

Canadian Nuclear | Laboratoires Nucléaires Canadiens

ANNUAL COMPLIANCE MONITORING REPORT

(PORT GRANBY PROJECT) ANNUAL COMPLIANCE **MONITORING REPORT FOR 2020**

UNDER LICENCE (WNSL-W1-2311.02/2021)

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Revision 0

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EXECUTIVE SUMMARY

This annual compliance monitoring report for the 2020 calendar year has been prepared as per licence condition 3.1 of the *Port Granby Long Term Low Level Radioactive Waste Management Project Licence WNSL-W1-2311.02/2021* (WNSL-W1-2311.02/2021) [1] and of the *Port Granby Long-Term Low-Level Radioactive Waste Management Project Licence Conditions Handbook* (LCH) [2] as a summary report of annual compliance monitoring and operational performance.

The Port Granby Long-Term Low-Level Radioactive Waste Management Project (PGP) 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* (Legal Agreement) [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 Low-Level Radioactive Waste (LLRW) within each of the communities. CNL is responsible for the direction and execution of the PHAI in compliance with the Legal Agreement, licences and Environmental Assessment decisions. CNL has overall responsibility for managing the PHAI on behalf of Atomic Energy of Canada Limited (AECL), a federal Crown corporation.

This report provides site-specific information to supplement information in the corporate *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.

This report provides site-specific information to supplement information in the corporate *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 activities are outlined below.

Management system

- CNL completed all required reporting as outlined in Licence Condition 3.1, PGP 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 PGP 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 PGP employees and contractors acquired mandated training (including refresher training) as appropriate for their duties to ensure the safe operation of the PGP facility and to conduct work under the PGP Licence [1].
- The Curriculum Review Committee continued to meet throughout 2020 to support the PHAI's Systematic Approach to Training program.

Facility and Equipment

- CNL continued to manage the PGP site during remediation activities in accordance with approved procedures, as outlined in the PGP Licence Conditions Handbook [2].
- 4 lake tanks were cleaned and removed from the PGP site.
- Pump Stations 5 and 6 were constructed.
- Construction of the East Gorge Groundwater Collection (EGGC) system was initiated.
- The excavation of the PG WMF LLRW and transport of LLRW to the PG LTWMF was completed in 2020.
- 59,944 metric tonnes were hauled and placed in containment in Cell 1 of the PG LTWMF. Residual solids from the PG WWTP continued to be placed in Cell 1 until mound closure in July 2020.
- The excavation and remediation verification of all 5 Phases of the PG WMF site was completed in 2020.
- The South SMP was excavated and the area underneath as verified clean. The Pumping Station located adjacent to the South SMP was removed.
- Placement/compaction of backfill and topsoil, and the spraying of hydroseed straw in the PG WMF was performed. Approximately 80% of the PG WMF has been seeded.
- Representatives for the Municipality of Clarington and CNL met at monthly coordination meetings throughout 2020. Work on the legal agreement between the Municipality of Clarington and Canada for Lakeshore Road, the Lakeshore Road Detour and Nichols Road continued.
- The Port Granby Project Phase 3 Long Term Management Plan [5], Port Granby Project Phase 3 Site and Facility Maintenance and Monitoring Plan [6] and Port Granby Long-term Waste Management Facility Base Liner and Final Cover Performance Monitoring Plan and Procedures [7]were finalized and submitted to the Canadian Nuclear Safety Commission in 2020 December [8]

Safety analysis

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

Physical Design

- The PG Waste Water Treatment Facility was upgraded to improve operations. Changes included
 - increasing the evaporative capacity of the site with a new mobile evaporator,
 - addition of cement mixers to maximize residuals management,
 - addition of brine return pumps to improve efficiency of solids management on site,
 - addition of portable tanks for slurry management,
 - addition of redundant clarifier pumping systems to minimize system downtime, and
 - addition of mezzanines to allow for safer access to equipment.

Fitness for service

• As per the PGP Licence Conditions Handbook [2], the Fitness for service Program is not applicable to the PGP.

Radiation protection

- As Low As Reasonably Achievable (ALARA) initiatives and activities continued to be at the forefront of the PGP Radiation Protection Program (RPP).
- Radiation Protection doses for workers remained ALARA and doses for public remain low. There were no exceedances of regulatory limits and action levels in the dose monitoring program.
- Refresher training was provided to staff on the efficacy of the radiation work planning process which included 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.

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 the 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 was achieved.
- 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 HWP MO 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 PGP 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.
- 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.

- Real-time dust monitoring results from the Independent Dust Monitoring Program for the PG LTWMF construction continue to be available at 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 $\mu g/m^3$ 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 Contract 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. In particular, the PG WWTP increased its efforts on the upgrade of file monitoring systems to help to limit faulty alarm triggers.

Waste management

- Approximately 59,944 metric tonnes of excavated waste was transported from the PG WMF to Cell 1 of the PG LTWMF.
- Approximately 80 m³ of process residual waste was transferred from the PG WWTP to the PG LTWMF prior to mound closure.
- Post-mound closure, the PG WWTP sent 408 filter press totes to Chalk River Laboratories Near Surface Disposal Facility for disposal and 2,402 m³ of brine was shipped off site for disposal at a contract waste disposal site.
- The PG WWTP continued to operate in conformance with the PGP Licence Conditions Handbook [2].

Security

- Contractors conducting work at the PGP site continued to be in compliance with CNL's corporate security policies and programs including those requirements mandated in the *Port Hope Area Initiative Security Plan* [9], as confirmed through CNL's oversight program.
- No reportable security events occurred at the PGP in 2020.

Safeguards and Non-Proliferation

• As per the Licence Conditions Handbook [2], the Safeguards and Non-Proliferation Program is not applicable to the PGP.

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.
- There were 125 classified shipments of dangerous goods from the PGP site to offsite facilities.
- Shipments of dangerous goods continued to be received at the PGP site from offsite vendors (consumable chemicals, diesel fuel, and propane).
- Oversight of each Transportation of Dangerous Goods contract was performed to ensure continuous adherence to the *Port Hope Area Initiative Transportation of Dangerous Goods Plan* [10].
- 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 Port Hope Area Initiative 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 [11] 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 [12] and was followed up with a virtual Public Information Session in 2020 October.
- 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 Granby Long-term Waste Management Facility site, while enhancements are being implemented to further improve results.

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INTRODUCTION

Name:	Port Granby Long-term Waste Management Facility			
Location:	4763 Lakeshore Road Municipality of Clarington, Regional Municipality of Durham, Ontario L1B 1L9			
Ownership	Canadian Nuclear Laboratories			

Licence Information and Reporting Period

This annual compliance monitoring report is produced to comply with licence condition 3.1 of the *Port Granby Long Term Low Level Radioactive Waste Management Project Waste Nuclear Substance Licence* (WNSL-W1-2311.02/2021) [1], hereinafter referred to as the Port Granby Project (PGP) Licence, in accordance with the compliance verification criteria listed in the *Port Granby Long-Term Low-Level Radioactive Waste Management Project Licence Conditions Handbook* (LCH), hereinafter referred to as the PGP LCH [2]. Information included in this report is for the period of January 01 to December 31 2020.

This report provides site-specific information to supplement information in the corporate *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 sites.

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

Facilities Included in this Report

Facilities included in this report include the Port Granby Long-term Waste Management Facility (PG LTWMF), the Port Granby Waste Management Facility (PG WMF), and the Port Granby Waste Water Treatment Plant (PG WWTP).

The existing PG WMF is located at 4763 Lakeshore Road in the Municipality of Clarington, Ontario. The PG WMF occupies 18 hectares (ha) in Lot 3, Broken Front Concession "A" in the Municipality of Clarington, Regional Municipality of Durham and Province of Ontario. The property is bounded by Lake Ontario to the south, by farmland owned by the Government of Canada to the east and west, and by Lakeshore Road to the north.

The PG LTWMF and PG WWTP are located at 4780 Lakeshore, Clarington, Ontario. The facility is 580 m north of Lakeshore Road, immediately northwest of the existing PG WMF. The site is bounded by Elliott Road to the west, Nichols Road on the east and the Canadian National Railway to the north.

Summary of Licenced Activities

The Port Hope Area Initiative (PHAI) includes two distinct and separate projects:

 The Port Hope Long-Term Low-Level Radioactive Waste Management Project (PHP) that comprises the long-term management of the Low Level Radioactive Waste (LLRW) currently located at the existing Welcome Waste Management Facility (WWMF), the construction of a new Port Hope Long-Term Waste Management Facility (PH LTWMF), the remediation of LLRW and specified industrial waste at various sites within the Municipality of Port Hope (MPH) and the safe transportation of the waste to the new PH LTWMF for long-term storage.

- Port Granby Long-Term Low-Level Radioactive Waste Management Project (PGP).
- The PGP involves the relocation of approximately 450,000 cubic metres of historic LLRW, located at a legacy waste management facility site on the shoreline of Lake Ontario in Southeast Clarington, to a new, engineered aboveground mound at the PG LTWMF being constructed approximately 700 m north of Lake Ontario.

The PGP comprises:

- Phase 1 (complete):
 - Securing regulatory approvals.
 - Management of waste at the existing PG WMF currently owned by the Government of Canada and operated by Canadian Nuclear Laboratories (CNL), on behalf of Atomic Energy of Canada Limited (AECL), a federal Crown corporation; CNL operation of this site was assumed from Cameco Corporation in 2012 March.
- Phase 2 (2011-2020) (in progress):
 - Construction of the PG LTWMF.
 - Remediation of PG WMF.
 - Transportation of LLRW from PG WMF to the PG LTWMF for consolidation in a new, engineered aboveground mound.
- Phase 3 (2020-2120):
 - Long-term maintenance and monitoring of the PG LTWMF.

1 MANAGEMENT SYSTEM

1.1 Management System Program

The PGP 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 Quality Assurance Plan* (HWP MO QA Plan) [13] is consistent with the corporate *Management System Manual* (Management System) [14] 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 [15] of revisions to the HWP MO QA Plan [13] as per the PGP LCH [2]. One revision was made to the HWP MO QA Plan [13] in 2020.

1.1.1 Audits, Inspections and Self-Assessments

As per the requirements of the Management System [14], both Safety Control Areas (SCA) 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 **Error! Reference source not found.**.

External Audits

There was 1 external audit conducted by SAI Global for the maintenance of CNL's ISO 9001:2015 certification specific to the PGP 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 PGP site in 2020. Due to COVID-19 Pandemic restrictions, the Internal Audit was divided into two 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 Canadian Nuclear Safety Commission (CNSC) Inspections were conducted at the PGP:

Inspection No.	Area Inspected	No. of Action Notices	No. of Actions Completed
CNL-PHAI-PGP-2020-01	PG WWTP <u>Safety and Control Areas</u> : Conventional Health and Safety, Environmental Protection, Management System,	0	N/A
CNL-PHAI-PGP-2020-02	Radiation Protection Port Granby Soil Remediation Activities <u>Safety and Control Area</u> : Environmental Protection	0	N/A
CNL-PHAI-PGP-2020-03	PG LTWMF Cell Cover <u>Safety and Control Area</u> : Physical Design	0	N/A
CNL-PHAI-PGP-2020-04Port Granby Geotechnical InspectionSafety and Control Area:Physical Design		0	N/A

Table 1: CNSC PGP Inspections for Error! Reference source not found.

Inspections by Other Regulatory Bodies

On 2020 September 29, Environment and Climate Change Canada (ECCC) conducted a Field Site Inspection of the PG WMF's East Gorge as a follow up to the reported *HWP – PG LTWMF – Water Release East Gorge* event.

1.1.1.3 Self-Assessments

In **Error! Reference source not found.**, 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 ImpAct¹ 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

¹ 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.

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 [16].

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

2 HUMAN PERFORMANCE MANAGEMENT

2.1 Human Performance Program

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

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 PGP 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) [17] defines the training processes applied during the work performed as part of the PGP and is consistent with CNL's corporate training policies and programs. The PHAI Training Plan [17] promotes safe and effective workplaces through the cooperation of management, employees, contractors and visitors, and ensures that all project staff (including CNL employees and contractors) are qualified to perform their duties effectively and safely, using established processes and standards.

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 PGP 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.

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

The PGP personnel, both employees and contractors, are adequately trained (and refreshed) to ensure the safe operation of the PGP facility and to conduct work under the PGP Licence [1]. PHAI has implemented a SAT-based training program for the PG WWTP Operations Supervisor position and the PG 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 PG 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.

No revisions were made to the PHAI Training Plan [17] in 2020.

The table below provides a list of federally/provincially legislated training courses that appear in positionspecific training plans at the PGP.

Table 2: PGP Operating Staff Training in Error! Reference source not found.

Course Code	Course Code Course Title		
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	30 19 46	
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	

Course Code	Course Title	No. of Attendees
TD-1035	RISE Field Essentials	40
TDG-1007	TDG Handler	7
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 PGP 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* for details [4].

3.1.1 Environmental Remediation Operations

This section provides a brief summary of the 2020 project activities. More detailed updates on the PGP activities, as well as a 3 month look ahead are provided to CNSC on a quarterly basis as required by Licence Condition 3.1, PGP LCH [2].

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 Long Term / Port Granby Waste Management Facility

CNL continued to manage the PGP site during remediation activities in accordance with approved procedures, as outlined in the PGP LCH [2].

Enabling Infrastructure

Enabling infrastructure activities, including upgrades to existing infrastructure, are required to facilitate construction of the PG LTWMF. These activities and upgrades included the following:

- Ongoing inspections of the municipal roads were indicative of modest deterioration but no repairs required. Final roads condition assessment, initially scheduled every two years, was deferred until after the importation of granulars is complete.
- Completed the cleaning and removal of 4 lake tanks. The 2 remaining lake tanks will remain in place to provide emergency storm water storage and operational flexibility for the PG WWTP.

Construction Activities

- Internal roadways were re-aligned as required throughout 2020, to maintain efficient haul routes between the waste materials and the containment mound.
- Construction of Pump Stations 5 and 6 was completed. Contractor-provided training began.
- Siltation of the Equalization (EQ) Pond continued to be an issue. The EQ Pond and adjacent Stormwater Management Pond (SMP) were cleaned out during the summer of 2020.
- Decontamination of heavy equipment for off-site release is ongoing.
- Construction of the East Gorge Groundwater Collection (EGGC) system began in 2020. It is scheduled to be operational mid-2021.

Remediation and Excavation Activities

• Excavation and remediation verification of all 5 Phases of the PG WMF site was completed in 2020.

- Placement/compaction of backfill and topsoil, and the spraying of hydroseed straw in the PG WMF was performed. Approximately 80% of the PG WMF has been seeded.
- Excavation of the PG WMF LLRW and transport of LLRW to the PG LTWMF was completed in 2020. 59,944 metric tonnes were hauled and placed in containment in Cell 1 of the PG LTWMF. Residual solids from the PG WWTP were placed in Cell 1 until the closure of the mound in July 2020. Quantities are noted below in Table 4.
- The South SMP was excavated and the area underneath as verified clean. The Pumping Station located adjacent to the South SMP was removed.

Supporting Activities

- Major site activities were temporarily suspended on 2020 March 18 due to COVID-19 Pandemic restrictions. Essential site activities continued. On 2020 May 25, major site activities were reopened using a phased approach.
- Representatives for the Municipality of Clarington and CNL met at monthly coordination meetings throughout 2020.
- Work on the legal agreement between the Municipality of Clarington and Canada for Lakeshore Road, the Lakeshore Road Detour and Nichols Road is ongoing. Design refinements will be required for Lakeshore Road to incorporate the closing of Nichols Road to public traffic, a possible new Lakeshore Road/Elliott Road intersection and the proposed Lakeshore Road allowance.
- The Port Granby Project Phase 3 Long Term Management Plan [5], Port Granby Project Phase 3 Site and Facility Maintenance and Monitoring Plan [6] and Port Granby Long-term Waste Management Facility Base Liner and Final Cover Performance Monitoring Plan and Procedures [7]were finalized and submitted to the Canadian Nuclear Safety Commission in 2020 December [8].

3.1.1.1 Port Granby Waste Water Treatment Plant

The new PG WWTP continued to operate on a full-time basis throughout the 2020 reporting period. As of 2018 September, the entire PG WWTP began operating on a 24/7 schedule in order to manage influent water levels and maximize the production of clean effluent and residuals.

3.1.1.1.1 Effluent Treatment

The PG WWTP was the sole source of effluent discharge from the PG WMF in 2020. The site had no exceedances as compared to the site release limits as described under Licence Condition 7.1 of the PGP LCH [2]. There was 1 event that was related to effluent treatment. This event was toxicity failure on the rainbow trout species of the test for a sample collected on 2020 November 17 (Appendix B, Table B-4), which CNL had provided notification to the CNSC. Further investigation into this event included an in depth review of effluent water quality conducted by CNL's third party laboratory. The investigation found no abnormalities in effluent quality that could have suggested a potential cause for the test failure. Subsequent tests that were done following the event showed no further non compliances. The event was deemed to be a laboratory anomaly.

Table 3 below, shows the production quantities of effluent for 2017-2020. Overall, there was a 48.6% decrease in production volume in 2020 as compared to 2019. This decrease in effluent volume was primarily driven by the completion of remediation on the PG WMF; gradual closure of the newly constructed PG LTWMF waste cell; and the treatment of backlogged water from previous years. Once these activities were completed, the plant was optimized to focus on residuals management; and effluent discharge occurred only when needed to maintain safe operating levels. Effluent quality for this time period is reported under Section 9.2.1, Environmental Monitoring.

Month	2017 Effluent (m ³)	2018 Effluent (m ³)	2019 Effluent (m ³)	2020 Effluent (m ³)
January	4,586	16,920	15,778	20,153
February	7,310	12,908	13,053	18,680
March	12,554	15,362	21,436	22,264
April	21,517	14,666	27,396	11,737
Мау	20,024	20,719	30,037	11,721
June	13,740	19,505	29,700	6,550
July	23,221	20,190	25,720	1,317
August	13,469	12,627	20,057	6,006
September	15,552	9,036	12,084	12,044
October	16,070	18,381	21,120	2,470
November	11,233	16,715	6,081	5,247
December	13,699	18,084	16,982	4,842
TOTAL	172,975	195,114	239,444	123,031

Table 3: PG WWTP 2017 - 2020 Production Quantities of Effluent

3.1.1.1.2 Waste Processing

Concurrent with operation of the water handling portion of the PG WWTP, there was consistent operation of the residuals management systems to remove contaminants from the system. In total, the PG WWTP produced ~277,000 kg of filter press solids and hauled 2,402 m³ of brine offsite in 2020. The overall summary of solids production can be seen in Table 4 below.

Table 4. Waste Processing Solids Production	PG WWTP Errorl Reference source not found
Table 4. Waste Frocessing, Solids Froduction,	FG WWWIF LITUI: Reference source not round.

Year	Filter Press Solids (kg)	Slurry Solids (kg)	Cement Solids (kg)	Brine Hauling (m ³)
2018	262,500	79,500	0	0
2019	349,500	1,282,500	756,000	261
2020	277,000	0	0	2,402

PGP Release Limits

As of 2018 April 4, approved release limits [18] were implemented at the PG WWTP and updated in the PGP Quarterly Effluent Reports. There were no changes to these limits in the 2020 reporting period.

3.1.1.1.3 Water Treatment and Monitoring

Influent and effluent samples were collected from the PG 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:

- Arsenic
- Cadmium
- Cobalt
- Copper
- Phosphorus
- Selenium
- Thallium
- Uranium
- Vanadium
- Ammonia N
- Nitrite N
- Nitrate N
- Molybdenum
- pH
- Total Suspended Solids
- Radium-226
- Toxicity

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-3.

The Effluent Discharge Limits for the PG WWTP 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. A summary of these analyses is provided in Appendix B, Tables B2 and B4. Histogram charts (Figures 1, 2, 3 and 4) have

been prepared for the purposes of comparing year over year results of final effluent results from 2019 and 2020.



Figure 1: PG WMF - 2020 Effluent Results - Copper, Cobalt, Vanadium, and TSS Histogram



Figure 2: PG WMF-2020 Effluent Results-Total Ammonia, Nitrate, and Nitrite Histogram



Figure 3: PG WMF- 2020 Effluent Results-Radium-226, Cadmium, Total Phosphorus, Selenium, and Thallium Histogram



Figure 4: PG WMF- 2020 Effluent Results- -Uranium, Arsenic, Molybdenum, and pH Histogram

3.1.2 Facility Staffing

There were no changes to the positions related to the PGP Licence [1] in Error! Reference source not found.

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

3.2 Reporting Requirements

3.2.1 Reportable Events

In **Error! Reference source not found.**, there were 3 events that occurred at the PGP that were deemed reportable to the CNSC. They are listed in the table below.

Event No.	Title	SCA	Facility (if applicable)
ERM-20-0266	HWP PG LTWMF – Water Release East Gorge	Environmental Protection	PG WMF
ERM-20-1728	HWP PG WWTP Bio-Reactor Leak	Environmental Protection	PG WWTP
ERM-20-2913 HWP PG WWTP – Effluent Toxicity Failure		Environmental Protection	PG WWTP

Table 5: Reportable Events to the CNSC at the PGP in Error! Reference source not found.

Reports to other regulatory agencies consisted of 1 Hazardous Occurrence Investigation Reports (HOIR) made to Employment and Social Development Canada (see Section 8 Conventional Health and Safety for further details).

3.2.2 Trending of Events Related to Operational Activities

As events at the PGP 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 neither limited nor exclusive to either the Port Hope or Port Granby 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.

			•			
Year	Level 0 ^a	Level 1	Level 2	Level 3	Level 4	Total
2016	0	0	1	9	62	72
2017	0	0	1	11	62	74
2018	7	0	1	23	55	86
2019Y	0	0	1	14	34	49
Error! Reference source not found.	4	0	0	6	38	48

Table 6: Number of ImpActs raised at the PGP

a 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 **Error! Reference source not found.**, there were no conflicts or inconsistencies identified between licence conditions, codes or standards, operations, programs, methods, or regulatory documents referenced in the PGP Licence [1] or PGP LCH [2].

4 SAFETY ANALYSIS

4.1 Safety Analysis Program

As per the PGP LCH [2], the Safety Analysis Program is not applicable to PGP.

5 PHYSICAL DESIGN

5.1 Design Program

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

5.1.1 Port Granby Waste Water Treatment Plant

The new PG WWTP continued to operate on a full-time 24/7 schedule throughout the 2020 reporting period in order to manage influent water levels and maximize the production of clean effluent and residuals.

5.1.2 PG WWTP Action Levels

As of 2017, approved action levels [2] have been implemented at the PG WWTP and updated in the PGP Quarterly Effluent Reports.

5.1.3 Engineering Upgrades

In an effort to improve the operation of the PG WWTP facility, CNL utilized Chalk River Laboratories (CRL) Design Engineering to implement fixes and upgrades to existing equipment following CNL's Engineering Change Control (ECC) process. These changes included increasing the evaporative capacity of the site with a new mobile evaporator, addition of cement mixers to maximize residuals management, addition of brine return pumps to improve efficiency of solids management on site, addition of portable tanks for slurry management, addition of redundant clarifier pumping systems to minimize system downtime and addition of mezzanines to allow for safer access to equipment.

6 FITNESS FOR SERVICE

6.1 Fitness for Service Program

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

7 RADIATION PROTECTION

7.1 Radiation Protection Program

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

The Port Hope Area Initiative Radiation Protection Plan (PHAI RP Plan) [19] defines the radiation protection measures applicable to PHAI projects at the PGP site and is consistent with CNL's Radiation Protection Program Requirements [20]. 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 Nuclear Safety and Control Act (NSCA) [21].

PGP uses the CRL licensed Dosimetry Service Provider (DSP) for external and internal dosimetry for site/facility staff and contractors. Dose to CNL staff is measured irrespective of the project site (Port Hope or Port Granby) at which the person works due to the continuous movement of staff between both sites.

PGP staff who work or frequently enter the Controlled Areas are assigned Thermoluminescent Dosimeters (TLDs) to monitor for external radiation exposures. PGP Contractors use a CNSC licensed DSP for external and internal dosimetry for their staff.

There were no revisions to the PHAI RP Plan [19] 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 PGP Radiation Protection Program (RPP). 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 PGP activities and is specifically addressed through the implementation of the PGP environmental monitoring program's monthly and quarterly deployment of PGP Environmental Radon Monitors and TLDs, respectively. Results from the 2020 monitoring program confirm a public dose estimate to be < 2.0% of the annual limit for non-Nuclear Energy Workers (NEW) based on maximum readings from Radon and TLD dose measured along the fence line, with an occupancy period of 60 hours per year. 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. There were no skin contamination events that were recorded above criteria at the PGP in 2020. On personal clothing, the maximum pre-decontamination levels for beta was recorded to be 50% 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 PGP in **Error! Reference source not** found.:

		Skin and Clothin	Workplace Contamination			
	Skinª	Personal Clothing ^b	Radiological Work Clothing ^c	Total	Surface ^d	Vehicle / Materials ^e
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	1	0	1	0	0
Error! Reference source not found.	0	2	0	2	0	0

Table 7: PGP Contamination Events, 2016 - 2020

a Detectable contamination on skin above background (in 2018, 2019 & 2020); detectable contamination on skin above 4 Bq/cm² β / γ or 0.1 Bq/cm² 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/cm² β /y or 0.1 Bq/cm² 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 4 contamination events noted in the table above occurred during planned routine work and regular operations. The maximum contamination noted on a worker's radiological clothing was found to be 0.01 Bq/cm² (α) and 0.27 Bq/cm2 ($\beta\gamma$) above background. For the clothing contamination events, the two events were related and the maximum contamination noted on both worker's safety boots (personal clothing) was found to be 0 Bq/cm² (α) and 1.83 Bq/cm² ($\beta\gamma$) above background. For the skin contamination event, the maximum contamination noted on the worker's skin was found to be 0 Bq/cm² (α) and 0.07 Bq/cm² ($\beta\gamma$) above background.

No exceedances of Action levels or Administrative control levels were noted.

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. It is important to note that dose to HWP MO Staff and its contractors from each individual PHAI

PGP and PHP site is not measured independently; only the total dose per person is recorded, irrespective of the site at which the person works.

HWP MO staff who work or frequently enter the Controlled Area are assigned with TLDs to monitor for external radiation exposures. Alternatively, some HWP MO Contractors use CNSC licensed DSPs using Optically Stimulated Luminescence Dosimetry (OSLD) equivalents. All external dosimetry is read on a monthly or 4 week basis. Visitors and non-NEWs are typically given Electronic Personal Dosimeters to track dose and ensure trigger limits identified within the PHAI RP Plan [19] are not exceeded.

The Internal Bioassay program is provided to the CNL Operations and RP staff who work in close proximity with radiological hazards within the PG 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.

Reflective of increasing work in Phase 2 Construction, CNL's personnel radon exposure program for PG WWTP Operations monitors (employees and contractors), Occupational Health and Safety, and RP staff. These workers are given track-etch type Personal Radon detectors and doses are calculated and recorded if the monthly average exceeds CNL's trigger level of 150 Bq/m³.

7.2.2 Radiation Doses to Personnel

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

Doses have not been broken down by individual facilities because employees, contractors and visitors routinely move between facilities without changing TLDs, thereby 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 to 2020 December 31) is 0.67 mSv, received by an HWP MO staff in their role as a Quality Assurance (QA) Specialist working for the PHAI PGP and PHP.

Monitored Person Type		Maximum Individual Effective Dose (mSv)								
		2016	2016 2017		2019	2020				
NEW	Employee	0.30	0.34	0.33	0.27	0.26				
	Contractor	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 8: Radiation Doses to PHAI Personnel, 2016 – 2020

Monitored Person Type		Total # of	Dose Range (mSv)								• • • •		
			0	0.01- 0.50	0.51- 1.00	1.01- 5.00	5.01- 10.00	10.01- 20.00	>20.00	Individual Dose (mSv)		mSv)	Dose
		Persons	Number of Persons							Max	Ø Avg ^a	Avg All ^b	(person-msv)
NEW	Employee	163	33	130	0	-	-	-	-	0.26	0.06	0.05	8.08
	Contractor	348	216	132	-	-	-	-	-	0.27	0.07	0.02	3.30
	Visitor ^c	6	2	4	-	-	-	-	-	0.06	0.04	0.02	0.14
Non- NEW	Contractor	179	176	3	-	-	-	-	-	0.20	0.17	0.003	0.50
	Visitor	33	33	-	-	-	-	-	-	0.00	0.00	0.00	0.00
	Totals	729	460	269	0	0	0	0	0	0.27	0.07	0.02	12.03

Table 9: Effective Dose for PGP

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.
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Monitored Person Type			Dose Range (mSv)											
		Total # of	0	0.01- 0.50	0.51- 1.00	1.01- 5.00	5.01- 10.00	10.01- 20.00	>20.00	Individual Dose (mSv)		mSv)	Dose	
			Persons			Num	ber of Pe	rsons	Max	Ø Avg ^a	Avg All ^b	(person mov)		
NEW		Employee	163	33	130	-	-	-	-	-	0.26	0.06	0.05	8.08
		Contractor	348	216	132	-	-	-	-	-	0.27	0.07	0.02	3.30
		Visitor ^c	6	2	4	-	-	-	-	-	0.06	0.04	0.02	0.14
Non-NEW		Contractor	179	176	3	-	-	-	-	-	0.20	0.17	0.003	0.50
	IEW	Visitor	33	33	0	-	-	-	-	-	0.00	0.00	0.00	0.00
		Totals	729	460	269	0	0	0	0	0	0.27	0.07	0.02	12.03

Table 10: Distribution of Equivalent Dose to the Skin for PGP

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.

Monitored Person Type		External Penetrating Dose					External Surface Dose					Extremity Dose				
		Total # Persons	Collective (p∙mSv)	Max	Ø Avg ^b	Avg All ^c	Total # Persons	Collective (p∙mSv)	Max	Ø Avg ^b	Avg All ^c	Total # Persons	Collective (p·mSv)	Max	Ø Avg⁵	Avg All ^c
NEWs	Employee	163	8.08	0.26	0.06	0.05	163	8.08	0.26	0.06	0.05	0	-	-	-	-
	Contractor	348	3.30	0.27	0.07	0.02	348	3.3	0.27	0.07	0.02	0	-	-	-	-
	Visitor ^d	6	0.14	0.06	0.04	0.02	6	0.14	0.06	0.04	0.02	0	-	-	-	-
Non- NEWs	Contractor	179	0.50	0.20	0.17	0.003	179	0.50	0.2	0.17	0.003	0	-	-	-	-
	Visitor	33	0.00	0.00	-	0.00	33	0.00	0.00	-	0.00	0	-	-	-	-
	Total	729	12.03	-	-	-	729	12.03	0.27	0.07	0.02	0	-	-	-	-

Table 11: Summary of Dose Components Received as a Result of Licensed Activities for Error! Reference source not found.ª

a All quantities are measured in mSv unless otherwise noted.

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

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

d 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 within Phase 2 Construction, the 2020 average dose to all workers (employees and contractors) was determined to be approximately 0.035 mSv between to the two worker categories as compared to an average dose of 0.05 mSv from the 2019 calendar year. This decrease in average dose to workers can be associated with the PGP nearing the completion of its excavation activities with focus turning to the capping of the PG LTWMF mound. With less waste being excavated in 2020 and PG LTWMF mound capping activities and site closure activities progress, it is expected that doses to workers will continue to trend downwards until site shutdown.

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 PGP 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) [22] has been developed to define the OSH program applicable to PHAI projects, including the PGP, consistent with CNL's corporate OSH Program. Contractors conducting work for the PGP submit site specific health and safety plans for CNL's review and approval to ensure compliance with the PHAI OSH Plan [22].

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 [22]. 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 [22] in 2020.

8.1.1 Site Safety and Health Committee

The Historic Waste Program Management Office (HWP MO) Site Safety and Health Committee (SSHC) is comprised of CNL workers and management staff who represent the PGP.

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 COVID-19 Pandemic, substantial efforts were placed on stress reduction and mental health wellness and awareness.

HWP MO 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 HWP MO SSHC met quarterly as per regulatory requirements and conducted routine inspections of workplaces under its jurisdiction, where possible. In 2020, the HWP MO SSHC conducted 2 inspections across the PGP which resulted in minor findings with all remedial actions completed. Note that where possible, components of the HWP MO SSHC inspections were conducted through virtual platforms.

The HWP MO 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 PGP sites.

8.1.2 Inspections

There were 52 site health and safety inspections completed in Error! Reference source not found..

CNL's conventional health and safety compliance oversight process directs various routine inspection programs and ongoing compliance oversight on PGP sites. Daily site level touch points and work observations were conducted by dedicated and experienced CNL health and safety specialists across all project sites. Daily informal touch points are further complemented by 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 precautions was achieved. 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 HOIRs and Lost-Time Injuries

There was 1 hazardous occurrence at the PGP that was reported to Employment and Social Development Canada, in **Error! Reference source not found.**. CNSC staff received copies of these notifications, as per the requirements of the

CNSC REGDOC-3.1.2, Reporting Requirements [23]. The Poison Ivy exposure event required topical application of prescription medical ointment.

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

	2016	2017	2018	2019	Error! Reference source not found.				
PHAI Employees	·		·						
Person Hours Worked				41622	30000				
Lost-Time Injuries	0	0	0	1	0				
Working Days Lost	0	0	0	1	0				
Frequency ^a	0	0	0	4.80	0				
Severity ^b	0	0	0	4.80	0				
PHAI Contractors ^{c,d}									
Lost Time Injuries	0	0	0	1	0				
Working Days Lost	0	0	0	365	0				

Table 12: Summary of PGP Injury Rate Data, 2016 - 2020

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 PGP 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 Granby Project Environmental and Biophysical Monitoring Plan* (PGP Environmental and Biophysical Monitoring Plan) [24] defines the methodologies and protocols followed in performing the environmental monitoring, with the exception of the Geotechnical Monitoring program in, Section 9.2.1.1.6.

There were no revisions to Environmental Protection documents in 2020.

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 PGP Environmental and Biophysical Monitoring Plan [24].

9.2.1.1.1 Operational Groundwater Monitoring

Operational wells were monitored on the PG WMF to detect any migration of contaminants from the PG WMF via the groundwater pathway and to further monitor the nature, extent, direction or rate of change of such migration. Operational groundwater well sampling was not conducted in 2020. The operational groundwater wells were decommissioned in 2016 as they were located within or adjacent to the PG WMF excavation areas. The re installation of these wells will be evaluated in the Maintenance and Monitoring Phase after the remediation and final grading of the sites are complete.

9.2.1.1.2 Bluff Seepage Monitoring

'Seep' samples from the south bluffs at the PG WMF are collected quarterly from 3 locations along the Lake Ontario bluffs between the East Gorge and West Gorge in the areas where active erosion is being monitored, as depicted in Appendix A Figure A-8. In 2020 March, samples were not collected at PG-S-1, PG-S-2 and PG-S-3 due to high water levels along the Lake Ontario shoreline making the sampling locations inaccessible. The sample for PG-S-1 was not collected in 2020 July as the seep was dry at the time of sampling. In 2020 October, PG-S-3 was not sampled as it was not able to be safely accessed. CNL will be ceasing to sample PG-S-3 in the future.

The results of the bluff seepage sampling are presented in Appendix B, Tables B-17, B-18 and B19. It is noted that there are elevated levels of fluoride, arsenic, uranium and nitrates in the seepage water that are above Ontario's *Provincial Water Quality Objectives* (PWQO) [25] and/or the Canadian Council of the Ministers of the Environment (CCME) *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (CWQG) [26].

Concentrations of some contaminants are slightly increased when comparing to 2019 concentrations, but overall, have been decreasing since 2015.

The Port Granby Project Aquatic Environment Environmental Effects Assessment Report (PGP Aquatic Environment Environmental Effects Assessment Report) [27] states that the baseline concentrations for arsenic and uranium exceeded the interim PWQO [25], but did not exceed the lowest chronic values (LCVs) for either compound in Lake Ontario. These concentrations are expected to decrease throughout the Construction and Development Phase of the project.

The Aquatic Environment Baseline Characterization Study for the Port Granby Project (Aquatic Environment Baseline Characterization Study for the PGP) [28] states that the projected plume of arsenic and uranium associated with bluff seepage will cover a very small area (< 750 m²), with the majority of the plume predicted to have contaminant concentrations equivalent to approximately 1% of the original concentration observed in the bluff seepage samples. The total contaminant plume to

Lake Ontario remains very small. The seepage water quality is expected to improve as the project evolves.

9.2.1.1.3 Sediment Monitoring

Sediment was sampled along the Lake Ontario shoreline near the areas of bluff seepage in 2020 and analyzed for metals and radionuclides. Sediment sampling locations are provided in Appendix A, Figure A-5. From the results in Appendix Table B-20 and B-21, arsenic exceeded the Ontario's *Provincial Sediment Quality Guidelines* (PSQG) [29] and the Canadian Council of Ministers of the Environment (CCME) *Canadian Sediment Quality Guidelines for the Protection of Aquatic Life* [30] at PG-BS-7. Arsenic exceeded the PSQG Lowest Effect Level (LEL) [29] and CCME *Interim Sediment Quality Guideline (ISQG) and Probable Effect Level* [30] in the 2020 October sample.

The Aquatic Environment Baseline Characterization Study for the PGP [28] states that sediment in the near shore zones along the bluffs are susceptible to change after every storm event. The natural stratigraphy of the Port Granby bluffs makes them vulnerable to erosion from external factors (e.g., wave action) and internal factors (e.g., high pore water pressure). This natural vulnerability may lead to the brief deposition of near shore sediments with elevated levels of metals and radionuclides in Lake Ontario. The transient nature of near shore sediments in Lake Ontario may contribute to alternating exceedances and non-exceedances of metals compared to the PSQG [29] based on weather and lake movement prior to sampling.

Sediment quality is expected to improve once remediation of the PGP site is complete. Monitoring will continue throughout the construction and development phase to evaluate the efficacy of mitigation measures intended to control off-site migration of contaminated wastes during excavation.

9.2.1.1.4 Stormwater Management Pond Monitoring

Two SMPs at the PG LTWMF were sampled monthly commencing in 2016 June. Location PG-SP1 refers to the North SMP and Location PG-SP2 refers to the South SMP, as shown in Appendix A, Figure A-7. The results of this sampling are provided in Appendix B, Tables B-28 and B-29. It should be noted that monthly samples were not collected in 2020 February at PG-SP1 and PG-SP2 and 2020 December at PG-SP2 as the SMPs were frozen.

The results of the sampling campaigns were compared against the PWQO [25] and the CWQG [26]. In 2020, the concentrations of fluoride, phosphorus and iron were observed to exceed the PWQO [25] and the CWQG [26]. Exceedances for these parameters were observed prior to the start of active waste transfer in

2016 November, suggesting that these concentrations may be indicative of surface water run-off in the area, unrelated to the PGP.

Elevated results for arsenic (2020 April and July), uranium (2020 April, June, July, October and November), cobalt (2020 April and July) at PG-SP1 and arsenic (2020 September, October), uranium (2020 August) and cobalt (2020 August) at PG-SP2 above the PWQO [25] were noted. Elevated concentration of COPCs (specifically arsenic) at PG-Sp-2 can be attributed to the PG WWTP bioreactor leak which occurred in 2020 July. The elevated uranium and arsenic results were not measurable in the Port Granby Creek Watershed, as discussed in Section 9.2.1.7.1.

9.2.1.1.5 Toxicity Sampling

The PGP Licence [1] specifies that the effluent from the PG WWTP cannot be toxic.

Monthly samples from final effluent were subjected to toxicity testing. Results for toxicity (rainbow trout and Daphnia magna) for 2020 January to 2020 December were all passes except for 1 event that was deemed to be a laboratory anomaly as reported in Section 3.1.1.1.1. (Appendix B, Table B-4).

9.2.1.1.6 Geotechnical Monitoring Program

The primary purpose of geotechnical inspections and monitoring is to provide continued assurance that erosion does not threaten the integrity of the waste storage area during the remaining lifetime of the site.

The contractor and CNL continued to conduct ongoing inspections and monitoring activities (including regular visual observations), as per each organizations' respective plans and procedures.

The contractors 2020 weekly slope stability reports listed in Appendix E, Table E-1 include the following:

- Vibrating Wire Piezometer (VWP) readings,
- Pore water pressure ratio measurements,
- Inclinometer readings,
- Ground surface movement measurements,
- Rate of ground surface movement (including qualitative, quantitative, and displacement/deflection rates),
- Maximum shear strain recordings,
- Alert levels, and
- Slope stability contingency measures.

Alert levels were reached multiple times throughout 2020 as described in contractor weekly reporting (Appendix E, Table E-1). Each time an alert occurred, the contractor increased the frequency of readings and performed inspections to determine if there was a failure that would present a potential health and safety risk to personnel and equipment in the area, or if the alert was the result of undue movement. Where required, inspection directed follow-up actions were implemented.

Some surface sloughing occurred in areas of exposed soil with high water content. Minor sloughing was repaired using rip-rap, silt fencing and/or clean fill as required. Sloughing was also subject to additional visual monitoring, and in some cases pins were installed to detect localized measurements.

Instruments were installed to monitor movement prior to excavation in each area of the site. Geotechnical instruments were removed as excavation progressed to different areas. Geotechnical reporting consisted of instrument readings, alerts, and the extent of each excavation.

Weekly geotechnical reporting ceased 2020 May, as it was no longer required. Monthly geotechnical reporting ceased during 2020 October, as it was no longer required.

9.2.1.2 EA Follow-Up and Environmental Monitoring

Licence Condition 7.1, Environmental Protection Program, of the PGP LCH, [2] applies 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 mitigation measures.

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

- Confirm EA predicted effects by means of monitoring, sampling, measurements and analysis.
- Demonstrate compliance with licence requirements and follow-up program requirements as stipulated in the PGP Environmental and Biophysical Monitoring Plan [24].
- Demonstrate effectiveness of containment and effluent control and to provide public assurance of effectiveness of containment and effluent control.
- Provide data to refine EA predictions and identify any deviations, positive or negative, in environmental parameters, as well as any Contaminants of Potential Concern (COPC).

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 event of an unplanned occurrence.
- Demonstrate due diligence.
- Meet stakeholder commitments.

The monitoring program is structured in a framework of six sub-programs of follow-up actions which collectively incorporate all of the individual activities required for tracking the follow-up actions prescribed in the PGP Screening Report [31]. The programs include the monitoring of the atmospheric environment (air quality, noise levels), geology and groundwater (groundwater flow and quality), and aquatic environment (surface water, drainage water quality).

This report contains information collected during the 2020 monitoring programs. The status of the EA commitments for the biophysical effects follow-up monitoring are summarized in Appendix D, Table D-1.

9.2.1.3 Methodology

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

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 PGP Environmental and Biophysical Monitoring Plan [24].

9.2.1.4 Atmospheric Environmental Monitoring

The atmospheric environment monitoring program included air quality (suspended particulates, radiological and non-radiological parameters) and noise monitoring relative to the operation and construction of the PG LTWMF and remediation of the existing PG WMF.

9.2.1.4.1 Air Quality

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

- Total suspended particles (TSP) comprising particle sizes < 44 μm in diameter, and
- Particulate matter (PM)_{2.5} comprising particulate matter with particle sizes < 2.5 µm in diameter.

High volume (Hi-Vol) air samplers were installed and operated at two locations in Port Granby in 2020 (PG South and PG East), Appendix A, Figure A-1 to measure both TSP and PM_{2.5}. The Hi-Vol samplers were set to operate for an approximate 24 hour period with the sampling media (filters) changed on a daily schedule. Mini-Vol portable air samplers (both TSP and PM_{2.5}) were deployed at the PG Northwest location as an alternative to high volume air samplers due to the lack of a power source at that location. The Mini-Vol air samplers were also run for an approximate 24-hour period. Results of the air monitoring program are provided in Appendix B, Table B-5, B-6 and B-7.

TSP

Three exceedances of the overriding limit of 120 micrograms per cubic metre ($\mu g/m^3$) as defined in the PHAI Dust Management and Requirements Plan [32] at the PG South location were noted in 2020. Two of the exceedances, 2020 January and May, were attributed to on-site activities. The 2020 November exceedance was attributed 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 exceedances represent approximately 0.95% of total samples collected at PG South. There was one exceedance observed in the Mini-Vol sample at the PG Northwest location in 2020 January. This exceedance was attributed to off-site activities. Exceedances were reported through CNL's ImpAct system and appropriate follow-up action was performed.

PM_{2.5}

In 2012, CCME adopted the Air Quality Management System [33] as a comprehensive approach to managing air issues. The Canadian Ambient Air Quality Standards for Fine Particulate Matter [33] are included, which replaced the Canada-wide standards developed in 2000. A 2020 value of 27 μ g/m³ is proposed for PM_{2.5}, which was exceeded in 2020 May at the Mini-Vol PG Northwest location. This exceedance was attributed to

off-site activities. Results from 2018, 2019 and 2020 are elevated due to some uncertainty arising from quality control results in skewing the three year average. The PGP Screening Report [31] predicted that there will be occasional and slight exceedances for PM_{2.5} along the edge of the existing WMF site. The PM_{2.5} results (98th percentile averaged over 3 years) were compared to this value as a proactive approach to current industry guidelines.

Additional Analysis

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 an accredited laboratory to determine the concentration of contaminants of potential concern in suspended dust. This included all TSP filers that exceeded the overriding limit as described above. The measured concentrations are presented in Appendix B, Tables. B-8 and B-9. There was an increase in the averages for uranium and silver in 2020 due to the change in the contract laboratory. There was 1 exceedance of the *Ambient Air Quality Criteria* (AAQC) [34] for nickel in 2020 November and the PG South location, this exceedance was attributed to off-site activities.

The PGP Screening Report [31] predicted that the maximum annual concentrations for radionuclides would be below the Health Canada reference values. These reference values are as defined in the *Port Granby Environmental Assessment Study Report* (PG EA Study Report) [35] and are based on *Canadian Guidelines for the Management of Naturally Occurring Radioactive Material* (NORM) guidelines [36]. The wastes for the project are not considered NORM [36], however the guideline levels have been provided for context. The predictions in the EA for the radionuclide concentrations were modelled for PM₁₀. TSP results have been compared to the Health Canada reference values as a conservative approach (i.e., if TSP results for radionuclides are below the Health Canada reference values, PM₁₀ will be as well). There were no exceedances of the Health Canada reference values in 2020.

9.2.1.4.2 Independent Dust Monitoring

Per the PHAI Dust Management and Requirements Plan [32], an Independent Dust Monitoring Program is carried out independent of 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.

In 2020, there were no exceedances of the 15-minute average action level of 120 μ g/m³ at the work site perimeter.

Real-time dust monitoring results from the Independent Dust Monitoring Program for the PG LTWMF construction are available at <u>www.phai.ca</u>. The weekly reports include daily real time dust measurements and a site map illustrating the locations of the independent real time dust monitors.

9.2.1.5 Noise Monitoring

Continuous sound level data was collected at a total of 9 locations in Port Granby during the 2020 monitoring period. The quarterly monitoring campaign took place at selected locations in 2020 as shown in Appendix B, Table B-8. Sampling locations are shown in Appendix A, Figure A-2.

The 2020 monitoring results during daytime hours were compared to average 2015 daytime results. As outdoor construction was not occurring in 2015, results for that period are more representative of baseline conditions than the results from 2004. A general increase in noise levels unrelated to the project can be

observed since the initial 2004 environmental assessment due to an increase in road and train traffic. The 2015 data provides a revised baseline.

The average results of the campaigns averaged logarithmically over 3 work days are provided in Appendix B, Table B-10.

The PG EA Study Report [35] states the noise levels (hourly) at the nearest receptor for the intersection of Elliott Road and Concession Road 1 (PG-N-0009) were predicted to be approximately 3 to 9 decibels (dBA) higher than the measured baseline noise levels (differential). For the intersection of Newtonville Road and Concession Road 1 (PG-N-0008), the noise levels at the nearest receptor were predicted to be approximately 4 to 15 dBA higher than the measured baseline noise levels. These 2 locations are representative of the project transportation route. The monitoring results during daytime hours, when compared to the baseline noise levels measured in 2015, revealed an average slight increase in or similar noise levels along the transportation route.

The PG EA Study Report [35] predicted an increase of 6 dBA at both the PG LTWMF and the existing facility in predicted zones of maximum influence. Overall, noise monitoring data is consistent with the EA predictions.

9.2.1.6 Geology and Groundwater Monitoring

The geology and groundwater monitoring program included elements related to groundwater flow and quality and to soil quality. Groundwater monitoring well locations are provided in Appendix A, A-3.

9.2.1.6.1 Groundwater (Flow and Quality) Monitoring

The groundwater wells were sampled on a quarterly basis in 2020 in conjunction with the measurement of groundwater static levels. Of the 39 groundwater wells to be monitored as part of the PGP Environmental and Biophysical Monitoring Plan [24], 4 have not been located on the PG WMF since 2013 (PG-BH204, PG-BH214, PG BH404 and PG-OW41-76). CNL is working on the reinstallation of these wells. Three groundwater wells were decommissioned in 2016 April related to the construction of the PG LTWMF (PG MW5A-02, PG MW5B 02 and PG MW5C-02). The reinstallation of these wells will be evaluated in the Maintenance and Monitoring Phase after the remediation and final grading of the sites are complete. As these wells were not sampled in 2019, the historic data has been excluded from this report.

Eleven wells located on the PG WMF site (PG-MW03-01A, PG-MW03-01B, PG-MW03-01C, PG-MW03-02A, PG-MW03-02B, PG MW03-02C, PG-MW03-03A, PG-MW03-03B, PG-MW03-03C, PG-BH210 and PG-OW4-87) have not been sampled since the remediation on the site commenced in 2016 due to ongoing construction and inaccessibility. In 2020, limited access was granted to sample 6 of the wells (PG-MW03-01A, PG-MW03-01B, PG-MW03-01C, PG-MW03-02A, PG-MW03-02B, PG-MW03-02C) starting in 2020 winter. In addition access was granted in 2020 fall for the sampling of PG-MW03-03A, MW03-03B and PG-MW03-03C. Two wells, PG-BH210 and PG-OW4-87, were not sampled in 2020, as they could not be located. The 2015 data was included for historical trending purposes, including a note for when these well were not sampled due to the PG WMF construction activities.

The remaining 21 wells located around the PG LTWMF were sampled on a quarterly basis in 2020. The data is presented in Appendix C and the sampling locations are shown in Appendix A, Figure A-3. Laboratory results for PG-MW2A-02, PG-BH1003E and PG-BH1003F have not been provided as the wells were dry (or had insufficient water to sample). This is consistent with monitoring data from previous years. Well PG BH1003A

was unable to be sampled in 2020 as it is broken. The re-installation of this well will be evaluated in the Maintenance and Monitoring Phase after the remediation and final grading of the sites are complete.

The following samples were not collected in 2020 due to insufficient volume for sampling; PG-MW1A-02 (winter, summer and fall), PG-MW03-01A (summer and fall), PG-MW03-02A (spring and fall), PG-MW3D-02 (summer and fall), PG-MW2C-02 (fall), PG-MW03-03A and PG-MW1D-02 (fall). Samples were not collected at PG-MW03-02A and PG-MW03-02B in the winter due to the COVID-19 Pandemic restrictions.

The results were compared against the *Water Quality Criteria for Potable Groundwater Conditions* tabled in the PGP Screening Report [31]. Onsite water is not potable therefore a conservative approach is taken to ensure consistency with reporting from previous years. In addition, results were compared to Ontario's groundwater standards, specifically *Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition* (Ontario's Table 3 Standard) [37].

In 2020, lead was found to exceed the criteria identified in the PGP Screening Report [31] and Ontario's Table 3 Standard [37] at PG-BH1002A. Other metals were elevated (including arsenic, barium, beryllium, boron, strontium, uranium and zinc) but below criteria as identified in the PGP Screening Report [31]. As groundwater in the region generally flows south towards Lake Ontario, these elevated concentrations are considered a sampling anomaly. Exceedances were not observed at any of CNL's other monitoring wells. In subsequent 2020 monitoring campaigns, concentrations in PG-BH1002A decreased to below the PGP Screening Report [31] and Ontario's Table 3 Standard [37] criteria. Overall, 2020 sampling results for key COPC are similar to the previous years' sampling results.

On the site of the current PG WMF, the groundwater quality is expected to be improved significantly once waste removal is completed. It may take years to see the positive effects of the project due to natural attenuation following waste removal. On the site of the PG LTWMF, changes to groundwater quality are expected to be minimal due to the presence of an engineered containment system made from a multi-layered base liner and cover system and a leachate water collection system. Perimeter groundwater monitoring will be undertaken at the site perimeter locations to confirm effectiveness of the containment system.

Groundwater levels were measured quarterly in 2020 and are presented in Appendix B, Table B-11. Average groundwater levels are generally similar to previous years. A slight decrease in average groundwater levels in 2020 can be observed in most wells relative the 2019 data.

9.2.1.6.2 Soil Monitoring

Soil quality monitoring activities involved the collection and analyses of surface soil samples at off-site perimeter locations at the PG LTWMF site to determine if there is an incremental increase in contaminant concentrations in these areas as a result of wind-blown dust deposition. As such, soil around the PG LTWMF at locations provided in Appendix A, Figure A-4 was sampled and analyzed for metals and radionuclides.

Results reported in Appendix B, Tables B-12, B-13, B-14, B-15 and B-16 all are comparable to previous years.

The PGP Screening Report [31] predicted no likely residual adverse effects to soil quality, with the exception of thorium-230, with an expected 38% increase in concentration over baseline, during the construction and development phase of the PG LTWMF. Thorium-230 soil concentrations have not increased in 2020 relative to baseline data and monitoring data for previous years.

9.2.1.7 Aquatic Environmental Monitoring

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.

9.2.1.7.1 Surface Water – Port Granby Creek Watershed

The water flowing in Port Granby Creek is sampled on a quarterly basis at two locations (upstream and downstream). The surface water locations are provided in Appendix A, Figure A-6. Results were compared to the PWQO [25] and the CWQG [26] where available. Results are provided in Appendix B, Tables B-22 and B-23. Water quality in both locations of the stream has generally remained stable over the last few years, notably with respect to metals and radionuclides, with the exception of iron. Iron exceeded the PWQO [25] and the CWQG [26] in 2020 January at the upstream location (PGC-U). The overall 2020 average for iron at PGC-U was below both the PWQOS [25] and the CWQGs [26]. The *PGP Screening Report* [31] stated that streams in the local study area exceeded for water quality guidelines for fluoride and iron, which is typical for agricultural/urban watersheds in the region. The PGP Screening Report [31] also predicted no measureable change to Port Granby Creek surface water quality as a result of the project.

Port Granby Creek was also monitored hourly during one storm event in 2020 October. The contaminant concentrations were observed to peak as Total Suspended Solids (TSS) increased; Appendix B, Table B-25. TSS concentrations at the peak of the storm event were 12 mg/L, compared to 4 mg/L as the storm event sampling commenced. As TSS levels increased, concentrations of iron were observed to exceed the PWQOs [25] and the CWQGs [26]. Concentrations were subsequently reduced as TSS levels declined. The rural nature of the site and the associated farming activities would likely contribute to the higher than normal iron levels observed during the storm event monitoring. Iron is not a key COPC associated with the PHAI PGP but has been discussed here for transparency.

9.2.1.7.2 Surface Water – Lake Ontario at the Diffuser

The surface water of Lake Ontario is sampled to verify that the water quality in the vicinity of the diffuser discharge and the associated mixing zone is not affected by operations of the PG LTWMF. The PGP Screening Report [31] predicted that there will be a long-term improvement and reduced contaminant loading to Lake Ontario as a result of the project. Sampling is conducted at the diffuser (location PG-LO-D) and approximately 20 m east and west of the diffuser (location PG LO-E and PG-LO-W respectively), as shown in Appendix A, Figure A-6. Results are provided in Appendix B, Tables B-25, B-26 and B-27. Due to COVID-19 Pandemic restrictions, sampling was unable to be completed in 2020 spring.

There were no exceedances of the PWQOs [25] and the CWQGs [26] in 2020, with the exception of fluoride. Fluoride exceedances of the CWQG [26] was observed at PG-LO-E and PG-LO-W in 2020 August and PG-LO-E in 2020 October. Results are generally consistent with monitoring data for the past few years, suggesting that current operations do not have an adverse effect on water quality. The 2020 results from location PG LO-D, relative to the mixing zone samples (PG-LO-E and PG-LO-W) are also comparable, suggesting that water quality at the diffuser is not affected by current operations.

9.2.1.7.3 Drainage Water

Two drainage water locations were sampled in previous years (PG-SW1/DP1-02 and PG-SW2/DP2-02). The locations of drainage water sampling are presented in Appendix A, Figure A-7. It should be noted location

PG SW2/DP2-02 was not sampled in 2020 as the existing pond has been removed as part of the site preparation work for the PG LTWMF. The monitoring location has been relocated to the outflow of the new North SMP. SMP sampling is discussed further in Section 9.2.1.1.4.

The results of the sampling campaigns were compared against the PWQOs [25] and the CWQGs [26] in Appendix B, Table B-30. In 2020 May, fluoride and phosphorus exceeded the CWQG [26] at PG-SW1/DP1-02. In 2020 October, fluoride exceeded CWQG [26]. Exceedances have been observed in previous years for fluoride and phosphorus in drainage water (prior to emplacement of the waste at the PG LTWMF), and as such are not likely related to the operation of the facility. The rural nature of the site and the associated farming activities would likely contribute to the higher than normal phosphorus levels in the pond. The *PGP Screening Report* [31] predicted no measureable changes in quality or quantity of drainage water during PG LTWMF construction.

10 EMERGENCY MANAGEMENT AND FIRE PROTECTION

10.1 Emergency Preparedness Program

The PGP 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) *[38]* has been developed to describe the planning and operational requirements for the response to an emergency directly or indirectly affecting the PGP and PHP. The plan 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 *[38]*. Contractor compliance with project-specific emergency preparedness plans are examined as part of CNL's Oversight Program.

There were no revisions to the PHAI Emergency Plan [38] 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 PGP incidents required activation of the EOC/SEP in 2020.

10.2 Fire Protection Program

The PGP adheres to the Corporate Fire Protection Program. See Section 10.2 of the Annual Compliance Monitoring Report for Canadian Nuclear Laboratories for details [6].

The PGP 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. In particular, the PG WWTP increased its efforts on the upgrade of file monitoring systems to help to limit faulty alarm triggers.

There were no revisions to Fire Protection documents in 2020.

10.2.1 Fire Response Drills

In 2020 all required annual fire response drills where completed at the PGP site. 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 CNL 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 & Inspections

In 2020, all required routine CNL fire protection program inspections were completed at the PGP. Inspections were completed using standard inspection forms and processes with no significant deficiencies noted with respect to fire hazards and necessary protective measures. Third-party fire system experts conducted inspections and follow-up maintenance on the PG WWTP updated fire system sensors.

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

11.1.1 Historic Waste Management Operations

Four major types of process wastes were historically placed at the PG WMF: limed raffinate, calcium fluoride, ammonium nitrate and magnesium fluoride.

11.1.1.1 Limed Raffinate

Limed raffinate is a wet neutral residue produced during refining of mine concentrates to uranium trioxide (UO³) consisting primarily of calcium sulphate and generally containing less than 0.5% unrecovered uranium and traces of radium and thorium. An estimated 64,200 m³ of raffinate was placed at the PG WMF until 1980 when recycling of the raffinate began at uranium mines in northern Ontario with trace amounts of uranium found in the raffinate being recovered for commercial value.

11.1.1.2 Calcium Floride

Calcium fluoride is an alkaline filter cake from the air scrubbing system used during the conversion of UO³ to uranium hexafluoride (UF⁶), generally containing less than 0.05% uranium. Calcium fluoride was the only process waste still being placed at the PG WMF when the site closed on 1988 June 30. At the facility, there are an estimated 27,000 m³ of the cake, which has as its main chemical constituents calcium fluoride (CaF²), potassium hydroxide (KOH) and calcium hydroxide (Ca(OH)²).

11.1.1.3 Ammonium Nitrate

Ammonium nitrate solution is a dilute liquid produced during the volume conversion of uranium trioxide (UO3) to uranium dioxide (UO2). It consists of an aqueous solution of ammonium nitrate (NH4NO3) containing trace amounts of uranium and radium. After 1977, NH4NO3 was no longer taken to the PG WMF because the refining operation was upgraded that enabled the NH4NO3 to be sold for use as a fertilizer with the approval of the CNSC and other regulatory agencies.

11.1.1.4 Magnesium Fluoride

Magnesium fluoride is a slag generated during the production of depleted uranium metal and contains about 10% unrecovered uranium. Approximately 1,700 m³ of the slag was placed at the facility until 1977 after which it was stored in drums at the conversion facility that produced it in Port Hope.

11.1.1.5 Other Wastes

Approximately 46,300 m³ of process wastes and contaminated soils were transferred to the PG WMF from waste sites in Port Hope as part of various 1956 to 1975 remedial works programs conducted by the former Eldorado Nuclear Ltd. Much of this material contains arsenic from the pre-1955 refining operations.

11.1.2 Onsite Soils

In addition to the placed soils, a volume of native soils at the facility has been affected to varying degrees by contact with the wastes and by the leachate generated by the wastes. These affected soils are chiefly confined to the waste storage area.

11.1.3 Waste Inventory

There was approximately 59,944 metric tonnes of excavated waste transported from the PG WMF to Cell 1 of the PG LTWMF during the 2020 calendar year.

As part of the routine water treatment process, residuals that are removed from the water effluent are packaged, and sent for disposal. There was approximately 80 cubic meters of process residual waste transferred from the PG WWTP to the PG LTWMF prior to mound closure. Post mound closure, the PG WWTP sent 408 filter press totes to CRL Near Surface Disposal Facility (NSDF) for disposal and 2,402 cubic meters of brine off site for disposal at a contract waste disposal site.

11.1.3.1 Changes to Waste Inventory

Waste Type	Source	Total Estimated Quantity (volume/weight)	Total Estimated Radioactivity (Bq) [Calculated/ Measured]	Primary Radionuclides
Radioactive	Historic Waste from PG WMF	1,315,061 metric tonnes	8.4 x 10^9 kBq of Ra-226	Uranium and Uranium Progeny
Radioactive	Process residuals from WWTP	2,679 metric tonnes	N/A	Uranium and Uranium Progeny
Radioactive	Cemented Waste from ancillary WWTP	0 metric tonnes	N/A	Uranium and Uranium Progeny

Table 13: Stored Waste Inventory in Error! Reference source not found.

UNRESTRICTED (PORT GRANBY PROJECT) ANNUAL COMPLIANCE MONITORING REPORT FOR 2020 4502-508760-ACMR-003 REV. 0 PAGE 56 OF 139

Waste Type	Material	Transfer Date	Volume or Mass	Total Estimated Radioactivity (Bq) [Calculated/Measured]	Radionuclide Content (Bq/m ³)	Destination
Hazardous	Evaporator Concentrate - 133T	2020-03-04	39460	2.95E+07	7.48E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-03-05	36750	2.45E+07	6.67E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-03-09	27760	1.66E+07	5.98E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-03-10	28740	N/A	N/A	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-03-12	28240	1.59E+07	5.63E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-03-18	27860	2.01E+07	7.21E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-06-16	36880	2.07E+07	5.61E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-06-17	36300	1.56E+07	4.30E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-06-18	36600	1.89E+07	5.16E-01	Stablex
Hazardous	Soda Ash - 122C	2020-06-23	18620	N/A	N/A	GFL Environmental
Hazardous	Evaporator Concentrate - 133T	2020-07-07	37710	2.72E+07	7.21E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-07-08	36650	4.11E+07	1.12E+00	Stablex
Hazardous	Misc Waste	2020-07-09	44 L	N/A	N/A	GFL Environmental
Hazardous	Evaporator Concentrate - 133T	2020-07-10	36780	2.85E+07	7.75E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-07-21	37140	8.85E+06	2.38E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-07-22	37440	7.04E+06	1.88E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-07-23	36000	6.45E+06	1.79E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-07-28	37810	7.03E+06	1.86E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-08-11	37190	5.06E+06	1.36E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-08-12	37300	5.21E+06	1.40E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-08-13	37320	4.77E+06	1.28E-01	Stablex

Table 14: Waste Transfers from PGP, PG WWTP

UNRESTRICTED

(PORT GRANBY PROJECT) ANNUAL COMPLIANCE MONITORING REPORT FOR 2020 4502-508760-ACMR-003 REV. 0 PAGE 57 OF 139

Waste Type	Material	Transfer Date	Volume or Mass	Total Estimated Radioactivity (Bq) [Calculated/Measured]	Radionuclide Content (Bq/m ³)	Destination
Hazardous	Evaporator Concentrate - 133T	2020-09-16	38790	1.42E+07	3.66E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-09-17	37910	1.42E+07	3.75E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-09-21	38620	1.42E+07	3.68E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-09-22	39040	4.74E+06	1.21E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-09-24	38600	4.74E+06	1.23E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-10-05	38910	1.86E+07	4.78E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-10-06	23970	1.06E+07	4.42E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-10-13	38680	1.07E+07	2.77E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-10-14	38730	1.07E+07	2.76E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-10-21	38880	5.85E+06	1.50E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-10-28	39610	1.69E+07	4.27E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-10-29	39570	9.88E+06	2.50E-01	Stablex
Hazardous	Misc Waste	2020-11-03	760 L	N/A	N/A	GFL Environmental
Hazardous	Evaporator Concentrate - 133T	2020-11-04	39260	1.05E+07	2.67E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-11-05	38640	6.50E+06	1.68E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-11-17	38150	7.27E+06	1.91E-01	Stablex
Hazardous	Waste Oil - 252 L	2020-11-17	600 L	1.36E+05	2.27E-01	GFL Environmental
Hazardous	Evaporator Concentrate - 133T	2020-11-18	35600	7.27E+06	2.04E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-11-19	36000	7.27E+06	2.02E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-11-24	38310	7.27E+06	1.90E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-11-24	37830	7.27E+06	1.92E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-11-25	38340	4.87E+06	1.27E-01	Stablex

UNRESTRICTED

(PORT GRANBY PROJECT) ANNUAL COMPLIANCE MONITORING REPORT FOR 2020 4502-508760-ACMR-003 REV. 0 PAGE 58 OF 139

Waste Type	Material	Transfer Date	Volume or Mass	Total Estimated Radioactivity (Bq) [Calculated/Measured]	Radionuclide Content (Bq/m ³)	Destination
Hazardous	Evaporator Concentrate - 133T	2020-12-08	38340	4.70E+06	1.23E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-12-09	37950	4.70E+06	1.24E-01	Stablex
Hazardous	Evaporator Concentrate - 133T	2020-12-10	37720	4.70E+06	1.25E-01	Stablex

12 SECURITY

12.1 Security Program

The PGP 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) [9] has been implemented for the PGP. The PHAI Security Plan [9] establishes the security arrangements that are required for the PHAI PGP and PHP. 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 [9] is to ensure the physical protection of the PGP assets and safeguarding of the public and personnel. The PHAI Security Plan [9] 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, were consistent with the requirements of the PHAI Security Plan [9], as confirmed through CNL's mandated review and acceptance process. Contractors' compliance with project-specific security plans is examined as part of CNL's oversight program.

In 2020, there were no revisions to the PHAI Security Plan [9].

12.1.1 Security Events

In Error! Reference source not found., there were no reportable security event(s) that affected the PGP sites.

13 SAFEGUARDS AND NON-PROLIFERATION

13.1 Safeguards Program

As per the PGP LCH [2], the Safeguards and Non-Proliferation Program is not applicable to the PGP.

14 PACKAGING AND TRANSPORT

14.1 Packaging and Transport Program

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

The Port Hope Area Initiative Transportation of Dangerous Goods Plan (PHAI TDG Plan) [10] 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.

In addition, firms or contractors performing work on behalf of CNL for the PHAI project under the PGP Licence [1] adhere to project specific work plans, which are compliant with the PHAI TDG Plan [10].

There were no revisions made to the PHAI TDG Plan [10] in 2020.

14.1.1 Shipments

The majority of the waste transferred for the PGP occurred along private, dedicated roads. As such, the TDG program was not applicable to these transfers.

In 2020, there were 125 classified shipments of dangerous goods from the PGP site to offsite facilities, and many shipments of dangerous goods were received at the site from offsite vendors (consumable chemicals, diesel fuel, and propane).

15 OTHER MATTERS OF REGULATORY INTEREST

15.1 Public Information and Disclosure Program

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

CNL is committed to providing the public with effective access to timely information about the PHAI and the PGP. 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) [11] 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 (Application for Amendment to the PHP Licence Clean-Up Criteria) [12]. Details on communications in support of the application were provided to the Port Granby community and are detailed under General Communications.

A number of previously planned activities from 2020 March to 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.

15.1.1 Communications

15.1.1.1 Website

The PHAI website, PHAI.ca, provides information on the PGP and PHP, 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.

15.1.1.2 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.

15.1.1.3 Public Information Office

The Public Information Office 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 PG LTWMF and PH LTWMF also on display. During COVID-19 Pandemic restrictions when the office is closed to the public; 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.

15.1.1.4 Project Newsletters

PGP 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 southeastern part of the Municipality of Clarington and to an extensive list of federal, provincial, regional and municipal stakeholders; newsletters are also available online at PHAI.ca.

The 2020 fall newsletter was distributed to approximately 7,000 homes, businesses and farms, and was posted on the PHAI website.

The newsletter covered a range of topics including the completion of remediation at the Port Granby Legacy Waste Management Facility, CNL's response to the COVID-19 Pandemic, next steps for the PGP and CNL's Application for Amendment to the PHP Licence Clean-Up Criteria [12].

15.1.1.5 Presentations

Presentations are provided on current and planned project activities, and the PVP Program, 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, 10 presentations were delivered on the PHAI and PGP.

15.1.1.6 Site Tours

Guided tours of project remediation sites and construction areas, led by expert CNL staff, provide a first-hand look at PHAI PGP 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.

15.1.1.7 Information Sessions

Information sessions are held as required to inform the community about upcoming PHAI PGP and PHP 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 PGP and PHP work. A virtual Public Information Session was held in October 2020 as part of the public engagement campaign in support of CNL's Application for Amendment to the PHP Licence Clean-Up Criteria [12].

15.1.1.8 Participation in External Events

As project ambassadors, CNL staff participates in external events to provide information about PHAI PGP and PHP 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.

15.1.1.9 Media Releases

CNL issued a media release in November 2020 to national and local media outlets announcing the completion of remediation at the Port Granby Legacy Waste Management Site.

15.1.1.10 Community Notifications

Residents and business owners in close proximity to PHAI PGP and PHP 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 one notification to the Port Granby community regarding upcoming night work at the PGP site.

15.1.2 Key Stakeholder Relations

15.1.2.1 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 PGP and PHP 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 participated in monthly municipal coordination meetings to provide updates on project and communications activities and provided an annual update to the Municipality of Clarington to update council on PHAI PGP and PHP progress, and next steps.

15.1.2.2 Agreement Monitoring Group

Quarterly meetings of the Agreement Monitoring Group bring together representatives of both municipalities as signatories to the Legal Agreement [3], 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 on a virtual platform.

15.1.2.3 Business Community Liaison

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.

15.1.3 PHAI Related Citizen Groups

15.1.3.1 Port Granby Citizen Liaison Group

The Port Granby (PG) Citizen Liaison Group (CLG) supplements other communications avenues for the exchange of information and perspectives that can assist CNL when planning activities that affect the Port Granby and surrounding communities. The PG CLG brings together a broad cross-section of residents and organizations in key sectors such as business, health, the environment/ conservation and community life.

A meeting of the PG CLG was held virtually in October 2020 providing an overview of the PGP, CNL's response to the COVID-19 Pandemic and an update on CNL's Application for Amendment to the PHP Licence Clean-Up Criteria [12].

15.1.3.2 Port Granby Discussion Group

The Port Granby (PG) Discussion Group provides a forum for CNL to update residents and other interested parties on PGP plans and activities and discuss community concerns. CNL consults the South East Clarington Ratepayers Association, which represents the interests of residents in the Hamlet of Port Granby, on meeting frequency, schedule and agenda topics. The PG Discussion Group members did not request a meeting in 2020.

15.1.4 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 PGP and PHP presentations and site tours and CNL continues to develop outreach activities related to Science, technology engineer and mathematics (STEM) education.

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

15.1.5 Internal Communications

As representatives of the PHAI PGP and PHP, CNL employees must be aware of PHAI PGP and PHP 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 Integrated Work Control to provide quick access to resources.

15.1.6 Atomic Energy of Canada Limited

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

In 2020, 9 notifications were provided to AECL staff on matters related to the PGP.

15.1.7 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 PGP and PHP communications activities.

15.1.8 Questions and Issues Management

15.1.8.1 Complaints Resolution Program

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

In 2020, there were no complaints received regarding the PGP.

15.1.9 Reporting and Disclosure

15.1.9.1 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* (REGDOC-3.2.1) [39], 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 [39], CNL informs the CNSC of disclosures made under this protocol at the time of or before the disclosure. In 2020, CNL posted 3 public disclosures related to the PGP.

15.1.9.2 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 CNSC Annual Compliance Reports on PHAI.ca with full reports being available upon request.

15.1.9.3 Communications and Outreach Activities

Communication and outreach activities conducted for the PGP during 2020 are summarized in Table 15.

Tactic	Reach		
	Port Granby Pr	oject	15
Public Information Office	Port Hope Area	Initiatives	84
r none, eman, m-person meetings		TOTAL	291
Public Engagement	Engagement		
Presentations	10		
Tours	1		
Media Releases	1		
Community Notifications	1		
Key Stakeholder Relations	7		
Indigenous Engagement	8		
Internal Communications	61		
Public Disclosures	3		
Online Communications			Total
Websites DUAL co	Visits to website		23,617
	Pages viewed	65,160	
		Total Posts	Total Reach
	Facebook	380	31,302
Social Modia		Total Tweets	Total Visited
	Twitter	399	1,529
		Total Posts	
	Instagram	35	

Table 15: Port Granby Project Communications outreach activities, 2020.

15.2 Indigenous Engagement

15.2.1 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 are 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
ALARA	As Low As Reasonably Achievable
AECL	Atomic Energy of Canada Limited
CCME	Canadian Council of Ministers of the Environment
CNL	Canadian Nuclear Laboratories
CNSC	Canadian Nuclear Safety Commission
CRL	Chalk River Laboratories
CLG	Citizen Liaison Group
CRP	Complaints Resolution Process
COPC	Contaminants of Potential Concern
dBA	Decibels
DSP	Dosimetry Service Provider
EGGC	East Gorge Groundwater Collection
ECC	Engineering Change Control
ECCC	Environment and Climate Change Canada
EA	Environmental Assessment
EQ	Equalization
HOIR	Hazardous Occurrence Investigation Reports
Hi-Vol	High Volume
HWP MO	Historic Waste Program Management Office
HU	Human Performance
ImpAct	Improvement Action
IWC	Integrated Work Control
ISQG	Interim Sediment Quality Guideline
LCH	Licence Conditions Handbook
LLRW	Low Level Radioactive Waste
LCV	Lowest Chronic Value
LEL	Lowest Effect Level
MPH	Municipality of Port Hope
NORM	Naturally Occurring Radioactive Material
NSDF	Near Surface Disposal Facility

NEW	Nuclear Energy Worker
NSCA	Nuclear Safety and Control Act
OSH	Occupational Safety and Health
OFI	Opportunity for Improvement
OSLD	Optically Stimulated Luminescence Dosimetry
PM	Particulate Matter
PG LTWMF	Port Granby Long-term Waste Management Facility
PGP	Port Granby Project
PG WMF	Port Granby Waste Management Facility
PG WWTP	Port Granby Waste Water Treatment Plant
PHAI	Port Hope Area Initiative
РНР	Port Hope Long-Term Low-Level Radioactive Waste Management Project
PH LTWMF	Port Hope Long-Term Waste Management Facility
PVP	Property Value Protection
PSQG	Provincial Sediment Quality Guidelines
PWQO	Provincial Water Quality Objectives
PIP	Public Information Program
QA	Quality Assurance
QA	Quality Assurance
RP	Radiation Protection
RPP	Radiation Protection Program
RWP	Radiation Work Permits
SCA	Safety Control Area
STEM	Science, technology, engineering, and mathematics
SSHC	Site Safety and Health Committee
SMP	Stormwater Management Pond
SAT	Systematic Approach to Training
TLD	Thermoluminescent Dosimeter
TSP	Total Suspended Particles
TSS	Total Suspended Solids
TDG	Transportation of Dangerous Goods
VWP	Vibrating Wire Piezometer

WWMF

Welcome Waste Management Facility

17 REFERENCES

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- [3] An Agreement for the Cleanup and Long-Term Safet Management of Low-Level Radioactive Waste Situate in the Town of Port Hope, The Township of Hope and the Municipality of Clarington, LLRWMO-513700-110-11000-008, 2001 March 29.
- [4] *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories,* 145-00583-ACMR-2020, Revision 0, 2021 April.
- [5] *Port Granby Project Phase 3 Long Term Management Plan,* 4502-508000-PLA-001, Revision 0, 2020 December.
- [6] *Port Granby Project Phase 3 Site and Facility Maintenance and Monitoring Plan,* 4502-508000-PLA-002, Revision 0, 2020 December.
- [7] Port Granby Long-term Waste Management Facility Base Liner and Final Cover Performance Monitoring Plan and Procedures, 4502-508110-PLA-001, Revision 0, 2020 December.
- [8] Letter, S. Morris (CNL) to R. Buhr (CNSC), *Submission of the Port Granby Project Phase 3 Plans and Procedures*, 4502-CNNO-20-0022-L, 2020 December 23.
- [9] Port Hope Area Initiative (PHAI) Security Plan, 4500-508710-PLA-001, Revision 1, 2017 February.
- [10] Port Hope Area Initiative (PHAI) Transportation of Dangerous Goods Plan, 4500-508520-PLA-001, Revision 4, 2018 June.
- [11] *Port Hope Area Initiative (PHAI) Phase 2 Public Information Program Plan,* 4500-513000-PLA-003, Revision 4, 2020 March.
- [12] Letter, S. Morris (CNL) to M. Leblanc (CNSC), Application for Amendment of the Port Hope Long-term Low-Level Radioactive Waste Management Project Waste Nuclear Substance Licence - WNSL-W1-2310.02/2022, 4501-CNNO-20-0013-L, 2020 March 31.
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APPENDIX A EA MONITORING LOCATION MAPS



Figure A-1: PGP Environmental Assessment (EA) air monitoring locations.



Coordinate System: NAD 1983 CSRS UTM Zone 17N Protection: Transverse Mercator Protected Park 198	Meters
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Figure A-2: PGP EA noise monitoring locations



Figure A-3: PGP EA groundwater monitoring locations



Figure A-4: PGP EA soil sampling locations



Figure A-5: PGP EA sediment sampling locations



Figure A-6: PGP EA surface water sampling locations



Figure A-7: PGP EA drainage water monitoring locations



Figure A-8: PG WMF bluff seepage sampling locations

APPENDIX B PORT GRANBY ENVIRONMENTAL MONITORING RESULTS

2020 Final Effluent Sample Monthly Mean	Radium-226 (Bq/L)	рН	Nitrite (mg/L)	Nitrate (mg/L)	Total Suspended Solids (mg/L)	Total Ammonia-N (mg/L)	Total Phosphorus (mg/L)	Total Arsenic (μg/L)	Total Cadmium (µg/L)	Total Cobalt (μg/L)	Total Copper (μg/L)	Total Molybdenum (µg/L)	Total Selenium (µg/L)	Total Thallium (µg/L)	Total Uranium (μg/L)	Total Vanadium (μg/L)
Release Limit (monthly mean)	0.37	6-9.5	1.5	75	15	5.75	0.35	100	1	5	5	-	30	8	100	40
Action Level	0.05	6.5 - 8.5	1.5	75	15	5.75	0.35	50	1	5	5	50	20	0.5	100	5
January	0.0058	7.98	0.11	0.9	<1	0.068	0.004	2.43	<0.006	0.31	0.45	1.28	<0.04	0.005	3.06	0.063
February	0.0075	7.76	0.095	1.92	<1	0.19	0.008	4.45	0.0048	0.56	0.53	2.43	0.045	0.009	6.04	0.11
March	<0.0050	7.63	0.072	0.51	<1	0.73	<0.022	2.62	<0.10	<0.56	<1.0	1.11	<2.0	<0.050	2.56	<0.50
April	<0.0050	7.83	0.164	1.14	<1	0.07	<0.020	6.9	<0.10	<0.52	<1.0	2.3	<2.0	<0.050	5.5	<0.50
Мау	<0.0050	7.82	0.029	0.36	<1	0.13	<0.020	9.2	<0.10	0.63	<1.1	3	<2.0	<0.050	5.3	<0.50
June	<0.0050	7.63	0.048	<0.12	<1	0.11	<0.021	15.6	<0.10	1.3	<1.0	5.4	<2.0	<0.050	8.8	<0.50
July	<0.006	7.37	<0.03	<0.06	<1	<0.05	<0.003	6.57	<0.003	0.12	<0.2	0.54	<0.04	<0.005	0.65	0.04
August	<0.005	7.54	<0.03	<0.06	<1	0.26	0.015	13.4	<0.003	1.01	0.4	3.29	0.04	<0.005	7.54	0.4
September	<0.008	7.69	0.16	<0.065	<1.25	0.2	<0.003	9.33	<0.004	0.52	0.25	2	<0.045	<0.005	3.94	0.26
October	<0.007	7.46	0.035	<0.06	<1	<0.04	0.026	5.3	<0.003	0.39	<0.2	1.58	<0.04	<0.005	1.9	0.11
November	<0.005	7.49	<0.035	<0.065	<1	0.08	<0.003	3.1	<0.003	0.22	<0.2	0.78	<0.05	<0.005	0.92	0.075
December	<0.005	7.43	<0.03	<0.06	<1.5	<0.05	0.016	2.3	<0.003	0.15	<0.2	0.78	<0.04	<0.005	0.62	0.075

Table B-1: 2020 Port Granby Waste Water Treatment Plant - results of water sampling analysis (effluent- monthly mean).

Table B-2: 2020 Port Granby Waste Water Treatment Plant - results of water sampling analysis (effluent- weekly maximum).

2020 Final Effluent Sample Weekly Maximum	Radium-226 (Bq/L)	рН	Nitrite (mg/L)	Nitrate (mg/L)	Total Suspended Solids (mg/L)	Total Ammonia-N (mg/L)	Total Phosphorus (mg/L)	Total Arsenic (μg/L)	Total Cadmium (μg/L)	Total Cobalt (μg/L)	Total Copper (μg/L)	Total Molybdenum (μg/L)	Total Selenium (μg/L)	Total Thallium (μg/L)	Total Uranium (μg/L)	Total Vanadium (µg/L)
Release Limit (weekly composite)	0.74	<6 or >9.5	3	150	30	11.5	0.7	200	2	10	10	-	60	16	200	80
Action Level	0.05	6.5 - 8.5	1.5	75	15	5.75	0.35	50	1	5	5	50	20	0.5	100	5
January	0.007	8.26	0.14	1.22	1	0.09	0.007	3.3	0.006	0.385	0.7	1.68	<0.04	0.005	4.43	0.08
February	0.01	7.8	0.1	3.98	<1	0.36	0.017	7.9	0.01	1.06	0.8	4.54	0.06	0.012	10.5	0.19
March	<0.0050	7.76	0.186	0.85	<1	2.3	0.03	5.5	<0.10	0.81	<1.0	2.9	<2.0	<0.050	6.8	<0.50
April	<0.0050	8.03	0.256	1.34	<1	0.21	<0.020	8.2	<0.10	0.59	<1.0	2.9	<2.0	<0.050	6.5	<0.50
Мау	<0.0050	7.9	0.038	0.76	<1	0.36	<0.020	13	<0.10	0.82	1.2	4.1	<2.0	<0.050	6.9	<0.50
June	<0.0050	7.76	0.13	0.18	1	0.16	0.022	18	<0.10	1.6	<1.0	6.7	<2.0	<0.050	11	<0.50
July	0.006	7.68	<0.03	<0.06	<1	0.07	0.003	11.4	<0.003	0.201	0.2	0.75	<0.04	<0.005	0.932	0.07
August	<0.005	7.54	<0.03	<0.06	<1	0.26	0.015	13.4	<0.003	1.01	0.4	3.29	0.04	<0.005	7.54	0.4
September	0.01	7.81	0.27	0.08	2	0.28	0.003	15.6	0.006	0.922	0.3	4.04	0.06	<0.005	7.72	0.43
October	0.009	7.57	0.04	<0.06	<1	<0.04	0.026	6.8	0.003	0.49	<0.2	2.07	<0.04	<0.005	2.37	0.14
November	<0.005	7.81	0.04	0.07	<1	0.09	<0.003	3.2	<0.003	0.22	<0.2	0.81	0.06	<0.005	0.94	0.08
December	<0.005	7.48	0.03	<0.06	2	0.06	0.019	2.7	<0.003	0.16	<0.2	1.08	<0.04	<0.005	0.71	0.11

Table B-3: 2020 Port Granby Waste Water Treatment Plant - results of water sampling analysis (influent- monthly average).

2020 Influent Sample Monthly Average	Radium-226 (Bq/L)	рН	Nitrite (mg/L)	Nitrate (mg/L)	Total Suspended Solids (mg/L)	Total Ammonia-N (mg/L)	Total Phosphorus (mg/L)	Total Arsenic (μg/L)	Total Cadmium (µg/L)	Total Cobalt (μg/L)	Total Copper (μg/L)	Total Molybdenum (µg/L)	Total Selenium (µg/L)	Total Thallium (µg/L)	Total Uranium (µg/L)	Total Vanadium (µg/L)
January	2.43	8.29	0.89	9.79	161	3.73	2.51	2000	1.46	379	297	1309	9.8	0.279	3843	82
February	2.53	8.00	0.90	12.33	112	4.00	3.41	2468	1.62	427	284	1683	11.8	0.266	4785	92
March	1.02	8.37	0.46	5.14	80	3.72	1.43	1190	<1.0	188	136	850	5.7	0.193	2880	42
April	3.55	8.25	0.71	9.03	165	1.35	4.75	3375	<5.0	540	333	2600	15.0	0.365	7100	123
Мау	3.03	8.32	0.32	2.53	148	2.70	4.13	3875	<1.0	610	233	2850	14.3	0.285	6675	112
June	1.57	9.00	0.13	0.27	150	0.88	4.03	3575	<3.0	600	100	2275	11.5	0.220	5275	107
July	0.37	8.85	<0.3	0.95	59	0.07	0.69	1166	0.33	162	16	603	2.6	0.010	1265	33
August	1.70	8.22	<0.3	<0.6	62	7.40	4.45	4690	0.95	592	22	1660	5.6	0.030	5105	186
September	1.20	8.65	1.87	0.62	78	5.17	2.94	2908	0.42	329	14	945	4.5	0.023	2730	139
October	0.53	7.84	<0.3	1.31	111	1.13	12.80	2270	0.52	338	25	1080	3.1	0.030	1952	91
November	0.39	7.56	<0.3	1.37	87	3.42	7.05	1724	0.40	249	16	723	2.5	<0.005	1435	74
December	0.38	7.58	<0.3	1.55	81	2.00	13.53	2215	0.91	291	12	951	2.4	<0.005	1600	78

Sample Date	48 Hour Result	96 Hour Result
January 14	Pass (0.0% mortality)	Pass (0.0% mortality)
February 11	Pass (0.0% mortality)	Pass (0.0% mortality)
March 10	Pass (16.7% mortality)	Pass (10.0%) mortality)
April 14	Pass (0.0% mortality)	Pass (0.0% mortality)
May 12	Pass (0.0% mortality)	Pass (10.0% mortality)
June 16	Pass (0.0% mortality)	Pass (20.0% mortality)
July 13	Pass (6.7% mortality)	Pass (40.0% mortality)
August 25	Pass (0.0% mortality)	Pass (0.0% mortality)
September 8	Pass (20.0% mortality)	Pass (0.0% mortality)
October 20	Pass (0.0% mortality)	Pass (0.0% mortality)
November 17	Pass (0.0% mortality)	*Fail (80.0% mortality)
November 23	Pass (0.0% mortality)	Pass (10.0% mortality)
December 7	Pass (0.0% mortality)	Pass (0.0% mortality)

 Table B-4: 2020 Port Granby interceptor discharge – toxicity testing summary.

*Note: Follow up investigation found no abnormalities in effluent quality that could have suggested a potential cause for the test failure. Subsequent tests that were done following the event showed no further non compliances. The event was deemed to be a laboratory anomaly. See Section 3.1.1.1.1

Table B-5: Air quality monitoring – PG South.

	20)15	20	16	20	17	20	18	20	19	20	20
	PM _{2.5}	TSP	PM _{2.5}	TSP	PM _{2.5}	TSP	PM _{2.5}	TSP	PM _{2.5}	TSP	PM _{2.5}	TSP
	(µg/m ³)	(µg/m³)	(µg/m³)	(µg/m³)								
Observations	73	74	248	247	225	225	232	234	204	230	212	211
Geometric Mean	6	12	5	20	6	16	9	22	5	17	6	18
Arithmetic Mean	10	16	7	27	6	20	10	27	6	20	9	23
Median	5	12	6	19	5	17	9	23	5	17	8	19
98 th Percentile	34	45	27	-	23	-	19	-	18	-	20 ¹	0
Maximum	37	47	24	166	23	170	94	223	18	161	134	184
Exceedances	0%	0%	0%	2%	0%	1%	0%	1%	0%	0%	0%	0.95%

Note:

 $^198^{th}$ Percentile for $PM_{2.5}$ averaged over 3 years (2018, 2019, 2020).

TSP values are compared to Overrriding Limit of 120 μ g/m³ as defined in the PHAI Dust Management and Requirements Plan and AAQC.

PM_{2.5} 98th percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 µg/m³ and the proposed 2020 value of 27 µg/m³.

Table B-6: Air quality n	monitoring – PG	East
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	20	15	20	16	20	17	20	18	20	19	20	20
	PM _{2.5}	TSP	PM _{2.5}	TSP	PM _{2.5}	TSP	PM _{2.5}	TSP	PM _{2.5}	TSP	PM _{2.5}	TSP
	(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m³)	(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m³)	(µg/m ³)	(µg/m³)	(µg/m ³)	(µg/m ³)
Observations	68	72	240	243	221	228	224	234	229	225	212	209
Geometric Mean	5	12	6	20	7	16	10	20	5	15	6	16
Arithmetic Mean	9	16	7	31	8	21	11	25	6	18	8	20
Median	5	10	6	18	7	16	11	21	5	16	8	18
98 th Percentile	32	45	28	-	27	-	24	-	23	-	22 ¹	0
Maximum	44	48	28	259	38	179	45	157	23	71	22	56
Exceedances	0%	0%	0%	4%	0%	1%	0%	1%	0%	0%	0%	0%

Note:

 $^198^{th}$ Percentile for $PM_{2.5}$ averaged over 3 years (2018, 2019, 2020).

TSP values are compared to Overrriding Limit of 120 μ g/m³ as defined in the PHAI Dust Management and Requirements Plan and AAQC.

PM_{2.5} 98th percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 µg/m³ and the proposed 2020 value of 27 µg/m³.

Table B-7: Air quality monitoring – PG Northwest.

	2015		2016		2017		2018		2019		20	20
	PM _{2.5}	TSP	PM _{2.5}	TSP	PM _{2.5}	TSP						
	(µg/m ³)	(µg/m³)	(µg/m ³)	(µg/m ³)	(µg/m ³)							
Observations			175	178	211	213	223	220	218	204	198	204
Geometric Mean			10	23	6	16	6	17	5	17	9	14
Arithmetic Mean			18	49	7	20	7	21	6	20	14	22
Median			7	24	6	17	6	17	5	17	5	12
98th Percentile			79		64		57		18		37 ¹	0
Maximum			221	1392	35	91	32	120	25	106	175	271
Exceedances			1%	8%	0%	0%	0%	0%	0%	0%	1%	0%

Note:

 $^{1}98^{th}$ Percentile for PM_{2.5} averaged over 3 years (2018, 2019, 2020).

TSP values are compared to Overrriding Limit of 120 μ g/m³ as defined in the PHAI Dust Management and Requirements Plan and AAQC.

PM_{2.5} 98th percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 µg/m³ and the proposed 2020 value of 27 µg/m³.

Table B-8: Metals and radionuclides concentrations in total suspended particulates – PG South.

						_	PG South			
				2015	2016	2017	2018	2019	20	20
	Numbe	r of San	nples Analvzed	17	51	51	51	52	4	7
Analysis	Unit	AAQC	Health Canada Reference Levels*			Average			Average	Maximum
Total Mercury (Hg)	ng/m ³	-		-	0.01	0.01	0.01	0.10	0.74	1.21
Silver (Ag)	ng/m ³	1000		5	2	3	3	4	21	24
Arsenic (As)	ng/m ³	300		1	2	3	3	3	3	6
Barium (Ba)	ng/m ³	10000		4	9	5	6	5	4	10
Beryllium (Be)	ng/m ³	10		0.01	0.15	0.56	0.57	0.53	0.03	0.05
Boron (B)	ng/m ³	120000		11	9	3	3	4	11	12
Cadmium (Cd)	ng/m ³	25		0.1	0.4	1.1	1.1	1.1	0.3	1.3
Cobalt (Co)	ng/m ³	100		0.1	0.3	1.1	1.2	1.1	0.3	0.3
Copper (Cu)	ng/m ³	50000		9	15	10	10	14	13	64
Molybdenum (Mo)	ng/m ³	120000		0.7	0.9	1.7	1.7	1.8	2.6	3.8
Nickel (Ni)	ng/m ³	200		1	1	2	2	2	8	331
Lead (Pb)	ng/m ³	500		2	2	3	3	2	3	7
Antimony (Sb)	ng/m ³	25000		1	3	6	6	6	8	29
Selenium (Se)	ng/m ³	10000		1	2	6	6	5	3	5
Uranium (U)	ng/m ³	300	4070	1	1	1	0.6	0.5	3.0	6
Vanadium (V)	ng/m ³	2000		0.3	1.6	2.9	3.0	2.7	0.4	1.3
Zinc (Zn)	ng/m ³	12000		17	25	18	18	19	23	124
Lead-210	Bq/m ³	-		0.0005	0.0003	0.0005	0.0008	0.0008	0.0006	0.0023
Radium-226	Bq/m ³	-	0.05	0.00003	0.00003	0.00006	0.00006	0.00005	0.00003	0.00003
Thorium-230	Bq/m ³	-	0.01	0.00006	0.00011	0.00029	0.00029	0.00027	0.00006	0.00017
Thorium-232	Bq/m ³	-	0.006	0.00006	0.00011	0.00028	0.00028	0.00027	0.00006	0.00006
Thorium, natural	Bq/m ³	-							0.00011	0.00012
Uranium, natural (calc)	Bq/m ³	-							0.00000	0.00003
Note: AAQC = Ambient Air Quality	/ Criteria									

*Health Canada reference levels as defined in the Port Granby Environmental Assessment Study Report

Bold values indicate an exceedance against the AAQC

Table B-9: Metals and radionuclides concentrations in total su	snondod n	articulatos —	DG Fast
Table D-3. Metals and faulunutilities concentrations in total su	spenueu p	ai liculates –	FU Lasi.

				PG East									
				2015	2016	2017	2018	2019	20	20			
	Numbe	r of San	nples Analyzed	17	55	50	51	51	4	6			
Analysis	Unit	AAQC	Health Canada Reference Levels*			Average			Average	Maximum			
Total Mercury (Hg)	ng/m ³	-		-	0.01	0.01	0.01	0.10	0.76	1.20			
Silver (Ag)	ng/m ³	1000		5	2	3	3	4	21	24			
Arsenic (As)	ng/m ³	300		1	2	3	3	6	3	6			
Barium (Ba)	ng/m ³	10000		4	12	7	6	6	4	8			
Beryllium (Be)	ng/m ³	10		0.01	0.16	0.56	0.56	0.52	0.03	0.03			
Boron (B)	ng/m ³	120000		11	10	3	3	4	11	12			
Cadmium (Cd)	ng/m ³	25		0.1	0.4	1.1	1.1	1.1	0.3	0.5			
Cobalt (Co)	ng/m ³	100		0.1	0.3	1.1	1.1	1.7	0.3	0.5			
Copper (Cu)	ng/m ³	50000		7	19	12	13	13	14	56			
Molybdenum (Mo)	ng/m ³	120000		1	0.9	1.7	1.7	1.8	3.5	14.6			
Nickel (Ni)	ng/m ³	200		1	2	2	2	2	1	2			
Lead (Pb)	ng/m ³	500		2	3	3	3	3	3	8			
Antimony (Sb)	ng/m ³	25000		1	3	6	6	6	10	85			
Selenium (Se)	ng/m ³	10000		1	2	6	6	5	3	8			
Uranium (U)	ng/m ³	300	4070	1	2	0.5	0.6	3	2.9	5			
Vanadium (V)	ng/m ³	2000		0.3	2.5	2.9	2.9	8.2	0.4	1.0			
Zinc (Zn)	ng/m ³	12000		16	31	22	22	17	22	101			
Lead-210	Bq/m ³	-		0.0006	0.0003	0.0005	0.0009	0.0008	0.0006	0.0017			
Radium-226	Bq/m ³	-	0.05	0.00003	0.00003	0.00006	0.00006	0.00009	0.00003	0.00004			
Thorium-230	Bq/m ³	-	0.01	0.00006	0.00011	0.00028	0.00028	0.00045	0.00006	0.00006			
Thorium-232	Bq/m ³	-	0.006	0.00006	0.00011	0.00028	0.00028	0.00027	0.00006	0.00006			
Thorium, natural	Bq/m ³	-							0.00011	0.00012			
Uranium, natural (calc)	Bq/m ³	-							0.00000	0.00004			

AAQC = Ambient Air Quality Criteria *Health Canada reference levels as defined in the Port Granby Environmental Assessment Study Report

 $\ensuremath{\textbf{Bold values}}$ indicate an exceedance against the AAQC

Table B-10: Noise monitoring results – PG LTWMF.

		201	5 Average L _{eq} (dBA)	201	6 Average L _{eq} (dBA)	201	7 Average L _{eq} (dBA)	201	8 Average L _{eq} (dBA)	201	9 Average L _{eq} (dBA)	202	0 Average L _{eq} (dBA)
		Day	Evening	Night															
Monitoring Location	Monitoring Location	(07:00-18:00)	(18:00-23:00)	(23:00-07:00)	(07:00-18:00)	(18:00-23:00)	(23:00-07:00)	(07:00-18:00)	(18:00-23:00)	(23:00-07:00)	(07:00-18:00)	(18:00-23:00)	(23:00-07:00)	(07:00-18:00)	(18:00-23:00)	(23:00-07:00)	(07:00-18:00)	(18:00-23:00)	(23:00-07:00)
PG-N-0001	Elliott Road and Lakeshore Road	50	51	48	52	52	52	54	50	50	52	49	48	52	48	47	49	46	44
PG-N-0002	South of PG LTWMF	54	52	50	56	52	51	54	51	47	56	51	49	55	50	49	53	51	50
PG-N-0003	NE PG LTWMF @ Lakeshore Road	55	52	49	58	56	50	56	51	51	55	51	50	58	51	50	56	50	50
PG-N-0004	NW PG LTWMF @ Elliott Road	74	74	70	74	75	70	75	75	69	75	74	71	74	74	71	68	68	65
PG-N-0005	PG East Hi Vol Area (Nichols Road)	54	54	50	55	53	51	55	52	49	51	54	50	54	54	51	50	48	49
PG-N-0006	Nichols Road North	62	66	64	59	61	61	59	60	58	58	58	59	55	54	57	56	55	56
PG-N-0007	Lakeshore Rd and East Townline	56	57	53	57	56	52	57	56	53	56	55	51	56	54	51	54	52	51
PG-N-0008	Concession #1 and Newtonville Rd	60	54	51	62	56	54	60	55	53	59	56	54	60	56	54	60	55	56
PG-N-0009	North Elliott Road and Concession #1	58	56	52	60	56	54	60	55	52	59	56	53	59	57	54	60	56	55
Note:		-			-			-									-		
Noise monitoring	results are compared to:																		
1.6 dBA difference	e from Baseline monitoring results																		
2. 70 dB over a 24 h	nour period as per the World Health Or	ganization's	Guideline for C	ommunity Nois	se , 1999														

	2015	2016	2017	2018	2019		2020	
			Average			Min	Max	Average
Well ID				(m	nASL)			
PG-BH1002A	109.33	108.76	109.89	109.19	109.38	108.57	109.39	108.98
PG-BH1003A	93.41	91.66	92.59		We	ll Damaged		
PG-BH1003B	112.03	110.75	112.21	111.54	112.16	111.15	112.32	111.69
PG-BH1003C	108.64	109.04	108.89	108.51	109.05	107.74	109.27	108.63
PG-BH1003D	106.83	106.01	106.65	106.29	106.86	105.61	107.23	106.54
PG-BH1003E	98.80	Dry	Dry	Dry	Dry	Dry	Dry	Dry
PG-BH1003F	94.59	94.69	94.42	94.74	94.69	94.30	94.93	94.69
PG-BH204				Well N	ot Located			
PG-BH210	102.52	-	-	-	-	-	-	-
PG-BH214				Well N	ot Located			
PG-BH404				Well Deco	ommissioned			
PG-MW03-01A	81.29	81.40	Con	struction O	ccurring	80.12	81.49	80.88
PG-MW03-01B	98.83	99.28	Con	struction O	ccurring	99.07	100.52	99.93
PG-MW03-01C	109.39	109.40	Con	struction O	ccurring	107.27	109.13	108.23
PG-MW03-02A	83.60	83.56	Con	struction O	ccurring	79.18	83.37	82.17
PG-MW03-02B	101.96	103.38	Con	struction O	ccurring	91.42	101.47	98.60
PG-MW03-02C	110.72	111.06	Con	struction O	ccurring	110.32	110.64	110.44
PG-MW03-03A	83.64	83.65	Con	struction O	ccurring	83.01	83.01	83.01
PG-MW03-03B	104.48	104.58	Con	struction O	ccurring	102.99	102.99	102.99
PG-MW03-03C	113.28	113.50	Con	struction O	ccurring	112.31	112.31	112.31
PG-MW1A-02	84.73	84.42	83.12	81.83	84.87	80.67	87.77	85.54
PG-MW1B-02	92.38	92.29	92.33	92.49	92.56	91.24	92.98	92.04
PG-MW1C-02	87.32	87.38	87.47	87.43	87.55	86.04	87.93	87.01
PG-MW1D-02	87.82	87.64	88.07	88.03	88.32	85.77	89.07	87.45
PG-MW2A-02	60.55	59.44	59.48	59.59	59.93	60.19	61.06	60.63
PG-MW2B-02	91.07	91.02	90.14	91.97	91.47	90.74	91.50	91.17
PG-MW2C-02	93.81	94.08	94.40	94.37	94.55	93.31	94.90	94.08
PG-MW3A-02	94.82	93.92	94.26	92.87	98.38	W	/ell Damage	ed
PG-MW3B-02	97.95	97.95	97.97	98.19	98.34	97.55	98.57	98.12
PG-MW3C-02	103.17	102.77	103.37	104.77	104.00	102.44	104.68	103.52
PG-MW3D-02	105.39	104.80	105.46	104.93	105.40	103.51	106.32	104.78
PG-MW4A-02	91.73	90.89	90.91	90.71	91.42	90.22	91.46	90.57
PG-MW4B-02	89.24	88.84	89.38	89.42	89.11	89.15	89.58	89.29
PG-MW4C-02	118.20	117.17	118.02	117.74	118.18	115.91	118.78	117.31
PG-MW5A-02	-			Wel	l Decommissio	ned		
PG-MW5B-02	108.38	108.75			Well Decomn	nissioned		
PG-MW5C-02	114.20	114.05			Well Decomn	nissioned		
PG-0W4-87	111.94	112.54			Well Decom	nissioned		
PG-OW41-76				Well	Damaged			

Table B-11: PG LTWMF groundwater levels.

mASL - metres above sea level

- No data available.

						P	G-LTW	۸F-S	SS-01				
Metals	Units		2015		2016		2017		2018		2019		2020
Water Soluble Boron	µg/g		_1		_ 1		0.35		0.32		0.44	<	0.50
Mercury	µg/g	<	0.05	۷	0.05	<	0.05	<	0.05	۷	0.05	<	0.05
Silver	µg/g		0.05		0.04	<	0.20	<	0.20	۷	0.20		0.06
Arsenic	µg/g		1.2		1.3		1.2		1.1		1.1		1.4
Barium	µg/g		24		24		21		21		19		24
Beryllium	µg/g		0.23		0.27		0.25		0.23		0.21		0.23
Boron	µg/g		2		3	۷	5	<	5	۷	5		2
Cadmium	µg/g		0.24		0.18		0.15		0.16		0.11		0.23
Cobalt	µg/g		1.9		2.1		2.1		2.0		1.8		2.3
Copper	µg/g		4.1		4.1		3.7		3.6		3.2		4.6
Molybdenum	µg/g		0.20		0.20	۷	0.50	<	0.50	۷	0.50		0.20
Nickel	µg/g		4.2		4.1		4.3		3.9		3.8		4.9
Lead	µg/g		7.2		6.7		6.4		6.4		5.8		7.4
Selenium	µg/g	<	0.7	۷	0.7	۷	0.5	<	0.5	۷	0.5	<	0.70
Antimony	µg/g	<	0.80	۷	0.80	۷	0.20	<	0.20	۷	0.20	<	0.80
Uranium	µg/g		0.61		0.62		0.60		0.58		0.60		0.70
Vanadium	µg/g		16		17		20		19		20		18
Radionuclides													
Lead-210	Bq/g	<	0.04	۷	0.04	۷	0.05	<	0.05	۷	0.05	<	0.20
Radium-226	Bq/g		0.03		0.02	<	0.10	<	0.05	<	0.05		0.050
Thorium-230	Bq/g		0.02		0.03	<	0.50	<	0.40	<	0.40		0.050
Thorium-232	Bq/g	<	0.02	<	0.02	<	0.30	<	0.04	<	0.30		0.014

Table B-12: Soil monitoring – PG LTWMF – Location 1 (PG-LTWMF-SS-01).

COPC = Cleanup Criteria for Inorganic Contaminants of Potential Concern (COPC) in Surface Soils, Port Granby Licence Conditions Handbook, 2019

Bold values indicate an exceedance against COPC criteria

¹ Analysis not included in laboratory contract.

Table B-13 Soil monitoring – PG LTWMF – Location 2 (PG-LTWMF-SS-02)

						P	G-LTWN	/F-S	SS-02				
Metals	Units		2015		2016		2017		2018		2019		2020
Water Soluble Boron	µg/g		_ 1		_ 1		0.45		0.52		0.67	۷	0.50
Mercury	µg/g	<	0.05	<	0.05	<	0.05	<	0.05	<	0.05	<	0.05
Silver	µg/g		0.04		0.05	<	0.20	<	0.20	<	0.20	۷	0.05
Arsenic	µg/g		2.7		2.6		2.1		2.1		1.7		2.3
Barium	µg/g		54		62		45		41		37		54
Beryllium	µg/g		0.34		0.39		0.28		0.30		0.25		0.32
Boron	µg/g		6		7	<	5		6.5	<	5		5
Cadmium	µg/g		0.23		0.23		0.11		0.20		0.13		0.24
Cobalt	µg/g		3.6		4.1		3.6		3.5		3.0		4.3
Copper	µg/g		8.0		7.9		6.5		6.5		5.0		9.2
Molybdenum	µg/g		0.20		0.30	<	0.50	<	0.50	<	0.50		0.20
Nickel	µg/g		7.5		8.5		7.1		6.5		5.7		8.6
Lead	µg/g		12		12		8.3		11		8.0		11
Selenium	µg/g	<	0.7	<	0.7	<	0.5	<	0.5	<	0.5	۷	0.70
Antimony	µg/g	۷	0.80	<	0.80	<	0.20	<	0.20	<	0.20	۷	0.80
Uranium	µg/g		0.48		0.47		0.39		0.49		0.50		0.44
Vanadium	µg/g		18		20		20		22		20		20
Radionuclides													
Lead-210	Bq/g	۷	0.04		0.04	<	0.05		0.06	<	0.05	۷	0.20
Radium-226	Bq/g		0.04		0.02	<	0.10	<	0.05	<	0.05		0.060
Thorium-230	Bq/g		0.04		0.04	<	0.50	<	0.40	<	0.40		0.080
Thorium-232	Bq/g	<	0.02	<	0.02	<	0.30	<	0.04	<	0.30		0.013

Note:

COPC = Cleanup Criteria for Inorganic Contaminants of Potential Concern (COPC) in Surface Soils, Port Granby Licence Conditions Handbook, 2019

Bold values indicate an exceedance against COPC criteria

¹ Analysis not included in laboratory contract.

						Р	G-LTWN	/F-S	SS-03				
Metals	Units		2015		2016		2017		2018		2019		2020
Water Soluble Boron	µg/g		_1		_1		0.56		0.57		0.87	<	0.50
Mercury	µg/g	۷	0.05	۷	0.05	۷	0.05		0.07	<	0.05	<	0.05
Silver	µg/g		0.04		0.04	۷	0.20	<	0.20		0.48	<	0.05
Arsenic	µg/g		2.1		2.1		1.7		1.7		2.0		1.7
Barium	µg/g		53		48		39		39		42		42
Beryllium	µg/g		0.34		0.33		0.28		0.27		0.29		0.26
Boron	µg/g		3		4	۷	5	<	5	<	5		3
Cadmium	µg/g		0.30		0.25		0.23		0.24		0.25		0.28
Cobalt	µg/g		3.2		3.2		3.0		3.0		3.1		3.2
Copper	µg/g		9.1		9.0		7.2		7.7		8.5		9.2
Molybdenum	µg/g		0.40		0.40	۷	0.50	<	0.50	<	0.50		0.30
Nickel	µg/g		6.1		6.3		5.7		5.8		5.7		6.1
Lead	µg/g		22		19.0		16		19		27		17
Selenium	µg/g	۷	0.7	۷	0.7	۷	0.5	<	0.5	<	0.5	<	0.70
Antimony	µg/g	۷	0.80	۷	0.80	۷	0.20	<	0.20	<	0.20	<	0.80
Uranium	µg/g		0.71		0.95		0.58		0.60		0.66		0.60
Vanadium	µg/g		18		18		19		20		21		17
Radionuclides													
Lead-210	Bq/g	۷	0.04	۷	0.04	۷	0.05		0.07		0.05	<	0.20
Radium-226	Bq/g		0.03		0.02	<	0.10	<	0.05	<	0.05		0.050
Thorium-230	Bq/g	<	0.02		0.04	<	0.50	<	0.40	<	0.40		0.060
Thorium-232	Bq/g	<	0.02	<	0.02	<	0.30	<	0.04	<	0.30		0.011

Table B-14: Soil monitoring – PG LTWMF – Location 3 (PG-LTWMF-SS-03).

COPC = Cleanup Criteria for Inorganic Contaminants of Potential Concern (COPC) in Surface Soils, Port Granby Licence Conditions Handbook, 2019

Bold values indicate an exceedance against COPC criteria

¹ Analysis not included in laboratory contract.

Table B-15: Soil monitoring – PG LTWMF – Location 4 (PG-LTWMF-SS-04).

				PG-LTW	NF-SS-04		
Metals	Units	2015	2016	2017	2018	2019	2020
Water Soluble Boron	µg/g	- ¹	_ ¹	0.54	0.49	0.57	< 0.50
Mercury	µg/g	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Silver	µg/g	0.04	0.03	< 0.20	< 0.20	< 0.20	< 0.05
Arsenic	µg/g	1.7	1.8	1.7	2.1	2.2	1.7
Barium	µg/g	31	27	29	29	28	28
Beryllium	µg/g	0.27	0.24	0.23	0.25	0.23	0.21
Boron	µg/g	3	3	< 5	< 5	< 5	2
Cadmium	µg/g	0.22	0.18	0.25	0.19	0.17	0.19
Cobalt	µg/g	2.2	2.2	2.4	2.6	2.6	2.5
Copper	µg/g	4.8	4.6	4.7	4.8	4.4	5.1
Molybdenum	µg/g	0.20	0.30	< 0.50	< 0.50	< 0.50	0.20
Nickel	µg/g	4.2	4.0	5.3	4.7	4.9	4.6
Lead	µg/g	11	11	11	14	13	10
Selenium	µg/g	< 0.7	< 0.7	< 0.5	< 0.5	< 0.5	< 0.70
Antimony	µg/g	< 0.80	< 0.80	< 0.20	< 0.20	< 0.20	< 0.80
Uranium	µg/g	0.61	0.53	0.61	0.68	3.0	0.61
Vanadium	µg/g	13	13	19	24	21	14
Radionuclides							
Lead-210	Bq/g	< 0.04	< 0.04	< 0.05	0.08	0.07	< 0.20
Radium-226	Bq/g	0.04	0.02	< 0.10	< 0.05	< 0.05	0.060
Thorium-230	Bq/g	0.02	0.02	< 0.50	< 0.40	< 0.40	0.080
Thorium-232	Bq/g	< 0.02	0.02	< 0.30	< 0.04	< 0.30	0.013

Note:

¹ Analysis not included in laboratory contract.

						Р	G-LTW	/F-S	S-05				
Metals	Units	2	2015		2016		2017		2018		2019		2020
Water Soluble Boron	µg/g		_1		_ 1		0.42		0.37		0.54	<	0.50
Mercury	µg/g	۷	0.05	<	0.05	<	0.05	<	0.05	<	0.05	۷	0.05
Silver	µg/g		0.08		0.08	<	0.20	<	0.20	<	0.20		0.08
Arsenic	µg/g		5.3		5.6		5		5.1		3.8		4.7
Barium	µg/g		28		24		21		23		18		27
Beryllium	µg/g		0.25		0.23	<	0.20		0.22	<	0.20		0.20
Boron	µg/g		3		3	<	5	<	5	<	5		3
Cadmium	µg/g		0.18		0.18		0.11		0.15		0.11		0.17
Cobalt	µg/g		3.5		3.5		3.2		3.2		2.5		3.7
Copper	µg/g		5.2		4.8		4.4		4.5		3.4		5.8
Molybdenum	µg/g		0.20		0.20	<	0.50	<	0.50	<	0.50		0.20
Nickel	µg/g		5.5		5.1		4.7		5.3		4.2		5.7
Lead	µg/g		13		12		11		12		8.8		12
Selenium	µg/g	<	0.7	<	0.7	<	0.5	<	0.5	<	0.5	<	0.70
Antimony	µg/g	<	0.80	<	0.80	<	0.20	<	0.20	<	0.20	۷	0.80
Uranium	µg/g		0.87		0.88		0.87		0.89		0.66		0.80
Vanadium	µg/g		15		14		16		19		15		14
Radionuclides													
Lead-210	Bq/g		0.09		0.07		0.08		0.07		0.12		0.30
Radium-226	Bq/g		0.13		0.09		0.11		0.08		0.09		0.060
Thorium-230	Bq/g		0.26		0.26	<	0.50	<	0.40	<	0.40		0.080
Thorium-232	Bq/g	<	0.02	<	0.02	<	0.30	<	0.04	<	0.30		0.015

Table B-16: Soil monitoring – PG LTWMF – Location 5 (PG-LTWMF-SS-05).

¹ Analysis not included in laboratory contract.

								F	PG-S-1				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	PWQO	CWQG			Average			2020-03-12	2020-05-08	2020-07-07	2020-10-23	Average
Fluoride	mg/L		0.12	1.24	1.05	1.17	0.89	No Sample	No Sample ²	0.80	No Sample ³	1.37	1.09
Ammonia+Ammonium (N)	as N mg/L			34	33	32	30			19.4		21.4	20.4
Nitrate (as N)	as N mg/L		13	287	258	242	193			142		245	194
Arsenic (total)	µg/L	100	5	1385	1178	1047	783			589		925	757
Uranium (total)	µg/L	5	15	147	217	247	217			101		255	178
Radium-226	Bq/L	1		0.70	0.47	0.30	0.29			0.26		< 0.01	0.14
Field Parameters													
ODO % Sat	%			_ 1	_1	_ ¹	_ 1	_1		97.4		98.9	
ORP	mV			_ 1	_1	_ ¹	_1	_ ¹		166.5		144.4	
SPC	µs/cm			_ 1	_1	_ ¹	_1	_ ¹		2900		3265	
Temperature	°C			_ 1	_1	_ ¹	_1	_ ¹		8.883		12.869	
Turbidity	FNU			_ 1	_1	_ ¹	_ 1	_ ¹		427.28		20.68	
pН	Units			_1	_1	_1	_1	_1		8.21		8.23	

Table B-17: Bluff seepage water quality – (PG-S-1).

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.

¹ Field parameters included for current sampling year only.

² Inaccessible due to water levels.

 $^{\rm 3}$ Insufficient surface water for sample collection.

Table B-18: Bluff seepage water quality (PG-S-2).

									PG-S-2				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	PWQO	CWQG			Average			2020-03-12	2020-05-08	2020-07-07	2020-10-23	Average
Fluoride	mg/L		0.12	1.08	0.96	0.87	0.78	0.90	No Sample ²	0.98	1.30	0.60	0.96
Ammonia+Ammonium (N)	as N mg/L			0.155	0.150	0.213	0.793	0.153		0.06	0.06	0.06	0.06
Nitrate (as N)	as N mg/L		13	6.91	5.73	7.42	5.29	0.29		2.89	2.78	0.64	2.10
Arsenic (total)	µg/L	100	5	866	808	953	688	439		509	573	546	543
Uranium (total)	µg/L	5	15	458	437	483	395	229		174	131	66.6	123.9
Radium-226	Bq/L	1		0.02	0.04	0.24	< 0.04	< 0.04		0.01	< 0.01	< 0.01	0.01
Field Parameters													
ODO % Sat	%			- ¹	_ 1	_ 1	_1	_1		59.6	69.1	75.7	
ORP	mV			_ 1	_1	_ 1	_1	_1		140.6	198.7	99.5	
SPC	µs/cm			_ 1	_1	_ 1	_1	_1		478.2	865.0	618.0	
Temperature	°C			_ 1	_1	_ 1	_1	_1		12.008	14.684	11.477	
Turbidity	FNU			- ¹	_1	- ¹	_1	_1		40.6	112.39	323.82	
pH	Units			_ 1	_1	_1	_1	_1		7.90	7.83	8.01	

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.

¹ Field parameters included for current sampling year only.

 $^{\rm 2}$ Inaccessible due to water levels.

-- - No data.

Table B-19: Bluff seepage water quality (PG-S-3).

									PG-S-3				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	PWQO	CWQG			Average			2020-03-12	2020-05-08	2020-07-07	2020-10-23	Average
Fluoride	mg/L		0.12	0.20	0.20	0.16	0.17	0.17	No Sample ²	0.20	0.20	No Sample ³	0.20
Ammonia+Ammonium (N)	as N mg/L			9.8	8.9	8.0	6.1	3.0		4.5	2.7		3.6
Nitrate (as N)	as N mg/L		13	114	107	108	94.2	80.2		77.7	88.2		83
Arsenic (total)	µg/L	100	5	677	613	570	503	420		425	496		461
Uranium (total)	µg/L	5	15	1585	1575	1667	1850	1467		1510	1920		1715
Radium-226	Bq/L	1		0.18	0.17	< 0.04	< 0.04	< 0.04		0.04	< 0.01		0.03
Field Parameters													
ODO % Sat	%			- ¹	_ 1	_ 1	- ¹	- ¹		78.9	70.0		
ORP	mV			- ¹	_ 1	_ 1	- ¹	_ 1		170.3	176.1		
SPC	µs/cm			- ¹	_ 1	_ 1	- ¹	_ 1		3081.0	3424.0		
Temperature	°C			_ ¹	_ 1	_ 1	- ¹	_ 1		8.876	15.142		
Turbidity	FNU			_1	_1	_1	_1	_1		122.9	26.77		
рН	Units			_1	_1	_1	_1	_1		7.32	7.27		

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.

¹ Field parameters included for current sampling year only.

² Inaccessible due to water levels.

³ Inaccessible due to unsafe conditions.

Table B-20: Sediment quality – Location 1 (PG-BS-6).

			Crit	eria Po				G-BS-6											
		PS	QG	CC	ME	2015		2016		2017		2018	2019				2020		
Parameter	Units	LEL	SEL	ISQG	PEL				Α	verage				202	20-05-08	202	20-10-23	A١	verage
Water Soluble Boron	µg/g					- ¹		0.12		0.16		0.14	No Sam ple	<	0.50	<	0.50	<	0.50
Mercury	µg/g	0.2	2	0.17	0.486	< 0.05	<	0.05	<	0.05	<	0.05		<	0.05	<	0.05	<	0.05
Silver	µg/g					0.07		0.12	<	0.20	<	0.20		<	0.05	<	0.05	<	0.05
Arsenic	µg/g	6	33	5.9	17	5.2		4.1		7.8		3.5			1.7		2.7		2.2
Barium	µg/g					32		27		27		25			28		31		30
Beryllium	µg/g					0.13		0.16		0.21	<	0.20			0.10		0.14		0.12
Boron	µg/g					3.0		4.0	<	5.0	<	5.0			3		4		3.5
Cadmium	µg/g	0.6	10	0.6	3.5	0.08		0.06	<	0.10	<	0.10			0.02		0.03		0.03
Cobalt	µg/g					3.4		2.4		4.0		2.8			1.9		2.8		2.4
Copper	µg/g	16	110	35.7	197	6.1		4.3		6.4		5.2			3.8		4.6		4.2
Molybdenum	µg/g					1.40		1.40		2.40		1.13			0.4		1.2		0.8
Nickel	µg/g	16	75			6.1		4.1		6		4.4			3.2		5.1		4.2
Lead	µg/g	31	250	35	91.3	3.1		2.1		3.9		2.5			1.6		2.4		2.0
Antimony	µg/g					< 0.80	<	0.50	<	0.20	<	0.20		<	0.80	<	0.80	<	0.80
Selenium	µg/g					0.90		0.65	<	0.50	<	0.50		<	0.70	<	0.70	<	0.70
Uranium	µg/g					2.4		1.5		2.2		1.6			0.23		4		2.12
Vanadium	µg/g					21		16		25		17			9		17		13
Lead-210	Bq/g					0.09		0.05		0.05	<	0.05			0.03	<	0.03		0.03
Radium-226	Bq/g					0.10		0.09	<	0.10		0.08			0.03		0.20		0.12
Thorium-230	Bq/g					0.22		0.29	<	0.50	<	0.45		<	0.20	<	0.3 ²		0.25
Thorium-232	Bq/g					0.03	<	0.26	<	0.30	<	0.17			0.009		0.011		0.010

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

 ${\ensuremath{\text{Bold values}}}$ indicate an exceedance of a PSQG or CCME value.

¹ Analysis not included in laboratory contract.

² Detection limit change due to laboratory.

Table B-21: Sediment quality – Location 2 (PG-BS-7).

			Crit	teria							PG	-BS	-7							
		PS	QG	CC	ME	2015	20)16		2017		2018		2019			:	2020		
Parameter	Units	Щ	SEL	ISQG	PEL				A٧	/erage					202	20-05-08	202	20-10-23	A١	/erage
Water Soluble Boron	µg/g					-1		- ¹		0.47		0.23	<	0.05	<	0.50	<	0.50	<	0.50
Mercury	µg/g	0.2	2	0.17	0.486	< 0.05	< (0.05	<	0.05	<	0.05	<	0.05	<	0.05	<	0.05	<	0.05
Silver	µg/g					0.02	0	0.04	<	0.20	<	0.20	<	0.20	<	0.05	<	0.05	<	0.05
Arsenic	µg/g	6	33	5.9	17	31.5		5.4		35		14		15		3.6		20		11.8
Barium	µg/g					15		28		15		18		11		15		22		19
Beryllium	µg/g					0.11	0	0.11	<	0.20	<	0.20	<	0.20		0.12		0.14		0.13
Boron	µg/g					2.5		4.0	<	5.0	<	5.0	<	5.0		3		4		3.5
Cadmium	µg/g	0.6	10	0.6	3.5	0.07	0	0.03	<	0.10	<	0.10	<	0.10		0.03		0.03		0.03
Cobalt	µg/g					4.4		2.7		8.8		4.8		2.6		1.8		2.8		2.3
Copper	µg/g	16	110	35.7	197	4.2		5.1		5.4		5.1		3.2		4.0		4.5		4.3
Molybdenum	µg/g					0.65	1	1.80		1.55	<	0.50	<	0.50		0.4		0.8		0.6
Nickel	µg/g	16	75			8.3	:	5.3		12		7.5		3.7		3.0		4.6		3.8
Lead	µg/g	31	250	35	91.3	1.8		2.6		1.8		2.7		1.2		1.6		2.1		1.9
Antimony	µg/g					< 0.80	< (0.80		0.21	<	0.20	<	0.20	<	0.80	<	0.80	۷	0.80
Selenium	µg/g					1.2		1.0		1.10	<	0.50	<	0.50	<	0.70	<	0.70	<	0.70
Uranium	µg/g					3.5		2.1		7.7		2.0		0.8		0.42		4		2.01
Vanadium	µg/g					12		15		17		19		13		13		11		12
Lead-210	Bq/g					< 0.04	0	0.08	۷	0.05	<	0.05	<	0.05	<	0.02 ²	<	0.03		0.03
Radium-226	Bq/g					0.03	C	0.06	<	0.10	<	0.08	<	0.05		0.05	<	0.05		0.05
Thorium-230	Bq/g					0.03	0	0.09	<	0.50	<	0.45	<	0.4	<	0.1 ²	<	0.20		0.15
Thorium-232	Bq/g					< 0.02	< (0.02	<	0.30	<	0.17	<	0.04		0.011		0.010		0.011

Note:

 $\label{eq:psqg} PSQG = \textit{Provincial Sediment Quality Guidelines} \ , \ \textit{LEL} \ - \ \textit{lowest effect level}, \ \textit{SEL} \ - \ \textit{severe effect level}$

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

 $\ensuremath{\text{Bold values}}$ indicate an exceedance of a PSQG or CCME value.

¹ Analysis not included in laboratory contract.

² Detection limit change due to laboratory.

									PGC-D				I
		Crite	eria	2015	2016	2017	2018	2019	1		2020		
Parameter	Units	PWQO	CWQG			Average			2020-01-31	2020-05-07	2020-06-29	2020-10-28	Average
Total Suspended Solids	ma/l			12	5	8	5	6	11	2	2	< 2	4
pH	no unit	6.5-8.5	6.5-9.0		8 29	8.30	8.23	8 26	8.26	8 44	8.37	8 43	8.38
Alkalinity	mg/L as CaCO3			222	231	238	245	245	225	226	239	248	235
Carbonate	mg/L as CaCO3			10	3	5	4	4	< 1	19	6	19	11
Bicarbonate	mg/L as CaCO3			213	227	233	243	243	225	206	233	229	223
Total Dissolved Solids	mg/L			355	339	371	373	365	326	334	374	371	351
Fluoride	mg/L		0.12	0.08	0.11	0.11	< 0.10	< 0.10	0.08	0.09	0.10	0.06	0.08
Total Organic Carbon	mg/L			7.6	6.4	6.9	6.3	6.6	4	7	6	6	6
Ammonia+Ammonium (N)	as N mg/L			0.128	0.048	< 0.050	0.053	0.074	0.040	< 0.04	< 0.04	0.10	0.055
Chloride (Dissolved)	mg/L		120	53	41	44	51	50	40	37	54	51	46
Sulphate (dissolved)	mg/L			13	18	17	16	15	12	9.7	13.7	20.4	14
Bromide (dissolved)	mg/L			< 0.3	0.5	< 1.0	< 1.0	< 1.0	< 0.3	< 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	< 0.03
Nitrate (as N)	as N mg/L		13	0.72	1.13	1.07	1.03	0.90	1.24	0.85	1.04	0.84	0.99
Nitrate + Nitrite (as N)	as N mg/L			0.72	1.13	1.07	1.03	0.90	1.24	0.85	1.04	0.84	0.99
Mercury (dissolved)	µg/L	0.2	0.026	0.013	0.010	0.013	< 0.010	< 0.010	< 0.010	< 0.010	0.010	< 0.010	< 0.010
Hardness	mg/L as CaCO3			249	290	258	280	295	262	262	305	303	283
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
Aluminum (total)	µg/L			211	64	116	83	104	164	39	27	16	62
Aluminum (0.2µm)	µg/L	75	100	-1	-'	11	7	7	8	14	6	3	8
Arsenic (total)	µg/L	100	5	0.6	0.7	< 1.0	< 1.0	< 1.0	0.4	0.5	0.7	0.4	0.5
Barium (total)	µg/L			54	60	52	52	52	45	46.6	64.5	64.2	55.1
Beryllium (total)	µg/L	1100	4500	0.01	0.13	< 0.50	< 0.50	< 0.50	0.010	< 0.007	< 0.007	< 0.007	0.008
Boron (total)	µg/L	200	1500	13	13	13	< 13	12	11	10	14	13	12
Bismuth (total)	µg/L			0.01	0.3	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Calcium (total)	µg/L		0.00	83875	97525	89250	91500	95250	91300	90400	102000	101000	96175
Cadmum (total)	µg/L	0.2	0.09	0.01	0.03	< 0.10	< 0.10	< 0.10	0.011	0.004	< 0.003	< 0.003	0.005
Cobail (Iolai)	µg/L	0.9		0.14	0.20	< 0.50	< 0.50	< 0.50	0.104	0.090	0.077	0.049	0.060
Copper (total)	µg/L	5		0.4	0.7	< <u>5.0</u>	< 5.0	< 1.0	0.40	0.35	0.09	0.30	0.32
Iron (total)	µg/L	300	300	374	175	240	108	250	273	130	0.2	137	158
Potassium (total)	µg/L	500	500	2738	1573	1525	1350	1475	1370	1230	1530	1540	1418
Magnesium (total)	ug/L			9735	11688	9550	11075	10050	8330	8860	12000	12100	10323
Manganese (total)	µg/L			37	22	26	24	31	28	23.9	17.8	13.8	20.9
Molybdenum (total)	µa/L	40	73	0.49	0.59	0.55	0.53	0.55	0.30	0.40	0.70	0.45	0.46
Sodium (total)	ua/L	-	-	29400	23475	28000	30500	30250	24100	23600	30400	27300	26350
Nickel (total)	µg/L	25	25	0.5	0.5	< 1.0	< 1.0	< 1.0	0.3	0.3	0.3	< 0.1	0.3
Phosphorus (total)	mg/L	0.01-0.03		0.038	0.013	0.024	0.018	0.018	0.023	0.010	0.019	< 0.003	0.014
Lead (total)	µg/L	5	7	0.29	0.23	< 0.50	< 0.50	< 0.50	0.25	0.05	< 0.01	< 0.01	0.08
Antimony (total)	µg/L	20		< 0.20	0.28	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Selenium (total)	µg/L	100	1	0.6	0.6	< 2.0	< 2.0	< 2.0	0.14	0.13	0.13	0.10	0.13
Tin (total)	µg/L			0.06	0.3	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06	0.07	0.13	0.08
Strontium (total)	µg/L			191	208	203	203	195	201	197	210	238	212
Titanium (total)	µg/L			_1	< 5.0	8.0	6.8	7.9	7.25	2.05	1.30	0.81	2.85
Thallium (total)	µg/L	0.3	0.8	0.01	0.02	< 0.05	< 0.05	< 0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium (total)	µg/L	5	15	0.73	0.90	0.89	0.90	0.82	0.832	0.652	0.858	0.813	0.789
Vanadium (total)	µg/L	6		1.27	1.01	1.06	1.09	1.01	0.76	0.61	1.12	0.56	0.76
Zinc (total)	µg/L	30	30	2.8	2.8	< 5.0	< 5.0	< 5.0	< 2.0	< 2.0	< 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	< 0.02	< 0.02
Radium-226	Bq/L	1		0.010	0.018	0.033	0.042	< 0.040	< 0.010	< 0.010	< 0.010	0.010	0.010
Thereium 230	Bq/L			< 0.020	< 0.030	< 0.070	< 0.070	< 0.070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Peremetric	Rd/L			< 0.020	< 0.028	< 0.060	< 0.060	< 0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters	_		-	2	2	2	2	2					
ODO % Sat	%			- ⁴	- ²	- ²	- ²	- ²	100.2	105.7	103.2	97.1	
	mV				-4	-4	-4	-4	70.0	71.1	198.7	125.8	
SPC	µs/cm			-*	-	-*	-	-	511.0	5.72	635	621	
Turbiality				-*	-*	-*			0.01	7.076	21.22	6.425	
	FINU			2				-*	5.08	0.78	0.99	1.25	
Proff Course	Units			 2		 2		-	8.14	8.29	8.27	8.49	
Start Gauge	cm					-	-		I	0.50	5	5	

Table B-22: Surface water quality – Port Granby Creek (PGC-D).

 Start Gauge
 cm
 - -

 Note:
 PWQ0 = 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.

 ¹Analysis not included in laboratory contract.

 ² Field parameters included for current sampling year only.

 -- No data.

l	1			r									
		Crit	oria	2015	2016	2017	2018	2010	PGC-U		2020		
Denomination	Unite	BWOO		2015	2010	2017	2010	2019	2020-01-31	2020-05-07	2020-06-20	2020-10-28	Average
Parameter Total Quan and ad Calida	Units	FWQU	CWQG	<u> </u>	0	Average	-		2020-01-31	2020-03-07	2020-00-29	2020-10-20	Average
	rng/L	6 5 9 5	6500	3	8	0	D 0 1 2	4	14	4	19	< 2	10
		0.0-0.0	0.5-9.0		0.20	0.20	0.13	0.32	0.24	0.39	0.31	0.29	0.31
Carbonata	mg/L as CaCO3			200	235	230	240	240	210	221	230	242	234
Bicarbonate	mg/L as CaCO3			0 252	232	4	245	235	< 1 218	210	249	242	232
Total Dissolved Solids	mg/L as Cacos			202	232	233	240	200	210	219	249	242	232
Fluoride	mg/L		0.12	0.08	0.09	< 0.10	012	- 0.10	0.06	0.06	0.09	< 0.06	0.07
Total Organic Carbon	mg/L		0.12	8.7	6.5	74	68	79	5	6	7	< 0.00 7	6
Ammonia+Ammonium (N)	as Nmg/L			0.093	0.050	< 0.050	0.056	< 0.050	< 0.040	< 0.040	0.060	0.050	0.048
Chloride (Dissolved)	mg/l		120	59	45	47	56	44	45	40	61	58	51
Sulphate (dissolved)	mg/L		120	14	17	16	15	11	12	87	10.8	20.4	13
Bromide (dissolved)	mg/L			< 0.3	0.5	< 10	< 10	< 10	< 0.3	< 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	< 0.03
Nitrate (as N)	as N mg/L		13	0.59	1.02	1.08	0.98	0.80	1.12	0.81	0.72	0.73	0.85
Nitrate + Nitrite (as N)	as N mg/L			0.59	1.03	1.08	0.99	0.80	1.12	0.81	0.72	0.74	0.85
Mercury (dissolved)	ua/L	0.2	0.026	< 0.010	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.010	< 0.010	< 0.010
Hardness	mg/L as CaCO3			285	282	263	280	280	261	260	286	291	275
Silver (total)	µq/L	0.1	0.25	0.00	0.03	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L	-		34	72	106	105	101	260	59	50	18	97
Aluminum (0.2um)	ua/L	75	100	_1	_1	7	7	13	8	16	10	5	10
Arsenic (total)	µg/L	100	5	0.7	0.7	< 1.0	< 1.0	< 1.0	0.4	0.4	0.8	0.4	0.5
Barium (total)	µg/L			61	64	53	56	57	46	47.7	65.3	64.6	56.0
Beryllium (total)	µg/L	1100		0.01	0.13	< 0.50	< 0.50	< 0.50	0.017	< 0.007	0.007	< 0.007	0.010
Boron (total)	μg/L	200	1500	14	13	12	13	13	14	9	14	13	13
Bismuth (total)	µg/L			< 0.01	0.3	< 1.0	< 1.0	< 1.0	0.009	< 0.007	< 0.007	0.013	0.009
Calcium (total)	µg/L			96633	94925	88500	90500	97000	91200	89700	97400	98400	94175
Cadmium (total)	µg/L	0.2	0.09	0.01	0.03	< 0.10	< 0.10	< 0.10	0.020	0.014	0.007	0.005	0.012
Cobalt (total)	µg/L	0.9		0.08	0.23	< 0.50	< 0.50	< 0.50	0.152	0.092	0.092	0.056	0.098
Chromium (total)	µg/L			0.2	1.7	< 5.0	< 5.0	< 5.0	0.54	0.37	0.15	0.27	0.33
Copper (total)	µg/L	5		0.8	0.9	< 1.1	< 1.0	< 1.0	0.9	0.6	0.2	0.5	0.6
Iron (total)	µg/L	300	300	227	311	255	288	250	474	193	197	160	256
Potassium (total)	µg/L			1487	1518	1450	1350	1500	1330	1210	1460	1610	1403
Magnesium (total)	µg/L			10630	10865	9400	10550	9000	7990	8640	10400	11000	9508
Manganese (total)	µg/L			44	46	36	41	41	47.7	43.8	36.6	25.9	38.5
Molybdenum (total)	µg/L	40	73	0.52	0.54	< 0.51	0.54	0.68	0.30	0.37	0.67	0.45	0.45
Sodium (total)	µg/L			32333	25175	29000	32750	28000	24500	25000	32400	30600	28125
Nickel (total)	µg/L	25	25	2.5	0.5	< 1.0	< 1.1	< 1.0	0.4	0.3	0.4	< 0.1	0.3
Phosphorus (total)	mg/L	0.01-0.03		0.016	0.021	0.024	0.020	0.031	0.021	0.003	0.028	0.004	0.014
Lead (total)	µg/L	5	7	0.12	0.34	< 0.50	< 0.50	< 0.50	0.47	0.11	0.05	< 0.01	0.16
Antimony (total)	µg/L	20		< 0.20	0.28	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Selenium (total)	µg/L	100	1	0.4	0.6	< 2.0	< 2.0	< 2.0	0.19	0.13	0.15	0.09	0.14
Tin (total)	µg/L			0.09	0.3	< 1.0	< 1.0	< 1.0	0.06	< 0.06	0.11	0.15	0.10
Strontium (total)	µg/L			220	205	195	195	195	191	192	201	222	202
Titanium (total)	µg/L			-'	< 5.0	8.2	8.3	6.3	12.70	3.06	2.54	0.84	4.79
Thallium (total)	µg/L	0.3	0.8	0.01	0.02	< 0.05	< 0.05	< 0.05	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium (total)	µg/L	5	15	0.84	0.92	0.80	0.91	0.77	0.750	0.636	0.834	0.773	0.748
Vanadium (total)	µg/L	6		1.06	1.34	0.85	1.32	1.14	1.08	0.71	1.30	0.57	0.92
∠inc (total)	µg/L	30	30	< 2.0	2.8	< 5.0	< 5.0	< 5.0	9.0	< 2.0	< 2.0	< 2.0	3.8
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		< 0.010	< 0.018	< 0.033	< 0.040	< 0.040	0.020	< 0.010	< 0.010	< 0.010	0.013
Inorium-230	вq/L			< 0.020	< 0.030	< 0.057	< 0.070	< 0.070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L			< 0.020	< 0.028	< 0.060	< 0.060	< 0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters			1	L	-	-							
ODO % Sat	%			_ ²	_ ²	_ ²	_ ²	_ ²	99.1	104.6	107.3	100.7	
ORP	mV			_2	- ²	_ ²	_ ²	_2	93.5	97.2	196.7	133.7	
SPC	µs/cm			_ ²	_ ²	_ ²	_ ²	_2	521.0	578	652	631	
Temperature	°C			_ 2	_ ²	_ 2	_2	_ ²	0.01	7.284	23.048	6.813	
Turbidity	FNU			- ²	-2	- ²	- ²	- ²	7.29	1.54	3.57	7.21	
рН	Units			_ ²	_ ²	_ ²	_ ²	_ ²	7.84	8.24	8.22	8.26	
Staff Gauge	cm			- ²	- ²	- ²	- ²	- ²					

Table B-23: Surface water quality – Port Granby Creek (PGC-U).

 Start Gauge
 cm
 - -

 Note:
 PWQ0 = 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.

 ¹Analysis not included in laboratory contract.

 ² Field parameters included for current sampling year only.

 -- - No data.

		Crit	eria						PG	C-D					
				20	20/10/21	20)20/10/21	20	020/10/21	20	20/10/21	20	20/10/21	20	20/10/21
Analysis	Units	PWOO	CWOG		9:25AM		10:00AM		11:00AM		12:00PM		1:00PM		2:00PM
Total Suspended Solids		1 11 120	CINGO		Λ		7		11		12		6		6
nH	ng/L	65-85	6 5-9 0		8 27		8 27		8 20		8 32		832		8 35
Alkalinity	mol as CaCO3	0.0-0.0	0.5-5.0		238		229		239		226		235		233
Carbonate	mg/L as CaCO3			~	1.0	~	1.0	~	1.0		20		20		4.0
Bicarbonate	mg/L as CaCO3			`	238		229		239		224		233		229
Total Dissolved Solids	mg/L at the tablet				371		374		371		349		363		380
Fluoride	mg/l		0.12	<	0.06		0.06		0.06		0.06		0.06		0.06
Total Organic Carbon	ma/L				7.0		7.0		7.0		7.0		7.0		7.0
Ammonia+Ammonium (N)	as N mo/L			<	0.04	<	0.04	<	0.04	<	0.04	<	0.04	<	0.04
Chloride (Dissolved)	mg/L		120		70		73		58		69		69		76
Sulphate (dissolved)	mg/L				20		22		29		22		22		22
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		13		0.54		0.54		0.55		0.55		0.56		0.56
Nitrate + Nitrite (as N)	as N mg/L				0.54		0.54		0.55		0.55		0.56		0.56
Mercury (dissolved)	µg/L	0.2	0.026	<	0.01	<	0.01	<	0.01	<	0.01	<	0.01	<	0.01
Hardness	mg/L as CaCO3				276		277		279		278		272		281
Silver (total)	µg/L	0.1	0.25	<	0.05	<	0.05	<	0.05	<	0.05	<	0.05	<	0.05
Aluminum (total)	µg/L				50		183		257		242		159		161
Aluminum (0.2µm)	µg/L	75	100		15		37		62		40		29		24
Arsenic (total)	µg/L	100	5		0.5		0.5		0.5		0.5		0.5		0.5
Barium (total)	µg/L				66.2		65.2		65.3		64.4		63.0		63.9
Beryllium (total)	µg/L	1100			0.007		0.010		0.014		0.015		0.007		0.008
Boron (total)	µg/L	200	1500		13		14		14		13		14		14
Bismuth (total)	µg/L				0.021		0.016		0.015		0.122		0.082		0.055
Calcium (total)	µg/L				92400		92700		93800		93900		91700		94500
Cadmium (total)	µg/L	0.2	0.09	<	0.003		0.003		0.005		0.003	<	0.003	<	0.003
Cobalt (total)	µg/L	0.9			0.064		0.129		0.159		0.147		0.112		0.109
Chromium (total)	µg/L				0.36		0.49		0.61		0.43		0.45		0.46
Copper (total)	µg/L	5			0.7		0.7		0.8		0.8		0.7		0.7
Iron (total)	µg/L	300	300		129		255		322		317		221		230
Potassium (total)	µg/L				2020		2110		2160		2090		2010		2040
Magnesium (total)	µg/L				11000		10900		10900		10700		10500		10900
Manganese (total)	µg/L				15.9		25.1		20.4		21.1		17.4		20.2
Molybdenum (total)	µg/L	40	73		0.44		0.42		0.43		0.45		0.46		0.49
Sodium (total)	µg/L	05	05		28900		27700	-	27000		26800		26600		28000
Nickel (total)	µg/L	25	25	_	0.3		0.3		0.4		0.4		0.4		0.4
Phosphorus (total)	mg/L	0.01-0.03	7	<	0.003		0.009		0.010		0.007		0.004		0.007
	µg/∟	5 20	1	-	0.08		0.18		0.18		0.20		0.10		0.12
Solonium (total)	µg/L	20	1	<	0.9	<	0.9	<	0.9	<	0.9	<	0.9	<	0.9
	µg/∟ ug/l	100	- 1		0.11		0.11		0.14		0.12		0.14		0.10
Stroptium (total)	µg/L				217		225	-	227		225		221		228
Titanium (total)	µg/L				217		7 /8	-	0.00		8.82		7.03		6 58
Thallium (total)	м9/ – ug/I	03	0.8	e.	0.005	2	0.005	2	0.005	~	0.02	~	0.005	~	0.005
Uranium (total)	ua/L	5	15	È	0.789	È	0.817	È	0.825	È	0.803	È	0.805	È	0.814
Vanadium (total)	ug/l	6			0.69		0.88		1.03		1 01		0.82		0.87
Zinc (total)	ug/l	30	30		3		3		3		4	<	2		2
Lead-210	Ba/L			<	0.02	<	0.02	<	0.02	<	0.02	<	0.02	<	0.02
Radium-226	Ba/L	1		<	0.01	<	0.01		0.01	<	0.01	<	0.01	<	0.01
Thorium-230	Ba/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
Field Parameters						†		İ.						İ	
ODO % Sat	mg/L				97.6		98.2		98.7		99.6		101.1		102.5
ORP	mV				205.4		216		220.2		222.7		222.2		220.3
SPC	us/cm				624		624		622		620		626	İ –	631
Temperature	°C				9.273	İ	9.390	İ	9.657		9.780		10.073		10.388
Turbidity	FNU				10.57	İ	10.57	İ	17.3		16.08		12.39		5.22
pH	Units				8.18		8.17		8.17		8.18		8.21		8.26
Staff Gauge	cm				5		5		5		5		5		5
						-		-				-			

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

	1							PC-LO-	ר ר			
		Crit	Criteria 2		2016	2017	2018	2010	,	203	20	
Devem eter	Unite	PWOO	CWOG	2013	2010	Average	2010	2019	2020-06-19	2020-08-07	2020-10-08	Average
Parameter	Units	FWQU	CWQG	0.0		Average	1.0	1.0	2020-00-19	2020-08-07	2020-10-08	Average
Total Suspended Solids	mg/L	C E O E		2.3	< 2.0	2.0	1.0	1.3	No Sample	< 2.0	4.0	3.0
рп Alkolinity		0.3-0.3	0.5-9.0			0.24	0.15	0.27		0.10	0.00	0.00
	mg/L as CaCO3			92	93	90	90	95		- <u>-</u> - 09	00	09
Ricarbonato	mg/L as CaCO3			< 2.0 02	< 2.0	0.4	07	1.0		< 1.0	< 1.0	< 1.0
Total Dissolved Solids	mg/L as Cacos			92 199	93	94 170	120	95		190	174	177
Fluoride	mg/L		0.12	0 12	0.13	0.11	0.11	0.11		0.11	0.11	0.11
Total Organic Carbon	mg/L		0.12	1.8	1.8	2.4	21	22		2.0	1.0	1.5
A mmonia+A mmonium (N)	as Nmg/L			0.06	- 0.04	< 0.05	2.1	< 0.05		0.06	0.04	0.05
Chloride (Dissolved)	ma/l		120	25	24	21	23	22		23	25	24
Sulphate (dissolved)	mg/L			24	24	23	20	23		21.7	21.1	21.4
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 10	< 10	< 10		< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/l			< 0.030	< 0.030	< 0.010	< 0.010	0.010		< 0.03	< 0.03	< 0.030
Nitrate (as N)	as N mg/L		13	0.36	0.24	0.23	0.26	0.25		0.00	0.38	0.31
Nitrate + Nitrite (as N)	as N mg/L		10	0.00	0.24	0.23	0.26	0.26		0.24	0.38	0.31
Mercury (dissolved)	ug/l	0.2	0.026	< 0.00	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010	< 0.00	< 0.010
Hardness	mg/L as CaCO3	0.2	0.020	127	128	125	125	137		120	120	120
Silver (total)		01	0 25	0.005	0.003	< 0.10	< 0.10	< 0.10		< 0.05	< 0.05	< 0.05
Aluminum (total)	ug/l	0.1	0.20	_1	_1	33	23	42		11	15	13
Aluminum (0.2um)	ug/l	75	100	26	3	< 5	< 5	< 5		2	1	2
Arsenic (total)	ug/l	100	5	0.9	0.8	< 10	< 10	< 10		0.9	0.8	0.9
Barium (total)	ug/l		•	24.2	21.5	22	23	23		23.4	22.8	23
Beryllium (total)	ug/l	1100		< 0.007	< 0.007	< 0.50	< 0.50	< 0.50		< 0.007	0.019	0.013
Boron (total)	ug/l	200	1500	24	26	25	21	21		21	20	21
Bismuth (total)	ug/l			0.008	0.009	< 10	< 10	< 10		< 0.007	0.062	0.035
Calcium (total)	ug/l			36233	36200	33500	33000	35333		34500	34200	34350
Cadmium (total)	ug/L	0.2	0.09	0.008	0.007	< 0.10	< 0.10	< 0.10		< 0.003	< 0.003	< 0.003
Cobalt (total)	ug/l	0.9	0.00	0.02	0.02	< 0.10	< 0.10	< 0.10		0.014	0.019	0.017
Chromium (total)	ug/L	0.0		0.1	0.4	< 5.0	< 5.0	< 5.0		0.25	0.21	0.23
Copper (total)	µg/L	5		0.9	0.8	2.7	1.2	1.2		0.9	0.8	0.9
Iron (total)	µg/L	300	300	26	9	< 100	< 100	< 100		10	21	16
Potassium (total)	ua/L			1600	1620	1600	1550	1533		1580	1520	1550
Magnesium (total)	µg/L			9150	9080	8800	8600	8700		8300	8360	8330
Manganese (total)	ua/L			2.1	0.5	2.6	< 2.0	2.7		0.86	1.67	1.27
Molybdenum (total)	ua/L	40	73	1.2	1.4	1.2	1.3	1.2		1.19	1.24	1.22
Sodium (total)	µg/L			14333	13500	14000	13500	14000		12500	12700	12600
Nickel (total)	ua/L	25	25	0.6	0.5	< 1.0	< 1.0	< 1.0		0.5	0.3	0.4
Phosphorus (total)	mg/L	0.01-0.03	-	0.010	0.005	0.008	< 0.004	0.007		0.004	< 0.003	0.004
Lead (total)	ua/L	5	7	0.04	0.03	< 0.5	< 0.5	< 0.5		< 0.01	0.04	0.03
Antimony (total)	ua/L	20		0.23	0.25	< 0.50	< 0.50	< 0.50		< 0.90	< 0.90	< 0.90
Selenium (total)	ua/L	100	1	0.4	0.2	< 2.0	< 2.0	< 2.0		0.10	0.18	0.14
Tin (total)	ua/L			0.1	0.3	< 1.0	< 1.0	< 1.0		0.08	0.14	0.11
Strontium (total)	ua/L			190	178	170	165	170		191	176	184
Titanium (total)	µg/L			_1	_1	< 5.0	< 5.0	5.6		0.61	0.88	0.75
Thallium (total)	ua/L	0.3	0.8	0.009	0.007	< 0.05	< 0.05	< 0.05		0.005	0.025	0.015
Uranium (total)	ua/L	5	15	0.40	0.36	0.35	0.37	0.36		0.342	0.322	0.332
Vanadium (total)	ua/L	6	-	0.33	0.19	0.52	< 0.50	0.53		0.21	0.21	0.21
Zinc (total)	ua/L	30	30	< 2	2	< 5	< 5	< 5		< 2.0	3.0	2.5
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		< 0.010	0.015	< 0.040	< 0.040	< 0.040		0.010	0.010	0.010
Thorium-230	Bq/L			< 0.020	< 0.020	< 0.070	< 0.070	< 0.070		< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L			< 0.020	< 0.020	< 0.060	< 0.060	< 0.060		< 0.020	< 0.020	< 0.020
Field Parameters	•						1	1				
ODO % Sat	%			_2	_ ²	_2	_2	_ 2		106.1	87	
ORP	mV			_2	_2	_ ²	_ ²	_ ²		131.5	166.4	
SPC	us/cm			_ 2	_2	_ 2	_ ²	_ 2		309.2	7.94	
Temperature	°C			_ 2	_2	_ 2	_ ²	_ 2		17.979	9.903	
Turbidity	FNU			_ ²	_ ²	_ ²	_ ²	_ ²		-0.69	4 05	
pH	Units			_2	_2	_ ²	_2	_ ²		8.37	7 94	
Staff Gauge	cm			_2	_2	_2	_2	_2				

Table B-25: Surface water quality – Lake Ontario – Port Granby Diffuser (PG-LO-D).

Staff G 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.

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

³ Due to COVID-19 restrictions.

	l							PCIO	-			
		Crit	!	2015	2016	2017	2019	PG-LU-1		201		
			CWOC	2015	2010	2017	2010	2019	2020 00 10	202	20	A.v.a.r.a.r.a
Parameter	Units	PWQU	CWQG			Average			2020-06-19	2020-08-07	2020-10-08	Average
Total Suspended Solids	mg/L			< 2.0	< 2.0	2.5	1.0	1.7	No Sample [°]	< 2.0	2.0	2.0
pH	no unit	6.5-8.5	6.5-9.0			8.20	8.16	8.25		8.15	7.92	8.04
Alkalinity	mg/L as CaCO3			97	94	95	98	94		91	89	90
Carbonate	mg/L as CaCO3			< 2.0	< 2.0	1.4	1.3	1.6		< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			106	94	94	97	93		91	89	90
Total Dissolved Solids	mg/L			186	169	188	120	160		170	1/1	1/1
	mg/L		0.12	0.13	0.12	0.14	0.12	0.10		0.12	0.12	0.12
Total Organic Carbon	mg/L			1.9	2.3	2.3	2.1	2.2		2.0	1.0	1.5
Ammonia+Ammonium (N)	as N mg/L			0.06	0.06	< 0.05	< 0.05	0.05		< 0.04	0.06	0.05
Chloride (Dissolved)	mg/L		120	25	24	22	22	22		23	25	24
Sulphate (dissolved)	mg/L			24	24	23	23	23		22.2	21.0	21.6
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			< 0.030	< 0.030	< 0.010	< 0.010	0.011		< 0.03	< 0.03	< 0.030
Nitrate (as N)	as N mg/L		13	0.35	0.24	0.23	0.30	0.26		0.24	0.38	0.31
Nitrate + Nitrite (as N)	as N mg/L			0.35	0.24	0.23	0.30	0.26		0.24	0.38	0.31
Mercury (dissolved)	µg/L	0.2	0.026	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010
Hardness	mg/L as CaCO3			125	130	125	120	133		121	126	124
Silver (total)	µg/L	0.1	0.25	0.013	< 0.002	< 0.10	< 0.10	< 0.10		< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			-'	-'	34	19	34		17	18	18
Aluminum (0.2µm)	µg/L	75	100	33	3	< 5	< 5	< 5		2	< 1	2
Arsenic (total)	µg/L	100	5	1.1	0.8	< 1.0	< 1.0	< 1.0		0.9	0.9	0.9
Barium (total)	µg/L			23.7	21.7	22	22	23		24.8	23.8	24
Beryllium (total)	µg/L	1100		< 0.007	< 0.007	< 0.50	< 0.50	< 0.50		< 0.007	< 0.007	< 0.007
Boron (total)	µg/L	200	1500	24	27	29	19	19		20	20	20
Bismuth (total)	µg/L			0.011	0.009	< 1.0	< 1.0	< 1.0		< 0.007	0.034	0.021
Calcium (total)	µg/L			35567	37150	34500	32000	35333		35000	36600	35800
Cadmium (total)	µg/L	0.2	0.09	0.007	0.005	< 0.10	< 0.10	< 0.10		0.006	0.020	0.013
Cobalt (total)	µg/L	0.9		0.02	0.02	< 0.5	< 0.5	< 0.5		0.015	0.036	0.026
Chromium (total)	µg/L			1.4	0.4	< 5.0	< 5.0	< 5.0		0.26	0.21	0.24
Copper (total)	µg/L	5		0.9	0.7	2.7	1.4	< 1.0		0.9	0.8	0.9
Iron (total)	µg/L	300	300	19	< 7	< 100	< 100	< 100		17	24	21
Potassium (total)	µg/L			1597	1655	1600	1450	1567		1610	1580	1595
Magnesium (total)	µg/L			8993	8915	8850	8350	8800		8160	8430	8295
Manganese (total)	µg/L			1.4	0.5	2.7	< 2.0	2.2		0.94	1.74	1.34
Molybdenum (total)	µg/L	40	73	1.2	1.5	1.2	1.2	1.1		1.22	1.24	1.23
Sodium (total)	µg/L			14167	13850	13500	13500	14000		12300	12900	12600
Nickel (total)	µg/L	25	25	0.6	0.6	< 1.0	< 1.0	< 1.0		0.5	0.3	0.4
Phosphorus (total)	mg/L	0.01-0.03		0.013	0.005	0.007	0.005	0.008		0.004	< 0.003	0.004
Lead (total)	µg/L	5	7	0.05	0.01	< 0.5	< 0.5	< 0.5		< 0.01	< 0.01	< 0.01
Antimony (total)	µg/L	20		0.23	0.20	< 0.50	< 0.50	< 0.50		< 0.90	< 0.90	< 0.90
Selenium (total)	µg/L	100	1	0.4	0.2	< 2.0	< 2.0	< 2.0		0.11	0.15	0.13
Tin (total)	µg/L			0.1	0.0	< 1.0	< 1.0	< 1.0		0.13	0.11	0.12
Strontium (total)	µg/L			185	182	170	160	167		194	183	189
Titanium (total)	µg/L			_ ¹	_ ¹	5.1	< 5.0	5.6		0.63	0.97	0.80
Thallium (total)	µg/L	0.3	0.8	0.007	0.008	< 0.05	< 0.05	< 0.05		0.006	0.007	0.007
Uranium (total)	µg/L	5	15	0.39	0.36	0.36	0.37	0.35		0.335	0.334	0.335
Vanadium (total)	µg/L	6		0.35	0.19	0.51	< 0.50	< 0.50		0.22	0.23	0.23
Zinc (total)	µg/L	30	30	< 2	< 2	< 5	< 5	< 5		< 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		0.013	0.010	< 0.040	< 0.040	< 0.040		< 0.010	< 0.010	< 0.010
Thorium-230	Bq/L			< 0.020	< 0.020	< 0.070	< 0.070	< 0.070		< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L			< 0.020	< 0.020	< 0.060	< 0.060	< 0.060		< 0.020	< 0.020	< 0.020
Field Parameters												
ODO % Sat	%			_ ²	- ²	- ²	_ ²	- ²		105.7	87.4	
ORP	mV			_2	- ²	- ²	- ²	- ²		140.6	225	
SPC	µs/cm			_2	- ²	- ²	- ²	- ²		306.7	296.1	
Temperature	°C			_2	- ²	- ²	- ²	- ²		17.177	9.726	
Turbidity	FNU			_2	- ²	- ²	- ²	- ²		-0.48	2.76	
pH	Units			_2	_ 2	_ ²	_ 2	_ 2		8.29	7.59	
Staff Gauge	cm			_2	_2	_2	_2	_ ²				

Table B-26: Surface water quality – Lake Ontario – Port Granby Diffuser (PG-LO-E).

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. ¹ Analysis not included in laboratory contract. ² Field parameters included for current sampling year only. ³ Due to COVID-19 restrictions. -- - No data.

								PC LOV	~			
		0-14		2015	2016	2017	2010	PG-LO-V	v	201	20	
			CWOC	2015	2010	2017	2010	2019	2020 00 10	202	20	A.v.a.r.a.r.a
Parameter	Units	PWQU	CWQG	0.7		Average	1.0	1.0	2020-06-19	2020-08-07	2020-10-08	Average
Total Suspended Solids	mg/L			9.7	2.0	2.5	< 1.0	1.3	No Sample	< 2.0	2.0	2.0
pH Aller lie ite	no unit	6.5-8.5	6.5-9.0			8.19	8.12	8.22		8.12	8.02	8.07
Alkalinity	mg/L as CaCO3			93	103	95	98	94		93	93	93
	mg/L as CaCO3			< 2.0	< 2.0	1.4	1.2	1.4		< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			93	103	93	96	92		93	93	93
Total Dissolved Solids	mg/L		0.40	1/2	1/4	201	118	1/2		200	146	1/3
Fluoride	mg/L		0.12	0.12	0.13	0.11	0.12	0.10		0.12	0.11	0.12
	mg/L			1.8	1.6	2.3	2.1	2.1		2.0	1.0	1.5
Chlorido (Dissolved)	as in mg/L		400	< 0.04	0.05	< 0.05	< 0.05	< 0.05		0.06	0.05	0.06
Chloride (Dissolved)	mg/L		120	24	24	22	22	22		23	20	20
Suprate (dissolved)	mg/L			24	24	23	24	23		22.0	21.1	21.0
Nitrite (as N)	IIIg/L			< 0.3	< 0.3	< 1.0	< 1.0	< 1.0		< 0.3	< 0.3	< 0.3
Nitroto (op N)	as Ning/L		12	< 0.030	< 0.030	< 0.010	< 0.010	0.011		< 0.03	< 0.03	< 0.030
Nitroto I Nitrito (oo Ni	as Ning/L		13	0.35	0.25	0.23	0.29	0.26		1.70	0.44	1.10
Moreury (disselved)	as N mg/L	0.2	0.026	0.35	0.25	0.23	0.29	0.20		1.70	0.44	1.10
Hardnoss	µg/∟ mg/L as CaCO2	0.2	0.020	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010
Silver (total)		0.1	0.25	0.011	0.002	120	120	- 0.10		123	120	120
Aluminum (total)	µg/∟	0.1	0.23	_1	1	< 0.10 54	20	< 0.10 36		< 0.05 11	< 0.05 1/	< 0.05 13
	µg/L	75	100	- 27	- 5	- 5	20	- 5		3	- 1	2
	µg/L	100	5	0.0	0.8	< 10	< 10	< 10		0.9	0.8	0.0
Barium (total)	µg/L	100	3	23.0	21.2	< 1.0 23	22	22		24.9	23.8	0.9
Beryllium (total)	µg/L	1100		< 0.007	0.018	< 0.50	< 0.50	< 0.50		< 0.007	< 0.007	< 0.007
Boron (total)	µg/L	200	1500	24	26	26	21	20		20	21	< 0.007 21
Bismuth (total)	µg/L	200	1500	0.008	< 0.007	20	21	<u> </u>		< 0.007	0.040	0.024
Calcium (total)	µg/L			35067	35800	35000	32000	35000		35300	36900	36100
Cadmium (total)	µg/L	0.2	0.00	0.007	0.007	< 0.10	0.10	- 0.10		0.005	0.006	0.006
Cobalt (total)	µg/L	0.2	0.03	0.007	0.007	< 0.10	< 0.10	< 0.10		0.003	0.000	0.000
Chromium (total)	µg/L µg/l	0.3		0.01	0.02	< 50	< 5.0	< 50		0.017	0.023	0.020
Copper (total)	ug/L	5		0.1	1.4	14	17	14		0.21	0.8	0.21
Iron (total)	ug/L	300	300	15	9	115	210	< 100		12	21	17
Potassium (total)	ug/L	000	000	1600	1635	1650	1550	1533		1640	1640	1640
Magnesium (total)	µg/=			9000	8940	9050	8400	8633		8480	8600	8540
Manganese (total)	µg/=			0.8	0.6	42	32	21		0.80	1 61	1 21
Molybdenum (total)	µg/L	40	73	1.2	1.5	1.2	1.1	1.1		1.22	1.29	1.26
Sodium (total)	µg/L			14233	13300	14000	13000	14000		12800	13200	13000
Nickel (total)	µg/L	25	25	0.6	0.6	< 1.0	< 1.0	< 1.0		0.5	0.3	0.4
Phosphorus (total)	ma/L	0.01-0.03		0.010	0.005	0.009	< 0.004	0.008		< 0.003	< 0.003	< 0.003
Lead (total)	ua/L	5	7	0.05	0.01	< 0.5	< 0.5	< 0.5		< 0.01	0.01	0.01
Antimony (total)	µg/L	20		< 0.20	0.20	< 0.50	< 0.50	< 0.50		< 0.90	< 0.90	< 0.90
Selenium (total)	ua/L	100	1	0.4	0.2	< 2.0	< 2.0	< 2.0		0.14	0.15	0.15
Tin (total)	µg/L			0.1	0.0	< 1.0	< 1.0	< 1.0		0.47	0.09	0.28
Strontium (total)	µg/L			184	175	170	165	163		197	185	191
Titanium (total)	µg/L			_1	_1	6.4	< 5.0	5.1		0.58	1.02	0.80
Thallium (total)	µg/L	0.3	0.8	0.011	0.006	< 0.05	< 0.05	< 0.05		< 0.005	0.007	0.006
Uranium (total)	µg/L	5	15	0.40	0.36	0.35	0.38	0.35		0.332	0.317	0.325
Vanadium (total)	µg/L	6		0.29	0.20	0.53	< 0.50	0.50		0.22	0.23	0.23
Zinc (total)	µg/L	30	30	< 2	3	< 5	< 5	< 5		< 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		< 0.010	0.015	< 0.040	< 0.040	< 0.040		< 0.010	< 0.010	< 0.010
Thorium-230	Bq/L			< 0.020	< 0.020	< 0.070	< 0.070	< 0.070		< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L			< 0.020	< 0.020	< 0.060	< 0.060	< 0.060		< 0.020	< 0.020	< 0.020
Field Parameters												
ODO % Sat	%			_ ²	_ ²	_ ²	_ ²	_ ²		105.7	88.9	
ORP	mV			_2	_ ²	_ 2	_2	_ ²		138.4	211.1	
SPC	µs/cm			_ ²	- ²	- ²	_2	_ ²		307.1	297.5	
Temperature	°C			_ 2	_ ²	_ ²	_2	_ ²		17.343	9.737	
Turbidity	FNU			_ 2	_ ²	_ ²	_2	_ ²		-0.6	2.96	
pH	Units			_ 2	_ 2	_ ²	_ ²	_ ²		8.3	7.73	
Staff Gauge	om			_2	_2	_2	_2	_2				

Table B-27: Surface water quality – Lake Ontario – Port Granby Diffuser (PG-LO-W).

Staff G 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.

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

³ Due to COV ID-19 restrictions.

Table B-28: Surface water quality – North Storm Water Pond – Location 1 (PG-SP1).

											PG-SP1 (N	orth Storm	Water Pond)							
		Crite	eria	2016	2017	2018	2019						•	2020			•		•	
Parameter	Units	PWQO	CWQG		Ave	erage		2020-01-14	2020-02-11	2020-03-16	2020-04-29	2020-05-11	2020-06-15	2020-07-08	2020-08-05	2020-09-10	2020-10-16	2020-11-17	2020-12-09	Average
Total Suspended Solids	mg/L			17	14	29	21	12	No Sample ²	14	22	3	23	211	3	2	54	8	26	34
рН	no unit	6.5-8.5	6.5-9.0	8.49	8.22	8.14	8.03	8.07		8.13	8.23	8.13	8.64	7.93	8.01	8.10	7.86	7.82	8.12	8.09
Alkalinity	mg/L as CaCO3			69	77	68	87	80		117	93	88	49	123	41	44	83	67	86	79
Carbonate	mg/L as CaCO3			6.5	2.1	1.6	1.1	< 1.0		< 1.0	< 1.0	< 1.0	6.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.5
Bicarbonate	mg/L as CaCO3			64	76	66	86	80		117	93	88	43	123	41	44	83	67	86	79
Total Dissolved Solids	mg/L			231	233	299	298	177		223	266	271	314	709	90	251	423	436	283	313
Fluoride	mg/L		0.12	0.19	0.16	0.27	0.43	0.17		0.14	0.25	0.24	< 0.06	0.44	0.25	0.27	0.30	0.23	0.26	0.24
Total Organic Carbon	mg/L			5.9	4.8	3.5	3.5	1.0		2.0	2.0	3.0	3.0	5.0	< 1.0	2.0	2.0	3.0	3.0	2.5
Ammonia+Ammonium (N)	as N mg/L			0.062	0.064	0.065	0.083	< 0.04		< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.04	< 0.04	< 0.04	< 0.04
Chloride (Dissolved)	mg/L		120	30	18	31	14	21		40	50	58	99	240	55	51	128	91	38	79.2
Sulphate (dissolved)	mg/L			69	67	108	94	24		39	56	56	79	164	68.2	72.5	142	138	80	84
Bromide (dissolved)	mg/L			0.4	< 1.0	< 1.0	< 1.0	< 0.3		< 0.3	< 0.3	< 0.3	< 0.3	0.5	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.3
Nitrite (as N)	as N mg/L			0.030	0.015	0.010	0.019	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.030
Nitrate (as N)	as N mg/L		13	0.30	0.58	0.39	0.27	0.32		0.34	0.06	0.16	< 0.06	< 0.06	0.52	0.09	0.26	0.46	1.72	0.37
Nitrate + Nitrite (as N)	as N mg/L			0.31	0.59	0.39	0.28	0.32		0.34	0.06	0.16	< 0.06	< 0.06	0.52	0.09	0.26	0.46	1.72	0.37
Mercury (dissolved)	µg/L	0.20	0.026	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 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			172	157	200	197	134		200	220	185	173	464	136	149	334	249	202	222
Silver (total)	µg/L	0.1	0.25	0.02	< 0.10	< 0.10	0.11	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (total)	µg/L			907	458	691	359	1010		351	733	270	440	3670	165	125	1210	102	128	746
Aluminum (0.2µm)	µg/L	75	100	313	29	12	11	200		30	18	77	99	720	49	65	15	40	9	120
Arsenic (total)	µg/L	100	5	1.0	1.8	1.6	190.9	0.6		1.7	6.3	3.4	3.7	10.2	2.8	4.5	2.0	2.2	0.6	3.5
Barium (total)	µg/L			23	26	37	36	25.9		34.2	45	34	45	115	29	32	77	50	28	47
Beryllium (total)	µg/L	1100		0.11	0.50	< 0.50	< 0.50	0.033		0.018	0.026	0.011	0.019	0.117	0.009	< 0.007	0.064	< 0.007	< 0.007	0.029
Boron (total)	µg/L	200	1500	42	61	87	77	16		19	28	31	50	46	28	31	68	46	28	36
Bismuth (total)	µg/L			0.2	< 1.0	< 1.0	< 1.0	< 0.007		0.010	0.187	0.022	0.018	0.115	< 0.007	< 0.007	0.017	0.010	0.020	0.038
Calcium (total)	µg/L			57283	52455	64500	65143	46000		69100	74200	62000	55300	159000	45600	48000	115000	82500	69100	75073
Cadmium (total)	µg/L	0.20	0.09	0.03	< 0.10	< 0.10	< 0.10	0.01		0.00	0.007	< 0.003	0.009	0.058	< 0.003	< 0.003	0.012	0.004	0.019	0.012
Cobalt (total)	µg/L	0.90		0.37	0.52	0.66	1.62	0.353		0.391	1.03	0.237	0.364	2.750	0.114	0.102	0.760	0.136	0.136	0.579
Chromium (total)	µg/L			1.8	< 5.0	< 5.0	< 5.0	1.16		0.74	1.09	0.58	0.660	5.430	0.440	0.290	1.940	0.280	0.410	1.184
Copper (total)	µg/L	5		1.5	1.2	1.6	3.7	4.1		1.4	2.9	2.0	2.0	5.4	1.4	1.3	2.1	1.3	1.2	2.3
Iron (total)	µg/L	300	300	589	505	757	373	800		320	591	184	342	3820	114	73	1100	100	106	686
Potassium (total)	µg/L			2830	3091	3130	4086	2100		1690	2260	2060	1830	3680	2000	2310	4240	3720	2480	2579
Magnesium (total)	µg/L			5792	8055	11630	10057	4740		6570	8330	7470	8550	16200	5370	7090	11500	10500	7150	8497
Manganese (total)	µg/L			78	52	30	33	21.8	-	27.7	22.1	7.3	16.2	192.0	7.0	3.1	56.5	8.2	10.8	33.9
Molybdenum (total)	µg/L	40	73	4.0	2.3	3.3	13.9	0.86	-	1.08	1.43	2.07	2.53	3.56	2.16	2.56	2.80	3.50	3.28	2.35
Sodium (total)	µg/L			12638	9591	11610	7743	6000		17400	22200	25900	46100	129000	25800	28700	62200	40400	16800	38227
Nickel (total)	µg/L	25	25	0.9	1.1	1.4	3.2	0.9	-	0.7	1.6	0.7	1.0	5.5	0.4	0.3	1.9	< 0.1	0.4	1.2
Phosphorus (total)	mg/L	0.01-0.03		0.05	0.04	0.04	0.05	0.03		0.03	0.02	0.01	0.03	0.17	0.01	0.02	0.08	0.03	< 0.003	0.04
Lead (total)	µg/L	5	1	0.37	0.53	0.69	1.44	0.32		0.42	1.07	< 0.01	0.38	2.63	0.06	< 0.01	0.68	0.10	0.04	0.52
Antimony (total)	µg/L	20		0.3	< 0.5	< 0.5	1.7	< 0.9		< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Jelefilum (total)	µg/L	100		0.0	2.0	× 2.0	< 2.U	0.1		0.10	0.13	0.14	0.14	0.21	0.20	0.20	0.20	0.19	0.13	0.10
Strontium (total)	μg/L			0.2	1000	1702	1207	0.15		0.20	1040	0.11	0.07	1710	< U.U0 E02	0.14	0.20	1290	1050	1009
Titonium (total)	μg/L			530	20	1/92	1007	419		920	20.7	932	1010	1/10	503	200	1000	1300	1000	20.1
Thallium (total)	µ9/L	0.3	0.8	0.019	20	3∠ ∠ 0.050	0.05/	0.012	ł	13.2	29.7	0.1	13.1	0.044	5./	2.9 - 0.00F	40.0	3.2	5.U	20.1
Liranium (total)	P9/L	5	15	0.010	1.000	2 0.000	51.8	1 30	ł	3.02	5.008	4.62	7 11	5 27	1 02	3.51	5.66	< 0.000 6.5F	2.57	4.32
Vanadium (total)	µg/L ua/l	6	15	2.10	1.1	2.3	7 60	1.39	1	0.02	1 01	4.0Z	1.11	0.21	1.92	1.06	2.00	0.53	0.51	2.01
Zinc (total)	µg/L	30	30	5.7	5.9	7.1	- 50	1.74		0.33	1.51	0.00	1.50	17	2	1.00	2.57	- 2	0.51	2.01
Lead-210	P9'⊏ Ba/I		50	< 0.02	0.04	/.i	< 0.0	< 0.02	1	0.04	- 0.02	< 0.02	- 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02
Radium-226	Bq/L	1		0.018	< 0.04	< 0.10	0.097	0.02		0.04	0.02	0.02	0.02	0.02	< 0.02	0.02	0.02	0.02	< 0.02	0.02
Thorium-230	Ba/I			0.027	< 0.040	< 0.064	0.001	< 0.02	1	< 0.01	< 0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02
Thorium-232	Ba/L			0.027	< 0.070	< 0.004	< 0.091	< 0.02		< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Field Parameters	-4-			0.020	- 0.000	- 0.000	- 0.000	- 0.02		- 0.01	- 0.02	- 0.02	- 0.02	- 0.02	- 0.02	- 0.02	- 0.02	- 0.02	- 0.02	- 0.02
ODO % Sat	%			_1	_1	_1	_1	100.2		102.3	99.6	106	135.7	88.5	105.1	102.3	95.4	99.7	115.7	
ORP	m\/			_1	_1	_1	_1	61.9	1	80.5	102.8	131	82.1	148.6	168.6	203.1	263.3	114 0	130.5	
SPC	us/cm			_1	_1	1	_1	2/0	1	363.7	433.4	452.3	5.2.1	1950	307.0	200.1 412.6	200.0 Q11	822	472 /	
Temperature	°C			_1	_1	_1	_1	2 607		2 935	8 473	8 530	23.615	26 714	23 108	18 652	10.823	5 373	475.4	
Turbidity	FNU			_1	_1	1	_1	37 55	1	2.335	45 15	5 34	86.67	370.94	6 30	2.50	64.16	5.49	16.5	
nH	Units	<u> </u>		_1	_1	1	_1	8 42		8 17	8 32	8.26	8 74	8 42	8 33	8 30	7.86	8.04	8 37	
Staff Gauge	cm	┣───┤		_1	_1	_1	_1	0.42	ł	0.17	0.32	0.20	0.74	0.42	0.00	0.00	1.00	0.04	0.01	
Nete:	Louin .			-			-		1											

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 ¹ Field parameters included for current sampling year only. ² Pond frozen, unable to collect surface w ater sample. --- No data.

Table B-29: Surface water quality – South Storm Water Pond – Location 2 (PG-SP2).

1											PG-SP2 (S	outh Storm	Water Pond)							
	1	Crit	eria	2016	2017	2018	2019							2020						
Parameter	Units	PWQO	CWQG		Av	erage		2020-01-14	2020-02-11	2020-03-16	2020-04-29	2020-05-11	2020-06-15	2020-07-08	2020-08-05	2020-09-10	2020-10-16	2020-11-17	2020-12-09	Average
Total Suspended Solids	mg/L			4	11	4	9	16	No Sample ²	5	< 2	2	7	37	2	< 2	3	3	No Sample ²	8
pH	no unit	6.5-8.5	6.5-9.0	8.68	8.30	7.92	8.08	7.99		8.05	8.14	8.17	9.68	8.79	7.73	7.85	7.79	8.00		8.22
Aikalinity	mg/L as CaCO3			69	78	70	78	91		96	52	48	41	56	107	95	93	108	l	79
Carbonate	mg/L as CaCO3			3.2	2.3	70	1.3	< 1.0		< 1.0	< 1.0	< 1.0	28.0	7.0	< 1.0	< 1.0	< 1.0	< 1.0		4.3
Total Dissolved Solida	mg/L as CaUUs			102	170	108	261	91		30	32	40	200	49	500	95	93	471		75
Fluorido	mg/L		0.12	0.19	0.17	0.10	0.19	014		0.12	0.14	0.13	309	0.19	0.20	0.17	4//	4/1		0.15
Total Organic Carbon	mg/L		0.12	5.7	4.8	4.3	46	2.0		2.0	2.0	3.0	< 0.00	4.0	6.0	6.0	5.0	5.0		3.9
Ammonia+Ammonium (N)	as N mg/L			0.072	0.054	< 0.050	< 0.050	< 0.04		< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.08	< 0.04	< 0.04	< 0.04		< 0.04
Chloride (Dissolved)	ma/L		120	33	25	63	86	59		100	120	150	120	140	180	180	183	170		140
Sulphate (dissolved)	mg/L			29	26	22	19	16		26	27	28	26	26	71.1	66.1	72	67		42
Bromide (dissolved)	mg/L			0.4	< 1.0	< 1.0	< 1.0	< 0.3		< 0.3	0.4	0.3	0.4	0.5	0.3	< 0.3	0.4	0.4		0.4
Nitrite (as N)	as N mg/L			< 0.027	< 0.011	< 0.010	< 0.010	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		< 0.03
Nitrate (as N)	as N mg/L		13	0.20	0.17	< 0.10	< 0.10	< 0.06		< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06		< 0.06
Nitrate + Nitrite (as N)	as N mg/L			0.20	0.17	< 0.10	< 0.10	< 0.06		< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06		< 0.06
Mercury (dissolved)	µg/L	0.20	0.026	< 0.01	0.01	< 0.01	< 0.01	< 0.01		< 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			108	109	110	123	152		170	151	130	114	147	206	182	211	197		166
Silver (total)	µg/L	0.1	0.25	0.02	< 0.10	< 0.10	< 0.10	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05
Aluminum (total)	µg/L			74	205	124	92	663		121	41	38	15	28	27	64	88	42	L	113
Aluminum (0.2µm)	µg/L	75	100	33	16	13	8	340	L	46	14	23	10	12	7	7	18	11		49
Arsenic (total)	µg/L	100	5	0.9	1.4	1.9	6.1	1.8	L	3.1	2.9	2.6	4.5	5.2	45.1	36.5	43.6	30.4		17.6
Barrum (total)	µg/L	4400		9	16	17	20	25.7		29.8	25	19	16	20	42	31	36	29	l	27
Derymum (total)	µg/L	1100	1500	0.09	< 0.50	< 0.50	< 0.50	0.021		< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.014	< 0.007	<u> </u>	0.009
Boron (total)	µg/L	200	1500	32	2/	21	19	18		1/	19	19	2/	16	28	26	44	2/		24
Coloium (total)	µg/L			25722	27527	29500	< 1.0	62200		< 0.007 57600	< 0.007	40500	< 0.007	< 0.007	< 0.007	< 0.007	60600	< 0.007		64260
Cadmium (total)	µg/L	0.20	0.00	0.02	0.10	38300	42111	0.004		0.004	48700	40300	< 0.003	40400	0.013	0.007	0.005	0.000		0.006
Cobalt (total)	ug/L	0.20	0.03	0.02	0.10	0.10	< 0.10	0.335		0.386	0.010	0.005	0.126	0.000	3 930	0.300	0.437	0.004		0.600
Chromium (total)	ug/L	0.30		12	5.0	< 50	< 5.0	0.000		0.500	0.32	0.100	0.120	0.101	0.290	0.190	0.440	0.170		0.362
Copper (total)	µg/L	5		0.7	1.1	< 1.0	1.2	4.0		1.1	0.9	1.2	0.5	0.5	0.4	0.3	0.6	0.4		1.0
Iron (total)	ug/L	300	300	82	271	241	148	518		132	42	41	32	53	140	46	122	77		120
Potassium (total)	ug/L			4370	2325	1838	1733	2750		2380	1690	1420	1530	2000	12900	8630	9610	8280		5119
Magnesium (total)	µg/L			4317	3742	4460	4933	4720		6260	7160	6890	6210	8090	9000	7990	8950	7730		7300
Manganese (total)	µg/L			33	44	116	28	21		19.6	7.6	5.1	17.0	118.0	156.0	34.4	45.7	7.1		43.1
Molybdenum (total)	µg/L	40	73	1.20	0.88	0.60	0.61	0.55		0.86	0.97	0.93	0.77	0.55	9.71	4.20	4.22	3.02		2.58
Sodium (total)	µg/L			18233	14082	31260	47111	24800		46200	51000	54400	50100	64100	104000	101000	107000	83300		68590
Nickel (total)	µg/L	25	25	0.4	1.0	1.0	< 1.0	1.1		1.0	0.9	0.9	0.8	1.0	9.1	6.0	7.4	4.2		3.2
Phosphorus (total)	mg/L	0.01-0.03		0.02	0.04	0.02	0.03	0.04		0.02	0.01	0.01	0.02	0.03	0.04	0.03	0.04	0.03		0.03
Lead (total)	µg/L	5	7	0.19	0.55	0.50	0.51	1.05		0.29	0.10	< 0.01	1.27	< 0.01	0.21	< 0.01	0.05	0.04		0.30
Antimony (total)	µg/L	20		0.3	< 0.5	< 0.5	< 0.5	< 0.9		< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9		< 0.9
Selenium (total)	µg/L	100	1	0.4	< 2.0	< 2.0	< 2.0	0.1		0.05	0.05	< 0.04	0.07	0.05	0.06	0.04	0.06	< 0.04		0.05
Tin (total)	µg/L			0.2	< 1.0	< 1.0	< 1.0	0.15		0.10	< 0.06	0.15	0.13	0.14	< 0.06	0.17	0.17	0.12		0.13
Strontium (total)	µg/L			338	414	307	359	450		557	625	528	454	545	634	563	682	618		566
Thalfum (total)	µg/L	0.2		0 010	11	0.050	/	29.1		4.0	1.5	1.4	0.5	0.9	1.0	0.2	2.0	1.5		4.3
Irranium (total)	µg/L	0.5	0.0	0.013	0.050	1.8	< 0.050 2.4	1.81	ł	< 0.005 3.25	< U.UU5 2.62	< 0.005 1.0F	< 0.005 0.64	0.006	< 0.005 6.55	< 0.005 2.4F	< 0.005 3.0F	< U.UU5 3.42	ł	2.62
Vanadium (total)	P9/L	6	10	0.2	0.85	0.73	0.83	1.01		0.38	0.10	0.21	0.04	0.42	0.00	0.20	0.59	0.45	<u> </u>	0.42
Zinc (total)	ug/L	30	30	3.0	5.7	16.6	5.1	11		7	3	3	2	2	6	2	2	< 2		4
Lead-210	Ba/L	-		< 0.02	0.03	< 0.10	0.12	< 0.02	1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	< 0.02
Radium-226	Bq/L	1		0.015	< 0.040	< 0.037	0.118	0.03	İ	0.01	0.01	< 0.01	0.02	< 0.01	< 0.01	0.02	< 0.01	0.02		0.01
Thorium-230	Bq/L	I		0.027	< 0.070	< 0.063	0.120	< 0.02		< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	< 0.02
Thorium-232	Bq/L			0.025	< 0.060	< 0.054	< 0.060	< 0.02		< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		< 0.02
Field Parameters																				
ODO % Sat	%			-1	_1	_1	_1	98.1		105.1	101	108.4	239.6	103.8	71.3	81.7	81.6	94.5		
ORP	mV			-1	_1	_1	_1	84.2		84.1	70	123.1	49	130.7	179.2	203.8	236.6	126		
SPC	µs/cm			-1	-1	_1	_1	263.4		486.7	517	536	548	654	930	878	835	984		
Temperature	°C			1	1		1	2.257		3.435	8.705	8.939	26.017	29.577	24.049	18.43	12.206	4.711		
Turbidity	FNU	ļ		-1	-1	-1	-1	6.73		1.31	-2.11	0.27	10.96	3.12	-0.4	-1.04	3.40	3.08		
pH	Units	I	L	-'	-	-	-'	7.96	L	8.11	9.00	8.60	9.95	8.95	7.55	7.73	7.86	7.96	L	
Staff Gauge	cm			-'	-1	2	-1		1										1	
UUU % Sat ORP SPC Temperature Turnicity pH Note: PWQ0 = Provincial Water CWQG=Canadian Water CWQG=Canadian Water Bold values indicate a nex ¹ Field parameters included 1 ² Pond frozen, unable to coll No data.	% mV us/cm *C FNU Uhits cm Quality Objectives vality Guidelines seedance of a PW or current samplin cct surface w ater	s, Ministry c for Protecti QO or CWC Ig year only sample.	of the Enviroion of Aqua G value	-' -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -			98.1 84.2 263.4 2.257 6.73 7.96 		105.1 84.1 486.7 3.435 1.31 8.11 	101 70 517 8.705 -2.11 9.00 	108.4 123.1 536 8.939 0.27 8.60	239.6 49 548 26.017 10.96 9.95 	103.8 130.7 654 29.577 3.12 8.95 	71.3 179.2 930 24.049 -0.4 7.55 	81.7 203.8 878 18.43 -1.04 7.73 	81.6 236.6 835 12.206 3.40 7.86	94.5 126 984 4.711 3.08 7.96 		

Table B-30: Drainage water quality – PG LTWMF (PG-SW1/DP1-02).	
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		Crit	eria							PG-SV	V1/C	DP1-02						
_					2015	2016		2017		2018		2019				2020		
Parameter	Units	PWQO	CWQG		10	0	_ A	verage		0	1	0.1	20	20-05-11	20	20-10-23	A١	/erage
nH	mg/L	65-85	6 5-9 0		<u>16</u>	9 7 74	-	7.96		3 7 74	-	34 8.07		7.82		4 7 86		7 84
Alkalinity	mg/L as CaCO3	0.0 0.0	0.0 0.0		101	84		130		120		155		164		138		151
Carbonate	mg/L as CaCO3			<	2.0	< 1.5		1.2	<	1.0		1.8	<	1.0	<	1.0	<	1.0
Bicarbonate	mg/L as CaCO3				101	84		125		120		155		164		138		151
Total Dissolved Solids	mg/L				122	348		201		115		198		194		143		169
Fluoride	mg/L		0.12		0.07	0.08	<	0.10		0.21	_	10.26		<u>0.17</u>		0.19		0.18
Ammonia+Ammonium (N)	as N mg/L			<	0.04	9.0	<	0.05	<	0.05	<	0.05	<	0.04		0.05		0.05
Chloride (Dissolved)	mg/L		120		1	7		3.2	-	2.5		2.5		12.0		0.7		6.4
Sulphate (dissolved)	mg/L				1.5	140		27		4.2		1.7		1.9		0.6		1.3
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		40	<	0.03	0.06	<	0.01	<	0.01	<	0.01	<	0.03	<	0.03	<	0.03
Nitrate (as N)	as Nmg/L as Nmg/l		13	<	0.06	1.89	<	0.10	< ~	0.10	<	0.10	<	0.06	<	0.06	<	0.06
Mercury (dissolved)	ua/L	0.2	0.026	~ <	0.010	< 0.010	<	0.010	~ <	0.010	<	0.010	~ <	0.010	<	0.010	~	0.010
Hardness	mg/L as CaCO3	-			102	240		160		125		165		189		157		173
Silver (total)	µg/L	0.1	0.1		0.01	0.06	<	0.10	<	0.10		0.18	<	0.05	<	0.05	<	0.05
Aluminum (total)	µg/L				_ ¹	89		61		20		347		35		49		42
Aluminum (0.2µm)	µg/L	75	100		12	47		7	<	5	<	5	<	1		1		1
Arsenic (total)	µg/L	100	5		7.5	0.7	<	14		1.1	-	5.9		1.3		1.1		1.2
Bervllium (total)	µg/L	1100		<	0.007	0.254	<	0.50	<	0.50	<	0.50	<	0.007	<	0.007	<	0.007
Boron (total)	µg/L	200	1500		2.5	8.5	<	10	<	10		11		9		10		10
Bismuth (total)	µg/L				0.02	0.5	<	1.0	<	1.0	<	1.0		0.008		0.035		0.022
Calcium (total)	µg/L				37850	96350		57500		46000		63500		71100		58300		64700
Cadmium (total)	µg/L	0.2	0.09		0.01	0.05	<	0.10	<	0.10	<	0.10		0.005	<	0.003		0.004
Cobait (total)	µg/L µg/l	0.9		~	0.2	0.3	<	0.5	<	5.0	~	5.0		0.09		0.11		0.10
Copper (total)	µg/L	5		-	0.00	1.2	<u> </u>	1.1	~ ~	1.0		2.0		0.10		0.10		0.10
Iron (total)	µg/L	300	300		203	228		200		110		695		189		154		172
Potassium (total)	µg/L				2495	6100		3100		3000		3500		4010		2290		3150
Magnesium (total)	µg/L				1815	3465		2700		2100		2550		2730		2690		2710
Manganese (total)	µg/L	40	70		38.3	35.8		24	_	13		107		24		8		16
Sodium (total)	µg/L	40	13		1050	2110		1400	`	940	< <u> </u>	925		1130		1460		1295
Nickel (total)	µg/L	25	25		0.3	0.6	<	1.0	<	1.0		1.2		0.2	<	0.1		0.15
Phosphorus (total)	mg/L	0.01-0.03			0.06	0.08		0.09		0.04		0.14		0.05		0.02		0.04
Lead (total)	µg/L	5	7		0.1	0.6	<	0.5	<	0.5		1.3	<	0.01		0.14		0.08
Antimony (total)	µg/L	20			0.20	0.60	<	0.50	<	0.50	<	0.50	<	0.90	<	0.90	<	0.90
Selenium (total)	µg/L	100	1		0.5	1.1	<	2.0	<	2.0	<	2.0		0.04		0.05		0.05
Strontium (total)	µg/L				75	159	<u>`</u>	1.0	< _	86	<u>`</u>	101		110		112		111
Titanium (total)	µg/L				_1	< 5		5	<	5		17		2		2		2
Thallium (total)	µg/L	0.3	0.8		0.01	0.03	<	0.05	<	0.05	<	0.05	<	0.01	<	0.01	<	0.01
Uranium (total)	μg/L	5	15		0.04	0.4		0.2		1.1		2.1		0.6		0.5		0.6
Vanadium (total)	µg/L	6	20		0.17	0.72		0.65	<	0.50		1.13		0.14		0.20		0.17
Lead-210	µg/L Ba/l	30	30	~	2.5	3.5 < 0.02	<	5.0	< ~	5.0 0.10		5.9 0.13	<	2.0	~	0.02	~	2.5
Radium-226	Bq/L	1		<	0.010	0.025	<	0.025	<	0.040	<	0.040	Ì	0.010	<	0.010	<	0.010
Thorium-230	Bq/L			<	0.020	0.045	<	0.070	<	0.070	<	0.070	<	0.020	<	0.020	<	0.020
Thorium-232	Bq/L			<	0.020	0.040	<	0.060	<	0.060	<	0.060	<	0.020	<	0.020	<	0.020
Field Parameters	0/		1		2)	1	2		2		2		00.5		70.0		
ODU % Sat	% m\/				_^ _2	2	┢	_2 _2	-	_^ _2	-	_2 _2		105.0		78.6		
SPC	us/cm				_2	_2	╞	_2	-	_2	-	_2		394.7		261.7		
Temperature	°C				- ²	_ 2	L	_2		- ²	L	_2		9.275	L	7.675		
Turbidity	FNU				_ ²	_ ²		_ 2		_ ²		_ 2		1.27		0.84		
pH	Units				- ²	- ²		_ ²		_ ²		_ ²		8.15		7.81		
Staff Gauge	cm				-*	-*		-*		-*		-*						
PWQO = Provincial Water Quality C CWQG= Canadian Water Quality G Bold values indicate an exceedance ¹ Analysis not included in laboratory ² Field parameters included for curren n/a - Not applicable. No data.	Objectives, Minisa uidelines for Prot e of a PWQO or C contract. nt sampling year o	try of the Er tection of A WQG value only.	nvironment, quatic Life, a.	Fe 20	bruary 19 15.	999.												

APPENDIX C PORT GRANBY GROUNDWATER MONITORING RESULTS

								PG	-BH1002A				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/01/21	2020/06/16	2020/07/22	2020/12/09	Average
pН	pН					7.88	7.81	7.80	7.59	-4	7.62	7.72	7.67
Alkalinity	mg/L as CaCO3			257	319	170	223	218	427	-4	348	378	363
Carbonate	mg/L as CaCO3			_1	-1	1.2	1.4	1.3	< 1.0	-4	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			-1	-1	170	223	215	427	-4	348	378	363
Total Dissolved Solids	mg/L			434	420	398	392	466	- ⁵	-4	457	406	432
Fluoride	mg/L	1.5		0.08	< 0.06	< 0.10	< 0.10	< 0.10	0.10	-4	< 0.06	< 0.06	0.06
Total Organic Carbon	mg/L			_1	_1	16	3.5	17.7	2.0	-4	1.0	1.0	1.0
Dissolved Organic Carbon	mg/L			1.9	1.8	1.6	1.3	1.5	1.0	-4	2.0	1.0	1.5
Ammonia+Ammonium (N)	as N mg/L			0.067	< 0.040	< 0.050	0.137	0.167	< 0.040	-4	< 0.040	0.060	0.050
Chloride (dissolved)	mg/L			10	10	24	20	45	51	-4	41	38	40
Sulphate (dissolved)	mg/L			36	33	35	33	31	40	-4	44	44	44
Bromide (dissolved)	mg/L			< 0.3	< 0.3	< 1.0	< 1.0	< 1.0	< 0.3	-4	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L	l	!	< 0.030	< 0.030	0.013	< 0.010	0.020	< 0.030	-4	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L	l		14.93	2.82	9.21	7.62	11.66	8.38	-4	6.44	10.00	8.22
Nitrate + Nitrite (as N)	as N mg/L	l		14.93	2.82	9.22	7.62	11.66	8.38	-4	6.44	10.00	8.22
Mercurv (dissolved)	ua/L	1	0.29	0.02	< 0.01	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3	l	···· ·	315	323	297	290	333	991	_4	655	697	676
Silver (dissolved)	ua/L		1.5	0.005	0.002	< 0.10	0.11	< 0.10	0.22	< 0.05	< 0.05	< 0.05	0.05
Aluminum (dissolved)	ug/l	┢───┤		59	< 1.0	370	7.8	9.5	22900	2 1	7	3	4
Arsenic (dissolved)	ug/l	25	1900	0.9	< 0.2	< 1.0	< 1.0	< 1.0	7.2	< 0.2	· 0.2	< 0.2	0.2
Barium (dissolved)	ug/l	1000	29000	58.6	54.8	56	55	62	553	61	56	60	59
Bervllium (dissolved)	µg/⊑	1000	67	0.01	- 0.01	- 0.50	- 0.50	- 0.50	2 10	- 0.01	- 0.01	- 0.01	0.01
Roron (dissolved)	µg/⊑	5000	45000	17	5	/ 10	< 10	/ 10	26	5	6	8	6
Rismuth (dissolved)	µg/⊑	0000		0.01	- 0.01	- 10	- 10	- 10	0.88	- 0.007	- 0.007	- 0.007	0.007
Calcium (dissolved)	µg/⊑		├─── ′	118250	121000	108333	107500	120000	371000	147000	156000	122000	141667
Cadmium (dissolved)	µg/L	5	2.7	0.017	0.004	- 0.10	- 0.10	- 0.10	0 401	0.005	0.023	0.004	0.011
Cobalt (discolved)	µg/∟ ug/l	, ,	66	0.017	0.005	0.73	- 0.50	- 0.50	6.25	0.000	0.020	0.00-	0.04
Chromium (dissolved)	µg/∟ ug/l	┟───┤	810	0.17	0.07	50	- 50	- 50	9.28	0.00	0.55	2.37	1 13
Conner (dissolved)	µg/∟ ug/l	1000	87	27	21	26	11	12	38.7	10	1.3	0.5	0.9
Iron (discolved)	µg/L	1000	<u>− .</u>	56	11	500	- 100	100	16400	- 7	8	7	7
Potassium (dissolved)	µg/∟ ug/l	┟───┤	┝───┘	499	533	460	465	488	3190	472	503	711	562
Magneeium (dissolved)	µg/∟ 	┟────┤	┝───┘	4690	4750	5100	6525	7700	15400	6190	6410	17400	10000
Magnesium (uissoweu)	µg/∟ 	┟────┤	───	67	4/00	/1	- 20	. 20	873	0.23	0410	0.35	0.47
Malybdonum (dissolved)	µg/∟ 	┟────┤	9200	0.7	1.89	- 0.50	< 2.0	< 2.0	0.26	0.25	0.00	0.00	0.47
	µg/∟ 	┟────┤	9200	3605	1.03	< 0.00	< 0.00	< 0.00	4750	1300	1730	5450	4827
Nickel (dissolved)	µg/∟ 	┟────┤	490	0.7	4000	12	- 10	- 10	10.1	0.30	0.20	0.20	0.23
Nickei (uissoiveu)	µg/∟ ∽∽/	l	490	0.0	0.0	0.01	< 1.0	< 1.0	0.85	- 0.003	0.20	- 0.003	0.20
Phosphorus (dissolved)	mg/∟	10	25	0.09	0.00	1.70	0.02	0.01	0.00 52 A	< 0.003	< 0.003	< 0.003	0.003
A stimony (discolved)	µg/∟ 	6	20	- 0.20	0.09	1.70	< 0.50	< 0.50	· 0.00	0.03	- 0.00	- 0.00	- 0.03
Antlinony (dissolved)	µg/∟ …~/I	40	20000	< 0.20	< 0.20	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
	µg/∟ …~/I	10	03	0.0	1.5	< 2.0	< 2.0	< 2.0	0.10	1.12	0.17	1.07	0.10
Tin (dissolved)	µg/∟	'	└─── ′	0.0	0.0	< 1.0	< 1.0	< 1	0.19	< 0.00	0.17	< 0.00	0.10
Strontium (dissolved)	µg/∟	'	├─── ′	205	205	103	103	203	580 46.0	250	239	249	240
Titanium (dissolveu)	µg/∟	'	510	1.7	0.1	12	< 0.0	< 5.0	40.∠ 0.202	0.21	U.2 I	< 0.00	0.10
Thaliium (dissolved)	µg/∟		510	0.008	0.000	< 0.050	< 0.000	< 0.00	0.303	< 0.005	< 0.005	< 0.005	0.005
Uranium (dissolved)	µg/∟	20	420	0.20	0.30	0.44	0.20	0.28	11	0.32	0.27	0.40	0.348
Vanadium (dissolved)	µg/L	┢────┘	250	0.39	0.15	1.0	< 0.50	< 0.5	13.7	0.11	0.20	0.28	0.20
Zinc (dissolvea)	µg/L		1100	3.8	2.5	1.1	< 5.0	< 5	95	< 2	3	< 2	2
Lead-210	Bq/L	0.2	└───'	< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Bq/L	0.49	└─── ′	0.023	< 0.020	< 0.040	< 0.040	< 0.040	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Thorium-230	Bq/L	0.65	↓'	< 0.010	< 0.010	< 0.070	< 0.070	< 0.070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L	0.6	└─── '	< 0.010	< 0.010	< 0.060	< 0.060	< 0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters	ļ!	 '	↓'		<u> </u>				,	ļ,		ļ,	ļ!
ODO % Sat	%	 '	└───'						- 3	-*	-3	-3	
ORP	mV		↓'	- ²	- ²	- ²	- ²	- ²	-3	-3	_3	-3	
SPC	µs/cm		<u> </u>	- ²	- ²	- ²	- ²	- ²	-3	-3	_3	_3	
Temperature	°C		<u> </u>	-2	-2	-2	-2	-2	-3	-3	_3	_3	
Turbidity	FNU		<u> </u>	- ²	-2	- ²	- ²	- ²	- ³	-3	-3	_3	
рН	Units		1 '	- ²	_2	-2	_2	- ²	- ³	_3	_3	-3	1 1

Table C-1: PG-BH1002A.

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

 $^{\rm 2}$ Field parameters included for current sampling year only.

³ Insufficient volume of groundw ater for field parameters

⁴ Insufficient volume of groundwater for full sample collection

⁵ Not reported by the lab for this sample

Table C-2: PG-BH1003A.

									PG-BH1003A					
		Crit	ria 2015 2016 201						2018	2019	2020			
Parameter	Units	COPC	Table 3		-	verage				Well Broken				
рН	рH			7.92	T	8.15		7.49						
Alkalinity	mo/L as CaCO3			185		224		190						
Carbonate	mg/L as CaCO3			_1		_ 1	<	1.0						
Bicarbonate	mg/L as CaCO3			_1		_1	-	190						
Total Dissolved Solids	mg/L			259		235		249						
Fluoride	mg/L	1.5		0.12		0.10		0.10						
Total Organic Carbon	mg/L			_1		_1		51						
Dissolved Organic Carbon	mg/L			92		92		92						
Ammonia+Ammonium (N)	as N mg/l			1.383		1.083		3 650						
Chloride (dissolved)	ma/l			5	-	6		5.8						
Sulphate (dissolved)	mg/L			30	-	7		73						
Bromide (dissolved)	mg/L			< 03	-	03	/	1						
Nitrite (as N)	nng/∟ as Nimo/I			< 0.0 0.20		0.0	<u>`</u>	0.037						
Nitrate (as N)	as Nimg/L			1.95	È	2.00		0.007						
Nitrate (d3 N)	as Nimg/L			2.23	-	2.03		0.30						
Mercury (discolved)	ua/l	1	0.20	0.02	-	0.03	-	0.1						
Hardness	ryr⊢ ma/Las CaCOa		0.29	162	<	1/7	<	155						
Silver (discolved)	mg/∟ as CaCO3	ļ	1 5	0.002	-	0.002	-	0.10						
	µg/∟ ug/l		1.5	0.003	<	202	<	21		+				
	P9/⊏ ug/l	25	1000	10	+	202	-	<u>د</u> ا ۱						
Arsenic (dissolved)	µg/∟	20	1900	1.2	_	0.9	<	1						
Barlum (dissolved)	µg/L	1000	29000	44	_	30		22						
Beryllium (dissolved)	µg/L	5000	67	< 0.007	-	0.023	<	0.5						
Boron (dissolved)	µg/L	5000	45000	20	_	13		26						
Bismuth (dissolved)	µg/L			0.007	_	0.008	<	1						
Calcium (dissolved)	µg/L	-	0.7	49900	_	53233		55500						
Cadmium (dissolved)	µg/L	5	2.7	0.01	_	0.04	<	0.1						
Cobalt (dissolved)	µg/L		66	0.502	_	1.019		0.61						
Chromium (dissolved)	µg/L		810	0.08	_	0.70	<	5						
Copper (dissolved)	µg/L	1000	87	0.79	_	1.92		1./						
Iron (dissolved)	µg/L			463	_	531		800		-				
Potassium (dissolved)	µg/L			14233	_	21433		14000		-				
Magnesium (dissolved)	µg/L			9223		3880		3800						
Manganese (dissolved)	µg/L			227		344		325						
Molybdenum (dissolved)	µg/L		9200	10.7	_	1.3		1.6						
Sodium (dissolved)	µg/L			1787		1010		1550						
Nickel (dissolved)	µg/L		490	2.2		1.7		1.3						
Phosphorus (dissolved)	mg/L			1.80		1.39		12						
Lead (dissolved)	µg/L	10	25	0.03		0.50	<	0.50						
Antimony (dissolved)	µg/L	6	20000	0.3		0.2		0.57						
Selenium (dissolved)	µg/L	10	63	0.4	_	0.3	<	2.0						
Tin (dissolved)	µg/L			0.2	_	0.1	<	1						
Strontium (dissolved)	µg/L			193	_	82		105						
Titanium (dissolved)	µg/L			0.53	_	10.39	<	5						
Thallium (dissolved)	µg/L		510	0.009	<	0.005	<	0.05						
Uranium (dissolved)	µg/L	20	420	0.863	_	0.296		0.27						
Vanadium (dissolved)	µg/L		250	1.16		2.19		1.8						
Zinc (dissolved)	µg/L		1100	< 2		7	<	5						
Lead-210	Bq/L	0.2		< 0.02	<	0.02	<	0.02						
Radium-226	Bq/L	0.49		< 0.01	<	0.02	<	0.04						
Thorium-230	Bq/L	0.65		< 0.01	<	0.01	<	0.07						
Thorium-232	Bq/L	0.6		< 0.01		0.01	<	0.06						
Field Parameters														
ODO % Sat	%			_2		_ ²		_2						
ORP	mV			_2		_ ²		_2						
SPC	µs/cm			_2	Τ	_ ²		_2						
Temperature	°C			_2	Τ	_ ²		_2						
Turbidity	FNU			_2	Τ	_2	Ì	_2						
рН	Units			_2	1	_2		_2		1				

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Table C-3: PG-BH1003B.

								PG	-BH1003B	003B				
		Crit	eria	2015	2016	2017	2018	2019			2020			
Parameter	Units	COPC	Table 3			Average			2020/01/21	2020/06/16	2020/07/21	2020/12/09	Average	
Hq	ρH			7.88		7.84	7.84	7.88	7.67	7.89	7.74	7.80	7.78	
Alkalinity	mg/L as CaCO3			255	248	218	238	235	231	230	231	224	229	
Carbonate	mg/L as CaCO3			_1	_1	1.4	1.6	1.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Bicarbonate	mg/L as CaCO3			_1	_1	215	235	235	231	230	231	224	229	
Total Dissolved Solids	mg/l			460	488	419	389	454	_4	451	431	423	435	
Fluoride	mg/L	1.5		0.08	0.09	< 0.10	< 0.10	0.11	0.11	< 0.06	0.08	0.10	0.09	
Total Organic Carbon	mg/L			_1	_1	15	1.8	15	1.0	1.0	2.0	1.0	1.3	
Dissolved Organic Carbon	mg/L			24	19	1.9	14	1.3	1.0	2.0	2.0	1.0	1.5	
Ammonia+Ammonium (N)	as Nmo/l	-		0.090	0.087	0.058	0.058	0.073	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040	
Chloride (dissolved)	ma/l	-		18	15	17	14	15	16	18	21	24	20	
Sulphate (dissolved)	mg/L	-		73	74	65	65	70	70	70	68	65	68	
Bromide (dissolved)	mg/L	-		< 0.3	< 0.3	< 10	< 10	< 10	< 03	< 0.3	< 0.3	< 0.3	< 0.3	
Nitrite (as N)	as Nmg/L			< 0.030	< 0.030	0.012	< 0.010	< 0.010	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	
Nitrate (as N)	as Nmg/L			12 20	14 30	10.06	11 20	10.30	10.40	10.30	10.40	14.40	11 38	
Nitrate + Nitrite (as N)	as Nmg/L			12.20	14.30	10.00	11.20	10.30	10.40	10.30	10.40	14.40	11.30	
Mercury (dissolved)		1	0.20	0.01	< 0.01	< 0.00	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Hardness	mg/L as CaCO3	- 1	0.23	372	388	313	343	360	356	384	407	362	377	
Silver (dissolved)	ug/L		15	0.003	< 0.002	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
	r9′⊏ ug/l		1.5	10.003	10.002	× 0.10	1/2	× 0.10	20.05	< 1	- 0.00	× 0.05 A	5/	
Areenic (dissolved)	ру/L ug/l	25	1000	10.8	19.0	404	14.0	0.0	209	- 02	- 02	4	- 0.2	
Arsenic (dissolved)	µg/∟	1000	20000	0.3	< 0.2 61.0	< 1.0	< 1.0 FF	< 1.0 60	< 0.2	< 0.2 50	< 0.2	< 0.2	< 0.2 60	
Danum (dissolved)	µg/L	1000	29000	50.9	01.0	40	55	0.50	0.01	59	0.01	0.01	02	
Derymunn (dissolved)	µg/L	5000	45000	< 0.01	< 0.01	< 0.50	< 0.50	< 0.50	0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Boron (dissolved)	µg/L	5000	40000	8	9	12	< 10	10	7	/	8	/	/	
Bismuth (dissolved)	µg/L			< 0.01	< 0.01	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	
Calcium (dissolved)	µg/L	-	0.7	122500	12/66/	106000	107500	110000	109000	0.004	125000	0.004	0.004	
Cadmium (dissolved)	µg/L	5	2.7	0.003	0.003	< 0.10	< 0.10	< 0.10	0.003	0.004	< 0.003	0.004	0.004	
Cobait (dissolved)	µg/L		00	0.06	0.04	< 0.50	< 0.50	< 0.50	0.06	0.03	0.03	0.02	0.04	
Chromium (dissolved)	µg/L	4000	810	1.49	1.80	< 5.0	< 5.0	< 5.0	1.83	2.22	2.40	1.49	1.99	
Copper (dissolved)	µg/L	1000	87	0.6	0.5	1.2	< 1.0	< 1.0	0.5	0.4	1.0	1.1	0.9	
Iron (dissolved)	µg/L			< 3	< /	2/3	< 100	< 100	126	< /	< /	8	3/	
Potassium (dissolved)	µg/L			584	624	508	5/3	643	749	< 9	/56	936	613	
Wagnesium (dissolved)	µg/L			15925	16633	11525	16250	19500	20300	20400	21100	22200	21000	
Ivlanganese (dissolved)	µg/L		0000	0.1	0.1	9	< 2.0	< 2.0	3.32	0.04	0.05	0.97	1.10	
Molybdenum (dissolved)	µg/L		9200	0.54	0.31	< 0.50	< 0.50	< 0.50	0.18	0.18	0.32	0.69	0.34	
Sodium (dissolved)	µg/L			5338	5460	4675	5075	5225	5310	5080	5360	5070	5205	
Nickel (dissolved)	µg/L		490	0.5	0.3	< 1.0	< 1.0	< 1.0	0.20	0.20	0.20	0.50	0.28	
Phosphorus (dissolved)	mg/L	- 10		0.60	0.13	0.01	0.05	0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	
Lead (dissolved)	µg/L	10	25	0.02	0.01	0.68	< 0.50	< 0.50	0.12	< 0.01	0.03	0.01	0.04	
Antimony (dissolved)	µg/L	6	20000	< 0.20	< 0.20	0.54	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	
Selenium (dissolved)	µg/L	10	63	0.85	1.31	< 2.0	< 2.0	< 2.0	0.92	1.11	1.19	0.74	0.99	
Tin (dissolved)	µg/L			0.06	0.07	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06	0.07	0.23	0.11	
Strontium (dissolved)	µg/L			240	228	198	218	225	233	229	247	252	240	
Litanium (dissolved)	µg/L			0.18	0.09	12	< 5.0	< 5.0	5.33	0.08	< 0.05	0.09	1.39	
Ihallium (dissolved)	µg/L		510	0.007	< 0.005	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
Uranium (dissolved)	µg/L	20	420	0.499	0.503	0.478	0.445	0.465	0.504	0.466	0.543	0.671	0.546	
Vanadium (dissolved)	µg/L		250	0.35	0.29	0.59	< 0.50	< 0.50	0.46	0.28	0.37	0.78	0.47	
∠inc (dissolved)	µg/L		1100	2.0	2.3	< 5.0	< 5.0	< 5.0	< 2	< 2	< 2	4	3	
Lead-210	Bq/L	0.2		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	
Radium-226	Bq/L	0.49		0.018	0.023	< 0.040	< 0.040	< 0.040	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	
Thorium-230	Bq/L	0.65		< 0.010	< 0.010	< 0.070	< 0.070	< 0.070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	
Thorium-232	Bq/L	0.6		< 0.010	< 0.010	< 0.060	< 0.060	< 0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	
Field Parameters													ļ	
ODO % Sat	%			- ²	- ²	- ²	- ²	- ²	83.4	-3	-3	-3		
ORP	mV			- ²	-3	-3	-3							
SPC	µs/cm			- ²	- ²	- ²	- ²	- ²	311.6	-3	-3	-3		
Temperature	°C			- ²	- ²	- ²	- ²	- ²	6.878	-3	-3	-3		
Turbidity	FNU			- ²	- ²	- ²	- ²	- ²	5.43	-3	-3	-3		
рН	Units			_ ²	- ²	- ²	- ²	- ²	8.08	-3	-3	-3		

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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

 $\ensuremath{\textbf{Bold}}\xspace$ values indicate an exceedance of the COPC or Table 3 criteria.

¹ Analysis not included in laboratory contract.

 $^{\rm 2}$ Field parameters included for current sampling year only.

 $^{\rm 3}$ Insufficient volume of groundwater for field parameters

⁴ Not reported by the lab for this sample -- - No data.

Table C-4: PG-BH1003C.

								PG	-BH1003C					
		Crit	eria	2015	2016	2017	2018	2019			2020			
Parameter	Units	COPC	Table 3			Average			2020/01/21	2020/06/16	2020/07/21	2020/12/09	Average	
pН	pН			7.80	7.97	7.95	7.89	7.87	7.76	7.61	7.67	-4	7.68	
Alkalinity	mg/L as CaCO3			217	205	210	220	205	206	223	211	-4	213	
Carbonate	mg/L as CaCO3			_ ¹	_1	1.8	1.6	1.5	< 1.0	< 1.0	< 1.0	-4	< 1.0	
Bicarbonate	mg/L as CaCO3			_1	_1	207.5	220	205	206	223	211	-4	213	
Total Dissolved Solids	mg/L			427	418	388	379	398	_5	423	400	-4	412	
Fluoride	ma/L	1.5		0.10	0.10	< 0.11	< 0.10	< 0.10	0.11	< 0.06	0.09	_4	0.09	
Total Organic Carbon	ma/L	-		_1	_1	2.2	1.6	1.9	2.0	2.0	2.0	_4	2.0	
Dissolved Organic Carbon	ma/L			1.8	1.4	1.6	1.4	1.8	2.0	3.0	2.0	_4	2.3	
Ammonia+Ammonium (N)	as N mo/L			0.090	< 0.040	< 0.050	< 0.050	< 0.050	< 0.040	< 0.040	< 0.040	_4	< 0.040	
Chloride (dissolved)	ma/L			15	13	15	14	15	16	30	26	_4	24	
Sulphate (dissolved)	ma/L			77	74	63	65	56	56	64	67	_4	62	
Bromide (dissolved)	ma/L			< 0.3	< 0.3	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	_4	< 0.3	
Nitrite (as N)	as N mo/L			< 0.030	< 0.030	< 0.010	< 0.010	< 0.010	< 0.030	< 0.030	< 0.030	-4	< 0.030	
Nitrate (as N)	as N mg/l			10.37	10.51	8.66	9.93	11.36	10.30	8.08	8.90	_4	9.09	
Nitrate + Nitrite (as N)	as N mg/l			10.37	10.51	8.66	9.93	11.36	10.30	8.08	8.90	_4	9.09	
Mercury (dissolved)	ug/l	1	0.29	0.01	< 0.01	< 0.00	< 0.10	< 0.10	< 0.01	< 0.01	< 0.00	< 0.01	< 0.00	
Hardness	mg/L as CaCO3	-	0.20	333	334	300	320	325	323	359	355	- ⁴	346	
Silver (dissolved)	11g/L do 60000		15	0.004	0.027	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Aluminum (dissolved)	r9'-			11 1	13.0	< 5	< 50	< 50	× 0.00 82	2 2	2 1	2 1	2 0.00	
Arsenic (dissolved)	149/L	25	1900	0.6	0.4	2 10	< 10	< 10	< 0.2	< 0.2	0.2	2 02	0.2	
Barium (dissolved)	P9/L	1000	20000	60.0	61.7	< 1.0 61	2.1 2	2.1.2	× 0.2	~ 0.2	70.2	1	5/	
Banullium (dissolved)	µg/∟ ug/l	1000	23000	00.2	01.7	0.50	< 0.50	× 0.50	- 0.01	7.5	78	- 0.01	J4	
Beron (dissolved)	µg/∟ ug/l	5000	45000	< 0.01 10	10	< 0.50	< 0.50	< 10	< 0.01	< 0.01	0.01	< 0.01	× 0.01	
Doron (dissolved)	µg/∟ ug/l	5000	43000	10	0.06	14	< 10	< 10	7	0 007	9	< 2	/	
Calaium (dissolved)	µg/∟ ug/l			< 0.01	0.20	< 1.0	< 1.0	< 1.0	0.020	< 0.007	< 0.007	< 0.007	77000	
Calcium (dissolved)	µg/L	E	27	0/025	0.020	01500	07250	93750	90000	106000	103000	200	0.004	
Caumium (dissolved)	µg/L	5	2.1	< 0.003	0.020	< 0.10	< 0.10	< 0.10	0.006	< 0.003	0.003	0.003	0.004	
Cobail (dissolved)	µg/L		910	0.04	0.14	< 0.50	< 0.50	< 0.50	0.07	0.03	0.03	0.03	0.04	
Chromium (dissolved)	µg/∟ ug/l	1000	010	0.5	1.0	< 5.0	< 5.0	< 5.0	0.00	0.55	0.78	0.45	0.07	
Copper (dissolved)	µg/∟ ug/l	1000	0/	I.I E	0.7	< 1.0	< 1.0	< 1.0	0.8	0.7	0.7	1.0	0.0	
Potoosium (diagolyad)	µg/∟ ug/l			1707	1900	4575	4676	< 100 1505	1620	< /	1670	< /	23	
Potassium (dissolved)	µg/L			1/8/	1890	1575	15/5	1525	1620	< 9	1670	< 9	827	
Magnesium (dissolved)	µg/L			27750	28400	23250	24250	21500	19900	19800	22500	24	15556	
	µg/L		0000	0.2	0.0	< 2.0	< 2.0	2.2	3.30	0.16	0.08	0.39	0.90	
Nolybaenum (dissolvea)	µg/L		9200	0.99	0.93	0.80	0.82	0.71	0.68	0.71	0.67	0.61	0.67	
Sodium (dissolved)	µg/L		400	5656	5843	5025	51/5	4//5	4700	4570	5290	390	3738	
Nickei (dissoived)	µg/L		490	0.4	0.5	< 1.0	< 1.0	< 1.0	0.20	0.30	0.40	< 0.10	0.25	
Phosphorus (dissolved)	mg/L	40	05	0.11	0.10	0.61	0.01	0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	
Lead (dissolved)	µg/L	10	25	0.02	0.13	< 0.50	< 0.50	< 0.50	0.06	< 0.01	0.01	0.07	0.04	
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.28	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90	
Selenium (dissolved)	µg/L	10	63	0.7	0.9	< 2.0	< 2.0	< 2.0	0.37	0.55	0.54	< 0.04	0.38	
Tim (dissoived)	µg/L			0.1	0.3	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06	< 0.06	0.18	0.09	
Suontium (dissolved)	µg/∟			238	222	210	220	210	210	239	228	0.94	169	
Thanium (dissolved)	µg/L		540	0.2	1.3	< 5	< 5.0	< 5.0	4.34	0.10	< 0.05	< 0.05	1.14	
Inailium (dissolved)	µg/L		510	0.008	0.016	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
Uranium (dissolved)	µg/∟	20	420	4.4	4.5	4.0	3.8	2.8	2.59	2.98	3.61	0.12	2.33	
vanadium (dissolved)	µg/L		250	0.81	0.69	0.57	0.55	0.52	0.63	0.50	0.51	0.03	0.42	
∠inc (dissolved)	µg/L		1100	2.3	2.8	< 5.0	< 5.0	< 5.0	< 2	< 2	< 2	< 2	< 2	
Lead-210	Bq/L	0.2		< 0.02	< 0.02	< 0.02	0.10	0.11	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	
Radium-226	Bq/L	0.49		< 0.013	0.025	< 0.040	< 0.040	< 0.040	0.010	0.020	< 0.010	< 0.010	0.013	
Thorium-230	Bq/L	0.65		< 0.010	0.025	< 0.070	< 0.070	< 0.070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	
Thorium-232	Bd/L	0.6		< 0.010	0.023	< 0.060	< 0.060	< 0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	
Field Parameters				0	0	0	0	0		•				
ODO % Sat	%			-2	-4		-4	-2	54.2	- 3	-3	-3		
UKP	mV			- ²	-2	-2	-2	- ²	85.5	-3	-3	-3		
SPC	µs/cm			-2	-2	-2	-2	- ²	542.0	-3	-3	-3		
Temperature	°C			-2	-2	- ²	-2	- ²	8.2	-3	-3	-3		
Turbidity	FNU			_2	-2	-2	-2	-2	4.5	-3	-3	-3		
рН	Units			_ ²	- ²	- ²	- ²	- ²	7.65	-3	-3	-3		

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

 $^{\rm 2}$ Field parameters included for current sampling year only.

³ Insufficient volume of groundw ater for field parameters ⁴ Insufficient volume of groundw ater for full sample collection

⁵ Not reported by the lab for this sample

Table C-5: PG-BH1003D.

								PG	-BH1003D				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/01/21	2020/06/16	2020/07/21	2020/12/09	Average
рН	pН			7.84	7.93	7.87	7.81	7.85	7.64	7.63	7.64	7.79	7.68
Alkalinity	mg/L as CaCO3			243	236	240	245	240	253	250	262	250	254
Carbonate	mg/L as CaCO3			_1	- ¹	1.7	1.5	1.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			_ ¹	- ¹	240	245	240	253	250	262	250	254
Total Dissolved Solids	mg/L			461	454	407	375	431	_4	446	420	403	423
Fluoride	mg/L	1.5		0.07	0.08	0.12	< 0.10	< 0.10	0.08	< 0.06	< 0.06	< 0.06	0.07
Total Organic Carbon	mg/L			_1	_1	2.0	2.0	2.1	1.0	1.0	1.0	1.0	1.0
Dissolved Organic Carbon	mg/L			2.1	1.1	1.4	1.3	1.3	1.0	2.0	2.0	1.0	1.5
Ammonia+Ammonium (N)	as N mo/L			0.065	< 0.040	< 0.050	0.059	0.093	< 0.040	< 0.040	< 0.040	< 0.040	< 0.040
Chloride (dissolved)	ma/L			23	19	18	14	15	15	17	17	20	17
Sulphate (dissolved)	ma/L			83	76	64	63	62	60	62	64	69	64
Bromide (dissolved)	ma/L			< 0.3	< 0.3	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mo/L			< 0.030	< 0.030	< 0.010	< 0.010	< 0.010	< 0.030	< 0.030	< 0.030	< 0.03	< 0.030
Nitrate (as N)	as N mg/l			7.97	7 87	7 74	8 89	8 17	8 45	7.50	7 39	7 16	7.63
Nitrate + Nitrite (as N)	as N mg/L			7.97	7 87	7 74	8 89	8 17	8 45	7.50	7.39	7 16	7.63
Mercury (dissolved)	ug/l	1	0.29	0.02	< 0.01	< 0.10	< 0.00	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3		0.20	369	373	323	340	348	428	405	432	364	407
Silver (dissolved)	ug/l		15	0.004	< 0.002	< 0.10	< 0.10	< 0.10	0.09	< 0.05	< 0.05	< 0.05	0.06
Aluminum (dissolved)	r9/⊏ ua/l		1.5	11 2	20.002	2 5	17.5	< 50	2/20	2 0.00	2 1	2 0.00	614
Arsonic (dissolved)	1997 - Lug/l	25	1900	0.7	20.0	- 10	- 10	< 1.0	0.5	< 0.2	0.2	< 0.2	014
Barium (dissolved)	P9/⊏ ug/l	1000	20000	6/ 1	0.262.8	< 1.0 5Ω	50	1.061	0.0 80	~ 0.2 62	60	× 0.2	70
Banullium (dissolved)	µg/L	1000	23000	04.1	02.0	- 0.50	J9	< 0.50	0.10	02	0.01	0.007	0.02
Beron (dissolved)	µg/L	5000	45000	< 0.01	< 0.01	< 0.50	< 0.50	< 0.50	0.10	< 0.01	< 0.01	< 0.007	0.03
Boron (dissolved)	µg/L	5000	43000	. 0.01	9	13	< 10	< 10	0 010	/	7	0	0
Bismuth (dissolved)	µg/L			< 0.01	< 0.01	< 1.0	< 1.0	< 1.0	0.012	< 0.007	< 0.007	< 0.007	0.008
Calcium (dissolved)	µg/L	F	0.7	0.000	107000	92750	98000	99250	133000	101000	104000	96200	0.010
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	< 0.003	< 0.10	< 0.10	< 0.10	0.053	< 0.003	0.004	0.010	0.018
Cobait (dissolved)	µg/L		66	0.06	0.03	< 0.50	< 0.50	< 0.50	1.09	0.04	0.03	0.008	0.29
Chromium (dissoived)	µg/L	4000	810	1.3	1.3	< 5.0	< 5.0	< 5.0	4.88	1.31	1.34	0.84	2.09
Copper (dissolved)	µg/L	1000	87	0.5	0.5	< 1.0	< 1.0	< 1.0	3.7	0.8	0.6	0.7	1.5
Iron (dissolved)	µg/L			4	< /	< 100	< 100	< 100	2280	23	< /	< /	579
Potassium (dissolved)	µg/L			847	8//	790	838	853	1660	< 9	954	1670	1073
Magnesium (dissolved)	µg/L			25925	25633	22000	23000	23000	23100	20900	22600	21500	22025
Manganese (dissolved)	µg/L			0.1	0.1	< 2.0	2.7	< 2.0	97.10	1.88	0.10	0.39	24.87
Molybdenum (dissolved)	µg/L		9200	0.24	0.24	< 0.50	< 0.50	< 0.50	0.26	0.22	0.22	1.11	0.45
Sodium (dissolved)	µg/L			5220	5190	4425	4525	4525	4660	4260	4700	4960	4645
Nickel (dissolved)	µg/L		490	0.3	0.3	< 1.0	< 1.0	< 1.0	2.30	0.30	0.20	0.30	0.78
Phosphorus (dissolved)	mg/L			0.04	0.05	0.16	0.12	0.21	0.110	0.003	< 0.003	< 0.003	0.030
Lead (dissolved)	µg/L	10	25	0.02	0.01	< 0.50	< 0.50	< 0.50	1.47	0.03	< 0.01	< 0.01	0.38
Antimony (dissolved)	µg/L	6	20000	< 0.20	< 0.20	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.7	0.9	< 2.0	< 2.0	< 2.0	0.57	0.73	0.80	0.78	0.72
Tin (dissolved)	µg/L			0.1	0.1	< 1.0	< 1.0	< 1.0	0.54	0.12	0.12	0.08	0.22
Strontium (dissolved)	µg/L			252	231	225	228	228	272	232	235	232	243
Titanium (dissolved)	µg/L			0.2	0.1	< 5	5.2	< 5.0	120	1.28	0.08	< 0.05	30.35
Thallium (dissolved)	µg/L		510	0.007	< 0.005	< 0.050	< 0.050	< 0.050	0.035	< 0.005	< 0.005	< 0.005	0.013
Uranium (dissolved)	µg/L	20	420	0.72	0.68	0.65	0.64	0.63	0.81	0.66	0.68	4.00	1.54
Vanadium (dissolved)	µg/L		250	0.89	0.89	0.68	0.73	0.70	4.59	0.86	0.80	0.59	1.71
Zinc (dissolved)	µg/L		1100	2.8	2.3	< 5.0	< 5.0	< 5.0	13	3.0	< 2.0	< 2.0	5.0
Lead-210	Bq/L	0.2		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.02	< 0.02	0.03	< 0.02	0.02
Radium-226	Bq/L	0.49		< 0.013	0.013	< 0.040	< 0.040	< 0.040	< 0.010	< 0.010	0.010	< 0.010	< 0.010
Thorium-230	Bq/L	0.65		< 0.010	< 0.010	< 0.070	< 0.070	< 0.070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L	0.6		< 0.010	0.010	< 0.060	< 0.060	< 0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters													
ODO % Sat	%			_2	_2	- ²	_2	_ ²	75.9	_3	-3	-3	
ORP	mV			_2	_2	- ²	_2	_2	96.5	_3	_3	-3	
SPC	µs/cm			-2	_2	- ²	_2	_2	552.0	_3	_3	-3	
Temperature	°C			-2	_2	-2	_2	-2	8.551	_3	_3	-3	
Turbidity	FNU			_2	-2	-2	-2	-2	238.37	_3	-3	-3	
рН	Units			_2	_2	-2	_2	_2	7.53	_3	_3	-3	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

 $^{\rm 3}$ Insufficient volume of groundwater for field parameters

⁴ Not reported by the lab for this sample -- - No data.

Table C-6: PG-MW03-01A.

								PG-I	/IW03-01A				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/02/17	2020/06/23	2020/07/30	2020/12/10	Average
pН	pН					No Sam ple	due to cor	struction	7.99	7.91	No Sample ³	No Sample ³	7.95
Alkalinity	mg/L as CaCO3			188	218				1356	828			1092
Carbonate	mg/L as CaCO3			_1	-1				167	< 1.0			84
Bicarbonate	mg/L as CaCO3			-1	-1				1190	828			1009
Total Dissolved Solids	mg/L			326	234				266	286			276
Fluoride	mg/L	1.5		0.15	0.14				0.14	0.17			0.16
Total Organic Carbon	mg/L			_1	-1				< 1.0	< 1.0			< 1.0
Dissolved Organic Carbon	mg/L			1.3	1.0				< 1.0	1.0			< 1.0
Ammonia+Ammonium (N)	as N mg/L			0.053	0.105				0.060	0.060			0.060
Chloride (dissolved)	mg/L			7.7	7.9				8	11			10
Sulphate (dissolved)	mg/L			53	55				55	53			54
Bromide (dissolved)	mg/L			< 0.3	< 0.3				< 0.3	< 0.3			< 0.3
Nitrite (as N)	as N mg/L			< 0.030	< 0.030				< 0.030	< 0.030			< 0.030
Nitrate (as N)	as N mg/L			0.14	0.13				< 0.06	< 0.06			< 0.06
Nitrate + Nitrite (as N)	as N mo/L			0.14	0.13				< 0.06	< 0.06			< 0.06
Mercury (dissolved)	ua/L	1	0.29	0.01	< 0.01				< 0.01	< 0.01			< 0.01
Hardness	mg/L as CaCO3			220	230				253	6250			3252
Silver (dissolved)	ua/L		1.5	0.002	< 0.002				< 0.05	< 0.05			< 0.05
Aluminum (dissolved)	µg/L			11.2	9.5				69	19			44
Arsenic (dissolved)	µg/L	25	1900	1.5	1.7				0.9	1.7			1.3
Barium (dissolved)	ua/L	1000	29000	122.0	112.0				122	148			135
Beryllium (dissolved)	µg/L		67	0.007	< 0.007				< 0.01	< 0.01			< 0.01
Boron (dissolved)	µg/L	5000	45000	15	20				13	30			22
Bismuth (dissolved)	µg/L			< 0.007	< 0.007				< 0.007	< 0.007			< 0.007
Calcium (dissolved)	µg/L			49750	53150				58800	52000			55400
Cadmium (dissolved)	µg/L	5	27	0.017	0.008				< 0.003	< 0.003			< 0.003
Cobalt (dissolved)	µg/L		66	0.017	0.000				0.000	0.000			0.000
Chromium (dissolved)	µg/L		810	< 0.03	0.177				0.14	0.12			0.10
Copper (dissolved)	µg/L	1000	87	0.3	0.21				2.3	0.10			1.4
Iron (dissolved)	µg/L	1000		10	<u>د</u> 7				121	27			74
Potassium (dissolved)	µg/L			1473	1485				1320	1480			1400
Magnesium (dissolved)	µg/L			23250	25100				25900	25900			25900
Magnesian (dissolved)	µg/L			10.4	67				20000	9.62			15 11
Molybdenum (dissolved)	µg/L		9200	1 23	2 74				1 15	1 93			1 54
Sodium (dissolved)	µg/L		0200	6623	6840				6760	8890			7825
Nickel (dissolved)	µg/L		490	1.2	1 4				0.40	0.70			0.55
Phosphorus (dissolved)	mg/L		400	0.130	0.225				0.10	0.010			0.00
Lead (dissolved)	ug/l	10	25	0.05	0.04				0.020	0.05			0.010
Antimony (dissolved)	µg/L	6	20000	0.30	0.45				< 0.90	< 0.90			< 0.90
Selenium (dissolved)	µg/L	10	63	0.52	0.06				< 0.00	< 0.04			< 0.00
Tin (dissolved)	µg/L			0.45	0.52				0.24	0.38			0.31
Strontium (dissolved)	µg/L			351	341				399	378			389
Titanium (dissolved)	ua/L	-		0.20	0.12				3.55	1.26			2.41
Thallium (dissolved)	ua/L		510	0.006	< 0.005				< 0.005	< 0.005			< 0.005
Uranium (dissolved)	µg/L	20	420	0.398	0.395				0.07	0.34			0.21
Vanadium (dissolved)	ua/L		250	1.35	1.18				0.34	1.53			0.94
Zinc (dissolved)	µg/L		1100	2.8	5.0				2.0	2.0			2.0
Lead-210	Ba/l	0.2		< 0.02	< 0.02				0.03	< 0.02			< 0.03
Radium-226	Ba/L	0.49		0.023	0.015				< 0.010	< 0.010			< 0.010
Thorium-230	Ba/L	0.65		< 0.013	< 0.010				< 0.020	< 0.020			< 0.020
Thorium-232	Ba/L	0.6		< 0.013	< 0.010				< 0.020	< 0.020			< 0.020
Field Parameters		0.0							0.020				
ODO % Sat	%			_2	_2	_2	_2	_2	27.2	52.5			
ORP	m\/			_2	_2	_2	_2	_2	74.5	128.0			
SPC	us/cm			_2	_2	_2	_2	_2	415 1	407.6			
Temperature	°C.			_2	_2	_2	_2	_2	R 162	16 71 9			
Turbidity	FNU			_2	_2	_2	_2	_2	8075 10	3508 10			
	Linits			_2	_2	_2	_2	_2	Q E A	7 70			
Pri I	OFIILO			-	-	-	-	-	0.04	1.13			

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

³ Insufficient volume of groundw ater for sample collection --- No data.

Table C-7: PG-MW03-01B.

								PG-I	MW03-01B				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/02/17	2020/06/16	2020/07/30	2020/12/18	Average
pН	pН					No Sam ple	due to cor	nstruction	7.88	7.91	7.76	7.75	7.83
Alkalinity	mg/L as CaCO3			165	158				2328	752	197	185	866
Carbonate	mg/L as CaCO3			-1	-1				< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			-1	-1				< 1.0	752	197.0	185	284
Total Dissolved Solids	mg/L			337	323				314	329	369	323	334
Fluoride	mg/L	1.5		0.07	0.07				0.07	0.14	0.06	< 0.06	0.08
Total Organic Carbon	mg/L			_1	_1				< 1.0	1.0	< 1.0	< 1.0	1.0
Dissolved Organic Carbon	ma/L			1.1	1.0				2.0	2.0	< 1.0	1.0	1.5
Ammonia+Ammonium (N)	as N mo/L			0.388	0.070				0.100	0.060	< 0.040	0.060	0.065
Chloride (dissolved)	ma/L			9.4	9.5				12	13	14	15	14
Sulphate (dissolved)	ma/L			86	86				90	88	90	87	89
Bromide (dissolved)	ma/L			< 0.3	< 0.3				< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			0.043	< 0.030				< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			0.12	0.09				< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			0.14	0.09				< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	ug/l	1	0.29	< 0.01	< 0.01				< 0.01	< 0.01	< 0.01	0.03	0.02
Hardness	mg/L as CaCO3	-	0.20	240	245				282	12273	12000	470	6256
Silver (dissolved)			15	< 0.002	< 0.002				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	µg/L		1.5	10.002	1.0				< 0.05 4	< 0.00 3	11	< 0.00	5
Arsenic (dissolved)	µg/L	25	1900	0.3	0.3				1.4	21	0.9	0.5	12
Barium (dissolved)	µg/L	1000	20000	118.5	111.0				85	70	50	55	67
Barullium (dissolved)	µg/L	1000	23000	- 0.007	< 0.007				< 0.01	/0	- 0.01	- 0.01	0,
Berginulli (dissolved)	µg/∟	5000	45000	< 0.007	< 0.007				< 0.01 11	< 0.01 12	< 0.01 15	< 0.01 10	< 0.01 12
Biomuth (dissolved)	µg/∟	5000	43000	10	10				- 0.007	12	10	10	12
Coloium (dissolved)	µg/∟ ug/l			< 0.007	< 0.007				< 0.007	< 0.007	< 0.007	< 0.007	< 0.007 91700
Calcium (dissolved)	µg/L	E	27	73000	74000				0.002	1 0.002	79400	02000	0.002
Cadmum (dissolved)	µg/L	5	2.7	< 0.003	< 0.003				0.003	< 0.003	< 0.003	< 0.003	0.003
Cobait (dissolved)	µg/L		00	0.055	0.044				0.08	0.04	0.06	0.08	0.06
Chromium (dissolved)	µg/L	4000	810	< 0.03	0.29				< 0.08	< 0.08	0.21	< 0.08	0.11
Copper (dissolved)	µg/L	1000	0/	0.2	0.2				1.0	0.4	0.3	0.2	0.7
Deteccium (discolved)	µg/L			1676	10				20 1770	6/	23	320	113
Magnasium (dissolved)	µg/L			1375	1375				1770	< 9	1500	12200	14225
Magnesium (dissolved)	µg/∟ ug/l			14075	10.6				11 20	10.90	13200	13200	14323
Mahyanese (dissolved)	µg/L		0200	0.74	0.75				0.05	10.60	12.30	0.79	12.33
	µg/L		9200	0.74	0.75				0.95	0.97	0.85	0.78	0.09
Sodium (dissolved)	µg/L		400	4008	9605				4820	4590	4640	4280	4583
Nickel (dissolved)	µg/L		490	0.5	0.2				0.40	0.40	< 0.10	0.20	0.28
Phosphorus (dissolved)	rng/∟	40	05	0.100	0.055				< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	0.07	< 0.01				0.02	0.02	< 0.01	0.05	0.03
Antimony (dissolved)	µg/L	6	20000	< 0.20	< 0.20				< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
	µg/L	10	03	0.52	< 0.04				< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Tin (dissoived)	µg/L			0.10	0.07				0.12	0.30	0.31	0.17	0.23
Strontium (dissolved)	µg/L			146	140				149	142	138	138	142
Titanium (dissolved)	µg/L		= 10	0.17	< 0.05				0.20	0.09	1.15	0.06	0.38
Thallium (dissolved)	µg/L		510	0.007	< 0.005				< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.075	0.130				0.33	0.42	0.31	0.08	0.28
Vanadium (dissolved)	µg/L		250	0.23	0.12				0.43	0.53	0.47	0.15	0.40
Zinc (dissolved)	µg/L		1100	2.3	< 2.0				3.0	< 2.0	< 2.0	< 2.0	2.3
Lead-210	Bq/L	0.2		< 0.02	< 0.02				0.02	< 0.02	< 0.02	< 0.02	0.02
Kadium-226	Bd/L	0.49		< 0.011	< 0.020				< 0.010	0.010	< 0.010	< 0.010	0.010
Thorium-230	Bq/L	0.65		< 0.010	< 0.010				< 0.020	< 0.020	0.020	< 0.020	0.020
Thorium-232	Bq/L	0.6		< 0.010	< 0.010				< 0.020	< 0.020	0.030	< 0.020	0.023
Field Parameters	ļ												
ODO % Sat	%			-2	-2	-2	-2	-2	13.2	24.0	12.5	35.5	
ORP	mV			_2	-2	-2	_2	-2	-122.7	-115.1	-76.7	-81.6	
SPC	µs/cm			_ ²	- ²	- ²	_ ²	- ²	352.1	377.8	396.7	548.0	
Temperature	°C			_2	- ²	- ²	_2	-2	9.647	12.049	13.638	8.623	
Turbidity	FNU			<u>-</u> ²	- ²	- ²	<u>-</u> 2	- ²	826.79	526.36	741.75	1418.20	
рН	Units			_ ²	- ²	- ²	_2	- ²	7.74	7.86	7.80	7.92	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Table C-8: PG-MW03-01C.

								PG-I	MW03-01C				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/02/17	2020/06/11	2020/07/30	2020/12/10	Average
рH	pН					No Sample	e due to cor	nstruction	7.52	7.50	7.54	7.58	7.54
Alkalinity	mg/L as CaCO3			312	171				491	522	365	315	423
Carbonate	mg/L as CaCO3			_1	_1				< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			_1	_1				491.0	522	365.0	315	423
Total Dissolved Solids	ma/L			412	299				497	489	514	494	499
Fluoride	ma/L	1.5		< 0.06	0.07				< 0.06	< 0.06	< 0.06	0.12	0.08
Total Organic Carbon	ma/l			_1	_1				1.0	10	1.0	1.0	10
Dissolved Organic Carbon	ma/L			1.3	1.3				1.0	1.0	2.0	2.0	1.5
Ammonia+Ammonium (N)	as N mo/L			0.043	< 0.040				< 0.040	0.050	< 0.040	< 0.040	0.043
Chloride (dissolved)	ma/l			24.0	32.5				39	40	44	48	43
Sulphate (dissolved)	mg/l			19	94				44	51	57	60	53
Bromide (dissolved)	mg/l			< 0.3	< 0.3				< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mo/L			< 0.030	< 0.030				< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			4 85	3.32				4 01	3.62	3.60	4 03	3.82
Nitrate + Nitrite (as N)	as N mg/L			4 85	3.32				4 01	3.62	3.60	4 03	3.82
Mercury (dissolved)	ug/l	1	0.29	< 0.01	< 0.01				< 0.01	< 0.01	< 0.00	0.02	0.01
Hardness	mg/L as CaCO3	-	0.20	338	390				481	14200	20600	7680	10740
Silver (dissolved)			15	0.004	< 0.002				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	r9'- ug/l			11 4	< 10				2 2	1	21	23	12
Arsenic (dissolved)	r9'- ug/l	25	1900	03	< 0.2				< 0.2	< 0.2	03	< 0.2	0.2
Barium (dissolved)	µg/L	1000	29000	32.0	34.5				40	< 0.2 38	39	42	40
Bervillium (dissolved)	µg/L	1000	67	0.009	< 0.007				< 0.007	< 0.007	0.013	< 0.007	0,000
Boron (dissolved)	µg/L	5000	45000	17	< 0.007				< 0.007 16	17	0.013	< 0.007 23	20
Bismuth (dissolved)	µg/L	3000	43000	< 0.007	- 0.007				< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			121500	1/2000				176000	145000	162000	170000	163250
Cadmium (dissolved)	µg/L	5	27	0.007	< 0.003				< 0.003	< 0.003	0.012	0.003	0.005
Caurilum (dissolved)	µg/∟	5	2.1	0.007	< 0.003				< 0.003	< 0.003	0.012	0.003	0.005
Cobait (dissolved)	µg/∟		910	0.040	0.017				0.03	0.04	0.05	0.01	0.03
Copper (dissolved)	µg/∟ ug/l	1000	87	0.43	0.07				0.03	0.00	0.58	0.50	0.01
lron (dissolved)	µg/L	1000	01	0.0	- 7				0.5	10	59	20	0.0
Potassium (dissolved)	µg/L			522	533				507	535	58/	556	568
Magnesium (dissolved)	µg/L			8273	8/10				10100	9440	9680	0880	0775
Magnesium (dissolved)	µg/L			0.08	0410				0.28	0.24	2 28	1.46	1.07
Molybdenum (dissolved)	µg/L		9200	0.00	0.10				< 0.04	< 0.04	0.08	0.37	0.13
Sodium (dissolved)	µg/L		5200	13800	20000				12300	14300	15200	15300	14275
Nickel (dissolved)	µg/L		490	0.2	0.1				0.30	0.10	- 0.10	0.20	0.18
Phosphorus (dissolved)	mg/L		430	0.2	0.050				< 0.003	< 0.003	0.003	< 0.003	0.10
Lead (dissolved)	ug/L	10	25	0.130	0.000				< 0.000	< 0.000	0.000	0.005	0.000
Antimony (dissolved)	µg/L	6	20000	0.00	< 0.01				< 0.01	< 0.01	< 0.01	0.00	< 0.02
Selenium (dissolved)	µg/L	10	63	0.20	0.20				0.70	0.50	0.49	0.52	0.50
Tin (dissolved)	µg/L	10		0.05	0.03				0.13	0.00	0.10	0.02	0.00
Strontium (dissolved)	ug/l			209	231				294	261	273	294	281
Titanium (dissolved)	r9/- ug/l			0.13	0.06				< 0.05	0.21	215	1 33	1 23
Thallium (dissolved)	µg/L		510	0.10	0.00				< 0.005	0.21	0.005	< 0.005	0.006
Liranium (dissolved)	µg/L	20	420	0.000	0.000				0.48	0.007	0.000	0.000	0.000
Vanadium (dissolved)	µg/L	20	250	0.402	0.400				0.40	0.50	0.64	0.65	0.50
Zinc (dissolved)	µg/L		1100	2.5	2.00				2.0	2.0	- 20	- 20	2.0
Lead-210	Ba/l	0.2	1100	< 0.02	0.04				0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radium-226	Ba/l	0.49		< 0.02	< 0.010				< 0.02	< 0.02	< 0.02	< 0.010	< 0.010
Thorium-230	Ba/l	0.45		< 0.000	< 0.010				< 0.020	< 0.020	< 0.010	< 0.020	< 0.010
Thorium-232	Ba/l	0.00		< 0.010	< 0.010				< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters		0.0		\$ 0.010	\$ 0.010				\$ 0.020	\$ 0.020	~ 0.020	\$ 0.020	. 0.020
ODO % Sat	0/_			2	2	2	2	2	52.0	ED 1	40.0	715	
	/0 m\/			2	2	- 2	- 2	2	107.9	00.4 175 F	43.3 172.6	14.0 151.0	
	ue/cm			2	2	2	2	2	605.0	140.0 926 0	950.0	957.0	
Tomporatura	µə/cm ∘C			2	2	2	2	2	0.450	10.950	0009.0	10 105	
				- 2	- 2	- 2	- 2	- 2	0.152	10.850	2560.00	2006 70	
	FINU			- 2	- 2	- 2	- 2	- 2	3004.10	3002.00	2000.20	2000.70	
рп	UNIIS								1.13	7.20	7.24	7.41	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Table C-9: PG-MW03-02A.

								PG-N	NW03-02A				
		Crite	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/03/17	2020/06/15	2020/08/06	2020/12/10	Average
рН	рН				No Sam ple	No Sam ple	due to cor	struction	No Sample ⁵	No Sample ⁶	_4	No Sample ⁶	
Alkalinity	mg/L as CaCO3			175							-4		
Carbonate	mg/L as CaCO3			_1							-4		
Bicarbonate	mg/L as CaCO3			_1							-4		
Total Dissolved Solids	mg/L			266							_4		
Fluoride	mg/L	1.5		0.18							-4		
Total Organic Carbon	mg/L			_1							_4		
Dissolved Organic Carbon	mg/L			1.2							-4		
Ammonia+Ammonium (N)	as N mg/L			0.050							_4		
Chloride (dissolved)	mg/L			4.8							_4		
Sulphate (dissolved)	mg/L			27							_4		
Bromide (dissolved)	mg/L			< 0.3							_4		
Nitrite (as N)	as N mg/L			< 0.030							-4		
Nitrate (as N)	as N mg/L			0.16							_4		
Nitrate + Nitrite (as N)	as N mg/L			0.16							_4		
Mercury (dissolved)	µg/L	1	0.29	< 0.01							_4		
Hardness	mg/L as CaCO3			194							_4		
Silver (dissolved)	μg/L		1.5	< 0.002							< 0.05		< 0.05
Aluminum (dissolved)	μg/L		-	11.6							2		2
Arsenic (dissolved)	μg/L	25	1900	2.3							1.9		1.9
Barium (dissolved)	ua/L	1000	29000	70.6							62.4		62.4
Bervllium (dissolved)	ua/L		67	< 0.007							< 0.007		< 0.007
Boron (dissolved)	µg/L	5000	45000	16							15		15
Bismuth (dissolved)	µg/L			< 0.007							< 0.007		< 0.007
Calcium (dissolved)	µg/L			36300							39000		39000
Cadmium (dissolved)	µg/L	5	2.7	0.006							0.003		0.003
Cobalt (dissolved)	µg/L	•	66	0.097							0.035		0.035
Chromium (dissolved)	µg/L		810	< 0.03							0.15		0.15
Copper (dissolved)	µg/L	1000	87	0.4							0.4		0.4
Iron (dissolved)	µg/L		•.	7							< 7		< 7
Potassium (dissolved)	µg/L			1360							1410		1410
Magnesium (dissolved)	µg/L			25200							25100		25100
Manganese (dissolved)	µg/L			34.9							10.5		10.5
Molybdenum (dissolved)	µg/L		9200	1.05							1.03		1.03
Sodium (dissolved)	µg/L			6750							6820		6820
Nickel (dissolved)	µg/L		490	1.0							0.4		0.4
Phosphorus (dissolved)	mg/l			0.080							< 0.003		< 0.003
Lead (dissolved)	ug/l	10	25	0.05							0.01		0.01
Antimony (dissolved)	µg/L	6	20000	0.40							< 0.90		< 0.90
Selenium (dissolved)	µg/L	10	63	< 1.00							< 0.04		< 0.04
Tin (dissolved)	ua/L			0.33							0.20		0.20
Strontium (dissolved)	ug/L			341							482		482
Titanium (dissolved)	ua/L			0.34							0.11		0.11
Thallium (dissolved)	ug/L		510	< 0.005							0.010		0.010
Uranium (dissolved)	ua/L	20	420	0.166							0.591		0.591
Vanadium (dissolved)	ua/L	•	250	0.37							1.14		1.14
Zinc (dissolved)	ug/L		1100	4 0							< 20		< 20
Lead-210	Ba/L	0.2		0.04							< 0.02		< 0.02
Radium-226	-r- Ba/L	0.49		< 0.005					-		0.13		0.13
Thorium-230	Ba/L	0.65		< 0.010							< 0.040		< 0.040
Thorium-232	n – Ba/L	0.6		< 0.010							< 0.040		< 0.040
Field Parameters				2.0.0							2.0.0		2.0.0
ODO % Sat	%			_2	_2	_2	_2	_2	75 Q		_3		
ORP	m\/			_2	_2	_2	_2	_2	96.5		_3		
SPC	us/cm			_2	_2	_2	_2	_2	552.0		_3		
Temperature	°C			_2	_2	_2	2	2	8 551		_3		
Turbidity	ENI I			_2	_2	_2	_2	_2	228 27		_3		
	L Inite			2	- 2	- 2	- 2	- 2	230.31		-		
μп	UTILS			-	-	-	-	-	1.53		-		

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

 $^{\rm 2}$ Field parameters included for current sampling year only.

 $^{\rm 3}$ Insufficient volume of groundw ater for field parameters

⁴ Insufficient volume of groundwater for full sample collection

⁵ Due to COVID-19 emergency shutdow n
 ⁶ Insufficient volume of groundw ater for sample collection

Table C-10: PG-MW03-02B.

								PG-I	MW03-02B				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/03/17	2020/06/15	2020/08/05	2020/12/10	Average
pН	pН					No Sam ple	e due to cor	nstruction	No Sample ³	7.80	7.85	8.07	7.91
Alkalinity	mg/L as CaCO3			187	214					193	286	178	219
Carbonate	mg/L as CaCO3			-1	-1					< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			-1	-1					193	286	178	219
Total Dissolved Solids	mg/L			268	446					260	380	217	286
Fluoride	mg/L	1.5		0.09	< 0.06					< 0.06	0.12	0.07	0.08
Total Organic Carbon	mg/L			_1	-1					1.0	1.0	< 1.0	1.0
Dissolved Organic Carbon	mg/L			1.2	1.2					1.0	< 1.0	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			< 0.040	< 0.040					0.060	0.080	0.070	0.070
Chloride (dissolved)	ma/L			1.9	31.0					2	3	2	2
Sulphate (dissolved)	ma/L			47	21					28	29	33	30
Bromide (dissolved)	mg/L			< 0.3	< 0.3					< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mo/L			< 0.030	< 0.030					< 0.030	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			< 0.06	0.07					< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			< 0.06	0.07					< 0.06	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	ua/L	1	0.29	< 0.01	0.02					< 0.01	< 0.01	0.02	0.01
Hardness	mg/Las CaCO3	-		211	213					4590	4900	2490	3993
Silver (dissolved)	ug/l		1.5	0.006	< 0.002					< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	ug/l			7.2	9.0					۵.00 ¢	1	14	8
Arsenic (dissolved)	µg/L	25	1900	< 0.2	0.0					< 0.2	0.3	0.9	0.5
Barium (dissolved)	µg/L	1000	29000	195.0	205.0					220	227	253	233
Bervillium (dissolved)	µg/L	1000	67	< 0.007	< 0.007					< 0.01	< 0.01	200	200
Boron (dissolved)	µg/L	5000	45000	< 0.007 Q	< 0.007 g					10	0.01	13	11
Bismuth (dissolved)	µg/L	3000	43000	- 0.007	< 0.007					< 0.007	- 0.007	- 0.007	< 0.007
Calcium (dissolved)	µg/L			58375	50500					57400	60300	61200	50633
Cadmium (dissolved)	µg/L	5	27	< 0.003	0.045					< 0.003	- 0.003	0 003	<u> </u>
Caumium (dissolved)	µg/L	5	2.1	< 0.003	0.045					< 0.003	0.003	< 0.003	< 0.003
Cobait (dissolved)	µg/L		810	0.043	0.100					0.043	0.023	0.004	0.023
Copper (dissolved)	µg/L	1000	87	0.03	0.03					< 0.00	0.14	0.01	0.34
lrop (dissolved)	µg/L	1000	07	252	20					< 0.2 257	266	259	227
Potassium (dissolved)	µg/L			1/25	1460					< 0	1420	1540	990
Magaasium (dissolved)	µg/L			1420	1400					12900	1420	14200	14067
Magnesium (dissolved)	µg/L			19.00	10 00					20.22	14100	14300	17.44
Mahyanese (dissolved)	µg/L		0200	0.74	0.79					20.23	0.40	0.07	0.92
Redium (dissolved)	µg/∟ ug/l		9200	2960	0.70					0.73	0.80	0.97	0.03
Sodium (dissolved)	µg/L		400	3000	3620					0.10	3410	3000	3540
Nickel (dissolved)	µg/L		490	0.2	0.4					0.10	0.10	0.20	0.13
	mg/∟	10	25	0.145	0.420					0.003	< 0.003	< 0.003	< 0.003
Leau (uissoiveu)	µg/L	10	20	0.03	0.02					0.03	< 0.01	0.00	0.03
Antimony (dissolved)	µg/L	0	20000	< 0.20	< 0.20					< 0.90	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.52	< 0.04					< 0.04	< 0.04	< 0.04	< 0.04
Titt (dissoived)	µg/∟			0.13	0.21					< 0.06	< 0.06	0.16	0.09
Suonuum (dissolved)	µg/∟			1//	1/5					169	1/9	1/8	1/5
Thanium (dissolved)	µg/L		510	0.21	< 0.05					1.47	0.21	0.72	0.80
Inallium (dissolved)	µg/L	20	510	0.013	< 0.005					< 0.005	< 0.005	< 0.005	< 0.005
Vranium (dissolved)	µg/L	20	420	0.084	0.071					0.04	0.03	0.09	0.05
Vanadium (dissolved)	µg/L		250	0.15	0.22					0.07	0.07	0.22	0.12
	µg/∟ Pα/l	0.0	1100	2.3	9.0					< 2.0	< 2.0	< 2.0	< 2.0
Lead-210	Bq/L	0.2		< 0.02	0.03					< 0.02	< 0.02	< 0.02	< 0.02
Kadium-226	Bq/L	0.49		0.012	0.020					< 0.010	< 0.010	< 0.010	< 0.010
Thorium-230	Bq/L	0.65		< 0.010	< 0.010					< 0.020	< 0.020	< 0.020	< 0.020
Inorium-232	Вd/Г	0.6		< 0.010	< 0.010					< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters				^	^	^	^			-			
ODO % Sat	%			- ²	-2	-2	-2	- ²	ļ	27.1	21.4	27.0	
OKP	mV			-2	-2	-2	-2	-2		-39.3	-37.9	-80.4	
SPC	µs/cm			-4	-2		-4		ļ	394.4	394.3	438.4	
Iemperature	°C			- ²	-2	-2	-2	-2	ļ	12.319	11.395	8.918	
Turbidity	FNU			-2	- ²	- ²	- ²	-2	ļ	885.62	2284.80	3591.30	
рН	Units			_2	-2	-2	-2	-2		7.67	7.59	7.60	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

³ Due to COVID-19 emergency shutdow n
Table C-11: PG-MW03-02C.

								PG-N	NW03-02C				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/03/05	2020/06/16	2020/08/05	2020/12/10	Average
рН	pН					No Sam ple	due to cor	nstruction	7.81	7.71	7.85	7.82	7.80
Alkalinity	mg/L as CaCO3			168	154				166	167	168	167	167
Carbonate	mg/L as CaCO3			-1	-1				< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			-1	-1				166	167	168	167	167
Total Dissolved Solids	mg/L			356	346				320	334	280	309	311
Fluoride	mg/L	1.5		0.07	0.07				0.06	< 0.06	< 0.06	< 0.06	0.06
Total Organic Carbon	mg/L			_1	-1				< 1.0	1.0	< 1.0	< 1.0	1.0
Dissolved Organic Carbon	ma/L			1.1	< 1.0				1.0	2.0	1.0	< 1.0	1.3
Ammonia+Ammonium (N)	as N mo/L			< 0.040	< 0.040				< 0.040	< 0.040	< 0.040	< 0.040	< 0.040
Chloride (dissolved)	ma/L			9	10				11	11	11	11	11
Sulphate (dissolved)	ma/L			104	110				91	87	91	93	91
Bromide (dissolved)	ma/L			< 0.3	< 0.3				< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mɑ/L			0.120	0.070				< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Nitrate (as N)	as N mg/L			0.59	0.36				< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			0.71	0.43				< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	ug/l	1	0.29	< 0.01	< 0.01				0.11	< 0.01	< 0.01	0.02	0.04
Hardness	mg/L as CaCO3	-	0.20	270	281				277	276	302	273	282
Silver (dissolved)	ua/L		1.5	0.006	< 0.002				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	ug/l			12.5	6.0				16	3	< 1	10	· 0.00
Arsenic (dissolved)	µg/L	25	1900	0.2	0.0				< 0.2	03	03	03	03
Barium (dissolved)	µg/L	1000	29000	72.6	69.4				< 0.2 70	70	72	67	70
Baryllium (dissolved)	µg/L	1000	67	0.01	< 0.01				< 0.01	- 0.01	< 0.01	- 0.01	< 0.01
Boron (dissolved)	µg/L	5000	45000	0.01	< 0.01 Q				< 0.01 Q	< 0.01 Q	10	1/	11
Biomuth (dissolved)	µg/L	5000	43000	9	9				9	9	10	14	0.009
Calaium (dissolved)	µg/L			< 0.01 02075	< 0.01 97400				91400	< 0.007 80000	< 0.007 95500	0.001	0.000
Cadmium (dissolved)	µg/L	5	27	0.004	0 002				0 002	0.002	0.002	0.004	0.002
Caurilum (dissolved)	µg/L	5	2.1	0.004	< 0.003				< 0.003	< 0.003	< 0.003 0.07	0.004	0.003
Cobait (dissolved)	µg/L		910	0.07	0.05				< 0.00 0.19	0.07	0.07	0.03	0.04
Conner (dissolved)	µg/L	1000	010	< 0.0	0.3				0.10	0.10	0.12	0.13	0.15
lron (dissolved)	µg/L	1000	01	0.2	0.2				0.3	< 0.2 13/	< 0.2 13/	178	0.3
Potassium (dissolved)	µg/L			1/30	1520				1450	- 0	1/60	1560	1120
Magnesium (dissolved)	µg/L			15/25	1520				13500	1/600	1400	1/600	1/350
Magnesium (dissolved)	µg/L			10420	12.0				10.30	14000	14700	14000	12.52
Mahyanese (dissolved)	µg/L		0200	0.02	0.01				0.01	0.92	0.02	14.10	0.02
Sodium (dissolved)	µg/L		9200	5110	4790				4100	4700	0.92	1.00	0.93
Niekel (disselved)	µg/∟ ug/l		400	0.2	4700				4190	4790	4400	4790	4000
Phoenborus (discolved)	µg/L		490	0.3	0.2				0.002	0.20	0.20	0.20	0.23
Filosphorus (dissolved)	ing/∟	10	25	0.100	< 0.030				< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Leau (uissoiveu)	µg/L	10	20	0.04	0.02				< 0.01	0.02	< 0.01	0.05	0.02
Selenium (dissolved)	µg/L	10	20000	< 0.20	< 0.20				< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.5	0.1				< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Ctroptium (discoluted)	µg/∟ ug/l			107	< U.U 400				< U.U0 470	< U.U0 404	< U.U0 406	101	407
Titopium (dissolved)	µg/∟ 			10/	103				1/8	0.46	190	191	10/
Thanium (dissolved)	µg/L		510	0.3	0.3				0.00	0.40	0.05	0.005	0.49
Inallium (dissolved)	µg/L	20	510	0.006	< 0.005				< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vranium (dissolved)	µg/L	20	420	3.53	2.01				2.19	2.50	2.47	2.34	2.38
	µg/L		200	0.40	0.21				0.16	0.17	0.18	0.16	0.17
	µg/L Ra/l	0.2	1100	< 2.0	< 2.0				< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Lead-210	Bq/L	0.2		< U.UZ	< 0.02				< U.UZ	< 0.02	< 0.02	< 0.02	< 0.02
Raulum-220	Dq/L	0.49		0.008	0.010				0.010	< 0.010	< 0.010	< 0.010	0.010
Therium-230	Bq/L	0.65		< 0.010	< 0.010				< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
	DQ/L	0.6		< 0.010	< 0.010				< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Held Parameters				0	0	0	0	0					
ODO % Sat	%								29.0	23.1	36.0	25.8	
	mV							-4	21.7	56.7	80.3	-6.9	
SPC	µs/cm							-4	431.4	544.0	523.0	566.0	
	°C			-2	-2	-2	-4	-4	8.612	10.914	12.414	10.062	
Turbidity	FNU			- ²	-2	-2	-2	-2	89.23	148.69	41.50	27.23	
рН	Units			-2	-2	-2	- ²	-2	7.63	7.69	7.80	7.49	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Table C-12: PG-MW03-03A.

								PG-N	MW03-03A				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average						2020/12/16	Average
рН	рH			No Sam ple		-	No Samp	ole due to c	onstruction			No Sample ³	
Alkalinity	mg/L as CaCO3						-						
Carbonate	mg/L as CaCO3												
Bicarbonate	mg/L as CaCO3												
Total Dissolved Solids	ma/L												
Fluoride	ma/L	1.5		-						-			
Total Organic Carbon	ma/L	-		-						-			
Dissolved Organic Carbon	ma/L			-						-			
Ammonia+Ammonium (N)	as N mo/L												
Chloride (dissolved)	ma/L												
Sulphate (dissolved)	ma/L												
Bromide (dissolved)	ma/L												
Nitrite (as N)	as N mo/L												
Nitrate (as N)	as N mg/L												
Nitrate + Nitrite (as N)	as N mo/L												
Mercury (dissolved)	µg/L	1	0.29										
Hardness	mg/L as CaCO3	-											
Silver (dissolved)	ua/L		1.5										
Aluminum (dissolved)	ua/L												
Arsenic (dissolved)	ug/l	25	1900										
Barium (dissolved)	ug/l	1000	29000										
Bervllium (dissolved)	ug/l	1000	67										
Boron (dissolved)	µg/L	5000	45000										
Bismuth (dissolved)	µg/L	5000	40000										
Calcium (dissolved)	µg/L												
Cadmium (dissolved)	µg/L	5	27										
Cabalt (dissolved)	µg/L	J	66										
Cobait (dissolved)	µg/L		810										
Conner (dissolved)	µg/L	1000	87										
kon (dissolved)	µg/L	1000	07										
Potassium (dissolved)	µg/L												
Magnesium (dissolved)	µg/L												
Magnesium (dissolved)	µg/L												
Molybdenum (dissolved)	µg/L		0200										
Sodium (dissolved)	µg/L		3200										
Nickel (dissolved)	µg/∟		400										
Phosphorus (dissolved)	pg/L mg/l		430										
	ing/∟	10	25										
Antimony (dissolved)	µg/L	6	20000										
Anumbry (dissolved)	µg/∟	10	20000										
Tin (dissolved)	P9/⊏ ug/l	10	03										
Strontium (dissolved)	P9/⊏ ug/l												
Titanium (dissolved)	P9/⊏ ug/l												
Thallium (dissolved)	P9/⊏ ua/l		510										
Liranium (dissolved)	Р9/⊏ ug/l	20	420										
Vanadium (dissolved)	P9/⊏ ug/l	20	250			ļ							
Zipo (dissolved)	µg/∟		1100										
	P9/⊏ Ba/l	0.2	1100										
Leau-210 Dedium 226	Bq/L Ba/l	0.2											
Thorium 220		0.49											
Thorium 222	Bq/L Bg/l	0.05											
	BY/L	0.0											
Field Parameters	o/			2	2	2	2	2					
ODO % Sat	% 							- <u>-</u>					
	MV Vini												
SPC Torrestore	µs/cm												
	°С					- ⁻							
Turbidity	FNU				-4	-4							
рН	Units			-2	-2	-2	-2	-2					

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

³ Insufficient volume of groundwater for full sample collection

Table C-13: PG-MW03-03B.

								PG-I	MW03-03B					
		Crit	eria	2015	2016	2017	2018	2019		2020				
Parameter	Units	COPC	Table 3			Average					202	20/12/17	Av	/erage
pН	pН						No Samp	ole due to c	onstruction			7.90		7.90
Alkalinity	mg/L as CaCO3			171								208		208
Carbonate	mg/L as CaCO3			-1							<	1.0	<	1.0
Bicarbonate	mg/L as CaCO3			-1								208		208
Total Dissolved Solids	mg/L			263								248		248
Fluoride	mg/L	1.5		0.08								0.06		0.06
Total Organic Carbon	mg/L			-1							<	1.0	<	1.0
Dissolved Organic Carbon	mg/L			1.2							<	1.0	<	1.0
Ammonia+Ammonium (N)	as N mg/L			< 0.058								0.070		0.070
Chloride (dissolved)	mg/L			1								1.9		1.9
Sulphate (dissolved)	mg/L			52								28		28
Bromide (dissolved)	mg/L			< 0.3							<	0.3	<	0.3
Nitrite (as N)	as N mg/L			< 0.030							<	0.030	<	0.030
Nitrate (as N)	as N mg/L			0.08							<	0.06	<	0.06
Nitrate + Nitrite (as N)	as N mg/L			0.08							<	0.06	<	0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01							<	0.01	<	0.01
Hardness	mg/L as CaCO3			190								302		302
Silver (dissolved)	µg/L		1.5	0.003							<	0.05	<	0.05
Aluminum (dissolved)	µg/L			12.8							<	1	<	1
Arsenic (dissolved)	ua/L	25	1900	< 0.2							<	0.2	<	0.2
Barium (dissolved)	ua/L	1000	29000	195.8							<u> </u>	197		197
Beryllium (dissolved)	µg/L		67	< 0.007							<	0.01	<	0.01
Boron (dissolved)	µg/L	5000	45000	11							<u> </u>	8	<u> </u>	8
Bismuth (dissolved)	ug/l			< 0.007							<	0.007	<	0.007
Calcium (dissolved)	ug/l			51450							-	51500		51500
Cadmium (dissolved)	µg/L	5	2.7	0.005							<	0.003	<	0.003
Cobalt (dissolved)	µg/L	-	66	0.03							<u> </u>	0.021	<u> </u>	0.021
Chromium (dissolved)	ug/l		810	< 0.0								0.12		0.12
Copper (dissolved)	ug/l	1000	87	0.0							<	0.2	<	0.2
Iron (dissolved)	µg/L			70							<u> </u>	105	-	105
Potassium (dissolved)	ua/L			1330								1170		1170
Magnesium (dissolved)	ua/L			15050							<u> </u>	13200		13200
Manganese (dissolved)	ua/L			11.1								17.43		17.43
Molvbdenum (dissolved)	ua/L		9200	1.01								1.14		1.14
Sodium (dissolved)	ua/L			3793								3300		3300
Nickel (dissolved)	ua/L		490	0.2							<	0.10	<	0.10
Phosphorus (dissolved)	ma/L			0.010							<	0.003	<	0.003
Lead (dissolved)	µg/L	10	25	0.03								0.05		0.05
Antimony (dissolved)	ua/L	6	20000	< 0.20							<	0.90	<	0.90
Selenium (dissolved)	µg/L	10	63	0.52							<	0.04	<	0.04
Tin (dissolved)	ua/L	-		0.1							<u> </u>	0.18		0.18
Strontium (dissolved)	µg/L			160			1	1			1	152		152
Titanium (dissolved)	µg/L			0.4			1	1			1	0.12		0.12
Thallium (dissolved)	µg/L		510	0.010					1		<	0.005	<	0.005
Uranium (dissolved)	µg/L	20	420	0.12					1			0.052		0.052
Vanadium (dissolved)	µg/L		250	0.31					1			0.18		0.18
Zinc (dissolved)	µg/L		1100	< 2.0							<	2.0	<	2.0
Lead-210	Bq/L	0.2		< 0.02							<	0.02	<	0.02
Radium-226	Bq/L	0.49		0.010					1		<	0.010	<	0.010
Thorium-230	Bq/L	0.65		< 0.010					1		<	0.020	<	0.020
Thorium-232	Bq/L	0.6		< 0.010							<	0.020	<	0.020
Field Parameters														
ODO % Sat	%			_2	_2	- ²	_ ²	- ²	1			48.5		
ORP	mV			_2	_2	- ²	_2	- ²				157.9		
SPC	µs/cm			_2	_2	_2	_2	_ ²	1			432.6		
Temperature	°C			_2	_2	_2	_2	_ ²				5.754		
Turbidity	FNU			_ ²	_2	- ²	_2	_ ²	1			246.48		
рН	Units			<u>-</u> 2	_2	- ²	_ ²	- ²	1		1	8.05		

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Table C-14: PG-MW03-03C.

								PG-I	MW03-03C					
		Crit	eria	2015	2016	2017	2018	2019			2020			
Parameter	Units	COPC	Table 3			Average						202	20/12/16	Average
pН	pН						No	Sample du	e to constru	ction			7.87	7.87
Alkalinity	mg/L as CaCO3			162	158								184	184
Carbonate	mg/L as CaCO3			_1	_1							<	1.0	1.0
Bicarbonate	mg/L as CaCO3			_1	_ ¹								184	184
Total Dissolved Solids	mg/L			307	289								294	294
Fluoride	mg/L	1.5		0.07	0.07								0.13	0.13
Total Organic Carbon	mg/L			-1	-1							<	1.0	1.0
Dissolved Organic Carbon	mg/L			1.1	< 1								1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			0.043	< 0.040							<	0.040	0.040
Chloride (dissolved)	mg/L			7.7	7.8								3.8	3.8
Sulphate (dissolved)	mg/L			69	70								40	40
Bromide (dissolved)	mg/L			< 0.3	< 0.3							<	0.3	0.3
Nitrite (as N)	as N mg/L			< 0.030	< 0.030								0.120	0.120
Nitrate (as N)	as N mg/L			< 0.06	< 0.06								2.90	2.90
Nitrate + Nitrite (as N)	as N mg/L			< 0.06	< 0.06								3.02	3.02
Mercury (dissolved)	µg/L	1	0.29	0.01	0.02							<	0.01	0.01
Hardness	mg/L as CaCO3			234	239								244	244
Silver (dissolved)	µg/L		1.5	0.005	< 0.002							<	0.05	0.05
Aluminum (dissolved)	µg/L			9	1							<	1	1
Arsenic (dissolved)	µg/L	25	1900	0.2	< 0.2							<	0.2	0.2
Barium (dissolved)	µg/L	1000	29000	59.1	57.8								61	61
Beryllium (dissolved)	µg/L		67	< 0.007	< 0.007							<	0.01	0.01
Boron (dissolved)	µg/L	5000	45000	11	0.008								10	10
Bismuth (dissolved)	µg/L			< 0.007	< 0.007							<	0.007	0.007
Calcium (dissolved)	µg/L			70650	74100								64700	64700
Cadmium (dissolved)	µg/L	5	2.7	0.007	< 0.003							<	0.003	0.003
Cobalt (dissolved)	µg/L		66	0.06	0.05								0.075	0.075
Chromium (dissolved)	µg/L		810	< 0.03	0.3								0.09	0.09
Copper (dissolved)	µg/L	1000	87	0.3	0.24								0.4	0.4
Iron (dissolved)	µg/L			4	< 7							<	7	7
Potassium (dissolved)	µg/L			2413	2280								2120	2120
Magnesium (dissolved)	µg/L			14025	13000								11800	11800
Manganese (dissolved)	µg/L			7.5	5.77								12.50	12.50
Molybdenum (dissolved)	µg/L		9200	1.40	1.5								1.37	1.37
Sodium (dissolved)	µg/L			4198	3640								3760	3760
Nickel (dissolved)	µg/L		490	0.2	0.2							<	0.10	0.10
Phosphorus (dissolved)	mg/L			0.009	< 0.003							<	0.003	0.003
Lead (dissolved)	µg/L	10	25	0.03	0.02								0.04	0.04
Antimony (dissolved)	µg/L	6	20000	< 0.20	< 0.20							<	0.90	0.90
Selenium (dissolved)	µg/L	10	63	0.52	0.05								0.40	0.40
Tin (dissolved)	µg/L			0.04	< 0.01								0.12	0.12
Strontium (dissolved)	µg/L			152	154							Γ	130	130
Titanium (dissolved)	µg/L			0.12	< 0.005							Γ	0.07	0.07
Thallium (dissolved)	µg/L		510	0.007	< 0.050							Γ	0.014	0.014
Uranium (dissolved)	µg/L	20	420	9.24	9.54								9.980	9.980
Vanadium (dissolved)	µg/L		250	0.45	0.34								0.39	0.39
Zinc (dissolved)	µg/L		1100	2.5	< 2.0							<	2.0	2.0
Lead-210	Bq/L	0.2		< 0.02	< 0.02							<	0.02	0.02
Radium-226	Bq/L	0.49		0.01	< 0.02							<	0.010	0.010
Thorium-230	Bq/L	0.65		< 0.010	< 0.010							<	0.020	0.020
Thorium-232	Bq/L	0.6		< 0.010	< 0.010							<	0.020	0.020
Field Parameters														
ODO % Sat	%			_2	_ ²	_ ²	_2	- ²					86.0	
ORP	mV			_2	_2	_2	_2	- ²					108.1	
SPC	µs/cm			_2	_2	- ²	_2	-2					461.7	
Temperature	°C			_2	-2	- ²	_2	-2					9.686	
Turbidity	FNU			_2	_2	_ ²	_2	_2					291.32	
рН	Units			-2	-2	-2	-2	-2					7.81	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Table C-15: PG-MW1A-02.

								PG-M	W1A-02				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average	•		2020/02/05	2020/06/23	2020/07/23	2020/11/12	Average
pН	pН			No Sam ple	Rads Only	8.10	No Sam ple	8.13	No Sample ⁴	8.21	No Sample ⁴	No Sample ⁴	8.21
Alkalinity	mg/L as CaCO3					110		98		90			90
Carbonate	mg/L as CaCO3					1.2		1		28			28
Bicarbonate	mg/L as CaCO3					110		93		62			62
Total Dissolved Solids	mg/L					445		483		503			503
Fluoride	ma/L	1.5				0.64		0.53		0.64			0.64
Total Organic Carbon	ma/L	-				6.2		4.2		1.0			1.0
Dissolved Organic Carbon	ma/L					1.40		1.105		1.0			1.0
Ammonia+Ammonium (N)	as N mg/L					0.37		0.35		0.18			0.18
Chloride (dissolved)	ma/L					220		205		230			230
Sulphate (dissolved)	ma/L					2.2		2		7.4			7.4
Bromide (dissolved)	ma/L					3.9		3.1		2.8			2.8
Nitrite (as N)	as N mg/L					< 0.010		< 0.01		< 0.03			< 0.03
Nitrate (as N)	as N mg/L					< 0.10		< 0.10		< 0.06			< 0.06
Nitrate + Nitrite (as N)	as N mg/L					< 0.10		< 0.10		< 0.06			< 0.06
Mercury (dissolved)	ug/l	1	0.29			< 0.10		< 0.1		< 0.00			< 0.00
Hardness	mg/L as CaCO3		0.20			410		100		2140			2140
Silver (dissolved)	ug/l		15			< 0.10		< 0.1		< 0.05			< 0.05
Aluminum (dissolved)	ug/L					3054		47		3			3
Arsenic (dissolved)	µg/L	25	1900			15		1		12			12
Barium (dissolved)	µg/L	1000	29000			117		03		78			78
Bervillium (dissolved)	µg/L	1000	67			< 0.50		< 0.5		< 0.007			< 0.007
Boron (dissolved)	µg/L	5000	45000			280		265		260			260
Bismuth (dissolved)	µg/L	3000	43000			- 10		200		< 0.007			< 0.007
Calcium (dissolved)	μg/L					70000		25500		20600			20600
Calcium (dissolved)	μg/L	5	27			/ 0.10		2000		20000			< 0.003
Caumum (dissolved)	μg/L	J	2.1			1.05		< 0.1		0.005			0.005
Cobail (dissolved)	µg/L		00			1.00		< 0.5		0.000			0.000
Copper (dissolved)	μg/L	1000	87			1.5		< J		0.12			0.12
lrop (dissolved)	μg/L	1000	0/			1750		120		< 0.2			< 0.2
Potassium (dissolved)	μg/L					3000		2050		1840			1840
Magnesium (dissolved)	μg/L					10700		2050		1040			10700
Magnesium (dissolved)	μg/L					67.1		10.0		6.2			6.2
Malybdenum (dissolved)	μg/L		9200			10		10.0		12			12
Sodium (dissolved)	µg/L		9200			150000		145000		140000			140000
Sourian (dissolved)	μg/L		400			150000		140000		149000			149000
Phoenhorus (dissolved)	µg/L		490			1.20		2.46		0.2			0.2
Filospilorus (dissolved)	ing/L	10	25			1.30		2.40		< 0.003			< 0.003
Antimony (dissolved)	μg/L	10	20			0.7		< 0.5		0.02			0.02
Solonium (dissolved)	µg/L	0	20000			0.7		1.0		< 0.90			< 0.90
Tip (dissolved)	µg/∟ ug/l	10	03			× 2.0		× 2		0.04			0.04
Strontium (discoluted)	µg/∟ ug/l		<u> </u>			025		770	ł	0.10			0.10
Titanium (dissolved)	µg/∟ ug/l		<u> </u>			000		- 5		940			940
Thallium (dissolved)	µg/⊏ ug/l		510			C/10		< 0.05		0.44			0.44
Liranium (dissolved)	µg/∟ ug/l	20	420			< 0.000 0.02		< 0.05 0.5	ł	0.001			0.000
	µg/∟ ug/l	20	420			0.93		0.5		0.931			0.931
Zinc (dissolved)	µg/⊏ ug/l		1100			4.00		0.0		2 20			2 20
	µg/∟ Ra/l	0.2	1100			0.02		× 0.10		< 0.000			< 0.020
Leau-210 Rodium 226	Bq/L	0.2			< 0.04	0.03		< 0.10		< 0.020			< 0.020
Thorium 220	Bq/L	0.49			< 0.02	< 0.040		< 0.04		< 0.010			< 0.010
Thorium 222	Bq/L	0.05			< 0.05	< 0.070		< 0.07		< 0.020			< 0.020
	Þq/L	0.0			< 0.05	< 0.060		< U.Ub		< 0.020			< 0.020
Field Parameters			ļ	2	2	2	2	2		3			ļ
ODO % Sat	% 		<u> </u>							-~			
	INV		<u> </u>							-7			
540	µs/cm		<u> </u>							-~			
Turkiditu			<u> </u>							-~			
	FNU		ļ	-4		-4		-4		-3			
рН	Units			-2	-2	-2	-4	-2]	-3			

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

 $^{2}\ \mbox{Field}$ parameters included for current sampling year only.

³ Insufficient volume of groundwater for field parameters

⁴ Insufficient volume of groundwater for sample collection --- No data.

Table C-16: PG-MW1B-02.

								PG-	MW1B-02				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/02/05	2020/06/23	2020/07/24	2020/11/12	Average
pН	pН			8.67		8.01	8.10	8.11	8.42	8.29	8.28	7.96	8.24
Alkalinity	mg/L as CaCO3			109		75	77	74	265	208	214	158	211
Carbonate	mg/L as CaCO3			_ ¹	-1	< 1.0	1.1	< 1.0	4	1.0	< 1.0	< 1.0	1.8
Bicarbonate	mg/L as CaCO3			- ¹	- ¹	74	76	73	260	207	214	158	210
Total Dissolved Solids	mg/L			526		522	469	457	477	451	451	480	465
Fluoride	mg/L	1.5		0.44		0.44	0.44	0.42	0.49	0.50	0.50	0.50	0.50
Total Organic Carbon	mg/L			_1	_1	2.9	5.6	1.7	1.0	1.0	< 1.0	2.0	1.3
Dissolved Organic Carbon	mg/L			1.90		1.10	0.99	0.86	1.0	1.0	1.0	2.0	1.3
Ammonia+Ammonium (N)	as N mg/L			0.09		0.25	0.31	0.29	0.25	0.24	0.28	0.29	0.27
Chloride (dissolved)	mg/L			230		200	210	203	230	240	210	220	225
Sulphate (dissolved)	mg/L			5.4	_1	3.0	5.8	3.4	6.6	3.2	2.8	6.4	4.8
Bromide (dissolved)	mg/L			2.7	_1	1.8	3.9	3.4	2.6	2.7	2.9	2.5	2.7
Nitrite (as N)	as N mg/L			< 0.030		< 0.010	< 0.010	< 0.010	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			< 0.06		< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			< 0.06		< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	< 0.10	< 0.10	< 0.10	< 0.10	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			92		90	89	87	114	475	520	711	455
Silver (dissolved)	µg/L		1.5	0.028	< 0.100	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			13.8	< 5.0	< 5.0	5.1	8.0	579	9	6	7	150
Arsenic (dissolved)	μg/L	25	1900	0.6	< 1.0	< 1.0	< 1.0	2.0	0.6	0.4	0.3	0.4	0.4
Barium (dissolved)	μg/L	1000	29000	57.5	76.0	60	69	64	83	55	55	60	63
Bervllium (dissolved)	µg/L		67	< 0.01	< 0.50	< 0.50	< 0.50	< 0.50	0.029	< 0.007	< 0.007	0.010	0.013
Boron (dissolved)	µg/L	5000	45000	267	270	270	263	267	298	255	212	263	257
Bismuth (dissolved)	µg/L			< 0.01	< 1.0	< 1.0	< 1.0	< 1.0	0.008	< 0.007	< 0.007	< 0.007	0.007
Calcium (dissolved)	µg/L			20400	21000	19500	19500	19000	29100	17900	20700	21000	22175
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	< 0.100	< 0.10	< 0.10	< 0.10	< 0.003	0.005	0.003	0.007	0.005
Cobalt (dissolved)	µg/L	-	66	0.06	< 0.50	< 0.50	< 0.50	< 0.50	0.216	0.044	0.041	0.048	0.087
Chromium (dissolved)	µg/L		810	< 0.0	< 5.0	< 5.0	< 5.0	< 5.0	0.80	0.14	0.15	0.23	0.33
Copper (dissolved)	ua/L	1000	87	0.3	< 1.0	< 1.0	< 1.0	1.9	0.4	< 0.2	0.3	0.3	0.3
Iron (dissolved)	µg/L			< 2	< 100	< 100	< 100	< 100	428	12	9	17	117
Potassium (dissolved)	µg/L			1390	1400	1250	1250	1267	1460	1230	1260	1200	1288
Magnesium (dissolved)	µg/L			9940	9600	9800	9800	9400	10100	10000	10100	8910	9778
Manganese (dissolved)	µg/L			4.5	5.7	4.1	4.2	7.8	10.9	8.5	5.4	5.3	7.5
Molybdenum (dissolved)	µg/L		9200	15	13	13	14	11	13	12.4	12.8	9.97	12
Sodium (dissolved)	µg/L			130000	120000	130000	130000	133333	122000	135000	138000	120000	128750
Nickel (dissolved)	µg/L		490	0.2	< 1.0	< 1.0	< 1.0	< 1.0	0.6	0.2	0.1	0.1	0.3
Phosphorus (dissolved)	mg/L			0.160		0.430	0.685	0.308	0.004	< 0.003	< 0.003	< 0.003	0.003
Lead (dissolved)	µg/L	10	25	0.01	< 0.50	< 0.50	< 0.50	< 0.50	0.23	< 0.01	< 0.01	0.06	0.08
Antimony (dissolved)	µg/L	6	20000	< 0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 0.0	< 2.0	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.1	< 1.0	< 1.0	< 1.0	< 1.0	0.21	0.08	0.17	0.31	0.19
Strontium (dissolved)	µg/L			803	880	835	873	830	996	997	963	813	942
Titanium (dissolved)	µg/L			0.2	< 5.0	< 5	< 5.0	< 5.0	15.4	0.46	0.25	0.28	4.10
Thallium (dissolved)	µg/L		510	< 0.005	< 0.050	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	μg/L	20	420	0.23	0.12	< 0.10	0.17	0.73	0.406	0.062	0.051	0.092	0.153
Vanadium (dissolved)	µg/L		250	0.81	0.57	< 0.50	0.55	< 0.50	1.50	0.11	0.09	0.22	0.48
Zinc (dissolved)	µg/L		1100	< 2.0	< 5.0	< 5.0	< 5.0	5.4	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Lead-210	Bq/L	0.2		< 0.02	0.06	< 0.02	0.08	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Radium-226	Bq/L	0.49		< 0.010	0.030	< 0.040	< 0.040	< 0.040	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Thorium-230	Bq/L	0.65		< 0.010	0.060	< 0.070	< 0.070	< 0.070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L	0.6		< 0.010	< 0.055	< 0.060	< 0.060	< 0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters								l l					
ODO % Sat	%			_2	- ²	- ²	-2	- ²	_3	34.7	73.1	-3	
ORP	mV			_2	- ²	_ ²	_2	_ ²	_3	119.1	172.2	-3	
SPC	µs/cm			_2	- ²	_ ²	_2	_2	_3	840	833	-3	
Temperature	°C			_2	- ²	- ²	_2	- ²	_3	12.519	11.26	-3	
Turbidity	FNU			_2	- ²	- ²	-2	- ²	_3	581.68	618.56	-3	
рН	Units			_2	- ²	- ²	-2	- ²	_3	8.45	8.46	-3	
										-	-		

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

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: PG-MW1C-02.

								PG-	MW1C-02				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/02/05	2020/06/12	2020/07/17	2020/11/12	Average
pН	pН			7.88	7.96	8.01	7.91	7.93	8.04	7.87	7.85	7.8	7.89
Alkalinity	mg/L as CaCO3			206	200	200	223	208	240	211	225	214	223
Carbonate	mg/L as CaCO3			_1	1.7	1.9	1.7	1.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			_1	200	200	220	208	240	211	225	214	223
Total Dissolved Solids	mg/L			308	325	292	333	354	363	414	363	337	369
Fluoride	ma/L	1.5		0.10	0.11	< 0.12	0.10	< 0.10	0.09	0.10	0.13	0.10	0.11
Total Organic Carbon	ma/L	-		_1	0.64	2.67	0.87	0.95	< 1.0	< 1.0	1.0	< 1.0	1.0
Dissolved Organic Carbon	ma/L			1.60	0.94	0.76	0.62	0.61	1.0	< 1.0	1.0	1.0	1.0
Ammonia+Ammonium (N)	as N mo/L			0.063	0.058	0.065	0.054	0.061	< 0.04	0.04	< 0.04	< 0.04	0.04
Chloride (dissolved)	ma/L			22	23	21	24	25	35	34	38	35	36
Sulphate (dissolved)	ma/L			34	33	32	32	32	34.0	37.0	38.0	33.0	35.5
Bromide (dissolved)	ma/L			< 0.3	0.5	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mo/L			< 0.030	0.025	< 0.010	< 0.010	< 0.010	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			< 0.06	0.07	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			< 0.06	0.07	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	ua/L	1	0.29	< 0.01	0.03	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			246	248	243	258	255	352	265	305	327	312
Silver (dissolved)	ua/L		1.5	< 0.002	0.027	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	ua/L			15.5	14.8	< 5	6.8	< 5.0	< 1	1	< 1	4	2
Arsenic (dissolved)	ua/L	25	1900	0.3	0.6	< 1.0	< 1.0	< 1.0	0.3	< 0.2	0.3	0.3	0.3
Barium (dissolved)	ra-	1000	29000	230.0	220.8	220	233	230	244	232	223	192	223
Beryllium (dissolved)	µg/L	1000	67	< 0.01	0.13	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	13	11	12	11	< 12	10	16	11	8	11
Bismuth (dissolved)	µg/L	3000	+3000	< 0.01	0.26	12	- 10	< 12	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			61067	63900	61000	65750	00033	78800	64500	68900	63800	69000
Cadmium (dissolved)	µg/L	5	27	< 0.003	0.027	0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L	, , , , , , , , , , , , , , , , , , ,	66	0.000	0.027	< 0.10	< 0.10	< 0.10	0.057	0.067	0.058	0.042	0.000
Chromium (dissolved)	µg/L		810	0.00	1.4	< 5.0	< 5.0	< 5.0	< 0.007	0.007	0.090	< 0.042	0.000
Copper (dissolved)	µg/L	1000	87	0.2	0.4	< 1.0	< 1.0	< 1.0	< 0.00 1.5	0.11	0.00	< 0.00	0.05
Iron (dissolved)	µg/L	1000	01	310	259	240	213	228	1.0	154	183	177	175
Potassium (dissolved)	µg/L			1537	1505	1500	1575	1525	1710	1460	1620	1370	1540
Magnesium (dissolved)	µg/L			22800	21725	21500	22250	22250	24800	21200	24900	20900	22950
Magnesian (dissolved)	µg/L			11.5	12.1	11.3	12.5	11.3	10.7	9.5	10.6	11.2	10.5
Molybdenum (dissolved)	µg/L		9200	0.62	0.67	0.94	1 24	0.62	0.64	0.67	0.55	0.45	0.58
Sodium (dissolved)	ug/l		0200	8253	7993	8000	9125	9225	11500	10600	12300	9020	10855
Nickel (dissolved)	ug/l		490	0.3	0.4	< 10	< 1.0	< 1.0	0.3	0.2	0.2	< 0.1	0.2
Phosphorus (dissolved)	mg/L		400	0.130	0.258	1 600	0.302	0 198	< 0.003	< 0.003	0.004	< 0.003	0.003
Lead (dissolved)		10	25	0.01	0.14	< 0.50	< 0.50	< 0.50	< 0.01	< 0.01	< 0.01	0.03	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.01	0.28	< 0.50	< 0.50	< 0.00	< 0.90	< 0.90	< 0.01	< 0.90	< 0.02
Selenium (dissolved)	µg/L	10	63	0.7	0.20	< 2.0	< 20	< 20	< 0.04	0.07	0.05	< 0.04	0.05
Tin (dissolved)	ua/L			0.0	0.3	< 10	< 10	< 10	< 0.04	< 0.06	0.06	< 0.04	0.06
Strontium (dissolved)	ra-			234	245	228	245	240	275	253	254	242	256
Titanium (dissolved)	ua/L			0.3	1.6	< 5	< 50	< 50	0.09	0.06	< 0.05	0.22	0.11
Thallium (dissolved)	µg/L		510	< 0.005	0.016	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Liranium (dissolved)	µg/L	20	420	0.000	0.010	0.14	0.18	0.14	0.234	0.221	0.203	0.137	0.000
Vanadium (dissolved)	µg/L	20	250	0.25	0.10	< 0.50	< 0.50	< 0.50	0.09	0.08	0.08	0.07	0.08
Zinc (dissolved)	ra-		1100	< 20	3.0	< 50	< 50	< 50	< 20	< 20	< 20	< 20	< 20
Lead-210	Bg/L	0.2	1100	< 0.02	< 0.02	< 0.02	0.08	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Radium-226	Ba/l	0.49		< 0.02	0.02	< 0.02	< 0.00	< 0.10	0.020	< 0.020	< 0.020	< 0.020	0.020
Thorium-230	Ba/l	0.45		< 0.010	0.025	< 0.000	< 0.070	< 0.070	< 0.020	< 0.070	< 0.020	< 0.020	< 0.020
Thorium-232	Ba/l	0.00		< 0.010	0.023	< 0.060	< 0.060	< 0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters	-4/-	0.0		- 0.010	0.020	. 0.000	- 0.000	. 0.000	- 0.020	- 0.020	. 0.020	- 0.020	- 0.020
ODO % Sat	0/_			2	2	2	2	2	24.2	25 G	- 1 0	20.0	
	/0 m\/			- 2	- 2	2	2	2	34.3 E	20.0 /10.0	20.2 57.2	-12.5	
				- 2	- 2	- 2	- 2	- 2	-0	42.Z	57.3	-13.5	
Tomporatura	µs/cm ∘C			- 2	- 2	- 2	- 2	- 2	0.000	5/0	10 404	0.205	
Turbidity				- 2	- 2	- 2	- 2	- 2	0.298	10.325	10.404	9.305	
	FINU			- 2	- 2	- 2	- 2	- 2	52.00	9.04	21.11	10.01	
μп	UTIIIS						-		7.46	1.51	1.50	1.51	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Table C-18: PG-MW1D-02.

								PG-	MW1D-02				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/02/05	2020/06/12	2020/07/17	2020/11/12	Average
pН	pН			7.35	7.77	7.79	7.69	7.70	7.88	7.67	7.59	No Sample ³	7.71
Alkalinity	mg/L as CaCO3			331	291	325	313	323	444	316	338		366
Carbonate	mg/L as CaCO3			-1	-1	1.9	1.5	1.5	< 1.0	< 1.0	< 1.0		< 1.0
Bicarbonate	mg/L as CaCO3			- ¹	_1	318	310	318	444	316	338		366
Total Dissolved Solids	mg/L			521	519	454	436	484	451	449	529		476
Fluoride	mg/L	1.5		0.07	0.09	< 0.10	< 0.10	< 0.10	0.09	0.09	0.08		0.09
Total Organic Carbon	mg/L			- ¹		3.30	2.33	2.65	2.0	1.0	2.0		1.7
Dissolved Organic Carbon	mg/L			1.9	1.6	1.8	1.6	1.6	2.0	2.0	2.0		2.0
Ammonia+Ammonium (N)	as N mg/L			0.070	0.050	< 0.050	0.070	0.055	< 0.04	0.06	< 0.04		0.05
Chloride (dissolved)	mg/L			86	103	78	85	89	83	70	110		88
Sulphate (dissolved)	mg/L			20.7	16.0	14.3	12.3	11.2	9.8	9.2	13.0		10.7
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			< 0.030	< 0.030	< 0.010	< 0.010	< 0.010	< 0.03	< 0.03	< 0.03		< 0.03
Nitrate (as N)	as N mg/L			0.31	0.18	< 0.14	0.14	0.12	< 0.06	< 0.06	0.06		0.06
Nitrate + Nitrite (as N)	as N mg/L			0.31	0.18	< 0.14	0.14	0.12	< 0.06	< 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		< 0.01
Hardness	mg/L as CaCO3			332	360	333	315	325	1510	1980	436		1309
Silver (dissolved)	µg/L		1.5	0.045	< 0.002	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05		< 0.05
Aluminum (dissolved)	µg/L			15.4	6.3	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0		< 1.0
Arsenic (dissolved)	µg/L	25	1900	0.2	0.3	< 1.0	< 1.0	< 1.0	< 0.2	< 0.2	< 0.2		< 0.2
Barium (dissolved)	μg/L	1000	29000	49.9	44.4	47	44	46	41	40	43		42
Beryllium (dissolved)	µg/L		67	< 0.01	< 0.01	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007		< 0.007
Boron (dissolved)	µg/L	5000	45000	8	4	< 13	< 10	11	11	5	5		7
Bismuth (dissolved)	μg/L			< 0.01	< 0.01	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007		< 0.007
Calcium (dissolved)	μg/L			118667	128667	117750	115000	114000	119000	95400	121000		111800
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	< 0.003	< 0.10	< 0.10	< 0.10	0.003	0.004	< 0.003		0.003
Cobalt (dissolved)	μg/L		66	0.08	0.03	< 0.50	< 0.50	< 0.50	0.047	0.037	0.020		0.035
Chromium (dissolved)	μg/L		810	0.6	0.4	< 5.0	< 5.0	< 5.0	0.20	0.19	0.16		0.18
Copper (dissolved)	μg/L	1000	87	0.8	0.6	< 1.0	< 1.0	< 1.0	1.7	0.5	0.7		1.0
Iron (dissolved)	μg/L			101	< 7	< 100	< 100	< 100	< 7	< 7	< 7		< 7
Potassium (dissolved)	μg/L			1187	1153	1200	1125	1055	1040	787	1020		949
Magnesium (dissolved)	μg/L			8850	9537	9500	8675	8650	8300	8610	9020		8643
Manganese (dissolved)	µg/L			0.2	0.1	< 2.0	4.5	2.3	1.8	1.3	0.1		1.1
Molybdenum (dissolved)	µg/L		9200	0.17	0.21	< 0.50	< 0.50	< 0.50	0.17	0.23	0.20		0.20
Sodium (dissolved)	μg/L			59867	48667	49000	53000	66000	42300	46400	68400		52367
Nickel (dissolved)	μg/L		490	0.5	0.2	< 1.0	< 1.0	< 1.0	0.2	0.2	0.1		0.2
Phosphorus (dissolved)	mg/L			0.07	0.28	2.73	0.78	0.51	< 0.003	< 0.003	< 0.003		< 0.003
Lead (dissolved)	µg/L	10	25	0.01	< 0.01	< 0.50	< 0.50	< 0.50	< 0.01	< 0.01	< 0.01		< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.20	< 0.20	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90		< 0.90
Selenium (dissolved)	µg/L	10	63	0.7	0.3	< 2.0	< 2.0	< 2.0	0.11	0.16	0.11		0.13
Tin (dissolved)	µg/L			0.0	0.1	< 1.0	< 1.0	< 1.0	< 0.06	0.07	0.13		0.09
Strontium (dissolved)	µg/L			227	244	220	218	213	221	202	235		219
Titanium (dissolved)	µg/L			0.3	0.1	< 5	< 5.0	< 5.0	0.13	< 0.05	< 0.05		0.08
Thallium (dissolved)	µg/L		510	< 0.005	< 0.005	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005		< 0.005
Uranium (dissolved)	µg/L	20	420	0.85	0.77	0.75	0.84	0.77	0.780	0.735	0.972		0.829
Vanadium (dissolved)	µg/L		250	0.44	0.24	< 0.50	< 0.50	< 0.50	0.22	0.18	0.19		0.20
Zinc (dissolved)	µg/L	L	1100	2.3	< 2.0	< 5.0	< 5.0	< 5.0	< 2.0	< 2.0	< 2.0		< 2.0
Lead-210	Bq/L	0.2		< 0.02	< 0.02	< 0.02	0.08	< 0.10	< 0.020	< 0.020	< 0.020		< 0.020
Radium-226	Bq/L	0.49		< 0.010	0.010	< 0.033	< 0.040	0.033	0.010	< 0.010	< 0.010		0.010
Thorium-230	Bq/L	0.65		< 0.010	< 0.010	< 0.070	< 0.070	0.055	< 0.020	< 0.020	< 0.020		< 0.020
Thorium-232	Bq/L	0.6		< 0.010	0.010	< 0.060	< 0.060	0.048	< 0.020	< 0.020	< 0.020		< 0.020
Field Parameters					0				ļ		L .		
ODO % Sat	%			-2	-2	-2	-2	-2	72	57.3	61.80		
ORP	mV			- ²	-2	-2	-2	-2	85.5	122.3	76.1		
SPC	µs/cm			- ²	-2	-2	- ²	-2	679	765	929		
Temperature	°C			- ²	-2	-2	-2	-2	9.231	8.663	8.788		
Turbidity	FNU			- ²	-2	-2	- ²	-2	1160.3	91.54	75.12		
рН	Units			-2	-2	-2	- ²	-2	7.34	7.22	7.36		

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

 $^{2}\ensuremath{\,\mbox{Field}}\xspace$ Field parameters included for current sampling year only.

³ Insufficient volume of groundwater for sample collection

Table C-19: PG-MW2B-02.

								PG-	MW2B-02				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/01/29	2020/06/17	2020/07/23	2020/12/08	Average
pН	pН			8.35	8.13	8.13	8.03	8.13	8.12	8.05	8.06	8.10	8.08
Alkalinity	mg/L as CaCO3			158	154	160	160	150	160	155	153	148	154
Carbonate	mg/L as CaCO3			_ ¹	1.9	2.0	1.7	1.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			_ ¹	150	155	160	150	160	155	153	148	154
Total Dissolved Solids	mg/L			206	210	179	153	185	234	209	214	209	217
Fluoride	mg/L	1.5		0.21	0.24	0.21	0.20	0.21	0.21	0.22	0.21	0.23	0.22
Total Organic Carbon	mg/L			_ ¹	0.55	0.77	0.59	0.88	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L			< 1.0	0.9	0.6	0.5	0.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ammonia+Ammonium (N)	as N mg/L			0.19	0.16	0.17	0.21	0.15	0.17	0.14	0.16	0.11	0.15
Chloride (dissolved)	mg/L			14	14	13	13	13	15	14	14	14	14
Sulphate (dissolved)	mg/L			12	12	12	11	12	12.0	12.0	12.5	13.0	12.4
Bromide (dissolved)	mg/L			< 0.3	0.5	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.030	0.025	< 0.010	< 0.010	< 0.010	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			< 0.06	0.07	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			< 0.06	0.07	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.03	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			158	158	155	158	163	155	163	167	153	160
Silver (dissolved)	µg/L		1.5	0.002	0.027	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			12.2	6.0	10	< 5.0	< 5.0	1	< 1	< 1	1	< 1
Arsenic (dissolved)	µg/L	25	1900	< 0.2	0.5	< 1.0	< 1.0	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Barium (dissolved)	µg/L	1000	29000	114.0	116.0	113	115	120	119	117	121	119	119
Bervllium (dissolved)	ua/L		67	< 0.01	0.13	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Boron (dissolved)	ua/L	5000	45000	41	39	37	38	36	33	33	34	41	35
Bismuth (dissolved)	µg/L			< 0.01	0.26	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			24533	24975	24250	24500	26000	27000	26900	25100	25600	26150
Cadmium (dissolved)	ua/L	5	2.7	< 0.003	0.027	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L	-	66	0.11	0.21	< 0.50	< 0.50	< 0.50	0.090	0.114	0.105	0.074	0.096
Chromium (dissolved)	µg/L		810	< 0.0	1.4	< 5.0	< 5.0	< 5.0	< 0.08	< 0.08	0.12	0.21	0.12
Copper (dissolved)	ua/L	1000	87	0.1	0.4	< 1.0	< 1.0	< 1.0	1.5	< 0.2	< 0.2	1.6	0.9
Iron (dissolved)	ua/L		-	43	53	< 100	< 100	< 100	20	32	22	38	28
Potassium (dissolved)	µg/L			1297	1348	1275	1250	1333	1260	1280	1370	1270	1295
Magnesium (dissolved)	µg/L			23567	23450	23250	23000	23667	21200	22700	24800	23400	23025
Manganese (dissolved)	µg/L			1.8	1.9	2.3	2.0	< 2.0	2.1	2.0	1.8	1.8	1.9
Molybdenum (dissolved)	µg/L		9200	0.70	0.79	0.74	0.68	0.76	0.67	0.99	0.74	0.40	0.70
Sodium (dissolved)	µg/L			13533	13575	13500	13000	13667	12400	13200	13600	13200	13100
Nickel (dissolved)	µg/L		490	< 0.1	0.3	< 1.0	< 1.0	< 1.0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phosphorus (dissolved)	mg/L			< 0.030	0.025	0.005	0.005	0.006	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	0.03	0.14	< 0.50	< 0.50	< 0.50	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.28	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.4	0.5	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.0	0.3	< 1.0	< 1.0	< 1.0	< 0.06	< 0.06	< 0.06	0.11	0.07
Strontium (dissolved)	µg/L			766	793	780	743	767	855	785	842	897	845
Titanium (dissolved)	μg/L			0.2	1.3	< 5	< 5.0	< 5.0	0.07	0.60	0.06	0.09	0.21
Thallium (dissolved)	µg/L		510	< 0.005	0.016	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.01	0.05	< 0.10	< 0.10	< 0.10	0.003	0.043	< 0.002	0.002	0.013
Vanadium (dissolved)	µg/L		250	0.14	0.17	< 0.50	< 0.50	< 0.50	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Zinc (dissolved)	µg/L		1100	< 2.0	3.0	< 5.0	< 5.0	< 5.0	5.0	< 2.0	< 2.0	< 2.0	2.8
Lead-210	Bq/L	0.2		< 0.02	0.03	< 0.02	0.08	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Radium-226	Bq/L	0.49		< 0.008	0.020	< 0.040	< 0.040	0.030	< 0.010	< 0.010	< 0.010	0.010	0.010
Thorium-230	Bq/L	0.65		< 0.010	0.025	< 0.070	< 0.070	0.050	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L	0.6		< 0.010	0.023	< 0.060	< 0.060	0.043	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters													
ODO % Sat	%			_2	_2	_ ²	_2	_2	48.6	28.4	42.1	51.8	
ORP	mV			_2	_2	_ ²	_2	_2	27.1	86.3	146.6	104.8	
SPC	µs/cm			_2	_ ²	- ²	_2	_2	318.1	354	353.7	483.7	
Temperature	°C			_2	_2	_ ²	_2	_2	6.739	11.87	12.563	7.525	
Turbidity	FNU			_2	_2	_ ²	_2	_2	3.78	26.08	5.38	1.81	
pH	Units			_2	_2	_ ²	_2	_2	7.77	8.03	8.05	7.78	
<u>.</u>							1	1				-	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Table C-20: PG-MW2C-02.

										PG-M	W2C-02							
		Crit	eria	2015	2016	2017		2018		2019					2020			
Parameter	Units	COPC	Table 3			Average					2020/01/29	20	20/06/17	20	20/07/17	2020/12/08	A١	verage
pН	pН			No Sam ple	No Sample	7.91		7.82		7.72	7.41		7.38		7.67	No Sample ³		7.49
Alkalinity	mg/L as CaCO3					230		250		310	320		446		367			378
Carbonate	mg/L as CaCO3					1.7		1.6		1.6	< 1.0	<	1.0	<	1.0		<	1.0
Bicarbonate	mg/L as CaCO3					230		250		310	320		446		367			378
Total Dissolved Solids	mg/L					284		265		360	403		323		323			350
Fluoride	mg/L	1.5				< 0.10	<	: 0.10	<	0.10	0.07		0.06		0.09			0.07
Total Organic Carbon	ma/L					3		3		3	2.0		2.0		2.0			2.0
Dissolved Organic Carbon	ma/L					1.4		1.3		1.3	3.0		2.0		2.0			2.3
Ammonia+Ammonium (N)	as N mɑ/L					< 0.05		0.11	<	0.05	< 0.04	<	0.04	<	0.04		<	0.04
Chloride (dissolved)	ma/L					22		15		37	53		26		28			36
Sulphate (dissolved)	ma/L					18.0		11.0		8.3	9.7		9.9		10.0			9.9
Bromide (dissolved)	ma/L					< 1.0	<	: 1.0	<	1.0	< 0.3	<	0.3	<	0.3		<	0.3
Nitrite (as N)	as N mg/L					< 0.010) <	0.010	<	0.010	< 0.03	<	0.03	<	0.03		<	0.03
Nitrate (as N)	as N mg/l					0.20		0.18	<	0.10	0.14	·	0.29		0.22		<u> </u>	0.22
Nitrate + Nitrite (as N)	as N mg/L					0.20		0.18	<	0.10	0.14		0.29		0.22			0.22
Mercury (dissolved)	ua/L	1	0.29			< 0.10	<	0.10	<	0.10	0.02	<	0.01	<	0.01			0.01
Hardness	mg/L as CaCO3	-	0.20			260		250		360	317	·	1320		2227			1288
Silver (dissolved)	ug/l		1.5			< 0.10	<	: 0.10	<	0.10	< 0.05	<	0.05	<	0.05			0.05
Aluminum (dissolved)	µg/L					< 50	2	50	2	5.0	10	-	1		2			4
Arsenic (dissolved)	ug/L	25	1900			< 1.0	2	· 10	~	1.0	< 0.2	~	0.2	~	0.2		~	0.2
Barium (dissolved)	µg/L	1000	29000			21		10	È	27	26		21	È	23		È	23
Beryllium (dissolved)	µg/L	1000	67			< 0.50	-	· 0.50	~	0.50	< 0.007	~	0.007	~	0.007		~	0.007
Boron (dissolved)	µg/L	5000	45000			26		· 0.00	È	18	14	-	6		12		È	11
Bismuth (dissolved)	ug/L	3000	43000			< 10		· 10	/	10	< 0.007	/	0.007	/	0.007		/	0.007
Calcium (dissolved)	μg/L					0.0		02000	<u>`</u>	140000	118000	<u>`</u>	0.007	<u>`</u>	106000		<u>`</u>	107/67
Calcium (dissolved)	μg/L	5	27			9000	,	92000	-	0.10	< 0.003	_	90400	/	0.003		/	0.003
Caumium (dissolved)	μg/L	5	2.1			< 0.10		0.10	<	0.10	< 0.003 0.016	<	0.003	<	0.003		< _	0.003
Cobali (dissolved)	μg/L		910			< 5.0		. 0.50	<	0.30	0.010		0.033		0.031		-	0.027
Copper (dissolved)	µg/L	1000	010			< 5.0	<	<u> </u>	<	5.0	0.15		0.20		0.52			0.22
	µg/L	1000	0/			< 1.0	<	1.0	<	1.0	1.0	<u>.</u>	0.4	<u> </u>	0.5			0.0
Deteopium (dissolved)	µg/L					< 100	<	440	<	610	< 1	<	1	<	1		<	1
Polassium (dissolved)	µg/L					400		440		010	507	-	500		5004			000
Magnesium (dissolved)	µg/L					4600		5100		6300	5540		5350		5360		-	5417
	µg/L		0000			20.0	<	2.0	<	2.0	0.2	-	0.1		0.4			0.2
Nolybaenum (dissolved)	µg/L		9200			< 0.50	<	0.50	<	0.50	17000	-	0.26		16000			0.20
Socium (dissolved)	µg/L		400			12000	J	9700	<u> </u>	24000	17900		16200		16000		-	16700
Nickel (dissolved)	µg/L		490			< 1.0	<	: 1.0	<	1.0	0.3	<u> </u>	0.3	<u> </u>	0.3			0.3
Phosphorus (dissolved)	mg/L	40	05			130		6		14	< 0.003	<	0.003	<	0.003		<	0.003
Lead (dissolved)	µg/L	10	25			< 0.50	<	0.50	<	0.50	0.03	<	0.01	<	0.01		-	0.02
Antimony (dissolved)	µg/L	6	20000			< 0.50	<	: 0.50	<	0.50	< 0.90	<	0.90	<	0.90		<	0.90
Selenium (dissolved)	µg/L	10	63			< 2.0	<	2.0	<	2.0	0.21		0.13		0.11			0.15
Tin (dissolved)	µg/L					< 1.0	<	: 1.0	<	1.0	0.06		0.06		0.11			0.08
Su Untium (dissolved)	µg/∟					160	_	170	+	230	221		192	-	191		├	201
Thallium (dissolved)	µg/∟		540			< 5.0	<	0.050	<	0.050	0.10		0.12		0.005			0.10
Inallium (dissolved)	µg/∟	20	510			< 0.050	, <	0.40	<	0.050	< 0.005	<	0.005	<	0.005		<	0.005
Vanadium (dissolved)	µg/∟	20	420			0.45		0.42		0.41	0.385		0.457	-	0.464		├	0.435
Vanadium (dissolved)	µg/L		250			< 0.50	<	0.50	<	0.50	0.19		0.22		0.22			0.21
∠inc (dissolved)	µg/∟ D≂/		1100			< 5.0	<	5.0	<	5.0	10.0	<	2.0	<	2.0		-	4./
Lead-210	Bq/L	0.2				< 0.02	<	: 0.10	<	0.10	< 0.020	<	0.020	<	0.020		<	0.020
Radium-226	Bq/L	0.49				< 0.040) <	0.040	<	0.040	< 0.010	<	0.010	<	0.010		<	0.010
Inorium-230	Bq/L	0.65				< 0.070) <	: 0.070	<	0.070	< 0.020	<	0.020	<	0.020		<	0.020
inorium-232	Rd/L	0.6				< 0.060	א ר א	0.060	<	0.060	< 0.020	<	0.020	<	0.020		<	0.020
Field Parameters						2	_	0	_	2		<u> </u>		<u> </u>				
ODO % Sat	%					-2		-2	1	-2	65.6	<u> </u>	81.1	<u> </u>	84.8		<u> </u>	
	mV					-2		-2	_	-2	85	<u> </u>	121.7	<u> </u>	144.6		<u> </u>	
SPC	µs/cm					-2		-2	1	-4	613	_	568	<u> </u>	585		<u> </u>	
Temperature	°C				ļ	-2		-2	1	-2	7.857		9.62	<u> </u>	13.203			
Turbidity	FNU					-2		_2	1	-2	678.97	L	894.18	<u> </u>	283.15			
рН	Units					- ²		_ ²		- ²	7.45		7.35		7.39			
Note:																		

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

 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.

¹ Analysis not included in laboratory contract.

 2 Field parameters included for current sampling year only.

 $^{\rm 3}$ Insufficient volume of groundwater for sample collection

Table C-21: PG-MW3A-02.

								PC	G-MW3A-02			
		Crit	eria	2015	2016	2017	2018	2019			2020	
Parameter	Units	COPC	Table 3			Average				Well Dam	naged	Average
рН	pН			7.24	7.47	7.58	7.55	7.52				
Alkalinity	mg/L as CaCO3			225	257	223	218	215				
Carbonate	mg/L as CaCO3			_1	< 1.0	< 1.0	1.1	< 1.0				
Bicarbonate	mg/L as CaCO3			_1	220	223	215	210				
Total Dissolved Solids	mg/L			7168	7013	6668	5588	4850				
Fluoride	mg/L	1.5		0.29	0.30	0.25	0.29	0.29				
Total Organic Carbon	mg/L			_1	0.84	1.27	1.40	1.17				
Dissolved Organic Carbon	mg/L			1.35	1.00	0.43	0.52	0.57				
Ammonia+Ammonium (N)	as N mg/L			5.5	5.5	5.8	5.2	4.7				
Chloride (dissolved)	mg/L			3850	3650	3625	3100	2600				
Sulphate (dissolved)	mg/L			2.3	14	< 1.0	3.3	35.0				
Bromide (dissolved)	mg/L			51	48	53	62	< 44				
Nitrite (as N)	as N mg/L			< 0.300	0.228	< 0.010	< 0.010	< 0.010				
Nitrate (as N)	as N mg/L			< 0.60	0.48	< 0.10	< 0.10	< 0.10				
Nitrate + Nitrite (as N)	as N mg/L			< 0.60	0.48	< 0.10	< 0.10	< 0.10				
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.03	< 0.10	< 0.10	< 0.10				
Hardness	mg/L as CaCO3			2608	2370	2350	2100	1600				
Silver (dissolved)	µg/L		1.5	0.07	0.03	0.20	< 0.10	< 0.10				
Aluminum (dissolved)	µg/L			11.2	19.3	10	< 5.0	< 5.0				
Arsenic (dissolved)	µg/L	25	1900	0.3	0.4	2.0	< 1.0	< 1.0				
Barium (dissolved)	µg/L	1000	29000	5802	5670	5750	4225	4100				
Beryllium (dissolved)	µg/L		67	< 0.01	0.13	1.00	< 0.50	< 0.50				
Boron (dissolved)	µg/L	5000	45000	803	591	915	828	750				
Bismuth (dissolved)	µg/L			0.02	0.28	2.0	< 1.0	< 1.0				
Calcium (dissolved)	µg/L			514250	515750	465000	437500	325000				
Cadmium (dissolved)	µg/L	5	2.7	0.004	0.03	0.20	< 0.10	< 0.10				
Cobalt (dissolved)	µg/L		66	0.10	0.26	1.13	< 0.50	< 0.50				
Chromium (dissolved)	µg/L		810	0.1	1.3	10.0	< 5.0	< 5.0				
Copper (dissolved)	µg/L	1000	87	1.6	1.5	2.0	< 1.0	< 1.0				
Iron (dissolved)	µg/L			1218	1009	1120	4500	615				
Potassium (dissolved)	µg/L			35300	30125	30750	31750	25500				
Magnesium (dissolved)	µg/L			290750	264750	287500	252500	190000				
Manganese (dissolved)	µg/L			56	53	46	49	26				
Molybdenum (dissolved)	µg/L		9200	0.56	0.55	1.00	0.53	< 0.50				
Sodium (dissolved)	µg/L			1550000	1292500	1200000	1225000	985000				
Nickel (dissolved)	µg/L		490	0.4	0.8	2.3	< 1.0	< 1.0				
Phosphorus (dissolved)	mg/L			0.123	0.173	0.172	0.152	0.018				
Lead (dissolved)	µg/L	10	25	0.02	0.13	1.00	< 0.50	< 0.50				
Antimony (dissolved)	µg/L	6	20000	0.48	0.55	1.02	< 0.54	< 0.50				
Selenium (dissolved)	µg/L	10	63	0.3	0.6	4.0	< 2.0	< 2.0				
Tin (dissolved)	µg/L			0.5	0.7	2.0	< 1.0	< 1.0				
Strontium (dissolved)	µg/L			49925	43800	41500	37750	27500				
Titanium (dissolved)	µg/L			0.3	1.4	10	< 5.0	< 5.0				
Thallium (dissolved)	µg/L		510	0.010	0.016	0.100	< 0.050	< 0.050	┨────┤			
Uranium (dissolved)	µg/L	20	420	0.07	0.11	0.20	0.14	< 0.10	┨────┤			
Vanadium (dissolved)	µg/L		250	0.35	0.78	1.50	< 0.50	< 0.50				
Zinc (dissolved)	µg/L		1100	2.3	9.3	10.3	< 5.0	< 5.0	┨────┤			
Lead-210	Bq/L	0.2		< 0.02	0.04	0.02	0.08	< 0.10				
Radium-226	Bq/L	0.49		0.173	0.060	0.165	0.054	< 0.040	┫────┤			
Thorium-230	Bq/L	0.65		< 0.010	0.025	< 0.070	< 0.070	< 0.070	┨────┤			
Thorium-232	Bq/L	0.6		< 0.010	0.023	< 0.060	< 0.060	< 0.060	 			
Field Parameters				^	^				┨────┤			
ODO % Sat	%			-2	-2	-2	-2	-2				
ORP	mV			-2	-2	-2	-2	-2	┫────┤			
SPC	µs/cm			-2	-2	-4	-2	-4	┨────┤			
Temperature	°C			-2	-2	-2	- ²	-2				
Turbidity	FNU			-2	-2		-2	-2				
рН	Units			-2	-2	-2	-2	-2				

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

 2 Field parameters included for current sampling year only.

Table C-22: PG-MW3B-02.

								PG-	MW3B-02				
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/02/04	2020/06/09	2020/07/28	2020/12/08	Average
рН	pН			8.41	8.12	8.20	8.12	8.23	8.35	8.35	8.29	8.26	8.31
Alkalinity	mg/L as CaCO3			116	145	113	128	128	629	232	280	167	327
Carbonate	mg/L as CaCO3			-1	1.4	1.7	1.6	2.0	4.0	3.0	3.0	< 1.0	2.8
Bicarbonate	mg/L as CaCO3			-1	110	110	125	123	625	229	277	167	325
Total Dissolved Solids	mg/L			197	234	162	154	158	249	169	157	134	177
Fluoride	mg/L	1.5		0.36	0.31	0.33	0.34	0.32	0.38	0.39	0.39	0.36	0.38
Total Organic Carbon	mg/L			-1	1.1	1.37	0.78	2.00	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L			1.43	0.91	0.76	< 0.50	0.54	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ammonia+Ammonium (N)	as N mg/L			0.18	0.14	0.16	0.22	0.20	< 0.04	< 0.04	0.17	0.12	0.09
Chloride (dissolved)	mg/L			2.2	7.3	2.4	2.5	2.7	3	3	3	3	3
Sulphate (dissolved)	mg/L			16	27	16	15	15	17.0	15.0	15.9	16.0	16.0
Bromide (dissolved)	mg/L			< 0.3	0.5	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.030	0.025	0.012	< 0.010	0.011	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			< 0.06	1.78	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			< 0.06	1.78	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.03	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			86	140	86	85	87	79	1090	657	130	489
Silver (dissolved)	µg/L		1.5	0.004	0.027	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			17.4	14.1	< 5	31.8	< 5.0	3	10	8	3	6
Arsenic (dissolved)	µg/L	25	1900	2.2	1.8	2.1	2.1	2.1	2.0	2.1	2.2	2.2	2.1
Barium (dissolved)	µg/L	1000	29000	60.5	59.7	58	57	58	54	53	59	51	54
Beryllium (dissolved)	µg/L		67	< 0.01	0.13	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	64	60	65	65	66	53	68	61	71	63
Bismuth (dissolved)	µg/L			< 0.01	0.26	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			15350	30800	15000	15750	15500	15600	16400	16900	15600	16125
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.027	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.02	0.14	< 0.50	< 0.50	< 0.50	0.008	0.014	0.010	< 0.004	0.009
Chromium (dissolved)	µg/L		810	0.1	1.7	< 5.0	< 5.0	< 5.0	< 0.08	0.14	0.11	0.12	0.11
Copper (dissolved)	µg/L	1000	87	0.2	0.4	< 1.0	< 1.0	< 1.0	< 0.2	0.2	< 0.2	< 0.2	< 0.2
Iron (dissolved)	µg/L			26	31	< 100	< 105	< 100	9	17	22	12	15
Potassium (dissolved)	µg/L			749	871	718	750	708	618	717	756	726	704
Magnesium (dissolved)	µg/L			11725	15375	11500	11250	11250	9630	11300	11800	11200	10983
Manganese (dissolved)	µg/L			2.9	2.6	2.9	4.5	3.1	4.4	4.5	4.4	3.8	4.3
Molybdenum (dissolved)	µg/L		9200	1.46	1.24	1.55	1.40	1.50	1.47	1.64	1.32	1.20	1.41
Sodium (dissolved)	µg/L			17575	15315	16750	16500	17250	15000	17000	17800	17600	16850
Nickel (dissolved)	µg/L		490	0.2	0.4	< 1.0	3.0	< 1.0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phosphorus (dissolved)	mg/L			0.45	0.79	5.15	1.34	6.99	0.004	0.004	0.003	< 0.003	0.004
Lead (dissolved)	µg/L	10	25	0.01	0.13	< 0.50	< 0.50	< 0.50	0.02	0.01	0.02	< 0.01	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.28	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.5	0.6	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.03	0.3	< 1.0	< 1.0	< 1.0	0.07	0.10	0.07	0.15	0.10
Strontium (dissolved)	µg/L			286	285	275	270	265	279	285	288	291	286
Titanium (dissolved)	µg/L			0.2	1.3	< 5	< 5.0	< 5.0	0.08	0.57	0.29	0.12	0.27
Thallium (dissolved)	µg/L		510	0.007	0.016	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.11	0.31	0.13	0.10	< 0.10	0.157	0.104	0.099	0.081	0.110
Vanadium (dissolved)	µg/L		250	0.26	0.43	< 0.63	< 0.50	< 0.50	0.09	0.08	0.05	< 0.01	0.06
Zinc (dissolved)	µg/L		1100	1.8	2.8	5.1	< 5.0	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Lead-210	Bq/L	0.2		< 0.02	0.03	< 0.02	0.08	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Radium-226	Bq/L	0.49		< 0.009	0.020	< 0.040	0.033	0.025	< 0.010	< 0.010	< 0.010	0.010	0.010
Thorium-230	Bq/L	0.65		< 0.010	0.025	< 0.070	0.055	0.055	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L	0.6		< 0.010	0.023	< 0.060	0.048	0.048	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters													
ODO % Sat	%			-2	_2	-2	- ²	-2	37.6	22.4	28.3	42.9	
ORP	mV			_2	_2	-2	-2	-2	70.1	104.3	182.1	92.8	
SPC	µs/cm			-2	_2	-2	- ²	-2	214.4	241.1	235.8	311.7	
Temperature	°C			_2	_2	-2	-2	-2	8.177	10.948	11.464	8.347	
Turbidity	FNU			-2	_2	-2	- ²	- ²	1178.4	564.38	751.11	283.75	
pН	Units			-2	_2	-2	-2	-2	7.93	8.37	8.36	8.37	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Table C-23: PG-MW3C-02

			PG-MW3C-02										
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/02/04	2020/06/09	2020/07/28	2020/12/08	Average
pН	pН			7.71	7.91	7.92	7.87	7.79	7.74	7.72	7.53	7.63	7.66
Alkalinity	mg/L as CaCO3			255	215	253	270	265	632	522	419	516	522
Carbonate	mg/L as CaCO3			_1	1.9	2.0	1.9	1.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			_ ¹	250	253	270	263	632	522	419	516	522
Total Dissolved Solids	mg/L			427	398	407	423	458	426	426	451	423	432
Fluoride	mg/L	1.5		0.09	0.17	< 0.10	0.11	0.11	0.13	0.18	0.10	0.07	0.12
Total Organic Carbon	mg/L			<u>_</u> 1	1.0	2.9	1.1	1.6	1.0	1.0	< 1.0	< 1.0	1.0
Dissolved Organic Carbon	mg/L			2.10	1.03	1.03	0.73	0.73	1.0	1.0	< 1.0	< 1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			0.093	0.078	0.050	0.098	0.147	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Chloride (dissolved)	mg/L			24	19	22	21	21	23	23	22	23	23
Sulphate (dissolved)	mg/L			62	49	59	57	58	61.0	60.0	61.4	62.0	61.1
Bromide (dissolved)	mg/L			< 0.3	0.5	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.030	0.025	0.012	0.010	< 0.010	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			6.87	4.81	5.96	5.69	5.35	5.09	4.98	4.96	4.82	4.96
Nitrate + Nitrite (as N)	as N mg/L			6.87	4.81	5.96	5.69	5.35	5.09	4.98	4.96	4.82	4.96
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.03	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			349	276	340	343	350	394	7730	932	718	2444
Silver (dissolved)	µg/L		1.5	0.005	0.027	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			14.8	10.5	6	< 5.0	< 5.0	3	2	2	4	3
Arsenic (dissolved)	µg/L	25	1900	0.3	1.1	< 1.0	< 1.0	< 1.0	0.2	0.2	0.3	0.3	0.3
Barium (dissolved)	µg/L	1000	29000	84.1	68.3	77	81	83	83	84	85	86	85
Beryllium (dissolved)	µg/L		67	< 0.01	0.13	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Boron (dissolved)	µg/L	5000	45000	13	22	11	15	13	8	9	11	18	12
Bismuth (dissolved)	µg/L			< 0.01	0.26	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			84525	67075	82000	84750	85250	102000	83200	86700	97500	92350
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.027	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	µg/L		66	0.05	0.14	< 0.50	< 0.50	< 0.50	0.031	0.032	0.023	0.010	0.024
Chromium (dissolved)	µg/L		810	1.3	2.0	< 5.0	< 5.0	< 5.0	1.27	1.11	1.21	1.13	1.18
Copper (dissolved)	µg/L	1000	87	0.5	0.5	< 1.0	< 1.0	< 1.0	0.4	0.4	0.2	0.7	0.4
Iron (dissolved)	µg/L			50	37	< 100	< 100	< 100	< 7	< 7	< 7	< 7	< 7
Potassium (dissolved)	µg/L			1273	1101	1150	1225	1100	1370	1240	1240	1300	1288
Magnesium (dissolved)	µg/L			33525	26258	31750	31500	33500	34100	33600	33000	34200	33725
Manganese (dissolved)	µg/L			0.6	2.0	2.0	< 2.0	2.6	1.8	3.3	1.8	2.6	2.4
Molybdenum (dissolved)	µg/L		9200	0.37	0.88	< 0.50	< 0.50	< 0.50	0.37	0.59	0.28	< 0.04	0.32
Sodium (dissolved)	µg/L			9148	10653	9675	8900	10000	8610	8840	8760	9460	8918
Nickel (dissolved)	µg/L		490	0.3	0.4	< 1.0	< 1.0	< 1.0	0.2	0.2	< 0.1	< 0.1	0.2
Phosphorus (dissolved)	mg/L			0.6	0.5	18.7	2.8	3.2	0.005	0.004	0.003	< 0.003	0.004
Lead (dissolved)	µg/L	10	25	0.02	0.18	< 0.50	< 0.50	< 0.50	0.03	0.01	0.01	0.01	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.28	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.6	0.7	< 2.0	< 2.0	< 2.0	0.31	0.35	0.32	0.31	0.32
Tin (dissolved)	µg/L			0.03	0.4	< 1.0	< 1.0	< 1.0	0.09	0.07	0.07	0.11	0.09
Strontium (dissolved)	µg/L			295	288	270	280	293	400	325	313	353	348
Titanium (dissolved)	µg/L			0.2	1.5	< 5	< 5.0	< 5.0	0.15	0.14	0.14	0.17	0.15
Thallium (dissolved)	µg/L		510	0.006	0.016	< 0.050	< 0.050	< 0.050	< 0.005	0.005	0.006	< 0.005	0.005
Uranium (dissolved)	µg/L	20	420	0.84	0.65	0.85	0.82	0.88	0.944	0.929	0.908	0.962	0.936
Vanadium (dissolved)	µg/L		250	0.91	0.66	0.75	0.75	0.76	0.91	0.71	0.75	0.72	0.77
Zinc (dissolved)	µg/L		1100	2.8	3.3	< 5.0	< 5.0	< 5.0	2.0	< 2.0	< 2.0	4.0	2.5
Lead-210	Bq/L	0.2		< 0.02	0.02	< 0.02	0.08	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Kadium-226	Bq/L	0.49		< 0.011	0.018	< 0.040	< 0.040	< 0.040	< 0.010	< 0.010	< 0.010	0.020	0.013
Inorium-230	Bq/L	0.65		< 0.010	0.025	< 0.070	< 0.070	< 0.070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Inorium-232	Rd/L	0.6		< 0.010	0.023	< 0.060	< 0.060	< 0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Held Parameters				2	2	2	2	2					<u> </u>
ODO % Sat	%								50.2	56.2	69.5	57.6	
	mv								101.8	143.5	227.4	143.1	
	µs/cm								590	694	560	882	
Temperature	т. Гъщ								8.374	10.368	14.332	8.585	
	FNU								2087.8	2180.9	610.33	1320.8	
рН	Units			-4					7.42	7.44	7.52	7.49	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

 $^{\rm 2}$ Field parameters included for current sampling year only.

Table C-24: PG-MW3D-02.

			PG-MW3D-02										
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/02/04	2020/06/09	2020/07/28	2020/12/08	Average
pН	рН			8.06	7.65	7.80	7.81	7.74	7.71	7.51	No Sample ³	No Sample ³	7.61
Alkalinity	mg/L as CaCO3			278	336	278	280	265	269	356			313
Carbonate	mg/L as CaCO3			_1	_1	1.6	1.7	1.4	< 1.0	< 1.0			< 1.0
Bicarbonate	mg/L as CaCO3			_1	_1	275	280	265	269	356			313
Total Dissolved Solids	mg/L			360	427	388	358	385	286	363			325
Fluoride	mg/L	1.5		0.10	0.09	< 0.10	0.11	< 0.10	0.11	0.12			0.12
Total Organic Carbon	mg/L			_1	_1	3.4	2.5	3.0	2.0	2.0			2.0
Dissolved Organic Carbon	mg/L			3.30	1.70	2.08	1.75	1.60	2.0	2.0			2.0
Ammonia+Ammonium (N)	as N mg/L			0.065	< 0.040	< 0.050	< 0.050	0.062	0.17	0.06			0.12
Chloride (dissolved)	mg/L			31	28	38	19	23	7	8			7
Sulphate (dissolved)	mg/L			13	16	17	17	14	9.2	12.0			10.6
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			< 0.030	< 0.030	< 0.010	< 0.010	< 0.010	< 0.03	< 0.03			< 0.03
Nitrate (as N)	as N mg/L			2.47	1.76	1.86	1.90	1.16	1.74	0.72			1.23
Nitrate + Nitrite (as N)	as N mg/L			2.47	1.76	1.86	1.90	1.16	1.74	0.72			1.23
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			336	313	318	305	303	185	2340			1263
Silver (dissolved)	µg/L		1.5	0.006	< 0.002	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05		1	< 0.05
Aluminum (dissolved)	μg/L		-	12.4	56.8	12	< 5.0	< 5.0	2	< 1			2
Arsenic (dissolved)	μg/L	25	1900	0.3	< 0.2	< 1.0	< 1.0	< 1.0	< 0.2	< 0.2			< 0.2
Barium (dissolved)	ua/L	1000	29000	39.3	36.0	38	31	32	20	27			23
Bervllium (dissolved)	ua/L		67	< 0.01	< 0.01	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007			< 0.007
Boron (dissolved)	µg/L	5000	45000	27	9	26	19	29	12	22			17
Bismuth (dissolved)	µg/L			< 0.01	< 0.01	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007			< 0.007
Calcium (dissolved)	µg/L			116000	113500	112250	110667	107750	67300	105000			86150
Cadmium (dissolved)	µg/L	5	2.7	0.003	0.008	< 0.10	< 0.10	< 0.10	< 0.003	0.007			0.005
Cobalt (dissolved)	µg/L	-	66	0.04	0.04	< 0.50	< 0.50	< 0.50	0.030	0.023			0.027
Chromium (dissolved)	µg/L		810	0.3	0.3	< 5.0	< 5.0	< 5.0	< 0.08	0.27			0.18
Copper (dissolved)	µg/L	1000	87	0.9	0.7	1.2	< 1.0	< 1.0	2.4	0.5			1.5
Iron (dissolved)	ua/L		-	4	29	< 100	< 100	< 100	< 7	< 7			< 7
Potassium (dissolved)	ua/L			1930	1999	1800	1767	1550	1360	1850			1605
Magnesium (dissolved)	µg/L			11210	7220	9675	8567	9125	4110	7380			5745
Manganese (dissolved)	ua/L			0.1	1.8	5.7	< 2.0	< 2.0	< 0.01	0.27			0.14
Molybdenum (dissolved)	ua/L		9200	0.22	0.11	< 0.50	< 0.50	< 0.50	0.18	0.17			0.18
Sodium (dissolved)	ua/L			7407	5241	8425	8033	8025	2630	5220			3925
Nickel (dissolved)	µg/L		490	0.2	0.2	< 1.0	< 1.0	< 1.0	0.3	0.2			0.3
Phosphorus (dissolved)	ma/L			0.20	0.30	0.57	0.26	0.77	0.006	< 0.003			0.005
Lead (dissolved)	ua/L	10	25	0.02	0.04	< 0.50	< 0.50	< 0.50	0.02	< 0.01			0.02
Antimony (dissolved)	ua/L	6	20000	< 0.20	< 0.20	0.56	< 0.50	< 0.50	< 0.90	< 0.90			< 0.90
Selenium (dissolved)	µg/L	10	63	0.4	0.3	< 2.0	< 2.0	< 2.0	0.18	0.12			0.15
Tin (dissolved)	ua/L	-		0.07	0.1	< 1.0	< 1.0	< 1.0	0.15	0.06			0.11
Strontium (dissolved)	μg/L			260	239	233	217	208	147	225			186
Titanium (dissolved)	μg/L			0.2	1.9	< 5	< 5.0	< 5.0	0.12	< 0.05		1	0.09
Thallium (dissolved)	µg/L		510	0.007	0.006	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005			< 0.005
Uranium (dissolved)	µg/L	20	420	0.26	0.24	0.26	0.23	0.21	0.165	0.241			0.203
Vanadium (dissolved)	µg/L		250	0.54	0.57	0.51	< 0.50	0.50	0.31	0.39			0.35
Zinc (dissolved)	μg/L		1100	< 2.0	2.5	5.1	< 5.0	< 5.0	4.0	< 2.0			3.0
Lead-210	Bq/L	0.2		< 0.03	< 0.02	< 0.02	< 0.10	< 0.10	< 0.020	< 0.020			< 0.020
Radium-226	Bq/L	0.49		< 0.013	< 0.010	< 0.040	< 0.040	0.033	< 0.010	0.020			0.015
Thorium-230	Bq/L	0.65		< 0.023	< 0.010	< 0.070	< 0.070	0.055	< 0.020	< 0.020			< 0.020
Thorium-232	Bq/L	0.6		< 0.023	< 0.010	< 0.060	< 0.060	0.048	< 0.020	< 0.020			< 0.020
Field Parameters				İ	1	1							
ODO % Sat	%			_ ²	_2	_ ²	_2	_ ²	73.6	58.7			
ORP	mV			- ²	_2	- ²	- ²	- ²	99.6	142.1			
SPC	µs/cm			- ²	_2	- ²	- ²	- ²	356.8	577			
Temperature	°C			_ ²	_2	_ ²	_2	_ ²	7.583	9.524			
Turbidity	FNU			- ²	_2	- ²	- ²	- ²	55.48	203.22			
pH	Units			- ²	_2	-2	- ²	- ²	7.53	7.21			

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

 $^{2}\ensuremath{\,\mbox{Field}}\xspace$ Field parameters included for current sampling year only.

³ Insufficient volume of groundwater for sample collection

Table C-25: PG-MW4A-02

			PG-MW4A-02										
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/01/28	2020/06/12	2020/07/17	2020/11/11	Average
pН	рН			8.43	8.04	8.13	8.05	7.87	8.24	8.34	8.33	8.30	8.30
Alkalinity	mg/L as CaCO3			82	92	76	75	69	68	128	184	112	123
Carbonate	mg/L as CaCO3			_1	< 1.0	1.0	1.0	< 1.0	< 1.0	2.0	2.0	< 1.0	1.5
Bicarbonate	mg/L as CaCO3			_1	79	75	74	69	68	125	182	112	122
Total Dissolved Solids	mg/L			431	436	409	384	412	366	420	414	394	399
Fluoride	mg/L	1.5		0.63	0.66	0.60	0.59	0.61	0.68	0.73	0.73	0.75	0.72
Total Organic Carbon	mg/L			_1	2.2	1.9	1.2	1.4	< 1.0	< 1.0	1.0	1.0	1.0
Dissolved Organic Carbon	mg/L			2.03	0.94	0.77	0.62	0.74	1.0	< 1.0	1.0	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			0.55	0.52	0.56	0.58	0.55	0.50	0.51	0.45	0.52	0.50
Chloride (dissolved)	mg/L			213	205	200	198	193	190	190	180	190	188
Sulphate (dissolved)	mg/L			0.4	0.5	< 1.0	1.3	2.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Bromide (dissolved)	mg/L			2.6	2.4	3.1	2.6	3.2	2.4	2.2	2.3	2.3	2.3
Nitrite (as N)	as N mg/L			< 0.030	0.025	< 0.010	< 0.010	< 0.010	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			< 0.06	0.07	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			< 0.06	0.07	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	ua/L	1	0.29	0.03	0.03	< 0.10	< 0.08	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			97	98	93	91	95	86	562	398	276	331
Silver (dissolved)	µg/L		1.5	0.004	0.027	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	ua/L			19.5	18.5	< 50	< 5.0	52	32	6	1	< 1	10
Arsenic (dissolved)	ug/L	25	1900	0.8	0.4	< 10	< 10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Barium (dissolved)	ug/L	1000	29000	94 7	95.0	100	98	93	84	90	94	81	87
Beryllium (dissolved)	ug/l	1000	67	< 0.01	0.13	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Boron (dissolved)	ug/l	5000	45000	174	187	185	170	177	142	177	168	166	163
Bismuth (dissolved)	µg/L	3000	43000	< 0.01	0.26	< 1.0	< 10	< 10	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			20033	20350	18750	18750	10333	19800	19600	16800	17700	18475
Cadmium (dissolved)	µg/L	5	27	< 0.003	0.027	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003	< 0.003	
Cobalt (dissolved)	µg/L	J	66	0.000	0.027	< 0.10	< 0.10	< 0.10	0.053	0.025	0.022	0.000	0.000
Chromium (dissolved)	µg/L		810	0.00	1.4	< 5.0	< 5.0	< 5.0	0.000	0.020	0.022	0.010	0.020
Copper (dissolved)	µg/L	1000	87	0.2	0.4	< 1.0	< 1.0	< 1.0	3.0	- 02	0.11	< 0.20	1 1
Iron (dissolved)	µg/L	1000	07	71	74	< 1.0	< 1.0	107	- 7	30	40	30	31
Potassium (dissolved)	µg/L			1863	1015	1875	1825	1833	1650	1700	1840	1660	1713
Magnesium (dissolved)	µg/L			11/67	11350	11250	1025	11333	8010	9770	10400	9180	9565
Magnesian (dissolved)	µg/L			5.4	3.5	3.1	2.8	2.5	2 41	3.02	2 24	1 96	2 41
Molybdenum (dissolved)	µg/L		9200	2.8	2.8	2.8	2.0	2.5	1 78	2 71	2.24	3.22	2.41
Sodium (dissolved)	µg/L		5200	128000	116250	112500	110000	116667	95100	104000	120000	97100	10/050
Nickel (dissolved)	µg/L		490	0.2	0.3	- 10	- 10	1 1 0	< 0.1	< 0.1	120000	< 0.1	- 0.1
Phosphorus (dissolved)	mg/L		430	0.2	0.0	0.588	0.296	0.021	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Lood (dissolved)	ug/L	10	25	0.010	0.000	0.500	0.200	0.021	0.05	< 0.000	< 0.000	< 0.000	0.000
Antimony (dissolved)	µg/L	6	20000	0.02	0.13	< 0.50	< 0.50	< 0.50	0.00	< 0.01	< 0.01	< 0.01	0.02
Selenium (dissolved)	µg/L	10	20000	0.20	0.20	< 2.0	< 20	< 2.0	< 0.90	< 0.30	< 0.90	< 0.00	< 0.30
Tip (dissolved)	µg/∟	10	03	0.02	0.5	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04	< 0.04	0.04
Strontium (discolued)	ру/L ug/l			1267	1/25	1350	1275	1300	1310	1220	1260	1200	1270
Titanium (dissolved)	ру/L ug/l			0.4	1420	- 5	- 50	- 50	0.05	0.28	0.15	- 0.05	0.13
Thallium (dissolved)	µg/L		510	0.4	0.016	< 0.050	< 0.050	< 0.050	0.05	0.20	0.15	< 0.005	0.13
Liranium (dissolved)	µg/∟	20	420	< 0.005	0.010	< 0.000	< 0.000	< 0.000	< 0.005	< 0.005 0.016	< 0.005	< 0.003	0.005
Vanadium (dissolved)	µg/∟	20	420	0.01	0.03	< 0.10	< 0.10	< 0.10	0.020	0.010	0.009	< 0.002	0.013
	µg/∟ ug/l		1100	0.20	0.24	< 0.00	< 0.00	< 0.50	4.0	2.00	0.02	0.00	0.05
	µy/∟ Pa/l	0.2	1100	< 2.0	2.0	< 0.02	< 0.10	< 0.10	4.0	< 2.0	< 2.0	< 2.0	2.0
Radium-226	Bq/L Bq/l	0.40		< 0.02	0.02	< 0.02	< 0.10	< 0.10	< 0.020 0.020	0.020	< 0.020	< 0.020	0.020
Thanium 220	Bq/L Bg/l	0.49		< 0.017	0.030	< 0.025	< 0.040	< 0.040	0.020	0.020	< 0.010	< 0.010	0.015
Thorium 222		0.65		< 0.010	0.025	< 0.070	< 0.070	< 0.070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
	D4/L	0.0		< 0.010	0.023	< 0.000	< 0.060	< 0.000	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
	0/			2	2	2	2	2	~-	70.0	01.0	00.0	
ODO % Sat	%			-*					37	/9.2	81.6	68.8	
	mv			-*				-*	44.3	74.4	103.6	86.2	
	µs/cm			-"					675	746	732	721	
	°С			-"					7.87	10.402	11.485	10.062	
Turbidity	FNU			-4	-4			-4	11.52	640.81	381.61	164.05	
рН	Units			-2	- ²	- ²	- ²	-2	8.07	8.36	8.35	8.31	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

 $^{2}\ensuremath{\,\mbox{Field}}\xspace$ field parameters included for current sampling year only.

Table C-26: PG-MW4B-02

			PG-MW4B-02										
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/01/28	2020/06/12	2020/07/17	2020/11/11	Average
рН	pН			7.91	8.09	8.13	8.08	8.13	8.23	8.21	8.09	8.09	8.16
Alkalinity	mg/L as CaCO3			156	165	155	160	163	219	160	343	187	227
Carbonate	mg/L as CaCO3			_1	1.7	2.0	1.8	2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			_1	150	153	158	160	219	160	343	187	227
Total Dissolved Solids	mg/L			189	234	207	188	228	254	226	237	226	236
Fluoride	mg/L	1.5		0.28	0.28	0.26	0.25	0.23	0.26	0.28	0.29	0.26	0.27
Total Organic Carbon	mg/L			_1	1.10	1.24	1.43	1.29	< 1.0	< 1.0	1.0	1.0	1.0
Dissolved Organic Carbon	mg/L			< 1.00	0.98	0.76	0.69	0.65	< 1.0	1.0	2.0	1.0	1.3
Ammonia+Ammonium (N)	as N mg/L			0.110	0.115	0.086	0.143	0.101	0.06	0.09	0.04	0.11	0.08
Chloride (dissolved)	mg/L			13	12	12	12	12	14	16	13	13	14
Sulphate (dissolved)	mg/L			21	20	22	22	22	22.0	22.0	23.0	23.2	22.6
Bromide (dissolved)	mg/L			< 0.3	0.5	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.030	0.025	< 0.010	< 0.010	< 0.010	< 0.03	< 0.03	0.04	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			< 0.06	0.08	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	0.09	0.07
Nitrate + Nitrite (as N)	as N mg/L			< 0.06	0.08	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	0.09	0.07
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.03	< 0.10	< 0.10	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			145	155	153	165	160	153	200	1052	286	423
Silver (dissolved)	µg/L		1.5	< 0.002	0.027	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			17.0	6.8	5.4	36.3	< 5.0	32	3	326	< 1	91
Arsenic (dissolved)	µg/L	25	1900	1.5	1.9	1.7	1.8	1.9	2.0	2.0	2.5	2.1	2.2
Barium (dissolved)	µg/L	1000	29000	47.5	60.8	65	68	65	64	62	78	60	66
Beryllium (dissolved)	µg/L		67	< 0.01	0.13	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	0.033	< 0.007	0.014
Boron (dissolved)	µg/L	5000	45000	26	36	35	31	29	30	29	27	33	30
Bismuth (dissolved)	µg/L			< 0.01	0.26	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	µg/L			23700	24725	24250	28000	26000	26200	25400	65800	24300	35425
Cadmium (dissolved)	µg/L	5	2.7	< 0.003	0.027	< 0.10	< 0.10	< 0.10	< 0.003	0.005	0.009	< 0.003	0.005
Cobalt (dissolved)	ua/L		66	0.04	0.16	< 0.50	< 0.50	< 0.50	0.067	0.025	0.360	0.019	0.118
Chromium (dissolved)	ua/L		810	0.4	1.4	< 5.0	< 5.0	< 5.0	0.11	< 0.08	0.77	< 0.08	0.26
Copper (dissolved)	ua/L	1000	87	0.5	0.4	< 1.0	< 1.0	< 1.0	< 0.2	< 0.2	0.8	< 0.2	0.4
Iron (dissolved)	ua/L		-	43	39	< 100	150	< 100	26	14	845	30	229
Potassium (dissolved)	µg/L			1050	1133	1075	1075	1067	991	956	1220	953	1030
Magnesium (dissolved)	µg/L			20800	22500	22500	23250	23333	21200	21700	28400	21700	23250
Manganese (dissolved)	µg/L			6.9	8.2	8.4	15.0	8.3	8.03	7.91	79.00	8.43	25.84
Molybdenum (dissolved)	µg/L		9200	0.71	1.02	0.98	0.95	0.97	1.16	0.85	0.91	0.70	0.91
Sodium (dissolved)	µg/L			15900	16075	14500	14000	14333	12800	12300	15000	12100	13050
Nickel (dissolved)	µg/L		490	0.4	0.3	< 1.0	< 1.0	< 1.0	< 0.1	< 0.1	0.6	< 0.1	0.2
Phosphorus (dissolved)	mg/L			0.24	0.97	2.80	2.25	1.36	0.004	0.004	0.231	< 0.003	0.061
Lead (dissolved)	µg/L	10	25	0.21	0.13	< 0.50	< 0.50	< 0.50	0.03	< 0.01	0.65	0.02	0.18
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.28	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	< 1.0	0.5	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			< 0.01	0.3	< 1.0	< 1.0	< 1.0	0.45	< 0.06	0.14	0.08	0.18
Strontium (dissolved)	µg/L			286	380	365	380	370	412	376	450	379	404
Titanium (dissolved)	μg/L			0.3	1.3	< 5	6.2	< 5.0	< 0.05	0.14	22.4	< 0.05	5.66
Thallium (dissolved)	µg/L		510	< 0.005	0.016	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.22	0.23	0.21	0.21	0.18	0.274	0.226	0.488	0.191	0.295
Vanadium (dissolved)	μg/L		250	0.34	0.25	< 0.50	< 0.50	< 0.50	0.06	0.06	1.18	0.03	0.33
Zinc (dissolved)	µg/L		1100	3.0	2.8	< 5.0	5.1	< 5.0	< 2.0	< 2.0	4.0	< 2.0	2.5
Lead-210	Bq/L	0.2		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Radium-226	Bq/L	0.49		< 0.010	0.020	0.025	< 0.040	0.030	0.010	< 0.010	< 0.010	< 0.010	0.010
Thorium-230	Bq/L	0.65		< 0.010	0.025	< 0.070	< 0.070	0.050	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L	0.6		< 0.010	0.023	< 0.060	< 0.060	0.043	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters									l	İ		Ì	
ODO % Sat	%			_2	_2	_2	_2	_ ²	40.4	62.4	58	90.2	
ORP	mV			_2	_ ²	_2	_2	_ ²	28.7	67.1	123.3	130.3	
SPC	µs/cm			_2	- ²	_ ²	- ²	- ²	336.5	358.7	362.5	357.5	
Temperature	℃			_2	_ ²	_2	_2	_ ²	8.668	10.075	11.232	10.138	
Turbidity	FNU			_2	_2	_2	_2	_ ²	671.03	85.32	1115.2	189.96	
, pH	Units			_2	_ ²	_2	_2	_ ²	8.05	8	8.08	8.19	
										-			

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Table C-27: PG-MW4C-02.

			PG-MW4C-02										
		Crit	eria	2015	2016	2017	2018	2019			2020		
Parameter	Units	COPC	Table 3			Average			2020/01/28	2020/06/12	2020/07/17	2020/11/11	Average
pН	pН			7.91	7.97	8.06	7.98	7.98	7.97	7.94	7.81	7.87	7.90
Alkalinity	mg/L as CaCO3			205	193	195	203	253	436	242	517	255	363
Carbonate	mg/L as CaCO3			-1	1.7	2.1	1.8	2.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bicarbonate	mg/L as CaCO3			- ¹	200	195	200	250	436	242	517	255	363
Total Dissolved Solids	mg/L			249	298	289	280	325	303	343	300	309	314
Fluoride	mg/L	1.5		0.10	0.11	0.12	0.11	0.11	0.15	0.12	0.13	0.11	0.13
Total Organic Carbon	mg/L			_1	0.9	0.8	2.0	1.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon	mg/L			1.20	0.93	0.66	0.63	0.61	1.0	< 1.0	1.0	1.0	1.0
Ammonia+Ammonium (N)	as N mg/L			0.047	0.058	< 0.050	0.107	0.200	0.06	0.07	< 0.04	0.05	0.06
Chloride (dissolved)	mg/L			2.7	2.9	3.7	4.2	3.9	3.9	4.0	3.4	3.6	3.7
Sulphate (dissolved)	mg/L			56	59	53	47	47	50	51	51	53	51
Bromide (dissolved)	mg/L			< 0.3	0.5	< 1.0	< 1.0	< 1.0	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrite (as N)	as N mg/L			< 0.030	0.025	< 0.010	< 0.010	< 0.010	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Nitrate (as N)	as N mg/L			< 0.06	0.07	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate + Nitrite (as N)	as N mg/L			< 0.06	0.07	< 0.10	< 0.10	< 0.10	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Mercury (dissolved)	µg/L	1	0.29	< 0.01	0.03	< 0.10	< 0.08	< 0.10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hardness	mg/L as CaCO3			237	240	235	233	243	228	7060	2752	409	2612
Silver (dissolved)	µg/L		1.5	< 0.002	0.027	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum (dissolved)	µg/L			14.7	11.5	< 5.0	< 5.0	6.1	71	2	< 1	< 1	19
Arsenic (dissolved)	µg/L	25	1900	2.2	2.4	2.1	2.2	2.0	1.8	1.9	1.9	2.0	1.9
Barium (dissolved)	µg/L	1000	29000	117.3	115.3	118	140	163	158	163	174	145	160
Beryllium (dissolved)	µg/L		67	< 0.01	0.13	< 0.50	< 0.50	< 0.50	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Boron (dissolved)	ua/L	5000	45000	11	9	13	< 10	< 10	15	9	9	12	11
Bismuth (dissolved)	ua/L			< 0.01	0.26	< 1.0	< 1.0	< 1.0	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Calcium (dissolved)	ua/L			52300	54500	53000	51750	55667	53200	53100	57300	50700	53575
Cadmium (dissolved)	ua/L	5	2.7	< 0.003	0.027	< 0.10	< 0.10	< 0.10	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Cobalt (dissolved)	ua/L	-	66	0.65	0.97	1.58	0.91	0.67	0.391	0.796	0.712	0.431	0.583
Chromium (dissolved)	ua/L		810	0.1	1.4	< 5.0	< 5.0	< 5.0	< 0.08	< 0.08	0.09	< 0.08	0.08
Copper (dissolved)	ua/L	1000	87	0.3	0.3	< 1.0	< 1.0	1.1	1.5	< 0.2	< 0.2	< 0.2	0.5
Iron (dissolved)	ua/L		-	99	80	< 100	< 100	110	175	74	59	166	119
Potassium (dissolved)	µg/L			1307	1385	1325	1275	1433	1300	1330	1560	1240	1358
Magnesium (dissolved)	µg/L			25667	25525	25000	25000	25667	23100	23600	27900	22900	24375
Manganese (dissolved)	µg/L			11.1	10.9	11.0	9.5	8.9	8.79	9.70	9.38	8.98	9.21
Molybdenum (dissolved)	µg/L		9200	0.80	0.79	0.78	0.79	0.76	0.98	0.65	0.68	0.62	0.73
Sodium (dissolved)	µg/L			5907	6250	6200	6100	6033	5280	5100	6380	5140	5475
Nickel (dissolved)	µg/L		490	0.3	0.4	< 1.0	< 1.0	< 1.0	< 0.1	0.1	< 0.1	< 0.1	0.1
Phosphorus (dissolved)	mg/L			0.11	0.14	0.13	2.58	8.16	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Lead (dissolved)	µg/L	10	25	0.01	0.14	< 0.50	< 0.50	< 0.50	0.03	< 0.01	< 0.01	0.02	0.02
Antimony (dissolved)	µg/L	6	20000	< 0.20	0.28	< 0.50	< 0.50	< 0.50	< 0.90	< 0.90	< 0.90	< 0.90	< 0.90
Selenium (dissolved)	µg/L	10	63	0.7	0.5	< 2.0	< 2.0	< 2.0	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Tin (dissolved)	µg/L			0.02	0.3	< 1.0	< 1.0	< 1.0	6.09	< 0.06	0.07	0.07	1.57
Strontium (dissolved)	µg/L			222	230	223	233	233	234	232	238	224	232
Titanium (dissolved)	µg/L			0.3	1.3	< 5	< 5.0	< 5.0	0.07	0.20	< 0.05	< 0.05	0.09
Thallium (dissolved)	µg/L		510	< 0.005	0.016	< 0.050	< 0.050	< 0.050	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium (dissolved)	µg/L	20	420	0.21	0.20	0.20	0.21	0.15	0.143	0.184	0.262	0.110	0.175
Vanadium (dissolved)	µg/L		250	0.24	0.21	< 0.50	< 0.50	< 0.50	0.03	0.12	0.22	0.03	0.10
Zinc (dissolved)	µg/L		1100	< 2.0	2.8	< 5.0	< 5.0	< 5.0	7.0	< 2.0	5.0	< 2.0	4.0
Lead-210	Bq/L	0.2		< 0.02	< 0.02	< 0.02	< 0.10	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Radium-226	Bq/L	0.49		< 0.010	0.018	0.025	< 0.040	< 0.040	< 0.010	0.010	< 0.010	< 0.010	0.010
Thorium-230	Bq/L	0.65		< 0.010	0.025	< 0.070	< 0.070	< 0.070	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Thorium-232	Bq/L	0.6		< 0.010	0.023	< 0.060	< 0.060	< 0.060	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Field Parameters							İ					Ì	
ODO % Sat	%			_2	_2	_2	_ ²	_2	24.7	38.9	47.8	21.7	
ORP	mV			_2	_ ²	_ ²	_ ²	_2	-26.5	23.3	95.9	77.8	
SPC	µs/cm			_2	- ²	- ²	- ²	_2	417.1	469.4	470.9	470.9	
Temperature	℃			_2	_ ²	_ ²	_ ²	_2	8.512	10.39	11.248	9.96	
Turbidity	FNU			_2	_2	_2	_ ²	_2	4166.3	2151.9	1451.6	386.03	
pH	Units			_2	_2	_2	_ ²	_2	7.61	7.63	7.68	7.78	
												-	

Note:

COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Portable Groundwater Conditions from the Screening Report - Port Granby Project

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.

¹ Analysis not included in laboratory contract.

² Field parameters included for current sampling year only.

Predicted Effects	Mitigation Measures	Residual Effects after Mitigation	Status of Mitigation Measures - 2020	EA Follow-Up Monitoring Requirements	Predicted Environmental Effect – 2020	Status of EA Commitments - 2020
Atmospheric Environment		<u> </u>		•		
Air Quality: For PM _{2.5} particulate emissions, there will be occasional and slight exceedances along the edge of the existing WMF site. Development Phase of the LTWMF.	Implementation of high level of dust control measures at waste site.	No residual adverse effects.	The Dust Management and Requirements Plan [32] was followed during construction activities. This included not working above certain wind thresholds. Water was used for dust suppression. During hot conditions when water was evaporating quickly, the contractor used pre-approved, commercially-available products specifically intended for dust suppression. Hydro seeding was undertaken on areas where work was completed.	Dust monitoring (TSP and PM _{2.5}) at site adjacent to construction activities during the Construction and Development Phase. The proponent should use recent/up-to-date data to establish baseline conditions.	There was one exceedances of the The Canadian Council of Ministers of the Environment (CCME) Air Quality Criteria for PM _{2.5} in 2020 May at the Northwest Mini-Vol location. This exceedance was attributed to off-site activities.	High volume (Hi-Vol) air samplers were installed and operated at two (2) locations in Port Granby in 2020 (Port Granby South and Port Granby East), to measure both TSP and PM2.5. Mini-Vol portable air samplers (both TSP and PM2.5) were deployed at the Port Granby Northwest location as an alternate to high volume air samplers due to the lack of a power source at that location.Three exceedances of the overriding limit of 120 micrograms per cubic metre (µg/m³) as defined in the Dust Management and Requirements Plan [32] at the Port Granby South location were noted in 2020. Two of the exceedances, 2020 January and May, were attributed to on- site activities. The 2020 November exceedance was attributed to off- site activities. The exceedances represent approximately 0.95% of total samples collected at Port Granby South. There was one exceedance observed in the Mini- Vol sample at the Port Granby Northwest location in 2020 January. This exceedance was attributed to off-site activities. Exceedances were reported through CNL's ImpAct system and appropriate follow-up action was performed.The Canadian Council of Ministers of the Environment (CCME) Air

Table D-1: Scope of biophysical effects EA Follow-Up Monitoring Plan.

Predicted Effects	Mitigation Measures	Residual Effects after	Status of Mitigation Measures	EA Follow-Up Monitoring	Predicted Environmental	Status of FA Commitments - 2020
		Mitigation	- 2020	Requirements	Effect – 2020	
						Quality Criteria for $PM_{2.5}$ of
						30 µg/m ³ (98 th percentile
						averaged over three years). In $2020 \text{ yaluo of } 27 \text{ ug/m}^3$ [22] is
						proposed for PM_{25} which was
						exceeded in 2020 May at the
						Mini-Vol Port Granby Northwest
						location. This exceedance was
						attributed to off-site activities.
						The PGP Screening Report [31]
						predicted that there will be
						occasional and slight exceedances
						for PIVI _{2.5} along the edge of the
						existing wiver site.
						The sample containing the highest
						week at each of the high volume
						air sampling monitoring stations
						was sent for additional analysis to
						determine the concentration of
						contaminants of potential concern
						in suspended dust. There was one
						exceedance of the Ambient Air
						Quality Criteria (AAQC) [34] for
						nickel in 2020 November and the
						exceedance was attributed to off
						site activities.
						Dadianualida analysis results are
						discussed under Radiological
						Particulate Radioactivity.
Noise:	1. Construction equipment will	No likely residual adverse	1. Construction equipment	Verify implementation of	The 2020 monitoring results	Continuous sound level data was
Levels will increase by 6 dBA	comply with emission standards as	effects.	complied with emission	mitigation measures.	during daytime hours, when	collected at a total of nine
to 56 dBA at both the	outlined in NPC-115 of the Ontario		standards outlined in NPC-115		compared to the baseline	locations in Port Granby during
LTWMF and the existing	Model Municipal Noise Control		of the Ontario Model	Periodically measure noise	noise levels measured in 2015,	the 2020 monitoring period. The
facility in predicted zones of	By-law.		Municipal Noise Control By-law	levels at receptor locations	revealed an average decrease	2020 monitoring results during
maximum influence as worst	2. Irucks and other equipment will		and had operable mufflers.	near the Site Study Area	or similar in noise levels.	daytime hours were compared to
case scenarios. There will be	be equipped with muthers. Tallgate		2. Construction activities were	ouring the construction and	Readings above 56 dbA word	Outdoor construction was not
local receptors	3 Empty trucks will be required to		accordance with the	Development mase.	observed however this	occurring in 2015 and therefore
	reduce speed at construction sites		Municipality of Clarington	Incorporate additional post-	prediction was based on 2004	2015 results are more
	and on local roads to avoid		Noise By-law 2007-071.	EA data collection results and	data. Elevated levels may be	representative of baseline
	excessive cargo box and tray noise.		3. Tailgate banging was	use to verify EA predictions.	influenced by an increase in	conditions than those results from
	4. Construction hoarding will be		avoided and tailgates were		local road traffic and trains	2004. (Section 9.2.1.5)
	erected where practicable.		secured as required.		since the initial environmental	

Predicted Effects	Mitigation Measures	Residual Effects after Mitigation	Status of Mitigation Measures - 2020	EA Follow-Up Monitoring Requirements	Predicted Environmental Effect – 2020	Status of EA Commitments - 2020
	5. All construction activities would be limited to daylight hours.		4. Contractors complied with posted speed limits on local public roads and avoided generating excessive cargo box or tray noise.	•	assessment. It was predicted that there will be nuisance noise impacts on local receptors. There were no noise complaints in 2019.	
Radiological Effects: Radon The highest predicted annual average radon concentration is 5.1 Bq/m ³ during construction and development.	 Working areas containing contaminated materials will be minimized. Application of dust suppressants including water and possibly chemical suppressants. Covering of stockpiles and exposed areas overnight and on weekends using foam agents, geotextiles or other appropriate materials. Placing wind fencing around exposed stockpiles. Possible cessation of activities under high wind conditions. Mulching or re-vegetating completed cells and excavation areas as soon as possible 	No residual adverse effects.	Mitigation measures were executed as outlined in the 'Mitigation Measures' column.	Verify implementation of mitigation measures at time appropriate to the measure. Radon and long-lived alpha (LLA) monitoring during the Construction and Development Phase and monitoring during Early Life.	LLA and radon monitoring were being performed by the contractor, on a routine basis under their approved Dust Plan and Radiation Protection Plan. In 2020, CNL continues to perform monthly radon monitoring, at a total of 7 locations at the PG LTWMF and PG WMF. The average annual radon concentration measured at these locations was 111 Bq/m ³ . The trigger level for radon monitoring is 150 Bq/m ³ given the consequence of excavating into the site. The predicted levels have been set to a significantly low unachievable level and should be re- evaluated.	Radon gas was monitored on a routine monthly basis at the PG WMF and LTMWF during the 2020 calendar year.
Radiological Effects: Particulate Radioactivity The maximum predicted annual concentrations for the radionuclides are below the Health Canada reference values.	No additional mitigation measures. (See mitigation measures for Atmospheric Environment – Radiological Effects, Radon).	No likely residual adverse effects.	The Dust Management and Requirements Plan [32] was followed during construction activities. This included not working above certain wind thresholds. Water was used for dust suppression. During hot conditions when water was evaporating quickly, the contractor used pre-approved, commercially-available products specifically intended for dust suppression. Hydro seeding was undertaken	Measure levels of radionuclides to verify modelling predictions.	No residual adverse effects. TSP high volume air filters were sent for additional laboratory analysis in 2019. Uranium, radium-226, thorium-230 and thorium-232 remained well below the Health Canada reference values [36] It should be noted that the predicted values were based on modelling PM ₁₀ concentrations. Comparing particulate radioactivity on TSP filters to the modelled predictions is taking a conservative approach.	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 contaminants of potential concern in suspended dust. (Section 9.2.1.4.1).

Predicted Effects	Mitigation Measures	Residual Effects after Mitigation	Status of Mitigation Measures - 2020	EA Follow-Up Monitoring Requirements	Predicted Environmental Effect – 2020	Status of EA Commitments - 2020
			on areas where work was completed.			
Aquatic Environment	L		· ·			
Sediment Quality: Non-Radiological Effects: Improvement to sediment quality by a decreasing contaminant transport. Environmental media sampling will be collected along the Lake Ontario shoreline to evaluate efficacy of mitigation measures intended to control offsite mitigation of contaminated wastes during excavation.	Prompt removal of excavation water after rainfall along Lake Ontario shoreline, if remediation necessary. Fuel oil spilled to the Port Granby Creek will be cleaned by high pressure washing of cobble and gravel.	No likely residual adverse effects.	In 2020, there were no fuel spills or sedimentation events that took place.	In case of a sedimentation event or spill to Port Granby Creek – in which case, a post- cleanup monitoring plan is to be established during the Construction and Development Phase and the Maintenance and Monitoring Phase. Environmental media sampling will be collected along the Lake Ontario shoreline to evaluate efficacy of mitigation measures intended to control offsite migration of contaminated wastes during excavation.	No residual adverse effects.	There was no sedimentation event that entered Port Granby Creek in 2020. Sediment monitoring along the Lake Ontario shoreline is performed twice per year. (Section 9.2.1.1.3)
Surface Water Quality: Non-Radiological and Radiological Effects: Long-term improvement to down-gradient surface water quality; reduced contaminant loading to down-gradient lake; and no measurable change to Port Granby Creek.	Groundwater, stormwater and drainage water collection and treatment systems, including flow control and quality control, will be in place.	Beneficial long-term effects.	Construction of the PG LTWMF for the treatment and control of groundwater is complete. Active commissioning commenced in 2016 April.	Conduct additional background data collection, field data collection and analysis and benchtop testing necessary to finalize the preferred treatment technology. Verify predicted improvements in surface water at existing and new water treatment system once the preferred treatment technology has been established. Compare the effluent quality performance with the predicted performance for the preferred technology. Proponent must ensure that discharge is not deleterious to aquatic environment at point of discharge. This must be confirmed through	No residual adverse effects. Based on the predicted effluent concentrations from the pilot scale work, effluent parameters at the new WWTP are less than what was predicted during the pilot scale test work. However, influent concentrations are also currently less than what was predicted. Actual removal efficiencies (comparing influent to effluent numbers), for elements where there is a reasonable detectable quantity, indicate that removal efficiencies are >99% for most licensed parameters or design objectives. This is as expected from the pilot scale test work.	Preferred treatment technology was evaluated in 2011 through the Water Treatment Definition – Port Granby Project. Toxicity testing was conducted monthly. (Section Error! Reference source not found.; Appendix B, Table B- 4). Effluent quality at the WWTP was measured in 2016 April once the plant was commissioned, based on the design objectives in the Port Granby Licence Conditions Handbook [2]. As of 2018 April 4, approved release limits [18] have been implemented at the PG WWTP and updated in the PGP Quarterly Effluent Reports. Groundwater seepage samples from the bluffs are collected on a quarterly basis (Section Error!

Predicted Effects	Mitigation Measures	Residual Effects after Mitigation	Status of Mitigation Measures - 2020	EA Follow-Up Monitoring Requirements	Predicted Environmental Effect – 2020	Status of EA Commitments - 2020
				appropriate monitoring and toxicity testing. Verify reduction of contaminant loadings due to leachate discharging to Lake Ontario via site groundwater seepage sampling program and, in cases where seep locations are adjacent to Lake Ontario, an accompanying mixing zone surface water sampling program.		Reference source not found.).
Geology and Groundwater Er	vironment					
Soil Quality: Radiological Effects: The mean incremental concentrations of radiological contaminants are expected to be less than 20% of background. The exception is thorium-230, with an expected 38% increase in concentration over baseline, during Construction and Development Phase of the LTWMF.	(See mitigation measures included in the Atmospheric and Terrestrial Environment components of the EASR).	No likely residual adverse effects.	The Dust Management and Requirements Plan [32] as followed during construction activities. This included not working above certain wind thresholds. Water was used for dust suppression. During hot conditions when water was evaporating quickly, the contractor used pre-approved, commercially-available products specifically intended for dust suppression. Polymer spray was used to cover stockpiles and excavations at end of day. Hydro seeding was undertaken on areas where work was completed.	Monitor soil quality in all project phases as described for the Terrestrial Environment component.	No residual adverse effects. Thorium-230 soil values have not increased in 2020 relative to previous years monitoring.	Soil samples are collected at perimeter locations on an annual basis. (Section 9.2.1.6.2)

Predicted Effects	Mitigation Measures	Residual Effects after Mitigation	Status of Mitigation Measures - 2020	EA Follow-Up Monitoring Requirements	Predicted Environmental Effect – 2020	Status of EA Commitments - 2020
Groundwater Quality: Non-Radiological and Radiological Effects: Volume of groundwater collected for treatment in the LTWMF site groundwater and drainage water collection system would decrease by approximately 75%; contaminant concentration expected to decline over time.	Collected groundwater will be treated to requirements set by the CNSC during licensing of the LTWMF.	No residual adverse effects.	Construction of WWTP for the treatment and control of groundwater is complete. Active commissioning occurred in 2016 April.	Measurement of volume and concentrations of contaminants in groundwater samples at selected monitoring wells; additional wells near the LTWMF may be required. Groundwater flow model to be revised by incorporating additional post-EA data collection results and used to verify EA predictions.	No residual adverse effects. Contaminant concentrations in groundwater at the PG WMF are expected to decline as remediation progresses and natural attenuation occurs.	Groundwater was sampled and analyzed quarterly in 2020. The monitoring data for each well is presented in Appendix C. On the site of the LTWMF, changes to groundwater quality are expected to be minimal due to the presence of a containment system made from several barriers and water collection system. Sentinel monitoring will be used at the site perimeter locations to confirm effectiveness of containment system. (Section 9.2.1.6.1)
Groundwater Flow: Groundwater discharge to Port Granby Creek is predicted to decrease by 1.6% due to operation of the mound leachate containment system.	No mitigation measures necessary.	No residual adverse effects.	No mitigation measures necessary.	Measure groundwater levels at an expanded network of groundwater monitoring wells, to ensure that there are sufficient monitors distributed in each hydro stratigraphic unit, both vertically and horizontally, to properly define groundwater flow. Measure groundwater levels at monitoring wells four times yearly during Construction and Development Phase, and annually during Early, Mid and Late Life Phases. Prior to the beginning of the construction a number of monitoring wells will require proper abandonment in accordance with Ontario Regulation 903 [40].	No residual adverse effects.	Groundwater levels are measured quarterly at the current groundwater network (Section 9.2.1.6.1.) Wells that were decommissioned in 2016 were completed as per <i>Ontario Regulation 903</i> [40].
Groundwater: No measurable changes in quality or quantity of groundwater and drainage water during LTWMF construction.	No mitigation measures necessary.	No residual adverse effects.	No mitigation measures necessary.	Monitor quantity and quality of groundwater and drainage water intercepted during construction to confirm predictions of no measurable change.	No residual adverse effects.	Groundwater samples are collected on a quarterly basis at perimeter locations of the LTWMF. (Section 9.6.1.6.1) Operational groundwater

Predicted Effects	Mitigation Measures	Residual Effects after	Status of Mitigation Measures	EA Follow-Up Monitoring	Predicted Environmental	Status of EA Commitments - 2020
Predicted EffectsDesign of LTWMF, including liner and cover:Clay Liner Unit would have maximum hydraulic conductivity of 1x10 ⁻⁷ cm/s.Cover would have a maximum hydraulic conductivity of 1x10 ⁻⁷ cm/s.Cover would have a maximum hydraulic conductivity of 1x10 ⁻⁷ cm/s.Volume of leachate generated within the LTWMF is predicted to be 100 m³ /year based on the assumption of 1 mm/a leakage through the cover.Volumes of excavated wastes to be stored in the LTWMF are predicted to be as follows: 204,400 m³ of low- level radioactive waste (LLRW), 101,000 m³ of marginally contaminated soils (MCS).	Mitigation Measures No mitigation measures necessary.	Residual Effects after Mitigation	Status of Mitigation Measures - 2020 No mitigation measures necessary.	EA Follow-Up Monitoring Requirements Monitoring of the existing PG WMF will continue as long as required based on evaluated contaminant concentrations, including bluff seepage. Monitoring is to be undertaken downgradient of the current PG WMF and in the East and West Gorges. Monitor leakage through the liner system to verify hydraulic conductivity of the liner unit. 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 to confirm the assumed leakage rate through the cover system. Verify the volume and concentration of excavated waste prior to emplacement in the LTWMF, to confirm the source term volumes and contaminant concentrations used to predict long-term	No residual adverse effects.	Status of EA Commitments - 2020 monitoring was not conducted in 2020. The wells were decommissioned in 2016 as they were located within or adjacent to the PG WMF excavation areas. All wells were decommission as per Ontario Regulation 903 [40]. Sampling of the bluff seepage is performed on a quarterly basis. (Section 9.2.1.1.2) Monitoring of volume of excavated waste was performed when active waste removal commenced in 2016 November. Levels of radioactivity are monitored throughout the vehicle portal monitor prior to the emplacement in the LTWMF. Leakage monitoring is in progress and is performed on a monthly basis using the SuperSting EC Measurement Device. This monitoring is performed by the PG WWTP. Settlement monitoring to be performed in the maintenance and monitoring phase. Rate of infiltration monitoring to be performed in the maintenance and monitoring phase.
Torroctrial Environment				environmental effects.		
Droporation of the LTM/ME	Delegation of the LTM/AC	No residual advance offerste	The ovicting need leasted to	Vorify role action of	No residuel educates offects	The evicting stormuster
Preparation of the LTWMF	Relocation of the LTWMF	No residual adverse effects.	The existing pond located to	Verity relocation of	No residual adverse effects.	The existing stormwater
site will result in temporary	stormwater management pond out		the east of the LIWIVIF was	stormwater management		in 2016
loss of vegetation of 2.2% in	of the cultural thicket and into an		removed in 2016 as part of	pond.		in 2016.
the Local Study Area and 6%	agricultural field.		the site preparation work and			
in the Site Study Area, with			has been replaced with the	Verity development of		The development of a protection

Predicted Effects	Mitigation Measures	Residual Effects after	Status of Mitigation Measures	EA Follow-Up Monitoring	Predicted Environmental	Status of EA Commitments - 2020
normanant conversion of		Mitigation	- 2020	Requirements	Effect – 2020	and rehabilitation plan for the fer
vegetation communities in	Development of site-specific		management pond	protection and renabilitation		vegetation near the East Gorge
6.1% of Local Study Area and	Landscape Plan by a qualified		management pond.	near the East Gorge.		was completed
15.3% of Site Study Area.	landscape architect or biologist for		Development of site-specific			(4500-03710-REPT-004).
,	terrestrial environment at each		Landscape plan will take place	Verify implementation of		· · · · · · · · · · · · · · · · · · ·
	work site.		prior to the completion of the	erosion and sediment		Verification of erosion and
	Development of new vegetation		LTWMF construction.	control structures;		sediment control structures will
	communities at the LTWMF site			application of dust		be performed as part of
	rather than simply re-creating pre-		Development of new	rehabilitation of sites		compliance monitoring during
	construction conditions.		vegetation communities at	rendsintation of sites.		the period of active construction.
	Development of a Drotestian and		the LIWMF site will take place	Monitor radiological and		
	Development of a Protection and		after the completion of the	non-radiological COPC in		Soil samples are collected at
	vegetation near the East Gorge		LI WIVIF COnstruction.	surficial soil during		basis (Section 9.2.1.6.2)
	vegetation near the East Gorge.		The development of a	Construction and		basis. (Section 9.2.1.0.2)
			protection and rehabilitation	Development Phase and		The extent of vegetation/loss
			plan for the fen vegetation	Monitoring Phase		change will be evaluated upon
			near the East Gorge was	Monitoring Phase.		completion of the Construction
			completed	Verify extent and duration of		and Development Phase.
			(4500-03710-REPT-004).	temporary and permanent		
				vegetation loss/change.		
	Vegetation clearing should not take		CNL reviewed and approved	Confirm that nest survey and	As per contractor's	CNL reviewed and approved
	place in migratory bird habitat		contractor plans for:	a mitigation plan to address	environmental protection	contractor plans for:
	during the breeding season		Environmental	impacts on migratory birds	plan: vegetation clearing will	Environmental protection,
			protection, including	or their active nests was	not take place in migratory	including terrestrial
	In exceptions, when the breeding		terrestrial habitat	completed and reviewed by	bird habitat during the	habitat management
	season cannot be avoided, an avian		management	Environment Canada before	breeding season of any given	Nest surveys to be completed
	immediately prior (e.g. within 2		Next surveys to be completed	site-specific remediation	year.	prior to construction activities as
	days) to starting any work		nior to construction activities	plans to confirm		per contractor environmental
	potentially impacting migratory		as per contractor	incorporation of structural		protection plan, which includes
	bird habitat, to identify and locate		environmental protection	habitat gualities and		sections on terrestrial habitat
	active nests of species covered by		plan, which includes sections	variability.		management and pre-work
	the Migratory Birds Convention		on terrestrial habitat			nesting bird surveys.
	Act. A mitigation plan would be		management and pre-work			
	developed to address any potential		nesting bird surveys.			
	impacts on migratory birds or their					
	active nests, and forwarded for		Development of site-specific			
	review to Environment Canada		Landscape plan will take place			
	prior to implementation.		prior to the completion of the			
	Site-specific rehabilitation plans		LI WIVIF CONSTRUCTION.			
	will incorporate features to re-		Included in contractor's			
	establish structural habitat		environmental protection plan			
	qualities and variability.		entrionmental protection plan.			

Predicted Effects	Mitigation Measures	Residual Effects after Mitigation	Status of Mitigation Measures - 2020	EA Follow-Up Monitoring Requirements	Predicted Environmental Effect – 2020	Status of EA Commitments - 2020
	Mitigation measures for vegetation communities equally apply to wildlife habitat.					
Human Health and Safety - Wo	orkers: Non-Radiological Effects					
Particulate matter is not predicted to have a measurable effect on workers' health. Accident rate is being monitored. Noise level would reach 93 to 95 dBA within 15 m of the LTWMF and existing PG WMF.	Use of personal protection equipment such as dust masks and respirators to reduce the exposure to arsenic. Personal protection equipment to mitigate noise, if necessary. Adopt a policy that all occupational illnesses and injuries are preventable and the formal establishment of the objective of zero-time occupational illnesses and injuries. Develop and implement a formal Health and Safety Program.	No residual adverse effects.	Construction contractors will be required to adhere to federal and provincial legislation related to the protection of health and safety. Compliance monitoring by CNL will occur during the active construction period. Accident rate is being monitored (Section 8) CNL reviewed and approved contractor plans for Health and Safety Program.	Monitor compliance with federal legislation related to protection of health and safety. Monitor accident rate.	For construction activities there were 0 recordable accidents in 2020, and no lost time. Further details are provided in (Section 8)	Construction contractors will be required to adhere to federal and provincial legislation related to the protection of health and safety. Compliance monitoring by CNL will occur during the active construction period. If they occur, accident reports and causes are reviewed with the contractors to ensure that appropriate measures are in place to reduce the possibility of recurrence. Continuous sound level data was collected at a total of nine locations in Port Granby during the 2020 monitoring period. The 2020 monitoring results during daytime hours were compared to average 2015 daytime results. Outdoor construction was not occurring in 2015, and therefore 2015 results are more representative of baseline conditions than those results from
Human Health and Safety - Members of the Public: Non-Radiological Effects						
 Air Quality and Noise: Non-radiological contaminants: Risk assessment on non- radiological contaminants predicted that any incremental risks associated with the Project would not 	(See Atmospheric Environment Component) Evaluation of the appropriateness of mitigation measures to prevent or minimize the potential public exposure to the effluents in the portion of Lake Ontario that may be affected by treated effluent or bluff seepage if needed.	No likely residual adverse effects.	Effluent sampling takes place on a weekly schedule from the PG LTWMF. These results were presented in Section 3.1.1.1.1. No exceedance of these specified limits occurred during the reporting period.	Monitor communication protocols. Survey members of the public to confirm level of satisfaction within the community. (See Aquatic Environment Components)	No residual adverse effects.	Surveys are performed routinely. Consult the Port Granby <i>Socio-</i> <i>Economic Effect Monitoring</i> <i>Report</i> for more information. Report to be issued in 2020. Complaints Resolution Program is being regularly monitored (See Section 15).

Predicted Effects	Mitigation Measures	Residual Effects after Mitigation	Status of Mitigation Measures - 2020	EA Follow-Up Monitoring Requirements	Predicted Environmental Effect – 2020	Status of EA Commitments - 2020
pose an unreasonable risk to human health. 3. General health and well- being: Reduced feelings of health and sense of wellbeing; feelings of personal security; and feelings of satisfaction with living in the community.	Continued and consistent protocols for delivering information and receiving input to/from residents in the Local and Regional Study Areas.	Some residual adverse effects predicted. However, these are considered to be minor.	Bluff seepage sampling takes place on a quarterly basis. The results are presented in Section 9.2.1.1.2. It is noted that there are elevated levels arsenic, uranium and nitrates in the seepage water that are above Ontario's <i>Provincial</i> <i>Water Quality Objectives</i> (PWQO) [29] and the Canadian Council of the Ministers of the Environment (CCME) Canadian <i>Water Quality Guidelines for</i> <i>the Protection of Aquatic Life</i> (CWQG) [26] however, the total contaminant plume to Lake Ontario remains small. The majority of the plume is estimated to have contaminant concentrations equivalent to approximately 1% of the original concentration observed in the bluff seepage samples. Continuous engagement with the Port Granby community continued in 2020. A summary of the communications and outreach activities related to the Port Granby Project are presented in section 15.1. The Complaints Resolution Program was regularly monitored in 2020 with results presented in section 15.1.	Monitor complaints resolution process.		
Human Health and Safety - W	/orkers: Radiological Effects					
Annual radiation doses are predicted to range between 2.1 and 7.1 mSv/a. During the Maintenance and Monitoring Phase, doses are predicted to be around 0.1 mSv/a.	Application of the ALARA principle. No additional proposed mitigation.	No residual adverse effects.	The Radiation Protection program was implemented effectively to ensure doses to the public are ALARA and are below the limited predicted effects.	Monitor radiation doses to confirm accuracy of predictions.	For the Port Granby Site, individual annual doses ranged from 0.01 mSv to 0.27 mSv. The collective radiation dose was 12.03 person-mSv. The average annual dose was 0.06 mSv.	Upon comparison between the actual and predicted doses, the doses exposed to the workers are generally below the predicted levels. These dose levels prove that the mitigation measures were effectively executed; and, reflect the fact that the site entered the capping phase in the

Predicted Effects	Mitigation Measures	Residual Effects after Mitigation	Status of Mitigation Measures - 2020	EA Follow-Up Monitoring Requirements	Predicted Environmental Effect – 2020	Status of EA Commitments - 2020
						final quarter of 2020.
Human Health and Safety Mer	nbers of Public: Radiological Effects					
During construction and	Application of the ALARA principle.	No residual adverse effects.	Excavation and transfer of	Monitor radiation doses to	The radiation dose to public	Upon comparison of the actual
development, the only			waste commenced in 2016	confirm accuracy of	was estimated to be less than	and predicted public doses, the
measurable radiation doses	Radiation Protection Program		November. The Radiation	predictions.	2% of the annual dose limit of	doses exposed to the public are
predicted are to adjacent	No additional proposed mitigation.		Protection program was		1 mSv for exposures for	below the predicted levels. This
resident child and infant;			implemented effectively to		members of the public.	has proven the mitigation
0.12 to 0.14 mSv/a for			ensure doses to the public are			measures were effectively
median dietary intakes and			ALARA and are below the			executed.
0.12 to 0.15 mSv/a for upper			limited predicted effects.			
bound dietary intakes.						
However, all predicted doses						
are within 15% of the CNSC						
public dose limit of 1 mSv/a						
and would occur for only a						
relatively short duration for						
the infant and child.						
Cumulative Effects						
Radiological:	1. Working areas containing	No likely residual adverse	Mitigation measures are	Verify radon concentrations	Radon monitoring commenced	Assessment of average radon
	contaminated materials will be	effects.	implemented as outlined.	and radiological constituents	at 3 locations around the PG	concentrations at 2 km will be
ine combined predicted	minimized.			of re-suspended dust at a	LTWMF in 2017 December.	performed on a quarterly basis.
incremental annual average	2. Application of dust suppressants			distance of 2 km.	These locations were less than	
radon concentration	including water and possibly				2 km distance from the	
associated with both the Port	chemical suppressants.				LTWMF Controlled Area	
Projects would be	Covering of stockpiles and				fenced boundary. The average	
indistinguishable from	exposed areas overnight and on				radon concentration for 2020	
haskground at a distance of	weekends using foam agents,				at these locations read	
packground at a distance of	geotextiles or other appropriate				38.6 Bq/m ³ . The highest noted	
approximately 2 km.	materials.				radon concentration level was	
	4. Placing wind fencing around				141 Bq/m ³ at the East location	
	exposed stockpiles.				to the PG site which is below	
	5. Possible cessation of activities				the environmental trigger level	
	under high wind conditions.				for radon 150 Bq/m ³ . This	
	Mulching or re-vegetating				measurement was noted	
	completed cells and excavation				within the Q3 monitoring	
	areas as soon as possible				period and in tandem with	
					elevated radon reading	
					observed at the site perimeter.	

Predicted Effects	Mitigation Measures	Residual Effects after	Status of Mitigation Measures	EA Follow-Up Monitoring	Predicted Environmental	Status of FA Commitments - 2020	
Fredicted Effects		Mitigation	- 2020	Requirements	Effect – 2020	Status of LA commitments - 2020	
The radiological constituents	1. Working areas containing	No likely residual adverse	The Dust Management and	Verify radiological	No residual adverse effect.	Radiological constituents in dust	
of re-suspended dust would	contaminated materials will be	effects.	Requirements Plan [32] was	constituents of re-suspended		was measured at the perimeter of	
not be measurable beyond	minimized.		followed during construction	dust at a distance of 2 km.		the Site at the locations of our	
approximately 2 km from the	2. Application of dust suppressants		activities. This included not			high volume air samplers as	
sites.	including water and possibly		working above certain wind			further discussed in	
	chemical suppressants.		thresholds.			Section 9.2.1.4.1.	
	3. Covering of stockpiles and						
	exposed areas overnight and on		Water was used for dust			A yearly soil (dust deposition)	
	weekends using foam agents,		suppression. During hot			monitoring program at a	
	geotextiles or other appropriate		conditions when water was			residential property located	
	materials.		evaporating quickly, the			approximately 1 km east of the	
	4. Placing wind fencing around		contractor used pre-approved,			Site commenced in 2016 June.	
	exposed stockpiles.		commercially-available			Now that active waste removal	
	5. Possible cessation of activities		products specifically intended			has commenced, the soil results	
	under high wind conditions.		for dust suppression.			will be compared yearly to verify	
	6. Mulching or re-vegetating					radiological constituents in soil as	
	completed cells and excavation		Hydro seeding was undertaken			a result of dust deposition.	
	areas as soon as possible		on areas where work was				
			completed.				

APPENDIX E GEOTECHNICAL MONITORING PROGRAM RESULTS

Date	Common CNL ATOM ID	Report Title		
2020-01-10	<u>4502-509241-041-000 - 53030831</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 January 10		
2020-01-17	<u>4502-509241-041-000 - 53035139</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 January 17		
2020-01-24	<u>4502-509241-041-000 - 53037185</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 January 24		
2020-01-31	<u>4502-509241-041-000 - 53034883</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 January 31		
2020-02-07	<u>4502-509241-041-000 - 53035011</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 February 07		
2020-02-14	<u>4502-509241-041-000 - 53030830</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 February 14		
2020-02-21	<u>4502-509241-041-000 - 53035664</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 February 21		
2020-02-28	<u>4502-509241-041-000 - 53033853</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 February 28		
2020-03-07	<u>4502-509241-041-000 - 53028908</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 March 07		
2020-03-13	<u>4502-509241-041-000 - 53033852</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 March 13		
2020-03-20	<u>4502-509241-041-000 - 53067737</u>	PG LTWMF Contract C - AMEC-CB&I/JV - Weekly Slope Stability Report - 2020 March 20		

Table E-1: PG LTWMF – Weekly Stability Reports, 2020