg/L	25	1900	17.5	24.6	24.0	24.3
Barium (dissolved)	µg/L	1000	29000	500	723	522	623
Beryllium (dissolved)	µg/L		67	< 0.50	0.029	0.008	0.019
Boron (dissolved)	µg/L	5000	45000	560	731	635	683
Bismuth (dissolved)	µg/L			< 1.0	0.012	< 0.007	0.010
Calcium (dissolved)	µg/L			150000	176000	166000	171000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	0.012	< 0.003	0.008
Cobalt (dissolved)	µg/L		66	6.50	8.580	7.910	8.245
Chromium (dissolved)	µg/L		810	< 5.0	1.84	0.95	1.40
Copper (dissolved)	µg/L	1000	87	< 1.0	3.6	0.7	2.2
Iron (dissolved)	µg/L			13000	17000	12500	14750
Potassium (dissolved)	µg/L			15000	19800	16800	18300
Magnesium (dissolved)	µg/L			46000	53000	45300	49150
Manganese (dissolved)	µg/L			615	748.00	742.00	745.0
Molybdenum (dissolved)	µg/L		9200	0.64	0.77	0.69	0.73
Sodium (dissolved)	µg/L			89500	70000	94000	82000
Nickel (dissolved)	µg/L		490	10.1	10.3	12.4	11.4
Phosphorus (total)	mg/L			0.350	0.073	0.020	0.047
Lead (dissolved)	µg/L	10	25	< 0.50	0.59	0.03	0.31
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.13	0.13	0.1
Tin (dissolved)	µg/L			< 1.0	0.72	0.29	0.51
Strontium (dissolved)	µg/L			645	878	696	787
Titanium (dissolved)	µg/L			< 5.0	67.20	1.13	34.17
Thallium (dissolved)	µg/L		510	< 0.05	0.042	0.011	0.027
Uranium (dissolved)	µg/L	20	420	7	5.05	4.54	4.80
Vanadium (dissolved)	µg/L		250	< 0.50	2.39	0.58	1.49
Zinc (dissolved)	µg/L		1100	< 5.0	7	2	5
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	0.03	0.02	0.03
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	25.2	26.5	--
ORP	mV			- <sup>1</sup>	-61.8	-55.2	--
SPC	us/cm			- <sup>1</sup>	1594.0	1579.0	--
Temperature	°C			- <sup>1</sup>	11.731	11.0	--
Turbidity	FNU			- <sup>1</sup>	25.6	20.84	--
pH	Units			- <sup>1</sup>	6.70	6.86	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-19: PH-93-10-II**

		Criteria		PH-93-10-II			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-26	2020-10-16	Average
pH	pH	6.5-8.5	6.5-9.0	7.17	6.98	6.99	6.99
Alkalinity	mg/L as CaCO <sub>3</sub>			805	603	815	709
Carbonate	mg/L as CaCO <sub>3</sub>			1.1	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			805	603	815	709
Total Dissolved Solids	mg/L			1008	780	1006	893
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			6.7	5	7	6
Dissolved Organic Carbon	mg/L			6.0	5	7	6
Total Ammonia-N	mg/l			17.00	12.3	23.5	17.9
Chloride	mg/L			71	57	82	70
Sulphate	mg/L			66.0	47	76	62
Bromide	mg/L			< 1.0	0.30	0.60	0.45
Nitrite (N)	mg/L			0.018	0.06	0.11	0.09
Nitrate (N)	mg/L			1.58	2.18	2.41	2.30
Nitrate + Nitrite (N)	mg/L			1.59	2.24	2.53	2.39
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			705	770	890	830
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	1	2	2
Arsenic (dissolved)	µg/L	25	1900	< 1.0	0.4	0.7	0.6
Barium (dissolved)	µg/L	1000	29000	175	132	203	168
Beryllium (dissolved)	µg/L	67		< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	2850	2550	4030	3290
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			210000	188000	237000	212500
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	0.004	0.005	0.005
Cobalt (dissolved)	µg/L		66	3.15	2.040	3.380	2.710
Chromium (dissolved)	µg/L		810	< 5.0	0.58	1.21	0.90
Copper (dissolved)	µg/L	1000	87	4.5	7.0	7.9	7.5
Iron (dissolved)	µg/L			< 100	< 7	28	18
Potassium (dissolved)	µg/L			40000	30300	48200	39250
Magnesium (dissolved)	µg/L			44500	35300	43800	39550
Manganese (dissolved)	µg/L			485	302.00	546.00	424.0
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.16	0.17	0.17
Sodium (dissolved)	µg/L			72000	65300	85900	75600
Nickel (dissolved)	µg/L		490	6.6	5.3	8.6	7.0
Phosphorus (total)	mg/L			0.415	0.008	0.018	0.013
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	0.02	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.72	0.32	0.5
Tin (dissolved)	µg/L			< 1.0	0.25	0.35	0.30
Strontium (dissolved)	µg/L			815	629	972	801
Titanium (dissolved)	µg/L			< 5.0	0.21	0.32	0.27
Thallium (dissolved)	µg/L		510	< 0.05	0.022	0.017	0.020
Uranium (dissolved)	µg/L	20	420	<b>5450</b>	<b>4460</b>	<b>5480</b>	<b>4970</b>
Vanadium (dissolved)	µg/L		250	0.72	0.89	0.85	0.87
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	< 2	< 2
Lead-210	Bq/L	0.20		< 0.10	< 0.02	0.03	0.03
Radium-226	Bq/L	0.49		< 0.040	0.02	< 0.01	0.02
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	42.3	33.4	--
ORP	mV			- <sup>1</sup>	51.2	88.4	--
SPC	us/cm			- <sup>1</sup>	1449.0	1824.0	--
Temperature	°C			- <sup>1</sup>	12	10.665	--
Turbidity	FNU			- <sup>1</sup>	84.36	21.85	--
pH	Units			- <sup>1</sup>	6.58	6.73	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-20: PH-93-12-II**

		Criteria		PH-93-12-II			
Analysis	Units	COPC	Table 3 (MECP)	2019 Average	2020-05-27	2020-10-22	Average
		6.5-8.5	6.5-9.0				
pH	pH			7.39	6.97	7.17	7.07
Alkalinity	mg/L as CaCO <sub>3</sub>			540	5420	1000	3210
Carbonate	mg/L as CaCO <sub>3</sub>			1.3	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			540	5420	1000	3210
Total Dissolved Solids	mg/L			655	623	643	633
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			6.0	3	3	3
Dissolved Organic Carbon	mg/L			3.0	3	3	3
Total Ammonia-N	mg/l			7.75	4.9	12.1	8.5
Chloride	mg/L			57	57	47	52
Sulphate	mg/L			32.5	33	29	31
Bromide	mg/L			< 1.0	< 0.30	< 0.30	< 0.30
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			1.18	0.91	1.33	1.12
Nitrate + Nitrite (N)	mg/L			1.18	0.91	1.33	1.12
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			535	12100	1490	6795
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			6.0	139	1	70
Arsenic (dissolved)	µg/L	25	1900	< 1.0	0.3	0.3	0.3
Barium (dissolved)	µg/L	1000	29000	165	164	221	193
Beryllium (dissolved)	µg/L		67	< 0.50	0.009	< 0.007	0.008
Boron (dissolved)	µg/L	5000	45000	785	518	1040	779
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			175000	199000	190000	194500
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	0.020	0.012
Cobalt (dissolved)	µg/L		66	0.65	0.662	0.875	0.769
Chromium (dissolved)	µg/L		810	< 5.0	0.46	0.34	0.40
Copper (dissolved)	µg/L	1000	87	1.5	1.8	4.9	3.4
Iron (dissolved)	µg/L			< 100	147	14	81
Potassium (dissolved)	µg/L			23500	20300	33500	26900
Magnesium (dissolved)	µg/L			23500	20800	25200	23000
Manganese (dissolved)	µg/L			75	36.70	101.00	68.9
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.13	0.16	0.15
Sodium (dissolved)	µg/L			33500	30500	36000	33250
Nickel (dissolved)	µg/L		490	2.2	1.8	2.9	2.4
Phosphorus (total)	mg/L			15.500	0.027	< 0.003	0.015
Lead (dissolved)	µg/L	10	25	< 0.50	0.14	0.04	0.09
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.16	0.20	0.2
Tin (dissolved)	µg/L			< 1.0	0.22	0.28	0.25
Strontium (dissolved)	µg/L			520	529	695	612
Titanium (dissolved)	µg/L			< 5.0	8.05	0.20	4.13
Thallium (dissolved)	µg/L		510	< 0.05	0.010	0.006	0.008
Uranium (dissolved)	µg/L	20	420	<b>3450</b>	<b>2530</b>	<b>4130</b>	<b>3330</b>
Vanadium (dissolved)	µg/L		250	< 0.50	0.77	0.45	0.61
Zinc (dissolved)	µg/L		1100	< 12.0	7	8	8
Lead-210	Bq/L	0.20		< 0.10	0.02	< 0.02	0.02
Radium-226	Bq/L	0.49		< 0.040	0.01	0.01	0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	21.1	44.5	--
ORP	mV			- <sup>1</sup>	180.9	130.1	--
SPC	us/cm			- <sup>1</sup>	1129.0	1035.0	--
Temperature	°C			- <sup>1</sup>	9.305	10.6	--
Turbidity	FNU			- <sup>1</sup>	5098.1	2801.1	--
pH	Units			- <sup>1</sup>	6.74	6.84	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-21: PH-95-I**

		Criteria		PH-95-I			
Analysis	Units	COPC	Table 3 (MECP)	2019 Average	2020-05-29	2020-10-19	2020 Average
		6.5-8.5	6.5-9.0				
pH	pH			7.64	7.47	7.76	7.62
Alkalinity	mg/L as CaCO <sub>3</sub>			335	262	318	290
Carbonate	mg/L as CaCO <sub>3</sub>			1.5	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			330	262	318	290
Total Dissolved Solids	mg/L			360	280	349	315
Fluoride	mg/L	1.5		< 0.10	0.07	0.08	0.08
Total Organic Carbon	mg/L			5.0	2	2	2
Dissolved Organic Carbon	mg/L			1.8	2	2	2
Total Ammonia-N	mg/l			0.13	< 0.04	< 0.04	< 0.04
Chloride	mg/L			4	2	3	2
Sulphate	mg/L			6.2	3	6	4
Bromide	mg/L			< 1.0	< 0.30	< 0.30	< 0.30
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			< 0.10	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (N)	mg/L			< 0.10	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			345	420	305	363
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	< 1	< 1	< 1
Arsenic (dissolved)	µg/L	25	1900	< 1.0	< 0.2	< 0.2	< 0.2
Barium (dissolved)	µg/L	1000	29000	16	12	15	13
Beryllium (dissolved)	µg/L	67		< 0.50	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	19	16	25	21
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			125000	103000	116000	109500
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	< 0.50	0.103	< 0.004	0.054
Chromium (dissolved)	µg/L		810	< 5.0	0.10	0.31	0.21
Copper (dissolved)	µg/L	1000	87	1.9	0.3	0.5	0.4
Iron (dissolved)	µg/L			< 100	< 7	< 7	< 7
Potassium (dissolved)	µg/L			725	569	818	694
Magnesium (dissolved)	µg/L			6100	3950	5740	4845
Manganese (dissolved)	µg/L			4	50.50	0.59	25.5
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.27	0.20	0.24
Sodium (dissolved)	µg/L			2200	1420	2290	1855
Nickel (dissolved)	µg/L		490	< 1.0	0.1	< 0.1	< 0.1
Phosphorus (total)	mg/L			2.595	0.007	0.006	0.007
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	0.04	0.03
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.15	0.21	0.2
Tin (dissolved)	µg/L			< 1.0	< 0.06	0.12	0.09
Strontium (dissolved)	µg/L			185	160	174	167
Titanium (dissolved)	µg/L			< 5.0	< 0.05	< 0.05	< 0.05
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	9	7.12	7.89	7.51
Vanadium (dissolved)	µg/L		250	< 0.50	0.22	0.33	0.28
Zinc (dissolved)	µg/L		1100	< 5.0	2	2	2
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	31.6	69.8	--
ORP	mV			- <sup>1</sup>	88.7	236.7	--
SPC	us/cm			- <sup>1</sup>	506	584.0	--
Temperature	°C			- <sup>1</sup>	8.265	11.367	--
Turbidity	FNU			- <sup>1</sup>	85.17	82.01	--
pH	Units			- <sup>1</sup>	7.03	7.32	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-22: PH-95-17-I**

		Criteria		PH-95-17-I			
Analysis	Units	COPC	Table 3 (MECP)	2019 Average	2020-05-27	2020-10-27	Average
		6.5-8.5	6.5-9.0				
pH	pH			7.35	6.97	7.33	7.15
Alkalinity	mg/L as CaCO <sub>3</sub>			805	1080	814	947
Carbonate	mg/L as CaCO <sub>3</sub>			1.8	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			800	1080	814	947
Total Dissolved Solids	mg/L			1023	840	843	842
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			7.3	6	6	6
Dissolved Organic Carbon	mg/L			6.4	6	5	6
Total Ammonia-N	mg/l			12.75	8.2	12.5	10.4
Chloride	mg/L			52	42	55	49
Sulphate	mg/L			103.5	41	48	45
Bromide	mg/L			1.1	< 0.30	0.40	0.35
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			< 0.10	0.18	0.12	0.15
Nitrate + Nitrite (N)	mg/L			< 0.10	0.18	0.12	0.15
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			790	2100	1069	1585
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	6	1	4
Arsenic (dissolved)	µg/L	25	1900	< 1.0	0.4	0.4	0.4
Barium (dissolved)	µg/L	1000	29000	240	198	184	191
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	0.015	0.011
Boron (dissolved)	µg/L	5000	45000	1500	1420	1260	1340
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			260000	250000	226000	238000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	0.012	0.005	0.009
Cobalt (dissolved)	µg/L		66	4.55	4.110	3.780	3.945
Chromium (dissolved)	µg/L		810	< 5.0	0.38	0.12	0.25
Copper (dissolved)	µg/L	1000	87	2.2	2.4	2.6	2.5
Iron (dissolved)	µg/L			< 100	27	39	33
Potassium (dissolved)	µg/L			32500	31800	31500	31650
Magnesium (dissolved)	µg/L			33500	33300	33000	33150
Manganese (dissolved)	µg/L			7550	7030	6200	6615
Molybdenum (dissolved)	µg/L		9200	0.65	0.51	0.50	0.51
Sodium (dissolved)	µg/L			43500	44400	35600	40000
Nickel (dissolved)	µg/L		490	5.3	4.7	4.6	4.7
Phosphorus (total)	mg/L			0.840	0.018	< 0.003	0.011
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	< 0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.20	0.29	0.25
Tin (dissolved)	µg/L			< 1.0	0.29	0.24	0.27
Strontium (dissolved)	µg/L			930	980	889	935
Titanium (dissolved)	µg/L			< 5.0	0.63	0.22	0.43
Thallium (dissolved)	µg/L		510	< 0.05	0.041	0.027	0.034
Uranium (dissolved)	µg/L	20	420	6150	8170	11300	9735
Vanadium (dissolved)	µg/L		250	< 0.50	0.50	0.50	0.50
Zinc (dissolved)	µg/L		1100	< 5.0	7	3	5
Lead-210	Bq/L	0.20		< 0.10	0.05	0.05	0.05
Radium-226	Bq/L	0.49		< 0.040	0.03	0.02	0.03
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	50.4	30.8	--
ORP	mV			- <sup>1</sup>	91.2	84.6	--
SPC	us/cm			- <sup>1</sup>	1425.0	1262.0	--
Temperature	°C			- <sup>1</sup>	12.44	10.0	--
Turbidity	FNU			- <sup>1</sup>	800.58	719.58	--
pH	Units			- <sup>1</sup>	6.72	6.71	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

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<sup>1</sup> Field parameters included for current sampling year only.

**Table D-23: PH-95-17-II**

		Criteria		PH-95-17-II			
Analysis	Units	COPC	Table 3 (MECP)	2019 Average	2020-05-27	2020-10-27	Average
		6.5-8.5	6.5-9.0				
pH	pH			7.42	6.97	7.41	7.19
Alkalinity	mg/L as CaCO <sub>3</sub>			530	1000	1030	1015
Carbonate	mg/L as CaCO <sub>3</sub>			1.4	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			530	1000	1030	1015
Total Dissolved Solids	mg/L			558	614	477	546
Fluoride	mg/L	1.5		< 0.10	< 0.06	< 0.06	< 0.06
Total Organic Carbon	mg/L			7.5	6	4	5
Dissolved Organic Carbon	mg/L			4.5	6	5	6
Total Ammonia-N	mg/l			21	25.4	18.9	22.2
Chloride	mg/L			30	41	29	35
Sulphate	mg/L			6.8	8	5	6
Bromide	mg/L			< 1.0	< 0.30	< 0.30	< 0.30
Nitrite (N)	mg/L			0.011	< 0.03	0.19	0.11
Nitrate (N)	mg/L			0.77	0.24	2.00	1.12
Nitrate + Nitrite (N)	mg/L			0.77	0.24	2.20	1.22
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	0.01	0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			400	5420	2572	3996
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	6	2	4
Arsenic (dissolved)	µg/L	25	1900	1.9	2.7	2.0	2.4
Barium (dissolved)	µg/L	1000	29000	225	218	166	192
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	0.011	0.009
Boron (dissolved)	µg/L	5000	45000	1350	1190	1110	1150
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			120000	149000	113000	131000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	0.012	0.008
Cobalt (dissolved)	µg/L		66	4.10	5.510	4.280	4.895
Chromium (dissolved)	µg/L		810	< 5.0	0.73	0.33	0.53
Copper (dissolved)	µg/L	1000	87	< 1.0	1.0	1.6	1.3
Iron (dissolved)	µg/L			4000	4900	2640	3770
Potassium (dissolved)	µg/L			36000	38500	33200	35850
Magnesium (dissolved)	µg/L			22500	24100	19400	21750
Manganese (dissolved)	µg/L			735	685	727	706
Molybdenum (dissolved)	µg/L		9200	< 0.50	0.21	0.15	0.18
Sodium (dissolved)	µg/L			35500	42900	29300	36100
Nickel (dissolved)	µg/L		490	4.8	5.1	4.6	4.9
Phosphorus (total)	mg/L			20.850	0.041	< 0.003	0.022
Lead (dissolved)	µg/L	10	25	< 0.50	0.01	< 0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.50	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 2.0	0.16	0.21	0.19
Tin (dissolved)	µg/L			< 1.0	0.30	0.22	0.26
Strontium (dissolved)	µg/L			490	536	476	506
Titanium (dissolved)	µg/L			< 5.0	0.53	0.25	0.39
Thallium (dissolved)	µg/L		510	< 0.05	0.017	0.139	0.078
Uranium (dissolved)	µg/L	20	420	31	183	15	99
Vanadium (dissolved)	µg/L		250	0.79	1.05	1.13	1.09
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	< 2	< 2
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	0.02	0.01	0.02
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	32.3	80.5	--
ORP	mV			- <sup>1</sup>	-45.2	-10.4	--
SPC	us/cm			- <sup>1</sup>	999	909.0	--
Temperature	°C			- <sup>1</sup>	11.023	9.652	--
Turbidity	FNU			- <sup>1</sup>	1548.3	2013.4	--
pH	Units			- <sup>1</sup>	6.77	7.02	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

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<sup>1</sup> Field parameters included for current sampling year only.



**Table D-24: PH-95-18**

		Criteria		PH-95-18		
Analysis	Units	COPC	Table 3 (MECP)	2019 Average	2020 Well Damaged	Average
		6.5-8.5	6.5-9.0			
pH	pH			7.14		--
Alkalinity	mg/L as CaCO <sub>3</sub>			870		--
Carbonate	mg/L as CaCO <sub>3</sub>			1.1		--
Bicarbonate	mg/L as CaCO <sub>3</sub>			860		--
Total Dissolved Solids	mg/L			1080		--
Fluoride	mg/L	1.5		< 0.10		--
Total Organic Carbon	mg/L			11.0		--
Dissolved Organic Carbon	mg/L			8.8		--
Total Ammonia-N	mg/l			40.00		--
Chloride	mg/L			46		--
Sulphate	mg/L			120.0		--
Bromide	mg/L			< 1.0		--
Nitrite (N)	mg/L			< 0.010		--
Nitrate (N)	mg/L			0.59		--
Nitrate + Nitrite (N)	mg/L			0.59		--
Mercury (dissolved)	µg/L	1	0.29	< 0.10		--
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			710		--
Silver (dissolved)	µg/L		1.5	< 0.1		--
Aluminum (dissolved)	µg/L			250.0		--
Arsenic (dissolved)	µg/L	25	1900	< 1.0		--
Barium (dissolved)	µg/L	1000	29000	160		--
Beryllium (dissolved)	µg/L		67	< 0.50		--
Boron (dissolved)	µg/L	5000	45000	2000		--
Bismuth (dissolved)	µg/L			< 1.0		--
Calcium (dissolved)	µg/L			220000		--
Cadmium (dissolved)	µg/L	5	2.7	< 0.1		--
Cobalt (dissolved)	µg/L		66	18.00		--
Chromium (dissolved)	µg/L		810	< 5.0		--
Copper (dissolved)	µg/L	1000	87	18.0		--
Iron (dissolved)	µg/L			430		--
Potassium (dissolved)	µg/L			61000		--
Magnesium (dissolved)	µg/L			42000		--
Manganese (dissolved)	µg/L			5700		--
Molybdenum (dissolved)	µg/L		9200	0.57		--
Sodium (dissolved)	µg/L			48000		--
Nickel (dissolved)	µg/L		490	15.0		--
Phosphorus (total)	mg/L			1.800		--
Lead (dissolved)	µg/L	10	25	0.51		--
Antimony (dissolved)	µg/L	6	20000	< 0.50		--
Selenium (dissolved)	µg/L	10	63	< 2.0		--
Tin (dissolved)	µg/L			< 1.0		--
Strontium (dissolved)	µg/L			1100		--
Titanium (dissolved)	µg/L			11.0		--
Thallium (dissolved)	µg/L		510	0.27		--
Uranium (dissolved)	µg/L	20	420	5000		--
Vanadium (dissolved)	µg/L		250	1.40		--
Zinc (dissolved)	µg/L		1100	5.2		--
Lead-210	Bq/L	0.20		< 0.10		--
Radium-226	Bq/L	0.49		< 0.040		--
Thorium-230	Bq/L	0.65		< 0.070		--
Thorium-232	Bq/L			< 0.060		--
<b>Field Parameters</b>						
ODO % Sat	mg/L			- <sup>1</sup>		--
ORP	mV			- <sup>1</sup>		--
SPC	us/cm			- <sup>1</sup>		--
Temperature	°C			- <sup>1</sup>		--
Turbidity	FNU			- <sup>1</sup>		--
pH	Units			- <sup>1</sup>		--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

**Table D-25: PH-M-19**

		Criteria		PH-M-19			
Analysis	Units	COPC	Table 3 (MECP)	2019	2020		
				Average	2020-05-28	2020-10-23	Average
pH	pH	6.5-8.5	6.5-9.0	7.85	7.59	7.55	7.57
Alkalinity	mg/L as CaCO <sub>3</sub>			370	360	366	363
Carbonate	mg/L as CaCO <sub>3</sub>			2.8	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO <sub>3</sub>			365	360	366	363
Total Dissolved Solids	mg/L			820	617	857	737
Fluoride	mg/L	1.5		< 0.10	< 0.06	0.06	0.06
Total Organic Carbon	mg/L			3.2	2	2	2
Dissolved Organic Carbon	mg/L			1.6	2	2	2
Total Ammonia-N	mg/l			0.07	< 0.04	< 0.04	< 0.04
Chloride	mg/L			250	170	300	235
Sulphate	mg/L			10.8	8	10	9
Bromide	mg/L			< 1.0	< 0.30	< 0.30	< 0.30
Nitrite (N)	mg/L			< 0.010	< 0.03	< 0.03	< 0.03
Nitrate (N)	mg/L			1.11	0.98	0.88	0.93
Nitrate + Nitrite (N)	mg/L			1.11	0.98	0.88	0.93
Mercury (dissolved)	µg/L	1	0.29	< 0.10	< 0.01	< 0.01	< 0.01
Hardness (dissolved)	mg/L as CaCO <sub>3</sub>			365	919	432	676
Silver (dissolved)	µg/L		1.5	< 0.1	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			< 5.0	< 1	10	6
Arsenic (dissolved)	µg/L	25	1900	310	394	364	379
Barium (dissolved)	µg/L	1000	29000	50	40	57	48
Beryllium (dissolved)	µg/L		67	< 0.50	< 0.007	0.026	0.017
Boron (dissolved)	µg/L	5000	45000	31	33	32	33
Bismuth (dissolved)	µg/L			< 1.0	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			115000	97000	123000	110000
Cadmium (dissolved)	µg/L	5	2.7	< 0.1	< 0.003	0.005	0.004
Cobalt (dissolved)	µg/L		66	< 0.50	0.117	0.101	0.109
Chromium (dissolved)	µg/L		810	< 5.0	0.42	0.88	0.65
Copper (dissolved)	µg/L	1000	87	< 1.0	0.7	0.4	0.6
Iron (dissolved)	µg/L			< 100	< 7	13	10
Potassium (dissolved)	µg/L			935	1040	1070	1055
Magnesium (dissolved)	µg/L			16000	11900	13200	12550
Manganese (dissolved)	µg/L			2	7	2	5
Molybdenum (dissolved)	µg/L		9200	0.73	0.98	0.84	0.91
Sodium (dissolved)	µg/L			170000	156000	172000	164000
Nickel (dissolved)	µg/L		490	< 1.0	0.2	0.4	0.3
Phosphorus (total)	mg/L			0.330	0.025	0.031	0.028
Lead (dissolved)	µg/L	10	25	< 0.50	< 0.01	0.05	0.03
Antimony (dissolved)	µg/L	6	20000	3.20	1.70	3.70	2.70
Selenium (dissolved)	µg/L	10	63	< 2.0	1.71	1.24	1.48
Tin (dissolved)	µg/L			< 1.0	< 0.06	< 0.06	< 0.06
Strontium (dissolved)	µg/L			375	296	371	334
Titanium (dissolved)	µg/L			< 5.0	0.17	0.81	0.49
Thallium (dissolved)	µg/L		510	< 0.05	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	225	194	180	187
Vanadium (dissolved)	µg/L		250	4.10	5.40	4.97	5.19
Zinc (dissolved)	µg/L		1100	< 5.0	< 2	< 2	< 2
Lead-210	Bq/L	0.20		< 0.10	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49		< 0.040	< 0.01	< 0.01	< 0.01
Thorium-230	Bq/L	0.65		< 0.070	< 0.02	< 0.02	< 0.02
Thorium-232	Bq/L			< 0.060	< 0.02	< 0.02	< 0.02
<b>Field Parameters</b>							
ODO % Sat	mg/L			- <sup>1</sup>	66.2	- <sup>2</sup>	--
ORP	mV			- <sup>1</sup>	158.5	- <sup>2</sup>	--
SPC	us/cm			- <sup>1</sup>	923.0	- <sup>2</sup>	--
Temperature	°C			- <sup>1</sup>	12.296	- <sup>2</sup>	--
Turbidity	FNU			- <sup>1</sup>	217.26	- <sup>2</sup>	--
pH	Units			- <sup>1</sup>	7.32	- <sup>2</sup>	--

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from

Table 3 = Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,

**Bold values** indicate an exceedance of the COPC or Table 3 criteria

<sup>1</sup> Field parameters included for current sampling year only.

<sup>2</sup> Insufficient volume of groundwater for field parameters

**APPENDIX E      EA FOLLOW UP SUMMARY TABLE**

TABLE E-1: SCOPE OF BIOPHYSICAL EFFECTS EA FOLLOW-UP MONITORING PLAN

Predicted Environmental Effect	Mitigation Measure	Residual Environmental Effect (remaining after mitigation)	Status of Mitigation Measures – 2020	EA Follow-up Monitoring Requirement	Predicted Environmental Effect - 2020	Status of EA Commitments - 2020
<b>Atmospheric Environment</b>  <i>Air Quality</i> 24-hour average Ambient Air Quality Criteria (AAQC) will be exceeded for arsenic and cobalt on occasions at offsite locations, including public receptor locations.  Total suspended particulates of PM <sub>10</sub> , PM <sub>2.5</sub> and NO <sub>2</sub> will exceed the 24-hour AAQC at some offsite locations.	Reduce travel distances within LTWMF from 200 m to 50 m, for equipment distributing off-loaded contaminants.	No residual adverse effects.	Construction equipment met Off-Road Compression-Ignition Engine Emission Regulations for PH LTWMF activities.	Verify implementation of mitigation measures.  Monitor arsenic and cobalt at offsite locations, including public receptor locations. Compare measured concentrations to predictions.  Monitor levels of PM <sub>2.5</sub> at offsite locations. Compare measured levels of PM <sub>2.5</sub> to correlate the predicted air quality relationships between PM <sub>10</sub> and PM <sub>2.5</sub> ; and relationships between NO <sub>2</sub> and PM <sub>2.5</sub> .	There were no exceedances of the 24 hour AAQC for arsenic or cobalt in 2020.  There were no exceedances of the AAQC for PM <sub>2.5</sub> of 30 µg/m³ in 2020. As described in the <i>Port Hope Environmental and Biophysical Monitoring Plan</i> [25] compliance with this criterion will also be protective of the potential effects from PM <sub>10</sub> and NO <sub>2</sub> .	Air quality monitoring was conducted throughout 2020 at the PH LTWMF Site. A holiday shutdown took place from 2020 December 21 to 2021 January 4.  The Overriding Limit of 120 µg/m³ for TSP, as defined in the <i>PHAI Dust Management Requirements and Plan</i> [28] as exceeded once in 2020 at the Welcome Northwest location on 2020 January 17. The exceedance was likely due to off-site activities. This exceedance represents approximately 0.63% of the total TSP samples at the Weather Station location. Exceedances were reported through CNL’s Improvement Action (ImpAct) system, and appropriate follow-up action was performed.  The AAQC for PM <sub>2.5</sub> of 30 µg/m³ (98 <sup>th</sup> percentile averaged over 3 years) was not exceeded in 2020.  The sample containing the highest net weight of TSP collected each week at each of the monitoring stations was sent for additional analysis to determine the concentration of metals and radionuclides in suspended dust.  There were no exceedances of the AAQC for metals in 2020. Radionuclide analysis results are discussed under Radiological, Particulate Radioactivity.
	Install a fence-type barrier or other movable barrier at specific targeted locations.					
	Construction equipment to meet Off-Road Compression-Ignition Engine Emission Regulations for use in areas of denser urbanization, where practicable.					
<i>Odour</i> MOE guideline for odour may be exceeded at properties near Highland Drive Landfill and the Port Hope Harbour.	Lime may be added to waste, for sulphur-related odours; foaming agents may be used to minimize surface odours; odour suppression sprays may be used.	No residual adverse effects.	Anticipated start of dredging at the Port Hope Harbour is 2021.  The Highland Drive Consolidation site waste movement will be completed in 2021 with a predicted project close-out in the first half of 2022. The Highland Drive Landfill is planned for 2023.	During pre-construction and construction phases, conduct odour analysis at Highland Drive Landfill and Port Hope Harbour sites. Implement mitigation measures if odour analysis indicates they are necessary.	Anticipated start of dredging at the Port Hope Harbour is 2021.  The Highland Drive Consolidation site waste movement will be completed in 2021 with a predicted project close-out in the first half of 2022. The Highland Drive Landfill is planned for 2023.	Odour analysis is planned to occur once impacted sediment/soil is removed from the Port Hope Harbour and the Highland Drive Landfill.  A third party odour monitoring contractor was procured in 2020 for the commencement of dredging in the Port Hope Harbour in 2021.
<i>Noise</i> Noise levels will increase by 12 dBA, to 63 dBA, for residents adjacent to the LTWMF, during construction and development; by 13 dBA, to 67 dBA, for residents adjacent to the Alexander Ravine; and by 12 dBA, to 61 dBA, for residents along the Strachan Street transportation route.	Hours of work will comply with Port Hope By-Law No 30/2002, which prohibits construction between 11:00 pm and 7:00 am.  At small and medium scale remediation sites in residential areas, activities would be limited to daylight hours and would conclude by 7:00 p.m.  Construction equipment will comply with emission standards as outlined in NPC-115 of the Ontario Model Municipal Noise Control By-Law.  Trucks and other equipment will be equipped with mufflers. Tailgate banging will be avoided.	Nuisance noise impacts on local receptors.	Complied with Port Hope By-Law No 30/2002 and World Health Organization’s 70 dBA over a 24 hour period [31].  Trucks and other equipment will were equipped with mufflers. Tailgate banging was avoided.  Physical and operational elements were built into the design of the new access road; construction of a berm and installation of traffic lights.	Verify implementation of mitigation measures.  Measure noise levels at the LTWMF including the intersection of the proposed access road [now constructed] and Toronto Road during construction; at Alexander Ravine during remediation; and along the Strachan Street transportation route, to verify accuracy of predictions and effectiveness of mitigation measures.  Monitor noise levels for compliance with appropriate by laws and regulations governing hours of work and levels of noise.	Noise Monitoring was conducted around the LTWMF in 2020. If 202- results are compared to 2015 results prior to the start of the EW3a construction (when levels of activity around the site were comparatively low), it can be observed that the 2020 results are similar to 2019 with no notable increases of results. All values were below the predicted range of 12 dBA and the World Health Organization’s <i>Guideline for Community Noise</i> level of 70 dBA over a 24-hour period [31].	Implementation of mitigation measures is verified during compliance inspections. Work was scheduled in compliance with local by laws.  There were two main campaigns, January and November, for noise monitoring in 2020 at the PH LTWMF.  The North, South and Central Transportation Routes were also monitored in 2020. Monitoring along the transportation routes showed little to no increase from the baseline monitoring that took place prior to the remedial activities.

Predicted Environmental Effect	Mitigation Measure	Residual Environmental Effect (remaining after mitigation)	Status of Mitigation Measures – 2020	EA Follow-up Monitoring Requirement	Predicted Environmental Effect - 2020	Status of EA Commitments - 2020
	<p>Empty trucks will be required to reduce speed at construction sites and on local roads to avoid excessive cargo box and tray noise.</p> <p>Construction hoarding will be erected where practical.</p> <p>Develop and implement a noise mitigation plan for the intersection of the new access road and Toronto Road involving physical (e.g., berms) and operational (e.g., transportation protocols) elements.</p>					
<p><i>Radiological, Radon</i> Annual average radon concentrations, downwind from the LTWMF during construction and development, are expected to be 25.3 Bq/m³.</p> <p>The radon pathway will be eliminated.</p>	<p>Covering stockpiles and exposed areas overnight and on weekends.</p> <p>Applying dust suppressants.</p> <p>Restricting or ceasing work under high wind conditions.</p> <p>Minimizing the exposed working face.</p> <p>Re-vegetation of completed cells and excavation areas as soon as possible.</p> <p>Modify methane gas piping exit vents to mitigate radon gas emanating from Cell 3 of the LTWMF.</p>	<p>No residual adverse effects.</p>	<p>Stock piles and exposed areas were covered with spray-on technology at the end of each work day.</p> <p>CNL approved dust suppressants are used.</p> <p>Work was restricted or ceased under high wind conditions</p> <p>Revegetation of the work areas is to be completed at the end of the PH LTWMF project.</p> <p>Remediation activity began in 2017 December and included the arsenic pile and marginally contaminated soil.</p>	<p>Stock piles and exposed areas were covered with spray-on technology at the end of each work day.</p> <p>CNL approved dust suppressants are used.</p> <p>Work was restricted or ceased under high wind conditions</p> <p>Revegetation of the work areas is to be completed at the end of the PH LTWMF project.</p> <p>Remediation activity began in 2017 December and included the arsenic pile and marginally contaminated soil.</p>	<p>Radon measurements are taken monthly at the fenceline as a representative reading to the public and around the existing mound. Measurements taken are located at the fence-line boundary. At the fence-line, the average radon measurements ranged between 49 Bq/m³ to 152 Bq/m³. Monitoring surrounding the mound ceased due to operational activities. The predicted levels were set to a significantly low unachievable level and should be re-evaluated.</p>	<p>Radon gas and radon progeny was monitored on a routine monthly basis at the LTWMF during the 2020 calendar year.</p>
<p><i>Radiological, Particulate Radioactivity</i> The predicted levels for the following radionuclides are below Health Canada reference levels: 226Ra (0.000049 Bq/m³, compared with 0.05 Bq/m³); 230Th (0.00042 Bq/m³, compared with 0.01 Bq/m³), 232Th (0.000057 µg/m³ compared with 0.006 Bq/m³); and uranium (0.0018 µg/m³ compared with 4.07 µg/m³).</p>	<p>Implement watering, to control dust on unpaved roads and excavation areas.</p> <p>Implement vacuum sweeping and water flushing on paved roads.</p>	<p>No residual adverse effects.</p>	<p>Watering trucks and spray on technology used in areas of excavation.</p>	<p>Verify implementation of mitigation measures.</p> <p>Measure levels of 226Ra; 230Th; 232Th, and uranium at work sites and along haul roads, to verify modelling predictions.</p>	<p>TSP high volume air sampler filters were sent for additional laboratory analysis in 2020. Radium-226, thorium-232 and uranium exceeded the predicted values for some of the filters in 2020; however, they remained well below the Health Canada reference values. It should be noted that the exceedances of the predicted values appear to be related to laboratory detection limits (uncalculated laboratory results were less than the limit of detection for radium-226, thorium-232 and uranium).</p> <p>Exceedances were reported through CNL’s Improvement Action (ImpAct) system, and appropriate follow-up action was performed.</p> <p>The predicted values were based on modeling PM10 concentrations. Comparing particulate radioactivity on TSP filters to the modelled predictions is taking a conservative approach.</p>	<p>The sample containing the highest net weight of TSP collected each week at each of the monitoring stations was sent for additional analysis to determine the concentration of COPCs in suspended dust.</p>
Aquatic Environment						
<p><i>Sediment Quality (Sculthorpe Marsh)</i> If remediation work is carried out in the Sculthorpe Marsh, the effect resulting from the sediment removal is expected to reduce invertebrate productivity temporarily.</p> <p>(See also, Terrestrial Environment Component)</p>	<p>Conduct sediment toxicity testing to confirm the need for remediation and /or refine area/extent/scope of any required sediment removal.</p> <p>Develop a Marsh Protection and Restoration Plan, which could include replacement of coarse organic matter and re-planting of shoreline vegetation.</p>	<p>No residual adverse effects.</p>	<p>Remediation is still being discussed with MPH. Site Specific Risk Assessment will be conducted prior to any remediation activities.</p>	<p>The remediation of the Sculthorpe Marsh is not required at this time. The following follow up actions with respect to the Sculthorpe Marsh; monitor recovery of benthic invertebrates and aquatic communities against predicted timelines are not incorporated into this plan.</p>	<p>Remediation is still being discussed with MPH. Site Specific Risk Assessment will be conducted prior to any remediation activities.</p>	<p>Remediation is still being discussed with MPH. Site Specific Risk Assessment will be conducted prior to any remediation activities.</p>
<p><i>Surface Water Quality, Radiological</i></p>	<p>The mitigation measures include the design (e.g., the low-permeability cover on the LTWMF and permeable reactive barriers installed in</p>	<p>No residual adverse effects.</p>	<p>Stage 1 Wave Attenuator and turbidity curtain has been installed at the Harbour site.</p>	<p>Measure concentrations of arsenic and uranium at the Highland Drive South Creek and Brewery Creek; and concentrations of uranium and <sup>226</sup>Ra</p>	<p>No residual adverse effects on surface water. There was no observable decrease in uranium concentrations in Brand Creek (downgradient</p>	<p>Pre-construction monitoring of surface water at the Highland Drive South Ravine Creek, Brewery Creek and Alexander Creek was</p>

Predicted Environmental Effect	Mitigation Measure	Residual Environmental Effect (remaining after mitigation)	Status of Mitigation Measures – 2020	EA Follow-up Monitoring Requirement	Predicted Environmental Effect - 2020	Status of EA Commitments - 2020
<p>Uranium concentrations in the groundwater and down-gradient surface water in the area of the LTWMF are expected to decrease by 63%.</p> <p>Concentrations of arsenic and uranium will decrease by 78-88% in the <i>Highland Drive, South Creek and Brewery Creek</i>.</p> <p>Concentrations of uranium and <sup>226</sup>Ra would decrease similarly in Alexander Creek.</p> <p>Concentrations of <sup>226</sup>Ra and uranium are expected to increase in the area between the harbour and the Ganaraska River, during dredging of the harbour, but to remain below Provincial Water Quality Guidelines (PWQOs).</p>	<p>Highland Drive South Ravine), operation and management (e.g., storm water management) features of the project proposal.</p> <p>The detailed design (PHP-PHH-N-031) includes a temporary wave attenuator and use of a turbidity curtain for construction of the wave attenuator.</p> <p>An Emergency Response Plan will be developed to address unexpected events.</p> <p>A Spill Contingency Plan will be developed to deal with unexpected spills of fuels and lubricants. Spill control and clean-up equipment will be provided in all work locations.</p> <p>Erosion and sediment control structures will be in place, and will be inspected and maintained regularly.</p>		<p>A Spill Contingency Plan has been developed to deal with unexpected spills of fuels and lubricants. Spill control and clean-up equipment is provided in all work locations.</p> <p>Erosion and sediment control structures are be in place, and are inspected and maintained regularly.</p>	<p>in Alexander Creek; concentrations of <sup>226</sup>Ra and uranium in the area between the harbour and the Ganaraska River during dredging of the harbour; and uranium concentrations in the groundwater and down-gradient surface water in the area of the LTWMF, to verify accuracy of predictions.</p> <p>Review Emergency Response Plan, Spill Contingency Plan and require revisions if necessary until plans are deemed acceptable.</p> <p>Verify presence of spill control and clean-up equipment at all work locations.</p> <p>Verify presence of erosion and sediment control structures, and review inspection and maintenance protocol.</p>	<p>of the LTWMF). This is not expected until the project evolves and the waste is remediated.</p>	<p>completed in 2013. Additional baseline sampling took place in 2020, in anticipation of the start of construction at various remediation sites.</p> <p>Monitoring of surface water at the Port Hope Harbour and Ganaraska River confluence was completed in 2020 and will continue in 2021.</p> <p>Monitoring of the surface water downgradient of the LTWMF (including Lake Ontario) is performed on a continuous, quarterly basis. (Section 9.2.1.6.1.2)</p> <p>Oversight is used by CNL personnel to confirm the suitability, implementation and effectiveness of processes applied to PHAI project activities in order to comply with contractual obligations, licensing requirements, federal/provincial acts and regulations, environmental management and protection plans, compliance plans and technical specifications. Oversight is applied by CNL taking into consideration the importance and complexity of activities and the organization(s) involved in the management of these activities. Activities performed by PHAI consultants, contractors and service providers are subject to oversight.</p>
<p><i>Surface Water Quality, Non-Radiological</i></p> <p>Long-term improvement to down-gradient surface water quality; reduced contaminant loadings to down-gradient streams; and no measurable change to Ganaraska River are the effects predicted.</p> <p>Any storm water flow which permeates the dike during harbour cleanup is not expected to raise contaminant concentrations above PWQOs in the harbour or Ganaraska River.</p> <p>Surface water infiltration into and through contaminated materials, to groundwater and down-gradient surface water, is expected to decrease.</p> <p>Contaminant loadings from LTWMF leachate, discharging to the lake, would be reduced by 44%.</p>	<p>Groundwater, stormwater, and drainage water collection and treatment systems, including flow control and quality control, will be in place.</p> <p>Dike and silt screen will isolate harbour work from Lake Ontario.</p> <p>It is to be noted that subsequent to the acceptance of the Environmental Assessment by the RAs, the preliminary design for the Port Hope Project continued to be refined in support of the licence application and some changes to preliminary design concepts were made.</p> <p>Among the design changes was the substitution of the proposed dike for purposes of separating the Approach Channel and Turning Basin from the Outer Harbour during dredging operations with a series of silt curtains to prevent transmission of suspended solids out of the Harbour during dredging; with the curtains being protected from wave damage by a floating wave attenuator designed for the dissipation of wave energy in harbours. This (and all other design refinements), and the potential environmental effects associated with the change, were described in the Engineering Change Summary Report which was submitted to, and approved by, the RAs. Therefore the silt barrier and wave attenuator are incorporated into the detailed design description report.</p>	<p>No residual adverse effects.</p>	<p>Required sampling of groundwater, storm water and drainage water took place during the PH LTWMF construction activities.</p> <p>No residual adverse effects for the PH LTWMF construction work.</p> <p>Confirmatory sampling took place at Highland Drive South Ravine Creek, Brewery Creek, and Alexander Creek in 2020.</p>	<p>Verify predicted improvements in surface water.</p> <p>Proponent must ensure that discharge is not deleterious to aquatic environment (fish) at point of discharge and appropriate monitoring must be employed to confirm this. Monitor contaminant concentrations in the harbour and Ganaraska River during the harbour cleanup following any storms.</p> <p>Monitor mercury and levels of other contaminant of potential concern (COPC) in fish tissue to verify predictions.</p> <p>Verify reduction of contaminant loadings due to leachate discharging to Lake Ontario.</p> <p>Monitor the maintenance of silt curtains.</p>	<p>There was no observable decrease in contaminant concentrations to downgradient Brand Creek; however, this is not expected until the project evolves and the waste is remediated.</p> <p>Confirmatory sampling took place at Highland Drive South Ravine Creek, Brewery Creek and Alexander Creek and will continued to take place in 2020.</p>	<p>Pre-construction monitoring of surface water at the Highland Drive South Ravine Creek, Brewery Creek and Alexander Creek was completed in 2013. Additional baseline sampling took place in 2020, in anticipation of the start of construction at various remediation sites.</p> <p>Monitoring of surface water at the Port Hope Harbour and Ganaraska River Confluence was completed in 2020 and will continue in 2021.</p> <p>Monitoring of the surface water downgradient of the LTWMF (including Lake Ontario) is performed on a continuous, quarterly basis. The PH LTWMF construction activities did not appear to be effecting surface water quality (Section 9.2.1.6.1).</p> <p>Monitoring of COPCs in fish tissue to occur in the project’s Maintenance and Monitoring Phase.</p> <p>Monitoring of the maintenance of the silt curtains will occur during the construction period around water features at Alexander Creek Highland Drive South Creek, Brand Creek, if necessary, and near Lake Ontario.</p> <p>Monitoring of the silt curtain installed at the Wave Attenuator includes regular visual monitoring of the curtain from the surface of the water from a boat.</p>

Predicted Environmental Effect	Mitigation Measure	Residual Environmental Effect (remaining after mitigation)	Status of Mitigation Measures – 2020	EA Follow-up Monitoring Requirement	Predicted Environmental Effect - 2020	Status of EA Commitments - 2020
<i>Sediment Quality (Harbour)</i> A long-term improvement to harbour sediment quality and habitat conditions is predicted.	Beneficial effects will be enhanced by the development of fish habitat enhancement incorporated into the harbour detailed design.	Beneficial effect.	Design of harbour incorporates enhancement to fish habitat. Monitoring to take place in the maintenance and monitoring phase.	Verify design enhancements have improved the fish habitat in the harbour. Monitor sediment quality and habitat conditions.	Not applicable. Expected to be a beneficial effect. Monitoring to take place in the maintenance and monitoring phase.	Monitoring to occur during Maintenance and Monitoring Phase.
<b>Geology and Groundwater Environment</b>						
<i>Soil Quality, Radiological</i> The mean incremental concentrations of radiological contaminants are expected to be less than 10% of background at remediation sites. The incremental concentrations at the LTWMF would be less than 20% of background.  The exception is <sup>230</sup> Th, with an expected 63% increase in concentration over baseline, during construction and development of the LTWMF, to a predicted mean concentration of 97.7 Bq/kg, with a maximum predicted concentration of 141.9 Bq/kg.	Reduce travel distances within LTWMF from 200 m to 50 m, for equipment distributing off-loaded contaminants.  Implementation of a Dust Management Requirements and Plan.	No residual adverse effects.	The <i>PHAI Dust Management and Requirements Plan</i> [28] was implemented during the PH LTWMF construction activities and Waterfront sites remediation activities.  The <i>Dust Management and Requirements Plan – Small-Scale Sites Remediation</i> [39] was implemented and used for the Package 3 and 4 Small Scale Sites remediations in 2020.	Measure concentrations of all radiological contaminants at all remediation sites and at the LTWMF to verify modelling predictions.  Monitor concentrations of 230Th at the LTWMF perimeter fence, and in the surface soils adjacent to it.	No residual adverse effects.  LTWMF: Thorium-230 soil concentrations in 2020 are above the predicted values at some locations due to the laboratory detection limit. (Section 9.2.1.5.3)  Highland Drive: Remediation activities have not commenced at the Highland Drive Site; therefore, the data collected in 2020 can be used to supplement existing baseline data. The 2020 results are similar to the data collected in previous years.	Surface soil monitoring for radiological contaminants of interest around the PH LTWMF and the Highland Drive Landfill Site were monitored in 2020.  Monitoring is planned annually for the remainder of the project for both Sites.
<i>Soil Quality, Non-Radiological</i> Relates to potential disposition of contaminants on surface at perimeter of LTWMF (see Atmospheric Environmental Component). Predicted maximum concentrations: arsenic 4.7 mg/kg; cobalt – 6.67 mg/kg.	See Atmospheric Environment Component.	No residual adverse effects.	No residual adverse effects for PH LTWMF construction work.  Watering trucks and spray on technology used in areas of excavation.	Verify predicted soil concentrations of arsenic and cobalt at perimeter of LTWMF.	LTWMF: In 2020, concentrations of arsenic 4.8 µg/g) and cobalt (8.2 µg/g) were greater than these predicted concentrations at PH-WWMF-SS-01., Cobalt was above the predicted concentration at PH-WWMF-SS-03 (7.5 µg/g). Aall other sampling locations were below. (Section 9.2.1.5.3).  There are no immediate environmental concerns.	Surface soil monitoring for non-radiological contaminants of interest around the perimeter of the PH LTWMF and the Highland Drive Landfill Site occurred in the spring of 2020.  Remediation activities have not commenced at the Highland Drive Site; therefore, the data collected in 2020 can be used to supplement existing baseline data. The 2020 results are similar to the data collected in previous years.  Monitoring is planned annually for the remainder of the project for both Sites.
<i>Groundwater Quality</i> With removal of source contamination, uranium concentrations at Mill Street and Alexander Street sites are predicted to decline below applicable criterion value within approximately 25 years.  Volume of groundwater collected for treatment in the LTWMF groundwater drainage water collection system would decrease by approximately 30%; contaminant concentrations expected to decline over time.  A 66% reduction is predicted for the volume of drainage water to be collected in the groundwater/drainage water collection and treatment system, to 27,380 m³/a after the cover is placed on the LTWMF.  A reduction of 92,110 m³/a to 116,280 m³/a is predicted for the sum of groundwater and drainage water discharge, an overall volume reduction of 44%.	Collected groundwater water will be treated to requirements set by the CNSC during licensing of the LTWMF.	No residual adverse effects.	WWTP construction was completed in 2016 – active commissioning commenced in the Fall of 2016.	Measure uranium concentrations at remediated Mill Street and Alexander Street sites. Report measurements annually to verify modelling predictions.  Measure volume and concentrations of contaminants in LTWMF groundwater collection system annually to verify predictions.  Measure volume of drainage water at the LTWMF annually to verify predictions.	No residual adverse effects.	Pre-construction ground water monitoring at the Mill Street South site occurred in 2012-2013.  Monitoring of selected remediated sites will occur following remediation to verify EA predictions.  Monitoring of LTWMF groundwater-drainage water collection system occurred in 2020. The drainage water location WC-SW4-02 was unable to be sampled in 2020 as this location due to insufficient water. This location has been historically intermittent and samples have not always been able to be collected. Changes in drainage water quality and volume were expected to occur after remediation work commenced. It should be noted that drainage water on site is treated prior to release to the environment.  Monitoring of groundwater and drainage water will continue throughout the Construction and Development Phase.
<i>Groundwater Flow</i> It is predicted that the water table will be lower by 10 m, and that the groundwater mounding under the existing facility will dissipate.	Not applicable.	Not applicable.	Not applicable.	Confirm lowering of water table. Confirm dissipation of mounding by monitoring water table beneath and adjacent to the LTWMF.  Monitor stream flow and perform base flow separation to get groundwater discharge, to	No residual adverse effects.	The average water levels in groundwater monitoring wells in 2020 are generally comparable to previous years. Monitoring will continue throughout the Construction and Development Phase.

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Groundwater discharge to Brand Creek is predicted to decrease by 2%.  Groundwater discharge to the onsite drainage system is predicted to decrease by 30%.  The treated effluent volume to be discharged to Lake Ontario is predicted to decrease by 42%.				confirm 2% decrease is not exceeded, and that there is a 30% decrease in groundwater discharge to the onsite drainage system, and a 42% decrease in the volume of treated effluent discharged to Lake Ontario. Monitor groundwater flow and direction to verify assessment assumption. Continue monitoring to increase understanding.		The volume of treated effluent discharged to Lake Ontario is monitored on a continuous basis. Annual effluent volume discharged to Lake Ontario is provided in Section 11.1.4.1. A volume of approximately 140,200 m³ was discharged in 2020.
<i>Groundwater Quality and Quantity</i> No measurable changes of quality or quantity of groundwater and drainage water during LTWMF construction.  Maximum breakthrough of Contaminants of Potential Concern (COPCs) through the LTWMF would be 1% of PWQO and Ontario Drinking Water Standards (ODWS) criteria.	Not applicable.	Not applicable.	Not applicable.	Monitor quantity and quality of groundwater and drainage water intercepted during construction to confirm prediction of no measurable change.	In 2020, a decrease in barium concentration was observed in groundwater at location WC-MW3A-11R relative to 2017 (Section 9.2.1.5.1).	Drainage water and groundwater were monitored in 2020 and will continue to be monitored throughout the Construction and Development Phase.
<i>Design of LTWMF</i> Primary and secondary liner units would have maximum hydraulic conductivity of 1x10 <sup>-7</sup> cm/s. Cover would have a maximum hydraulic conductivity of 10 <sup>-8</sup> cm/s.  Volume (annual) of leachate generated within the LTWMF is predicted to be 150 m³ based on the assumption of 1 mm/a leakage through the cover.	Not applicable.	Not applicable.	Not applicable.	Monitor leakage through the primary liner using collection system installed between the primary and secondary liners to verify hydraulic conductivity of the liner units.  Monitor settlement of the LTWMF cover, to confirm the assumption that there will not be excessive settlements of the waste under the cover that would compromise the cover performance.  Monitor rate of infiltration through the LTWMF cover to verify the hydraulic conductivity of the cover and confirm the assumed leakage rate through the cover system.	Not applicable until maintenance and monitoring.	Monitoring to occur in the Maintenance and Monitoring Phase.
<i>Volumes of Excavated Wastes</i> Volumes of excavated wastes to be stored in the LTWMF are predicted to be as follows: 620,000 m³ of low-level radioactive waste (LLRW); 572,000 m³ of material mixed with LLRW; 51,250 m3 of industrial waste; and 150,000 m3 of Cameco decommissioning and stored waste. Predictions of contaminant concentrations are found in Tables 9.2.2-1 and 9.2.1-2 of the EA Study Report.	Not applicable.	Not applicable.	Not applicable.	Verify the volume and concentrations of excavated waste prior to emplacement in the LTWMF, to confirm the source term volumes and contaminant concentrations used to predict long-term environmental effects.	On-site waste movement occurred between 2020 January 01 to 2020 December 31. Off-site waste deliveries to the PH LTWMF occurred from 2020 June 20 to 2020 December 31. See Section 11.1.2 Waste Inventory, Table 12: Stored Waste Inventory in PH LTWMF for waste quantities.	Volume of waste will be monitored as waste is placed in the cells of the PH LTWMF.
Terrestrial Environment						
Preparation of the LTWMF site will result in temporary loss of vegetation of 3% in Local Study Area and 11% in Site Study Area, with permanent conversion of vegetation communities in 11% of Local Study Area and 47% of Site Study Area.  Remediation of sites within Ward 1 will result in temporary loss of 7.6% of vegetation within Local Study Area and 53% in Site Study Area.  Remediation of sites outside the Highland Drive Site Local Study Area will result in temporary loss of 34% (18.3 ha) of vegetation.	Relocation of the LTWMF storm water management pond out of the wooded area into an area of Cultural Meadow vegetation.  Development of new vegetation communities at the LTWMF site, rather than re-establishing pre-construction conditions.  Development of a protection and rehabilitation plan for the fen and beach vegetation at the waterworks site.  Implementation of erosion and sediment control structures around cleared sites.  Application of dust suppression techniques.	No residual adverse effects.	CNL performed oversight on a regular basis to ensure compliance with the approved Environmental protection and management plans.  CNL-approved dust suppressant was used when needed to aid in the dust management for the construction activities.  Site-specific rehabilitation and landscape plan will be created at the end of the construction and remediation activities.	Verify relocation of stormwater management pond.  Verify development of protection and rehabilitation plans for the fen and beach vegetation at the Waterworks site.  Verify implementation of erosion and sediment control structures; application of dust suppression techniques; and rehabilitation of sites.  Verify extent and duration of temporary and permanent loss/change.  Confirm that no vegetation clearing is occurring during breeding season. In exceptions, confirm that nest survey was conducted and reviewed.	No residual adverse effects.	Monitoring planned for active construction phase.  CNL performed oversight on a regular basis to ensure compliance with the approved Environmental protection and management plans.  A Dust Monitoring Program was carried out by an independent contractor (not the prime contractor or CNL) for the PH LTWMF activities to ensure that perceived organizational conflicts regarding dust monitoring results and work activities had been avoided. Continuous monitoring occurs during the work hours and results are reported on a 15-minute interval. Any exceedances as identified in <i>PHAI Dust Management and Requirements Plan</i> [28] are



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	<p>Rehabilitation of sites after completion of waste removal.</p> <p>Development of a site-specific landscape plan of each work site.</p> <p>Vegetation clearing should not take place in migratory bird habitat during the breeding season. In exceptions, when the breeding season cannot be avoided, an avian biologist will conduct a nest survey immediately prior (e.g., within 2 days) to starting any work potentially impacting migratory bird habitat, to identify and locate active nests of species covered by the Migratory Birds Convention Act. A mitigation plan would be developed to address any potential impacts on migratory birds or their active nests, and forwarded for review to Environment Canada prior to implementation.</p> <p>Site-specific rehabilitation plans will incorporate features to re-establish structural habitat qualities and variability for sites (including at Sculthorpe Marsh, if its remediation is warranted).</p>			<p>Review site-specific remediation plans to confirm incorporation of structural habitat qualities and variability.</p>		<p>immediately reported to CNL and the prime contractor to initiate corrective action.</p> <p>CNL-approved dust suppressant was used when needed to aid in the dust management for the PH LTWMF construction activities.</p>
<i>Terrestrial (Sculthorpe Marsh)</i>	<p>If remediation occurs (in the Marsh), a Protection and Restoration Plan would be developed to ensure no net loss of wetland function, and should include:</p> <p>No excavation into beach bar; Protection of willow trees along public trails, from excavation or onsite movement of machinery; Erosion prevention, and; Accelerated soil stabilization and plant growth.</p>		<p>Not currently applicable, remediation is still being discussed with MPH. A Site Specific Risk Assessment will be conducted prior to any remediation activities.</p>	<p>Follow-up actions with respect to the Sculthorpe Marsh, including the requirement for its remediation, are the subjects of a separate report.</p> <p>Should remediation of Sculthorpe Marsh be required, EA follow-up monitoring would comprise:</p> <p>Verify development of Protection and Restoration Plan that is acceptable to provincial and federal regulatory agencies.</p> <p>Verify no net loss of wetland functions.</p>	<p>Not currently applicable, remediation is still being discussed with MPH. An MECP approved Site Specific Risk Assessment will be conducted prior to any remediation activities.</p>	<p>Remediation of Sculthorpe Marsh is still being discussed with MPH. A Site Specific Risk Assessment will be conducted prior to any remediation activities. A site boundary overlap with the Chemetron Lagoon was resolved to support planned risk assessments.</p>
Human Health and Safety						
<p><i>Workers, Non-Radiological</i></p> <p>Maximum dust exposures to non-radiological conventional contaminants - within established weighted average criteria (AAQC) for acute 8-hour exposures.</p> <p>For construction activities: annual accident rate of 2.0 to 3.0 Lost time Accidents, and 8.0 to 10.0 Total Recordable Accidents per 100 workers. This equates to 24.4 recordable accidents during construction and development, with 7.3 of the accidents resulting in lost time; 7.8 recordable accidents during site remediation work, with 2.3 of the accidents resulting in lost time.</p> <p>Noise levels would reach 88 to 96 dBA in construction areas.</p>	<p>(See <i>Atmospheric Environmental Component</i>).</p> <p>Personal protection equipment would be supplied to mitigate noise effects. All workers would be provided with and required to implement worker protection measures as set out by the Port Hope Site Health and Safety Plan. Implement a policy that all occupational illnesses and injuries are preventable and adopt an operational objective of zero occupational illnesses and injuries (For details, see the specific elements of this policy as listed under Mitigation Measures in Table 11.9.1 of the PHP Screening Report [26] Implement a Health and Safety Plan procedure and an Environmental Protection Plan protocol to address the demolition of buildings and the appropriate management of debris materials generated from these activities.</p>	<p>No residual adverse effects.</p>	<p>CNL reviewed and approved contractor plan for Health and Safety for the PH LTWMF projects.</p> <p>Construction contractors adhered to federal and provincial legislation related to the protection of health and safety. Compliance oversights occurred during the PH LTWMF activities. A discussion of the compliance oversight is in Section 8.</p> <p>In 2020, informal oversight activities were completed and in-depth programmatic site level review and inspections were completed for all sites and contractors to ensure safe restart processes and compliance with COVID-19 Pandemic restrictions.</p> <p>In addition to standard safety program inspections, numerous ergonomic work-at-home virtual assessments were completed to support staff setup of home-office space to</p>	<p>Monitor compliance with relevant federal legislation related to protection of health and safety.</p> <p>Monitor accident rate.</p> <p>Verify the development of an operational policy, and confirm the details conform to the elements proposed as mitigation measures.</p> <p>(Note that some follow-up elements in the Atmospheric Environment are also relevant in that they are fundamentally intended for the protection of worker health and safety).</p>	<p>No residual adverse effects.</p> <p>There were no hazardous occurrences or Lost-Time injuries in 2020.</p> <p>Further details are provided in section 8.</p>	<p>Contractors conducting work on behalf of the PHAI submitted health and safety plans, for CNL’s review and acceptance to ensure they meet the requirements of the <i>PHAI OSH Plan</i> [24].</p> <p>Construction contractors will be required to adhere to federal and provincial legislation related to the protection of health and safety. Compliance oversight occurred during the PH LTWMF activities. A discussion of the compliance oversight is in Section 8.</p> <p>Incident rates are being monitored. (Section 8).</p> <p>Noise monitoring was completed by CNL over four campaigns in 2020 around the PH LTWMF. It can be observed that there are some increases in 2020 but below the predicted range of 12 dBA and the <i>World Health Organization’s Guideline for Community Noise</i></p>

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	Notify residents when activities are expected to result in a 6 dBA increase in noise. Establish an operational protocol that will maintain noise levels at the fenceline below 70 dBA. Prevent public access to areas where noise levels may exceed 70 dBA.		manage ergonomic risk.			level of 70 dBA over a 24-hour period [31].
<i>Members of the Public, Non-Radiological</i>  Air quality; Noise and Non radiological Contaminants See Atmospheric Environment Component for predicted effects; mitigation measures; residual effects after mitigation; and follow-up program features. General Health and Well-being.  22% of people surveyed expect their level of satisfaction with the community to increase with completion of the project; 14%, to decrease.	(See <i>Atmospheric Environmental Component</i> )  Implement protocols for delivering information to and receiving concerns from, residents to address their concerns for health, sense of well-being, feelings of safety and security and of satisfaction with their community.	Increased stress and adverse effects to health and general well-being resulting from negative changes to people’s feelings of health and sense of well-being, feelings of personal security, and feelings of satisfaction with their community.	Seven public complaints were received and processed for the Port Hope project activities in 2020.  Public attitude survey was completed in 2018. The public attitude survey scheduled to take place in 2020 was deferred due to COVID-19 Pandemic restrictions.	Monitor communications protocol.  Survey members of the public to confirm level of satisfaction with the community.	Public attitude survey was completed in 2018. The public attitude survey scheduled to take place in 2020 was deferred due to COVID-19 Pandemic restrictions..	Since 2002, the CNL has commissioned bi-annual public attitude surveys to monitor public awareness of the PHAI, identify issues and concerns, determine communication needs of the public, and provide data regarding public attitudes. Section 15 discusses PHAI interactions within the community of Port Hope. The public attitude survey scheduled to take place in 2020 was deferred due to COVID-19 Pandemic restrictions.
<i>Workers, Radiological</i> Workers excavating onsite wastes and placing on- and offsite wastes are expected to receive annual radiation doses between 1.6 and 2.7 mSv/a. Workers dewatering sediment during harbour cleanup are expected to receive doses up to 7.6 mSv/a.	(See Atmospheric Environmental Component).  If necessary, workers would be rotated in and out of positions where there is a risk of receiving a higher dose.  <i>PHAI Radiation Protection Plan</i> [22] includes the ALARA principle. Other requirements of the plan include completion of Radiation Safety Assessments, use of Work Permits/Assessments and worker rotation in and out of positions where there is a risk of receiving a higher dose.	No residual adverse effects.	On-site remediation continued in 2020. Activity involved hauling of on-site Arsenic waste and some quantity of Marginally Contaminated Waste. Hauling of off-site waste to LTWMF began in 2018.	See Atmospheric Environmental Component.  Monitor radiation doses to confirm accuracy of predictions.	For Port Hope Sites, workers annual doses ranged from 0.01 mSv to 0.27 mSv. The collective radiation dose was 17.78 person-mSv. The highest annual individual dose monitored was 0.27 mSv.  On-site waste hauling at the LTWMF contract work continued in 2020. The collective dose reported during this period is 3.38 person-mSv with a maximum recorded dose of 0.25 mSv.	Upon comparison between the actual and predicted doses, the doses exposed to the workers were below the predicted levels. This has proven the mitigation measures were effectively executed.
<i>Members of the Public, Radiological</i> During remediation, Ward 1 adjacent residents: radiation dose of 0.074 mSv/a for adult on median diet, 0.16 mSv/a, for infant on upper bound diet.  During construction and development, Ward 1 residents: 0.06 mSv/a for an adult, to 0.25 mSv/a, for an infant. Ward 2 residents: 0.12 mSv/a, for an adult on a median diet, to 0.25 mSv/a, for an infant on an upper bound diet.	(See Atmospheric Environment Component)  No additional proposed mitigation.	No residual adverse effects.	Remediation activities continued in 2020.	See Atmospheric Environmental Component.  Monitor radiation doses to confirm accuracy of predictions.	Fence-line gamma dose in 2020 is less than 1 % of the annual dose limited for occupational exposures for members of the public of 1 mSv/a (1000 µSv/a). Total dose to the public was assessed with the inclusion of radon exposure at the fencel-ine. A total effective dose was estimated to be around 2% for occupational exposures for members of the public.	The maximum radiation dose to public was measured to be 0.04 mSv/a which is about 4% of the annual dose limit for occupational exposures for members of the public of 1 mSv/a (1000 µSv/a).
<b>Cumulative Effects (in the Biophysical Environment)</b>						
<i>Radiological</i> Incremental annual average radon concentrations would be indistinguishable from background at a distance of 2 km; radiological constituents of re-suspended dust would not be measurable beyond approximately 1 km.	(See Atmospheric Environment Component).	No residual adverse effects.	Remediation activities continued in 2020.	Verify radon concentrations, radiological constituents of re suspended dust, at distance of 2 km and 1 km, respectively.	Radon monitoring commenced at 4 locations around the PH LTWMF in 2020. These locations were positioned at approximately 2 km distance from the LTWMF Controlled Area fenced boundary.  Results from the 2020 monitoring program confirm a public dose estimate to be < 3.3 % of the annual limit for non-Nuclear Energy Workers (NEWs).	Assessment of average radon concentrations at 2 km will be performed on a quarterly basis to receive better statistics.  Results from the 2020 monitoring program confirm a public dose estimate to be < 3.3 % of the annual limit for non-Nuclear Energy Workers (NEWs).  In 2018 July, CNL started to deployed a dust fall jar on a monthly basis, following the MECP siting requirements, to measure the potential dust deposition at a location approximately 1

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						km from north of the site. The location is approximately 1 km north of the PH LTWMF site, PH-DF-001. From 2019 January to 2019 May, no results were above the AACQ for uranium, lead-201, radium-226, thorium-230 and thorium-232. The dustfall jar was deployed until one year of data was collected, in which the EA prediction that radiological constituents of re-suspended dust will not be measurable beyond approximately 1 km from the Site was verified. Full details can be found in the <i>Port Hope Project Annual Compliance Monitoring Report for 2019 Under Licence (WNSL-W1-2310.02/2022)</i> [40].