This page is for Content Controls that apply to this document. If no Content Controls apply, none will be listed.

## Revision History

| Rev. No. | Date | Details of Rev. | Prepared By | Reviewed By | Approved By |
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| D3 | 2023/03/28 | Issued for "Review and Comment". | S. Rheubottom | S. Brewer<br>M. Conan<br>C. Gallagher<br>M. Hughey | N/A |
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## EXECUTIVE SUMMARY

This annual compliance monitoring report for the 2022 calendar year is produced to demonstrate that Canadian Nuclear Laboratories (CNL) has successfully met the requirements of the *Nuclear Safety and Control Act*, associated regulations, the *Port Granby Long-Term Low-Level Radioactive Waste Management Project Licence WNSL-W1-2311.00/2022* (PGP Licence), and the *Port Granby Long-Term Low-Level Radioactive Waste Management Project Licence Conditions Handbook* (LCH). This report has been prepared based on Canadian Nuclear Safety Commission (CNSC) REGDOC -3.1.3, *Reporting Requirements for Waste Nuclear Substance Licensees, Class II Nuclear Facilities and Users of Prescribed Equipment, Nuclear Substances and Radiation Devices*.

This stand-alone, unrestricted document provides CNL compliance monitoring and performance information for the Port Granby Project (PGP) and is organized by CNSC's 14 Safety and Control Areas (SCA). This report provides site-specific information to supplement information in the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* for 2022, which provides programmatic updates and performance of the 14 SCAs and CNL's Public Information and Disclosure program as applicable to all CNL sites.

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 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), 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 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, a federal Crown corporation.

### Land Acknowledgement

CNL's Historic Waste Program Management Office and the Port Hope Area Initiative projects are situated on the traditional and treaty lands of the Williams Treaties First Nations, specifically the Gunshot Treaty signed with the Mississauga First Nations of Alderville, Curve Lake, Hiawatha and Scugog Island.

These Mississauga Nations are also signatories to various 18th and 19th century treaties that covered lands in different parts of south-central Ontario. In 1923, the Mississauga First Nations and the Chippewa First Nations consisting of Rama, Beausoleil and Georgina Island signed the Williams Treaties and together, over 90 years later in June 2018, joined to ensure that their

rights to and the relationship with these lands are respected through a renewed agreement with Canada and the Province of Ontario.

The area in which we are situated is also home to Indigenous Peoples from across the region and Canada. CNL is grateful to have the opportunity to work on these traditionally and culturally significant lands and waterways.

### Engagement with Indigenous Communities and Organizations

Historically, the PHAI Phase 2 Public Information Program (PIP) has included Indigenous communities and organizations as a priority audience. In support of CNL's objective to advance reconciliation through meaningful actions and move toward increased inclusion and participation, CNL is developing a distinct program for engagement with Indigenous communities and organizations. The program will be implemented in tandem with the PIP and aligned with CNL company-wide Indigenous relations efforts. CNL continued to host monthly meetings with members of the Williams Treaties First Nations in 2022 and held several meetings and tours of the PGP site with Indigenous representatives.

### Overall Performance Highlights

Following a one-day hearing, the CNSC has renewed the licence for the PHAI (Summary Record of Decision - Port Hope Project Renewal), for a 10-year period beginning 2023 January 01. As part of the licence renewal, a single licence consolidates four previous licences for PHAI activities, authorizing CNL to continue the safe cleanup and management of low-level radioactive waste in Port Hope, Ontario. The licence will also facilitate the ongoing monitoring and maintenance of the Port Granby Long-Term Waste Management Facility (PG LTWMF).

CNL continued to manage the PGP site during remediation activities in accordance with approved procedures, as outlined in the PGP LCH. The following is a list of overall performance highlights at PGP for 2022 activities:

- All licensed activities continue to be carried out safely and securely.
- No members of the public received a radiation dose that exceeded any regulatory limit.
- No worker received a dose in excess of any of the respective radiation dose limits as defined by the Radiation Protection Regulations.
- All effluent releases were below their respective release limits.

### Management System

CNL has a well-established and effective management system that defines the requirements to ensure that applicable work is conducted in accordance with requirements and best practices. Internal audits and self-assessments were conducted as required. ISO 9001:2015 certification was maintained. The management system was effectively implemented at the PGP site in the reporting period.

### Human Performance Management

CNL has a well-established and effective training program. It is in place to enhance human performance through the development and implementation of processes that ensure workers are sufficient in numbers in all relevant job areas, and have the necessary knowledge, skills, and tools in place to safely carry out their duties. The PGP maintained a sufficient number of qualified workers to carry on the licensed activities safely. A range of mandatory and other job-specific training activities were carried out in the reporting period 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, and to conduct work under the PGP Licence.

### Operating Performance

CNL has a well-established and effective conduct of operations program. CNL completed all required reporting as outlined in Licence Condition 3.1 of the PGP LCH. There were three events reported to the CNSC in the reporting period, as outlined in the applicable SCA. The reported events did not have any adverse effect on the health, safety and security of persons or the environment.

### Safety Analysis

As per the PGP LCH, the Safety Analysis SCA is not applicable to the PGP.

### Physical Design

Changes made to the physical facility, equipment, processes, procedures, or practices that could adversely affect the design basis are identified and assessed by key stakeholders through the Engineering Change Control program. In 2022 November, CNSC staff raised concerns with CNL's management oversight of changes and its adherence to the change control process. CNL acknowledged that the implementation of the change management process is an area needing improvement and initiated a Root Cause Analysis to identify and correct the programmatic issues. Program improvement continues through 2023.

### Fitness for Service

As per the PGP LCH, the Fitness for Service SCA is not applicable to the PGP.

### Radiation Protection

CNL has a well-established and effective Radiation Protection program. As Low As Reasonably Achievable (ALARA) initiatives and activities continued to be at the forefront of the PGP Radiation Protection Program. Radiation Protection doses for workers remained ALARA and estimated doses to the public remain low. There were no exceedances of regulatory limits or action levels in the dose monitoring program.

### Conventional Health and Safety

CNL has a well-established and effective conventional health and safety program to manage non-radiological workplace safety hazards and to protect personnel and equipment. All licensed activities continued to be carried out safely and securely. The Site Safety and Health Committee met and conducted inspections as required by regulations. No reportable occupational health and safety events or investigations occurred at the PGP in the reporting period.

### Environmental Protection

CNL has a well-established and effective environmental and biophysical protection program that monitors radiological and hazardous substances to minimize risk to employees and the public. Environmental protection and mitigation continue to be effective; changes from the baseline are minimal and generally within the Environmental Assessment predictions. Environmental Assessment follow-up and operational monitoring continued in the reporting period. No reportable environmental events occurred at the PGP in the reporting period.

### Emergency Management and Fire Protection

CNL has well-established emergency management and fire protection programs that are in place to reduce the risk of fires and assist emergency staff in responding to events, and assist in the protection of employees, the local community, and the environment. All required annual fire response drills, were completed as per program and regulatory requirements. Fire screening assessments were completed in support of CNL's Engineering Change Control process for capital and maintenance/ repair projects. One unplanned reportable emergency event occurred at the PGP in the reporting period. The reported event did not have any adverse effect on the health, safety and security of persons or the environment.

### Waste Management

As per the PGP LCH, the Waste Management SCA is not applicable to the PGP. CNL has a well-established and effective waste management program, and it is described in this report for information. During the reporting period, on-site management of waste occurred safely and without incident. There were 3,497 tonnes of reverse osmosis concentrate sent to the Port Hope WWTP for treatment, and 1,779 tonnes of process residuals sent to the PH LTWMF.

### Security

CNL has a well-established and effective security program that is in place to implement and support the security requirements stipulated in the regulations and the LCH. Contractors conducting work at the PGP site continued to follow CNL's security policies and programs, as confirmed through CNL's oversight program. There was one security event reported to CNSC in the reporting period. The reported event did not have any adverse effect on the health, safety and security of persons or the environment.

### Safeguards and Non-Proliferation

As per the PGP LCH, the Safeguards and Non-Proliferation SCA is not applicable to the PGP.

### Packaging and Transport

The PHAI Transportation of Dangerous Goods Program continued to safely operate the off-site transport and shipment of dangerous goods by conforming to all applicable laws and regulations, including company policies and procedures. Shipments of dangerous goods continued to be safely received from offsite vendors at the PGP site (consumable chemicals, diesel fuel, and propane). There was one reportable Transportation of Dangerous Goods event at the PGP in the reporting period. The reported event did not have any adverse effect on the health, safety and security of persons or the environment.

### Public Information Program

CNL has a well-established and effective public information program that includes a public disclosure protocol regarding events and developments involving PGP facilities or activities - two public disclosures related to the PGP were made in the reporting period. Stakeholder and public engagement continued in 2022 in accordance with the PIP with a total of seven presentations and four site tours, along with a community celebration of the completion of the construction and remediation phase of the PGP in May.

### Conclusion

**CNL is committed to achieving high standards of operational safety and security. The information and data presented in this report support the conclusion that safe and secure performance was achieved at the PGP site in 2022, while enhancements were implemented to further improve results.**

## ACKNOWLEDGEMENTS

The “Author” of this document would like to thank the many contributors and reviewers from Facilities and Program for their production of the individual sections of the report.

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CNL's Historic Waste Program Management Office and the Port Hope Area Initiative (PHAI) projects are situated on the traditional and treaty lands of the Williams Treaties First Nations, specifically the Gunshot Treaty signed with the Mississauga First Nations of Alderville, Curve Lake, Hiawatha and Scugog Island.

These Mississauga Nations are also signatories to various 18th and 19th century treaties that covered lands in different parts of south-central Ontario. In 1923, the Mississauga First Nations and the Chippewa First Nations consisting of Rama, Beausoleil and Georgina Island signed the Williams Treaties and together, over 90 years later in June 2018, joined to ensure that their rights to and the relationship with these lands are respected through a renewed agreement with Canada and the Province of Ontario.

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The PHAI represents the federal government's response to the community-requested solution for the cleanup and local, long-term, safe management of historic low-level radioactive waste in the municipalities of Port Hope and Clarington. The waste is the result of the refining practices of the former Crown Corporation, Eldorado Nuclear Ltd., and its private sector predecessors. The original Eldorado refining operation and plant were established in the 1930s without consultation with Indigenous peoples of the area.

A legal agreement, finalized in March 2001, between the Government of Canada and the two municipalities, launched the PHAI by defining the framework and setting out the responsibilities for the Port Hope Project and the Port Granby Project.

Through its Historic Waste Program Management Office, Canadian Nuclear Laboratories is implementing the PHAI on behalf of Atomic Energy of Canada Limited, a federal Crown corporation.

### An Indigenous History of the Port Hope Area

This Indigenous history has been generously provided by Curve Lake First Nation - publication reference: *Gitiga Migizi and Julie Kapyrka, 2015 Before, During, and After: Mississauga Presence in the Kawarthas*. In Peterborough, Archaeology, Dirk Verhulst, editor, pp. 127-136. Peterborough, Ontario: Peterborough Chapter of the Ontario Archaeological Society.

The traditional homelands of the Michi Saagiig (Mississauga Anishinaabeg) encompass a vast area of what is now known as southern Ontario. The Michi Saagiig are known as "the people of the big river mouths" and were also known as the "Salmon People" who occupied and fished the north shore of Lake Ontario where the various tributaries emptied into the lake. Their territories extended north into and beyond the Kawarthas as winter hunting grounds on which

they would break off into smaller social groups for the season, hunting, and trapping on these lands, then returning to the lakeshore in spring for the summer months.

The Michi Saagiig were a highly mobile people, travelling vast distances to procure subsistence for their people. They were also known as the “Peacekeepers” among Indigenous nations. The Michi Saagiig homelands were located directly between two very powerful Confederacies: The Three Fires Confederacy to the north and the Haudenosaunee Confederacy to the south. The Michi Saagiig were the negotiators, the messengers, the diplomats, and they successfully mediated peace throughout this area of Ontario for countless generations.

Michi Saagiig oral histories speak to their people being in this area of Ontario for thousands of years. These stories recount the “Old Ones” who spoke an ancient Algonquian dialect. The histories explain that the current Ojibwa phonology is the 5th transformation of this language, demonstrating a linguistic connection that spans back into deep time. The Michi Saagiig of today are the descendants of the ancient peoples who lived in Ontario during the Archaic and Paleo-Indian periods. They are the original inhabitants of southern Ontario, and they are still here today.

The traditional territories of the Michi Saagiig span from Gananoque in the east, all along the north shore of Lake Ontario, west to the north shore of Lake Erie at Long Point. The territory spreads as far north as the tributaries that flow into these lakes, from Bancroft and north of the Haliburton highlands. This also includes all the tributaries that flow from the height of land north of Toronto like the Oak Ridges Moraine, and all of the rivers that flow into Lake Ontario (the Rideau, the Salmon, the Ganaraska, the Moira, the Trent, the Don, the Rouge, the Etobicoke, the Humber, and the Credit, as well as Wilmot and 16 Mile Creeks) through Burlington Bay and the Niagara region including the Welland and Niagara Rivers, and beyond. The western side of the Michi Saagiig Nation was located around the Grand River which was used as a portage route as the Niagara portage was too dangerous. The Michi Saagiig would portage from present-day Burlington to the Grand River and travel south to the open water on Lake Erie.

Michi Saagiig oral histories also speak to the occurrence of people coming into their territories sometime between 500-1000 A.D. seeking to establish villages and a corn growing economy – these newcomers included peoples that would later be known as the Huron-Wendat, Neutral, Petun/Tobacco Nations. The Michi Saagiig made Treaties with these newcomers and granted them permission to stay with the understanding that they were visitors in these lands. Wampum was made to record these contracts, ceremonies would have bound each nation to their respective responsibilities within the political relationship, and these contracts would have been renewed annually (see Gitiga Migizi and Kapyrka 2015). These visitors were extremely successful as their corn economy grew as well as their populations. However, it was understood by all nations involved that this area of Ontario were the homeland territories of the Michi Saagiig.

The Odawa Nation worked with the Michi Saagiig to meet with the Huron-Wendat, the Petun, and Neutral Nations to continue the amicable political and economic relationship that existed – a symbiotic relationship that was mainly policed and enforced by the Odawa people. Problems arose for the Michi Saagiig in the 1600s when the European way of life was introduced into southern Ontario. Also, around the same time, the Haudenosaunee were given firearms by the colonial governments in New York and Albany which ultimately made an expansion possible for them into Michi Saagiig territories. There began skirmishes with the various nations living in Ontario at the time. The Haudenosaunee engaged in fighting with the Huron-Wendat and between that and the onslaught of European diseases, the Iroquoian speaking peoples in Ontario were decimated. The onset of colonial settlement and missionary involvement severely disrupted the original relationships between these Indigenous nations. Disease and warfare had a devastating impact upon the Indigenous peoples of Ontario, especially the large sedentary villages, which mostly included Iroquoian speaking peoples. The Michi Saagiig were largely able to avoid the devastation caused by these processes by retreating to their wintering grounds to the north, essentially waiting for the smoke to clear.

Michi Saagiig Elder Gitiga Migizi (2017) recounts[1]:

*"We weren't affected as much as the larger villages because we learned to paddle away for several years until everything settled down. And we came back and tried to bury the bones of the Huron but it was overwhelming, it was all over, there were bones all over – that is our story.*

*There is a misnomer here, that this area of Ontario is not our traditional territory and that we came in here after the Huron-Wendat left or were defeated, but that is not true. That is a big misconception of our history that needs to be corrected. We are the traditional people, we are the ones that signed treaties with the Crown. We are recognized as the ones who signed these treaties and we are the ones to be dealt with officially in any matters concerning territory in southern Ontario.*

*We had peacemakers go to the Haudenosaunee and live amongst them in order to change their ways. We had also diplomatically dealt with some of the strong chiefs to the north and tried to make peace as much as possible. So we are very important in terms of keeping the balance of relationships in harmony.*

*Some of the old leaders recognized that it became increasingly difficult to keep the peace after the Europeans introduced guns. But we still continued to meet, and we still continued to have some wampum, which doesn't mean we negated our territory or gave up our territory – we did not do that. We still consider ourselves a sovereign nation despite legal challenges against that. We still view ourselves as a nation and the government must negotiate from that basis."*

[1] This historical context was prepared by Gitiga Migizi, a respected Elder and Knowledge Keeper of the Michi Saagiig Nation.

Often times, southern Ontario is described as being “vacant” after the dispersal of the Huron-Wendat peoples in 1649 (who fled east to Quebec and south to the United States). This is misleading as these territories remained the homelands of the Michi Saagiig Nation.

The Michi Saagiig participated in eighteen treaties from 1781 to 1923 to allow the growing number of European settlers to establish in Ontario. Pressures from increased settlement forced the Michi Saagiig to slowly move into small family groups around the present day communities: Curve Lake First Nation, Hiawatha First Nation, Alderville First Nation, Scugog Island First Nation, New Credit First Nation, and Mississauga First Nation.

The Michi Saagiig have been in Ontario for thousands of years, and they remain here to this day.

## Introduction

Canadian Nuclear Laboratories (CNL) is Canada's premier nuclear science and technology organization, and a world leader in developing nuclear technology for peaceful and innovative applications. Using unique expertise, CNL is restoring and protecting the environment, advancing clean energy technology, and medical breakthroughs continue to improve the health of people around the world.

Atomic Energy of Canada Limited (AECL), a federal Crown corporation, has contracted CNL to manage and operate its sites and facilities across the country. CNL is also contracted to carry out AECL's mandate to enable nuclear science and technology and to protect the environment by fulfilling the government of Canada's radioactive waste and decommissioning responsibilities. Through its Historic Waste Program Management Office, CNL is implementing the PHAI on behalf of AECL.

The PHAI represents the federal government's response to the community-requested solution for the cleanup and local, long-term, safe management of historic low-level radioactive waste in the municipalities of Port Hope and Clarington. The waste is the result of the refining practices of the former Crown Corporation, Eldorado Nuclear Ltd., and its private sector predecessors. The original Eldorado refining operation and plant were established in the 1930s without consultation with Indigenous peoples of the area.

*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* the (Legal Agreement) [1], finalized in 2001 March, between the Government of Canada and the two municipalities, launched the PHAI by defining the framework and setting out the responsibilities for the Port Hope Project and the Port Granby Project.

### Licence Information and Reporting Period

| | |
|---|---|
| **Name:** | Port Hope Area Initiative - Port Granby Long-Term Waste Management Facility |
| **Location:** | 4763 Lakeshore Road<br>Municipality of Clarington, Regional Municipality of Durham, Ontario<br>L1B 1L9 |

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) [2], hereinafter referred to as the Port Granby Project Licence (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* [3], hereinafter referred to as the PGP LCH and Section 4 Annual

Compliance Report of CNSC REGDOC-3.1.3, *Reporting Requirements for Waste Nuclear Substance Licensees, Class II Nuclear Facilities and Users of Prescribed Equipment, Nuclear Substances and Radiation Devices* [4]. Information included in this report is for the period of 2022 January 01 to December 31.

This report provides site-specific information to supplement information in the *Annual Compliance Monitoring Report for Canadian Nuclear Laboratories* (ACMR for CNL) [5], which provides corporate updates to 14 Safety and Control Areas as they are applied across all CNL.

The intent of this report is to provide sufficient detail to demonstrate how PGP programs are meeting the requirements of the Nuclear Safety and Control Act (NSCA), associated regulations and requirements as specified in the PGP Licence [2] and the PGP LCH [3].

Following a one-day hearing, the Canadian Nuclear Safety Commission (CNSC) has renewed the licence for the Port Hope Area Initiative (PHAI), for a 10-year period beginning 2023 January 01 [7]. As part of the licence renewal, a single licence consolidates four previous licences for PHAI activities, authorizing CNL to continue the safe cleanup and management of low-level radioactive waste in Port Hope, Ontario. The licence will also facilitate the ongoing monitoring and maintenance of the Port Granby Long-Term Waste Management Facility (PG LTWMF).

### Changes to Organizational Structure

There were no changes to key positions or the organizational structure in the reporting period.

### Facilities Included in this Report

Facilities included in this report are the PG LTWMF, the Port Granby Waste Management Facility site (PG WMF), and the Port Granby Waste Water Treatment Plant (PG WWTP).

The PG WMF site 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 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 Licensed Activities

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* (the Legal Agreement) [1], which took effect on 2001 March 29, between the Government of Canada and the municipalities of Port Hope and Clarington for the

management of the LLRW as prescribed under the PGP, and the Port Hope Long-Term Low-Level Radioactive Waste Management Project.

The PHAI includes two distinct and separate projects:

- The Port Hope Long-Term Low-Level Radioactive Waste Management Project that comprises the long-term management of the LLRW removed from the former Welcome Waste Management Facility, 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 and the safe transportation of the waste to the new PH LTWMF for long-term storage.
- The 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 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 CNL, on behalf of Atomic Energy of Canada Limited, a federal Crown corporation; CNL operation of this site was assumed from Cameco Corporation in 2012 March.
- Phase 2 (2011-2022) (completed in 2022):
  - 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 (2022-2120):
  - Activities related to the post-closure operations of the PG LTWMF associated with long-term care and maintenance.

# 1. Management System

## 1.1 Management System Program

The PGP adheres to CNL's Management System Functional Support Area. See Section 1 of the *ACMR for CNL* for details [5].

The *Historic Waste Program Quality Plan* (Quality Plan) [7] is consistent with the corporate *Management System Manual* (Management System) [9] and summarizes the processes and practices applicable to the PGP licensed activities. These processes and practices 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 2021 April 21.

The CNSC was notified [10] of the revision to the *Quality Plan* [7], implemented in the reporting period.

## 1.2 Audits, Inspections and Self-Assessments

As per the requirements of the Management System, both Safety and Control Areas (SCAs) and Facilities conduct various audits, inspections, and self-assessments to ensure that the management system is functioning according to expectations; and, that any policy, programmatic, or procedural deficiencies are identified, and appropriate actions taken to resolve them.

### 1.2.1 Audits

See Section 1.2 of the *ACMR for CNL* [5] for a list of all CNL-wide Audits for the reporting period.

### 1.2.2 External Audits

The annual ISO 9001:2015 external audit was held by third party registrar SAI Global for the recertification of the Historic Waste Program Management Office (HWP MO) ISO 9001:2015 certification. The audit identified two opportunities for improvement (managed through the corporate ImpAct[2] system (DevonWay)) that have since been closed.

### 1.2.3 Internal Quality Audits

There were no internal audits completed by the Quality Audits and Processes branch specific to the PGP in the reporting period.

[2] 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.

### 1.2.4 Regulatory Inspections

**CNSC Inspections**

There were two CNSC compliance inspections conducted at the PGP in the reporting period. The purpose of the inspections was to very adherence with the NSCA, associated regulations, conditions of the applicable licence and associated LCH, and other related licensing basis documentation.

The CNSC inspections conducted at the PGP in the reporting period are summarized in Table 1.

Two general inspections took place from 2022 March 28 to April 8 at the PG WWTP, PG LTWMF, and PG WMF. The inspections included the Radiation Protection, Environmental Protection, and Conventional Health and Safety SCAs. CNL worked through 2022 to address CNSC staff comments related to the issued non-conformance.

**Table 1: CNSC Inspections Summary**

| Inspection No. | Area Inspected | No. of NNCs | No. of Recommendations | No. of NNC[a] Closed |
|---|---|---|---|---|
| CNL-PHAI-PGP-2022-01 | General Inspection | 0 | 1 | N/A |
| CNL-PHAI-PGP-2022-02 | General Inspection | 1 | 0 | 1 |

NNC – Notice of Non-Compliance

a Closed as of 2023 March 17

**Inspections by Other Regulatory Bodies**

There were no inspections by other regulatory bodies at the PGP in the reporting period.

### 1.2.5 Self-Assessments

The corporate ImpAct System (DevonWay) tracks the planned self-assessments from the *Environmental Remediation Management (ERM) HWP Self-Assessment 2022/2023 Plan.* These are listed in Table 2. During the reporting period, two (2) self-assessments were planned to be conducted at HWP MO sites covering various aspects of the Management System, including SCAs.

**Table 2: List of Self-Assessments**

| Title | Facility/Safety and Control Area |
|---|---|
| ERM HWP Self-Assessments 2022/2023 | HWP Quality Plan [8] |
| | PHAI Transportation of Dangerous Goods Plan [11] |

## 1.3 Management Reviews

A Quality Assurance Program/Management System Review was completed for 2022/2023 to evaluate the effectiveness of the management system. The conclusion was that CNL's management system is suitable to meet the necessary requirements, adequate and aligned with the strategic direction, and effective at supporting CNL to achieve its objectives.

## 1.4 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. Compliance objectives for contractual obligations, licensing requirements, Acts and Regulations, environmental management and protection plans, compliance plans, and technical specifications are outlined in the *Historic Waste Program Management Office Field Oversight Activities* (HWP MO Field Oversight Activities) procedure [12].

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 CNL's Performance Assurance Functional Support Area. See Section 2 of the *ACMR for CNL* for details [5].

All CNL employees receive mandatory Human Performance Training. CNL's Human Performance and Training 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 Human Performance program at the PGP has been enhanced through the following improvements:

- CNL created and launched a new Human Performance training course called *Leaders in Field Training*. This course complements *Human Performance Awareness – Fundamentals and Nuclear Safety Culture*. *Leaders in Field Training* is tailored to support employees and managers as a refresher of Human Performance fundamentals and safety culture. This course is available to all employees at CNL, and it is delivered remotely.
- A Field Checklist Observation card for the PGP was created in the DevonWay software system with updated buildings and work locations for HWP inspections. This is a robust data collection and reporting card that encompasses housekeeping, stairways and passageways, roadways and parking lots, Electrical Safety, Workplace Hazardous Materials Information System, Portable Tools and Equipment, Ladders, Emergency Equipment, Personal Protective Equipment, Fire Protection, and Emergency Preparedness.

## 2.2 Training program

The PGP adheres to the Human Performance and Training Functional Support Area. See Section 2 of the *ACMR for CNL* for details [5]. The Port Hope Area Initiative (*PHAI) Training Plan* [13] defines the training processes applied to the work performed at the PGP and promotes safe and effective workplaces through the cooperation of management, employees, contractors, and visitors. Compliance with the plan ensures that all project staff (including CNL employees and contractors) are qualified to perform their duties effectively and safely, using established processes and standards.

There were no revisions to the *PHAI Training Plan* [13] in the reporting period. A revision to the *PHAI Training Plan* [13] will be submitted to CNSC staff in 2023.

### 2.2.1 Required Training

The PGP maintained a sufficient number of qualified workers to carry on the licensed activities safely and in accordance with the NSCA [6] and the regulations made under the NSCA [6]. All workers assigned to the PGP are required to attend a PHAI Awareness session to gain understanding of the project. Contractors are responsible to qualify staff to PHAI requirements as well as maintain their training. Records are inspected regularly by CNL staff during compliance oversight activities and audits.

The PHAI applies the Systematic Approach to Training for positions and roles identified on the *Controlled List* [14]. The Systematic Approach to Training enlists the Training Analysis method – Job/Task Analysis to identify training requirements to be documented in Training Plans. The positions and roles at PGP that are on the *Controlled List* [14] are:

- Radiation Surveyor
- Health Physicist
- Certified Industrial Hygienist
- Shipper
- Handler
- Design Authority

Identified positions at PGP that do not meet the threshold criteria established in the *Process to Determine the Application of the Systematic Approach to Training at CNL* [15] for the *Controlled List* [14] have their training requirements defined using CNL's Learning and Development Standard [20]. These positions are:

- PG WWTP Operator
- PG WWTP Supervisor
- CNL Safety Specialist
- Environmental Technologist

Continued progress was made in developing both Systematic Approach to Training and Learning and Development based training programs for the above positions.

An established Curriculum Review Committee is scheduled to meet quarterly with required membership. In 2022, the second quarter Curriculum Review Committee meeting was not held within the scheduled quarter. In 2023, an ImpAct was raised in the corporate DevonWay system to address the non-conformance and prevent recurrence. The Curriculum Review Committee Terms of Reference mandate includes review of staff qualifications, field performance, system, equipment and staffing changes and training compliance. Updates and improvements are monitored in the ongoing action list.

All PGP personnel, both employees and contractors, are adequately trained with initial and continuing training requirements to ensure safe operations and to conduct work under the PGP Licence [2]. Section 2 of the *ACMR for CNL* [5] details the 2022 CNL Employee and Manager/Supervisor required training. Table 3 provides a list of federally/provincially legislated training courses that appear in PHAI position-specific training plans. Section 2 of the *ACMR for CNL* [5] provides the established CNL performance benchmark. CNL is focused in 2023 to reach the necessary performance benchmarks.

**Table 3: Federally/Provincially Legislated Training in 2022**

| Course Title | Course Code | % Complete |
|---|---|---|
| Aerial Platform Practical | OSH-3003-D | 77 |
| Aerial Work Platform Theory | OSH-1003-Online | 92 |
| Arc Flash Safety for Canada | OSH-9070-Online | 85 |
| Electrical Safety Introduction for Canada | OSH-9071-Online | 92 |
| First Aid Standard & Defibrillation | OSH-1020 | 100 |
| Ladder Safety | OSH-1033-Online | 100 |
| Lift Truck Operation - Counter Balance Practical | OSH-3002-C | 100 |
| Lift Truck Operation - Electric Pallet Truck Practical | OSH-3002-H | 90 |
| Lift Truck Operation - Non-Electric Pallet Truck Practical | OSH-3002-D | 100 |
| Lift Truck Operation - Theory | OSH-1002-Online | 100 |
| Lock Out / Tag Out | OSH-1004 | 100 |
| Transportation of Dangerous Goods Class 7 Radioactive Material - Handler | TDG-1007-H | 100 |
| Utility Task Vehicle Rider | OSH-1013 | 100 |
| Vehicle Spotter Training | OSH-1047-Online | 100 |
| Working at Heights Practical | OSH-3005 | 100 |
| Working at Heights Theory | OSH-1005 | 100 |
| **Percent complete:** | **-** | **96** |

### 2.2.2 Contractor Training

Training records for all contractors are verified before work commencement. In addition, records are verified regularly through CNL Compliance Oversight activities.

Before accessing the PGP, contractors are required to complete the following CNL training:

- Contractor Safety Orientation
- Radiation Protection Group 4 (if required)
- PHAI Awareness
- Step up to Safety
- CNL COVID Awareness

### 2.2.3 Training Evaluations Summary

See Section 2.2.3 of the *ACMR for CNL* [5] for the inputs and mechanisms for on-going Training Evaluation.

# 3. Operating Performance

## 3.1 Operating Program

Although not formally part of the PGP LCH [3], the PGP adheres to CNL's Conduct of Operations Functional Support Area. See Section 3.1 and Section 11.2 of the *ACMR for CNL* for details [5].

### 3.1.1 Environmental Remediation Operations

The following sub-sections provide a summary of the project activities during the reporting period. Detailed written reports on the PGP activities, as well as a three month look ahead were provided to CNSC staff on a quarterly basis [16] [17] [18] [19], as required by Licence Condition 3.1 of the PGP LCH [3].

#### 3.1.1.1 Port Granby Long-Term Waste Management Facility

The Phase 2 activities described in this section were conducted during the reporting period as part of the transition of the facility to Phase 3. Activities, including upgrades to existing infrastructure, are required to facilitate operation of the PG LTWMF. These activities and upgrades included the following:

- Ongoing inspections of the municipal roads showed 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.
- It was determined that the remaining two lake tanks were not needed to support water management activities and thus underwent the appropriate radiation protection required screening prior to removal from site.
- Construction and commissioning activities continued for the East Gorge Groundwater Collection system which included the installation of flexamat geogrid above the East Gorge which assisted with erosion and sediment control for the PG WMF site.
- Commissioning was completed for the PG LTWMF leachate Pump Stations 05 and 06.
- Decontamination of equipment for offsite release was completed.
- Construction of the PG LTWMF surrounding ditches to final grade, placing clean fill, topsoil and hydro seeding was completed.
- Consolidation and disposition of waste generated onsite through decommissioning of the PG WWTP outdoor activities was completed.
- Remediation activities for the PG WMF, including backfill, topsoil, and erosion and sediment control construction was completed.
- Placement/ compaction of backfill and topsoil, spraying of hydro seed straw was completed for the PG WMF.

- Placement/ compaction of backfill and topsoil, spraying of hydro seed straw was completed for the PG LTWMF.

**Supporting Activities**

- Representatives for the Municipality of Clarington and CNL met at monthly coordination meetings throughout 2022.
- To ensure compliance with CNL mandated COVID-19 Pandemic related restrictions for the number of personnel onsite, site activities and mobilizations continued to be monitored into 2022.
- The Phase 3 Long Term Maintenance and Monitoring Plan and Port Granby Site and Facility Maintenance and Monitoring Plan were revised to address CNSC staff review and comments.
- Port Granby Site Turnover Plans were finalised and integrated into the contractor's processes to initiate the transition from Phase 2 to Phase 3.

#### 3.1.1.2 Port Granby Waste Water Treatment Plant

During the reporting period, the PG WWTP daily operations and regular maintenance activities transitioned from Phase 2 to Phase 3 activities. PG WWTP daily operations and regular maintenance activities are ongoing for Phase 3.

**Water Collection and Treatment System**

Waste water from within the PG LTWMF (leachate) and East Gorge drainage recovery system (I.e., pump station 03) is pumped to an equalization pond. The water then enters the plant, where it is treated using a two-stage process – membrane bioreactor pre-treatment (Stage 1), followed by reverse osmosis (Stage 2).

In Stage 1, membrane bioreactors are used to pre-filter the influent to remove fine solids and some biological material to supply high quality feed to the reverse osmosis membranes.

In Stage 2, the biologically treated water enters the reverse osmosis system where contaminants such as radium, uranium and arsenic are removed. The water is forced under high pressure through a membrane. The contaminants are rejected by the membrane, and the treated water flows through to the pH adjustment tank.

A composite automatic water sampling unit conducts samples at regular intervals before the water is discharged to Lake Ontario. See Section 9.2 for details. A summary of these analyses is provided in Appendix B, Table 16, and Table 17. Histogram charts (Figure 1, Figure 2, Figure 3, and Figure 4) show year over year results of final effluent results from 2018 to 2022. The treated water is then discharged through a pipe extending 120 metres into Lake Ontario.

The rejected contaminants (reverse osmosis brine) are collected, then safely transported to the Port Hope WWTP for further treatment.

### Water Treatment and Monitoring

The PG WWTP was the sole source of effluent discharge from the PG WMF in 2022. Table 4 shows the production quantities of effluent for 2018-2022. Overall, there was a 32.3% decrease in production volume in 2022 as compared to 2021. This decrease in effluent volume was driven by several factors including reverse osmosis brine being transported to the Port Hope WWTP; the completion of remediation on the PG WMF; and the completed closure of the constructed PG LTWMF waste cell.

Effluent quality for this time period is reported under Section 9.2, Environmental Protection.

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

A review of action levels following CSA Group Standard N288.8-17 [21] was initiated in 2022 and is planned for submission to CNSC staff in 2023.

**Table 4: PG WWTP Production Quantities of Effluent**

| Month | 2018 Effluent ($m^3$) | 2019 Effluent ($m^3$) | 2020 Effluent ($m^3$) | 2021 Effluent ($m^3$) | 2022 Effluent ($m^3$) |
|---|---|---|---|---|---|
| January | 16,920 | 15,778 | 20,153 | 2,055 | 3,682 |
| February | 12,908 | 13,053 | 18,680 | 0[a] | 3,492 |
| March | 15,362 | 21,436 | 22,264 | 3,195 | 7,046 |
| April | 14,666 | 27,396 | 11,737 | 4,432 | 4,291 |
| May | 20,719 | 30,037 | 11,721 | 1,895 | 2,727 |
| June | 19,505 | 29,700 | 6,550 | 0[a] | 1,990 |
| July | 20,190 | 25,720 | 1,317 | 5,285 | 4,058 |
| August | 12,627 | 20,057 | 6,006 | 3,626 | 3,110 |
| September | 9,036 | 12,084 | 12,044 | 8,499 | 2,451 |
| October | 18,381 | 21,120 | 2,470 | 14,573 | 1,863 |
| November | 16,715 | 6,081 | 5,247 | 8,467 | 1,562 |
| December | 18,084 | 16,982 | 4,842 | 3,299 | 1,185 |
| TOTAL | **195,114** | **239,444** | **123,031** | **55,326** | **37,457** |
| [a] No effluent was produced during the months of February and June 2021. | | | | | |

### Waste Processing

The PG WWTP did not produce any filter press solids in 2022. In 2022, 3,497 $m^3$ of brine was safely transported to the Port Hope WWTP main collection pond for treatment at the Port Hope WWTP. The overall summary of solids production is provided in Table 5. For waste transfers to off-site locations, refer to Section 11.2.2.

**Table 5: PG WWTP Waste Processing, Solids Production**

| Year | Filter Press Solids (kg) | Slurry Solids (kg) | Cement Solids (kg) | Brine Residuals ($m^3$) |
|---|---|---|---|---|
| 2018 | 262,500 | 79,500 | 0 | 0 |
| 2019 | 349,500 | 1,282,500 | 756,000 | 261 |
| 2020 | 277,000 | 0 | 0 | 2,402 |
| 2021 | 47,300 | 0 | 0 | 5,418 |
| 2022 | 0 | 0 | 0 | 3,497 |

## 3.2 Reporting Requirements

The PGP maintains a program for reporting information to the CNSC in accordance with the PGP LCH [3]. This includes compliance monitoring, operational performance, event reporting, and various types of notifications. In the reporting period, CNL prepared and submitted the written reports required by the PGP LCH [3].

### 3.2.1 Reportable Events to CNSC

During the reporting period, there were three events that occurred at the PGP that were deemed reportable to the CNSC. Reportable events are listed in Table 6. The reported events did not have any adverse effect on the health, safety and security of persons or the environment.

**Table 6: Reportable Events to CNSC**

| Event No. | Title | SCA |
|---|---|---|
| **HSSE-22-0145** | HWP – PG LTWMF – Process residual waste totes were shipped without proper classification | Packaging and Transport |
| **ERM-22-2811** | HWP - PG LTWMF – Security Breach | Security |
| **ERM-22-3094** | HWP - PG LTWMF – Water Collection Line Struck and Severed During Excavation | Emergency Response |

### 3.2.2 Reportable Events to Other Regulators

During the reporting period, there were no events that occurred at the PGP that were deemed reportable to other regulatory agencies, including Employment and Social Development Canada, Environment and Climate Change Canada, or the Ministry of the Environment, Conservation and Parks - Spills Action Centre.

### 3.2.3 Corrective Action Program

#### 3.2.3.1 Trending of Events Related to Operational Activities

As events at the PGP occur, they are recorded in the corporate ImpAct system (DevonWay). This information is regularly reviewed to identify any trends.

One ImpAct with cognitive trending analysis was opened in 2022 where the trending searches were inclusive of both Port Hope and PGP sites. The 2022 ImpAct related to both Port Granby and Port Hope was:

- HWP -PH/PG MO - Adverse TREND "Dump Box Leaks" and Related Events / Issues

The ImpAct had a total of ten corrective actions assigned to address the event type and any contributing factors. One corrective action is currently open and ongoing. The remaining nine are closed as of 2023 January.

ImpActs raised at the PGP over the past five years by Significance Level[3] are summarized in Table 7.

**Table 7: Number of ImpActs Raised at PGP**

| Year | Level 0[a] | Level 1 | Level 2 | Level 3 | Level 4 | Total |
|---|---|---|---|---|---|---|
| **2018** | 7 | 0 | 1 | 23 | 55 | 86 |
| **2019** | 0 | 0 | 1 | 14 | 34 | 49 |
| **2020** | 4 | 0 | 0 | 6 | 38 | 48 |
| **2021** | 0 | 0 | 0 | 13 | 25 | 38[b] |
| **2022** | 1 | 0 | 2 | 8 | 25 | 36[c] |

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.
b Total does not include one committee-based ImpAct.
c Total does not include committee-based ImpActs.

[3] Significance Level: Levels assigned to an event (SL1 being most significant, SL4 being least significant) based on the actual or potential result in safety, environmental, or business consequences.

# 4. Safety Analysis

## 4.1 Safety Analysis Program

As per the PGP LCH [3], the Safety Analysis SCA is not applicable to the PGP.

# 5. Physical Design

## 5.1 Design Program

The PGP adheres to CNL's Design Authority and Design Engineering Functional Support Area. See Section 5.1 of the *ACMR for CNL* for details [5].

### 5.1.1 Changes to Design or Equipment

The PGP utilizes CNL's Engineering Change Control process, supplemented by *HWP MO Application of Engineering Change Control and Oversight* [22], to implement modifications and upgrades to existing equipment. The initial release of the application document was in 2022 January [23]. At the request of the CNSC, the document was revised and revision 1 was released in 2022 September. Revision 1 included additional references to the PG licensing basis documents for the Physical Design SCA [24].

During the reporting period, there were no major changes to design or equipment identified that required the change request to follow the full Engineering Change Control process (i.e., full assessment).

Notable activities at the PG LTWMF included:

- Completion and capping of the PG LTWMF
- Reinstating Lakeshore Road

Notable activities at the PG WWTP included:

- In 2022 spring, CNL implemented an operational change to transfer liquid waste from the PG WWTP to the Port Hope WWTP. In 2022 August, CNL submitted the assessment for permitting the transfer of the liquid waste to CNSC [25]. In 2022 October, CNL submitted the licensing basis assessment for the transfer of liquid waste to CNSC [26]. To address CNSC comments, CNL continues to update relevant documentation, which will be submitted to CNSC in 2023.
- Removal of the short-term supplementary evaporator and supporting infrastructure
- Execution of the chemical room modifications and upgrades
- Execution of the design of underground influent piping upgrades
- Emptying and removal of the methanol tanks associated with the permanently out-of-service bioreactors

In 2022 November, CNSC staff raised concerns with CNL's management oversight of changes and its adherence to the change control process. CNL acknowledged that the implementation of the change management process is an area needing improvement and initiated a Root Cause

Analysis to identify and correct the programmatic issues. Program improvement continues through 2023.

# 6. Fitness for Service

## 6.1 Fitness for Service Program

As per the PGP LCH [3], the Fitness for Service SCA is not applicable to the PGP.

# 7. Radiation Protection

## 7.1 Radiation Protection Program

The PGP adheres to CNL's Radiation Protection (RP) Functional Support Area. See Section 7 of the *ACMR for CNL* for details [5].

The *Port Hope Area Initiative Radiation Protection Plan* (PHAI RP Plan) [27] defines the radiation protection measures applicable to PHAI projects at the PGP site and is consistent with CNL's Radiation Protection Program Requirements [28]. The purpose of these radiation protection measures is to ensure that the execution of PHAI projects complies with the level of radiation safety required by the relevant regulations pursuant to the NSCA [6].

The CNL PGP Contractor responsible for operating the PG LTWMF utilizes a CNSC licensed Dosimetry Service Provider, specifically Health Canada, for monitoring dosimetry on site. Alternatively, CNL site and facility staff (i.e., CNL employees, contingent workers, and sub-contractors) utilize the Chalk River Laboratories licensed Dosimetry Service Provider. Dose to CNL site and facility staff is not measured independently – only the total dose per person is recorded, irrespective of the site at which the person works (e.g., licensed activities at both Port Hope and Port Granby). CNL site and facility staff and the PGP Contractor who work in, or frequently enter Controlled Areas are assigned Thermoluminescent Dosimeters (TLDs) or Optically Stimulated Luminescent Dosimeters respectively to monitor for external radiation exposures.

There were no revisions to the *PHAI RP Plan* [27] in the reporting period.

### 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 RP Program. Recent CNL improvements and changes include Radiation Protection barriers, and Radiation Protection instrumentation. In 2022 the PGP RP program sought out to standardize RP barriers, specifically colouring with yellow and magenta, along with having the stands, posts and stanchions used in the barriers to be of a more robust nature. Radiation Protection instruments and equipment used for radiation measurements are selected, tested, and calibrated for the task and hazard for which they will be utilized. Instrumentation is calibrated to isotope(s) that closely represent the energy and type of radiation (α, β, γ) encountered in the LLRW found on the project.

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. Results from the 2022 monitoring program confirm a public dose estimate to be 3.3% of the annual limit for non-NEWs based on the 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 reviews of dose records to confirm that no adverse trends or exceedance have occurred.

### 7.1.2 Contamination Control

Routine monitoring across the project confirms that current activities have been executed while minimizing the spread of contamination. There were no contamination events at the PGP in the reporting period. Table 8 summarizes contamination events that occurred at PGP over the past 5-years.

**Table 8: Contamination Events**

| | Skin and Clothing Contamination | | | | Workplace Contamination | |
|---|---|---|---|---|---|---|
| | Skin[a] | Personal Clothing[b] | Radiological Work Clothing[c] | Total | Surface[d] | Vehicle / Materials[e] |
| **2018** | 0 | 0 | 0 | 0 | 0 | 0 |
| **2019** | 0 | 1 | 0 | 1 | 0 | 0 |
| **2020** | 0 | 2 | 0 | 2 | 0 | 0 |
| **2021** | 0 | 0 | 0 | 0 | 0 | 0 |
| **2022** | 0 | 0 | 0 | 0 | 0 | 0 |

a Contamination found is greater than 4 Bq/cm$^2$ beta-gamma or 0.1 Bq/cm$^2$ alpha
b Contamination detected above background on personal clothing
c Contamination detected is greater than 10,000 cpm beta/gamma or greater than 230 cpm alpha
d Fixed/loose contamination in excess of limits specified for the applicable radiological zone
e Removable surface contamination detected above background.

## 7.2 Dosimetry

### 7.2.1 Interpretation of Reported Dose Quantities

The PGP uses the Chalk River Laboratories licensed Dosimetry Service Provider for external and internal dosimetry for CNL staff, contingent workers, and some sub-contractors. CNL staff, contingent worker, and sub-contractors whose external and internal dosimetry are monitored using the dosimeters are not measured independent of the site location worked (i.e., individuals may work at more than one licensed PHAI project site); only the total dose per person is recorded, irrespective of the site at which the person works. The PGP Contractor uses an alternate CNL approved, and CNSC licensed dosimetry service provider, where dose is monitored for the assigned PHAI PGP site where work is performed. All people who have a reasonable probability of receiving an occupational effective dose in connection with a nuclear

substance or nuclear facility in excess of 1 mSv per calendar year will be designated a Nuclear Energy Worker (NEW) [27].

CNL staff, contingent workers and sub-contractors who work within or frequently enter the Controlled Area, are assigned a TLD to monitor for external radiation exposures. Alternatively, the PGP Contractors use Optically Stimulated Luminescence Dosimetry equivalents that are provided by a CNSC licensed Dosimetry Service Provider. CNL dosimetry operates on a quarterly monitoring period. All external dosimetry is read on a routine basis. Visitors and non-NEWs are typically given Electronic Personal Dosimeters to track dose and to ensure trigger limits and dose control points identified within the *PHAI RP Plan* [27] are not exceeded.

The Internal Bioassay program is primarily provided to the CNL Operations and RP staff who work in close proximity with radiological hazards within the PG WWTP. The bioassay is tested for the presence of uranium 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.

CNL's personnel radon exposure program for PG WWTP operations monitors employees, contingent workers, sub-contractors, and PGP contractors due to the increased work required to support Phase 2 construction. Phase 2 construction workers were assigned track-etch type Personal Radon detectors and doses are calculated and recorded if the monthly/ quarterly average exceeds the trigger level of 150 $Bq/m^3$. No exceedances were identified.

PGP continues to ensure that doses to staff and contractors are kept ALARA by strict compliance to its Dosimetry program as stipulated in the PHAI RP Plan [27].

### 7.2.2 Radiation Doses to Personnel

The dose data in Table 9, Table 10 and Table 11 represent doses delivered at PGP for all monitored persons, which includes employees (including those in temporary employment such as students), sub-contractors, visitors, and the PGP Contractor.

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

The maximum individual effective dose during the current five-year dosimetry period (from 2021 January 01 to 2025 December 31) is 0.76 mSv, received by a CNL sub-contractor tradesperson.

In 2022, there were no non-NEWs that had their effective dose assessed.

**Table 9: Effective Dose for 2022**

| Monitored Person Type | | Dose Range (mSv) | | | | | | | Total # of Persons | Individual Dose (mSv) | | | Collective Dose (person·mSv) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 0.01-0.50 | 0.51-1.00 | 1.01-5.00 | 5.01-10.00 | 10.01-20.00 | >20.00 | | Max | Ø Avg[a] | Avg All[b] | |
| | | Number of Persons | | | | | | | | | | | |
| NEW | Employee | 112 | 98 | 0 | 0 | 0 | 0 | 0 | 210 | 0.34 | 0.08 | 0.04 | 7.42 |
| | Contractor | 291 | 103 | 0 | 0 | 0 | 0 | 0 | 394 | 0.42 | 0.09 | 0.02 | 9.43 |
| | Visitor[c] | 53 | 0 | 0 | 0 | 0 | 0 | 0 | 53 | 0 | - | 0 | 0 |
| Non-NEW | Contractor | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | - | 0 | 0 |
| | Visitor | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | - | 0 | 0 |
| Totals | | 461 | 201 | 0 | 0 | 0 | 0 | 0 | 662 | 0.42 | 0.08 | 0.02 | 16.85 |

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 who were historically employee and/or contractor NEWs, but have returned to the site as visitor while retaining their historical NEW status, or frequented often enough to warrant NEW status as per *PHAI RP Plan* [27].

## Table 10: Distribution of Equivalent Dose to the Skin for 2022

| Monitored Person Type | | Total # of Persons | Dose Range (mSv) | | | | | | | Individual Dose (mSv) | | | Collective Dose (person·mSv) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 0.01-0.50 | 0.51-1.00 | 1.01-5.00 | 5.01-10.00 | 10.01-20.00 | >20.00 | | | | |
| | | | Number of Persons | | | | | | | Max | Ø Avg[a] | Avg All[b] | |
| NEW | Employee | 210 | 111 | 99 | 0 | 0 | 0 | 0 | 0 | 0.34 | 0.08 | 0.04 | 7.62 |
| | Contractor | 394 | 290 | 104 | 0 | 0 | 0 | 0 | 0 | 0.49 | 0.1 | 0.03 | 10.15 |
| | Visitor[c] | - | - | - | - | - | - | - | - | - | - | - | - |
| Non-NEW | Contractor | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| | Visitor[c] | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| Totals | | 606 | 403 | 203 | 0 | 0 | 0 | 0 | 0 | 0.49 | 0.09 | 0.03 | 17.77 |

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 Visitors on contractor sites are not monitored for their equivalent dose to the skin. Visitors issued a TLD by CNL are monitored for their equivalent dose to the skin.

**Table 11: Summary of Dose Components Received as a Result of Licensed Activities for 2022[a]**

| 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 Avg[b] | Avg All[c] |
| NEWs | Employee | 210 | 7.42 | 0.34 | 0.08 | 0.04 | 210 | 7.62 | 0.34 | 0.08 | 0.04 | - | - | - | - | - |
| | Contractor | 394 | 9.43 | 0.42 | 0.09 | 0.02 | 394 | 10.15 | 0.49 | 0.1 | 0.03 | - | - | - | - | - |
| | Visitor[de] | 53 | 0 | 0 | - | 0 | -[c] | - | - | - | - | - | - | - | - | - |
| Non-NEWs | Contractor | 1 | 0 | 0 | - | 0 | 1 | 0 | 0 | - | 0 | - | - | - | - | - |
| | Visitor[e] | 4 | 0 | 0 | - | 0 | 1 | 0 | 0 | - | 0 | - | - | - | - | - |
| | Total | 662 | 16.85 | 0.42 | 0.08 | 0.02 | 606 | 17.77 | 0.49 | 0.09 | 0.03 | - | - | - | - | - |

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 who were historically employee and/or contractor NEWs but have returned to the site as visitor while retaining their historical NEW status, or frequented often enough to warrant NEW status as per *PHAI RP Plan* [27].
e Visitors on contractor sites are not monitored for their equivalent dose to the skin. Visitors issued a TLD by CNL are monitored for their equivalent dose to the skin.

#### 7.2.2.1 Discussion of Dose Data

No anomalies were noted 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 PGP.

#### 7.2.2.2 Radiation Dose Changes or Trends

As the project advances past Phase 2 Construction, the 2022 average dose to all workers (employees and contractors) was determined to be approximately 0.02 mSv. This low average dose to workers is to be expected with PGP as capping and site closure activities are completed.

### 7.2.3 Program Exceedances

There were no exceedances of regulatory limits and action levels in the dose monitoring program for the 2022 calendar year.

# 8. Conventional Health and Safety

## 8.1 Conventional Health and Safety Program

The PGP adheres to CNL's Occupational Safety and Health Functional Support Area. See Section 8 of the *ACMR for CNL* for details [5]. The *Port Hope Area Initiative Occupational Safety and Health Plan* (PHAI OSH Plan) [29] has been developed to define the OSH program applicable to PHAI projects and is consistent with CNL's corporate OSH program.

Contractors conducting work for the PGP submit site specific health and safety plans for CNL's review and approval to ensure compliance with the *PHAI OSH Plan* [29].

CNL's OSH program priorities for 2022 included:

- Initiation of a comprehensive review to verify accuracy and completeness of the WWTP lock-out tag-out program and instructions in relation to requirements of the new CNL Hazardous Energy Standard
- Significant enhancements to the HWP MO formal contractor health and safety oversight process to implement formal programmatic auditing practices following ISO 45001 practices
- Re-establishment of the face-to-face Contractor Safety Forums
- Development and implementation of a HWP wide minimum standard on working near overhead hazards across all project sites
- Completion of updates to the HWP Contractor Health and Safety Plan Submission Criteria
- Completion of chemical process maps for WWTP's and updated spill control procedures based on results and facilitated advanced spill response training for applicable personnel
- Enhanced workplace health and safety recognition through awarding the Port Hope safety recognition award to various nominees
- Completion of hearing and Self-Contained Breathing Apparatus medical assessments
- Introduced wellness safety podcasts with a focus on psychological safety and resilience

The CNSC was notified [30] of revisions to the *PHAI OSH Plan* [29].

### 8.1.1 Site Safety and Health Committee

The Site Safety and Health Committee (SSHC) had nine regular scheduled meetings and one special meeting in the reporting period. The SSHC continued to meet regularly by virtual meetings.

A significant number of employees continued to work remotely and were permanently given that status. As a result of the pandemic and many other factors, a focus on mental health, reducing workplace stress, ergonomic and other safe working practices continued through the SSHC's Employee Awareness Campaigns. All inspections of HWP workplaces were carried out and completed.

No investigations were carried out in 2022 and there were no unresolved issues at the end of the year. The SSHC supported CNL's Safety Excellence initiative which spawned several new initiatives at the HWP including Safety Suggestion Boxes which have produced multiple proactive safety suggestions and ideas shared with the committee to date.

### 8.1.2 Inspections

During the reporting period:

- All inspections of PHAI workplaces were carried out and completed.
- The SSHC conducted three inspections.
- There were 28 site health and safety inspections completed by the Field Safety Specialists.

### 8.1.3 Hazardous Occurrence Investigation Reports and Lost-Time Injuries

There were no hazardous occurrences at the PGP that were reported to Employment and Social Development Canada in 2022.

A summary of injury rate data for the last five years is provided in Table 12.

**Table 12: Summary of Injury Rate Data**

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| **PGP Employees** | | | | | |
| **Person Hours Worked** | - | 41622 | 30000 | 19,614 | 10,513 |
| **Lost-Time Injuries** | 0 | 1 | 0 | 0 | 00 |
| **Working Days Lost** | 0 | 1 | 0 | 0 | 0 |
| **Frequency[a]** | 0 | 4.8 | 0 | 0 | 0 |
| **Severity[b]** | 0 | 4.8 | 0 | 0 | 0 |
| **PGP Contractors[c]** | | | | | |
| **Lost Time Injuries** | 0 | 1 | 0 | 0 | 0 |
| **Working Days Lost** | 0 | 365 | 0 | 0 | 0 |

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

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

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

# 9. Environmental Protection

## 9.1 Environmental Protection Program

The PGP adheres to CNL's Environmental Protection Functional Support Area. See Section 9 of the *ACMR for CNL* for details [5].

The *Environmental and Biophysical Monitoring Plan, Port Granby Project* [31] defines the methodologies and protocols followed in performing the environmental monitoring.

The CNSC was notified [32] of a revision to the *Environmental and Biophysical Monitoring Plan, Port Granby Project* [31].

## 9.2 Effluent Monitoring

### 9.2.1 Liquid Effluent Monitoring

#### 9.2.1.1 Monitoring Points, Schedules and Parameters

A composite sample is collected weekly at the PG WWTP to provide data on the final effluent discharge. The sampling point is located at the final effluent tank. The sample is collected via an auto-sampler which collects a sample aliquot at a minimum frequency of every 15 minutes.

The samples are submitted to a third-party commercial laboratory on a weekly basis to determine concentrations of the following parameters:

- Radium-226
- Metal parameters including Arsenic, Cadmium, Cobalt, Copper, Molybdenum, Selenium, Thallium, Uranium, Vanadium, and Phosphorus
- General chemistry parameters including pH and Total Suspended Solids (TSS)
- Nitrogen species including Total Ammonia, Nitrate, and Nitrite
- Monthly samples are submitted for toxicity analysis

#### 9.2.1.2 Monitoring and Testing Methods

All compliance samples were submitted to a third-party commercial laboratory for analysis. The laboratory is certified by the Canadian Association for Laboratory Accreditation Inc.

Toxicity samples were sent to two commercial laboratories for toxicity analysis via approved reference methods, namely:

- Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*, Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments

- Reference Method for Determining Acute Lethality of Liquid Effluents to Rainbow Trout, Environment Canada EPS 1/RM/13 (Second Edition, December 2000, with May 2007 and February 2016 amendments

#### 9.2.1.3 Monitoring Results

The effluent discharge limits for the PG WWTP for the 2022 reporting period, as listed in Section 7 of the PGP LCH [3], specifies the monthly arithmetic mean concentration (total) of the contaminants of concern in the effluent discharge water shall not exceed the stated release limits. Additionally, effluent should not be acutely toxic as determined by monthly testing of the effluent. During the reporting period, the effluent was found not to be toxic.

A summary of the PG WWTP effluent discharge monthly average concentrations is provided in Appendix B, Table 15. Monthly effluent toxicity is provided in Appendix B, Table 16. Monthly influent average concentrations is provided in Table 17 for information. Histogram charts are presented in Figure 1, Figure 2, Figure 3, and Figure 4 for the purposes of comparing year over year final effluent results from 2018 to 2022. Note that radium-226, total suspended solids, and total phosphorus, cadmium, selenium, and thallium results were not graphed, since reported analytical results above the parameter detection limits are rarely reported.

A review of the data from Figures 1 to 4 yield the following observations:

- During the period of 2018 to 2022, Port Granby WWTP reported final effluent discharge analytical results were generally stable.
- Arsenic results tend to fluctuate over time, depending on total dissolved solids content of the influent water. Reported arsenic concentrations in the final effluent discharge increased slightly during 2022.
- Total ammonia, nitrate, and nitrite concentrations have decreased to near zero during 2022.
- Beginning 2020 January, CNL changed the third-party commercial laboratory providing the analytical results. The current commercial laboratory generally has lower detection limits for licensed parameters than the previous commercial laboratory. This can be readily observed on the curves for cobalt, copper, and vanadium, where more recent reported results are much lower than older results, owing to the lower detection limit.

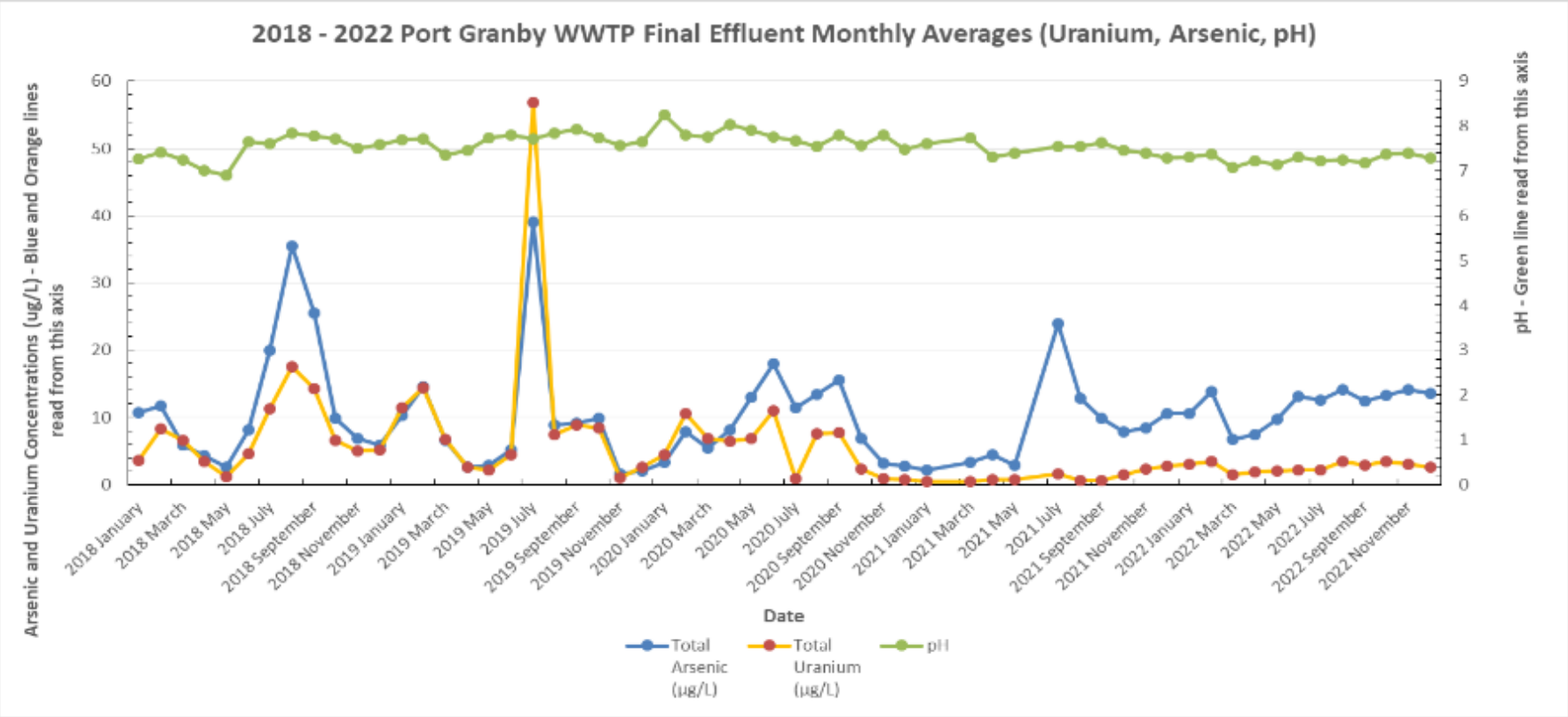


**Figure 1: 2018 to 2022 PG WWTP Final Effluent Monthly Averages (pH, Total Arsenic and Total Uranium)**

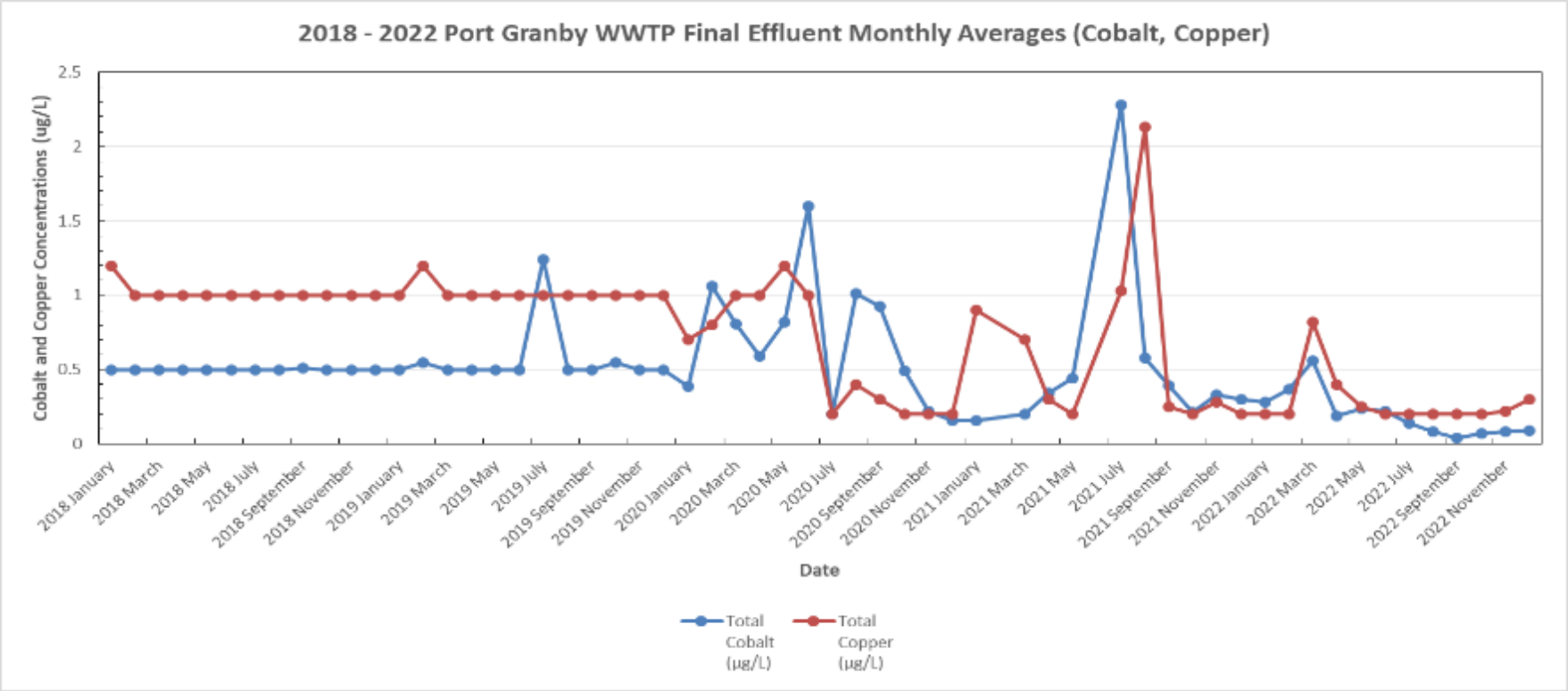


**Figure 2: 2018 to 2022 PG WWTP Final Effluent Monthly Averages (Total Cobalt and Total Copper)**

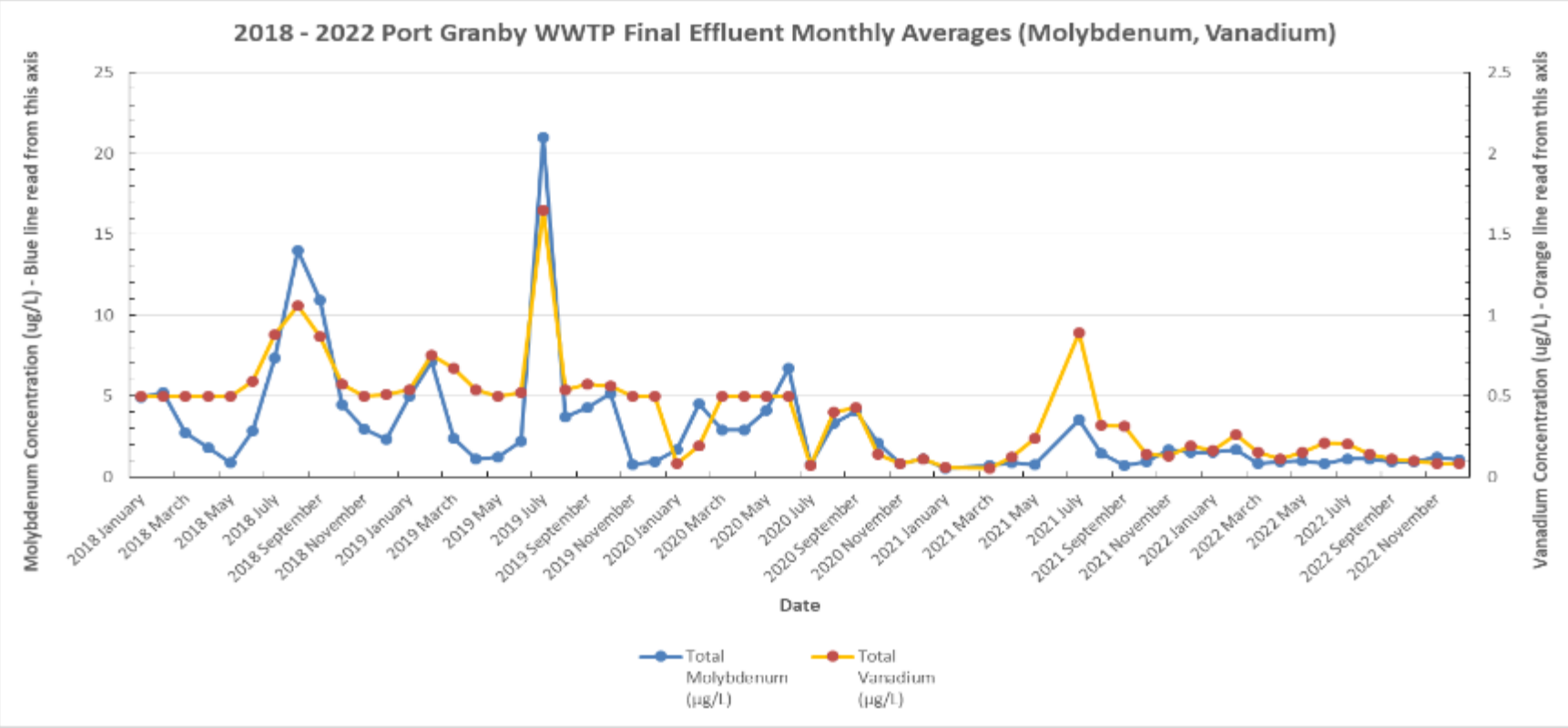


**Figure 3: 2018 to 2022 PG WWTP Final Effluent Monthly Averages (Total Molybdenum and Total Vanadium)**

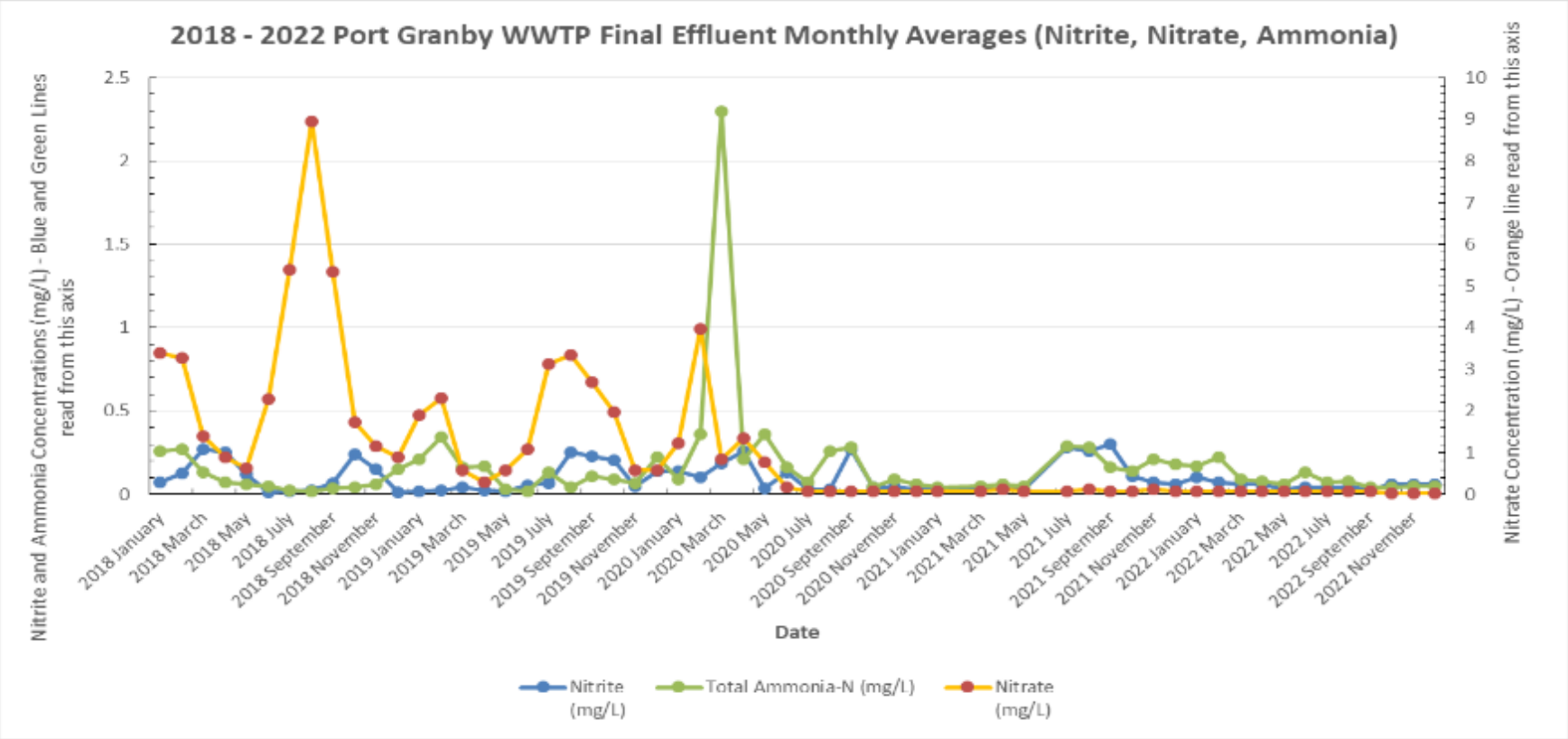


**Figure 4: 2018 to 2022 PG WWTP Final Effluent Monthly Averages (Total Ammonia, Nitrate, and Nitrite)**

### 9.2.2 Quality Assurance and Quality Control

To confirm the accuracy and precision of laboratory analyses, a quality control regime is followed. For the purposes of the environmental compliance of the PG WWTP, both duplicate and blank sampling is conducted:

- Duplicate samples are collected at a minimum frequency of once per month;
- Duplicate final effluent toxicity samples are collected each month. To prevent laboratory bias, the duplicate toxicity sample is sent to a different certified laboratory; and,
- Blank samples are collected at a minimum frequency of once per month.

Sample nomenclature on QA/QC samples is “blind” in nature, ensuring that the analytical laboratory cannot determine the source of the sample.

Blank samples are created using laboratory grade deionized water or commercially available distilled water.

### 9.2.3 Regulatory Limit Exceedances and Contamination Incidents

All reportable events are summarized in Section 3.2. During the reporting period, there were no exceedances as compared to the site release limits as described under Licence Condition 7.1 of the PGP LCH [3].

## 9.3 Operational Environmental Monitoring

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 17025:2017.

The methodologies and protocols followed in performing the environmental monitoring are described in the *PGP Environmental and Biophysical Monitoring Plan* [31].

### 9.3.1 Operational Groundwater Monitoring

Operational wells are 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 2022. The operational groundwater wells were decommissioned in 2016 as they were located within or adjacent to the PG WMF excavation areas. Additional monitoring wells will be installed in Phase 3 as required by the *PGP Environmental and Biophysical Monitoring Plan* [31]. Further discussion is in Section 9.4.3.1.

### 9.3.2 Bluff Seepage Monitoring

'Seep' samples from the south bluffs at the PG WMF are collected quarterly from three locations along the Lake Ontario bluffs. The two locations (PG-S-1, and PG-S-2) are between the East Gorge and West Gorge, as depicted in Appendix A, Figure 14.

Note that:

- The sample for PG-S-1 was not collected in 2022 March and June due to high Lake Ontario water level and bluff erosion and 2022 September and November as the seep was dry at the time of sampling.
- PG-S-2 was not sampled in 2022 March as the seep was dry.

The results of the bluff seepage sampling are presented in Appendix B, Table 30 and Table 31. In 2022, elevated levels of fluoride, arsenic, and uranium were observed in the seepage water, that are above Ontario's Provincial Water Quality Objectives (PWQO) [32] and/or the Canadian Council of the Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG) [34]. Concentrations of some contaminants are slightly increased at PG-S-2 when comparing to 2021 concentrations, but overall, have been decreasing since 2015. According to the baseline predictions from the *Environmental Assessment Summary Report for the Port Granby Project* [35] bluff seepage to Lake Ontario is occurring at the rate of 51,100 $m^3$ per year of uranium (baseline concentration of 0.79 mg/L (790 µg/L)), arsenic (baseline concentration of 0.64 mg/L (640 µg/L)) and radium-226 (baseline concentration of 0.55 Bq/L). The 2022 bluff seepage results for uranium and Ra-226 are at or below the baseline concentrations. Arsenic was noted to be above the baseline concentrations in 2022 September, however the overall average in 2022 was below baseline concentrations.

The *Port Granby Project Aquatic Environment Environmental Effects Assessment Report* [36] states that the baseline concentrations for arsenic and uranium exceeded the interim PWQO [32] but did not exceed the lowest chronic values for either compound in Lake Ontario. These concentrations are expected to decrease after remediation is complete.

The *Aquatic Environment Baseline Characterization Study for the Port Granby Project* [37] states that the projected plume of arsenic and uranium associated with bluff seepage will cover a very small area (< 750 $m^2$), 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 remediation of the PG WMF is complete and natural attenuation takes place.

### 9.3.3 Sediment Monitoring

Sediment was sampled along the Lake Ontario shoreline near the areas of bluff seepage in 2022 and analyzed for metals and radionuclides. Sediment sampling locations are depicted in Appendix A, Figure 11.

The results of the sampling are presented in Appendix B, Table 32, and Table 33. PG-BS-6 was not sampled in 2022 June and November as it was not able to be safely accessed. From the results in Appendix B, Table 32, and Table 33, arsenic exceeded Ontario's Provincial Sediment Quality Guidelines (PSQG) [38] and the CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life [39] at PG-BS-7. Arsenic exceeded the PSQG Lowest Effect Level [38] and CCME Interim Sediment Quality Guidelines (ISGQ) [39] in the 2022 June sample and the PSQG Lowest Effect Level and CCME Probable Effect Level (PEL) [39] in the 2022 November sample. The 2022 results are consistent with previous years.

The Aquatic Environment Baseline Characterization Study for the PGP [37] 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 [38] based on weather and lake movement before sampling.

Sediment quality is expected to improve once remediation of the PGP site is complete.

### 9.3.4 Stormwater Management Pond Monitoring

Two stormwater management ponds (SMP(s)) 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 depicted in Appendix A, Figure 13.

The results of the sampling are provided in Appendix B, Table 40, and Table 41. The monthly samples were not collected in 2022 January, February, or December at PG-SP1 and PG-SP2 as the SMPs were frozen. The results of the sampling campaigns were compared against the PWQO [32] and the CWQG [34]. In 2022, the concentrations of fluoride and phosphorus were observed to exceed the PWQO [32] and the CWQG [34] in both the North and South SWPs. Iron was also observed to exceed the PWQO [32] and the CWQG [34] in the North SWP. These exceedances were observed before the start of active waste transfer in 2016 November, suggesting that these concentrations are indicative of surface water run-off in the area, unrelated to the PG LTWMF. The *Screening Report for Port Granby Long-Term Low-Level Radioactive Waste Management Project* (PGP Screening Report) [40] states that water quality guidelines for fluoride, iron, and phosphorus were exceeded in baseline data, which is typical for agriculture/urban watersheds in the region.

In the spring of 2022 elevated concentrations of arsenic and uranium were identified in the South SWP. Investigations of the source continued through 2022, and release was prevented to Port Granby Creek during this time. Water quality improved in 2022 October and discharge was resumed to Port Granby Creek once contaminant levels were verified to be within acceptable range before release.

In the North and South SWP, the pH level was outside of the recommended range as defined in the PWQO [32] and the CWQG [34] in 2022 May.

The elevated uranium, arsenic, and other Contaminants of Potential Concern (COPC) results were not measurable in the Port Granby Creek Watershed, as discussed in Section 9.4.4.1

## 9.4 Environmental Assessment Follow-Up Environmental Monitoring

For the 2022 reporting period, Licence Condition 7.1, Environmental Protection Program, of the PGP LCH [3] 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:

- Confirm EA predicted effects by means of monitoring, sampling, measurements, and analysis.
- Demonstrate compliance with licence requirements and EA Follow-up Program requirements as stipulated in the *PGP Environmental and Biophysical Monitoring Plan* [31].
- 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, and COPC.

The secondary objectives of the program are:

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

The EA monitoring program is structured using a framework of six sub-programs of follow-up actions. These programs collectively incorporate all the individual activities required for tracking the follow-up actions prescribed in the *PGP Screening Report* [40]. 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). The details of the program can be found in the *PGP Environmental and Biophysical Monitoring Plan* [31].

This report contains information collected during the 2022 monitoring programs. The status of the EA commitments for the biophysical effects follow-up monitoring are summarized in Appendix D.

### 9.4.1 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 a laboratory accredited to ISO 17025:2017, under contract to CNL.

The methodologies used and protocols followed in performing the environmental monitoring are described in the *PGP Environmental Biophysical Monitoring Plan* [31].

### 9.4.2 Atmospheric Environmental Monitoring

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

#### 9.4.2.1 Air Quality

Air quality monitoring is intended to identify 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.

In 2022, high volume (Hi-Vol) air samplers were operated at two locations in Port Granby (PG South and PG East), as depicted in Appendix A, Figure 7, 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 Hi-Vol 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 18, Table 19, and Table 20.

**Total Suspended Particulate**

Exceedances of the overriding limit of 120 micrograms per cubic metre (µg/$m^3$) as defined in the *PHAI Dust Management and Requirements Plan* [41] at the PG East and PG Northwest

location were noted in 2022. Three exceedances were observed for the PG East location in 2022 January, May, and June were attributed to off-site activities. Three exceedances were observed at the PG Northwest location in 2022 May, June, and July. These exceedances are believed to be from off-site sources based on the wind direction and the absence of real-time dust exceedances from contractor and independent real-time dust monitoring. A confirmed source could not be identified. The exceedance represents approximately 1.5% of total samples collected at PG East and PG Northwest locations. There were no exceedances observed at the PG South location.

### Particulate matter ($PM_{2.5}$)

In 2012, CCME adopted the Air Quality Management System as a comprehensive approach to managing air issues. The Canadian Ambient Air Quality Standards for Fine Particulate Matter are included, which replaced the Canada-wide standards developed in 2000. A 2020 value of 27µg/$m^3$ is proposed for $PM_{2.5}$, which was exceeded in 2022 May and July at the Mini-Vol PG Northwest location. The 2022 May exceedance was attributed to construction work on the railways just north of the PG Northwest Mini-Vol station and the predominant wind direction. The 2022 July 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 *PGP Screening Report* [40] 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 ($98^{th}$ percentile averaged over three years) were compared to Canadian Ambient Air Quality Standard 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 filters that exceeded the overriding limit as described above. The measured concentrations are presented in Appendix B, Table 21, and Table 22. There was an increase in the averages for uranium and silver in 2020, 2021 and 2022 due to the change in the contract laboratory. There were no exceedances of the Ambient Air Quality Criteria [43] at PG East and PG South in 2022.

The *PGP Screening Report* [40] predicted that the maximum annual concentrations for radionuclides would be below the Health Canada reference values. These reference values are defined in the *Port Granby Environmental Assessment Study Report* (PG EA Study Report) [35] and are based on Health Canada guidelines for the Management of Naturally Occurring Radioactive Material [44]. The wastes for the project are not considered Naturally Occurring Radioactive Material, however, the guideline levels have been provided for context. The predictions in the EA for the radionuclide concentrations were modelled for $PM_{10}$. TSP results were 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, $PM_{10}$ will be as well). There were no exceedances of the Health Canada reference values for radionuclides in 2022.

#### 9.4.2.2 Independent Dust Monitoring

In accordance with the *Dust Management and Requirements Plan* [41], an Independent Dust Monitoring Program is executed by a third party in addition to that conducted by the Prime Contractor and CNL, to ensure that perceived organizational conflicts regarding dust monitoring results and work activities are avoided. Continuous monitoring occurs during the work hours and results are reported on a 15-minute interval.

The Independent Dust Monitoring Contractor uses real-time monitors to measure TSP at the work site perimeter. The *Dust Management Requirements and Plan* [41] identifies the dust action level for a TSP monitor reading at the work site perimeter to be > 120 $\mu g/m^3$ averaged over 15 minutes. An exceedance of a dust action level triggers an immediate response by CNL and the Prime Contractor to initiate corrective action to reduce dust levels.

In 2022, there were no instances when the 15-minute average exceeded the action level of 120 $\mu g/m^3$ that were attributed to site activities at the PG LTWMF.

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

#### 9.4.2.3 Noise Monitoring

EA follow-up monitoring with respect to noise is conducted to confirm the accuracy of predictions made during the EA and the effectiveness of any mitigation measures. Additional noise monitoring is also required at the remediation sites to confirm compliance with appropriate by-laws and regulations (World Health Organization's Guideline for Community Noise) [45].

During the 2022 monitoring period, continuous sound level data was collected quarterly at nine locations in Port Granby. The sampling locations are depicted in Appendix A, Figure 8.

The results of the campaigns, averaged logarithmically over three workdays, are provided in Appendix B, Table 23. The 2022 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 *PG EA Study Report* [35] states the noise levels (hourly) at the nearest receptor for the intersection of North Elliott Road and Concession Road 1 (PG-N-0008) 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-0009), the noise levels at the nearest receptor were predicted to be approximately 4 to 15 dBA higher than the measured baseline noise levels. These two locations are representative of the project transportation route. The monitoring results reflect daytime hours from 2022. When compared to the adjusted 2015 baseline noise levels, 2022 data reveal a slight increase in the average, 1 to 2 dBA; 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.

### 9.4.3 Geology and Groundwater Monitoring

The prescribed EA follow-up monitoring activities in the geology and groundwater environment include elements associated with groundwater flow and quality and soil quality. Groundwater monitoring well locations are depicted in Appendix A, Figure 9. Results of the monitoring are summarized in the following sub-sections.

#### 9.4.3.1 Groundwater (Flow and Quality) Monitoring

During the reporting period, the groundwater wells were sampled on a quarterly basis in conjunction with the measurement of groundwater static levels. Groundwater monitoring is conducted in accordance with the *PGP Environmental and Biophysical Monitoring Plan* [31].

Note that of the 39 groundwater wells to be monitored:

- Four have not been located on the PG WMF since 2013 (PG-BH204, PG-BH214, PG BH404 and PG-OW41-76). Re-installation of these wells took place in 2022 fall.
- 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). As these wells were not sampled in 2022, the historic data has been excluded from this report. Re-installation of these wells took place in 2022 fall.
- Twelve wells located on the PG WMF (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) were not sampled once the remediation on

the site commenced in 2016, due to ongoing construction and inaccessibility. Limited access was granted in 2020 to sample the wells located at the PG WMF site. In 2021, full access was granted to sample the wells. Wells PG-MW03-02A, PG-MW03-02B, PG-MW03-02C, PG-MW03-03A and PG-MW03-03B are damaged and repairs were completed in 2022 fall, and sampling was reinitiated. Two wells, PG-BH210 and PG-OW4-87, were not sampled in 2022, as they could not be located. Replacement of damaged or missing wells took place in 2022 fall. The 2016 data was included for historical trending purposes, including a note for when these wells were not sampled due to the PG WMF construction activities.

In 2022, the remaining 20 wells located around the PG LTWMF were sampled on a quarterly basis. The data is presented in Appendix C.

Note that:

- Laboratory results for PG-MW2A-02, PG-BH1003E, PG-BH1003F, and PG-MW03-01A, and PG-MW1A-02 and PG MW2C-02 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, and PG-MW3B-02 were unable to be sampled in 2022 as they are in need of further repair.
- The following samples were not collected in 2022 due to insufficient volume for sampling: PG-BH1002A (partial results in spring and fall), PG-BH1003B (partial results in fall), PG-BH1003C (partial results in fall), PG-MW1D-02 (fall), PG-MW03-01A (winter, spring, summer, and fall), PG-MW03-01B (summer and fall), PG-MW03-03A (fall), PG-MW03-03B (fall), PG-MW3D-02 (summer and fall),
- The following samples were not collected in 2022 due to no access for sampling: PG-MW4A-02 (winter) and PG-MW4B-02 (winter), PG-MW4C-02 (winter).

The results were compared against the Water Quality Criteria for Potable Groundwater Conditions tabulated in the *PGP Screening Report* [40]. 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) [46].

In 2022, barium was found to exceed the criteria identified in the *PGP Screening Report* [40] at PG-MW3A-02, which is the site's most northerly well. The elevated barium is consistent with monitoring data collected in previous years. As groundwater in the region generally flows south towards Lake Ontario, these elevated concentrations are likely originating from an alternative source; exceedances were not observed at any of CNL's other monitoring wells or surface water monitoring in Port Granby Creek Watershed (Section 9.4.4.1) and Lake Ontario (Section

9.4.4.2). There were no exceedances of the Ontario's Table 3 Standards [46] in 2022. Overall, 2022 sampling results for key COPC are similar to the previous year's 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 2022 and are presented in Appendix B, Table 24. Average groundwater levels are generally similar to previous years.

Soil monitoring is conducted to determine if there has been an incremental increase in contaminant concentrations in these areas as a result of wind-blown dust deposition. Soil quality monitoring activities involved the collection and analyses of surface soil samples at off-site perimeter locations at the PG LTWMF site. The soil sampling locations are depicted in Appendix A, Figure 10.

Soil located around the PG LTWMF site were sampled and analyzed for metals and radionuclides in 2022. The sample analysis results provided in Appendix B, Table 25, Table 26, Table 27, Table 28, and Table 29 are comparable to previous years. The *PGP Screening Report* [40] 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 in 2022 have remained consistent with baseline data and monitoring data from previous years.

### 9.4.4 Aquatic Environmental Monitoring

The aquatic environment monitoring program includes surface water sampling at Port Granby Creek, surface water sampling at the Lake Ontario diffuser, and drainage water sampling.

#### 9.4.4.1 Surface Water – Port Granby Creek Watershed

During the reporting period, the water flowing in Port Granby Creek was sampled on a quarterly basis at two locations (upstream and downstream). The surface water locations are depicted in Appendix A, Figure 12.

Results were compared to the PWQO [32] and the CWQG [34] where available. Results are provided in Appendix B, Table 34, and Table 35. 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 cobalt. Cobalt exceeded the PWQO [32] in 2022 October at the upstream location (PGC-U). The overall 2022 average for cobalt at PGC-U was below the PWQO [32]. Iron exceeded the PWQO [32] and the CWQG [34] at the upstream location in 2022 April. The overall average for iron at PGC-U was below PWQO [32] and the CWQG [34]. At PGC-

D, pH exceeded the PWQO [32] and the CWQG [34] in 2022 July. Phosphorus exceeded the PWQO [32] in the 2022 October sample. As iron and cobalt were elevated at the upstream location, the value was not attributed to site activities. The *PGP Screening Report* [40] predicted no measurable 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 2022 June. The contaminant concentrations were observed to peak as Total Suspended Solids (TSS) increased. Results from the storm event monitoring are presented in Appendix B, Table 36. TSS concentrations at the peak of the storm event were 312 mg/L, compared to 37 mg/L as the storm event sampling commenced. As TSS levels increased, concentrations of iron and phosphorus were observed to exceed the PWQO [32] and mercury exceeded the CWQG [34]. Cobalt and vanadium were observed to exceed the PWQO [19]. Exceedances of cobalt were noted in the 2022 October upstream location (PGC-U). Off-site construction activities were taking place throughout the 2022 summer, which may have attributed to the cobalt and vanadium exceedances of the PWQO [19]. The downstream PGC-D was also elevated for cobalt and vanadium but was not attributed to site activities.

The rural nature of the site and the associated farming activities would likely contribute to the higher-than-normal iron and phosphorus levels observed during the storm event monitoring. Iron and phosphorus are not key COPC associated with the PHAI PGP. They are discussed here for transparency.

#### 9.4.4.2 Surface Water – Lake Ontario and 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* [40] 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 depicted in Appendix A, Figure 12. Results are provided in Appendix B, Table 37, Table 38, and Table 39. Samples were not collected for the winter season due to unsafe conditions on Lake Ontario.

There was one exceedance of the CWQG [34] for mercury in June 2022. Mercury was observed to exceed the CWQG [34] in the Port Granby Creek watershed during the storm event monitoring (Section 9.4.4.1) but not in the groundwater monitoring network (Section 9.4.3.1). The mercury exceedance is not attributed to site activities. Fluoride and phosphorus were observed to exceed the PWQO [32] and CWQG [34] in 2022. Fluoride exceeded the CWQG [34] at PG-LO-E in 2022 June. Phosphorus exceedances of the PWQO [32] were observed at PG-LO-D, PG-LO-E, and PG-LO-W in 2022 June, September, and November.

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 2022 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.

#### 9.4.4.3 Drainage Water

Drainage water locations are depicted in Appendix A, Figure 13 (PG-SW1/DP1-02 and PG-SW2/CP2-02). Note that location PG SW2/DP2-02 was not sampled since 2022 as the existing pond was removed as part of the site preparation work for the PG LTWMF. The monitoring location was relocated to the outflow of the new North SMP. SMP sampling is discussed further in Section 9.3.4.

PG-SW1/DP1-02 was sampled twice in 2022 (May and November). The results of the sampling campaigns are presented in Appendix B, Table 42, and were compared against the PWQOs [32] and the CWQGs [34]. In 2022 May and November, fluoride exceeded the CWQG [34] at PG-SW1/DP1-02. Exceedances have been observed in previous years for fluoride in drainage water (before emplacement of the waste at the PG LTWMF), and as such are not likely related to the operation of the facility. The *PGP Screening Report* [40] predicted no measurable 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 CNL's Emergency Preparedness Functional Support Area. See Section 10.1 of the *ACMR for CNL* for details [5].

*The* Port Hope Area Initiative Emergency Plan *(PHAI Emergency Plan)* [47] has been developed to describe the planning and operational requirements for the response to an emergency directly or indirectly affecting the PHAI. The *PHAI Emergency Plan* is consistent with CNL's Corporate Emergency Preparedness Program which ensures that 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* [47]. Contractor compliance with project-specific emergency preparedness plans is examined as part of CNL's Oversight Program.

Enhanced emergency preparedness training was provided to personnel including fire extinguisher training and building emergency evacuation training and drills. The building emergency plan for the PG WWTP was revised.

There were no revisions to the *PHAI Emergency Plan* [47] in the reporting period.

### 10.1.1 Drills and Exercises

In the reporting period, a comprehensive five-year drill plan was created, outlining all drills that are required to be conducted, and an approximate timeline for those drills. In addition to the five-year drill plan, all drills were completed internally as per regulatory and programmatic requirements.

### 10.1.2 Training

In the reporting period, Emergency Steward and Officer in Charge training was offered to staff at all PHAI facilities.

### 10.1.3 External Collaborations

In the reporting period, there was repeated engagement with Clarington and Durham Region first responders. Continuous communications regarding site activities during the Phase 3 transition was conducted with Clarington Fire Department. Durham Regional Police and Durham Paramedic Service were engaged on separate topics.

### 10.1.4 Unplanned Emergency Events

In the reporting period, there was one unplanned emergency event. On 2022 October 11, a water collection line was damaged during excavation activities and was appropriately responded to and repaired with no adverse effect on the health, safety and security of persons or the environment. The event was reported to CNSC (See Section 3.2.1 for details).

## 10.2 Fire Protection Program

The PGP adheres to CNL's Fire Protection Functional Support Area. See Section 10.2 of the *ACMR for CNL* for details [5]. The *Port Hope Area Initiative Fire Protection Program* [48] 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.

The *PHAI Fire Protection Plan* [48] was approved for use in the reporting period.

### 10.2.1 Fire Response Drills

During the reporting period, all required annual fire response drills were completed at the PG site. Drill responses identified requirements for updated notification processes along with improved training and awareness on response procedures for all 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

During the reporting period, site tours were conducted with Clarington Emergency and Fire Services.

### 10.2.3 Third Party Audits and Inspections

During the reporting period, all required routine CNL fire protection program inspections were completed at the PGP. Inspections were completed using standard inspection forms and processes. No significant deficiencies were 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 Protection Screening Assessments

During the reporting period, several fire screening assessments were completed for various maintenance and capital improvement projects in accordance with CNL's Engineering Change Control program. Fire protection screening assessments were also completed for work outside the Engineering Change Control process that affected fire protection, either from the modification itself, or from the implementation of the modification. Fire screenings were completed in accordance with the *CNL Fire Protection Screening Process* [49].

# 11. Waste Management

## 11.1 Waste Management Program

As per the PGP LCH [3], the Waste Management SCA is not applicable to the PGP. It is included in this report for information. The PGP adheres to CNL's Waste Management Functional Support Area. See Section 11.1 of the *ACMR for CNL* for details [5].

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

- Port Granby Waste Management Plan [50]

## 11.2 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. Of note, all the PG WMF waste types, and affected onsite soils have been transferred to the PG LTWMF for long-term management as part of the PGP.

### 11.2.1 Waste Inventory

The PG LTWMF mound contains an inventory of 1,315,059 metric tonnes, and an estimated total activity of 1.60E+14 Bq. The activity stems from the uranium and uranium progeny found in the waste. This is information is summarized in Table 13. There was no new waste placed in the PG LTWMF during the 2022 calendar year.

As part of the routine water treatment process, residuals that are removed from the water effluent are packaged and sent to an off-site facility for disposal or long-term management. Waste material sent off-site is summarized below and in Table 14.

In 2022, there were 1,779 tonnes of process residual waste sent to the PH LTWMF for long term management, and 3,497 tonnes of reverse osmosis concentrate sent for treatment at the Port Hope WWTP.

**Table 13: Stored Waste Inventory in PG LTWMF**

| Waste Type | Source | Total Estimated Quantity (Metric tonnes) | Total Estimated Radioactivity (Bq) [Calculated] | Primary Radionuclides |
|---|---|---|---|---|
| **Radioactive** | Historic Waste from PG WMF, Marginally Contaminated Soils (MCS) and Mix of LLRW and MCS | 1,314,446 | 1.60E+14 | Uranium and Uranium Progeny |
| **Radioactive** | Process residuals from WWTP (LLRW) | 613 | 1.13E+10 | Uranium and Uranium Progeny |
| **Radioactive** | Total Waste Placed at the PG LTWMF | 1,315,059 | 1.60E+14 | Uranium and Uranium Progeny |

### 11.2.2 Waste Transfers

**Table 14: Waste Transfers from Port Granby**

| Waste Type | Waste Description | Transfer Date | Weight | Total Estimated Radioactivity (Bq) [Calculated] | Primary Radionuclides | Destination |
|---|---|---|---|---|---|---|
| **LLRW** | Reverse Osmosis Concentrate | 2022 January to 2022 December | 3,497 tonnes | 9.47E+08 | Uranium and Uranium Progeny | Port Hope WWTP |
| **LLRW** | Process Residuals – Solids from the PG WWTP and PG site demobilisation waste. | 2022 January – 2022 December | 1,779 tonnes | 1.16E+10 | Uranium and Uranium Progeny | PH LTMWF |
| **Hazardous** | Waste crankcase oils and lubricants | 2022 November | Approximately 160 kg | N/A | N/A | GFL Environmental Inc. |
| **Hazardous** | Non-halogenated pesticide | 2022 November | Approximately 205 kg | N/A | N/A | GFL Environmental Inc. |

# 12. Security

## 12.1 Security Program

The PGP adheres to CNL's Security Functional Support Area. See Section 12 of the *ACMR for CNL* for details [5]. The *Port Hope Area Initiative Security Plan* (PHAI Security Plan) [50] has been implemented for the PGP. The *PHAI Security Plan* [50] establishes the security arrangements that are required for the PHAI project sites. 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* [50] is to ensure the physical protection of the PGP assets and safeguarding of the public and personnel. The *PHAI Security Plan* [50] 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 to CNL for review and approval. As confirmed through CNL's mandated review and acceptance process, contractor plans are consistent with the requirements of the *PHAI Security Plan* [50]. Contractor's compliance with project specific security plans is examined as part of CNL's oversight program.

In the reporting period, the PHAI implemented a graded personnel security assessment program. In addition, an updated threat risk assessment was conducted for PHAI facilities, including the PGP.

The CNSC was notified [52] of revisions to the *PHAI Security Plan* [50]. Major updates included the newly implemented graded security assessment process and additional cascaded changes to the visitor process.

### 12.1.1 Security Events

In the reporting period, there was one security event that affected the PGP. On 2022 September 16th, an individual was found to have gained access to the Port Granby site overnight and took shelter in the contractor lunch trailer. The individual left site without incident. There was no adverse effect on the health, safety and security of persons or the environment. The event was reported to CNSC (See Section 3.2.1 for details).

# 13. Safeguards and Non-Proliferation

## 13.1 Safeguards Program

As per the PGP LCH [3], the Safeguards and Non-Proliferation SCA is not applicable to the PGP.

## 14. Packaging and Transport Program

The PGP adheres to CNL's Transportation of Dangerous (TDG) Goods Functional Support Area, which includes the requirements of the Packaging and Transport SCA. See Section 14 of the *ACMR for CNL* for details [5]. The *Port Hope Area Initiative Transportation of Dangerous Goods Plan* (PHAI TDG Plan) [11] 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 CNL policies and procedures.

In addition, firms or contractors performing work on behalf of CNL for the PHAI project under the PGP Licence [2] adhere to project specific work plans, which are compliant with the *PHAI TDG Plan* [11].

There were no revisions to the *PHAI TDG Plan* [11] in the reporting period.

### 14.1 Shipments

During the reporting period, there were a number of 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 (e.g., consumable chemicals, diesel fuel, and propane).

### 14.2 Packaging and Transport Events

During the reporting period, there was one packaging and transport event that affected the PGP. There were no adverse effects on the health, safety and security of persons or the environment. The event was reported to CNSC (See Section 3.2.1 for details).

## 15. Engagement with Indigenous Communities and Organizations

In alignment with the Truth and Reconciliation Commission Call to Action #92 *Business and Reconciliation* [54], CNL is committed to advancing truth and reconciliation through meaningful actions, continued inclusion of and participation by Indigenous peoples in the planning and execution of CNL's missions including seeking input into project-related engagement plans such as this document.

CNL prioritizes the recognition of Indigenous rights and interests as we continue to build relationships with local Indigenous communities through ongoing learning about their values and interests. CNL continues to enhance its corporate Indigenous relations program, in collaboration with Indigenous communities, with the development of a formal reconciliation action plan, and the establishment of an Indigenous procurement policy, both underway.

All communications, plans and reporting are reviewed to ensure balanced language and acknowledgement of Constitutional Indigenous rights and worldviews and Indigenous knowledge systems will be integrated into CNL project planning and activities.

Historically, the *PHAI Phase 2 Public Information Program* (PIP) [55] had included Indigenous communities and organizations as a target audience. In support of CNL's objective to advance reconciliation through meaningful actions and movement toward increased inclusion and participation, the *PHAI Phase 2 and 3 Program for Engagement with Indigenous Communities and Organizations*, currently in development in collaboration with Indigenous representatives, will be implemented in tandem with the PIP. The *Program for Engagement with Indigenous Communities and Organizations* will be reviewed on an annual basis and updated as necessary to ensure it continues to provide appropriate direction.

As part of the commitment to undertake meaningful actions toward Truth and Reconciliation, corporately CNL is enhancing its overall Indigenous Relations program and in 2022, CNL expanded its resources for the PHAI with the addition of a Senior Advisor, Indigenous Relations.

In 2022, CNL staff worked closely with representatives of Indigenous communities and organizations to increase project awareness and enhance relationship building through a variety of approaches, as depicted in Figure 5.


**Figure 5: 2022 Engagement with Indigenous Communities and Organizations**

## 15.1 Indigenous Communities and Organizations

CNL is committed to timely engagement with Indigenous communities and organizations about projects and operations.

From the start of the planning process, the Mississauga communities of the Williams Treaties First Nations have been involved in the PHAI and participated in the EA through more than 40 engagements. When the EA was approved and the PHAI moved into the implementation phase (Phase 2) in 2012, the Mississauga communities asked to receive regular updates about the projects.

These communities continued to receive routine updates about the PHAI projects through regular meetings and dialogue with CNL staff. Since 2021, engagements have become more frequent, and the Williams Treaties First Nations have become increasingly more involved.

CNL also shares PHAI project updates with representatives from the Anishinabek Nation, Mohawks of the Bay of Quinte, and Métis Nation of Ontario as Indigenous communities/organizations with interests in the area.

**Communities with Rights**

- Alderville First Nation
- Curve Lake First Nation
- Hiawatha First Nation
- Mississaugas of Scugog Island First Nation
- Beausoleil First Nation
- Chippewas of Georgina Island First Nation
- Chippewas of Rama First Nation

**Communities with Interests**

- Mohawks of the Bay of Quinte
- Métis Nation of Ontario, Regions 6, 8 and local constituent Councils

**Indigenous Organizations**

- Anishinabek Nation
- Métis Nation of Ontario

### 15.1.1 Monitoring Concerns and Incorporating Feedback

CNL maintains open dialogue with Indigenous communities and organizations to strengthen understanding of Indigenous worldviews and relationship to the land and monitor concerns about PHAI activities.

Throughout all engagement activities any questions, concerns, and input about the PHAI and project-related impacts are recorded in writing and implemented where applicable.

### 15.1.2 Indigenous Input and Involvement

CNL seeks Indigenous input on the development of its engagement programs and provides opportunity for Indigenous communities and organizations (particularly those with Treaty rights in a project area) to review and comment on draft reports and plans and communications products, for technical and procedural aspects of the projects.

CNL responds to all comments and questions and provides information as to how input was incorporated and if not, why.

When comments are received on draft plans, reports, etc. a record of disposition of the feedback is circulated to all reviewers with the updated document outlining how each comment was dispositioned and applied.

In 2022, CNL circulated two draft documents for formal review and comment. In support of the CNL application for a 10-year licence renewal, CNL circulated the *PHAI Indigenous Communications and Engagement Supplementary Report (April – July 2022)* [57] for review and comment. Feedback received on the supplementary report was integrated into the final version, where applicable, before it was submitted to the CNSC in August 2022.

CNL also circulated a first draft of the *PHAI Phase 2 and 3 Program for Engagement with Indigenous Communities and Organizations* for review and comment. Feedback received was

incorporated into a second draft circulated to the communities and organizations for additional comment.

In conjunction with the CNL application for a 10-year renewal of the PHAI Waste Nuclear Substance Licence CNL reviewed formal interventions submitted to the CNSC by Curve Lake First Nation and Mississaugas of Scugog Island First Nation and documented all questions and comments. In 2023, a response was prepared for each community responding to each comment and with details on how each comment was applied.

In addition to topic-specific questions and requests, feedback often includes requests and suggestions on use of language and inclusion of specific content in CNL plans, reports, and communications. Where applicable, this input is applied not only to the specific document under review but more broadly to other relevant CNL communications and materials as appropriate.

### 15.1.3 Contribution/Relationship Agreements

CNL supports the development of contribution/relationship agreements to provide funding to ensure Indigenous communities remain actively involved in CNL communications, engagement, and project planning.

Contribution/relationship agreements may include financial support for staff time related to administration, community liaison activities and meetings; technical documentation review; and environmental and habitat assessments as well as community capacity building through skills training and job shadowing.

Currently, PHAI has a contribution agreement with Curve Lake First Nation that will be renewed in 2023 and is in discussions with the Mississaugas of Scugog Island First Nation and Hiawatha First Nations to develop a contribution agreement during 2023.

### 15.1.4 Indigenous Knowledge Systems

Guided by the CNSC's *Indigenous Knowledge Policy Framework* [58], CNL is in the process of applying guidance and direction from Indigenous knowledge systems into its projects.

As noted in the CNSC framework,

*'IK is a body of knowledge gathered by generations of Indigenous peoples living in close contact with their traditional territories and resources. IK is cumulative and dynamic. It is built on the historic experiences of a people and adapts to social, economic, environmental, spiritual and political change*.'

CNL will continue to provide any relevant updates on the ongoing monitoring and maintenance of the facility and work to incorporate Indigenous ontological worldviews into any future planning.

### 15.1.5 Archaeology Program

CNL's *Protocol for Archaeological and Forensic Discovery* [59] outlines the required procedure should items of potential archaeological, Indigenous, or cultural heritage significance be uncovered during PHAI work. The protocol requires that the archaeologist overseeing the site engage with cultural heritage liaisons from Indigenous communities. CNL will ensure that Indigenous communities remain engaged and involved in all stages of the archaeological work.

With the PGP now complete, it is anticipated that no further archaeology investigation would be undertaken at the site.

### 15.1.6 Engagement with Indigenous Communities and Organizations

Through discussion with Indigenous communities and organizations over the course of the PHAI, CNL has noted preferences for communications and engagement and remains open to continual refinement of approaches based on the interest and needs of the communities.

The broad range of methods, products and activities is reviewed, revised and/or supplemented as required to reflect lessons learned during the implementation of this plan.

#### Williams Treaties First Nations Monthly Meetings

At the request of Curve Lake First Nation, CNL's Indigenous Relations team established monthly meetings in 2021 with representatives from the Mississauga First Nations as well as the Chippewa communities (Beausoleil, Georgina Island and Rama First Nations). Meetings are organized with input from the community representatives and each meeting is focused on CNL environmental remediation projects and/or the interests identified by these Nations.

In 2022, nine meetings were held with the June meeting taking place in-person at the CNL office. Discussions focused on the PHAI and included a tour of PHAI project sites.

#### Meetings and Site Tours

Meetings with Indigenous communities and organizations provide the opportunity for CNL to strengthen relationships through mutual sharing of updates and information. CNL provides presentations and updates on project plans and activities and particular areas of interest to ensure all interested parties have the opportunity to receive and provide comment on information on the PHAI. Guided tours of project remediation sites and construction areas, led by expert CNL staff, provide a first-hand look at PHAI work, promoting an in-depth understanding and appreciation for the complexity and importance of the projects. Tours illustrate the project scope, planning, implementation, and progress, including environmental protection, compliance with occupational health and safety requirements, and conformance with Environmental Assessment monitoring obligations and adaptive management practices.

In May 2022, members of the Anishinabek Nation Grand Council visited the CNL office in Port Hope for a project update and site tour.

CNL held a planning meeting with Métis Nation of Ontario representatives, staff, and Region 5 and 6 Councillors in June 2022 followed by a PHAI update in July. In October, members of MNO visited the CNL office in Port Hope for a tour of the project sites.

### Special Events

Where possible, CNL engages formally and informally to deepen the relationship with Indigenous communities in the project area.

CNL Indigenous Relations and Environmental Monitoring staff were invited to visit the Savannah Lands at Alderville First Nation in September 2022 to learn more about these protected lands.

At the invitation of Curve Lake First Nation, CNL staff travelled to the community in October 2022 for a visit that included traditional teaching from an Elder.

CNL staff visited Alderville First Nation again in November, at the invitation of Chief Dave Mowat, to attend the Treaty 27 200th Commemoration Symposium to better understand this treaty and its relevance.

### Indigenous Business and Trade Liaison

To facilitate 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. A dedicated procurement policy for working with Indigenous communities is in development to further facilitate economic involvement in CNL projects.

Information on business and career events, including CNL's industry days and career fairs, is circulated to Indigenous communities and organizations. As the PGP was completed in 2022, CNL did not hold any business-related events.

### Information Updates

CNL routinely distributes PHAI newsletters, media releases, public disclosures, and invitations to special events to Indigenous communities and organizations and in 2022, in addition to these general information products, an invitation to CNL's webinar on the licence renewal application was circulated.

## 15.2 Public Information Program

CNL is committed to providing effective access to timely information about the PHAI. The PHAI Phase 2 Public Information Program [55] is aimed at strengthening understanding of and confidence in the projects, information is provided to ensure the public, Indigenous communities and organizations and key stakeholders are knowledgeable about upcoming work and project activities. Reports are also available on programs, schedules, environmental protection and mitigation measures, long-term benefits, and economic opportunities.

CNL responds to the diverse needs of a wide range of audiences to increase project awareness and enhance relationship building through a variety of approaches, as depicted in Figure 6.


**Figure 6: 2022 PHAI and Port Granby Public Engagement**

### 15.2.1 General Communications Tactics

#### Project Information Office

CNL's Project 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 Property Value Protection programs. Three-dimensional models of the Port Hope and Port Granby long-term waste management facilities are also on display.

Due to COVID-19 pandemic restrictions, the office was closed to the public until it reopened in April 2022. Staff members remained 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. In 2022, 13 visits to the Project Information Office took place.

#### Website

The PHAI website – PHAI.ca – provides information on the Port Hope Project and PGP, including descriptions of current and upcoming work, environmental monitoring reports, public disclosures, the Complaints Resolution Program, and the Property Value Protection Program. The website also provides telephone and email points of contact for enquiries.

In April 2022, CNL launched a redesigned website with streamlined access to details on the cleanup of historic low-level radioactive waste in the community, how work is performed on private properties, interactive maps of active and remediated sites around town and one-click access to request Radiological Status Letters.

In 2022, the PHAI.ca website received a total of 33,817 visits (number of individual visits to the website itself) and 75,055 individual pages viewed.

#### 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 detailed 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 2022, 111 inquiries were received via Facebook. CNL circulated 362 Facebook/Twitter posts and 104 Instagram posts covering subjects from project updates to interesting facts about project work.

### Media Releases

CNL issued two media releases in 2022, via Canada Newswire, one in May to announce the Completion of the PGP and the second in December to announce the CNSC renewal of the PHAI Waste Nuclear Substance Licence for 10 years.

### Port Granby 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 Southeast Clarington and to an extensive list of federal, provincial, regional, and municipal stakeholders; newsletters are also available online at PHAI.ca.

The 2022 spring newsletter was distributed by mail to approximately 7,000 homes, businesses, and farms and to approximately 400 contacts via email. The newsletter covered a range of topics including the completion of the PGP, CNL engagement with Indigenous communities and organizations, the new PHAI.ca website, an overview of PGP milestones and an update on the Port Granby Nature Reserve proposal.

## 15.2.2 Presentations

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

During the reporting period, seven presentations were provided to the public on the PHAI and PGP.

### Education and Science and Technology Communities

Presentations, site tours and program-specific information and demonstrations are provided on request 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 participates in the annual Take Our Kids to Work Day event and other education initiatives including the Junior Achievement World of Opportunity program and judging local science fairs. National and international education institutions, industry and professional groups also participate in PHAI presentations and site tours and CNL continues to develop outreach activities related to Science, Technology, Engineering, and Math education.

In 2022, CNL provided an overview of the PHAI for four groups: Carlton University Architecture Workshop, Ontario Tech University Nuclear Engineering and two Fleming College Monitoring in Waste Management classes.

During the reporting period, three presentations were provided to science and technology audiences on the PHAI and PGP.

### 15.2.3 Public Site Tours

In alignment with COVID-19 restrictions in 2022, CNL's communications were adapted, and virtual tours were provided through detailed photographs, diagrams, and video until in-person began to resume in April 2022.

Four public sites tours related to the PGP were provided in 2022.

### 15.2.4 Public Information Sessions

Information sessions are held as required to inform the community about PHAI work, provide updates on planned or changed project activity and programs, and receive feedback from the public.

A webinar was held in June 2022 to provide an overview of the CNL application to CNSC for a 10-year licence renewal.

### 15.2.5 Special Events

CNL hosts special events on occasion to highlight project milestones and, as project ambassadors, CNL staff participates in external events to provide information about PHAI activities to a broader audience and increase awareness and understanding of the projects.

In 2022, CNL hosted a community celebration to mark the completion of the PGP. Speakers included the Mayor and council representative of the Municipality of Clarington and local residents. In November, CNL staff attended an event hosted by the Ontario Society of Professional Engineers and accepted an award recognizing the PGP as Project of the Year.

### 15.2.6 Community Notifications

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

During the reporting period, CNL staff delivered three notifications to residents in the vicinity of the PGP site.

### 15.2.7 Dedicated Engagement Campaigns

CNL may implement dedicated campaigns to support specific initiatives with targeted engagement to inform, educate and discuss specific topics with the public, property owners and stakeholders.

In 2022, CNL continued public and stakeholder engagement in support of its application to the CNSC for the renewal of the Port Hope Project waste nuclear substance licence and the consolidation of the four existing licences associated with the Port Hope Area Initiative portfolio. A variety of tactics were used to provide information, encourage, and facilitate feedback including distribution of information in Port Granby newsletters, advertising, and an information webinar.

In November 2022, CNL submitted its *PHAI Licence Renewal Public Engagement Report 2021 September to 2022 September* [60] to the CNSC, summarizing public communications and engagement in support of the application, undertaken from September 1, 2021 to September 30, 2022 which outlined more than 35 communications and engagement initiatives including a dedicated webpage, feature feed stories and links to additional resources, extensive advertising in print, radio and online, newsletter stories, fact sheets and overviews in all presentations provided during the engagement period. Information updates were provided at quarterly Agreement Monitoring Group meetings and in June 2022 a webinar was held to provide information and respond to questions about the hearing process and the process for public participation.

### 15.2.8 Key Stakeholder Relations

Strategic relationships are developed and maintained through information exchange and feedback, to increase support and cooperation as the PGP advances.

#### Municipal Liaison

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

In 2022, CNL participated in 11 monthly municipal coordination meetings to share information on project and communications activities. CNL provided an annual update on PGP progress and next steps to both the Municipality of Clarington and the Durham Nuclear Health Committee.

#### Agreement Monitoring Group

Quarterly meetings of the Agreement Monitoring Group bring together representatives of both municipalities, as signatories to the Legal Agreement, and representatives of AECL and CNL to provide updates on project activities, budget, and schedule and to ensure project commitments outlined in the agreement are reviewed and actioned. Four meetings were held in 2022.

#### 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.

As the PGP was completed in 2022, CNL did not hold any business-related events.

### 15.2.9 PHAI-Related Citizen Groups

**Port Granby Citizen Liaison Group**

In 2013, the Port Hope and Port Granby citizen liaison groups were established to encourage two-way engagement and input from a broad cross-section of each community. Municipal and CNSC staff observers were invited to attend all Citizen Liaison Group meetings.

With the PGP moving into Phase 3, maintenance and monitoring, the Port Granby Citizen Liaison Group was discontinued in the spring of 2022. Information updates and opportunities for feedback will continue through Phase 3 and CNL staff remain available to speak to residents directly and address any concerns.

**Port Granby Discussion Group**

The Port Granby 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 Discussion Group members did not request a meeting in 2022.

### 15.2.10 Internal Communications

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

In 2022, 45 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.

## 15.3 Monitoring Public Opinion and Media Coverage

CNL monitors and analyzes public opinion, including social media and media coverage to record public understanding, perceptions, concerns and opinions about the PHAI and project-related impacts; gauge stakeholder awareness of and support for the PHAI; and be aware of trends in public opinion, social media and/or media coverage and how they may affect public perception of the PHAI to promptly and effectively respond.

### 15.3.1 Public Attitude Surveys

Through public attitude surveys, CNL monitors and records public understanding and perceptions of the projects and public opinion about community impacts. Feedback from surveys helps CNL gauge stakeholder understanding and awareness of the projects and identify stakeholders' knowledge gaps, types of information that are of public interest and how best to focus future communication efforts.

CNL conducted Public Attitude Surveys in the Port Granby Area in 2011, 2014, 2016 and 2018. In 2022, with the PGP completed, CNL conducted a final survey of the residents living near the Port Granby Long-Term Waste Management Facility. The survey was completed in December 2022 and results will be published and shared with the community in spring 2023.

### 15.3.2 Issues Management

For the purposes of the *PHAI PIP* [55], an issue is defined as something that could positively or negatively impact on CNL operations, credibility, or reputation. Where questions and issues arise, CNL attempts to identify the issue, determine its basis or cause, assess its implications, and, if possible, identify means to inform on the issue to the satisfaction of the concerned parties and the public.

CNL maintains a formal Complaints Resolution Process to help resolve public complaints arising from tangible, physical issues caused directly by the Port Hope and PGPs.

## 15.4 Documentation and Reporting

To measure the effectiveness of this engagement plan, all written, telephone and electronic communications, as well as follow-up actions or requests for information, are tracked and recorded in writing. Comments and questions at meetings are recorded in writing for follow-up where required and responses are made available to all interested parties.

PHAI staff provide regular updates and reports on communications and engagement activities to a number of audiences.

### 15.4.1 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 informed of relevant communications issues and public disclosures as they arise.

In 2022, four notifications were provided to AECL staff on matters related to the PGP and CNL provided a tour of project sites for AECL staff.

### 15.4.2 Canadian Nuclear Safety Commission

CNL keeps the CNSC apprised of activities through quarterly and annual reporting and ongoing engagement on relevant regulatory issues. CNSC and CNL interactions are supplemented by regular meetings with regulatory, licensing, project, and program staff.

In 2022, CNL provided quarterly reports on PGP communications activities.

In November 2022, CNL submitted a *PHAI Licence Renewal Public Engagement Report (2021 September – 2022 September)* [60] summarizing the activities undertaken to support the CNL application for a 10-year renewal of the Waste Nuclear Substance Licence.

### 15.4.3 Performance Reports

Information is posted on PHAI.ca regarding environmental impact including environmental monitoring program results and PHAI Annual Compliance Monitoring Reports to the CNSC.

### 15.4.4 Public Disclosures

CNL is committed to providing open and transparent public disclosure.

In 2022, CNL issued two public disclosures related to the PGP regarding: residual waste shipped from the PG LTWMF not being classified before shipping and an excavator at the PGP LTWMF coming into contact with a two-inch pipeline designed to contain impacted water on the site.

Public Disclosures are posted on the PHAI.ca website. In 2022, there were 2,593 visits to the Public Disclosures website page.

## 16. Acronyms

| | |
|---|---|
| ACMR | Annual Compliance Monitoring Report |
| AECL | Atomic Energy of Canada Limited |
| ALARA | As Low As Reasonably Achievable |
| CCME | Canadian Council of Ministers of the Environment |
| CNL | Canadian Nuclear Laboratories |
| CNSC | Canadian Nuclear Safety Commission |
| COVID-19 | Novel Coronavirus Disease 2019 |
| COPC | Contaminants of Potential Concern |
| CWQG | Canadian Water Quality Guidelines |
| dBA | Decibels |
| EA | Environmental Assessment |
| EQ | Equalization |
| ERM | Environmental Remediation Management |
| HWP | Historic Waste Program |
| HWP MO | Historic Waste Program Management Office |
| ISQG | Interim Sediment Quality Guidelines |
| ImpAct | Improvement Action |
| LCH | Licence Conditions Handbook |
| LLRW | Low Level Radioactive Waste |
| MCS | Marginally Contaminated Soils |
| NEW | Nuclear Energy Worker |

| | |
|---|---|
| NNC | Notice of Non-Compliance |
| NSCA | Nuclear Safety and Control Act |
| OSH | Occupational Safety and Health |
| PEL | Probable Effect Level |
| 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 |
| PH LTWMF | Port Hope Long-Term Waste Management Facility |
| PSQG | Provincial Sediment Quality Guidelines |
| PWQO | Provincial Water Quality Objectives |
| RP | Radiation Protection |
| SCA | Safety and Control Area |
| SMP | Stormwater Management Pond |
| SSHC | Site Safety and Health Committee |
| TDG | Transportation of Dangerous Goods |
| TLD | Thermoluminescent Dosimeter |
| TSP | Total Suspended Particles |
| TSS | Total Suspended Solids |

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## Appendix A Environmental Assessment Monitoring Locations

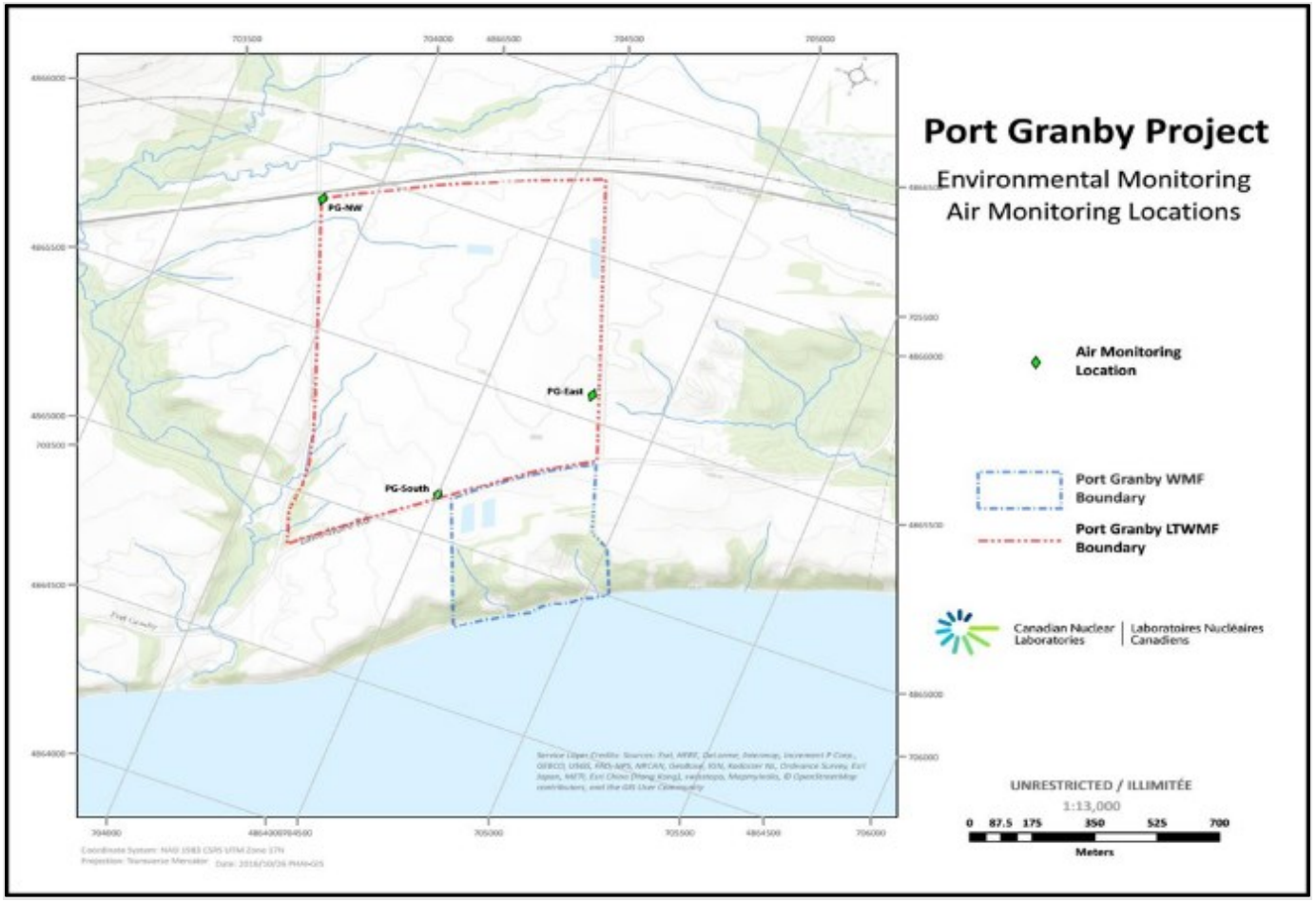


**Figure 7: PGP EA Air Monitoring Locations**

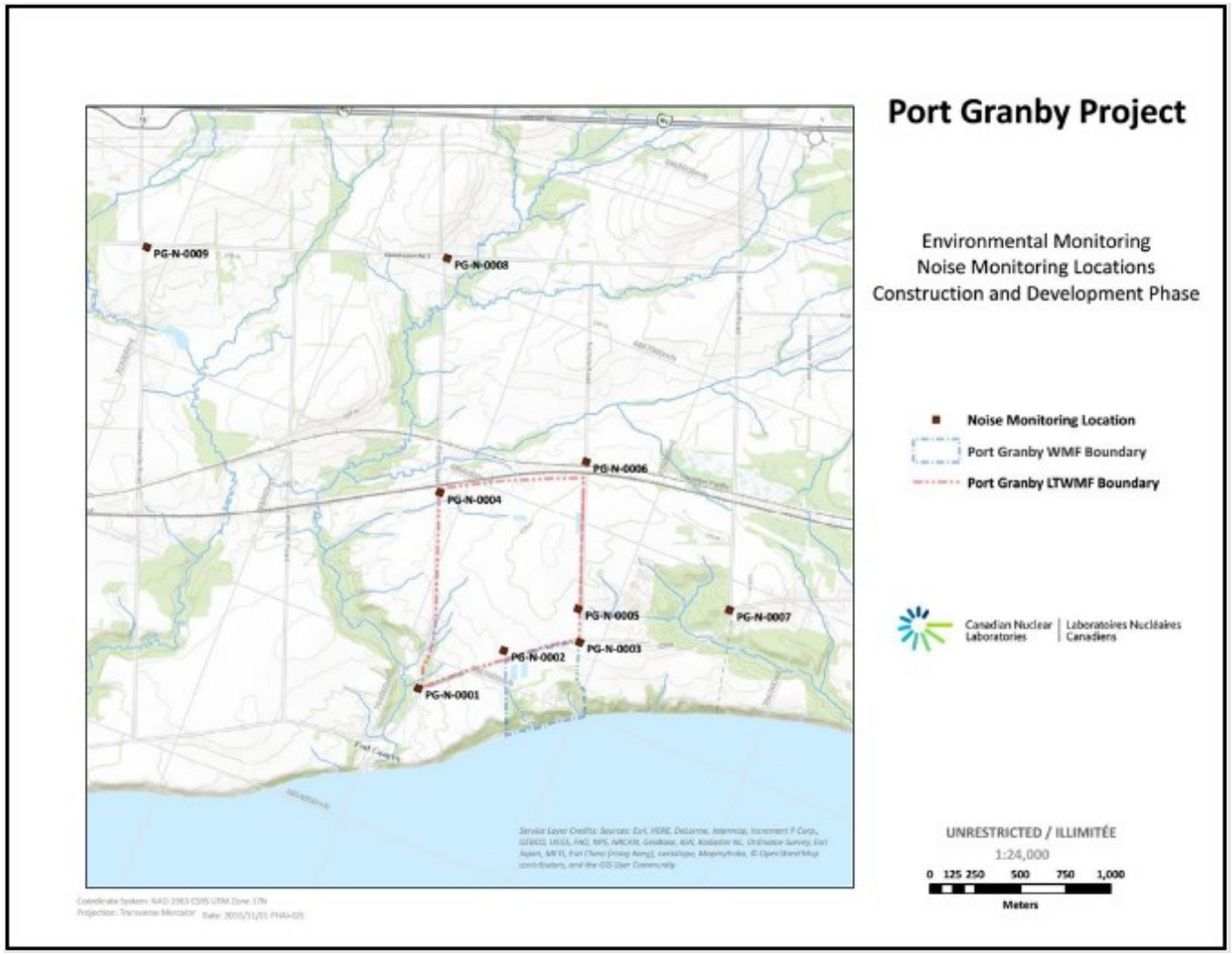


**Figure 8: PGP EA Noise Monitoring Locations**

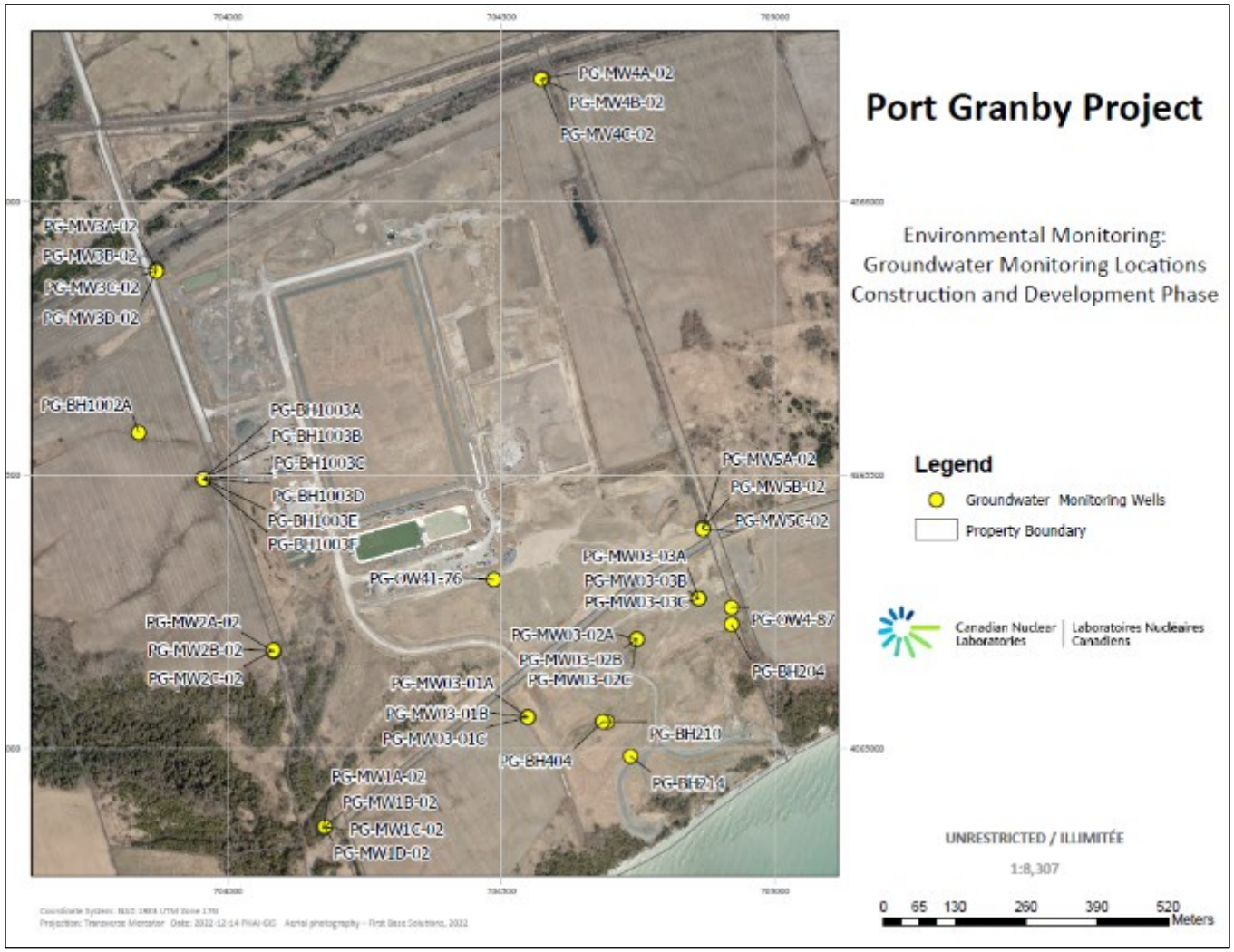


**Figure 9: PGP EA Groundwater Monitoring Locations**

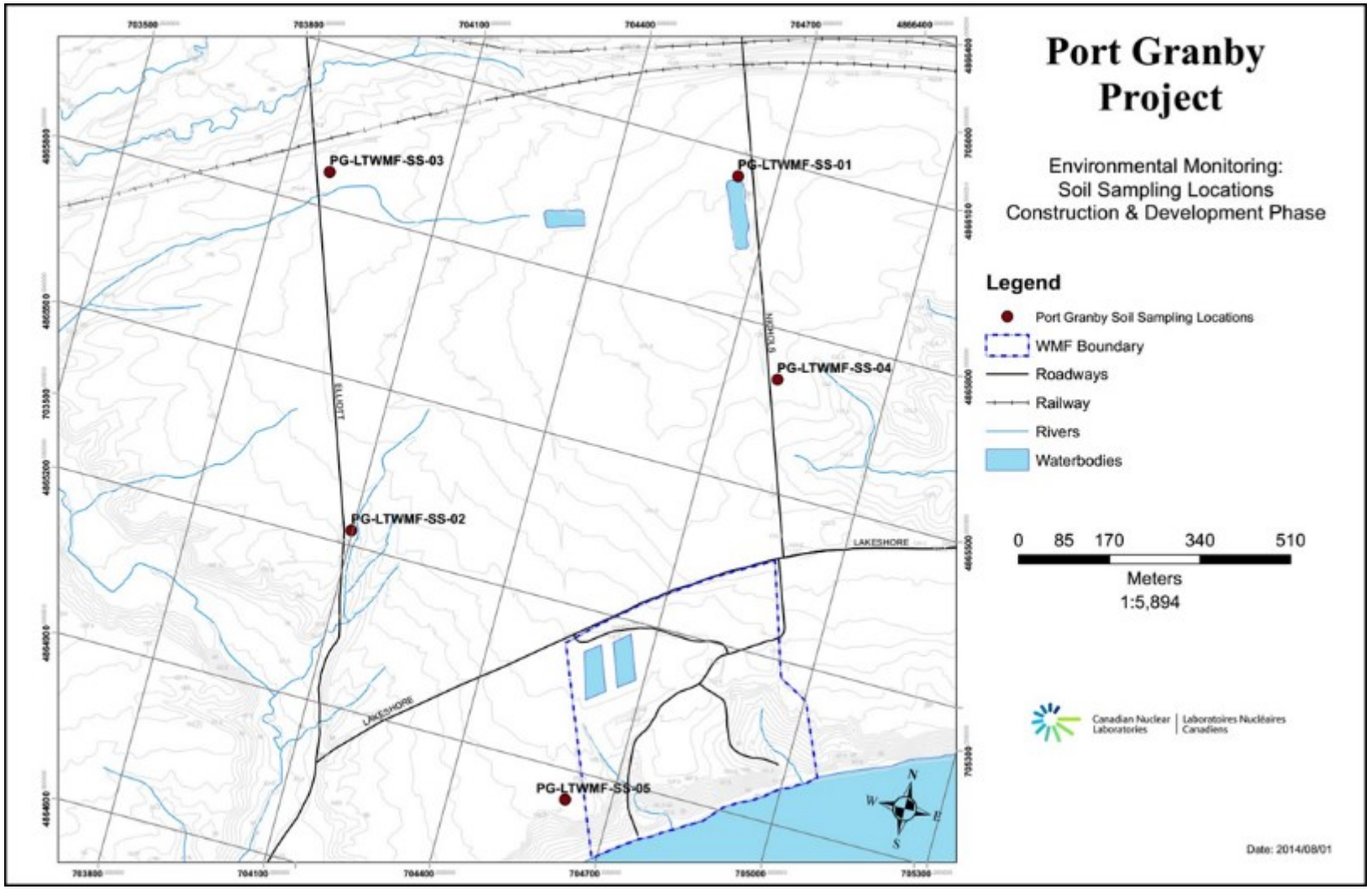


**Figure 10: PGP EA Soil Sampling Locations**

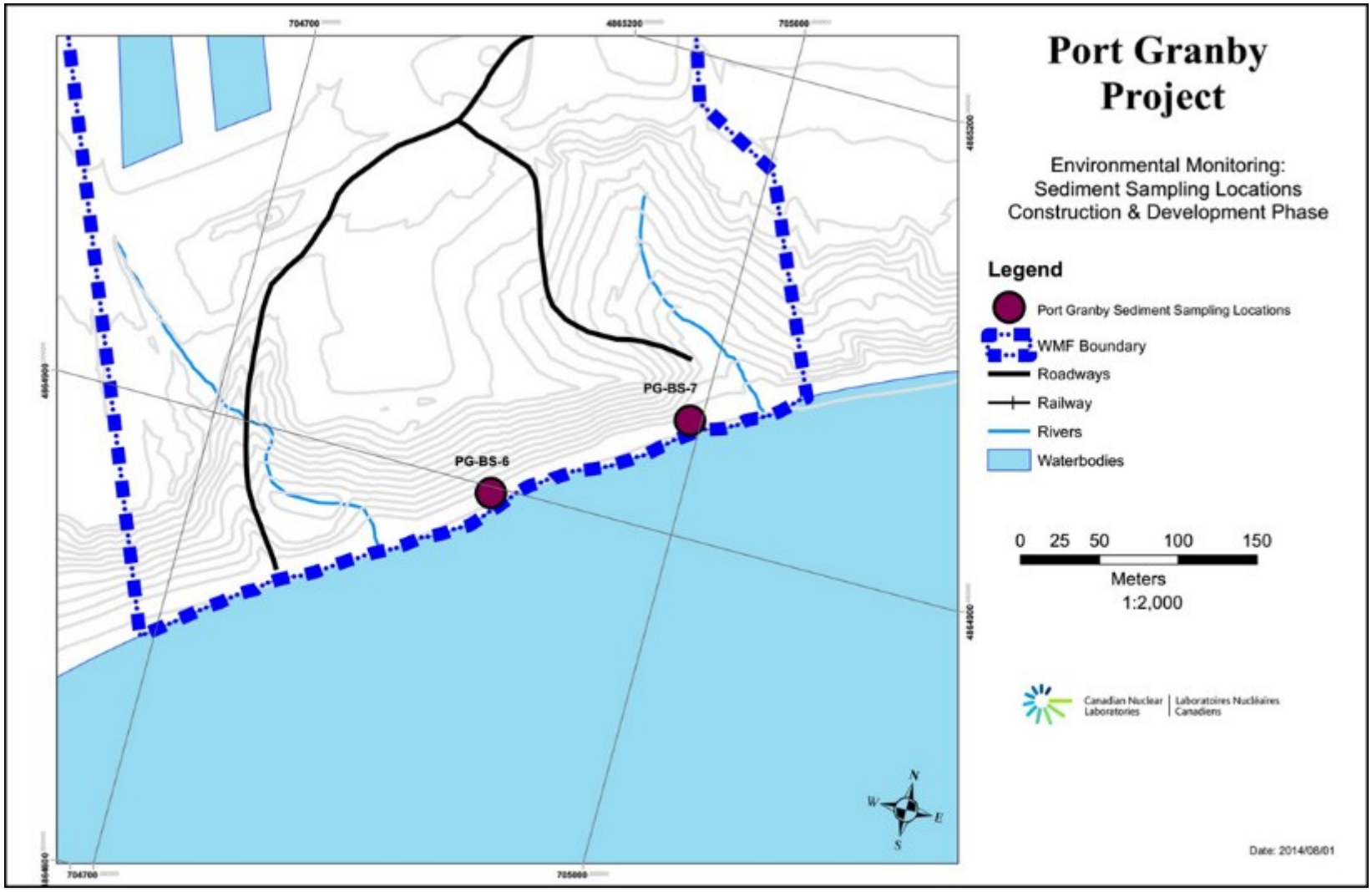


**Figure 11: PGP EA Sediment Sampling Locations**

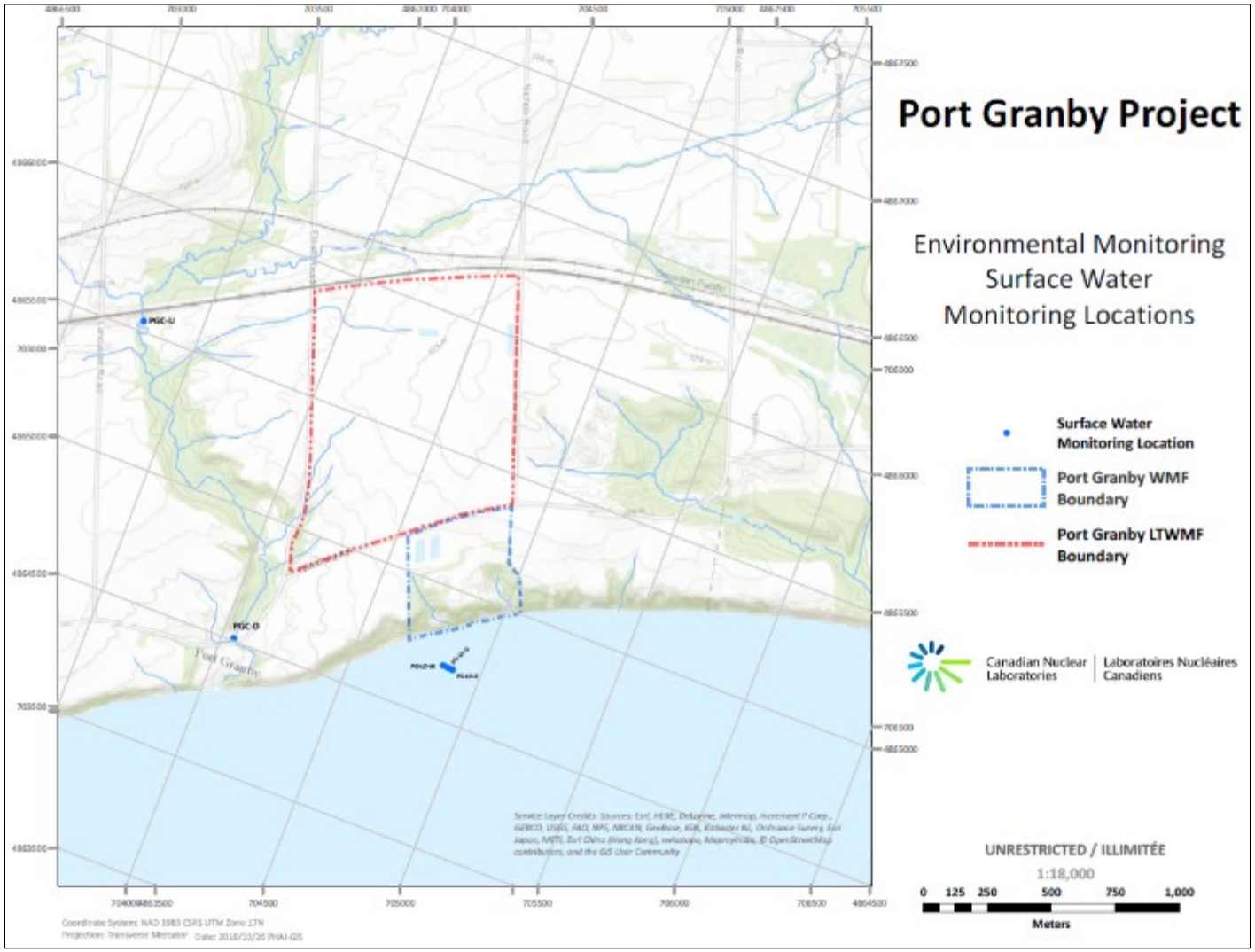


**Figure 12: PGP EA Surface Water Sampling Locations**

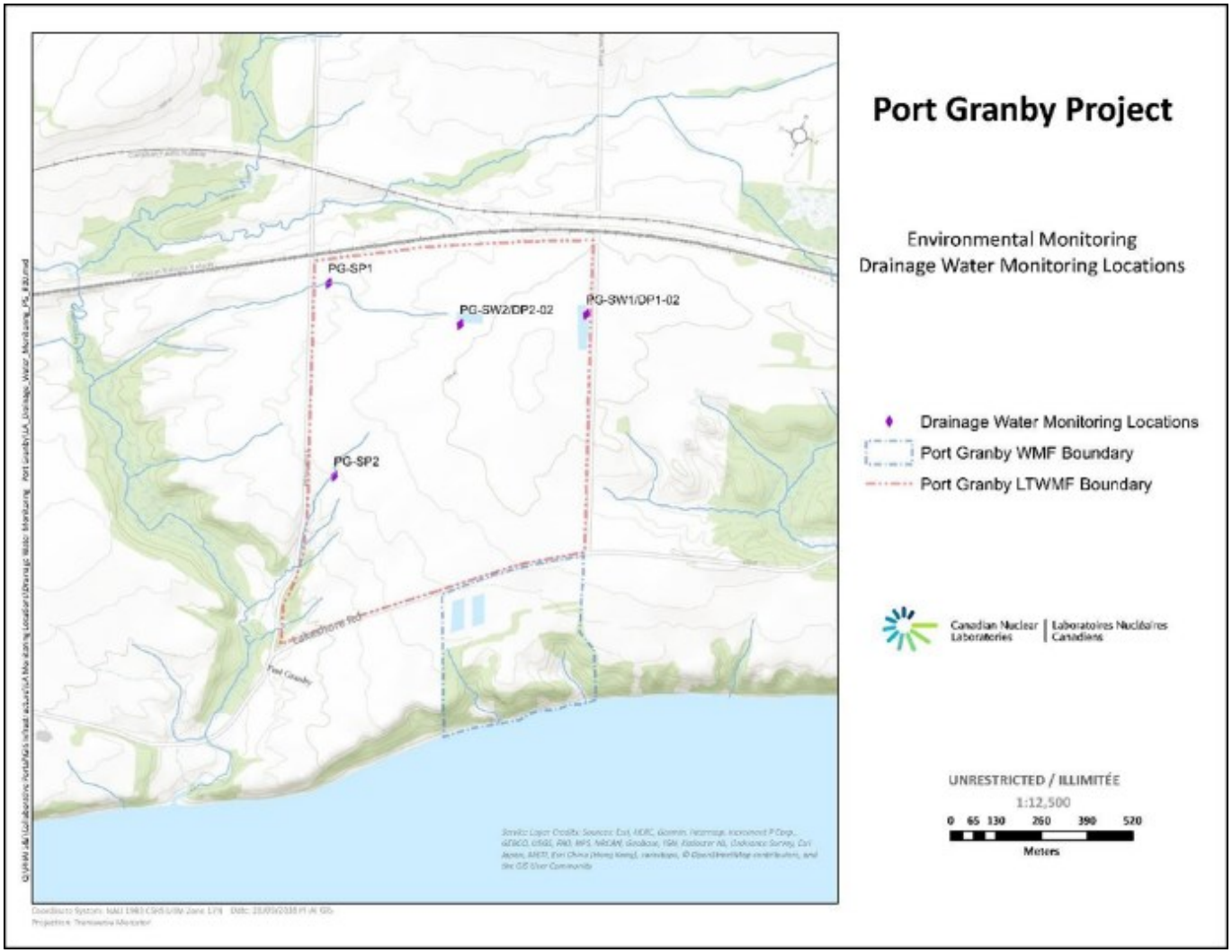


**Figure 13: PGP EA Drainage Water Monitoring Locations**

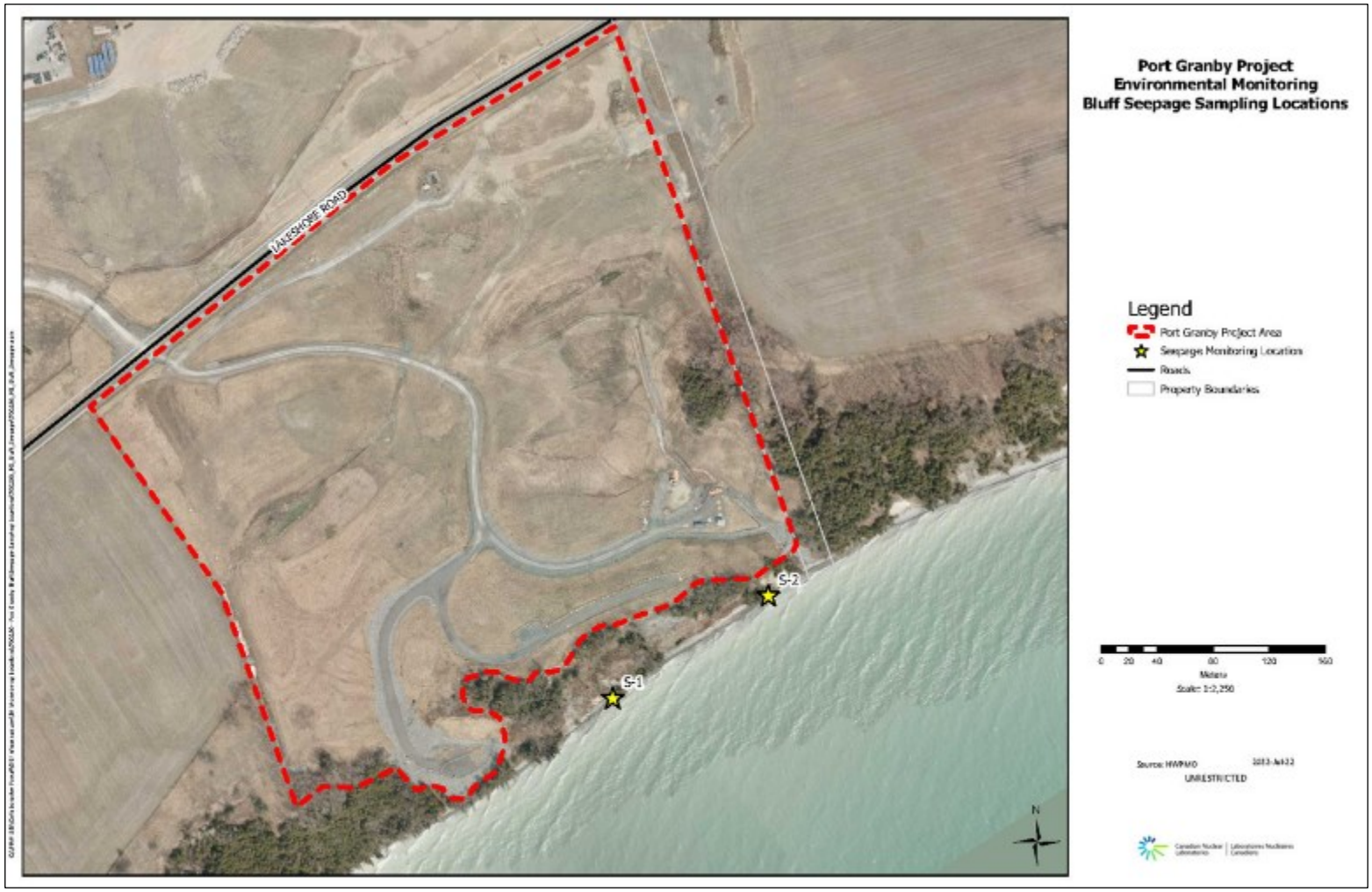


**Figure 14: PG WMF Bluff Seepage Sampling Locations**

## Appendix B Port Granby Environmental Monitoring Results

### Table 15: 2020 - 2022 Port Granby Waste Water Treatment Plant – Results of Water Sampling Analysis (Effluent – Monthly Average)

| Final Effluent Sample Monthly Average | Radium-226 (Bq/L) | pH | 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)[2] | 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) | Totalized Effluent Volume ($m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Design Objective** | 0.37 | 6-9.5 | 1.5 | 75 | 15 | 5.75 | 0.35 | 100 | 1 | 5 | 5 | - | 30 | 8 | 100 | 40 | -- |
| **Action Level[1]** | 0.050 | 6.5-8.5 | 1.5 | 75 | 15 | 5.75 | 0.35 | 50 | 1 | 5 | 5 | 50 | 20 | 0.5 | 100 | 5 | -- |
| 2020 January | 0.007 | 8.26 | 0.14 | 1.22 | 1 | 0.09 | 0.0 | 3.3 | 0 | 0.4 | 0.7 | 1.7 | <0.04 | 0.01 | 4.43 | 0.1 | 20,153 |
| 2020 February | 0.01 | 7.80 | 0.10 | 3.98 | <1 | 0.36 | 0.0 | 7.9 | 0 | 1.1 | 0.8 | 4.5 | 0.06 | 0.01 | 10.50 | 0.2 | 18,680 |
| 2020 March | <0.0050 | 7.76 | 0.19 | 0.85 | <1 | 2.30 | 0.0 | 5.5 | <0.10 | 0.8 | <1.0 | 2.9 | <2.0 | <0.050 | 6.80 | <0.50 | 22,264 |
| 2020 April | <0.0050 | 8.03 | 0.26 | 1.34 | <1 | 0.21 | <0.020 | 8.2 | <0.10 | 0.6 | <1.0 | 2.9 | <2.0 | <0.050 | 6.50 | <0.50 | 11,737 |
| 2020 May | <0.0050 | 7.90 | 0.04 | 0.76 | <1 | 0.36 | <0.020 | 13.0 | <0.10 | 0.8 | 1.2 | 4.1 | <2.0 | <0.050 | 6.90 | <0.50 | 11,721 |
| 2020 June | <0.0050 | 7.76 | 0.13 | 0.18 | 1 | 0.16 | 0.0 | 18.0 | <0.10 | 1.6 | <1.0 | 6.7 | <2.0 | <0.050 | 11.00 | <0.50 | 6,550 |
| 2020 July | 0.006 | 7.68 | <0.03 | <0.06 | <1 | 0.07 | 0.0 | 11.4 | <0.003 | 0.2 | 0.2 | 0.8 | <0.04 | <0.005 | 0.93 | 0.1 | 1,317 |
| 2020 August | <0.005 | 7.54 | <0.03 | <0.06 | <1 | 0.26 | 0.0 | 13.4 | <0.003 | 1.0 | 0.4 | 3.3 | 0.04 | <0.005 | 7.54 | 0.4 | 6,006 |
| 2020 September | 0.01 | 7.81 | 0.27 | 0.08 | 2 | 0.28 | 0.0 | 15.6 | 0 | 0.9 | 0.3 | 4.0 | 0.06 | <0.005 | 7.72 | 0.4 | 12,044 |
| 2020 October | 0.009 | 7.57 | 0.04 | <0.06 | <1 | <0.04 | 0.0 | 6.8 | 0 | 0.5 | <0.2 | 2.1 | <0.04 | <0.005 | 2.37 | 0.1 | 2,470 |

| Final Effluent Sample Monthly Average | Radium-226 (Bq/L) | pH | 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)[2] | 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) | Totalized Effluent Volume ($m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2020 November | <0.005 | 7.81 | 0.04 | 0.07 | <1 | 0.09 | <0.003 | 3.2 | <0.003 | 0.2 | <0.2 | 0.8 | 0.06 | <0.005 | 0.94 | 0.1 | 5,247 |
| 2020 December | <0.005 | 7.48 | 0.03 | <0.06 | 2 | 0.06 | 0.0 | 2.7 | <0.003 | 0.2 | <0.2 | 1.1 | <0.04 | <0.005 | 0.71 | 0.1 | 4,842 |
| 2021 January | <0.005 | 7.61 | <0.03 | 0.08 | 1 | 0.04 | 0.0 | 2.2 | <0.003 | 0.2 | 0.9 | 0.5 | <0.04 | <0.005 | 0.52 | 0.1 | 2,055 |
| 2021 February | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF |
| 2021 March | <0.005 | 7.74 | <0.03 | <0.06 | <1 | 0.05 | 0.0 | 3.3 | <0.003 | 0.2 | 0.7 | 0.7 | <0.04 | <0.005 | 0.43 | 0.1 | 3,195 |
| 2021 April | <0.005 | 7.31 | <0.03 | <0.11 | <1 | <0.06 | 0.0 | 4.4 | <0.004 | 0.3 | 0.3 | 0.9 | <0.04 | <0.005 | 0.67 | 0.1 | 4,432 |
| 2021 May | <0.005 | 7.39 | <0.03 | <0.07 | <1 | <0.05 | <0.017 | 2.9 | <0.064 | 0.4 | <0.2 | 0.7 | <0.04 | <0.005 | 0.72 | 0.2 | 1,895 |
| 2021 June | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF | NO EFF |
| 2021 July | <0.005 | 7.54 | 0.28 | 0.07 | <1 | 0.29 | 0.046 | 24.0 | 0 | 2.3 | 1.0 | 3.50 | <0.04 | <0.005 | 1.58 | 0.9 | 5,285 |
| 2021 August | <0.005 | 7.54 | 0.26 | 0.12 | <1 | 0.28 | 0.007 | 12.9 | <0.003 | 0.6 | 2.1 | 1.45 | <0.04 | <0.005 | 0.55 | 0.3 | 3,626 |
| 2021 September | 0.0052 | 7.64 | <0.3 | 0.07 | 1 | 0.16 | 0.021 | 9.9 | 0 | 0.4 | 0.3 | 0.710 | <0.04 | <0.005 | 0.55 | 0.3 | 8,499 |
| 2021 October | 0.005 | 7.46 | 0.11 | 0.07 | 1 | 0.14 | 0.01 | 7.9 | 0 | 0.2 | 0.2 | 0.95 | 0.04 | 0.01 | 1.50 | 0.1 | 14,573 |
| 2021 November | 0.005 | 7.40 | 0.07 | 0.13 | 1.3 | 0.21 | 0.02 | 8.4 | 0 | 0.3 | 0.3 | 1.70 | 0.04 | 0.01 | 2.30 | 0.1 | 8,467 |

| Final Effluent Sample Monthly Average | Radium-226 (Bq/L) | pH | 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)[(2)] | 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) | Totalized Effluent Volume ($m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2021 December | 0.005 | 7.30 | 0.06 | 0.06 | 1.2 | 0.18 | 0.02 | 10.6 | 0.0 | 0.3 | 0.2 | 1.50 | 0.04 | 0.01 | 2.70 | 0.2 | 3,299 |
| 2022 January | 0.005 | 7.31 | 0.10 | 0.06 | 1.3 | 0.17 | 0.0 | 10.5 | 0 | 0.3 | 0.2 | 1.5 | 0.04 | 0.01 | 3.00 | 0.2 | 3,682 |
| 2022 February | 0.005 | 7.37 | 0.07 | 0.06 | 1 | 0.22 | 0.0 | 13.8 | 0 | 0.4 | 0.2 | 1.7 | 0.04 | 0.01 | 3.40 | 0.3 | 3,492 |
| 2022 March | 0.005 | 7.08 | 0.06 | 0.06 | 1.4 | 0.09 | 0.0 | 6.7 | 0 | 0.6 | 0.8 | 0.8 | 0.04 | 0.01 | 1.50 | 0.2 | 7,046 |
| 2022 April | 0.005 | 7.22 | 0.06 | 0.06 | 1.3 | 0.08 | 0.0 | 7.5 | 0 | 0.2 | 0.4 | 0.9 | 0.04 | 0.01 | 1.90 | 0.1 | 4,291 |
| 2022 May | 0.005 | 7.15 | 0.03 | 0.06 | 1 | 0.06 | 0.0 | 9.7 | 0 | 0.2 | 0.3 | 1.0 | 0.04 | 0.01 | 2.00 | 0.2 | 2,727 |
| 2022 June | 0.005 | 7.32 | 0.04 | 0.08 | 1 | 0.13 | 0.02 | 13.1 | 0 | 0.2 | 0.2 | 0.8 | 0.04 | 0.01 | 2.10 | 0.2 | 1,990 |
| 2022 July | <0.005 | 7.22 | <0.04 | <0.06 | <1.0 | 0.07 | 0.02 | <12.6 | <0.003 | 0.1 | <0.2 | 1.1 | <0.04 | <0.005 | 2.20 | 0.2 | 4,058 |
| 2022 August | <0.005 | 7.24 | <0.04 | <0.08 | <1.0 | 0.08 | 0.01 | 14.1 | 0 | 0.1 | <0.2 | 1.1 | <0.04 | <0.005 | 3.50 | 0.1 | 3,110 |
| 2022 September | <0.005 | 7.19 | <0.03 | <0.06 | <1.0 | <0.04 | 0.0 | 12.4 | <0.003 | 0.0 | <0.20 | 0.9 | <0.04 | <0.005 | 2.90 | 0.1 | 2,451 |
| 2022 October | <0.005 | 7.38 | <0.06 | <0.03 | <1.0 | <0.04 | 0.01 | 13.3 | <0.020 | 0.1 | <0.20 | 0.9 | <0.10 | <0.01 | 3.40 | 0.1 | 1,863 |
| 2022 November | <0.005 | 7.40 | <0.06 | <0.03 | <1.0 | <0.05 | 0.02 | 14.1 | <0.006 | 0.1 | <0.22 | 1.2 | <0.07 | <0.005 | 3.00 | 0.1 | 1,562 |
| 2022 December | <0.005 | 7.28 | <0.06 | <0.03 | <1.0 | <0.05 | 0.0 | 13.6 | <0.005 | 0.1 | <0.30 | 1.0 | <0.05 | <0.005 | 2.60 | 0.1 | 1,185 |

**Table 16: 2020 - 2022 Port Granby Interceptor Discharge – Toxicity Testing Summary**

| Sample Date | 48 Hour Result | 96 Hour Result |
|---|---|---|
| 2020 January 14 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2020 February 11 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2020 March 10 | Pass (16.7% mortality) | Pass (10.0%) mortality) |
| 2020 April 14 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2020 May 12 | Pass (0.0% mortality) | Pass (10.0% mortality) |
| 2020 June 16 | Pass (0.0% mortality) | Pass (20.0% mortality) |
| 2020 July 13 | Pass (6.7% mortality) | Pass (40.0% mortality) |
| 2020 August 25 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2020 September 08 | Pass (20.0% mortality) | Pass (0.0% mortality) |
| 2020 October 20 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2020 November 17<br>2020 November 23 | Pass (0.0% mortality)<br>Pass (0.0% mortality) | Fail (80.0% mortality)<br>Pass (10.0% mortality) |
| 2020 December 07 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2021 January 12 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2021 February 01 | No Effluent | No Effluent |
| 2021 March 25 | Pass (0.0% mortality) | Pass (10% mortality) |
| 2021 April 02 | Pass (0.0% mortality) | *Fail (70% mortality) |
| 2021 May 04 | Pass (0.0% mortality) | Pass (10% mortality) |
| 2021 June 01 | No Effluent | No Effluent |
| 2021 July 14 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2021 August 11 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2021 September 08 | Pass (0.0% mortality) | Pass (0.0% mortality) |

| Sample Date | 48 Hour Result | 96 Hour Result |
|---|---|---|
| 2021 October 06 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2021 November 10 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2021 December 08 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 January 12 | Pass (0.0% mortality) | Pass (10% mortality) |
| 2022 February 09 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 March 09 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 April 06 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 May 11 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 June 08 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 July 13 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 August 10 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 September 07 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 October 12 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 November 09 | Pass (0.0% mortality) | Pass (0.0% mortality) |
| 2022 December 07 | Pass (0.0% mortality) | Pass (0.0% mortality) |

## Table 17: 2020 – 2022 Port Granby Waste Water Treatment Plant – Results of Water Sampling Analysis (Influent – Monthly Average)

| Influent Sample Monthly Average | Radium-226 (Bq/L) | pH | 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)[2] | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2020 January | 2.43 | 8.29 | 0.9 | 9.8 | 161 | 3.7 | 3 | 2000 | 1.5 | 379 | 297 | 1309 | 10 | 0 | 3843 | 82 |
| 2020 February | 2.53 | 8.00 | 0.9 | 12.3 | 112 | 4.0 | 3 | 2468 | 1.6 | 427 | 284 | 1683 | 12 | 0 | 4785 | 92 |
| 2020 March | 1.02 | 8.37 | 0.5 | 5.1 | 80 | 3.7 | 1 | 1190 | <1.0 | 188 | 136 | 850 | 6 | 0 | 2880 | 42 |
| 2020 April | 3.55 | 8.25 | 0.7 | 9.0 | 165 | 1.4 | 5 | 3375 | <5.0 | 540 | 333 | 2600 | 15 | 0 | 7100 | 123 |
| 2020 May | 3.03 | 8.32 | 0.3 | 2.5 | 148 | 2.7 | 4 | 3875 | <1.0 | 610 | 233 | 2850 | 14 | 0 | 6675 | 112 |
| 2020 June | 1.57 | 9.00 | 0.1 | 0.3 | 150 | 0.9 | 4 | 3575 | <3.0 | 600 | 100 | 2275 | 12 | 0 | 5275 | 107 |
| 2020 July | 0.37 | 8.85 | <0.3 | 1.0 | 59 | 0.1 | 1 | 1166 | 0.3 | 162 | 16 | 603 | 3 | 0 | 1265 | 33 |
| 2020 August | 1.70 | 8.22 | <0.3 | <0.6 | 62 | 7.4 | 4 | 4690 | 1.0 | 592 | 22 | 1660 | 6 | 0 | 5105 | 186 |
| 2020 September | 1.20 | 8.65 | 1.9 | 0.6 | 78 | 5.2 | 3 | 2908 | 0.4 | 329 | 14 | 945 | 5 | 0 | 2730 | 139 |
| 2020 October | 0.53 | 7.84 | <0.3 | 1.3 | 111 | 1.1 | 13 | 2270 | 0.5 | 338 | 25 | 1080 | 3 | 0 | 1952 | 91 |
| 2020 November | 0.39 | 7.56 | <0.3 | 1.4 | 87 | 3.4 | 7 | 1724 | 0.4 | 249 | 16 | 723 | 3 | <0.005 | 1435 | 74 |
| 2020 December | 0.38 | 7.58 | <0.3 | 1.6 | 81 | 2.0 | 14 | 2215 | 0.9 | 291 | 12 | 951 | 2 | <0.005 | 1600 | 78 |
| 2021 January | 0.15 | 7.62 | <0.3 | 2.9 | 8 | 3.9 | 36 | 1590 | 0.6 | 224 | 9 | 666 | 2 | 0 | 1130 | 57 |
| 2021 February | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2021 March | 0.17 | 7.29 | <0.3 | 2.0 | 55 | 0.2 | 26 | 2510 | 0.5 | 346 | 13 | 929 | 2 | 0 | 1070 | 95 |
| 2021 April | 0.22 | 7.41 | <0.3 | <0.6 | 73 | 3.7 | 23 | 2240 | 0.4 | 319 | 12 | 810 | 2 | <0.005 | 1110 | 94 |
| 2021 May | 0.10 | 7.51 | <0.3 | 1.4 | 125 | 2.4 | 18 | 2460 | 0.4 | 331 | 27 | 677 | 2 | 0 | 906 | 112 |
| 2021 June | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2021 July | 0.15 | 8.29 | 6.0 | 1.5 | 356 | 5.8 | 8 | 2533 | 0.4 | 324 | 8 | 447 | 1 | 0 | 267 | 116 |
| 2021 August | 0.21 | 8.58 | 1.1 | <0.6 | 110 | 4.4 | 5 | 2100 | 0.2 | 246 | 4 | 323 | 1 | 0 | 255 | 90 |

| Influent Sample Monthly Average | Radium-226 (Bq/L) | pH | 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)[(2)] | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2021 September | 0.15 | 8.39 | 3.6 | 1.9 | 190 | 4.0 | 6 | 2211 | 0.2 | 259 | 5 | 340 | 1 | 0 | 273 | 100 |
| 2021 October | 0.32 | 7.73 | 1.0 | 0.4 | 92 | 6.3 | 7 | 2835 | 0.3 | 160 | 9 | 612 | 1 | 0 | 2713 | 87 |
| 2021 November | 0.71 | 7.55 | 0.9 | 1.3 | 47 | 14.8 | 12 | 3333 | 0.2 | 203 | 17 | 843 | 2 | 0 | 3065 | 96 |
| 2021 December | 0.66 | 7.46 | 0.8 | 2.3 | 74 | 17.5 | 14 | 3372 | 0.2 | 209 | 23 | 828 | 2 | 0 | 3430 | 105 |
| 2022 January | 0.58 | 7.50 | 1.6 | 2.3 | 41 | 18.4 | 16 | 3673 | 0.3 | 222 | 35 | 867 | 2 | 0 | 3755 | 115 |
| 2022 February | 0.65 | 7.41 | 1.4 | 0.7 | 52 | 21.3 | 17 | 3842 | 0.5 | 224 | 47 | 778 | 2 | 0 | 3725 | 126 |
| 2022 March | 0.35 | 7.50 | 1.3 | 2.2 | 43 | 11.9 | 11 | 1966 | 0.1 | 111 | 34 | 419 | 1 | 0 | 1928 | 66 |
| 2022 April | 0.29 | 7.63 | 0.8 | 1.4 | 120 | 3.3 | 14 | 2247 | 0.2 | 117 | 48 | 442 | 2 | 0 | 1730 | 74 |
| 2022 May | 0.31 | 7.55 | 0.3 | 0.1 | 188 | 2.1 | 13 | 2485 | 0.1 | 124 | 45 | 410 | 2 | 0 | 1948 | 75 |
| 2022 June | 0.23 | 8.07 | 0.3 | 0.1 | 114 | 6.6 | 8 | 2288 | 0.1 | 80 | 15 | 263 | 1 | 0 | 1307 | 61 |
| 2022 July | 0.27 | 8.00 | 0.4 | 0.1 | 70 | 3.6 | 5 | 2293 | 0.1 | 53 | 6 | 260 | 1 | 0 | 1450 | 50 |
| 2022 August | 0.27 | 8.23 | 0.2 | 0.1 | 40 | 2.8 | 3 | 1868 | 0.1 | 20 | 2 | 202 | 1 | 0 | 1267 | 27 |
| 2022 September | 0.25 | 8.30 | 0.3 | 0.1 | 26 | 1.3 | 3 | 2293 | 0.1 | 16 | 4 | 230 | 1 | 0 | 1449 | 26 |
| 2022 October | 0.33 | 8.35 | 0.3 | 0.2 | 95 | 0.1 | 3 | 2306 | 0.2 | 19 | 7 | 236 | 2 | 0 | 1670 | 24 |
| 2022 November | 0.40 | 7.97 | 0.3 | 0.3 | 83 | 0.4 | 4 | 2396 | 0.1 | 25 | 11 | 219 | 1 | 0 | 1496 | 24 |
| 2022 December | 0.27 | 7.58 | 0.3 | 0.5 | 72 | 1.2 | 5 | 2340 | 0.1 | 30 | 12 | 243 | 1 | 0 | 1540 | 26 |

## Table 18: Air Quality Monitoring – PG East

| PG East | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017 | | 2018 | | 2019 | | 2020 | | 2021 | | 2022 | |
| | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) |
| Observations | 221 | 228 | 224 | 234 | 229 | 225 | 212 | 209 | 205 | 191 | 225 | 200 |
| Geometric Mean | 7 | 16 | 10 | 20 | 5 | 15 | 6 | 16 | 8 | 14 | 8 | 19 |
| Arithmetic Mean | 8 | 21 | 11 | 25 | 6 | 18 | 8 | 20 | 10 | 18 | 11 | 25 |
| Median | 7 | 16 | 11 | 21 | 5 | 16 | 8 | 18 | 9 | 16 | 9 | 20 |
| $98^{th}$ Percentile | 27 | - | 24 | - | 23 | - | 22 | - | 22 | - | 27[1] | - |
| Maximum | 38 | 179 | 45 | 157 | 23 | 71 | 22 | 56 | 51 | 135 | 33 | 211 |
| Exceedances | 0% | 1% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0.5% | 0% | 1.5% |

**Note:**

[1] $98^{th}$ Percentile for $PM_{2.5}$ averaged over 3 years (2020, 2021 and 2022).

TSP values are compared to Overrriding Limit of 120 $\mu g/m^3$ as defined in the PHAI Dust Management and Requirements Plan and AAQC.

$PM_{2.5}$ $98^{th}$ percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 $\mu g/m^3$ and the proposed 2020 value of 27 $\mu g/m^3$.

## Table 19: Air Quality Monitoring – PG South

| PG South | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017 | | 2018 | | 2019 | | 2020 | | 2021 | | 2022 | |
| | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) |
| Observations | 225 | 225 | 232 | 234 | 204 | 230 | 212 | 211 | 198 | 213 | 173 | 224 |
| Geometric Mean | 6 | 16 | 9 | 22 | 5 | 17 | 6 | 18 | 7 | 17 | 8 | 17 |
| Arithmetic Mean | 6 | 20 | 10 | 27 | 6 | 20 | 9 | 23 | 9 | 21 | 11 | 22 |
| Median | 5 | 17 | 9 | 23 | 5 | 17 | 8 | 19 | 9 | 18 | 9 | 20 |
| $98^{th}$ Percentile | 23 | - | 19 | - | 18 | - | 20 | - | 21 | - | 24[1] | - |
| Maximum | 23 | 170 | 94 | 223 | 18 | 161 | 134 | 184 | 48 | 110 | 29 | 69 |
| Exceedances | 0% | 1% | 0% | 1% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% |

**Note:**

[1] $98^{th}$ Percentile for $PM_{2.5}$ averaged over 3 years (2020, 2021 and 2022).

TSP values are compared to Overrriding Limit of 120 $\mu g/m^3$ as defined in the PHAI Dust Management and Requirements Plan and AAQC.

$PM_{2.5}$ $98^{th}$ percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 $\mu g/m^3$ and the proposed 2020 value of 27 $\mu g/m^3$.

## Table 20: Air Quality Monitoring – PG Northwest

| PG Northwest | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017 | | 2018 | | 2019 | | 2020 | | 2021 | | 2022 | |
| | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) | $PM_{2.5}$ ($\mu g/m^3$) | TSP ($\mu g/m^3$) |
| Observations | 211 | 213 | 223 | 220 | 218 | 204 | 198 | 204 | 190 | 201 | 186 | 195 |
| Geometric Mean | 6 | 16 | 6 | 17 | 5 | 17 | 9 | 14 | 10 | 14 | 16 | 15 |
| Arithmetic Mean | 7 | 20 | 7 | 21 | 6 | 20 | 14 | 22 | 15 | 22 | 26 | 29 |
| Median | 6 | 17 | 6 | 17 | 5 | 17 | 5 | 12 | 5 | 14 | 14 | 14 |
| $98^{th}$ Percentile | 64 | - | 57 | - | 18 | - | 37 | - | 47 | - | 78[1] | - |
| Maximum | 35 | 91 | 32 | 120 | 25 | 106 | 175 | 271 | 65 | 104 | 108 | 711 |
| Exceedances | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 1% |

**Note:**

[1] $98^{th}$ Percentile for $PM_{2.5}$ averaged over 3 years (2020, 2021 and 2022).

TSP values are compared to Overrriding Limit of 120 $\mu g/m^3$ as defined in the PHAI Dust Management and Requirements Plan and AAQC.

$PM_{2.5}$ $98^{th}$ percentile is compared to the 2000 Canadian Air Quality Standards for Fine Particulate Matter value of 30 $\mu g/m^3$ and the proposed 2020 value of 27 $\mu g/m^3$.

## Table 21: Metals and Radionuclides Concentrations in Total Suspended Particulate – PG East

| | | | | PG East | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | |
| Number of Samples Analyzed | | | | 50 | 51 | 51 | 46 | 45 | 48 | |
| Analysis | Unit | AAQC | Health Canada Reference Levels* | Average | | | | | Average | Maximum |
| Total Mercury (Hg) | ng/m$^3$ | - | | 0.01 | 0.01 | 0.10 | 0.76 | 0.98 | 1.13 | 1.22 |
| Silver (Ag) | ng/m$^3$ | **1000** | | 3 | 3 | 4 | 21 | 22 | 19 | 24 |
| Arsenic (As) | ng/m$^3$ | **300** | | 3 | 3 | 6 | 3 | 3 | 2 | 7 |
| Barium (Ba) | ng/m$^3$ | **10000** | | 7 | 6 | 6 | 4 | 4 | 6 | 15 |
| Beryllium (Be) | ng/m$^3$ | **10** | | 0.56 | 0.56 | 0.52 | 0.03 | 0.10 | 0.02 | 0.05 |
| Boron (B) | ng/m$^3$ | **120000** | | 3 | 3 | 4 | 11 | 20 | 11 | 12 |
| Cadmium (Cd) | ng/m$^3$ | **25** | | 1.1 | 1.1 | 1.1 | 0.3 | 0.3 | 0 | 1 |
| Cobalt (Co) | ng/m$^3$ | **100** | | 1.1 | 1.1 | 1.7 | 0.3 | 0.3 | 0 | 1 |
| Copper (Cu) | ng/m$^3$ | **50000** | | 12 | 13 | 13 | 14 | 11 | 14 | 50 |
| Molybdenum (Mo) | ng/m$^3$ | **120000** | | 1.7 | 1.7 | 1.8 | 3.5 | 12.1 | 2 | 3 |
| Nickel (Ni) | ng/m$^3$ | **200** | | 2 | 2 | 2 | 1 | 3 | 1 | 3 |
| Lead (Pb) | ng/m$^3$ | **500** | | 3 | 3 | 3 | 3 | 2 | 4 | 17 |
| Antimony (Sb) | ng/m$^3$ | **25000** | | 6 | 6 | 6 | 10 | 10 | 8 | 46 |
| Selenium (Se) | ng/m$^3$ | **10000** | | 6 | 6 | 5 | 3 | 3 | 3 | 15 |
| Uranium (U) | ng/m$^3$ | **300** | **4070** | 0.5 | 0.6 | 3 | 3 | 3 | 3 | 13 |
| Vanadium (V) | ng/m$^3$ | **2000** | | 2.9 | 2.9 | 8.2 | 0.4 | 0.3 | 0.6 | 3.6 |
| Zinc (Zn) | ng/m$^3$ | **12000** | | 22 | 22 | 17 | 22 | 17 | 18 | 45 |
| Lead-210 | Bq/m$^3$ | - | | 0.0005 | 0.0009 | 0.0008 | 0.0006 | 0.0007 | 0.0006 | 0.0032 |
| Radium-226 | Bq/m$^3$ | - | **0.05** | 0.00006 | 0.00006 | 0.00009 | 0.00003 | 0.00003 | 0.00003 | 0.00004 |
| Thorium-230 | Bq/m$^3$ | - | **0.01** | 0.00028 | 0.00028 | 0.00045 | 0.00006 | 0.00006 | 0.00006 | 0.00012 |
| Thorium-232 | Bq/m$^3$ | - | **0.006** | 0.00028 | 0.00028 | 0.00027 | 0.00006 | 0.00006 | 0.00006 | 0.00006 |

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 22: Metals and Radionuclides Concentrations in Total Suspended Particulate – PG South

| | | | | PG South | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | |
| Number of Samples Analyzed | | | | 51 | 51 | 52 | 47 | 48 | 48 | |
| Analysis | Unit | AAQC | Health Canada Reference Levels* | Average | | | | | Average | Maximum |
| Total Mercury (Hg) | ng/m³ | - | | 0.01 | 0.01 | 0.10 | 0.74 | 0.96 | 1.12 | 1.20 |
| Silver (Ag) | ng/m³ | **1000** | | 3 | 3 | 4 | 21 | 22 | 19 | 24 |
| Arsenic (As) | ng/m³ | **300** | | 3 | 3 | 3 | 3 | 3 | 2 | 5 |
| Barium (Ba) | ng/m³ | **10000** | | 5 | 6 | 5 | 4 | 5 | 5 | 15 |
| Beryllium (Be) | ng/m³ | **10** | | 0.56 | 0.57 | 0.53 | 0.03 | 0.09 | 0.02 | 0.03 |
| Boron (B) | ng/m³ | **120000** | | 3 | 3 | 4 | 11 | 24 | 11 | 12 |
| Cadmium (Cd) | ng/m³ | **25** | | 1.1 | 1.1 | 1.1 | 0.3 | 0.3 | 0.3 | 0.7 |
| Cobalt (Co) | ng/m³ | **100** | | 1.1 | 1.2 | 1.1 | 0.3 | 0.3 | 0.3 | 0.8 |
| Copper (Cu) | ng/m³ | **50000** | | 10 | 10 | 14 | 13 | 10 | 11 | 60 |
| Molybdenum (Mo) | ng/m³ | **120000** | | 1.7 | 1.7 | 1.8 | 2.6 | 6.6 | 2.4 | 3.0 |
| Nickel (Ni) | ng/m³ | **200** | | 2 | 2 | 2 | 8 | 3 | 1 | 3 |
| Lead (Pb) | ng/m³ | **500** | | 3 | 3 | 2 | 3 | 3 | 4 | 23 |
| Antimony (Sb) | ng/m³ | **25000** | | 6 | 6 | 6 | 8 | 12 | 6 | 27 |
| Selenium (Se) | ng/m³ | **10000** | | 6 | 6 | 5 | 3 | 3 | 3 | 12 |
| Uranium (U) | ng/m³ | **300** | **4070** | 1 | 0.6 | 0.5 | 3.0 | 3.0 | 3.6 | 18 |
| Vanadium (V) | ng/m³ | **2000** | | 2.9 | 3.0 | 2.7 | 0.4 | 0.4 | 0.4 | 2.5 |
| Zinc (Zn) | ng/m³ | **12000** | | 18 | 18 | 19 | 23 | 17 | 17 | 53 |
| Lead-210 | Bq/m³ | - | | 0.0005 | 0.0008 | 0.0008 | 0.0006 | 0.0007 | 0.0006 | 0.0024 |
| Radium-226 | Bq/m³ | - | **0.05** | 0.00006 | 0.00006 | 0.00005 | 0.00003 | 0.00003 | 0.00003 | 0.00003 |
| Thorium-230 | Bq/m³ | - | **0.01** | 0.00029 | 0.00029 | 0.00027 | 0.00006 | 0.00009 | 0.00006 | 0.00006 |
| Thorium-232 | Bq/m³ | - | **0.006** | 0.00028 | 0.00028 | 0.00027 | 0.00006 | 0.00006 | 0.00006 | 0.00006 |

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 23: Noise Monitoring Results – PG LTWMF

| Monitoring Location | Monitoring Location | 2017 Average $L_{eq}$ (dBA) | | | 2018 Average $L_{eq}$ (dBA) | | | 2019 Average $L_{eq}$ (dBA) | | | 2020 Average $L_{eq}$ (dBA) | | | 2021 Average $L_{eq}$ (dBA) | | | 2022 Average $L_{eq}$ (dBA) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Day (07:00-18:00) | Evening (18:00-23:00) | Night (23:00-07:00) | Day (07:00-18:00) | Evening (18:00-23:00) | Night (23:00-07:00) | Day (07:00-18:00) | Evening (18:00-23:00) | Night (23:00-07:00) | Day (07:00-18:00) | Evening (18:00-23:00) | Night (23:00-07:00) | Day (07:00-18:00) | Evening (18:00-23:00) | Night (23:00-07:00) | Day (07:00-18:00) | Evening (18:00-23:00) | Night (23:00-07:00) |
| PG-N-0001 | Elliott Road and Lakeshore Road | 54 | 50 | 50 | 52 | 49 | 48 | 52 | 48 | 47 | 49 | 46 | 44 | 51 | 49 | 45 | 49 | 46 | 46 |
| PG-N-0002 | South of PG LTWMF | 54 | 51 | 47 | 56 | 51 | 49 | 55 | 50 | 49 | 53 | 51 | 50 | 56 | 52 | 50 | 55 | 50 | 50 |
| PG-N-0003 | NE PG LTWMF @ Lakeshore Road | 56 | 51 | 51 | 55 | 51 | 50 | 58 | 51 | 50 | 56 | 50 | 50 | 56 | 53 | 49 | 56 | 50 | 51 |
| PG-N-0004 | NW PG LTWMF @ Elliott Road | 75 | 75 | 69 | 75 | 74 | 71 | 74 | 74 | 71 | 68 | 68 | 65 | 71 | 69 | 68 | 72 | 71 | 69 |
| PG-N-0005 | PG East Hi Vol Area (Nichols Road) | 55 | 52 | 49 | 51 | 54 | 50 | 54 | 54 | 51 | 50 | 48 | 49 | 53 | 53 | 51 | 53 | 51 | 50 |
| PG-N-0006 | Nichols Road North | 59 | 60 | 58 | 58 | 58 | 59 | 55 | 54 | 57 | 56 | 55 | 56 | 59 | 59 | 59 | 62 | 59 | 63 |
| PG-N-0007 | Lakeshore Rd and East Townline | 57 | 56 | 53 | 56 | 55 | 51 | 56 | 54 | 51 | 54 | 52 | 51 | 56 | 54 | 52 | 55 | 53 | 52 |
| PG-N-0008 | North Elliott Road and Concession #1 | 60 | 55 | 52 | 59 | 56 | 53 | 59 | 57 | 54 | 60 | 56 | 55 | 60 | 57 | 54 | 60 | 56 | 55 |
| PG-N-0009 | Concession #1 and Newtonville Rd | 60 | 55 | 53 | 59 | 56 | 54 | 60 | 56 | 54 | 60 | 55 | 56 | 59 | 56 | 54 | 59 | 55 | 55 |

**Note:**
Noise monitoring results are compared to:
1. 6 dBA difference from Baseline monitoring results
2. 70 dB over a 24 hour period as per the World Health Organization's *Guideline for Community Noise* , 1999
-- - No data.

## Table 24: PG LTWMF Groundwater Levels

| Well ID | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | |
|---|---|---|---|---|---|---|---|---|
| | Average (mASL) | | | | | Min | Max | Average |
| PG-BH1002A | 109.89 | 109.19 | 109.38 | 108.98 | 109.37 | 108.41 | 109.18 | 108.78 |
| PG-BH1003A | 92.59 | **Well Damaged** | | | | | | |
| PG-BH1003B | 112.21 | 111.54 | 112.16 | 111.69 | 111.92 | 110.23 | 113.26 | 111.66 |
| PG-BH1003C | 108.89 | 108.51 | 109.05 | 108.63 | 108.62 | 107.92 | 108.82 | 108.50 |
| PG-BH1003D | 106.65 | 106.29 | 106.86 | 106.54 | 106.55 | 105.34 | 106.43 | 106.01 |
| PG-BH1003E | **Dry** | | | | | | | |
| PG-BH1003F | 94.42 | 94.74 | 94.69 | 94.69 | 94.50 | 94.31 | 94.65 | 94.45 |
| PG-BH204 | **Well Not Located** | | | | | | | |
| PG-BH210 | - | - | - | - | - | - | - | - |
| PG-BH214 | **Well Not Located** | | | | | | | |
| PG-BH404 | **Well Not Located** | | | | | | | |
| PG-MW03-01A | **Construction Occurring** | | | 80.88 | 77.21 | 77.10 | 81.18 | 78.24 |
| PG-MW03-01B | **Construction Occurring** | | | 99.93 | 98.50 | 90.42 | 100.43 | 97.07 |
| PG-MW03-01C | **Construction Occurring** | | | 108.23 | 107.62 | 107.26 | 108.81 | 107.86 |
| PG-MW03-02A | **Construction Occurring** | | | 82.17 | 79.18 | 79.18 | 83.18 | 80.18 |
| PG-MW03-02B | **Construction Occurring** | | | 98.60 | 91.42 | 91.42 | 91.42 | 91.42 |
| PG-MW03-02C | **Construction Occurring** | | | 110.44 | 104.40 | 104.40 | 109.90 | 105.78 |
| PG-MW03-03A | **Construction Occurring** | | | 83.01 | 82.50 | 81.96 | 82.94 | 82.21 |
| PG-MW03-03B | **Construction Occurring** | | | 102.99 | 99.51 | 102.58 | 102.58 | 102.58 |
| PG-MW03-03C | **Construction Occurring** | | | 112.31 | 110.44 | 108.71 | 115.39 | 112.24 |
| PG-MW1A-02 | 83.12 | 81.83 | 84.87 | 85.54 | 79.42 | 82.11 | 83.73 | 82.91 |
| PG-MW1B-02 | 92.33 | 92.49 | 92.56 | 92.04 | 91.24 | 91.15 | 91.80 | 91.62 |
| PG-MW1C-02 | 87.47 | 87.43 | 87.55 | 87.01 | 86.97 | 85.42 | 87.18 | 86.27 |
| PG-MW1D-02 | 88.07 | 88.03 | 88.32 | 87.45 | 86.61 | 86.03 | 88.43 | 87.16 |
| PG-MW2A-02 | 59.48 | 59.59 | 59.93 | 60.63 | 60.65 | 57.95 | 61.99 | 60.81 |
| PG-MW2B-02 | 90.14 | 91.97 | 91.47 | 91.17 | 91.26 | 88.88 | 91.13 | 90.44 |
| PG-MW2C-02 | 94.40 | 94.37 | 94.55 | 94.08 | 93.76 | 93.31 | 94.42 | 93.82 |
| PG-MW3A-02 | 94.26 | 92.87 | 98.38 | **Well Damaged** | | 92.52 | 92.52 | 92.52 |
| PG-MW3B-02 | 97.97 | 98.19 | 98.34 | 98.12 | 97.85 | 97.23 | 97.88 | 97.65 |
| PG-MW3C-02 | 103.37 | 104.77 | 104.00 | 103.52 | 101.80 | 102.93 | 103.64 | 103.17 |
| PG-MW3D-02 | 105.46 | 104.93 | 105.40 | 104.78 | 104.60 | 103.51 | 105.79 | 104.61 |
| PG-MW4A-02 | 90.91 | 90.71 | 91.42 | 90.57 | 90.11 | 90.14 | 90.66 | 90.42 |
| PG-MW4B-02 | 89.38 | 89.42 | 89.11 | 89.29 | 88.90 | 88.92 | 89.13 | 89.01 |
| PG-MW4C-02 | 118.02 | 117.74 | 118.18 | 117.31 | 117.49 | 115.96 | 117.72 | 116.74 |
| PG-MW5A-02 | **Well Decommissioned** | | | | | | | |
| PG-MW5B-02 | **Well Decommissioned** | | | | | | | |
| PG-MW5C-02 | **Well Decommissioned** | | | | | | | |
| PG-OW4-87 | **Well Decommissioned** | | | | | | | |
| PG-OW41-76 | **Well Not Located** | | | | | | | |

**Note:**
mASL - metres above sea level
- No data available.

## Table 25: Soil Monitoring – PG LTWMF – Location 1 (PG-LTWMF-SS-01)

| | | PG-LTWMF-SS-01 | | | | | |
|---|---|---|---|---|---|---|---|
| **Metals** | **Units** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Water Soluble Boron | µg/g | 0.35 | 0.32 | 0.44 | < 0.50 | < 0.50 | < 0.50 |
| Mercury | µg/g | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Silver | µg/g | < 0.20 | < 0.20 | < 0.20 | 0.06 | < 0.05 | < 0.05 |
| Arsenic | µg/g | 1.2 | 1.1 | 1.1 | 1.4 | 1.7 | 1.6 |
| Barium | µg/g | 21 | 21 | 19 | 24 | 26 | 25 |
| Beryllium | µg/g | 0.25 | 0.23 | 0.21 | 0.23 | 0.23 | 0.24 |
| Boron | µg/g | < 5 | < 5 | < 5 | 2 | 2 | 2 |
| Cadmium | µg/g | 0.15 | 0.16 | 0.11 | 0.23 | 0.19 | 0.22 |
| Cobalt | µg/g | 2.1 | 2.0 | 1.8 | 2.3 | 2.1 | 2.3 |
| Copper | µg/g | 3.7 | 3.6 | 3.2 | 4.6 | 4.4 | 4.5 |
| Molybdenum | µg/g | < 0.50 | < 0.50 | < 0.50 | 0.20 | 0.20 | 0.20 |
| Nickel | µg/g | 4.3 | 3.9 | 3.8 | 4.9 | 4.3 | 4.7 |
| Lead | µg/g | 6.4 | 6.4 | 5.8 | 7.4 | 7.0 | 7.6 |
| Selenium | µg/g | < 0.5 | < 0.5 | < 0.5 | < 0.7 | < 0.7 | < 0.7 |
| Antimony | µg/g | < 0.2 | < 0.2 | < 0.2 | < 0.8 | < 0.8 | < 0.8 |
| Uranium | µg/g | 0.60 | 0.58 | 0.60 | 0.70 | 0.78 | 0.66 |
| Vanadium | µg/g | 20 | 19 | 20 | 18 | 16 | 19 |
| Lead-210 | Bq/g | < 0.05 | < 0.05 | < 0.05 | < 0.20 | 0.07 | 0.08 |
| Radium-226 | Bq/g | < 0.10 | < 0.05 | < 0.05 | 0.05 | < 0.05 | < 0.04 |
| Thorium-230 | Bq/g | < 0.50 | < 0.40 | < 0.40 | 0.05 | < 0.30 | < 0.30 |
| Thorium-232 | Bq/g | < 0.30 | < 0.04 | < 0.30 | 0.01 | 0.01 | 0.01 |

## Table 26: Soil Monitoring – PG LTWMF – Location 2 (PG-LTWMF-SS-02)

| | | PG-LTWMF-SS-02 | | | | | |
|---|---|---|---|---|---|---|---|
| **Metals** | **Units** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Water Soluble Boron | µg/g | 0.45 | 0.52 | 0.67 | < 0.50 | < 0.50 | < 0.50 |
| Mercury | µg/g | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Silver | µg/g | < 0.20 | < 0.20 | < 0.20 | < 0.05 | < 0.05 | < 0.05 |
| Arsenic | µg/g | 2.1 | 2.1 | 1.7 | 2.3 | 2.9 | 2.9 |
| Barium | µg/g | 45 | 41 | 37 | 54 | 55 | 62 |
| Beryllium | µg/g | 0.28 | 0.30 | 0.25 | 0.32 | 0.31 | 0.34 |
| Boron | µg/g | < 5 | 6.5 | < 5 | 5 | 6 | 6 |
| Cadmium | µg/g | 0.11 | 0.20 | 0.13 | 0.24 | 0.22 | 0.23 |
| Cobalt | µg/g | 3.6 | 3.5 | 3.0 | 4.3 | 3.8 | 4.6 |
| Copper | µg/g | 6.5 | 6.5 | 5.0 | 9.2 | 8.3 | 9.1 |
| Molybdenum | µg/g | < 0.50 | < 0.50 | < 0.50 | 0.20 | 0.20 | 0.20 |
| Nickel | µg/g | 7.1 | 6.5 | 5.7 | 8.6 | 7.3 | 8.9 |
| Lead | µg/g | 8.3 | 11 | 8.0 | 11 | 12 | 13 |
| Selenium | µg/g | < 0.5 | < 0.5 | < 0.5 | < 0.7 | < 0.7 | < 0.7 |
| Antimony | µg/g | < 0.2 | < 0.2 | < 0.2 | < 0.8 | < 0.8 | < 0.8 |
| Uranium | µg/g | 0.39 | 0.49 | 0.50 | 0.44 | 0.53 | 0.48 |
| Vanadium | µg/g | 20 | 22 | 20 | 20 | 19 | 22 |
| Lead-210 | Bq/g | < 0.05 | 0.06 | < 0.05 | < 0.20 | 0.08 | 0.07 |
| Radium-226 | Bq/g | < 0.10 | < 0.05 | < 0.05 | 0.06 | 0.06 | < 0.05 |
| Thorium-230 | Bq/g | < 0.50 | < 0.40 | < 0.40 | 0.08 | 0.20 | < 0.10 |
| Thorium-232 | Bq/g | < 0.30 | < 0.04 | < 0.30 | 0.01 | 0.01 | 0.013 |

## Table 27: Soil Monitoring – PG LTWMF – Location 3 (PG-LTWMF-SS-03)

| | | PG-LTWMF-SS-03 | | | | | |
|---|---|---|---|---|---|---|---|
| **Metals** | **Units** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Water Soluble Boron | µg/g | 0.56 | 0.57 | 0.87 | < 0.50 | < 0.50 | < 0.50 |
| Mercury | µg/g | < 0.05 | 0.07 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Silver | µg/g | < 0.20 | < 0.20 | 0.48 | < 0.05 | < 0.05 | < 0.05 |
| Arsenic | µg/g | 1.7 | 1.7 | 2.0 | 1.7 | 2.1 | 2.3 |
| Barium | µg/g | 39 | 39 | 42 | 42 | 44 | 53 |
| Beryllium | µg/g | 0.28 | 0.27 | 0.29 | 0.26 | 0.25 | 0.32 |
| Boron | µg/g | < 5 | < 5 | < 5 | 3 | 3 | 3 |
| Cadmium | µg/g | 0.23 | 0.24 | 0.25 | 0.28 | 0.25 | 0.30 |
| Cobalt | µg/g | 3.0 | 3.0 | 3.1 | 3.2 | 2.8 | 3.8 |
| Copper | µg/g | 7.2 | 7.7 | 8.5 | 9.2 | 8.6 | 11.0 |
| Molybdenum | µg/g | < 0.50 | < 0.50 | < 0.50 | 0.30 | 0.30 | 0.40 |
| Nickel | µg/g | 5.7 | 5.8 | 5.7 | 6.1 | 5.3 | 7.3 |
| Lead | µg/g | 16 | 19 | 27 | 17 | 20 | 23 |
| Selenium | µg/g | < 0.5 | < 0.5 | < 0.5 | < 0.7 | < 0.7 | < 0.7 |
| Antimony | µg/g | < 0.2 | < 0.2 | < 0.2 | < 0.8 | < 0.8 | < 0.8 |
| Uranium | µg/g | 0.58 | 0.60 | 0.66 | 0.60 | 0.59 | 0.67 |
| Vanadium | µg/g | 19 | 20 | 21 | 17 | 16 | 20 |
| Lead-210 | Bq/g | < 0.05 | 0.07 | 0.05 | < 0.20 | 0.06 | 0.05 |
| Radium-226 | Bq/g | < 0.10 | < 0.05 | < 0.05 | 0.05 | < 0.03 | 0.07 |
| Thorium-230 | Bq/g | < 0.50 | < 0.40 | < 0.40 | 0.06 | < 0.20 | < 0.30 |
| Thorium-232 | Bq/g | < 0.30 | < 0.04 | < 0.30 | 0.01 | 0.01 | 0.011 |

## Table 28: Soil Monitoring – PG LTWMF – Location 4 (PG-LTWMF-SS-04)

| | | PG-LTWMF-SS-04 | | | | | |
|---|---|---|---|---|---|---|---|
| **Metals** | **Units** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Water Soluble Boron | µg/g | 0.54 | 0.49 | 0.57 | < 0.50 | < 0.50 | < 0.50 |
| Mercury | µg/g | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Silver | µg/g | < 0.20 | < 0.20 | < 0.20 | < 0.05 | < 0.05 | < 0.05 |
| Arsenic | µg/g | 1.7 | 2.1 | 2.2 | 1.7 | 2.1 | 2.1 |
| Barium | µg/g | 29 | 29 | 28 | 28 | 32 | 34 |
| Beryllium | µg/g | 0.23 | 0.25 | 0.23 | 0.21 | 0.23 | 0.26 |
| Boron | µg/g | < 5 | < 5 | < 5 | 2 | 3 | 3 |
| Cadmium | µg/g | 0.25 | 0.19 | 0.17 | 0.19 | 0.19 | 0.20 |
| Cobalt | µg/g | 2.4 | 2.6 | 2.6 | 2.5 | 2.4 | 3.0 |
| Copper | µg/g | 4.7 | 4.8 | 4.4 | 5.1 | 5.5 | 5.8 |
| Molybdenum | µg/g | < 0.50 | < 0.50 | < 0.50 | 0.20 | 0.20 | 0.30 |
| Nickel | µg/g | 5.3 | 4.7 | 4.9 | 4.6 | 4.3 | 5.2 |
| Lead | µg/g | 11 | 14 | 13 | 10 | 11 | 12 |
| Selenium | µg/g | < 0.5 | < 0.5 | < 0.5 | < 0.7 | < 0.7 | < 0.7 |
| Antimony | µg/g | < 0.2 | < 0.2 | < 0.2 | < 0.8 | < 0.8 | < 0.8 |
| Uranium | µg/g | 0.61 | 0.68 | 3.0 | 0.61 | 0.66 | 0.62 |
| Vanadium | µg/g | 19 | 24 | 21 | 14 | 13 | 17 |
| Lead-210 | Bq/g | < 0.05 | 0.08 | 0.07 | < 0.20 | 0.06 | 0.04 |
| Radium-226 | Bq/g | < 0.10 | < 0.05 | < 0.05 | 0.06 | 0.06 | < 0.06 |
| Thorium-230 | Bq/g | < 0.50 | < 0.40 | < 0.40 | 0.08 | < 0.10 | < 0.40 |
| Thorium-232 | Bq/g | < 0.30 | < 0.04 | < 0.30 | 0.01 | 0.01 | 0.011 |

## Table 29: Soil Monitoring – PG LTWMF – Location 5 (PG-LTWMF-SS-05)

| Metals | Units | PG-LTWMF-SS-05 | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| Water Soluble Boron | µg/g | 0.42 | 0.37 | 0.54 | < 0.50 | < 0.50 | < 0.50 |
| Mercury | µg/g | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Silver | µg/g | < 0.20 | < 0.20 | < 0.20 | 0.08 | 0.06 | 0.07 |
| Arsenic | µg/g | 5 | 5.1 | 3.8 | 4.7 | 4.9 | 5.1 |
| Barium | µg/g | 21 | 23 | 18 | 27 | 23 | 28 |
| Beryllium | µg/g | < 0.20 | 0.22 | < 0.20 | 0.20 | 0.18 | 0.21 |
| Boron | µg/g | < 5 | < 5 | < 5 | 3 | 3 | 3 |
| Cadmium | µg/g | 0.11 | 0.15 | 0.11 | 0.17 | 0.15 | 0.18 |
| Cobalt | µg/g | 3.2 | 3.2 | 2.5 | 3.7 | 3.0 | 3.6 |
| Copper | µg/g | 4.4 | 4.5 | 3.4 | 5.8 | 4.7 | 5.6 |
| Molybdenum | µg/g | < 0.50 | < 0.50 | < 0.50 | 0.20 | 0.10 | 0.20 |
| Nickel | µg/g | 4.7 | 5.3 | 4.2 | 5.7 | 4.7 | 5.7 |
| Lead | µg/g | 11 | 12 | 8.8 | 12 | 10 | 12 |
| Selenium | µg/g | < 0.5 | < 0.5 | < 0.5 | < 0.7 | < 0.7 | < 0.7 |
| Antimony | µg/g | < 0.2 | < 0.2 | < 0.2 | < 0.8 | < 0.8 | < 0.8 |
| Uranium | µg/g | 0.87 | 0.89 | 0.66 | 0.80 | 0.80 | 0.79 |
| Vanadium | µg/g | 16 | 19 | 15 | 14 | 13 | 16 |
| Lead-210 | Bq/g | 0.08 | 0.07 | 0.12 | 0.30 | 0.10 | 0.10 |
| Radium-226 | Bq/g | 0.11 | 0.08 | 0.09 | 0.06 | 0.06 | 0.14 |
| Thorium-230 | Bq/g | < 0.50 | < 0.40 | < 0.40 | 0.08 | 0.40 | < 0.40 |
| Thorium-232 | Bq/g | < 0.30 | < 0.04 | < 0.30 | 0.02 | 0.02 | 0.016 |

## Table 30: Bluff Seepage Water Quality (PG-S-1)

| | | Criteria | | PG-S-1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **PWQO** | **CWQG** | **Average** | | | | | 2022-03-28 | 2022-06-22 | 2022-09-29 | 2022-11-28 | **Average** |
| Fluoride | mg/L | | **0.12** | **1.17** | **0.89** | No Sample | **1.09** | **2.90** | No Sample[2] | No Sample[2] | No Sample[2] | No Sample[2] | -- |
| Ammonia+Ammonium (N) | as N mg/L | | | 31.7 | 30.3 | | 20.4 | 26.0 | | | | | -- |
| Nitrate (as N) | as N mg/L | | **13** | **242** | **193** | | **194** | **227** | | | | | -- |
| Arsenic (total) | µg/L | **100** | **5** | **1047** | **783** | | **757** | **967** | | | | | -- |
| Uranium (total) | µg/L | **5** | **15** | **247** | **217** | | **178** | **278** | | | | | -- |
| Radium-226 | Bq/L | **1** | | 0.30 | 0.29 | | 0.14 | 0.55 | | | | | -- |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | | -[1] | -[1] | | | | | -- |
| ORP | mV | | | -[1] | -[1] | | -[1] | -[1] | | | | | -- |
| SPC | µs/cm | | | -[1] | -[1] | | -[1] | -[1] | | | | | -- |
| Temperature | °C | | | -[1] | -[1] | | -[1] | -[1] | | | | | -- |
| Turbidity | FNU | | | -[1] | -[1] | | -[1] | -[1] | | | | | -- |
| pH | Units | | | -[1] | -[1] | | -[1] | -[1] | | | | | -- |

**Note:**
*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life*
**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/bluff erosion.
-- - No data.

## Table 31: Bluff Seepage Water Quality (PG-S-2)

| | | Criteria | | PG-S-2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **PWQO** | **CWQG** | **Average** | | | | | 2022-03-28 | 2022-06-22 | 2022-09-29 | 2022-11-28 | **Average** |
| Fluoride | mg/L | | **0.12** | **0.87** | **0.78** | **0.90** | **0.96** | **0.71** | No Sample[2] | **0.66** | **0.68** | **0.88** | **0.74** |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.213 | 0.793 | 0.153 | 0.060 | 0.053 | | < 0.04 | 0.07 | 0.04 | 0.05 |
| Nitrate (as N) | as N mg/L | | **13** | 7.42 | 5.29 | 0.29 | 2.10 | 2.97 | | 2.67 | 0.59 | 1.86 | 1.71 |
| Arsenic (total) | µg/L | **100** | **5** | **953** | **688** | **439** | **543** | **520** | | **477** | **986** | **636** | **700** |
| Uranium (total) | µg/L | **5** | **15** | **483** | **395** | **229** | **124** | **131** | | **80** | **57** | **110** | **82** |
| Radium-226 | Bq/L | **1** | | 0.24 | < 0.04 | < 0.04 | 0.01 | 0.02 | | < 0.01 | 0.01 | < 0.01 | < 0.01 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 67.1 | 74.8 | 84.6 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 184.9 | 84.6 | 142.9 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 909.0 | 789.0 | 725.0 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 10.459 | 11.641 | 7.999 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 28.4 | 411.6 | 58.24 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 7.75 | 7.90 | 7.84 | -- |

**Note:**

*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life*
**Bold values** indicate an exceedance of a PWQO or CWQG value.

[1] Field parameters included for current sampling year only.

[2] Insufficient surface water for full sample collection.

-- - No data.

## Table 32: Sediment Quality – Location 1 (PG-BS-6)

| | | Criteria | | | | PG-BS-6 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PSQG | | CCME | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | |
| Parameter | Units | LEL | SEL | ISQG | PEL | Average | | | | | 2022-06-22 | 2022-11-28 | Average |
| Water Soluble Boron | µg/g | | | | | 0.16 | 0.14 | No Sample | < 0.50 | < 0.50 | No Sample[1] | No Sample[1] | |
| Mercury | µg/g | **0.2** | **2** | **0.17** | **0.486** | < 0.05 | < 0.05 | | < 0.05 | < 0.05 | | | |
| Silver | µg/g | | | | | < 0.20 | < 0.20 | | < 0.05 | < 0.05 | | | |
| Arsenic | µg/g | **6** | **33** | **5.9** | **17** | **7.8** | 3.5 | | 2.2 | 1.9 | | | |
| Barium | µg/g | | | | | 27 | 25 | | 30 | 15 | | | |
| Beryllium | µg/g | | | | | 0.21 | < 0.20 | | 0.12 | 0.10 | | | |
| Boron | µg/g | | | | | < 5.0 | < 5.0 | | 3.5 | 1.5 | | | |
| Cadmium | µg/g | **0.6** | **10** | **0.6** | **3.5** | < 0.10 | < 0.10 | | 0.03 | 0.04 | | | |
| Cobalt | µg/g | | | | | 4.0 | 2.8 | | 2.4 | 2.4 | | | |
| Copper | µg/g | **16** | **110** | **35.7** | **197** | 6.4 | 5.2 | | 4.2 | 2.4 | | | |
| Molybdenum | µg/g | | | | | 2.4 | 1.1 | | 0.8 | 0.7 | | | |
| Nickel | µg/g | **16** | **75** | | | 6 | 4.4 | | 4.2 | 3.0 | | | |
| Lead | µg/g | **31** | **250** | **35** | **91.3** | 3.9 | 2.5 | | 2.0 | 1.7 | | | |
| Antimony | µg/g | | | | | < 0.20 | < 0.20 | | < 0.80 | < 0.80 | | | |
| Selenium | µg/g | | | | | < 0.5 | < 0.5 | | < 0.7 | < 0.7 | | | |
| Uranium | µg/g | | | | | 2.2 | 1.6 | | 2.1 | 1.2 | | | |
| Vanadium | µg/g | | | | | 25 | 17 | | 13 | 33 | | | |
| Lead-210 | Bq/g | | | | | 0.05 | < 0.05 | | 0.03 | 0.04 | | | |
| Radium-226 | Bq/g | | | | | < 0.10 | 0.08 | | 0.12 | 0.08 | | | |
| Thorium-230 | Bq/g | | | | | < 0.50 | < 0.45 | | 0.25 | 0.25 | | | |
| Thorium-232 | Bq/g | | | | | < 0.30 | < 0.17 | | 0.01 | 0.06 | | | |

**Note:**
*PSQG = Provincial Sediment Quality Guidelines , LEL - lowest effect level, SEL - severe effect level*
*CCME = Canadian Council of Ministers of the Environment, Sediment Quality Guidelines for the Protection of Aquatic Life, ISQG = Interim Sediment Quality Guidelines, PEL = Probable Effect Level*
**Bold values** indicate an exceedance of a PSQG or CCME value.
[1] Location not accessible

## Table 33: Sediment Quality – Location 2 (PG-BS-7)

| | | Criteria | | | | PG-BS-7 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PSQG | | CCME | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | |
| Parameter | Units | LEL | SEL | ISQG | PEL | Average | | | | | 2022-06-22 | 2022-11-28 | Average |
| Water Soluble Boron | µg/g | | | | | 0.47 | 0.23 | < 0.05 | < 0.50 | < 0.50 | < 0.50 | 0.90 | 0.70 |
| 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 | | | | | < 0.20 | < 0.20 | < 0.20 | < 0.05 | < 0.05 | 0.08 | < 0.05 | 0.07 |
| Arsenic | µg/g | **6** | **33** | **5.9** | **17** | **35** | **14** | **15** | **12** | **19** | **11** | **17** | **14** |
| Barium | µg/g | | | | | 15 | 18 | 11 | 19 | 15 | 36 | 16 | 26 |
| Beryllium | µg/g | | | | | < 0.20 | < 0.20 | < 0.20 | 0.13 | 0.09 | 1.0 | 0.12 | 0.56 |
| Boron | µg/g | | | | | < 5.0 | < 5.0 | < 5.0 | 4 | 2 | 3 | 3 | 3 |
| Cadmium | µg/g | **0.6** | **10** | **0.6** | **3.5** | < 0.10 | < 0.10 | < 0.10 | 0.03 | 0.04 | 0.06 | < 0.05 | 0.06 |
| Cobalt | µg/g | | | | | 8.8 | 4.8 | 2.6 | 2.3 | 3.6 | 4.4 | 3.7 | 4.1 |
| Copper | µg/g | **16** | **110** | **35.7** | **197** | 5.4 | 5.1 | 3.2 | 4.3 | 2.0 | 7.2 | 3.2 | 5.2 |
| Molybdenum | µg/g | | | | | 1.6 | < 0.5 | < 0.5 | 0.6 | 0.3 | 0.8 | 0.6 | 0.7 |
| Nickel | µg/g | **16** | **75** | | | 12 | 7.5 | 3.7 | 3.8 | 3.8 | 6.6 | 4.5 | 5.6 |
| Lead | µg/g | **31** | **250** | **35** | **91.3** | 1.8 | 2.7 | 1.2 | 1.9 | 1.7 | 3.5 | 1.9 | 2.7 |
| Antimony | µg/g | | | | | 0.21 | < 0.20 | < 0.20 | < 0.80 | < 0.80 | < 0.80 | < 0.80 | < 0.80 |
| Selenium | µg/g | | | | | 1.1 | < 0.5 | < 0.5 | < 0.7 | < 0.7 | < 0.7 | < 0.7 | < 0.7 |
| Uranium | µg/g | | | | | 7.7 | 2.0 | 0.8 | 2.0 | 1.2 | 2.7 | 1.7 | 2.2 |
| Vanadium | µg/g | | | | | 17 | 19 | 13 | 12 | 32 | 16 | 10 | 13 |
| Lead-210 | Bq/g | | | | | < 0.05 | < 0.05 | < 0.05 | 0.03 | 0.03 | < 0.05 | 0.03 | 0.04 |
| Radium-226 | Bq/g | | | | | < 0.10 | < 0.08 | < 0.05 | 0.05 | 0.05 | < 0.05 | < 0.03 | 0.04 |
| Thorium-230 | Bq/g | | | | | < 0.50 | < 0.45 | < 0.4 | 0.15 | < 0.20 | < 0.20 | < 0.20 | < 0.20 |
| Thorium-232 | Bq/g | | | | | < 0.30 | < 0.17 | < 0.04 | 0.01 | 0.03 | 0.01 | 0.01 | 0.01 |

**Note:**
*PSQG = Provincial Sediment Quality Guidelines , LEL - lowest effect level, SEL - severe effect level*
*CCME = Canadian Council of Ministers of the Environment, Sediment Quality Guidelines for the Protection of Aquatic Life, ISQG = Interim Sediment Quality Guidelines, PEL = Probable Effect Level*
**Bold values** indicate an exceedance of a PSQG or CCME value.

# Table 34: Surface Water Quality – Port Granby Creek (PGC-D)

| | | Criteria | | PGC-D | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **PWQO** | **CWQG** | Average | | | | | 2022-01-12 | 2022-04-04 | 2022-07-08 | 2022-10-24 | **Average** |
| Total Suspended Solids | mg/L | | | 8 | 5 | 6 | 4 | 7 | 2 | 3 | 4 | < 2 | 3 |
| pH | no unit | **6.5-8.5** | **6.5-9.0** | 8.30 | 8.23 | 8.26 | 8.38 | 8.34 | 8.23 | 8.35 | **9.14** | 8.36 | **8.52** |
| Alkalinity | mg/L as $CaCO_3$ | | | 238 | 245 | 245 | 235 | 244 | 273 | 233 | 266 | 249 | 255 |
| Carbonate | mg/L as $CaCO_3$ | | | 5 | 4 | 4 | 11 | 7 | < 1 | 3 | 71 | 6 | 20 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 233 | 243 | 243 | 223 | 238 | 273 | 229 | 195 | 243 | 235 |
| Total Dissolved Solids | mg/L | | | 371 | 373 | 365 | 351 | 371 | 391 | 377 | 363 | 431 | 391 |
| Fluoride | mg/L | | **0.12** | 0.11 | < 0.10 | < 0.10 | 0.08 | 0.09 | 0.07 | < 0.06 | 0.09 | < 0.06 | 0.07 |
| Total Organic Carbon | mg/L | | | 7 | 6 | 7 | 6 | 7 | 6 | 6 | 7 | 5 | 6 |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | 0.05 | 0.07 | 0.06 | 0.05 | 0.05 | < 0.04 | 0.04 | < 0.04 | < 0.04 |
| Chloride (Dissolved) | mg/L | | **120** | 44 | 51 | 50 | 46 | 64 | 65 | 69 | 48 | 56 | 60 |
| Sulphate (dissolved) | mg/L | | | 17 | 16 | 15 | 14 | 18 | 20 | 15 | 13 | 15 | 16 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | **13** | 1.07 | 1.03 | 0.90 | 0.99 | 1.13 | 1.62 | 1.23 | 0.66 | 0.73 | 1.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 1.07 | 1.03 | 0.90 | 0.99 | 1.13 | 1.63 | 1.23 | 0.66 | 0.73 | 1.06 |
| Mercury (dissolved) | µg/L | **0.2** | **0.026** | 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 258 | 280 | 295 | 283 | 298 | 343 | 279 | 302 | 271 | 299 |
| Silver (total) | µg/L | **0.1** | **0.25** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (total) | bq/L | | | 116 | 83 | 104 | 62 | 63 | 47 | 69 | 61 | 45 | 56 |
| Aluminum (0.2µm) | µg/L | **75** | **100** | 11 | 7 | 7 | 8 | 5 | 5 | 6 | 12 | 7 | 8 |
| Arsenic (total) | µg/L | **100** | **5** | < 1.0 | < 1.0 | < 1.0 | 0.5 | 1.7 | 0.4 | 0.4 | 1.0 | 0.6 | 0.6 |
| Barium (total) | µg/L | | | 51.8 | 52.0 | 52.0 | 55.1 | 57.5 | 58 | 44.7 | 69.7 | 65.4 | 59.5 |
| Beryllium (total) | µg/L | **1100** | | < 0.50 | < 0.50 | < 0.50 | 0.008 | 0.021 | < 0.007 | < 0.007 | < 0.007 | 0.023 | 0.011 |
| Boron (total) | µg/L | **200** | **1500** | 13 | < 13 | 12 | 12 | 13 | 14 | 10 | 15 | 19 | 15 |
| Bismuth (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | 0.009 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (total) | µg/L | | | 89250 | 91500 | 95250 | 96175 | 101575 | 118000 | 95700 | 101000 | 89600 | 101075 |
| Cadmium (total) | µg/L | **0.2** | **0.09** | < 0.10 | < 0.10 | < 0.10 | 0.005 | 0.014 | < 0.003 | < 0.003 | < 0.003 | 0.018 | 0.007 |
| Cobalt (total) | µg/L | **0.9** | | < 0.50 | < 0.50 | < 0.50 | 0.080 | 0.174 | 0.08 | 0.096 | 0.108 | 0.075 | 0.091 |
| Chromium (total) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.32 | 0.63 | 0.13 | 0.41 | 0.36 | 0.34 | 0.31 |
| Copper (total) | µg/L | **5** | | 1.0 | < 1.0 | < 1.0 | 0.6 | 0.7 | 0.6 | 0.8 | 0.9 | 0.4 | 0.7 |
| Iron (total) | µg/L | **300** | **300** | 240 | 198 | 250 | 158 | 165 | 207 | 151 | 132 | 213 | 176 |
| Potassium (total) | µg/L | | | 1525 | 1350 | 1475 | 1418 | 1603 | 1400 | 1560 | 1820 | 1610 | 1598 |
| Magnesium (total) | µg/L | | | 9550 | 11075 | 10050 | 10323 | 10685 | 11900 | 9720 | 11900 | 11400 | 11230 |
| Manganese (total) | µg/L | | | 25.8 | 24.3 | 31.3 | 20.9 | 32.1 | 41.7 | 30.0 | 30.5 | 20.8 | 30.8 |
| Molybdenum (total) | µg/L | **40** | **73** | 0.55 | 0.53 | 0.55 | 0.46 | 0.84 | 0.44 | 0.33 | 0.75 | 0.57 | 0.52 |
| Sodium (total) | µg/L | | | 28000 | 30500 | 30250 | 26350 | 31825 | 30200 | 34000 | 27700 | 25900 | 29450 |
| Nickel (total) | µg/L | **25** | **25** | < 1.0 | < 1.0 | < 1.0 | 0.3 | 3.6 | 0.5 | 0.3 | 0.4 | 0.3 | 0.4 |
| Phosphorus (total) | µg/L | **10-30** | | 24 | 18 | 18 | 14 | 20 | 26 | 17 | 24 | **9** | 19 |
| Lead (total) | µg/L | **5** | **7** | < 0.50 | < 0.50 | < 0.50 | 0.08 | 0.12 | < 0.09 | < 0.09 | < 0.09 | 0.15 | 0.11 |
| Antimony (total) | µg/L | **20** | | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (total) | µg/L | **100** | **1** | < 2.0 | < 2.0 | < 2.0 | 0.13 | 0.25 | 0.14 | 0.18 | 0.17 | 0.33 | 0.21 |
| Tin (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.08 | 0.09 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Strontium (total) | µg/L | | | 203 | 203 | 195 | 212 | 243 | 253 | 194 | 253 | 245 | 236 |
| Titanium (total) | µg/L | | | 8.0 | 6.8 | 7.9 | 2.85 | 3.23 | 2.27 | 4.08 | 3.01 | 2.16 | 2.88 |
| Thallium (total) | µg/L | **0.3** | **0.8** | < 0.05 | < 0.05 | < 0.05 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (total) | µg/L | **5** | **15** | 0.893 | 0.900 | 0.820 | 0.789 | 0.884 | 0.984 | 0.789 | 0.824 | 0.851 | 0.862 |
| Vanadium (total) | µg/L | **6** | | 1.06 | 1.09 | 1.01 | 0.76 | 0.93 | 0.64 | 0.60 | 1.01 | 0.83 | 0.77 |
| Zinc (total) | µg/L | **30** | **30** | < 5.0 | < 5.0 | < 5.0 | < 2.0 | 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| Lead-210 | Bq/L | | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | < 0.02 | 0.03 | < 0.02 | < 0.02 | < 0.02 | 0.02 |
| Radium-226 | Bq/L | **1** | | 0.03 | 0.04 | < 0.04 | 0.01 | < 0.01 | 0.02 | < 0.01 | < 0.01 | < 0.01 | 0.01 |
| Thorium-230 | Bq/L | | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 112.9 | 100.2 | 110.7 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 190.3 | 139.8 | 171.7 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 598 | 615 | 639 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 3.458 | 19.625 | 8.964 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 2.48 | 0.62 | 0.86 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 8.33 | 8.41 | 8.28 | -- |
| Staff Gauge | cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 5.0 | 2.0 | 4.0 | -- |

**Note:**
*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life*
**Bold values** indicate an exceedance of a PWQO or CWQG value.
[1] Field parameters included for current sampling year only.
[2] No field parameters - water quality units out for repair
-- - No data.

# Table 35: Surface Water Quality – Port Granby Creek (PGC-U)

| | | Criteria | | PGC-U | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **PWQO** | **CWQG** | **Average** | | | | | 2022-01-12 | 2022-04-04 | 2022-07-08 | 2022-10-24 | **Average** |
| Total Suspended Solids | mg/L | | | 6 | 5 | 4 | 10 | 8 | No Sample[2] | 5 | 8 | < 2 | 5 |
| pH | no unit | **6.5-8.5** | **6.5-9.0** | 8.28 | 8.13 | 8.32 | 8.31 | 8.25 | | 8.23 | 6.83 | 8.23 | 7.76 |
| Alkalinity | mg/L as $CaCO_3$ | | | 238 | 245 | 240 | 234 | 248 | | 231 | 207 | 260 | 233 |
| Carbonate | mg/L as $CaCO_3$ | | | 4 | 3 | 5 | 3 | 1 | | < 1 | < 1 | < 1 | < 1 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 233 | 245 | 235 | 232 | 247 | | 231 | 207 | 260 | 233 |
| Total Dissolved Solids | mg/L | | | 379 | 374 | 358 | 381 | 381 | | 325 | 383 | 397 | 368 |
| Fluoride | mg/L | | **0.12** | < 0.10 | **0.12** | < 0.10 | 0.07 | 0.08 | | < 0.06 | 0.08 | < 0.06 | 0.07 |
| Total Organic Carbon | mg/L | | | 7 | 7 | 8 | 6 | 7 | | 5 | 8 | 6 | 6 |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | 0.06 | < 0.05 | 0.05 | 0.07 | | 0.04 | 0.04 | < 0.04 | 0.04 |
| Chloride (Dissolved) | mg/L | | **120** | 47 | 56 | 44 | 51 | 70 | | 70 | 54 | 58 | 61 |
| Sulphate (dissolved) | mg/L | | | 16 | 15 | 11 | 13 | 15 | | 14 | 11 | 13 | 13 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | **13** | 1.08 | 0.98 | 0.80 | 0.85 | 1.04 | | 1.16 | 0.47 | 0.67 | 0.77 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 1.08 | 0.99 | 0.80 | 0.85 | 1.04 | | 1.16 | 0.47 | 0.67 | 0.77 |
| Mercury (dissolved) | µg/L | **0.2** | **0.026** | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | | < 0.01 | 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 263 | 280 | 280 | 275 | 302 | | 255 | 296 | 270 | 274 |
| Silver (total) | µg/L | **0.1** | **0.25** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (total) | bq/L | | | 106 | 105 | 101 | 97 | 87 | | 148 | 74 | 59 | 94 |
| Aluminum (0.2µm) | µg/L | **75** | **100** | 7 | 7 | 13 | 10 | 7 | | 4 | 7 | 8 | 6 |
| Arsenic (total) | µg/L | **100** | **5** | < 1.0 | < 1.0 | < 1.0 | 0.5 | 1.7 | | 0.4 | 0.9 | 0.5 | 0.6 |
| Barium (total) | µg/L | | | 52.5 | 56.0 | 57.0 | 56.0 | 60.5 | | 45 | 72 | 68 | 61.8 |
| Beryllium (total) | µg/L | **1100** | | < 0.50 | < 0.50 | < 0.50 | 0.010 | 0.021 | | 0.009 | < 0.007 | 0.010 | 0.009 |
| Boron (total) | µg/L | **200** | **1500** | 12 | 13 | 13 | 13 | 12 | | 10 | 14 | 20 | 15 |
| Bismuth (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.009 | 0.011 | | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (total) | µg/L | | | 88500 | 90500 | 97000 | 94175 | 103475 | | 87600 | 100000 | 90700 | 92767 |
| Cadmium (total) | µg/L | **0.2** | **0.09** | < 0.10 | < 0.10 | < 0.10 | 0.012 | 0.010 | | 0.008 | 0.006 | 0.025 | 0.013 |
| Cobalt (total) | µg/L | **0.9** | | < 0.50 | < 0.50 | < 0.50 | 0.098 | 0.156 | | 0.122 | 0.116 | **1.990** | 0.743 |
| Chromium (total) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.33 | 0.51 | | 0.49 | 0.30 | 0.44 | 0.41 |
| Copper (total) | µg/L | **5** | | < 1.1 | < 1.0 | < 1.0 | 0.6 | 0.7 | | 0.7 | 0.8 | 0.5 | 0.7 |
| Iron (total) | µg/L | **300** | **300** | 255 | 288 | 250 | 256 | 242 | | **301** | 255 | 218 | 258 |
| Potassium (total) | µg/L | | | 1450 | 1350 | 1500 | 1403 | 1603 | | 1400 | 1410 | 1500 | 1437 |
| Magnesium (total) | µg/L | | | 9400 | 10550 | 9000 | 9508 | 10408 | | 8780 | 11000 | 10700 | 10160 |
| Manganese (total) | µg/L | | | 36.0 | 40.5 | 41.0 | 38.5 | 55.4 | | 48.2 | 59.0 | 40.4 | 49.2 |
| Molybdenum (total) | µg/L | **40** | **73** | < 0.51 | 0.54 | 0.68 | 0.45 | 0.61 | | 0.42 | 0.60 | 0.56 | 0.53 |
| Sodium (total) | µg/L | | | 29000 | 32750 | 28000 | 28125 | 34900 | | 32200 | 30100 | 26300 | 29533 |
| Nickel (total) | µg/L | **25** | **25** | < 1.0 | < 1.1 | < 1.0 | 0.3 | 1.8 | | 0.4 | 0.4 | 0.3 | 0.4 |
| Phosphorus (total) | µg/L | **10-30** | | 24 | 20 | **31** | 14 | 23 | | 15 | 28 | 14 | 19 |
| Lead (total) | µg/L | **5** | **7** | < 0.50 | < 0.50 | < 0.50 | 0.16 | 0.13 | | 0.24 | 0.16 | < 0.09 | 0.16 |
| Antimony (total) | µg/L | **20** | | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (total) | µg/L | **100** | **1** | < 2.0 | < 2.0 | < 2.0 | 0.14 | 0.31 | | 0.19 | 0.14 | 0.27 | 0.20 |
| Tin (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.10 | 0.09 | | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Strontium (total) | µg/L | | | 195 | 195 | 195 | 202 | 224 | | 185 | 237 | 224 | 215 |
| Titanium (total) | µg/L | | | 8.2 | 8.3 | 6.3 | 4.79 | 4.30 | | 7.94 | 3.78 | 2.83 | 4.85 |
| Thallium (total) | µg/L | **0.3** | **0.8** | < 0.05 | < 0.05 | < 0.05 | < 0.005 | < 0.005 | | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (total) | µg/L | **5** | **15** | 0.795 | 0.913 | 0.765 | 0.748 | 0.826 | | 0.746 | 0.805 | 0.809 | 0.787 |
| Vanadium (total) | µg/L | **6** | | 0.85 | 1.32 | 1.14 | 0.92 | 1.07 | | 0.86 | 1.21 | 0.95 | 1.01 |
| Zinc (total) | µg/L | **30** | **30** | < 5.0 | < 5.0 | < 5.0 | 3.8 | 2.5 | | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| Lead-210 | Bq/L | | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | < 0.02 | | < 0.02 | 0.04 | < 0.02 | 0.03 |
| Radium-226 | Bq/L | **1** | | < 0.03 | < 0.04 | < 0.04 | 0.01 | < 0.01 | | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | | | < 0.06 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 110.5 | 112.1 | 112.1 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 180.3 | 132.2 | -- | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 595 | 632 | 657 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 4.000 | 21.714 | 8.622 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 2.57 | 12.63 | 14.45 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 8.23 | 8.31 | -- | -- |
| Staff Gauge | cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | | -- | -- | -- | -- |

**Note:**
*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life*
**Bold values** indicate an exceedance of a PWQO or CWQG value.
[1] Field parameters included for current sampling year only.
[2] Creek frozen, unable to collect surface w ater samples.
-- - No data.

## Table 36: Storm Event Sampling – Port Granby Creek (PGC-D)

| | | Criteria | | PGC-D | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analysis** | **Units** | **PWQO** | **CWQG** | 2022/06/07 9:00AM | 2022/06/07 10:00AM | 2022/06/07 11:00AM | 2022/06/07 12:00PM | 2022/06/07 1:00PM | 2022/06/07 2:00PM |
| Total Suspended Solids | mg/L | | | 37 | 50 | 109 | 153 | 252 | 312 |
| pH | no unit | **6.5-8.5** | **6.5-9.0** | 8.33 | 8.32 | 8.31 | 8.13 | 8.27 | 8.23 |
| Alkalinity | mg/L as $CaCO_3$ | | | 234 | 262 | 257 | 236 | 249 | 245 |
| Carbonate | mg/L as $CaCO_3$ | | | 4.0 | 2.0 | 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 231 | 259 | 257 | 236 | 249 | 245 |
| Total Dissolved Solids | mg/L | | | 363 | 346 | 346 | 340 | 343 | 357 |
| Fluoride | mg/L | | **0.12** | **0.13** | 0.06 | 0.07 | 0.06 | 0.07 | 0.07 |
| Total Organic Carbon | mg/L | | | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 8.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.07 | 0.06 | 0.07 | 0.07 | 0.06 | 0.07 |
| Chloride (Dissolved) | mg/L | | **120** | 50 | 46 | 45 | 49 | 49 | 57 |
| Sulphate (dissolved) | mg/L | | | 12 | 13 | 13 | 13 | 13 | 13 |
| 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** | 0.51 | 0.54 | 0.54 | 0.54 | 0.63 | 0.92 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 0.51 | 0.54 | 0.54 | 0.54 | 0.63 | 0.92 |
| Mercury (dissolved) | µg/L | **0.2** | **0.026** | < 0.01 | < 0.01 | < 0.01 | < 0.01 | **0.03** | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 278 | 266 | 275 | 278 | 298 | 302 |
| Silver (total) | µg/L | **0.1** | **0.25** | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (total) | µg/L | | | 547 | 622 | 1240 | 1730 | 2770 | 3450 |
| Aluminum (0.2µm) | µg/L | **75** | **100** | 9 | 5 | 4 | 7 | 3 | 9 |
| Arsenic (total) | µg/L | **100** | **5** | 0.9 | 1.1 | 1.2 | 1.8 | 1.9 | 2.1 |
| Barium (total) | µg/L | | | 63.0 | 64.8 | 72.0 | 82.1 | 99.5 | 110.0 |
| Beryllium (total) | µg/L | **1100** | | 0.023 | 0.034 | 0.061 | 0.064 | 0.106 | 0.154 |
| Boron (total) | µg/L | **200** | **1500** | 16 | 16 | 16 | 25 | 21 | 20 |
| Bismuth (total) | µg/L | | | < 0.010 | < 0.010 | 0.010 | 0.020 | 0.020 | 0.030 |
| Calcium (total) | µg/L | | | 92900 | 89100 | 92700 | 94200 | 101000 | 103000 |
| Cadmium (total) | µg/L | **0.2** | **0.09** | 0.015 | 0.028 | 0.054 | 0.059 | 0.083 | 0.135 |
| Cobalt (total) | µg/L | **0.9** | | 0.4 | 0.4 | 0.7 | **1.0** | **1.5** | **1.9** |
| Chromium (total) | µg/L | | | 1.07 | 1.32 | 3.19 | 2.86 | 4.40 | 4.84 |
| Copper (total) | µg/L | **5** | | 1.0 | 1.2 | 1.8 | 2.4 | 3.2 | 4.0 |
| Iron (total) | µg/L | **300** | **300** | **916** | **1080** | **1760** | **2510** | **3930** | **4950** |
| Potassium (total) | µg/L | | | 1500 | 1460 | 1640 | 1770 | 1990 | 2070 |
| Magnesium (total) | µg/L | | | 11100 | 10500 | 10700 | 10400 | 11300 | 11100 |
| Manganese (total) | µg/L | | | 131.0 | 148.0 | 243.0 | 347.0 | 574.0 | 735.0 |
| Molybdenum (total) | µg/L | **40** | **73** | 0.63 | 0.55 | 0.56 | 0.60 | 0.63 | 0.55 |
| Sodium (total) | µg/L | | | 30200 | 28500 | 27100 | 28200 | 31200 | 33000 |
| Nickel (total) | µg/L | **25** | **25** | 0.9 | 0.9 | 1.5 | 1.9 | 2.8 | 3.4 |
| Phosphorus (total) | mg/L | **10-30** | | **62** | **69** | **121** | **158** | **247** | **286** |
| Lead (total) | µg/L | **5** | **7** | 0.71 | 0.85 | 1.46 | 2.09 | 3.31 | 4.40 |
| Antimony (total) | µg/L | **20** | | < 0.9 | < 0.9 | < 0.9 | < 0.9 | < 0.9 | < 0.9 |
| Selenium (total) | µg/L | **100** | **1** | 0.17 | 0.20 | 0.22 | 0.23 | 0.34 | 0.36 |
| Tin (total) | µg/L | | | 0.08 | 0.13 | 0.09 | 0.14 | 0.11 | 0.11 |
| Strontium (total) | µg/L | | | 206 | 210 | 201 | 219 | 228 | 240 |
| Titanium (total) | µg/L | | | 25.90 | 30.00 | 56.50 | 79.60 | 127.00 | 157.00 |
| Thallium (total) | µg/L | **0.3** | **0.8** | 0.009 | 0.012 | 0.018 | 0.025 | 0.037 | 0.045 |
| Uranium (total) | µg/L | **5** | **15** | 0.884 | 0.904 | 0.911 | 0.964 | 0.971 | 1.030 |
| Vanadium (total) | µg/L | **6** | | 1.98 | 2.33 | 3.41 | 4.90 | **7.09** | **9.11** |
| Zinc (total) | µg/L | **30** | **30** | 5 | 5 | 10 | 10 | 17 | 20 |
| Lead-210 | Bq/L | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **1** | | < 0.01 | < 0.01 | < 0.01 | 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | |
| ODO % Sat | mg/L | | | 105.9 | 105.8 | 105.7 | 105.7 | 106 | 105.9 |
| ORP | mV | | | 167 | 175.4 | 171.2 | 170.4 | 165.3 | 165.2 |
| SPC | us/cm | | | 603 | 596 | 586 | 587 | 593 | 600 |
| Temperature | °C | | | 15.256 | 15.148 | 15.01 | 14.983 | 14.955 | 14.841 |
| Turbidity | FNU | | | 13.67 | 22.09 | 42 | 58.84 | 96.27 | 118.04 |
| pH | Units | | | 8.21 | 8.12 | 8.18 | 8.15 | 8.17 | 8.16 |
| Staff Gauge | cm | | | 5.5 | 6 | 8 | 9 | 13 | 10 |

*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life*
**Bold values** indicate an exceedance of a PWQO or CWQG value

## Table 37: Surface Water Quality – Lake Ontario Diffuser – Port Granby Diffuser (PG-LO-D)

| | | Criteria | | PG-LO-D | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | |
| Parameter | Units | PWQO | CWQG | Average | | | | | 2022-06-15 | 2022-09-23 | 2022-11-02 | Average |
| Total Suspended Solids | mg/L | | | 2.0 | 1.0 | 1.3 | 3.0 | 2.7 | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| pH | no unit | 6.5-8.5 | 6.5-9.0 | 8.24 | 8.15 | 8.27 | 8.08 | 7.96 | 8.24 | 8.02 | 8.12 | 8.13 |
| Alkalinity | mg/L as $CaCO_3$ | | | 96 | 98 | 95 | 89 | 94 | 104 | 96 | 98 | 99 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.5 | 1.3 | 1.6 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 94 | 97 | 93 | 89 | 94 | 104 | 96 | 98 | 99 |
| Total Dissolved Solids | mg/L | | | 170 | 130 | 155 | 177 | 173 | 174 | 157 | 174 | 168 |
| Fluoride | mg/L | | **0.12** | 0.11 | 0.11 | 0.11 | 0.11 | **0.12** | 0.11 | 0.11 | 0.10 | 0.11 |
| Total Organic Carbon | mg/L | | | 2.4 | 2.1 | 2.2 | 1.5 | 2.0 | 2.0 | 2.0 | 3.0 | 2.3 |
| Ammonia+Ammonium(N) | as N mg/L | | | < 0.05 | < 0.05 | < 0.05 | 0.05 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 |
| Chloride (Dissolved) | mg/L | | **120** | 21 | 23 | 22 | 24 | 25 | 28 | 24 | 24 | 25 |
| Sulphate (dissolved) | mg/L | | | 23 | 24 | 23 | 21 | 22 | 26 | 20 | 21 | 22 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | **13** | 0.23 | 0.26 | 0.25 | 0.31 | 0.34 | 0.35 | 0.39 | 0.24 | 0.33 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 0.23 | 0.26 | 0.26 | 0.31 | 0.34 | 0.35 | 0.39 | 0.24 | 0.33 |
| Mercury (dissolved) | µg/L | **0.2** | **0.026** | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | **0.05** | < 0.01 | < 0.01 | 0.02 |
| Hardness | mg/L as $CaCO_3$ | | | 125 | 125 | 137 | 120 | 116 | 124 | 125 | 117 | 122 |
| Silver (total) | µg/L | **0.1** | **0.25** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (total) | µg/L | | | 33 | 23 | 42 | 13 | 19 | 10 | 3 | 2 | 5 |
| Aluminum (0.2µm) | µg/L | **75** | **100** | < 5 | < 5 | < 5 | 2 | 2 | 3 | 1 | 2 | 2 |
| Arsenic (total) | µg/L | **100** | **5** | < 1.0 | < 1.0 | < 1.0 | 0.9 | 0.8 | 1.0 | 0.9 | 0.9 | 0.9 |
| Barium (total) | µg/L | | | 22.0 | 22.5 | 23.0 | 23.1 | 20.7 | 24.5 | 22.5 | 20.9 | 22.6 |
| Beryllium (total) | µg/L | **1100** | | < 0.50 | < 0.50 | < 0.50 | 0.013 | < 0.007 | < 0.007 | < 0.007 | 0.007 | 0.007 |
| Boron (total) | µg/L | **200** | **1500** | 25 | 21 | 21 | 21 | 24 | 25 | 23 | 20 | 23 |
| Bismuth (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.03 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Calcium (total) | µg/L | | | 33500 | 33000 | 35333 | 34350 | 33133 | 35600 | 35900 | 33500 | 35000 |
| Cadmium (total) | µg/L | **0.2** | **0.09** | < 0.10 | < 0.10 | < 0.10 | < 0.003 | 0.004 | 0.003 | 0.008 | < 0.003 | 0.005 |
| Cobalt (total) | µg/L | **0.9** | | < 0.5 | < 0.5 | < 0.5 | 0.017 | 0.020 | 0.014 | 0.019 | 0.017 | 0.017 |
| Chromium (total) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.23 | 0.23 | 0.13 | 0.26 | 0.12 | 0.17 |
| Copper (total) | µg/L | **5** | | 2.7 | 1.2 | 1.2 | 0.9 | 0.7 | 0.9 | 0.9 | 0.7 | 0.8 |
| Iron (total) | µg/L | **300** | **300** | < 100 | < 100 | < 100 | 16 | 26 | 10 | 42 | < 7 | 20 |
| Potassium (total) | µg/L | | | 1600 | 1550 | 1533 | 1550 | 1597 | 1590 | 1660 | 1640 | 1630 |
| Magnesium (total) | µg/L | | | 8800 | 8600 | 8700 | 8330 | 8120 | 8670 | 8590 | 8190 | 8483 |
| Manganese (total) | µg/L | | | 2.6 | < 2.0 | 2.7 | 1.27 | 1.59 | 0.80 | 1.00 | 0.39 | 0.73 |
| Molybdenum (total) | µg/L | **40** | **73** | 1.2 | 1.3 | 1.2 | 1.22 | 1.22 | 1.12 | 1.20 | 1.19 | 1.17 |
| Sodium (total) | µg/L | | | 14000 | 13500 | 14000 | 12600 | 13467 | 14500 | 13600 | 12400 | 13500 |
| Nickel (total) | µg/L | **25** | **25** | < 1.0 | < 1.0 | < 1.0 | 0.4 | 0.6 | 0.5 | 0.6 | 0.4 | 0.5 |
| Phosphorus (total) | µg/L | **10-30** | | **8** | < **4** | **7** | **4** | **6** | **6** | **6** | **6** | **6** |
| Lead (total) | µg/L | **5** | **7** | < 0.5 | < 0.5 | < 0.5 | 0.03 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (total) | µg/L | **20** | | < 0.5 | < 0.5 | < 0.5 | < 0.9 | < 0.9 | < 0.9 | < 0.9 | < 0.9 | < 0.9 |
| Selenium (total) | µg/L | **100** | **1** | < 2.0 | < 2.0 | < 2.0 | 0.14 | 0.14 | 0.15 | 0.15 | < 0.04 | 0.11 |
| Tin (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.11 | 0.07 | 0.11 | < 0.06 | < 0.06 | 0.08 |
| Strontium (total) | µg/L | | | 170 | 165 | 170 | 184 | 170 | 178 | 185 | 178 | 180 |
| Titanium (total) | µg/L | | | < 5.0 | < 5.0 | 5.6 | 0.75 | 1.10 | 0.55 | 0.12 | < 0.05 | 0.24 |
| Thallium (total) | µg/L | **0.3** | **0.8** | < 0.05 | < 0.05 | < 0.05 | 0.015 | 0.005 | 0.006 | 0.008 | 0.006 | 0.007 |
| Uranium (total) | µg/L | **5** | **15** | 0.35 | 0.37 | 0.36 | 0.332 | 0.369 | 0.478 | 0.364 | 0.401 | 0.414 |
| Vanadium (total) | µg/L | **6** | | 0.52 | < 0.50 | 0.53 | 0.21 | 0.23 | 0.20 | 0.22 | 0.20 | 0.21 |
| Zinc (total) | µg/L | **30** | **30** | < 5 | < 5 | < 5 | 3 | < 2 | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **1** | | < 0.04 | < 0.04 | < 0.04 | 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.01 | 0.01 |
| Thorium-230 | Bq/L | | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | 100.3 | 84.9 | 113.4 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | 173.8 | 48.1 | 109.5 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | 209.8 | 308.6 | 302.7 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | 12.42 | 8.198 | 11.841 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | -1.21 | -0.36 | 3.79 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | 8.64 | 7.81 | 8.59 | -- |

**Note:**
*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG = Canadian Water Quality Guidelines for Protection of Aquatic Life*
**Bold values** indicate an exceedance of a PWQO or CWQG value.
[1] Field parameters included for current sampling year only.
-- - No data.

## Table 38: Surface Water Quality – Lake Ontario Diffuser – Port Granby Diffuser (PG-LO-E)

| | | Criteria | | PG-LO-E | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | |
| Parameter | Units | PWQO | CWQG | Average | | | | | 2022-06-15 | 2022-09-23 | 2022-11-02 | Average |
| Total Suspended Solids | mg/L | | | 2.5 | 1.0 | 1.7 | 2.0 | 3.0 | < 2.0 | 2.0 | 2.0 | 2.0 |
| pH | no unit | 6.5-8.5 | 6.5-9.0 | 8.20 | 8.16 | 8.25 | 8.04 | 8.03 | 8.33 | 8.05 | 8.03 | 8.14 |
| Alkalinity | mg/L as $CaCO_3$ | | | 95 | 98 | 94 | 90 | 97 | 96 | 102 | 95 | 98 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.4 | 1.3 | 1.6 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 94 | 97 | 93 | 90 | 97 | 96 | 102 | 95 | 98 |
| Total Dissolved Solids | mg/L | | | 188 | 120 | 160 | 171 | 167 | 154 | 166 | 206 | 175 |
| Fluoride | mg/L | | **0.12** | **0.14** | 0.12 | 0.10 | **0.12** | 0.11 | **0.12** | 0.10 | 0.11 | 0.11 |
| Total Organic Carbon | mg/L | | | 2.3 | 2.1 | 2.2 | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Ammonia+Ammonium(N) | as N mg/L | | | < 0.05 | < 0.05 | 0.05 | 0.05 | < 0.04 | 0.05 | 0.05 | < 0.04 | 0.05 |
| Chloride (Dissolved) | mg/L | | **120** | 22 | 22 | 22 | 24 | 24 | 29 | 24 | 24 | 26 |
| Sulphate (dissolved) | mg/L | | | 23 | 23 | 23 | 22 | 23 | 25 | 21 | 21 | 22 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | **13** | 0.23 | 0.30 | 0.26 | 0.31 | 0.34 | 0.34 | 0.40 | 0.28 | 0.34 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 0.23 | 0.30 | 0.26 | 0.31 | 0.34 | 0.34 | 0.40 | 0.28 | 0.34 |
| Mercury (dissolved) | µg/L | **0.2** | **0.026** | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 125 | 120 | 133 | 124 | 119 | 122 | 125 | 118 | 122 |
| Silver (total) | µg/L | **0.1** | **0.25** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (total) | µg/L | | | 34 | 19 | 34 | 18 | 26 | 8 | 3 | 3 | 5 |
| Aluminum (0.2µm) | µg/L | **75** | **100** | < 5 | < 5 | < 5 | 2 | 2 | 3 | 2 | < 1 | 2 |
| Arsenic (total) | µg/L | **100** | **5** | < 1.0 | < 1.0 | < 1.0 | 0.9 | 0.8 | 0.9 | 0.9 | 0.9 | 0.9 |
| Barium (total) | µg/L | | | 22.0 | 22.0 | 22.7 | 24.3 | 22.5 | 23.5 | 22.6 | 20.6 | 22.2 |
| Beryllium (total) | µg/L | **1100** | | < 0.50 | < 0.50 | < 0.50 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 |
| Boron (total) | µg/L | **200** | **1500** | 29 | 19 | 19 | 20 | 17 | 25 | 22 | 19 | 22 |
| Bismuth (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.02 | 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Calcium (total) | µg/L | | | 34500 | 32000 | 35333 | 35800 | 33900 | 34800 | 36100 | 33300 | 34733 |
| Cadmium (total) | µg/L | **0.2** | **0.09** | < 0.10 | < 0.10 | < 0.10 | 0.013 | 0.005 | 0.012 | 0.011 | 0.004 | 0.009 |
| Cobalt (total) | µg/L | **0.9** | | < 0.5 | < 0.5 | < 0.5 | 0.026 | 0.023 | 0.009 | 0.015 | 0.011 | 0.012 |
| Chromium (total) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.24 | 0.20 | 0.30 | 0.25 | < 0.08 | 0.21 |
| Copper (total) | µg/L | **5** | | 2.7 | 1.4 | < 1.0 | 0.9 | 0.8 | 0.8 | 1.6 | 0.8 | 1.1 |
| Iron (total) | µg/L | **300** | **300** | < 100 | < 100 | < 100 | 21 | 37 | 8 | 33 | < 7 | 16 |
| Potassium (total) | µg/L | | | 1600 | 1450 | 1567 | 1595 | 1577 | 1560 | 1680 | 1650 | 1630 |
| Magnesium (total) | µg/L | | | 8850 | 8350 | 8800 | 8295 | 8463 | 8480 | 8590 | 8400 | 8490 |
| Manganese (total) | µg/L | | | 2.7 | < 2.0 | 2.2 | 1.34 | 2.15 | 0.74 | 0.97 | 0.40 | 0.70 |
| Molybdenum (total) | µg/L | **40** | **73** | 1.2 | 1.2 | 1.1 | 1.23 | 1.14 | 1.17 | 1.21 | 1.24 | 1.21 |
| Sodium (total) | µg/L | | | 13500 | 13500 | 14000 | 12600 | 13633 | 14100 | 14000 | 12600 | 13567 |
| Nickel (total) | µg/L | **25** | **25** | < 1.0 | < 1.0 | < 1.0 | 0.4 | 0.5 | 0.5 | 0.7 | 0.5 | 0.6 |
| Phosphorus (total) | µg/L | **10-30** | | **7** | **5** | **8** | **4** | **7** | **8** | **6** | **4** | **6** |
| Lead (total) | µg/L | **5** | **7** | < 0.5 | < 0.5 | < 0.5 | < 0.01 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (total) | µg/L | **20** | | < 0.5 | < 0.5 | < 0.5 | < 0.9 | < 0.9 | < 0.9 | < 0.9 | < 0.9 | < 0.9 |
| Selenium (total) | µg/L | **100** | **1** | < 2.0 | < 2.0 | < 2.0 | 0.13 | 0.16 | 0.14 | 0.15 | 0.17 | 0.15 |
| Tin (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.12 | 0.08 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Strontium (total) | µg/L | | | 170 | 160 | 167 | 189 | 170 | 175 | 186 | 181 | 181 |
| Titanium (total) | µg/L | | | 5.1 | < 5.0 | 5.6 | 0.80 | 1.31 | 0.48 | 0.15 | < 0.05 | 0.23 |
| Thallium (total) | µg/L | **0.3** | **0.8** | < 0.05 | < 0.05 | < 0.05 | 0.007 | < 0.005 | < 0.005 | 0.006 | 0.006 | 0.006 |
| Uranium (total) | µg/L | **5** | **15** | 0.36 | 0.37 | 0.35 | 0.335 | 0.345 | 0.462 | 0.363 | 0.412 | 0.412 |
| Vanadium (total) | µg/L | **6** | | 0.51 | < 0.50 | < 0.50 | 0.23 | 0.25 | 0.17 | 0.22 | 0.18 | 0.19 |
| Zinc (total) | µg/L | **30** | **30** | < 5 | < 5 | < 5 | 2 | 3 | < 2 | 3 | < 2 | 2 |
| Lead-210 | Bq/L | | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **1** | | < 0.04 | < 0.04 | < 0.04 | < 0.01 | 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | 105.3 | 84.4 | 109.5 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | 166.9 | 54.7 | 131.1 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | 310.5 | 308.6 | 299.2 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | 12.138 | 8.253 | 11.687 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | 8.17 | -0.35 | 1.88 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | 8.43 | 7.79 | 8.40 | -- |

**Note:**
*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG = Canadian Water Quality Guidelines for Protection of Aquatic Life*
**Bold values** indicate an exceedance of a PWQO or CWQG value.
[1] Field parameters included for current sampling year only.
-- - No data.

## Table 39: Surface Water Quality – Lake Ontario Diffuser – Port Granby Diffuser (PG-LO-W)

| | | | | PG-LO-W | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Criteria | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | |
| Parameter | Units | PWQO | CWQG | Average | | | | | 2022-06-15 | 2022-09-23 | 2022-11-02 | Average |
| Total Suspended Solids | mg/L | | | 2.5 | < 1.0 | 1.3 | 2.0 | 3.0 | 2.0 | < 2.0 | < 2.0 | < 2.0 |
| pH | no unit | 6.5-8.5 | 6.5-9.0 | 8.19 | 8.12 | 8.22 | 8.07 | 7.95 | 8.04 | 8.06 | 8.08 | 8.06 |
| Alkalinity | mg/L as $CaCO_3$ | | | 95 | 98 | 94 | 93 | 95 | 104 | 95 | 95 | 98 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.4 | 1.2 | 1.4 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 93 | 96 | 92 | 93 | 95 | 104 | 95 | 95 | 98 |
| Total Dissolved Solids | mg/L | | | 201 | 118 | 172 | 173 | 160 | 146 | 157 | 174 | 159 |
| Fluoride | mg/L | | **0.12** | 0.11 | **0.12** | 0.10 | **0.12** | 0.11 | 0.11 | 0.11 | 0.09 | 0.10 |
| Total Organic Carbon | mg/L | | | 2.3 | 2.1 | 2.1 | 1.5 | 2.3 | 2.0 | 2.0 | 2.0 | 2.0 |
| Ammonia+Ammonium(N) | as N mg/L | | | < 0.05 | < 0.05 | < 0.05 | 0.06 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 |
| Chloride (Dissolved) | mg/L | | **120** | 22 | 22 | 22 | 25 | 25 | 28 | 24 | 25 | 26 |
| Sulphate (dissolved) | mg/L | | | 23 | 24 | 23 | 22 | 23 | 31 | 20 | 21 | 24 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | **13** | 0.23 | 0.29 | 0.26 | 1.10 | 0.34 | 0.35 | 0.37 | 0.30 | 0.34 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 0.23 | 0.29 | 0.26 | 1.10 | 0.34 | 0.35 | 0.37 | 0.30 | 0.34 |
| Mercury (dissolved) | µg/L | **0.2** | **0.026** | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 125 | 120 | 133 | 126 | 117 | 125 | 120 | 118 | 121 |
| Silver (total) | µg/L | **0.1** | **0.25** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (total) | µg/L | | | 54 | 20 | 36 | 13 | 30 | 8 | 3 | 1 | 4 |
| Aluminum (0.2µm) | µg/L | **75** | **100** | < 5 | < 5 | < 5 | 2 | 2 | 4 | 1 | 2 | 2 |
| Arsenic (total) | µg/L | **100** | **5** | < 1.0 | < 1.0 | < 1.0 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 |
| Barium (total) | µg/L | | | 23.0 | 21.5 | 22.3 | 24.4 | 22.2 | 24.2 | 21.8 | 22.1 | 22.7 |
| Beryllium (total) | µg/L | **1100** | | < 0.50 | < 0.50 | < 0.50 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 |
| Boron (total) | µg/L | **200** | **1500** | 26 | 21 | 20 | 21 | 20 | 26 | 27 | 21 | 25 |
| Bismuth (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.02 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Calcium (total) | µg/L | | | 35000 | 32000 | 35000 | 36100 | 32900 | 35600 | 34000 | 34000 | 34533 |
| Cadmium (total) | µg/L | **0.2** | **0.09** | < 0.10 | < 0.10 | < 0.10 | 0.006 | 0.005 | 0.005 | 0.007 | 0.006 | 0.006 |
| Cobalt (total) | µg/L | **0.9** | | < 0.5 | < 0.5 | < 0.5 | 0.020 | 0.028 | 0.014 | 0.019 | 0.017 | 0.017 |
| Chromium (total) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.21 | 0.71 | 0.16 | 0.21 | 0.14 | 0.17 |
| Copper (total) | µg/L | **5** | | 1.4 | 1.7 | 1.4 | 0.9 | 0.9 | 1.2 | 1.6 | 0.8 | 1.2 |
| Iron (total) | µg/L | **300** | **300** | 115 | 210 | < 100 | 17 | 48 | 9 | 152 | < 7 | 56 |
| Potassium (total) | µg/L | | | 1650 | 1550 | 1533 | 1640 | 1590 | 1630 | 1580 | 1640 | 1617 |
| Magnesium (total) | µg/L | | | 9050 | 8400 | 8633 | 8540 | 8373 | 8660 | 8520 | 8020 | 8400 |
| Manganese (total) | µg/L | | | 4.2 | 3.2 | 2.1 | 1.21 | 2.74 | 0.77 | 1.15 | 0.62 | 0.85 |
| Molybdenum (total) | µg/L | **40** | **73** | 1.2 | 1.1 | 1.1 | 1.26 | 1.41 | 1.13 | 1.12 | 1.11 | 1.12 |
| Sodium (total) | µg/L | | | 14000 | 13000 | 14000 | 13000 | 13933 | 14600 | 13200 | 12300 | 13367 |
| Nickel (total) | µg/L | **25** | **25** | < 1.0 | < 1.0 | < 1.0 | 0.4 | 0.7 | 0.6 | 0.6 | 0.4 | 0.5 |
| Phosphorus (total) | µg/L | **10-30** | | **9** | < **4** | **8** | < **3** | 11 | **7** | **4** | **3** | **5** |
| Lead (total) | µg/L | **5** | **7** | < 0.5 | < 0.5 | < 0.5 | 0.01 | 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (total) | µg/L | **20** | | < 0.5 | < 0.5 | < 0.5 | < 0.9 | < 0.9 | < 0.9 | < 0.9 | < 0.9 | < 0.9 |
| Selenium (total) | µg/L | **100** | **1** | < 2.0 | < 2.0 | < 2.0 | 0.15 | 0.15 | 0.17 | 0.1 | 0.1 | 0.14 |
| Tin (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.28 | 0.07 | 0.08 | < 0.06 | < 0.06 | 0.07 |
| Strontium (total) | µg/L | | | 170 | 165 | 163 | 191 | 169 | 181 | 178 | 176 | 178 |
| Titanium (total) | µg/L | | | 6.4 | < 5.0 | 5.1 | 0.80 | 1.60 | 0.32 | 0.17 | 0.10 | 0.20 |
| Thallium (total) | µg/L | **0.3** | **0.8** | < 0.05 | < 0.05 | < 0.05 | 0.006 | 0.005 | 0.005 | < 0.005 | 0.006 | 0.005 |
| Uranium (total) | µg/L | **5** | **15** | 0.35 | 0.38 | 0.35 | 0.325 | 0.350 | 0.476 | 0.367 | 0.346 | 0.396 |
| Vanadium (total) | µg/L | **6** | | 0.53 | < 0.50 | 0.50 | 0.23 | 0.25 | 0.23 | 0.18 | 0.18 | 0.20 |
| Zinc (total) | µg/L | **30** | **30** | < 5 | < 5 | < 5 | 2 | 2 | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **1** | | < 0.04 | < 0.04 | < 0.04 | < 0.01 | 0.01 | 0.02 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | 104.8 | 84.2 | 111.9 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | 162.4 | 51.9 | 118.4 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | 305.8 | 308 | 298.8 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | 12.075 | 8.496 | 11.753 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | 1.71 | -0.32 | 1.42 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | 8.45 | 7.86 | 8.40 | -- |

**Note:**
*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG = Canadian Water Quality Guidelines for Protection of Aquatic Life*
**Bold values** indicate an exceedance of a PWQO or CWQG value.
[1] Field parameters included for current sampling year only.
-- - No data.

## Table 40: Surface Water Quality – North Storm Water Pond – Location 1 (PG-SP1)

| | | Criteria | | PG-SP1 (North Storm Water Pond) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | | | | | | | | | | |
| Parameter | Units | PWQO | CWQG | Average | | | | | 2022-01-06 | 2022-02-01 | 2022-03-18 | 2022-04-14 | 2022-05-25 | 2022-06-13 | 2022-07-22 | 2022-08-15 | 2022-09-09 | 2022-10-21 | 2022-11-18 | 2022-12-22 | Average |
| Total Suspended Solids | mg/L | | | 14 | 29 | 21 | 34 | 18 | No Sample[2] | No Sample[2] | 22 | 5 | 16 | 2 | 17 | 10 | 3 | 10 | 7 | No Sample[2] | 11 |
| pH | no unit | **6.5-8.5** | **6.5-9.0** | 8.22 | 8.14 | 8.03 | 8.09 | 8.19 | | | 7.75 | 8.35 | **10.30** | 8.93 | 8.50 | 8.27 | 8.05 | 7.68 | 7.38 | | 8.38 |
| Alkalinity | mg/L as $CaCO_3$ | | | 77 | 68 | 87 | 79 | 82 | | | 101 | 109 | 30 | 49 | 71 | 108 | 83 | 52 | 59 | | 69 |
| Carbonate | mg/L as $CaCO_3$ | | | 2 | 2 | 1 | 1 | 3 | | | < 1 | 2 | 30 | 11 | 4 | < 1 | < 1 | < 1 | < 1 | | 6 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 76 | 66 | 86 | 79 | 80 | | | 101 | 107 | < 1 | 38 | 67 | 108 | 83 | 52 | 59 | | 64 |
| Total Dissolved Solids | mg/L | | | 233 | 299 | 298 | 313 | 269 | | | 130 | 274 | 223 | 266 | 160 | 150 | 209 | 183 | 234 | | 207 |
| Fluoride | mg/L | | **0.12** | **0.16** | **0.27** | **0.43** | **0.24** | **0.18** | | | **0.12** | **0.13** | **0.15** | **0.17** | **0.18** | **0.15** | **0.17** | **0.22** | **0.23** | | **0.17** |
| Total Organic Carbon | mg/L | | | 4.8 | 3.5 | 3.5 | 2.5 | 4.0 | | | 6.0 | 5.0 | 9.0 | 6.0 | 5.0 | 5.0 | 5.0 | 5.0 | 7.0 | | 5.9 |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.064 | 0.065 | 0.083 | < 0.04 | 0.06 | | | 0.10 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | | 0.05 |
| Chloride (Dissolved) | mg/L | | **120** | 18 | 31 | 14 | 79 | 42 | | | 7.2 | 39 | 32 | 25 | 11 | 16 | 16 | 23 | 24 | | 22 |
| Sulphate (dissolved) | mg/L | | | 67 | 108 | 94 | 84 | 65 | | | 15 | 61 | 88 | 84 | 47 | 22 | 32 | 43 | 55 | | 53 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.3 | 0.4 | | | < 0.3 | 0.4 | 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | | < 0.3 |
| Nitrite (as N) | as N mg/L | | | 0.01 | 0.01 | 0.02 | < 0.03 | < 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** | 0.58 | 0.39 | 0.27 | 0.37 | 0.51 | | | 0.28 | < 0.06 | < 0.06 | 0.32 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | 0.10 | | 0.11 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 0.59 | 0.39 | 0.28 | 0.37 | 0.51 | | | 0.28 | < 0.06 | < 0.06 | 0.32 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | 0.10 | | 0.11 |
| Mercury (dissolved) | µg/L | **0.20** | **0.026** | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | | | < 0.01 | < 0.01 | **0.03** | 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | | 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 157 | 200 | 197 | 222 | 199 | | | 133 | 217 | 161 | 170 | 125 | 139 | 121 | 114 | 160 | | 150 |
| Silver (total) | µg/L | **0.1** | **0.25** | < 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 | | | 458 | 691 | 359 | 746 | 407 | | | 944 | 186 | 402 | 142 | 639 | 127 | 141 | 266 | 219 | | 350 |
| Aluminum (0.2µm) | µg/L | **75** | **100** | 29 | 12 | 11 | **120** | 35 | | | 9 | 24 | 16 | 36 | 39 | 42 | 39 | 29 | 22 | | 28 |
| Arsenic (total) | µg/L | **100** | **5** | 1.8 | 1.6 | **190.9** | 3.5 | **5.4** | | | 0.9 | 1.9 | **6.0** | 3.8 | 2.5 | 4.9 | 3.6 | 2.5 | 1.7 | | 3.4 |
| Barium (total) | µg/L | | | 26 | 37 | 36 | 47 | 31 | | | 27.1 | 22.1 | 6.26 | 22.4 | 24.4 | 27.9 | 24.4 | 21.9 | 27 | | 21 |
| Beryllium (total) | µg/L | **1100** | | 0.50 | < 0.50 | < 0.50 | 0.029 | 0.015 | | | 0.036 | 0.007 | < 0.007 | 0.008 | 0.032 | 0.007 | 0.010 | 0.014 | 0.008 | | 0.014 |
| Boron (total) | µg/L | **200** | **1500** | 61 | 87 | 77 | 36 | 44 | | | 10 | 21 | 48 | 54 | 31 | 40 | 33 | 26 | 35 | | 33 |
| Bismuth (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.038 | 0.022 | | | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | 0.010 | < 0.010 | | < 0.010 |
| Calcium (total) | µg/L | | | 52455 | 64500 | 65143 | 75073 | 66890 | | | 46800 | 74500 | 49300 | 54900 | 43900 | 45600 | 40500 | 36200 | 54000 | | 49400 |
| Cadmium (total) | µg/L | **0.20** | **0.09** | < 0.10 | < 0.10 | < 0.10 | 0.012 | 0.010 | | | 0.021 | 0.007 | 0.007 | 0.004 | 0.023 | 0.005 | 0.004 | 0.009 | 0.026 | | 0.012 |
| Cobalt (total) | µg/L | **0.90** | | 0.52 | 0.66 | **1.62** | 0.579 | 0.309 | | | 0.787 | 0.16 | 0.341 | 0.166 | 0.407 | 0.170 | 0.175 | 0.248 | 0.170 | | 0.297 |
| Chromium (total) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 1.184 | 0.822 | | | 1.56 | 0.36 | 0.61 | 0.43 | 1.14 | 0.40 | 0.34 | 0.350 | 0.390 | | 0.628 |
| Copper (total) | µg/L | **5** | | 1.2 | 1.6 | 3.7 | 2.3 | 1.5 | | | 1.9 | 1.0 | 1.2 | 1.0 | 1.8 | 0.7 | 1.3 | 1.1 | 1.9 | | 1.3 |
| Iron (total) | µg/L | **300** | **300** | **505** | **757** | **373** | **686** | **374** | | | **1060** | 160 | **467** | 119 | **750** | 175 | 202 | 252 | 213 | | **391** |
| Potassium (total) | µg/L | | | 3091 | 3130 | 4086 | 2579 | 2810 | | | 3560 | 3040 | 2620 | 1910 | 3010 | 3430 | 3620 | 4470 | 6960 | | 3526 |
| Magnesium (total) | µg/L | | | 8055 | 11630 | 10057 | 8497 | 7733 | | | 3910 | 7450 | 9300 | 7930 | 3790 | 6050 | 4780 | 5640 | 6130 | | 6396 |
| Manganese (total) | µg/L | | | 52 | 30 | 33 | 33.9 | 23.6 | | | 222 | 20.4 | 64.9 | 15.1 | 61.0 | 86.1 | 44.0 | 13.2 | 8.7 | | 60.1 |
| Molybdenum (total) | µg/L | **40** | **73** | 2.3 | 3.3 | 13.9 | 2.35 | 1.68 | | | 0.90 | 1.10 | 1.72 | 1.50 | 1.54 | 1.30 | 1.36 | 1.49 | 1.46 | | 1.37 |
| Sodium (total) | µg/L | | | 9591 | 11610 | 7743 | 38227 | 12805 | | | 2800 | 5240 | 7820 | 7140 | 3680 | 7760 | 6640 | 7760 | 8740 | | 6478 |
| Nickel (total) | µg/L | **25** | **25** | 1.1 | 1.4 | 3.2 | 1.2 | 0.7 | | | 1.3 | 0.6 | 0.8 | 0.5 | 1.1 | 0.6 | 0.5 | 0.7 | 0.7 | | 0.8 |
| Phosphorus (total) | µg/L | **10-30** | | **41** | **40** | **48** | **38** | **34** | | | **81** | 25 | **35** | 24 | **79** | **52** | 27 | 27 | **73** | | **45** |
| Lead (total) | µg/L | **5** | **7** | 0.53 | 0.69 | 1.44 | 0.52 | 0.33 | | | 0.60 | 0.17 | 0.30 | 0.12 | 0.48 | 0.09 | 0.13 | 0.22 | 0.21 | | 0.27 |
| Antimony (total) | µg/L | **20** | | < 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 |
| Selenium (total) | µg/L | **100** | **1** | < 2.0 | < 2.0 | < 2.0 | 0.16 | 0.15 | | | 0.07 | 0.15 | 0.15 | 0.10 | 0.15 | 0.14 | < 0.04 | 0.20 | 0.45 | | 0.16 |
| Tin (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.13 | 0.08 | | | 0.06 | < 0.06 | < 0.06 | 0.06 | 0.06 | 0.11 | 0.20 | 0.47 | 0.15 | | 0.13 |
| Strontium (total) | µg/L | | | 1088 | 1792 | 1307 | 1008 | 837 | | | 334 | 810 | 784 | 830 | 490 | 381 | 405 | 410 | 512 | | 579 |
| Titanium (total) | µg/L | | | 20 | 32 | 16 | 28.1 | 14.1 | | | 37.3 | 7.0 | 14.5 | 4.7 | 43.9 | 3.0 | 4.1 | 8.9 | 8.0 | | 14.7 |
| Thallium (total) | µg/L | **0.3** | **0.8** | 0.050 | < 0.050 | 0.054 | 0.011 | 0.008 | | | 0.016 | < 0.005 | < 0.005 | < 0.005 | 0.014 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | | 0.007 |
| Uranium (total) | µg/L | **5** | **15** | 1.1 | 2.9 | **51.8** | 4.32 | 3.19 | | | 1.08 | 3.41 | 1.94 | 2.65 | 1.04 | 1.10 | 1.20 | 1.95 | 1.98 | | 1.83 |
| Vanadium (total) | µg/L | **6** | | 1.80 | 1.74 | **7.60** | 2.01 | 1.29 | | | 2.48 | 0.64 | 1.62 | 0.93 | 2.49 | 0.75 | 0.90 | 0.98 | 0.80 | | 1.35 |
| Zinc (total) | µg/L | **30** | **30** | 5.9 | 7.1 | < 5.0 | 5 | 4 | | | 15 | < 2 | < 2 | < 2 | 4 | 3 | < 2 | < 2 | 4 | | 4 |
| Lead-210 | Bq/L | | | 0.04 | < 0.10 | < 0.10 | 0.02 | < 0.02 | | | < 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** | | < 0.04 | < 0.04 | 0.10 | 0.02 | 0.02 | | | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.01 | | < 0.01 |
| Thorium-230 | Bq/L | | | < 0.07 | < 0.06 | 0.09 | < 0.02 | < 0.02 | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | < 0.02 |
| Thorium-232 | Bq/L | | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | | | < 0.02 | < 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] | -[1] | | | 94 | 143.5 | 152.5 | -[3] | 100.8 | 111.3 | 128.4 | 90.8 | 132.2 | | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | | | 138.8 | 153 | 165.9 | -[3] | 99.2 | 137.7 | 113.1 | 87.8 | 105.3 | | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | | | 274.9 | 429.6 | 361.8 | -[3] | 274.2 | 313.3 | 293.9 | 277.1 | 375.1 | | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | | | 3.096 | 12.413 | 20.793 | -[3] | 24.535 | 23.962 | 25.105 | 7.165 | 5.236 | | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | | | 51.13 | 14.43 | 41.1 | -[3] | 18.68 | 4.16 | 1.91 | 8.97 | 8.99 | | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | | | 7.91 | 8.70 | 10.32 | -[3] | 8.89 | 8.38 | 8.25 | 8.31 | 9.04 | | -- |

**Note:**
*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life*
**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 water sample.
[3] No field parameters - water quality units out for repair.
-- - No data.

## Table 41: Surface Water Quality – South Storm Water Pond – Location 2 (PG-SP2)

| | | Criteria | | PG-SP2 (South Storm Water Pond) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | | | | | | | | | | | |
| Parameter | Units | PWQO | CWQG | Average | | | | | 2022-01-06 | 2022-02-01 | 2022-03-18 | 2022-04-14 | 2022-05-25 | 2022-06-13 | 2022-07-22 | 2022-08-15 | 2022-09-09 | 2022-10-21 | 2022-11-18 | 2022-12-22 | Average |
| Total Suspended Solids | mg/L | | | 11 | 4 | 9 | 8 | 9 | No Sample[2] | No Sample[2] | 11 | 2 | 2 | 2 | 3 | 6 | 4 | 4 | 8 | No Sample[2] | 5 |
| pH | no unit | **6.5-8.5** | **6.5-9.0** | 8.30 | 7.92 | 8.08 | 8.22 | 7.81 | | | 8.02 | 8.08 | **9.42** | 8.14 | 7.69 | 7.73 | 8.59 | 7.65 | 7.94 | | 8.14 |
| Alkalinity | mg/L as $CaCO_3$ | | | 78 | 70 | 78 | 79 | 93 | | | 35 | 91 | 49 | 53 | 99 | 163 | 73 | 111 | 126 | | 89 |
| Carbonate | mg/L as $CaCO_3$ | | | 2 | 1 | 1 | 4 | 2 | | | < 1 | < 1 | 16 | < 1 | < 1 | < 1 | 3 | < 1 | < 1 | | 3 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 74 | 70 | 77 | 75 | 92 | | | 35 | 91 | 32 | 53 | 99 | 163 | 70 | 111 | 126 | | 87 |
| Total Dissolved Solids | mg/L | | | 178 | 198 | 261 | 367 | 285 | | | 57 | 243 | 197 | 229 | 191 | 240 | 194 | 214 | 209 | | 197 |
| Fluoride | mg/L | | **0.12** | **0.17** | **0.19** | **0.18** | **0.15** | **0.18** | | | < 0.06 | **0.14** | **0.16** | **0.19** | **0.18** | **0.16** | **0.20** | **0.20** | **0.16** | | **0.16** |
| Total Organic Carbon | mg/L | | | 4.8 | 4.3 | 4.6 | 3.9 | 4.0 | | | 1.0 | 3.0 | 2.0 | 5.0 | 6.0 | 6.0 | 5.0 | 4.0 | 5.0 | | 4.1 |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.054 | < 0.050 | < 0.050 | < 0.04 | 0.06 | | | 0.29 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | 0.04 | | 0.07 |
| Chloride (Dissolved) | mg/L | | **120** | 25 | 63 | 86 | 140 | 57 | | | 8.4 | 76 | 62 | 58 | 43 | 26 | 24 | 31 | 30 | | 40 |
| Sulphate (dissolved) | mg/L | | | 26 | 22 | 19 | 42 | 62 | | | 3.2 | 32 | 33 | 38 | 28 | 16 | 14 | 14 | 16 | | 21.6 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.4 | < 0.3 | | | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 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 | | < 0.03 |
| Nitrate (as N) | as N mg/L | | **13** | 0.17 | < 0.10 | < 0.10 | < 0.06 | 0.10 | | | 0.09 | < 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 | | | 0.17 | < 0.10 | < 0.10 | < 0.06 | 0.10 | | | 0.09 | < 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 $CaCO_3$ | | | 109 | 110 | 123 | 166 | 189 | | | 39 | 135 | 96 | 115 | 127 | 179 | 97 | 133 | 160 | | 120 |
| Silver (total) | µg/L | **0.1** | **0.25** | < 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 | | < 0.05 |
| Aluminum (total) | µg/L | | | 205 | 124 | 92 | 113 | 178 | | | 268 | 76 | 128 | 22 | 53 | 20 | 25 | 64 | 106 | | 85 |
| Aluminum (0.2µm) | µg/L | **75** | **100** | 16 | 13 | 8 | 49 | 6 | | | 9 | 8 | 15 | 10 | < 1 | 4 | 7 | 6 | 4 | | 7 |
| Arsenic (total) | µg/L | **100** | **5** | 1.4 | 1.9 | **6.1** | **17.6** | **22.3** | | | 1.4 | **11.7** | **11.0** | **8.5** | **7.1** | **5.7** | **5.2** | 4.5 | 4.4 | | **6.6** |
| Barium (total) | µg/L | | | 16 | 17 | 20 | 27 | 30 | | | 9.2 | 10.3 | 4.31 | 18.8 | 26.2 | 31.3 | 15.0 | 15.0 | 17.9 | | 16 |
| Beryllium (total) | µg/L | **1100** | | < 0.50 | < 0.50 | < 0.50 | 0.009 | 0.012 | | | 0.014 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | 0.012 | | 0.008 |
| Boron (total) | µg/L | **200** | **1500** | 27 | 21 | 19 | 24 | 42 | | | < 2 | 18 | 32 | 34 | 31 | 58 | 26 | 21 | 34 | | 28 |
| Bismuth (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.008 | < 0.010 | | | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | | < 0.010 |
| Calcium (total) | µg/L | | | 37527 | 38500 | 42111 | 54360 | 62010 | | | 14500 | 46800 | 30100 | 37500 | 43100 | 63300 | 31000 | 45200 | 56000 | | 40833 |
| Cadmium (total) | µg/L | **0.20** | **0.09** | 0.10 | < 0.10 | < 0.10 | 0.006 | 0.018 | | | 0.010 | 0.004 | < 0.003 | 0.006 | < 0.003 | < 0.003 | 0.003 | 0.005 | 0.021 | | 0.006 |
| Cobalt (total) | µg/L | **0.90** | | 0.51 | 0.51 | < 0.50 | 0.628 | 0.845 | | | 0.315 | 0.579 | 0.41 | 0.16 | 0.16 | 0.10 | 0.17 | 0.88 | 0.08 | | 0.32 |
| Chromium (total) | µg/L | | | 5.0 | < 5.0 | < 5.0 | 0.362 | 7.941 | | | 0.47 | 0.23 | 0.32 | 0.21 | 0.19 | 0.23 | 0.19 | 0.19 | 0.41 | | 0.27 |
| Copper (total) | µg/L | **5** | | 1.1 | < 1.0 | 1.2 | 1.0 | 0.9 | | | 1.0 | 0.4 | 0.9 | 0.5 | 0.7 | < 0.2 | 1.1 | 0.5 | 0.8 | | 0.7 |
| Iron (total) | µg/L | **300** | **300** | 271 | 241 | 148 | 120 | 225 | | | 287 | 97 | 281 | 52 | 114 | 146 | 66 | 71 | 106 | | 136 |
| Potassium (total) | µg/L | | | 2325 | 1838 | 1733 | 5119 | 4965 | | | 1660 | 5410 | 3600 | 2290 | 2790 | 3400 | 1830 | 2280 | 4810 | | 3119 |
| Magnesium (total) | µg/L | | | 3742 | 4460 | 4933 | 7300 | 8192 | | | 730 | 4510 | 5040 | 5200 | 4580 | 5110 | 4730 | 4910 | 4920 | | 4414 |
| Manganese (total) | µg/L | | | 44 | 116 | 28 | 43.1 | 36.4 | | | 56.1 | 13.80 | 68.8 | 33.0 | 179.0 | 30.0 | 15.8 | 7.9 | 17.1 | | 46.8 |
| Molybdenum (total) | µg/L | **40** | **73** | 0.88 | 0.60 | 0.61 | 2.58 | 6.16 | | | 0.64 | 2.73 | 2.55 | 1.67 | 1.67 | 1.12 | 0.97 | 1.14 | 1.13 | | 1.51 |
| Sodium (total) | µg/L | | | 14082 | 31260 | 47111 | 68590 | 25455 | | | 5010 | 25600 | 30900 | 27800 | 16300 | 14900 | 14500 | 13800 | 14600 | | 18157 |
| Nickel (total) | µg/L | **25** | **25** | 1.0 | 1.0 | < 1.0 | 3.2 | 3.3 | | | 0.6 | 2.8 | 2.5 | 1.9 | 1.4 | 0.9 | 0.9 | 0.9 | 0.9 | | 1.4 |
| Phosphorus (total) | µg/L | **10-30** | | **36** | 23 | **30** | 26 | **30** | | | **67** | 17 | 22 | 27 | **45** | 22 | 21 | 25 | **40** | | **32** |
| Lead (total) | µg/L | **5** | **7** | 0.55 | 0.50 | 0.51 | 0.30 | 0.32 | | | 0.35 | 0.11 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | | 0.12 |
| Antimony (total) | µg/L | **20** | | < 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 | | < 0.9 |
| Selenium (total) | µg/L | **100** | **1** | < 2.0 | < 2.0 | < 2.0 | 0.05 | 0.07 | | | 0.07 | 0.04 | 0.09 | 0.09 | 0.07 | 0.05 | < 0.04 | < 0.04 | 0.17 | | 0.07 |
| Tin (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.13 | 0.07 | | | 0.06 | < 0.06 | < 0.06 | 0.06 | 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | | < 0.06 |
| Strontium (total) | µg/L | | | 414 | 307 | 359 | 566 | 596 | | | 70.5 | 454 | 346 | 386 | 387 | 442 | 357 | 353 | 361 | | 351 |
| Titanium (total) | µg/L | | | 11 | 8 | 7 | 4.3 | 10.8 | | | 10.1 | 2.5 | 3.4 | 1.3 | 2.6 | 0.8 | 0.8 | 2.5 | 4.7 | | 3.2 |
| Thallium (total) | µg/L | **0.3** | **0.8** | < 0.050 | < 0.050 | < 0.050 | 0.006 | 0.006 | | | 0.005 | < 0.005 | < 0.005 | < 0.005 | 0.006 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | | < 0.005 |
| Uranium (total) | µg/L | **5** | **15** | 1.4 | 1.8 | 2.4 | 2.62 | **49.57** | | | 3.3 | **18.3** | **6.8** | 3.8 | 4.4 | **5.7** | 3.5 | 4.0 | 4.8 | | **6.1** |
| Vanadium (total) | µg/L | **6** | | 0.85 | 0.73 | 0.83 | 0.42 | 0.69 | | | 0.77 | 0.31 | 0.54 | 0.29 | 0.51 | 0.29 | 0.27 | 0.24 | 0.30 | | 0.39 |
| Zinc (total) | µg/L | **30** | **30** | 5.7 | 16.6 | 5.1 | 4 | 3 | | | 5 | < 2 | < 2 | < 2 | < 2 | < 2 | < 2 | 2 | < 2 | | < 2 |
| Lead-210 | Bq/L | | | 0.03 | < 0.10 | 0.12 | < 0.02 | < 0.02 | | | < 0.02 | < 0.02 | 0.05 | 0.03 | < 0.02 | 0.06 | < 0.04 | < 0.02 | < 0.02 | | 0.03 |
| Radium-226 | Bq/L | **1** | | < 0.04 | < 0.04 | 0.12 | 0.01 | 0.01 | | | < 0.01 | < 0.01 | < 0.01 | 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | | < 0.01 |
| Thorium-230 | Bq/L | | | < 0.07 | < 0.06 | 0.12 | < 0.02 | < 0.02 | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | < 0.02 |
| Thorium-232 | Bq/L | | | < 0.06 | < 0.05 | < 0.06 | < 0.02 | < 0.02 | | | < 0.02 | < 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] | -[1] | | | 86.3 | 124.4 | 174 | -[3] | 53.5 | 104.5 | 260.5 | 73.7 | 95.0 | | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | | | 122.9 | 163.9 | 162.9 | -[3] | 130.5 | 139.3 | 118.6 | 91.4 | 120.7 | | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | | | 104.8 | 420.1 | 354.2 | -[3] | 354.4 | 438 | 268.2 | 339.8 | 383.5 | | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | | | 1.896 | 12.056 | 20.099 | -[3] | 25.635 | 23.006 | 24.149 | 7.328 | 2.884 | | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | | | 0.94 | 4.56 | 2.79 | -[3] | 2.25 | 1.77 | 1.63 | 1.04 | 3.7 | | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | | | 8.36 | 8.42 | 9.48 | -[3] | 7.81 | 7.85 | 8.85 | 7.99 | 8.28 | | -- |

**Note:**
*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life*
**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 water sample.
[3] No field parameters - water quality units out for repair.
-- - No data.

## Table 42: Drainage Water Quality – PG LTWMF (PG-SW-1/DP1-02)

| | | Criteria | | PG-SW1/DP1-02 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | |
| Parameter | Units | PWQO | CWQG | Average | | | | | 2022-05-03 | 2022-11-07 | Average |
| Total Suspended Solids | mg/L | | | 10 | 3 | 34 | 7 | 9 | 25 | 36 | 31 |
| pH | no unit | 6.5 - 8.5 | 6.5-9.0 | 7.96 | 7.74 | 8.07 | 7.84 | 7.78 | 7.97 | 7.28 | 7.63 |
| Alkalinity | mg/L as $CaCO_3$ | | | 130 | 120 | 155 | 151 | 137 | 169 | 169 | 169 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.2 | < 1.0 | 1.8 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 125 | 120 | 155 | 151 | 137 | 169 | 169 | 169 |
| Total Dissolved Solids | mg/L | | | 201 | 115 | 198 | 169 | 178 | 203 | 234 | 219 |
| Fluoride | mg/L | | **0.12** | < 0.10 | **0.21** | **0.26** | **0.18** | **0.14** | **0.13** | **0.12** | **0.13** |
| Total Organic Carbon | mg/L | | | 11 | 7.9 | 10.2 | 7.5 | 7.5 | 7.0 | 9.0 | 8.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | < 0.05 | < 0.05 | 0.05 | 0.15 | < 0.04 | 0.11 | 0.08 |
| Chloride (Dissolved) | mg/L | | **120** | 3.2 | 2.5 | 2.5 | 6.4 | 4.3 | 7.4 | 3.9 | 5.7 |
| Sulphate (dissolved) | mg/L | | | 27 | 4.2 | 1.7 | 1.3 | 2.4 | 3.2 | 1.2 | 2.2 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | **13** | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | < 0.06 | 0.95 | 0.51 |
| Nitrate + Nitrite (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | < 0.06 | 0.95 | 0.51 |
| Mercury (dissolved) | µg/L | **0.2** | **0.026** | < 0.010 | < 0.010 | < 0.010 | < 0.010 | 0.015 | < 0.010 | < 0.010 | < 0.010 |
| Hardness | mg/L as $CaCO_3$ | | | 160 | 125 | 165 | 173 | 152 | 173 | 189 | 181 |
| Silver (total) | µg/L | **0.1** | **0.1** | < 0.10 | < 0.10 | 0.18 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (total) | µg/L | | | 61 | 20 | 347 | 42 | 39 | 7 | 19 | 13 |
| Aluminum (0.2µm) | µg/L | **75** | **100** | 7 | < 5 | < 5 | 1 | 2 | 3 | 2 | 3 |
| Arsenic (total) | µg/L | **100** | **5** | < 1 | 1.1 | **5.9** | 1.2 | 1.2 | 0.6 | 0.5 | 0.6 |
| Barium (total) | µg/L | | | 14 | 10 | 12 | 15 | 14 | 14.8 | 15.0 | 14.9 |
| Beryllium (total) | µg/L | **1100** | | < 0.50 | < 0.50 | < 0.50 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 |
| Boron (total) | µg/L | **200** | **1500** | < 10 | < 10 | 11 | 10 | 7 | 5 | 13 | 9 |
| Bismuth (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.02 | 0.04 | < 0.01 | < 0.01 | < 0.01 |
| Calcium (total) | µg/L | | | 57500 | 46000 | 63500 | 64700 | 56650 | 64800 | 70600 | 67700 |
| Cadmium (total) | µg/L | **0.2** | **0.09** | < 0.10 | < 0.10 | < 0.10 | 0.004 | 0.003 | 0.004 | < 0.003 | 0.004 |
| Cobalt (total) | µg/L | **0.9** | | < 0.5 | < 0.5 | 0.8 | 0.1 | 0.1 | 0.035 | 0.046 | 0.04 |
| Chromium (total) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.1 | 0.2 | 0.17 | < 0.08 | 0.13 |
| Copper (total) | µg/L | **5** | | 1.1 | < 1.0 | 2.0 | 0.3 | 0.3 | 0.6 | 0.3 | 0.5 |
| Iron (total) | µg/L | **300** | **300** | 200 | 110 | **695** | 172 | 127 | 130 | 24 | 77 |
| Potassium (total) | µg/L | | | 3100 | 3000 | 3500 | 3150 | 3725 | 4790 | 2240 | 3515 |
| Magnesium (total) | µg/L | | | 2700 | 2100 | 2550 | 2710 | 2655 | 2740 | 3010 | 2875 |
| Manganese (total) | µg/L | | | 24 | 13 | 107 | 16 | 12 | 8.49 | 1.4 | 5 |
| Molybdenum (total) | µg/L | **40** | **73** | 0.66 | < 0.50 | < 0.50 | 0.10 | 0.11 | 0.11 | 0.09 | 0.10 |
| Sodium (total) | µg/L | | | 1400 | 940 | 925 | 1295 | 1175 | 1620 | 960 | 1290 |
| Nickel (total) | µg/L | **25** | **25** | < 1.0 | < 1.0 | 1.2 | 0.2 | < 0.1 | 0.1 | 0.1 | 0.1 |
| Phosphorus (total) | µg/L | **10-30** | | **87** | **43** | **145** | **37** | **52** | 27 | 12 | 20 |
| Lead (total) | µg/L | **5** | **7** | < 0.5 | < 0.5 | 1.3 | 0.1 | 0.2 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (total) | µg/L | **20** | | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (total) | µg/L | **100** | **1** | < 2.0 | < 2.0 | < 2.0 | 0.05 | 0.05 | 0.08 | < 0.04 | 0.06 |
| Tin (total) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.1 | < 0.1 | < 0.06 | < 0.06 | < 0.06 |
| Strontium (total) | µg/L | | | 105 | 86 | 101 | 111 | 105 | 114 | 133 | 124 |
| Titanium (total) | µg/L | | | 5 | < 5 | 17 | 2.2 | 1.8 | 0.29 | 0.40 | 0.3 |
| Thallium (total) | µg/L | **0.3** | **0.8** | < 0.05 | < 0.05 | < 0.05 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (total) | µg/L | **5** | **15** | 0.2 | 1.1 | 2.1 | 0.56 | 0.46 | 0.445 | 0.29 | 0.37 |
| Vanadium (total) | µg/L | **6** | | 0.65 | < 0.50 | 1.13 | 0.17 | 0.14 | 0.09 | 0.03 | 0.06 |
| Zinc (total) | µg/L | **30** | **30** | < 5.0 | < 5.0 | 5.9 | 2.5 | < 2.0 | < 2 | 3 | 2.5 |
| Lead-210 | Bq/L | | | < 0.02 | < 0.10 | 0.13 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **1** | | < 0.03 | < 0.04 | < 0.04 | < 0.01 | 0.02 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | 120.7 | 57 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | 190.9 | 124.7 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | 333 | 358.2 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | 12.953 | 11.673 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | 1.20 | 11.05 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | 7.92 | 7.97 | -- |

**Note:**
*PWQO = Provincial Water Quality Objectives, Ministry of the Environment*
*CWQG= Canadian Water Quality Guidelines for Protection of Aquatic Life*
**Bold values** indicate an exceedance of a PWQO or CWQG value.
[1] Field parameters included for current sampling year only.
-- - No data.

# Appendix C Port Granby Groundwater Monitoring Results

## Table 43: PG-BH1002A

| | | Criteria | | PG-BH1002A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | 2022/03/02 | 2022/06/21 | 2022/09/01 | 2022/12/06 | **Average** |
| pH | pH | | | 7.88 | 7.81 | 7.80 | 7.67 | 7.63 | -[3] | 7.63 | 7.57 | -[3] | 7.60 |
| Alkalinity | mg/L as $CaCO_3$ | | | 170 | 223 | 218 | 363 | 463 | -[3] | 361 | 816 | -[3] | 589 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.2 | 1.4 | 1.3 | < 1.0 | < 1.0 | -[3] | < 1.0 | < 1.0 | -[3] | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 170 | 223 | 215 | 363 | 463 | -[3] | 361 | 816 | -[3] | 589 |
| Total Dissolved Solids | mg/L | | | 398 | 392 | 466 | 432 | 501 | -[3] | 427 | 463 | -[3] | 445 |
| Fluoride | mg/L | **1.5** | | < 0.10 | < 0.10 | < 0.10 | 0.06 | < 0.06 | -[3] | < 0.06 | < 0.06 | -[3] | < 0.06 |
| Total Organic Carbon | mg/L | | | 16.5 | 3.5 | 17.7 | 1.0 | 2.0 | -[3] | 1.0 | < 1.0 | -[3] | 1.0 |
| Dissolved Organic Carbon | mg/L | | | 1.6 | 1.3 | 1.5 | 1.5 | 1.7 | -[3] | 2.0 | 1.0 | -[3] | 1.5 |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | 0.14 | 0.17 | 0.05 | < 0.04 | -[3] | < 0.04 | < 0.04 | -[3] | < 0.04 |
| Chloride (dissolved) | mg/L | | | 24 | 20 | 45 | 40 | 51 | -[3] | 54 | 55 | -[3] | 55 |
| Sulphate (dissolved) | mg/L | | | 35 | 33 | 31 | 44 | 46 | -[3] | 50 | 37 | -[3] | 44 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | -[3] | < 0.3 | < 0.3 | -[3] | < 0.3 |
| Nitrite (as N) | as N mg/L | | | 0.01 | < 0.01 | 0.02 | < 0.03 | < 0.03 | -[3] | < 0.03 | < 0.03 | -[3] | < 0.03 |
| Nitrate (as N) | as N mg/L | | | 9.21 | 7.62 | 11.66 | 8.22 | 14.14 | -[3] | 8.17 | 9.22 | -[3] | 8.70 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 9.22 | 7.62 | 11.66 | 8.22 | 14.14 | -[3] | 8.17 | 9.22 | -[3] | 8.70 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 297 | 290 | 333 | 676 | 906 | -[3] | 887 | 360 | -[3] | 624 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | 0.11 | < 0.10 | 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | 370 | 8 | 10 | 4 | 3 | < 1 | 2 | 41 | 2 | 12 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | 0.5 | 0.3 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 56 | 55 | 62 | 59 | 43 | 35.9 | 43 | 57 | 62 | 50 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | < 10 | < 10 | < 10 | 6 | 7 | 3 | 7 | 6 | 6 | 6 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.007 | 0.009 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 108333 | 107500 | 120000 | 141667 | 128750 | 126000 | 156000 | 118000 | 122000 | 130500 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | 0.011 | 0.006 | 0.003 | 0.009 | 0.009 | 0.012 | 0.008 |
| Cobalt (dissolved) | µg/L | | **66** | 0.73 | < 0.50 | < 0.50 | 0.04 | 0.04 | 0.035 | 0.04 | 0.05 | 0.07 | 0.049 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 1.1 | 0.7 | 0.64 | 0.52 | 0.89 | 0.94 | 0.75 |
| Copper (dissolved) | µg/L | **1000** | **87** | 2.6 | 1.1 | 1.2 | 0.9 | 1.1 | 0.6 | 1.1 | 1.2 | 1.4 | 1.1 |
| Iron (dissolved) | µg/L | | | 500 | < 100 | < 100 | 7 | 8 | < 7 | < 7 | 22 | < 7 | 11 |
| Potassium (dissolved) | µg/L | | | 460 | 465 | 488 | 562 | 431 | 320 | 434 | 561 | 522 | 459 |
| Magnesium (dissolved) | µg/L | | | 5100 | 6525 | 7700 | 10000 | 6460 | 6760 | 6130 | 7580 | 8500 | 7243 |
| Manganese (dissolved) | µg/L | | | 41 | < 2.0 | < 2.0 | 0.47 | 0.29 | 0.03 | 0.29 | 0.67 | 0.23 | 0.31 |
| Molybdenum (dissolved) | µg/L | | **9200** | < 0.50 | < 0.50 | < 0.50 | 0.44 | 0.28 | 0.18 | 0.19 | 0.37 | 0.42 | 0.29 |
| Sodium (dissolved) | µg/L | | | 3500 | 3925 | 3975 | 4827 | 4410 | 4340 | 4980 | 4510 | 4230 | 4515 |
| Nickel (dissolved) | µg/L | | **490** | 1.2 | < 1.0 | < 1.0 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 |
| Phosphorus (dissolved) | µg/L | | | 12 | 23 | 8 | 3 | < 3 | < 3 | 7 | < 3 | < 3 | 4 |
| Lead (dissolved) | µg/L | **10** | **25** | 1.70 | < 0.50 | < 0.50 | 0.03 | 0.07 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | 1.10 | 1.36 | 1.20 | 1.08 | 1.07 | 1.29 | 1.16 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.10 | 0.08 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Strontium (dissolved) | µg/L | | | 183 | 183 | 203 | 246 | 211 | 213 | 246 | 219 | 236 | 229 |
| Titanium (dissolved) | µg/L | | | 12.0 | < 5.0 | < 5.0 | 0.18 | 0.13 | < 0.05 | 0.08 | 1.10 | < 0.05 | 0.32 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.05 | 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.443 | 0.275 | 0.275 | 0.348 | 0.254 | 0.209 | 0.251 | 0.399 | 0.370 | 0.307 |
| Vanadium (dissolved) | µg/L | | **250** | 1.0 | < 0.50 | < 0.50 | 0.20 | 0.17 | 0.16 | 0.21 | 0.26 | 0.20 | 0.21 |
| Zinc (dissolved) | µg/L | | **1100** | 8 | < 5 | < 5 | 2 | < 2 | < 2 | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | 0.03 | 0.02 |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | < 0.04 | < 0.04 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 86.6 | -[2] | -[2] | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 158.5 | -[2] | -[2] | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 744.0 | -[2] | -[2] | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 12.631 | -[2] | -[2] | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 1185.0 | -[2] | -[2] | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 7.46 | -[2] | -[2] | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for field parameters

[3] Insufficient volume of groundwater for full sample collection

-- - No data.

## Table 44: PG-BH1003A

| | | Criteria | | PG-BH1003A | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | Well Broken | | |
| pH | pH | | | 7.49 | | | | | |
| Alkalinity | mg/L as $CaCO_3$ | | | 190 | | | | | |
| Carbonate | mg/L as $CaCO_3$ | | | < 1.0 | | | | | |
| Bicarbonate | mg/L as $CaCO_3$ | | | 190 | | | | | |
| Total Dissolved Solids | mg/L | | | 249 | | | | | |
| Fluoride | mg/L | **1.5** | | 0.10 | | | | | |
| Total Organic Carbon | mg/L | | | 51 | | | | | |
| Dissolved Organic Carbon | mg/L | | | 9.2 | | | | | |
| Ammonia+Ammonium (N) | as N mg/L | | | 3.65 | | | | | |
| Chloride (dissolved) | mg/L | | | 6 | | | | | |
| Sulphate (dissolved) | mg/L | | | 7 | | | | | |
| Bromide (dissolved) | mg/L | | | < 1.0 | | | | | |
| Nitrite (as N) | as N mg/L | | | 0.04 | | | | | |
| Nitrate (as N) | as N mg/L | | | 0.38 | | | | | |
| Nitrate + Nitrite (as N) | as N mg/L | | | 0.41 | | | | | |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.1 | | | | | |
| Hardness | mg/L as $CaCO_3$ | | | 155 | | | | | |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | | | | | |
| Aluminum (dissolved) | µg/L | | | 21 | | | | | |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1 | | | | | |
| Barium (dissolved) | µg/L | **1000** | **29000** | 22 | | | | | |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | | | | | |
| Boron (dissolved) | µg/L | **5000** | **45000** | 26 | | | | | |
| Bismuth (dissolved) | µg/L | | | < 1.0 | | | | | |
| Calcium (dissolved) | µg/L | | | 55500 | | | | | |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.1 | | | | | |
| Cobalt (dissolved) | µg/L | | **66** | 0.61 | | | | | |
| Chromium (dissolved) | µg/L | | **810** | < 5 | | | | | |
| Copper (dissolved) | µg/L | **1000** | **87** | 1.7 | | | | | |
| Iron (dissolved) | µg/L | | | 800 | | | | | |
| Potassium (dissolved) | µg/L | | | 14000 | | | | | |
| Magnesium (dissolved) | µg/L | | | 3800 | | | | | |
| Manganese (dissolved) | µg/L | | | 325 | | | | | |
| Molybdenum (dissolved) | µg/L | | **9200** | 1.6 | | | | | |
| Sodium (dissolved) | µg/L | | | 1550 | | | | | |
| Nickel (dissolved) | µg/L | | **490** | 1.3 | | | | | |
| Phosphorus (dissolved) | µg/L | | | 12 | | | | | |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | | | | | |
| Antimony (dissolved) | µg/L | **6** | **20000** | 0.57 | | | | | |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | | | | | |
| Tin (dissolved) | µg/L | | | < 1.0 | | | | | |
| Strontium (dissolved) | µg/L | | | 105 | | | | | |
| Titanium (dissolved) | µg/L | | | < 5.00 | | | | | |
| Thallium (dissolved) | µg/L | | **510** | < 0.05 | | | | | |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.270 | | | | | |
| Vanadium (dissolved) | µg/L | | **250** | 1.85 | | | | | |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | | | | | |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | | | | | |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | | | | | |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | | | | | |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | | | | | |
| **Field Parameters** | | | | | | | | | |
| ODO % Sat | % | | | -- | | | | | |
| ORP | mV | | | -- | | | | | |
| SPC | µs/cm | | | -- | | | | | |
| Temperature | °C | | | -- | | | | | |
| Turbidity | FNU | | | -- | | | | | |
| pH | Units | | | -- | | | | | |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

--- No data.

# Table 45: PG-BH1003B

| | | Criteria | | PG-BH1003B | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | 2022/03/02 | 2022/06/21 | 2022/09/01 | 2022/12/06 | **Average** |
| pH | pH | | | 7.84 | 7.84 | 7.88 | 7.78 | 7.69 | 7.68 | 7.64 | 7.81 | -[3] | 7.71 |
| Alkalinity | mg/L as $CaCO_3$ | | | 218 | 238 | 235 | 229 | 313 | 391 | 423 | 234 | -[3] | 349 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.4 | 1.6 | 1.7 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | -[3] | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 215 | 235 | 235 | 229 | 313 | 391 | 423 | 234 | -[3] | 349 |
| Total Dissolved Solids | mg/L | | | 419 | 389 | 454 | 435 | 504 | 534 | 420 | 443 | -[3] | 466 |
| Fluoride | mg/L | **1.5** | | < 0.10 | < 0.10 | 0.11 | 0.09 | 0.08 | 0.07 | 0.07 | 0.06 | -[3] | 0.07 |
| Total Organic Carbon | mg/L | | | 15 | 1.8 | 1.5 | 1.3 | 1.8 | 2.0 | 1.0 | 1.0 | -[3] | 1.3 |
| Dissolved Organic Carbon | mg/L | | | 1.9 | 1.4 | 1.3 | 1.5 | 1.8 | 2.0 | 1.0 | 1.0 | -[3] | 1.3 |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.06 | 0.06 | 0.07 | < 0.04 | < 0.04 | 0.06 | < 0.04 | < 0.04 | -[3] | 0.05 |
| Chloride (dissolved) | mg/L | | | 17 | 14 | 15 | 20 | 29 | 69 | 41 | 37 | -[3] | 49 |
| Sulphate (dissolved) | mg/L | | | 65 | 65 | 70 | 68 | 46 | 52 | 60 | 55 | -[3] | 56 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | -[3] | < 0.3 |
| Nitrite (as N) | as N mg/L | | | 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | -[3] | < 0.03 |
| Nitrate (as N) | as N mg/L | | | 10.06 | 11.20 | 10.30 | 11.38 | 27.38 | 10.70 | 14.00 | 14.00 | -[3] | 12.90 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 10.06 | 11.20 | 10.30 | 11.38 | 27.38 | 10.70 | 14.00 | 14.00 | -[3] | 12.90 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 313 | 343 | 360 | 377 | 875 | 722 | 6400 | 352 | -[3] | 2491 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | 404 | 14 | 6 | 54 | 5 | 61 | 74 | 1 | < 1 | 34 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | < 0.2 | 0.2 | < 0.2 | < 0.2 | < 0.2 | 0.4 | 0.3 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 48 | 55 | 60 | 62 | 54 | 62 | 66 | 88 | 79 | 74 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.008 | < 0.007 | 0.012 | 0.009 | < 0.007 | < 0.007 | 0.009 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 12 | < 10 | 10 | 7 | 10 | 6 | 26 | 8 | 9 | 12 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | 0.009 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 106000 | 107500 | 110000 | 111000 | 133500 | 144000 | 140000 | 105000 | 128000 | 129250 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | 0.00 | 0.01 | 0.008 | 0.003 | < 0.003 | 0.008 | 0.006 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.04 | 0.03 | 0.044 | 0.044 | 0.033 | 0.032 | 0.038 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 2.0 | 1.6 | 1.39 | 2.18 | 0.80 | 2.59 | 1.74 |
| Copper (dissolved) | µg/L | **1000** | **87** | 1.2 | < 1.0 | < 1.0 | 0.9 | 0.4 | 1.1 | 0.6 | 0.5 | 0.9 | 0.8 |
| Iron (dissolved) | µg/L | | | 273 | < 100 | < 100 | 37 | 7 | 34 | 35 | < 7 | < 7 | 21 |
| Potassium (dissolved) | µg/L | | | 508 | 573 | 643 | 613 | 522 | 382 | 696 | 1690 | 911 | 920 |
| Magnesium (dissolved) | µg/L | | | 11525 | 16250 | 19500 | 21000 | 11938 | 8530 | 17400 | 19400 | 21700 | 16758 |
| Manganese (dissolved) | µg/L | | | 9.25 | < 2.0 | < 2.0 | 1.10 | 0.14 | 2.47 | 2.29 | < 0.01 | 0.23 | 1.25 |
| Molybdenum (dissolved) | µg/L | | **9200** | < 0.50 | < 0.50 | < 0.50 | 0.34 | 0.24 | 0.17 | 0.46 | 0.69 | 0.31 | 0.41 |
| Sodium (dissolved) | µg/L | | | 4675 | 5075 | 5225 | 5205 | 5838 | 5740 | 5850 | 5190 | 5820 | 5650 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.3 | 0.2 | 1.3 | 0.2 | 0.3 | 0.3 | 0.5 |
| Phosphorus (dissolved) | µg/L | | | 9 | 53 | 7 | < 3 | < 3 | 6 | 10 | < 3 | 4 | 6 |
| Lead (dissolved) | µg/L | **10** | **25** | 0.68 | < 0.50 | < 0.50 | 0.04 | 0.07 | 0.16 | 0.10 | < 0.09 | < 0.09 | 0.11 |
| Antimony (dissolved) | µg/L | **6** | **20000** | 0.54 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | 1.0 | 1.4 | 0.7 | 0.96 | 0.54 | 1.19 | 0.84 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.11 | 0.07 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Strontium (dissolved) | µg/L | | | 198 | 218 | 225 | 240 | 236 | 254 | 263 | 239 | 301 | 264 |
| Titanium (dissolved) | µg/L | | | 11.5 | < 5.0 | < 5.0 | 1.39 | 0.07 | 1.63 | 1.85 | < 0.05 | < 0.05 | 0.90 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.478 | 0.445 | 0.465 | 0.546 | 0.364 | 0.416 | 0.475 | 3.860 | 0.541 | 1.323 |
| Vanadium (dissolved) | µg/L | | **250** | 0.59 | < 0.50 | < 0.50 | 0.47 | 0.21 | 0.13 | 0.25 | 0.45 | 0.39 | 0.31 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | < 5 | 3 | < 2 | 3 | < 2 | 3 | < 2 | 3 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | 0.06 | 0.03 |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | < 0.04 | < 0.04 | < 0.01 | 0.01 | < 0.01 | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | -[2] | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | -[2] | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | -[2] | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | -[2] | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | -[2] | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | -[2] | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for field parameters

[3] Insufficient volume of groundwater for full sample collection

-- - No data.

# Table 46: PG-BH1003C

| | | Criteria | | PG-BH1003C | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | Average | | | | | 2022/03/02 | 2022/06/21 | 2022/09/01 | 2022/12/06 | **Average** |
| pH | pH | | | 7.95 | 7.89 | 7.87 | 7.68 | 7.76 | 7.62 | 7.99 | -[3] | 7.83 | 7.81 |
| Alkalinity | mg/L as $CaCO_3$ | | | 210 | 220 | 205 | 213 | 210 | 199 | 212 | -[3] | 213 | 208 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.8 | 1.6 | 1.5 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | -[3] | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 207.5 | 220 | 205 | 213 | 210 | 199 | 212 | -[3] | 213 | 208 |
| Total Dissolved Solids | mg/L | | | 388 | 379 | 398 | 412 | 445 | 480 | 503 | -[3] | 426 | 470 |
| Fluoride | mg/L | **1.5** | | < 0.11 | < 0.10 | < 0.10 | 0.09 | 0.10 | 0.08 | 0.09 | -[3] | 0.08 | 0.08 |
| Total Organic Carbon | mg/L | | | 2.2 | 1.6 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | -[3] | 2.0 | 2.0 |
| Dissolved Organic Carbon | mg/L | | | 1.6 | 1.4 | 1.8 | 2.3 | 2.0 | 2.0 | 2.0 | -[3] | 2.0 | 2.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | < 0.05 | < 0.05 | < 0.04 | 0.04 | < 0.04 | 0.07 | -[3] | < 0.04 | 0.05 |
| Chloride (dissolved) | mg/L | | | 15 | 14 | 15 | 24 | 27 | 33 | 50 | -[3] | 33 | 39 |
| Sulphate (dissolved) | mg/L | | | 63 | 65 | 56 | 62 | 62 | 59 | 68 | -[3] | 67 | 65 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | -[3] | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | -[3] | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | | 8.66 | 9.93 | 11.36 | 9.09 | 12.68 | 15.50 | 12.10 | -[3] | 12.30 | 13.30 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 8.66 | 9.93 | 11.36 | 9.09 | 12.68 | 15.50 | 12.10 | -[3] | 12.30 | 13.30 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 300 | 320 | 325 | 346 | 416 | 344 | 422 | 320 | 355 | 360 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | < 5 | < 5 | < 5 | 22 | 2 | < 1 | 2 | 358 | 2 | 91 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | 0.2 | 0.2 | < 0.2 | < 0.2 | < 0.2 | 0.7 | 0.3 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 61 | 66 | 66 | 54 | 69 | 71.7 | 80 | 72 | 81 | 76 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | 0.011 | < 0.007 | 0.008 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 14 | < 10 | < 10 | 7 | 14 | 7 | 15 | 7 | 10 | 10 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.010 | 0.009 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 81500 | 87250 | 93750 | 77000 | 104100 | 105000 | 139000 | 111000 | 119000 | 118500 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | 0.004 | 0.003 | < 0.003 | 0.004 | 0.003 | 0.006 | 0.004 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.042 | 0.024 | 0.028 | 0.035 | 0.073 | 0.053 | 0.047 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.67 | 0.69 | 0.77 | 0.68 | 2.27 | 1.16 | 1.22 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | < 1.0 | 0.8 | 0.8 | 0.5 | 0.7 | 0.5 | 1.5 | 0.8 |
| Iron (dissolved) | µg/L | | | < 100 | < 100 | < 100 | 25 | < 7 | < 7 | < 7 | 172 | 8 | 49 |
| Potassium (dissolved) | µg/L | | | 1575 | 1575 | 1525 | 827 | 1650 | 1490 | 1690 | 827 | 2050 | 1514 |
| Magnesium (dissolved) | µg/L | | | 23250 | 24250 | 21500 | 15556 | 22475 | 19700 | 18600 | 18700 | 22000 | 19750 |
| Manganese (dissolved) | µg/L | | | < 2.0 | < 2.0 | 2.2 | 1.0 | 0.2 | < 0.01 | 0.04 | 5.14 | 0.36 | 1.39 |
| Molybdenum (dissolved) | µg/L | | **9200** | 0.80 | 0.82 | 0.71 | 0.67 | 0.76 | 0.63 | 0.61 | 0.26 | 0.91 | 0.60 |
| Sodium (dissolved) | µg/L | | | 5025 | 5175 | 4775 | 3738 | 5418 | 4710 | 5130 | 5430 | 5490 | 5190 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.3 |
| Phosphorus (dissolved) | µg/L | | | 610 | 14 | 6 | < 3 | < 3 | 3 | 4 | < 3 | 3 | 3 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.04 | 0.07 | < 0.09 | < 0.09 | 0.21 | < 0.09 | < 0.12 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | 0.38 | 0.70 | 0.6 | 0.53 | 1.07 | 0.82 | 0.76 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.09 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Strontium (dissolved) | µg/L | | | 210 | 220 | 210 | 169 | 238 | 241 | 263 | 246 | 286 | 259 |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 1.14 | 0.06 | 0.13 | 0.07 | 7.49 | < 0.05 | < 1.94 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | 0.006 | 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 3.975 | 3.775 | 2.800 | 2.325 | 2.970 | 2.600 | 2.370 | 0.600 | 3.160 | 2.183 |
| Vanadium (dissolved) | µg/L | | **250** | 0.57 | 0.55 | 0.52 | 0.42 | 0.56 | 0.38 | 0.41 | 0.43 | 0.59 | 0.45 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | < 5 | < 2 | 3 | < 2 | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | 0.10 | 0.11 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | < 0.04 | < 0.04 | 0.01 | 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | 59.0 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | 116.8 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | 711.0 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | 10.3 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | 5.2 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | -[2] | -[2] | 7.52 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for field parameters

[3] Insufficient volume of groundwater for full sample collection

-- - No data.

# Table 47: PG-BH1003D

| | | Criteria | | PG-BH1003D | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | Average | | | | | 2022/03/02 | 2022/06/21 | 2022/09/01 | 2022/12/06 | **Average** |
| pH | pH | | | 7.87 | 7.81 | 7.85 | 7.68 | 7.67 | 7.67 | 7.73 | 7.65 | 7.80 | 7.71 |
| Alkalinity | mg/L as $CaCO_3$ | | | 240 | 245 | 240 | 254 | 298 | 253 | 245 | 244 | 229 | 243 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.7 | 1.5 | 1.6 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 240 | 245 | 240 | 254 | 298 | 253 | 245 | 244 | 229 | 243 |
| Total Dissolved Solids | mg/L | | | 407 | 375 | 431 | 423 | 447 | 437 | 406 | 431 | 409 | 421 |
| Fluoride | mg/L | **1.5** | | 0.12 | < 0.10 | < 0.10 | 0.07 | 0.07 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Total Organic Carbon | mg/L | | | 2.0 | 2.0 | 2.1 | 1.0 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Dissolved Organic Carbon | mg/L | | | 1.4 | 1.3 | 1.3 | 1.5 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | 0.06 | 0.09 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 |
| Chloride (dissolved) | mg/L | | | 18 | 14 | 15 | 17 | 19 | 22 | 26 | 23 | 22 | 23 |
| Sulphate (dissolved) | mg/L | | | 64 | 63 | 62 | 64 | 62 | 59 | 60 | 54 | 62 | 59 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | | 7.74 | 8.89 | 8.17 | 7.63 | 9.16 | 9.07 | 9.46 | 9.16 | 8.27 | 8.99 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 7.74 | 8.89 | 8.17 | 7.63 | 9.16 | 9.07 | 9.46 | 9.16 | 8.27 | 8.99 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 323 | 340 | 348 | 407 | 542 | 378 | 414 | 329 | 344 | 366 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | 0.06 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | < 5 | 18 | < 5 | 614 | 3 | < 1 | 2 | < 1 | < 1 | 1 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | 0.3 | 0.2 | 0.3 | < 0.2 | < 0.2 | 0.4 | 0.3 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 58 | 59 | 61 | 70 | 61 | 61.3 | 68 | 70 | 73 | 68 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | 0.030 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 13 | < 10 | < 10 | 8 | 9 | 8 | 10 | 7 | 8 | 8 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.008 | 0.009 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 92750 | 98000 | 99250 | 108550 | 107500 | 100000 | 122000 | 97600 | 104000 | 105900 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | 0.02 | 0.01 | 0.006 | < 0.003 | < 0.003 | 0.004 | 0.004 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.29 | 0.03 | 0.029 | 0.031 | 0.031 | 0.040 | 0.03 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 2.1 | 1.7 | 1.59 | 1.34 | 1.45 | 1.35 | 1.43 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | < 1.0 | 1.5 | 0.9 | 0.8 | 0.7 | 0.5 | 0.9 | 0.7 |
| Iron (dissolved) | µg/L | | | < 100 | < 100 | < 100 | 579 | 8 | < 7 | < 7 | < 7 | < 7 | < 7 |
| Potassium (dissolved) | µg/L | | | 790 | 838 | 853 | 1073 | 1019 | 977 | 1080 | 1020 | 1020 | 1024 |
| Magnesium (dissolved) | µg/L | | | 22000 | 23000 | 23000 | 22025 | 23900 | 24100 | 22500 | 21800 | 21600 | 22500 |
| Manganese (dissolved) | µg/L | | | < 2.0 | 2.7 | < 2.0 | 24.9 | 0.4 | 0.24 | 0.39 | < 0.01 | 0.14 | 0.20 |
| Molybdenum (dissolved) | µg/L | | **9200** | < 0.50 | < 0.50 | < 0.50 | 0.45 | 0.24 | 0.33 | 0.21 | 0.22 | 0.21 | 0.24 |
| Sodium (dissolved) | µg/L | | | 4425 | 4525 | 4525 | 4645 | 4950 | 4920 | 4960 | 4630 | 4600 | 4778 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.8 | 0.4 | 0.5 | 0.3 | 0.2 | 0.2 | 0.3 |
| Phosphorus (dissolved) | µg/L | | | 164 | 124 | 212 | 30 | 4 | 9 | 9 | < 3 | 3 | 6 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.38 | 0.07 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | 0.7 | 0.9 | 0.6 | 0.68 | 0.55 | 0.84 | 0.66 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.22 | 0.15 | 0.11 | < 0.06 | < 0.06 | < 0.06 | 0.07 |
| Strontium (dissolved) | µg/L | | | 225 | 228 | 228 | 243 | 250 | 252 | 256 | 242 | 258 | 252 |
| Titanium (dissolved) | µg/L | | | < 5.0 | 5.2 | < 5.0 | 30.35 | 0.21 | 0.07 | 0.10 | < 0.05 | < 0.05 | < 0.07 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | 0.013 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.653 | 0.638 | 0.625 | 1.538 | 0.640 | 0.666 | 0.629 | 0.767 | 0.694 | 0.689 |
| Vanadium (dissolved) | µg/L | | **250** | 0.68 | 0.73 | 0.70 | 1.71 | 0.79 | 0.83 | 0.74 | 0.73 | 0.75 | 0.76 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | < 5 | 5 | 4 | 9 | < 2 | < 2 | < 2 | < 4 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | < 0.10 | < 0.10 | 0.02 | 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | < 0.04 | < 0.04 | < 0.01 | 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 83.4 | -[2] | 75.1 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 146.4 | -[2] | 144.3 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 694.0 | -[2] | 683.0 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 14.1 | -[2] | 9.7 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 17.0 | -[2] | 273.27 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 7.57 | -[2] | 7.33 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for field parameters

-- - No data.

# Table 48: PG-MW03-01B

| | | Criteria | | PG-MW03-01B | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | 2022/03/29 | 2022/06/27 | 2022/10/06 | 2022/12/21 | **Average** |
| pH | pH | | | No Sample due to construction | | | 7.83 | 7.79 | 7.86 | No Sample[2] | No Sample[2] | 7.86 | 7.86 |
| Alkalinity | mg/L as $CaCO_3$ | | | | | | 866 | 296 | 1300 | | | 158 | 729 |
| Carbonate | mg/L as $CaCO_3$ | | | | | | < 1.0 | < 1.0 | < 1.0 | | | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | | | | 284 | 296 | 1300 | | | 158 | 729 |
| Total Dissolved Solids | mg/L | | | | | | 334 | 371 | 320 | | | 311 | 316 |
| Fluoride | mg/L | **1.5** | | | | | 0.08 | 0.07 | 0.10 | | | 0.21 | 0.16 |
| Total Organic Carbon | mg/L | | | | | | 1.0 | 1.3 | < 1.0 | | | 1.0 | 1.0 |
| Dissolved Organic Carbon | mg/L | | | | | | 1.5 | 1.0 | 1.0 | | | 1.0 | 1.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | | | | 0.07 | 0.05 | 0.08 | | | 0.05 | 0.07 |
| Chloride (dissolved) | mg/L | | | | | | 14 | 14 | 15 | | | 11 | 13 |
| Sulphate (dissolved) | mg/L | | | | | | 89 | 84 | 91 | | | 57 | 74 |
| Bromide (dissolved) | mg/L | | | | | | < 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 |
| Nitrate (as N) | as N mg/L | | | | | | < 0.06 | < 0.06 | < 0.06 | | | < 0.06 | < 0.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | | | | < 0.06 | < 0.06 | < 0.06 | | | < 0.06 | < 0.06 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | | | | 0.02 | < 0.01 | < 0.01 | | | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | | | | 6256 | 8653 | 16100 | | | 238 | 8169 |
| Silver (dissolved) | µg/L | | **1.5** | | | | < 0.05 | < 0.05 | < 0.05 | | | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | | | | 5 | 6 | 3 | | | 12 | 8 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | | | | 1.2 | 1.2 | 1.0 | | | 1.0 | 1.0 |
| Barium (dissolved) | µg/L | **1000** | **29000** | | | | 67 | 54 | 58 | | | 57 | 57 |
| Beryllium (dissolved) | µg/L | | **67** | | | | < 0.007 | < 0.007 | 0.010 | | | < 0.007 | 0.009 |
| Boron (dissolved) | µg/L | **5000** | **45000** | | | | 12 | 14 | 38 | | | 12 | 25 |
| Bismuth (dissolved) | µg/L | | | | | | < 0.007 | 0.009 | 0.010 | | | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | | | | 81700 | 77650 | 77400 | | | 71600 | 74500 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | | | | 0.003 | 0.007 | 0.020 | | | < 0.003 | 0.012 |
| Cobalt (dissolved) | µg/L | | **66** | | | | 0.06 | 0.17 | 0.200 | | | 0.133 | 0.167 |
| Chromium (dissolved) | µg/L | | **810** | | | | 0.11 | 1.83 | 0.11 | | | < 0.08 | 0.10 |
| Copper (dissolved) | µg/L | **1000** | **87** | | | | 0.7 | 4.8 | < 0.2 | | | < 0.2 | < 0.2 |
| Iron (dissolved) | µg/L | | | | | | 119 | 2063 | 60 | | | 33 | 47 |
| Potassium (dissolved) | µg/L | | | | | | 1130 | 1388 | 1410 | | | 1520 | 1465 |
| Magnesium (dissolved) | µg/L | | | | | | 14325 | 14050 | 13100 | | | 13800 | 13450 |
| Manganese (dissolved) | µg/L | | | | | | 12.3 | 27.9 | 14.7 | | | 15.5 | 15.1 |
| Molybdenum (dissolved) | µg/L | | **9200** | | | | 0.89 | 1.19 | 1.02 | | | 1.20 | 1.11 |
| Sodium (dissolved) | µg/L | | | | | | 4583 | 4553 | 4630 | | | 8440 | 6535 |
| Nickel (dissolved) | µg/L | | **490** | | | | 0.3 | 1.6 | 0.6 | | | 0.3 | 0.5 |
| Phosphorus (dissolved) | µg/L | | | | | | < 3 | 5 | 10 | | | < 3 | 7 |
| Lead (dissolved) | µg/L | **10** | **25** | | | | 0.03 | 0.11 | < 0.09 | | | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | | | | < 0.90 | < 0.90 | < 0.90 | | | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | | | | < 0.04 | 0.09 | < 0.04 | | | 0.04 | 0.04 |
| Tin (dissolved) | µg/L | | | | | | 0.23 | 0.34 | 0.16 | | | 0.54 | 0.35 |
| Strontium (dissolved) | µg/L | | | | | | 142 | 157 | 148 | | | 152 | 150 |
| Titanium (dissolved) | µg/L | | | | | | 0.38 | 1.41 | < 0.05 | | | 1.18 | 0.62 |
| Thallium (dissolved) | µg/L | | **510** | | | | < 0.005 | < 0.005 | < 0.005 | | | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | | | | 0.285 | 0.323 | 0.550 | | | 0.410 | 0.480 |
| Vanadium (dissolved) | µg/L | | **250** | | | | 0.40 | 0.23 | 0.54 | | | 0.45 | 0.50 |
| Zinc (dissolved) | µg/L | | **1100** | | | | 2 | 4 | 5 | | | < 2 | < 4 |
| Lead-210 | Bq/L | **0.2** | | | | | 0.02 | < 0.02 | < 0.02 | | | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **0.49** | | | | | 0.01 | 0.02 | < 0.01 | | | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | | | | 0.02 | 0.03 | < 0.02 | | | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | | | | 0.02 | < 0.02 | < 0.02 | | | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | 81.7 | | | 55.0 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | 77.3 | | | 81.8 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | 488.3 | | | 175.7 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | 6.556 | | | 8.080 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | 2315.40 | | | 51.52 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | 7.78 | | | 8.06 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for full sample collection

-- - No data.

# Table 49: PG-MW03-01C

| | | Criteria | | PG-MW03-01C | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | 2022/03/29 | 2022/06/27 | 2022/09/14 | 2022/12/07 | **Average** |
| pH | pH | | | No Sample due to construction | | | 7.54 | 7.56 | 7.65 | 7.42 | 7.52 | 7.73 | 7.58 |
| Alkalinity | mg/L as $CaCO_3$ | | | | | | 423 | 469 | 304 | 319 | 312 | 305 | 310 |
| Carbonate | mg/L as $CaCO_3$ | | | | | | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | | | | 423 | 469 | 304 | 319 | 312 | 305 | 310 |
| Total Dissolved Solids | mg/L | | | | | | 499 | 540 | 483 | 489 | 566 | 534 | 518 |
| Fluoride | mg/L | **1.5** | | | | | 0.08 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Total Organic Carbon | mg/L | | | | | | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Dissolved Organic Carbon | mg/L | | | | | | 1.5 | 1.3 | 2.0 | 1.0 | 2.0 | 1.0 | 1.5 |
| Ammonia+Ammonium (N) | as N mg/L | | | | | | 0.04 | < 0.04 | < 0.04 | 0.04 | < 0.04 | 0.06 | 0.05 |
| Chloride (dissolved) | mg/L | | | | | | 43 | 58 | 53 | 52 | 52 | 75 | 58 |
| Sulphate (dissolved) | mg/L | | | | | | 53 | 59 | 61 | 53 | 55 | 50 | 55 |
| Bromide (dissolved) | mg/L | | | | | | < 0.3 | < 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 | < 0.03 |
| Nitrate (as N) | as N mg/L | | | | | | 3.82 | 3.34 | 2.98 | 2.74 | 2.66 | 2.67 | 2.76 |
| Nitrate + Nitrite (as N) | as N mg/L | | | | | | 3.82 | 3.34 | 2.98 | 2.74 | 2.66 | 2.67 | 2.76 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | | | | 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | | | | 10740 | 3863 | 417 | 416 | 434 | 393 | 415 |
| Silver (dissolved) | µg/L | | **1.5** | | | | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | | | | 12 | 2 | 1 | < 1 | 1 | < 1 | < 1 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | | | | 0.23 | 0.58 | 0.50 | 0.60 | 0.40 | < 0.20 | 0.43 |
| Barium (dissolved) | µg/L | **1000** | **29000** | | | | 40 | 44 | 39.1 | 42 | 51 | 37 | 42 |
| Beryllium (dissolved) | µg/L | | **67** | | | | 0.009 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | 0.010 | 0.008 |
| Boron (dissolved) | µg/L | **5000** | **45000** | | | | 20 | 19 | 21 | 27 | 28 | 21 | 24 |
| Bismuth (dissolved) | µg/L | | | | | | < 0.007 | 0.009 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | | | | 163250 | 167250 | 145000 | 150000 | 152000 | 138000 | 146250 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | | | | 0.005 | 0.004 | 0.010 | < 0.003 | < 0.003 | < 0.003 | 0.005 |
| Cobalt (dissolved) | µg/L | | **66** | | | | 0.03 | 0.03 | 0.027 | 0.036 | 0.034 | 0.019 | 0.03 |
| Chromium (dissolved) | µg/L | | **810** | | | | 0.61 | 0.64 | 0.53 | 0.68 | 0.65 | 0.46 | 0.58 |
| Copper (dissolved) | µg/L | **1000** | **87** | | | | 0.6 | 0.6 | 1.1 | 0.4 | 0.7 | 0.4 | 0.7 |
| Iron (dissolved) | µg/L | | | | | | 26 | 10 | < 7 | < 7 | < 7 | < 7 | < 7 |
| Potassium (dissolved) | µg/L | | | | | | 568 | 580 | 559 | 551 | 544 | 514 | 542 |
| Magnesium (dissolved) | µg/L | | | | | | 9775 | 10153 | 10100 | 10700 | 10300 | 10800 | 10475 |
| Manganese (dissolved) | µg/L | | | | | | 1.07 | 0.25 | 0.53 | 0.09 | 0.19 | 0.03 | 0.21 |
| Molybdenum (dissolved) | µg/L | | **9200** | | | | 0.13 | 0.07 | 0.04 | < 0.04 | < 0.04 | 0.05 | 0.04 |
| Sodium (dissolved) | µg/L | | | | | | 14275 | 18175 | 22600 | 23100 | 21500 | 19400 | 21650 |
| Nickel (dissolved) | µg/L | | **490** | | | | 0.2 | 0.3 | 0.6 | 0.2 | 0.2 | 0.2 | 0.3 |
| Phosphorus (dissolved) | µg/L | | | | | | < 3 | < 3 | < 3 | < 3 | < 3 | < 3 | < 3 |
| Lead (dissolved) | µg/L | **10** | **25** | | | | 0.02 | 0.07 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | | | | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | | | | 0.59 | 0.44 | 0.56 | 0.51 | 0.55 | 0.70 | 0.58 |
| Tin (dissolved) | µg/L | | | | | | 0.10 | 0.09 | 0.12 | < 0.06 | 0.51 | < 0.06 | 0.19 |
| Strontium (dissolved) | µg/L | | | | | | 281 | 306 | 279 | 282 | 286 | 255 | 276 |
| Titanium (dissolved) | µg/L | | | | | | 1.23 | 0.12 | < 0.05 | < 0.05 | 0.11 | 0.07 | 0.07 |
| Thallium (dissolved) | µg/L | | **510** | | | | 0.006 | 0.006 | 0.005 | < 0.005 | 0.009 | 0.013 | 0.008 |
| Uranium (dissolved) | µg/L | **20** | **420** | | | | 0.499 | 0.504 | 0.444 | 0.451 | 0.464 | 0.446 | 0.451 |
| Vanadium (dissolved) | µg/L | | **250** | | | | 0.65 | 0.64 | 0.54 | 0.55 | 0.62 | 0.55 | 0.57 |
| Zinc (dissolved) | µg/L | | **1100** | | | | < 2 | 4 | 4 | < 2 | < 2 | < 2 | 3 |
| Lead-210 | Bq/L | **0.2** | | | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **0.49** | | | | | < 0.01 | < 0.01 | < 0.01 | 0.02 | < 0.01 | 0.01 | 0.01 |
| Thorium-230 | Bq/L | **0.65** | | | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | 69.3 | 67.6 | 54.7 | 41.0 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | 93.1 | 125.9 | 231.5 | 151.8 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | 825.0 | 845.0 | 574.0 | 860.0 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | 7.891 | 11.553 | 12.247 | 10.524 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | 5506.50 | 446.72 | 30.95 | 3.14 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | 7.29 | 7.57 | 7.40 | 7.29 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

-- - No data.

# Table 50: PG-MW03-02A

| | | Criteria | | PG-MW03-02A | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | | | | 2022/12/09 | **Average** | |
| pH | pH | | | No Sample due to construction | | | -- | No Sample | No Sample due to well damage | | | 7.88 | 7.88 | |
| Alkalinity | mg/L as $CaCO_3$ | | | | | | -- | | | | | 382 | 382 | |
| Carbonate | mg/L as $CaCO_3$ | | | | | | -- | | | | | < 1.0 | < 1.0 | |
| Bicarbonate | mg/L as $CaCO_3$ | | | | | | -- | | | | | 382 | 382 | |
| Total Dissolved Solids | mg/L | | | | | | -- | | | | | 257 | 257 | |
| Fluoride | mg/L | **1.5** | | | | | -- | | | | | 0.21 | 0.21 | |
| Total Organic Carbon | mg/L | | | | | | -- | | | | | < 1.0 | < 1.0 | |
| Dissolved Organic Carbon | mg/L | | | | | | -- | | | | | < 1.0 | < 1.0 | |
| Ammonia+Ammonium (N) | as N mg/L | | | | | | -- | | | | | 0.07 | 0.07 | |
| Chloride (dissolved) | mg/L | | | | | | -- | | | | | 5 | 5 | |
| Sulphate (dissolved) | mg/L | | | | | | -- | | | | | 27 | 27 | |
| Bromide (dissolved) | mg/L | | | | | | -- | | | | | < 0.3 | < 0.3 | |
| Nitrite (as N) | as N mg/L | | | | | | -- | | | | | < 0.03 | < 0.03 | |
| Nitrate (as N) | as N mg/L | | | | | | -- | | | | | 0.13 | 0.13 | |
| Nitrate + Nitrite (as N) | as N mg/L | | | | | | -- | | | | | 0.13 | 0.13 | |
| Mercury (dissolved) | µg/L | **1** | **0.29** | | | | -- | | | | | < 0.01 | < 0.01 | |
| Hardness | mg/L as $CaCO_3$ | | | | | | -- | | | | | 661 | 661 | |
| Silver (dissolved) | µg/L | | **1.5** | | | | < 0.05 | | | | | < 0.05 | < 0.05 | |
| Aluminum (dissolved) | µg/L | | | | | | 2 | | | | | 3 | 3 | |
| Arsenic (dissolved) | µg/L | **25** | **1900** | | | | 1.9 | | | | | 1.70 | 1.70 | |
| Barium (dissolved) | µg/L | **1000** | **29000** | | | | 62.4 | | | | | 68 | 68 | |
| Beryllium (dissolved) | µg/L | | **67** | | | | < 0.007 | | | | | < 0.007 | < 0.007 | |
| Boron (dissolved) | µg/L | **5000** | **45000** | | | | 15 | | | | | 58 | 58 | |
| Bismuth (dissolved) | µg/L | | | | | | < 0.007 | | | | | < 0.010 | < 0.010 | |
| Calcium (dissolved) | µg/L | | | | | | 39000 | | | | | 43300 | 43300 | |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | | | | 0.003 | | | | | 0.004 | 0.004 | |
| Cobalt (dissolved) | µg/L | | **66** | | | | 0.035 | | | | | 0.090 | 0.09 | |
| Chromium (dissolved) | µg/L | | **810** | | | | 0.15 | | | | | 0.20 | 0.20 | |
| Copper (dissolved) | µg/L | **1000** | **87** | | | | 0.4 | | | | | 2.3 | 2.3 | |
| Iron (dissolved) | µg/L | | | | | | < 7 | | | | | < 7 | < 7 | |
| Potassium (dissolved) | µg/L | | | | | | 1410 | | | | | 1220 | 1220 | |
| Magnesium (dissolved) | µg/L | | | | | | 25100 | | | | | 18300 | 18300 | |
| Manganese (dissolved) | µg/L | | | | | | 10.5 | | | | | 17.3 | 17.3 | |
| Molybdenum (dissolved) | µg/L | | **9200** | | | | 1.03 | | | | | 1.01 | 1.01 | |
| Sodium (dissolved) | µg/L | | | | | | 6820 | | | | | 5180 | 5180 | |
| Nickel (dissolved) | µg/L | | **490** | | | | 0.4 | | | | | 0.3 | 0.3 | |
| Phosphorus (dissolved) | µg/L | | | | | | < 3 | | | | | 11 | 11 | |
| Lead (dissolved) | µg/L | **10** | **25** | | | | 0.01 | | | | | < 0.09 | < 0.09 | |
| Antimony (dissolved) | µg/L | **6** | **20000** | | | | < 0.90 | | | | | < 0.90 | < 0.90 | |
| Selenium (dissolved) | µg/L | **10** | **63** | | | | < 0.04 | | | | | 0.06 | 0.06 | |
| Tin (dissolved) | µg/L | | | | | | 0.20 | | | | | 0.11 | 0.11 | |
| Strontium (dissolved) | µg/L | | | | | | 482 | | | | | 297 | 297 | |
| Titanium (dissolved) | µg/L | | | | | | 0.11 | | | | | 0.59 | 0.59 | |
| Thallium (dissolved) | µg/L | | **510** | | | | 0.010 | | | | | 0.007 | 0.007 | |
| Uranium (dissolved) | µg/L | **20** | **420** | | | | 0.591 | | | | | 0.188 | 0.188 | |
| Vanadium (dissolved) | µg/L | | **250** | | | | 1.14 | | | | | 0.87 | 0.87 | |
| Zinc (dissolved) | µg/L | | **1100** | | | | < 2 | | | | | < 2 | < 2 | |
| Lead-210 | Bq/L | **0.2** | | | | | < 0.02 | | | | | < 0.02 | < 0.02 | |
| Radium-226 | Bq/L | **0.49** | | | | | 0.13 | | | | | 0.02 | 0.02 | |
| Thorium-230 | Bq/L | **0.65** | | | | | < 0.04 | | | | | < 0.03 | < 0.03 | |
| Thorium-232 | Bq/L | **0.6** | | | | | < 0.04 | | | | | < 0.03 | < 0.03 | |
| **Field Parameters** | | | | | | | | | | | | | | |
| ODO % Sat | % | | | | | | -[1] | | | | | -[2] | -- | |
| ORP | mV | | | | | | -[1] | | | | | -[2] | -- | |
| SPC | µs/cm | | | | | | -[1] | | | | | -[2] | -- | |
| Temperature | °C | | | | | | -[1] | | | | | -[2] | -- | |
| Turbidity | FNU | | | | | | -[1] | | | | | -[2] | -- | |
| pH | Units | | | | | | -[1] | | | | | -[2] | -- | |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for field parameters

-- - No data.

## Table 51: PG-MW03-02B

| | | Criteria | | PG-MW03-02B | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | Well Damaged | | | | **Average** |
| pH | pH | | | No Sample due to construction | | | 7.91 | No Sample | | | | | |
| Alkalinity | mg/L as $CaCO_3$ | | | | | | 219 | | | | | | |
| Carbonate | mg/L as $CaCO_3$ | | | | | | < 1.0 | | | | | | |
| Bicarbonate | mg/L as $CaCO_3$ | | | | | | 219 | | | | | | |
| Total Dissolved Solids | mg/L | | | | | | 286 | | | | | | |
| Fluoride | mg/L | **1.5** | | | | | 0.08 | | | | | | |
| Total Organic Carbon | mg/L | | | | | | 1.0 | | | | | | |
| Dissolved Organic Carbon | mg/L | | | | | | 1.0 | | | | | | |
| Ammonia+Ammonium (N) | as N mg/L | | | | | | 0.07 | | | | | | |
| Chloride (dissolved) | mg/L | | | | | | 2 | | | | | | |
| Sulphate (dissolved) | mg/L | | | | | | 30 | | | | | | |
| Bromide (dissolved) | mg/L | | | | | | < 0.3 | | | | | | |
| Nitrite (as N) | as N mg/L | | | | | | < 0.03 | | | | | | |
| Nitrate (as N) | as N mg/L | | | | | | < 0.06 | | | | | | |
| Nitrate + Nitrite (as N) | as N mg/L | | | | | | < 0.06 | | | | | | |
| Mercury (dissolved) | µg/L | **1** | **0.29** | | | | 0.01 | | | | | | |
| Hardness | mg/L as $CaCO_3$ | | | | | | 3993 | | | | | | |
| Silver (dissolved) | µg/L | | **1.5** | | | | < 0.05 | | | | | | |
| Aluminum (dissolved) | µg/L | | | | | | 8 | | | | | | |
| Arsenic (dissolved) | µg/L | **25** | **1900** | | | | 0.5 | | | | | | |
| Barium (dissolved) | µg/L | **1000** | **29000** | | | | 233 | | | | | | |
| Beryllium (dissolved) | µg/L | | **67** | | | | < 0.01 | | | | | | |
| Boron (dissolved) | µg/L | **5000** | **45000** | | | | 11 | | | | | | |
| Bismuth (dissolved) | µg/L | | | | | | < 0.007 | | | | | | |
| Calcium (dissolved) | µg/L | | | | | | 59633 | | | | | | |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | | | | < 0.003 | | | | | | |
| Cobalt (dissolved) | µg/L | | **66** | | | | 0.023 | | | | | | |
| Chromium (dissolved) | µg/L | | **810** | | | | 0.34 | | | | | | |
| Copper (dissolved) | µg/L | **1000** | **87** | | | | < 0.2 | | | | | | |
| Iron (dissolved) | µg/L | | | | | | 327 | | | | | | |
| Potassium (dissolved) | µg/L | | | | | | 990 | | | | | | |
| Magnesium (dissolved) | µg/L | | | | | | 14067 | | | | | | |
| Manganese (dissolved) | µg/L | | | | | | 17.44 | | | | | | |
| Molybdenum (dissolved) | µg/L | | **9200** | | | | 0.83 | | | | | | |
| Sodium (dissolved) | µg/L | | | | | | 3540 | | | | | | |
| Nickel (dissolved) | µg/L | | **490** | | | | 0.1 | | | | | | |
| Phosphorus (dissolved) | µg/L | | | | | | < 3 | | | | | | |
| Lead (dissolved) | µg/L | **10** | **25** | | | | 0.03 | | | | | | |
| Antimony (dissolved) | µg/L | **6** | **20000** | | | | < 0.90 | | | | | | |
| Selenium (dissolved) | µg/L | **10** | **63** | | | | < 0.04 | | | | | | |
| Tin (dissolved) | µg/L | | | | | | 0.09 | | | | | | |
| Strontium (dissolved) | µg/L | | | | | | 175 | | | | | | |
| Titanium (dissolved) | µg/L | | | | | | 0.80 | | | | | | |
| Thallium (dissolved) | µg/L | | **510** | | | | < 0.005 | | | | | | |
| Uranium (dissolved) | µg/L | **20** | **420** | | | | 0.053 | | | | | | |
| Vanadium (dissolved) | µg/L | | **250** | | | | 0.12 | | | | | | |
| Zinc (dissolved) | µg/L | | **1100** | | | | < 2 | | | | | | |
| Lead-210 | Bq/L | **0.2** | | | | | < 0.02 | | | | | | |
| Radium-226 | Bq/L | **0.49** | | | | | < 0.01 | | | | | | |
| Thorium-230 | Bq/L | **0.65** | | | | | < 0.02 | | | | | | |
| Thorium-232 | Bq/L | **0.6** | | | | | < 0.02 | | | | | | |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | | | | -[1] | | | | | | |
| ORP | mV | | | | | | -[1] | | | | | | |
| SPC | µs/cm | | | | | | -[1] | | | | | | |
| Temperature | °C | | | | | | -[1] | | | | | | |
| Turbidity | FNU | | | | | | -[1] | | | | | | |
| pH | Units | | | | | | -[1] | | | | | | |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

-- - No data.

# Table 52: PG-MW03-02C

| | | Criteria | | PG-MW03-02C | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | | | | 2022/12/08 | **Average** | |
| pH | pH | | | No Sample due to construction | | | 7.80 | No Sample | No Sample due to well damage | | | 7.68 | 7.68 | |
| Alkalinity | mg/L as $CaCO_3$ | | | | | | 167 | | | | | 156 | 156 | |
| Carbonate | mg/L as $CaCO_3$ | | | | | | < 1.0 | | | | | < 1.0 | < 1.0 | |
| Bicarbonate | mg/L as $CaCO_3$ | | | | | | 167 | | | | | 156 | 156 | |
| Total Dissolved Solids | mg/L | | | | | | 311 | | | | | 329 | 329 | |
| Fluoride | mg/L | **1.5** | | | | | 0.06 | | | | | < 0.06 | < 0.06 | |
| Total Organic Carbon | mg/L | | | | | | 1.0 | | | | | < 1.0 | < 1.0 | |
| Dissolved Organic Carbon | mg/L | | | | | | 1.3 | | | | | < 1.0 | < 1.0 | |
| Ammonia+Ammonium (N) | as N mg/L | | | | | | < 0.04 | | | | | 0.06 | 0.06 | |
| Chloride (dissolved) | mg/L | | | | | | 11 | | | | | 11 | 11 | |
| Sulphate (dissolved) | mg/L | | | | | | 91 | | | | | 90 | 90 | |
| Bromide (dissolved) | mg/L | | | | | | < 0.3 | | | | | < 0.3 | < 0.3 | |
| Nitrite (as N) | as N mg/L | | | | | | < 0.03 | | | | | < 0.03 | < 0.03 | |
| Nitrate (as N) | as N mg/L | | | | | | < 0.06 | | | | | < 0.06 | < 0.06 | |
| Nitrate + Nitrite (as N) | as N mg/L | | | | | | < 0.06 | | | | | < 0.06 | < 0.06 | |
| Mercury (dissolved) | µg/L | **1** | **0.29** | | | | 0.04 | | | | | 0.03 | 0.03 | |
| Hardness | mg/L as $CaCO_3$ | | | | | | 282 | | | | | 274 | 274 | |
| Silver (dissolved) | µg/L | | **1.5** | | | | < 0.05 | | | | | < 0.05 | < 0.05 | |
| Aluminum (dissolved) | µg/L | | | | | | 8 | | | | | < 1 | < 1 | |
| Arsenic (dissolved) | µg/L | **25** | **1900** | | | | 0.3 | | | | | 0.2 | 0.2 | |
| Barium (dissolved) | µg/L | **1000** | **29000** | | | | 70 | | | | | 60 | 60 | |
| Beryllium (dissolved) | µg/L | | **67** | | | | < 0.01 | | | | | < 0.007 | < 0.01 | |
| Boron (dissolved) | µg/L | **5000** | **45000** | | | | 11 | | | | | 22 | 22 | |
| Bismuth (dissolved) | µg/L | | | | | | 0.008 | | | | | < 0.010 | < 0.010 | |
| Calcium (dissolved) | µg/L | | | | | | 83425 | | | | | 74500 | 74500 | |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | | | | 0.003 | | | | | < 0.003 | < 0.003 | |
| Cobalt (dissolved) | µg/L | | **66** | | | | 0.04 | | | | | 0.057 | 0.06 | |
| Chromium (dissolved) | µg/L | | **810** | | | | 0.15 | | | | | < 0.08 | < 0.08 | |
| Copper (dissolved) | µg/L | **1000** | **87** | | | | 0.3 | | | | | 0.2 | 0.2 | |
| Iron (dissolved) | µg/L | | | | | | 115 | | | | | 138.0 | 138 | |
| Potassium (dissolved) | µg/L | | | | | | 1120 | | | | | 1360 | 1360 | |
| Magnesium (dissolved) | µg/L | | | | | | 14350 | | | | | 14300 | 14300 | |
| Manganese (dissolved) | µg/L | | | | | | 12.53 | | | | | 13.20 | 13.20 | |
| Molybdenum (dissolved) | µg/L | | **9200** | | | | 0.93 | | | | | 0.98 | 0.98 | |
| Sodium (dissolved) | µg/L | | | | | | 4558 | | | | | 4440 | 4440 | |
| Nickel (dissolved) | µg/L | | **490** | | | | 0.2 | | | | | 0.2 | 0.2 | |
| Phosphorus (dissolved) | µg/L | | | | | | < 3 | | | | | 3 | 3 | |
| Lead (dissolved) | µg/L | **10** | **25** | | | | 0.02 | | | | | < 0.09 | < 0.09 | |
| Antimony (dissolved) | µg/L | **6** | **20000** | | | | < 0.90 | | | | | < 0.90 | < 0.90 | |
| Selenium (dissolved) | µg/L | **10** | **63** | | | | < 0.04 | | | | | < 0.04 | < 0.04 | |
| Tin (dissolved) | µg/L | | | | | | 0.06 | | | | | < 0.06 | < 0.06 | |
| Strontium (dissolved) | µg/L | | | | | | 187 | | | | | 165 | 165 | |
| Titanium (dissolved) | µg/L | | | | | | 0.49 | | | | | < 0.05 | < 0.05 | |
| Thallium (dissolved) | µg/L | | **510** | | | | < 0.005 | | | | | < 0.005 | < 0.005 | |
| Uranium (dissolved) | µg/L | **20** | **420** | | | | 2.375 | | | | | 1.252 | 1.252 | |
| Vanadium (dissolved) | µg/L | | **250** | | | | 0.17 | | | | | 0.11 | 0.11 | |
| Zinc (dissolved) | µg/L | | **1100** | | | | < 2 | | | | | < 2 | < 2 | |
| Lead-210 | Bq/L | **0.2** | | | | | < 0.02 | | | | | < 0.02 | < 0.02 | |
| Radium-226 | Bq/L | **0.49** | | | | | 0.01 | | | | | < 0.01 | < 0.01 | |
| Thorium-230 | Bq/L | **0.65** | | | | | < 0.02 | | | | | < 0.02 | < 0.02 | |
| Thorium-232 | Bq/L | **0.6** | | | | | < 0.02 | | | | | < 0.02 | < 0.02 | |
| **Field Parameters** | | | | | | | | | | | | | | |
| ODO % Sat | % | | | | | | -[1] | | | | | 32.6 | -- | |
| ORP | mV | | | | | | -[1] | | | | | 52.2 | -- | |
| SPC | µs/cm | | | | | | -[1] | | | | | 254.4 | -- | |
| Temperature | °C | | | | | | -[1] | | | | | 11.098 | -- | |
| Turbidity | FNU | | | | | | -[1] | | | | | 18.86 | -- | |
| pH | Units | | | | | | -[1] | | | | | 7.73 | -- | |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

-- - No data.

# Table 53: PG-MW03-03A

| | | Criteria | | PG-MW03-03A | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | | | | | 2022/12/07 | **Average** |
| pH | pH | | | No Sample due to construction | | | No Sample | No Sample | No Sample due to well damage | | | | No Sample[1] | |
| Alkalinity | mg/L as $CaCO_3$ | | | | | | | | | | | | | |
| Carbonate | mg/L as $CaCO_3$ | | | | | | | | | | | | | |
| Bicarbonate | mg/L as $CaCO_3$ | | | | | | | | | | | | | |
| Total Dissolved Solids | mg/L | | | | | | | | | | | | | |
| Fluoride | mg/L | **1.5** | | | | | | | | | | | | |
| Total Organic Carbon | mg/L | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | | | | | | | | | | | | | |
| Ammonia+Ammonium (N) | as N mg/L | | | | | | | | | | | | | |
| Chloride (dissolved) | mg/L | | | | | | | | | | | | | |
| Sulphate (dissolved) | mg/L | | | | | | | | | | | | | |
| Bromide (dissolved) | mg/L | | | | | | | | | | | | | |
| Nitrite (as N) | as N mg/L | | | | | | | | | | | | | |
| Nitrate (as N) | as N mg/L | | | | | | | | | | | | | |
| Nitrate + Nitrite (as N) | as N mg/L | | | | | | | | | | | | | |
| Mercury (dissolved) | µg/L | **1** | **0.29** | | | | | | | | | | | |
| Hardness | mg/L as $CaCO_3$ | | | | | | | | | | | | | |
| Silver (dissolved) | µg/L | | **1.5** | | | | | | | | | | | |
| Aluminum (dissolved) | µg/L | | | | | | | | | | | | | |
| Arsenic (dissolved) | µg/L | **25** | **1900** | | | | | | | | | | | |
| Barium (dissolved) | µg/L | **1000** | **29000** | | | | | | | | | | | |
| Beryllium (dissolved) | µg/L | | **67** | | | | | | | | | | | |
| Boron (dissolved) | µg/L | **5000** | **45000** | | | | | | | | | | | |
| Bismuth (dissolved) | µg/L | | | | | | | | | | | | | |
| Calcium (dissolved) | µg/L | | | | | | | | | | | | | |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | | | | | | | | | | | |
| Cobalt (dissolved) | µg/L | | **66** | | | | | | | | | | | |
| Chromium (dissolved) | µg/L | | **810** | | | | | | | | | | | |
| Copper (dissolved) | µg/L | **1000** | **87** | | | | | | | | | | | |
| Iron (dissolved) | µg/L | | | | | | | | | | | | | |
| Potassium (dissolved) | µg/L | | | | | | | | | | | | | |
| Magnesium (dissolved) | µg/L | | | | | | | | | | | | | |
| Manganese (dissolved) | µg/L | | | | | | | | | | | | | |
| Molybdenum (dissolved) | µg/L | | **9200** | | | | | | | | | | | |
| Sodium (dissolved) | µg/L | | | | | | | | | | | | | |
| Nickel (dissolved) | µg/L | | **490** | | | | | | | | | | | |
| Phosphorus (dissolved) | µg/L | | | | | | | | | | | | | |
| Lead (dissolved) | µg/L | **10** | **25** | | | | | | | | | | | |
| Antimony (dissolved) | µg/L | **6** | **20000** | | | | | | | | | | | |
| Selenium (dissolved) | µg/L | **10** | **63** | | | | | | | | | | | |
| Tin (dissolved) | µg/L | | | | | | | | | | | | | |
| Strontium (dissolved) | µg/L | | | | | | | | | | | | | |
| Titanium (dissolved) | µg/L | | | | | | | | | | | | | |
| Thallium (dissolved) | µg/L | | **510** | | | | | | | | | | | |
| Uranium (dissolved) | µg/L | **20** | **420** | | | | | | | | | | | |
| Vanadium (dissolved) | µg/L | | **250** | | | | | | | | | | | |
| Zinc (dissolved) | µg/L | | **1100** | | | | | | | | | | | |
| Lead-210 | Bq/L | **0.2** | | | | | | | | | | | | |
| Radium-226 | Bq/L | **0.49** | | | | | | | | | | | | |
| Thorium-230 | Bq/L | **0.65** | | | | | | | | | | | | |
| Thorium-232 | Bq/L | **0.6** | | | | | | | | | | | | |
| **Field Parameters** | | | | | | | | | | | | | | |
| ODO % Sat | % | | | | | | | | | | | | | |
| ORP | mV | | | | | | | | | | | | | |
| SPC | µs/cm | | | | | | | | | | | | | |
| Temperature | °C | | | | | | | | | | | | | |
| Turbidity | FNU | | | | | | | | | | | | | |
| pH | Units | | | | | | | | | | | | | |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Insufficient volume of groundwater for full sample collection

-- - No data.

## Table 54: PG-MW03-03B

| | | Criteria | | PG-MW03-03B | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | | | | 2022/12/08 | **Average** | |
| pH | pH | | | No Sample due to construction | | | 7.90 | 7.92 | No Sample due to well damage | | | 7.78 | 7.78 | |
| Alkalinity | mg/L as $CaCO_3$ | | | | | | 208 | 238 | | | | 1149 | 1149 | |
| Carbonate | mg/L as $CaCO_3$ | | | | | | < 1.0 | < 1.0 | | | | < 1.0 | < 1.0 | |
| Bicarbonate | mg/L as $CaCO_3$ | | | | | | 208 | 238 | | | | 1150 | 1150 | |
| Total Dissolved Solids | mg/L | | | | | | 248 | 254 | | | | 211 | 211 | |
| Fluoride | mg/L | **1.5** | | | | | 0.06 | 0.10 | | | | < 0.06 | < 0.06 | |
| Total Organic Carbon | mg/L | | | | | | < 1.0 | < 1.0 | | | | < 1.0 | < 1.0 | |
| Dissolved Organic Carbon | mg/L | | | | | | < 1.0 | 1.0 | | | | < 1.0 | < 1.0 | |
| Ammonia+Ammonium (N) | as N mg/L | | | | | | 0.07 | 0.04 | | | | 0.08 | 0.08 | |
| Chloride (dissolved) | mg/L | | | | | | 2 | 2 | | | | 2 | 2 | |
| Sulphate (dissolved) | mg/L | | | | | | 28 | 28 | | | | 28 | 28 | |
| Bromide (dissolved) | mg/L | | | | | | < 0.3 | < 0.3 | | | | < 0.3 | < 0.3 | |
| Nitrite (as N) | as N mg/L | | | | | | < 0.03 | < 0.03 | | | | < 0.03 | < 0.03 | |
| Nitrate (as N) | as N mg/L | | | | | | < 0.06 | < 0.06 | | | | 0.08 | 0.08 | |
| Nitrate + Nitrite (as N) | as N mg/L | | | | | | < 0.06 | < 0.06 | | | | 0.08 | 0.08 | |
| Mercury (dissolved) | µg/L | **1** | **0.29** | | | | < 0.01 | < 0.01 | | | | < 0.01 | < 0.01 | |
| Hardness | mg/L as $CaCO_3$ | | | | | | 302 | 666 | | | | 4730 | 4730 | |
| Silver (dissolved) | µg/L | | **1.5** | | | | < 0.05 | < 0.05 | | | | < 0.05 | < 0.05 | |
| Aluminum (dissolved) | µg/L | | | | | | < 1 | < 1 | | | | 1 | 1 | |
| Arsenic (dissolved) | µg/L | **25** | **1900** | | | | < 0.2 | < 0.2 | | | | < 0.20 | < 0.2 | |
| Barium (dissolved) | µg/L | **1000** | **29000** | | | | 197 | 175 | | | | 185 | 185 | |
| Beryllium (dissolved) | µg/L | | **67** | | | | < 0.007 | < 0.007 | | | | < 0.007 | < 0.007 | |
| Boron (dissolved) | µg/L | **5000** | **45000** | | | | 8 | 8 | | | | 9 | 9 | |
| Bismuth (dissolved) | µg/L | | | | | | < 0.007 | < 0.007 | | | | < 0.010 | < 0.010 | |
| Calcium (dissolved) | µg/L | | | | | | 51500 | 50300 | | | | 45500 | 45500 | |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | | | | < 0.003 | 0.003 | | | | < 0.003 | < 0.003 | |
| Cobalt (dissolved) | µg/L | | **66** | | | | 0.021 | 0.018 | | | | 0.022 | 0.022 | |
| Chromium (dissolved) | µg/L | | **810** | | | | 0.12 | 0.19 | | | | < 0.08 | < 0.08 | |
| Copper (dissolved) | µg/L | **1000** | **87** | | | | < 0.2 | < 0.2 | | | | < 0.2 | < 0.2 | |
| Iron (dissolved) | µg/L | | | | | | 105 | 82 | | | | 11.0 | 11 | |
| Potassium (dissolved) | µg/L | | | | | | 1170 | 1210 | | | | 1280 | 1280 | |
| Magnesium (dissolved) | µg/L | | | | | | 13200 | 13600 | | | | 14200 | 14200 | |
| Manganese (dissolved) | µg/L | | | | | | 17.43 | 12.90 | | | | 9.53 | 9.53 | |
| Molybdenum (dissolved) | µg/L | | **9200** | | | | 1.14 | 1.06 | | | | 1.06 | 1.06 | |
| Sodium (dissolved) | µg/L | | | | | | 3300 | 3170 | | | | 3130 | 3130 | |
| Nickel (dissolved) | µg/L | | **490** | | | | < 0.1 | < 0.1 | | | | < 0.1 | < 0.1 | |
| Phosphorus (dissolved) | µg/L | | | | | | < 3 | 5 | | | | < 3 | < 3 | |
| Lead (dissolved) | µg/L | **10** | **25** | | | | 0.05 | < 0.01 | | | | < 0.09 | < 0.09 | |
| Antimony (dissolved) | µg/L | **6** | **20000** | | | | < 0.90 | < 0.90 | | | | < 0.90 | < 0.90 | |
| Selenium (dissolved) | µg/L | **10** | **63** | | | | < 0.04 | < 0.04 | | | | 0.06 | 0.06 | |
| Tin (dissolved) | µg/L | | | | | | 0.18 | 0.14 | | | | < 0.06 | < 0.06 | |
| Strontium (dissolved) | µg/L | | | | | | 152 | 159 | | | | 144 | 144 | |
| Titanium (dissolved) | µg/L | | | | | | 0.12 | 0.35 | | | | 0.17 | 0.17 | |
| Thallium (dissolved) | µg/L | | **510** | | | | < 0.005 | < 0.005 | | | | < 0.005 | < 0.005 | |
| Uranium (dissolved) | µg/L | **20** | **420** | | | | 0.052 | 0.031 | | | | 0.094 | 0.094 | |
| Vanadium (dissolved) | µg/L | | **250** | | | | 0.18 | 0.07 | | | | 1.49 | 1.49 | |
| Zinc (dissolved) | µg/L | | **1100** | | | | < 2 | < 2 | | | | < 2 | < 2 | |
| Lead-210 | Bq/L | **0.2** | | | | | < 0.02 | < 0.02 | | | | 0.04 | 0.04 | |
| Radium-226 | Bq/L | **0.49** | | | | | < 0.01 | < 0.01 | | | | 0.01 | 0.01 | |
| Thorium-230 | Bq/L | **0.65** | | | | | < 0.02 | < 0.02 | | | | < 0.02 | < 0.02 | |
| Thorium-232 | Bq/L | **0.6** | | | | | < 0.02 | < 0.02 | | | | < 0.02 | < 0.02 | |
| **Field Parameters** | | | | | | | | | | | | | | |
| ODO % Sat | % | | | | | | -[1] | -[1] | | | | 52.6 | -- | |
| ORP | mV | | | | | | -[1] | -[1] | | | | 142.3 | -- | |
| SPC | µs/cm | | | | | | -[1] | -[1] | | | | 362.0 | -- | |
| Temperature | °C | | | | | | -[1] | -[1] | | | | 9.377 | -- | |
| Turbidity | FNU | | | | | | -[1] | -[1] | | | | 2820.80 | -- | |
| pH | Units | | | | | | -[1] | -[1] | | | | 8.00 | -- | |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

-- - No data.

# Table 55: PG-MW03-03C

| | | Criteria | | PG-MW03-03C | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | 2022/03/31 | 2022/06/20 | 2022/10/06 | 2022/12/07 | **Average** |
| pH | pH | | | No Sample due to construction | | | 7.87 | 7.87 | 7.85 | 8 | No Sample[2] | 7.84 | 7.90 |
| Alkalinity | mg/L as $CaCO_3$ | | | | | | 184 | 188 | 164 | 169 | | 152 | 162 |
| Carbonate | mg/L as $CaCO_3$ | | | | | | < 1.0 | < 1.0 | < 1.0 | < 1.0 | | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | | | | 184 | 188 | 164 | 169 | | 152 | 162 |
| Total Dissolved Solids | mg/L | | | | | | 294 | 231 | 234 | 77 | | 243 | 185 |
| Fluoride | mg/L | **1.5** | | | | | 0.13 | 0.06 | < 0.06 | < 0.06 | | < 0.06 | < 0.06 |
| Total Organic Carbon | mg/L | | | | | | < 1.0 | < 1.0 | < 1.0 | < 1.0 | | < 1.0 | < 1.0 |
| Dissolved Organic Carbon | mg/L | | | | | | 1.0 | < 1.0 | < 1.0 | < 1.0 | | < 1.0 | < 1.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | | | | < 0.04 | < 0.04 | < 0.04 | < 0.04 | | 0.12 | 0.07 |
| Chloride (dissolved) | mg/L | | | | | | 4 | 5 | 4 | 3 | | 3 | 3 |
| Sulphate (dissolved) | mg/L | | | | | | 40 | 38 | 36 | 42 | | 34 | 37 |
| Bromide (dissolved) | mg/L | | | | | | < 0.3 | < 0.3 | < 0.3 | < 0.3 | | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | | | | 0.12 | 0.15 | 0.15 | 0.13 | | 0.14 | 0.14 |
| Nitrate (as N) | as N mg/L | | | | | | 2.90 | 2.76 | 2.02 | 1.81 | | 1.32 | 1.72 |
| Nitrate + Nitrite (as N) | as N mg/L | | | | | | 3.02 | 2.91 | 2.17 | 1.94 | | 1.46 | 1.86 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | | | | < 0.01 | < 0.01 | < 0.01 | < 0.01 | | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | | | | 244 | 380 | 203 | 247 | | 200 | 217 |
| Silver (dissolved) | µg/L | | **1.5** | | | | < 0.05 | < 0.05 | < 0.05 | < 0.05 | | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | | | | < 1 | 3 | 1 | 2 | | 1 | 1 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | | | | < 0.2 | < 0.2 | < 0.2 | < 0.2 | | < 0.2 | < 0.2 |
| Barium (dissolved) | µg/L | **1000** | **29000** | | | | 61 | 56 | 54.1 | 56 | | 49 | 53 |
| Beryllium (dissolved) | µg/L | | **67** | | | | < 0.007 | < 0.007 | < 0.007 | < 0.007 | | < 0.007 | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | | | | 10 | 12 | 11 | 13 | | 9 | 11 |
| Bismuth (dissolved) | µg/L | | | | | | < 0.007 | 0.009 | < 0.010 | < 0.010 | | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | | | | 64700 | 60750 | 57800 | 68400 | | 58900 | 61700 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | | | | < 0.003 | 0.003 | 0.004 | < 0.003 | | 0.003 | 0.003 |
| Cobalt (dissolved) | µg/L | | **66** | | | | 0.075 | 0.055 | 0.048 | 0.054 | | 0.073 | 0.058 |
| Chromium (dissolved) | µg/L | | **810** | | | | 0.09 | 0.21 | 0.08 | 0.13 | | 0.13 | 0.11 |
| Copper (dissolved) | µg/L | **1000** | **87** | | | | 0.4 | 0.2 | < 0.2 | < 0.2 | | < 0.2 | < 0.2 |
| Iron (dissolved) | µg/L | | | | | | < 7 | 7 | < 7 | < 7 | | < 7 | < 7 |
| Potassium (dissolved) | µg/L | | | | | | 2120 | 2108 | 2010 | 2360 | | 2120 | 2163 |
| Magnesium (dissolved) | µg/L | | | | | | 11800 | 12200 | 10500 | 12100 | | 12400 | 11667 |
| Manganese (dissolved) | µg/L | | | | | | 12.50 | 8.24 | 5.1 | 8.8 | | 11.4 | 8.42 |
| Molybdenum (dissolved) | µg/L | | **9200** | | | | 1.4 | 1.6 | 1 | 1 | | 1 | 1.4 |
| Sodium (dissolved) | µg/L | | | | | | 3760 | 3798 | 3690 | 3840 | | 3510 | 3680 |
| Nickel (dissolved) | µg/L | | **490** | | | | < 0.1 | 0.1 | < 0.1 | < 0.1 | | 0.2 | 0.1 |
| Phosphorus (dissolved) | µg/L | | | | | | < 3 | < 3 | < 3 | < 3 | | < 3 | < 3 |
| Lead (dissolved) | µg/L | **10** | **25** | | | | 0.04 | 0.07 | < 0.09 | < 0.09 | | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | | | | < 0.90 | < 0.90 | < 0.90 | < 0.90 | | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | | | | 0.40 | 1.00 | 0.91 | 0.76 | | 0.34 | 0.67 |
| Tin (dissolved) | µg/L | | | | | | 0.12 | 0.06 | < 0.06 | < 0.06 | | < 0.06 | < 0.06 |
| Strontium (dissolved) | µg/L | | | | | | 130 | 141 | 127 | 141 | | 129 | 132 |
| Titanium (dissolved) | µg/L | | | | | | 0.07 | 0.25 | < 0.05 | 0.07 | | 0.08 | 0.07 |
| Thallium (dissolved) | µg/L | | **510** | | | | 0.014 | 0.008 | 0.011 | 0.006 | | 0.009 | 0.009 |
| Uranium (dissolved) | µg/L | **20** | **420** | | | | 9.980 | 9.985 | 9.850 | 8.367 | | 9.135 | 9.117 |
| Vanadium (dissolved) | µg/L | | **250** | | | | 0.39 | 0.41 | 0.39 | 0.44 | | 0.46 | 0.43 |
| Zinc (dissolved) | µg/L | | **1100** | | | | < 2 | < 2 | < 2 | < 2 | | < 2 | < 2 |
| Lead-210 | Bq/L | **0.2** | | | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | 0.13 | 0.06 |
| Radium-226 | Bq/L | **0.49** | | | | | < 0.01 | 0.01 | < 0.01 | < 0.01 | | 0.02 | 0.01 |
| Thorium-230 | Bq/L | **0.65** | | | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | | | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | | | | -[1] | -[1] | 28.2 | 44.7 | | 50.1 | -- |
| ORP | mV | | | | | | -[1] | -[1] | 162.7 | 151.8 | | 183.5 | -- |
| SPC | µs/cm | | | | | | -[1] | -[1] | 406.4 | 423.8 | | 399.8 | -- |
| Temperature | °C | | | | | | -[1] | -[1] | 9.638 | 11.503 | | 11.416 | -- |
| Turbidity | FNU | | | | | | -[1] | -[1] | 8.37 | 7.2 | | 4.76 | -- |
| pH | Units | | | | | | -[1] | -[1] | 7.81 | 7.91 | | 7.85 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Well was being repaired by contractor

-- - No data.

## Table 56: PG-MW1A-02

| | | Criteria | | PG-MW1A-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | | 2022/03/11 | 2022/06/20 | 2022/09/07 | 2022/12/07 | **Average** |
| pH | pH | | | 8.10 | No Sample | 8.13 | 8.21 | 8.27 | No Sample[2] | No Sample[2] | No Sample[2] | No Sample[2] | -- |
| Alkalinity | mg/L as $CaCO_3$ | | | 110 | | 98 | 90 | 1162 | | | | | -- |
| Carbonate | mg/L as $CaCO_3$ | | | 1.2 | | 1.2 | 28 | < 1 | | | | | -- |
| Bicarbonate | mg/L as $CaCO_3$ | | | 110 | | 93 | 62 | 1160 | | | | | -- |
| Total Dissolved Solids | mg/L | | | 445 | | 483 | 503 | 760 | | | | | -- |
| Fluoride | mg/L | **1.5** | | 0.64 | | 0.53 | 0.64 | 0.63 | | | | | -- |
| Total Organic Carbon | mg/L | | | 6.2 | | 4.2 | 1.0 | 2.0 | | | | | -- |
| Dissolved Organic Carbon | mg/L | | | 1.4 | | 1.1 | 1.0 | 2.0 | | | | | -- |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.37 | | 0.35 | 0.18 | 0.26 | | | | | -- |
| Chloride (dissolved) | mg/L | | | 220 | | 205 | 230 | 230 | | | | | -- |
| Sulphate (dissolved) | mg/L | | | 2 | | 2 | 7 | 5 | | | | | -- |
| Bromide (dissolved) | mg/L | | | 3.9 | | 3.1 | 2.8 | 2.8 | | | | | -- |
| Nitrite (as N) | as N mg/L | | | < 0.01 | | < 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) | µg/L | **1** | **0.29** | < 0.10 | | < 0.1 | < 0.01 | < 0.01 | | | | | -- |
| Hardness | mg/L as $CaCO_3$ | | | 410 | | 100 | 2140 | 2140 | | | | | -- |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | | < 0.10 | < 0.05 | < 0.05 | | | | | -- |
| Aluminum (dissolved) | µg/L | | | 3054 | | 47 | 3 | 362 | | | | | -- |
| Arsenic (dissolved) | µg/L | **25** | **1900** | 1.5 | | 1.2 | 1.2 | 1.4 | | | | | -- |
| Barium (dissolved) | µg/L | **1000** | **29000** | 117 | | 93 | 78 | 41 | | | | | -- |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | | < 0.50 | < 0.007 | 0.022 | | | | | -- |
| Boron (dissolved) | µg/L | **5000** | **45000** | 280 | | 265 | 260 | 215 | | | | | -- |
| Bismuth (dissolved) | µg/L | | | < 1.0 | | < 1.0 | < 0.007 | < 0.010 | | | | | -- |
| Calcium (dissolved) | µg/L | | | 79000 | | 25500 | 20600 | 18000 | | | | | -- |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | | < 0.10 | < 0.003 | < 0.003 | | | | | -- |
| Cobalt (dissolved) | µg/L | | **66** | 1.05 | | < 0.50 | 0.055 | 0.113 | | | | | -- |
| Chromium (dissolved) | µg/L | | **810** | 6.2 | | < 5.0 | 0.12 | 0.47 | | | | | -- |
| Copper (dissolved) | µg/L | **1000** | **87** | 1.5 | | < 1.0 | < 0.2 | 1.2 | | | | | -- |
| Iron (dissolved) | µg/L | | | 1750 | | 120 | < 7 | 158 | | | | | -- |
| Potassium (dissolved) | µg/L | | | 3000 | | 2050 | 1840 | 1470 | | | | | -- |
| Magnesium (dissolved) | µg/L | | | 10700 | | 9150 | 10700 | 6910 | | | | | -- |
| Manganese (dissolved) | µg/L | | | 67.1 | | 10.0 | 6.3 | 10.7 | | | | | -- |
| Molybdenum (dissolved) | µg/L | | **9200** | 10.05 | | 9.50 | 11.80 | 10.76 | | | | | -- |
| Sodium (dissolved) | µg/L | | | 150000 | | 145000 | 149000 | 157000 | | | | | -- |
| Nickel (dissolved) | µg/L | | **490** | 2.2 | | < 1.0 | 0.2 | 0.3 | | | | | -- |
| Phosphorus (dissolved) | µg/L | | | 1 | | 2 | < 3 | 7 | | | | | -- |
| Lead (dissolved) | µg/L | **10** | **25** | 1.70 | | < 0.50 | 0.02 | 0.31 | | | | | -- |
| Antimony (dissolved) | µg/L | **6** | **20000** | 0.70 | | 1.0 | < 0.90 | < 0.90 | | | | | -- |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | | < 2.0 | 0.04 | < 0.04 | | | | | -- |
| Tin (dissolved) | µg/L | | | < 1.0 | | < 1.0 | 0.18 | 1.08 | | | | | -- |
| Strontium (dissolved) | µg/L | | | 835 | | 770 | 940 | 550 | | | | | -- |
| Titanium (dissolved) | µg/L | | | 87.5 | | < 5.0 | 0.44 | 8.63 | | | | | -- |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | | < 0.05 | < 0.005 | < 0.005 | | | | | -- |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.925 | | 0.480 | 0.931 | 0.967 | | | | | -- |
| Vanadium (dissolved) | µg/L | | **250** | 4.88 | | 0.51 | 0.45 | 0.27 | | | | | -- |
| Zinc (dissolved) | µg/L | | **1100** | 8 | | < 5 | < 2 | 3 | | | | | -- |
| Lead-210 | Bq/L | **0.2** | | 0.03 | | < 0.10 | < 0.02 | 0.03 | | | | | -- |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | | < 0.04 | < 0.01 | 0.01 | | | | | -- |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | | < 0.07 | < 0.02 | < 0.02 | | | | | -- |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | | < 0.06 | < 0.02 | < 0.02 | | | | | -- |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | | -[1] | -[1] | -[1] | | | | | -- |
| ORP | mV | | | -[1] | | -[1] | -[1] | -[1] | | | | | -- |
| SPC | µs/cm | | | -[1] | | -[1] | -[1] | -[1] | | | | | -- |
| Temperature | °C | | | -[1] | | -[1] | -[1] | -[1] | | | | | -- |
| Turbidity | FNU | | | -[1] | | -[1] | -[1] | -[1] | | | | | -- |
| pH | Units | | | -[1] | | -[1] | -[1] | -[1] | | | | | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for full sample collection

-- - No data.

# Table 57: PG-MW1B-02

| | | Criteria | | PG-MW1B-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | Average | | | | | 2022/03/11 | 2022/06/21 | 2022/09/08 | 2022/12/08 | **Average** |
| pH | pH | | | 8.01 | 8.10 | 8.11 | 8.24 | 7.94 | 8.45 | 8.38 | 7.72 | 7.92 | 8.12 |
| Alkalinity | mg/L as $CaCO_3$ | | | 75 | 77 | 74 | 211 | 238 | 318 | 194 | 144 | 153 | 202 |
| Carbonate | mg/L as $CaCO_3$ | | | < 1.0 | 1.1 | < 1.0 | 1.8 | < 1.0 | 5.0 | 3.0 | < 1.0 | < 1.0 | 2.5 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 74 | 76 | 73 | 210 | 238 | 313 | 191 | 144 | 153 | 200 |
| Total Dissolved Solids | mg/L | | | 522 | 469 | 457 | 465 | 459 | 437 | 383 | 509 | 431 | 440 |
| Fluoride | mg/L | **1.5** | | 0.44 | 0.44 | 0.42 | 0.50 | 0.33 | 0.46 | 0.44 | 0.47 | 0.47 | 0.46 |
| Total Organic Carbon | mg/L | | | 2.9 | 5.6 | 1.7 | 1.3 | 1.0 | 1.0 | < 1.0 | < 1.0 | 1.0 | 1.0 |
| Dissolved Organic Carbon | mg/L | | | 1.1 | 1.0 | 0.9 | 1.3 | 1.0 | 1.0 | 1.0 | 2.0 | 1.0 | 1.3 |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.25 | 0.31 | 0.29 | 0.27 | 0.27 | 0.24 | 0.25 | 0.29 | 0.31 | 0.27 |
| Chloride (dissolved) | mg/L | | | 200 | 210 | 203 | 225 | 220 | 260 | 230 | 240 | 260 | 248 |
| Sulphate (dissolved) | mg/L | | | 3 | 6 | 3 | 5 | 3 | 4 | 4 | 3 | 3 | 3 |
| Bromide (dissolved) | mg/L | | | 1.8 | 3.9 | 3.4 | 2.7 | 2.7 | 2.8 | 2.6 | 2.6 | 2.7 | 2.7 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 90 | 89 | 87 | 455 | 496 | 517 | 207 | 300 | 280 | 326 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | < 5 | 5 | 8 | 150 | 475 | 70 | 7 | 7 | 4 | 22 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | 2.0 | 0.4 | 0.5 | 0.30 | 0.50 | 0.40 | 0.20 | 0.4 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 60 | 69 | 64 | 63 | 80 | 65 | 70 | 62 | 53 | 62 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | 0.01 | 0.05 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 270 | 263 | 267 | 257 | 244 | 229 | 296 | 265 | 251 | 260 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.0 | 0.0 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 19500 | 19500 | 19000 | 22175 | 45167 | 21900 | 24900 | 19500 | 18600 | 21225 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | 0.00 | 0.01 | 0.004 | 0.003 | 0.003 | 0.007 | 0.004 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.09 | 0.37 | 0.078 | 0.062 | 0.044 | 0.032 | 0.054 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.3 | 1.1 | 0.34 | 0.15 | < 0.08 | 0.17 | 0.19 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | 1.9 | 0.3 | 0.8 | 0.4 | 0.3 | < 0.2 | < 0.2 | 0.3 |
| Iron (dissolved) | µg/L | | | < 100 | < 100 | < 100 | 117 | 660 | 68 | < 7 | 34 | 9 | 30 |
| Potassium (dissolved) | µg/L | | | 1250 | 1250 | 1267 | 1288 | 1373 | 1190 | 1300 | 1120 | 1050 | 1165 |
| Magnesium (dissolved) | µg/L | | | 9800 | 9800 | 9400 | 9778 | 10927 | 9260 | 9140 | 9060 | 9260 | 9180 |
| Manganese (dissolved) | µg/L | | | 4.1 | 4.2 | 7.8 | 7.5 | 37.6 | 7.01 | 7.4 | 5.6 | 6.1 | 6.5 |
| Molybdenum (dissolved) | µg/L | | **9200** | 13 | 14 | 11 | 12 | 12 | 9.92 | 11 | 12 | 10 | 11 |
| Sodium (dissolved) | µg/L | | | 130000 | 130000 | 133333 | 128750 | 130333 | 123000 | 133000 | 127000 | 114000 | 124250 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.3 | 0.8 | 0.7 | 0.2 | 0.1 | < 0.1 | 0.3 |
| Phosphorus (dissolved) | µg/L | | | 430 | 685 | 308 | 3 | 76 | 5 | 6 | < 3 | < 3 | 4 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.08 | 0.69 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.2 | 0.2 | 0.39 | 0.13 | 0.07 | 0.13 | 0.18 |
| Strontium (dissolved) | µg/L | | | 835 | 873 | 830 | 942 | 1005 | 904 | 1050 | 855 | 839 | 912 |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 4.10 | 23.82 | 3.13 | 0.19 | 0.32 | 0.11 | 0.94 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | 0.010 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | < 0.100 | 0.165 | 0.733 | 0.153 | 0.314 | 0.125 | 0.129 | 0.091 | 0.039 | 0.096 |
| Vanadium (dissolved) | µg/L | | **250** | < 0.50 | 0.55 | < 0.50 | 0.48 | 1.36 | 0.82 | 0.37 | 0.09 | 0.16 | 0.36 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | 5 | < 2 | 4 | < 2 | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | 0.08 | < 0.10 | < 0.02 | 0.03 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | < 0.04 | < 0.04 | < 0.01 | 0.01 | < 0.01 | < 0.01 | 0.02 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | 0.03 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | 0.03 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | 84.1 | -[2] | 43.3 | 45 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | 177.1 | -[2] | 188.3 | 144.5 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | 829 | -[2] | 848 | 408.1 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | 8.162 | -[2] | 12.478 | 8.897 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | 615.38 | -[2] | 328.02 | 232.63 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | 8.51 | -[2] | 8.02 | 8.56 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for field parameters

-- - No data.

# Table 58: PG-MW1C-02

| | | Criteria | | PG-MW1C-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | Average | | | | | 2022/02/21 | 2022/06/20 | 2022/09/07 | 2022/11/25 | **Average** |
| pH | pH | | | 8.01 | 7.91 | 7.93 | 7.89 | 7.86 | 7.86 | 7.79 | 7.49 | 7.59 | 7.68 |
| Alkalinity | mg/L as $CaCO_3$ | | | 200 | 223 | 208 | 223 | 318 | 191 | 210 | 227 | 254 | 221 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.9 | 1.7 | 1.7 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 200 | 220 | 208 | 223 | 318 | 191 | 210 | 227 | 254 | 221 |
| Total Dissolved Solids | mg/L | | | 292 | 333 | 354 | 369 | 339 | 277 | 300 | 349 | 306 | 308 |
| Fluoride | mg/L | **1.5** | | < 0.12 | 0.10 | < 0.10 | 0.11 | 0.10 | 0.10 | 0.08 | 0.11 | 0.09 | 0.10 |
| Total Organic Carbon | mg/L | | | 2.7 | 0.9 | 0.9 | 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | 1.0 | < 1.0 |
| Dissolved Organic Carbon | mg/L | | | 0.8 | 0.6 | 0.6 | 1.0 | < 1.0 | < 1.0 | < 1.0 | 1.0 | < 1.0 | < 1.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.07 | 0.05 | 0.06 | 0.04 | 0.04 | 0.05 | 0.06 | < 0.04 | 0.06 | 0.05 |
| Chloride (dissolved) | mg/L | | | 21 | 24 | 25 | 36 | 27 | 26 | 32 | 38 | 31 | 32 |
| Sulphate (dissolved) | mg/L | | | 32 | 32 | 32 | 36 | 31 | 31 | 37 | 26 | 39 | 33 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 243 | 258 | 255 | 312 | 884 | 250 | 283 | 243 | 334 | 278 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | 0.06 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | < 5 | 7 | < 5 | 2 | 2 | 13 | < 1 | < 1 | 2 | 4 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | 0.3 | 0.3 | < 0.2 | 0.2 | 0.3 | 0.3 | 0.3 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 220 | 233 | 230 | 223 | 222 | 233 | 233 | 200 | 221 | 222 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 12 | 11 | < 12 | 11 | 11 | 9 | 15 | 11 | 12 | 12 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | 0.009 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 61000 | 65750 | 66000 | 69000 | 66825 | 62100 | 74700 | 65500 | 77100 | 69850 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.056 | 0.061 | < 0.004 | 0.039 | 0.043 | 0.045 | 0.033 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.09 | 0.11 | 0.14 | 0.10 | < 0.08 | < 0.08 | 0.10 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | < 1.0 | 0.5 | < 0.2 | < 0.2 | < 0.2 | 0.2 | < 0.2 | < 0.2 |
| Iron (dissolved) | µg/L | | | 240 | 213 | 228 | 175 | 226 | 216 | 222 | 188 | 244 | 218 |
| Potassium (dissolved) | µg/L | | | 1500 | 1575 | 1525 | 1540 | 1570 | 1550 | 1670 | 1480 | 1460 | 1540 |
| Magnesium (dissolved) | µg/L | | | 21500 | 22250 | 22250 | 22950 | 22225 | 19200 | 21000 | 21300 | 20400 | 20475 |
| Manganese (dissolved) | µg/L | | | 11.3 | 12.5 | 11.3 | 10.5 | 13.9 | 11.10 | 11.71 | 11.50 | 12.40 | 11.68 |
| Molybdenum (dissolved) | µg/L | | **9200** | 0.94 | 1.24 | 0.62 | 0.58 | 0.74 | 0.56 | 0.53 | 0.68 | 0.64 | 0.60 |
| Sodium (dissolved) | µg/L | | | 8000 | 9125 | 9225 | 10855 | 9090 | 8480 | 9090 | 8660 | 7880 | 8528 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 |
| Phosphorus (dissolved) | µg/L | | | 1600 | 302 | 198 | 3 | 5 | < 3 | < 3 | 3 | 6 | 4 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.02 | 0.07 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | 0.05 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.06 | 0.08 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Strontium (dissolved) | µg/L | | | 228 | 245 | 240 | 256 | 257 | 227 | 252 | 236 | 274 | 247 |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.11 | 0.20 | 0.77 | 0.09 | < 0.05 | 0.08 | 0.25 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | 0.006 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.140 | 0.183 | 0.143 | 0.199 | 0.149 | 0.147 | 0.172 | 0.183 | 0.132 | 0.159 |
| Vanadium (dissolved) | µg/L | | **250** | < 0.50 | < 0.50 | < 0.50 | 0.08 | 0.11 | 0.06 | 0.05 | 0.04 | 0.02 | 0.04 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | < 5 | < 2 | < 2 | < 2 | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | 0.08 | < 0.10 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | 0.03 | 0.02 |
| Radium-226 | Bq/L | **0.49** | | < 0.03 | < 0.04 | < 0.04 | 0.01 | 0.01 | < 0.01 | < 0.01 | 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 74.4 | 53.7 | 26.2 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 58.6 | 30.7 | 4.0 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 516 | 520 | 505 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 10.911 | 10.415 | 8.827 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 178.3 | 41.05 | 161.28 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 7.61 | 7.59 | 7.58 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for field parameters

-- - No data.

# Table 59: PG-MW1D-02

| | | Criteria | | PG-MW1D-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | Average | | | | | 2022/02/10 | 2022/06/20 | 2022/09/07 | 2022/11/25 | **Average** |
| pH | pH | | | 7.79 | 7.69 | 7.70 | 7.71 | 7.45 | 7.47 | 7.47 | 7.37 | No Sample[2] | 7.44 |
| Alkalinity | mg/L as $CaCO_3$ | | | 325 | 313 | 323 | 366 | 472 | 321 | 318 | 388 | | 342 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.9 | 1.5 | 1.5 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 318 | 310 | 318 | 366 | 472 | 321 | 318 | 388 | | 342 |
| Total Dissolved Solids | mg/L | | | 454 | 436 | 484 | 476 | 494 | 437 | 406 | 600 | | 481 |
| Fluoride | mg/L | **1.5** | | < 0.10 | < 0.10 | < 0.10 | 0.09 | < 0.08 | 0.08 | 0.07 | < 0.06 | | 0.07 |
| Total Organic Carbon | mg/L | | | 3.3 | 2.3 | 2.7 | 1.7 | 2.8 | 2.0 | 2.0 | 2.0 | | 2.0 |
| Dissolved Organic Carbon | mg/L | | | 1.8 | 1.6 | 1.6 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | | 2.3 |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | 0.07 | 0.06 | 0.05 | < 0.04 | 0.11 | < 0.04 | < 0.04 | | 0.06 |
| Chloride (dissolved) | mg/L | | | 78 | 85 | 89 | 88 | 108 | 99 | 87 | 150 | | 112 |
| Sulphate (dissolved) | mg/L | | | 14 | 12 | 11 | 11 | 18 | 11 | 8 | 15 | | 11 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | | < 0.03 |
| Nitrate (as N) | as N mg/L | | | < 0.14 | 0.14 | 0.12 | 0.06 | 0.10 | < 0.06 | < 0.06 | < 0.06 | | < 0.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | < 0.14 | 0.14 | 0.12 | 0.06 | 0.10 | < 0.06 | < 0.06 | < 0.06 | | < 0.06 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 333 | 315 | 325 | 1309 | 859 | 393 | 395 | 435 | | 408 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | | < 0.05 |
| Aluminum (dissolved) | µg/L | | | < 5 | < 5 | < 5 | < 1 | 8 | 1 | 5 | < 1 | | 2 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | | < 0.2 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 47 | 44 | 46 | 42 | 47 | 43 | 43 | 51 | | 46 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.007 | 0.008 | < 0.007 | < 0.007 | < 0.007 | | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | < 13 | < 10 | 11 | 7 | 7 | 5 | 6 | 6 | | 6 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | 0.009 | < 0.010 | < 0.010 | < 0.010 | | < 0.010 |
| Calcium (dissolved) | µg/L | | | 117750 | 115000 | 114000 | 111800 | 129000 | 116000 | 132000 | 131000 | | 126333 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | 0.003 | 0.004 | 0.005 | 0.004 | < 0.003 | | 0.004 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.03 | 0.07 | 0.019 | 0.030 | 0.030 | | 0.026 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.18 | 0.46 | 0.27 | 0.33 | < 0.08 | | 0.23 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | < 1.0 | 1.0 | 0.7 | 0.5 | 0.8 | 0.6 | | 0.6 |
| Iron (dissolved) | µg/L | | | < 100 | < 100 | < 100 | < 7 | 15 | < 7 | 9 | < 7 | | 8 |
| Potassium (dissolved) | µg/L | | | 1200 | 1125 | 1055 | 949 | 993 | 861 | 988 | 996 | | 948 |
| Magnesium (dissolved) | µg/L | | | 9500 | 8675 | 8650 | 8643 | 8775 | 8830 | 9940 | 9420 | | 9397 |
| Manganese (dissolved) | µg/L | | | < 2.00 | 4.50 | 2.25 | 1.07 | 3.07 | 0.16 | 0.48 | 0.43 | | 0.36 |
| Molybdenum (dissolved) | µg/L | | **9200** | < 0.50 | < 0.50 | < 0.50 | 0.20 | 0.19 | 0.16 | 0.18 | 0.18 | | 0.17 |
| Sodium (dissolved) | µg/L | | | 49000 | 53000 | 66000 | 52367 | 57450 | 44700 | 47300 | 81600 | | 57867 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.2 | 0.3 | 0.2 | 0.2 | 0.3 | | 0.2 |
| Phosphorus (dissolved) | µg/L | | | 3 | 780 | 513 | < 3 | < 3 | 3 | < 3 | < 3 | | < 3 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | < 0.01 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | 0.1 | 0.2 | 0.14 | 0.10 | 0.10 | | 0.11 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.09 | 0.15 | 0.06 | 0.08 | 0.15 | | 0.10 |
| Strontium (dissolved) | µg/L | | | 220 | 218 | 213 | 219 | 253 | 225 | 229 | 258 | | 237 |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.08 | 0.36 | 0.11 | 0.36 | 0.06 | | 0.18 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | 0.007 | < 0.005 | < 0.005 | < 0.005 | | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.753 | 0.840 | 0.765 | 0.829 | 0.859 | 0.859 | 0.675 | 1.260 | | 0.931 |
| Vanadium (dissolved) | µg/L | | **250** | < 0.50 | < 0.50 | < 0.50 | 0.20 | 0.28 | 0.21 | 0.24 | 0.22 | | 0.22 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | < 5 | < 2 | < 2 | < 2 | < 2 | < 2 | | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | 0.08 | < 0.10 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | < 0.02 |
| Radium-226 | Bq/L | **0.49** | | < 0.03 | < 0.04 | 0.03 | 0.01 | < 0.01 | < 0.01 | 0.01 | < 0.01 | | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | 0.05 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | 82.6 | 79.2 | 75.9 | | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | 126.5 | 185.1 | 96.6 | | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | 814 | 790 | 1050 | | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | 10.984 | 8.967 | 12.733 | | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | 52.4 | 218.08 | 171.04 | | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | 7.19 | 7.19 | 7.17 | | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for full sample collection

-- - No data.

# Table 60: PG-MW2B-02

| | | Criteria | | PG-MW1D-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | Average | | | | | 2022/02/10 | 2022/06/20 | 2022/09/07 | 2022/11/25 | **Average** |
| pH | pH | | | 7.79 | 7.69 | 7.70 | 7.71 | 7.45 | 7.47 | 7.47 | 7.37 | No Sample[2] | 7.44 |
| Alkalinity | mg/L as $CaCO_3$ | | | 325 | 313 | 323 | 366 | 472 | 321 | 318 | 388 | | 342 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.9 | 1.5 | 1.5 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 318 | 310 | 318 | 366 | 472 | 321 | 318 | 388 | | 342 |
| Total Dissolved Solids | mg/L | | | 454 | 436 | 484 | 476 | 494 | 437 | 406 | 600 | | 481 |
| Fluoride | mg/L | **1.5** | | < 0.10 | < 0.10 | < 0.10 | 0.09 | < 0.08 | 0.08 | 0.07 | < 0.06 | | 0.07 |
| Total Organic Carbon | mg/L | | | 3.3 | 2.3 | 2.7 | 1.7 | 2.8 | 2.0 | 2.0 | 2.0 | | 2.0 |
| Dissolved Organic Carbon | mg/L | | | 1.8 | 1.6 | 1.6 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | | 2.3 |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | 0.07 | 0.06 | 0.05 | < 0.04 | 0.11 | < 0.04 | < 0.04 | | 0.06 |
| Chloride (dissolved) | mg/L | | | 78 | 85 | 89 | 88 | 108 | 99 | 87 | 150 | | 112 |
| Sulphate (dissolved) | mg/L | | | 14 | 12 | 11 | 11 | 18 | 11 | 8 | 15 | | 11 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | | < 0.03 |
| Nitrate (as N) | as N mg/L | | | < 0.14 | 0.14 | 0.12 | 0.06 | 0.10 | < 0.06 | < 0.06 | < 0.06 | | < 0.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | < 0.14 | 0.14 | 0.12 | 0.06 | 0.10 | < 0.06 | < 0.06 | < 0.06 | | < 0.06 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 333 | 315 | 325 | 1309 | 859 | 393 | 395 | 435 | | 408 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | | < 0.05 |
| Aluminum (dissolved) | µg/L | | | < 5 | < 5 | < 5 | < 1 | 8 | 1 | 5 | < 1 | | 2 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | | < 0.2 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 47 | 44 | 46 | 42 | 47 | 43 | 43 | 51 | | 46 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.007 | 0.008 | < 0.007 | < 0.007 | < 0.007 | | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | < 13 | < 10 | 11 | 7 | 7 | 5 | 6 | 6 | | 6 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | 0.009 | < 0.010 | < 0.010 | < 0.010 | | < 0.010 |
| Calcium (dissolved) | µg/L | | | 117750 | 115000 | 114000 | 111800 | 129000 | 116000 | 132000 | 131000 | | 126333 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | 0.003 | 0.004 | 0.005 | 0.004 | < 0.003 | | 0.004 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.03 | 0.07 | 0.019 | 0.030 | 0.030 | | 0.026 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.18 | 0.46 | 0.27 | 0.33 | < 0.08 | | 0.23 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | < 1.0 | 1.0 | 0.7 | 0.5 | 0.8 | 0.6 | | 0.6 |
| Iron (dissolved) | µg/L | | | < 100 | < 100 | < 100 | < 7 | 15 | < 7 | 9 | < 7 | | 8 |
| Potassium (dissolved) | µg/L | | | 1200 | 1125 | 1055 | 949 | 993 | 861 | 988 | 996 | | 948 |
| Magnesium (dissolved) | µg/L | | | 9500 | 8675 | 8650 | 8643 | 8775 | 8830 | 9940 | 9420 | | 9397 |
| Manganese (dissolved) | µg/L | | | < 2.00 | 4.50 | 2.25 | 1.07 | 3.07 | 0.16 | 0.48 | 0.43 | | 0.36 |
| Molybdenum (dissolved) | µg/L | | **9200** | < 0.50 | < 0.50 | < 0.50 | 0.20 | 0.19 | 0.16 | 0.18 | 0.18 | | 0.17 |
| Sodium (dissolved) | µg/L | | | 49000 | 53000 | 66000 | 52367 | 57450 | 44700 | 47300 | 81600 | | 57867 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.2 | 0.3 | 0.2 | 0.2 | 0.3 | | 0.2 |
| Phosphorus (dissolved) | µg/L | | | 3 | 780 | 513 | < 3 | < 3 | 3 | < 3 | < 3 | | < 3 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | < 0.01 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | 0.1 | 0.2 | 0.14 | 0.10 | 0.10 | | 0.11 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.09 | 0.15 | 0.06 | 0.08 | 0.15 | | 0.10 |
| Strontium (dissolved) | µg/L | | | 220 | 218 | 213 | 219 | 253 | 225 | 229 | 258 | | 237 |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.08 | 0.36 | 0.11 | 0.36 | 0.06 | | 0.18 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | 0.007 | < 0.005 | < 0.005 | < 0.005 | | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.753 | 0.840 | 0.765 | 0.829 | 0.859 | 0.859 | 0.675 | 1.260 | | 0.931 |
| Vanadium (dissolved) | µg/L | | **250** | < 0.50 | < 0.50 | < 0.50 | 0.20 | 0.28 | 0.21 | 0.24 | 0.22 | | 0.22 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | < 5 | < 2 | < 2 | < 2 | < 2 | < 2 | | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | 0.08 | < 0.10 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | < 0.02 |
| Radium-226 | Bq/L | **0.49** | | < 0.03 | < 0.04 | 0.03 | 0.01 | < 0.01 | < 0.01 | 0.01 | < 0.01 | | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | 0.05 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | 82.6 | 79.2 | 75.9 | | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | 126.5 | 185.1 | 96.6 | | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | 814 | 790 | 1050 | | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | 10.984 | 8.967 | 12.733 | | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | 52.4 | 218.08 | 171.04 | | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | 7.19 | 7.19 | 7.17 | | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for full sample collection

-- - No data.

# Table 61: PG-MW2C-02

| | | Criteria | | PG-MW2C-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| Parameter | Units | COPC | Table 3 | Average | | | | | 2022/03/29 | 2022/06/22 | 2022/08/29 | 2022/12/01 | Average |
| pH | pH | | | 7.91 | 7.82 | 7.72 | 7.49 | No Sample | No Sample[2] | No Sample[2] | No Sample[2] | No Sample[2] | -- |
| Alkalinity | mg/L as $CaCO_3$ | | | 230 | 250 | 310 | 378 | | | | | | -- |
| Carbonate | mg/L as $CaCO_3$ | | | 1.7 | 1.6 | 1.6 | < 1.0 | | | | | | -- |
| Bicarbonate | mg/L as $CaCO_3$ | | | 230 | 250 | 310 | 377.667 | | | | | | -- |
| Total Dissolved Solids | mg/L | | | 284 | 265 | 360 | 350 | | | | | | -- |
| Fluoride | mg/L | **1.5** | | < 0.10 | < 0.10 | < 0.10 | 0.07 | | | | | | -- |
| Total Organic Carbon | mg/L | | | 3.2 | 2.9 | 3.0 | 2.0 | | | | | | -- |
| Dissolved Organic Carbon | mg/L | | | 1.4 | 1.3 | 1.3 | 2.3 | | | | | | -- |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | 0.11 | < 0.05 | < 0.04 | | | | | | -- |
| Chloride (dissolved) | mg/L | | | 22 | 15 | 37 | 36 | | | | | | -- |
| Sulphate (dissolved) | mg/L | | | 18 | 11 | 8 | 10 | | | | | | -- |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | | | | | | -- |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | | | | | | -- |
| Nitrate (as N) | as N mg/L | | | 0.20 | 0.18 | < 0.10 | 0.22 | | | | | | -- |
| Nitrate + Nitrite (as N) | as N mg/L | | | 0.20 | 0.18 | < 0.10 | 0.22 | | | | | | -- |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | 0.01 | | | | | | -- |
| Hardness | mg/L as $CaCO_3$ | | | 260 | 250 | 360 | 1288 | | | | | | -- |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | 0.05 | | | | | | -- |
| Aluminum (dissolved) | µg/L | | | < 5 | < 5 | < 5 | 4 | | | | | | -- |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | < 0.2 | | | | | | -- |
| Barium (dissolved) | µg/L | **1000** | **29000** | 21 | 19 | 27 | 23 | | | | | | -- |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.01 | | | | | | -- |
| Boron (dissolved) | µg/L | **5000** | **45000** | 26 | < 10 | 18 | 11 | | | | | | -- |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.0 | | | | | | -- |
| Calcium (dissolved) | µg/L | | | 96000 | 92000 | 140000 | 107467 | | | | | | -- |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | < 0.00 | | | | | | -- |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.03 | | | | | | -- |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.2 | | | | | | -- |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | < 1.0 | 0.8 | | | | | | -- |
| Iron (dissolved) | µg/L | | | < 100 | < 100 | < 100 | < 7 | | | | | | -- |
| Potassium (dissolved) | µg/L | | | 460 | 440 | 610 | 566 | | | | | | -- |
| Magnesium (dissolved) | µg/L | | | 4600 | 5100 | 6300 | 5417 | | | | | | -- |
| Manganese (dissolved) | µg/L | | | 28.0 | < 2.0 | < 2.0 | 0.2 | | | | | | -- |
| Molybdenum (dissolved) | µg/L | | **9200** | < 0.50 | < 0.50 | < 0.50 | 0.20 | | | | | | -- |
| Sodium (dissolved) | µg/L | | | 12000 | 9700 | 24000 | 16700 | | | | | | -- |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.3 | | | | | | -- |
| Phosphorus (dissolved) | µg/L | | | 130 | 6 | 14 | < 3 | | | | | | -- |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.02 | | | | | | -- |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | | | | | | -- |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | 0.2 | | | | | | -- |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.1 | | | | | | -- |
| Strontium (dissolved) | µg/L | | | 160 | 170 | 230 | 201 | | | | | | -- |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.10 | | | | | | -- |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | | | | | | -- |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.450 | 0.420 | 0.410 | 0.435 | | | | | | -- |
| Vanadium (dissolved) | µg/L | | **250** | < 0.50 | < 0.50 | < 0.50 | 0.21 | | | | | | -- |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | < 5 | 5 | | | | | | -- |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | | | | | | -- |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | < 0.04 | < 0.04 | < 0.01 | | | | | | -- |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | | | | | | -- |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | | | | | | -- |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | | | | | | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | | | | | | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | | | | | | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | | | | | | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | | | | | | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | | | | | | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for full sample collection

-- - No data.

# Table 62: PG-MW3A-02

| | | Criteria | | PG-MW3A-02 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | **Average** | | | | Well Damaged | | No Sample due to well damage | | | 2022/12/08 | **Average** |
| pH | pH | | | 7.47 | 7.58 | 7.55 | 7.52 | | | | | | 7.35 | 7.35 |
| Alkalinity | mg/L as $CaCO_3$ | | | 257 | 223 | 218 | 215 | | | | | | 190 | 190 |
| Carbonate | mg/L as $CaCO_3$ | | | < 1.0 | < 1.0 | 1.1 | < 1.0 | | | | | | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 220 | 223 | 215 | 210 | | | | | | 190 | 190 |
| Total Dissolved Solids | mg/L | | | 7013 | 6668 | 5588 | 4850 | | | | | | 4440 | 4440 |
| Fluoride | mg/L | **1.5** | | 0.30 | 0.25 | 0.29 | 0.29 | | | | | | 0.35 | 0.35 |
| Total Organic Carbon | mg/L | | | 0.8 | 1.3 | 1.4 | 1.2 | | | | | | < 1.0 | < 1.0 |
| Dissolved Organic Carbon | mg/L | | | 1.0 | 0.4 | 0.5 | 0.6 | | | | | | 1.0 | 1.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | 5.50 | 5.78 | 5.20 | 4.65 | | | | | | 4.52 | 4.52 |
| Chloride (dissolved) | mg/L | | | 3650 | 3625 | 3100 | 2600 | | | | | | 2800 | 2800 |
| Sulphate (dissolved) | mg/L | | | 14 | < 1 | 3 | 35 | | | | | | < 2 | < 2 |
| Bromide (dissolved) | mg/L | | | 48.0 | 52.8 | 62.0 | < 44.0 | | | | | | 30.3 | 30.3 |
| Nitrite (as N) | as N mg/L | | | 0.23 | < 0.01 | < 0.01 | < 0.01 | | | | | | < 0.30 | < 0.30 |
| Nitrate (as N) | as N mg/L | | | 0.48 | < 0.10 | < 0.10 | < 0.10 | | | | | | < 0.06 | < 0.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 0.48 | < 0.10 | < 0.10 | < 0.10 | | | | | | < 0.30 | < 0.30 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | 0.03 | < 0.10 | < 0.10 | < 0.10 | | | | | | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 2370 | 2350 | 2100 | 1600 | | | | | | 2010 | 2010 |
| Silver (dissolved) | µg/L | | **1.5** | 0.03 | 0.20 | < 0.10 | < 0.10 | | | | | | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | 19 | 10 | < 5 | < 5 | | | | | | 1 | 1 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | 0.4 | 2.0 | < 1.0 | < 1.0 | | | | | | 0.6 | 0.6 |
| Barium (dissolved) | µg/L | **1000** | **29000** | **5670** | **5750** | **4225** | **4100** | | | | | | **4160** | **4160** |
| Beryllium (dissolved) | µg/L | | **67** | 0.13 | 1.00 | < 0.50 | < 0.50 | | | | | | < 0.007 | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 591 | 915 | 828 | 750 | | | | | | 658 | 658 |
| Bismuth (dissolved) | µg/L | | | 0.28 | 2.0 | < 1.0 | < 1.0 | | | | | | 0.010 | 0.010 |
| Calcium (dissolved) | µg/L | | | 515750 | 465000 | 437500 | 325000 | | | | | | 605000 | 605000 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | 0.03 | 0.20 | < 0.10 | < 0.10 | | | | | | 0.006 | 0.006 |
| Cobalt (dissolved) | µg/L | | **66** | 0.26 | 1.13 | < 0.50 | < 0.50 | | | | | | 0.035 | 0.035 |
| Chromium (dissolved) | µg/L | | **810** | 1.3 | 10.0 | < 5.0 | < 5.0 | | | | | | 1.45 | 1.45 |
| Copper (dissolved) | µg/L | **1000** | **87** | 1.5 | 2.0 | < 1.0 | < 1.0 | | | | | | 0.8 | 0.8 |
| Iron (dissolved) | µg/L | | | 1009 | 1120 | 4500 | 615 | | | | | | 4880 | 4880 |
| Potassium (dissolved) | µg/L | | | 30125 | 30750 | 31750 | 25500 | | | | | | 33400 | 33400 |
| Magnesium (dissolved) | µg/L | | | 264750 | 287500 | 252500 | 190000 | | | | | | 238000 | 238000 |
| Manganese (dissolved) | µg/L | | | 53 | 46 | 49 | 26 | | | | | | 54.5 | 54.5 |
| Molybdenum (dissolved) | µg/L | | **9200** | 0.55 | 1.00 | 0.53 | < 0.50 | | | | | | 0.66 | 0.66 |
| Sodium (dissolved) | µg/L | | | 1292500 | 1200000 | 1225000 | 985000 | | | | | | 1290000 | 1290000 |
| Nickel (dissolved) | µg/L | | **490** | 0.8 | 2.3 | < 1.0 | < 1.0 | | | | | | 0.2 | 0.2 |
| Phosphorus (dissolved) | µg/L | | | 173 | 172 | 152 | 18 | | | | | | < 3 | < 3 |
| Lead (dissolved) | µg/L | **10** | **25** | 0.13 | 1.00 | < 0.50 | < 0.50 | | | | | | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | 0.55 | 1.02 | < 0.54 | < 0.50 | | | | | | 1.50 | 1.50 |
| Selenium (dissolved) | µg/L | **10** | **63** | 0.6 | 4.0 | < 2.0 | < 2.0 | | | | | | 0.08 | 0.08 |
| Tin (dissolved) | µg/L | | | 0.7 | 2.0 | < 1.0 | < 1.0 | | | | | | 0.22 | 0.22 |
| Strontium (dissolved) | µg/L | | | 43800 | 41500 | 37750 | 27500 | | | | | | 41300 | 41300 |
| Titanium (dissolved) | µg/L | | | 1.38 | 10.0 | < 5.0 | < 5.0 | | | | | | < 0.05 | < 0.05 |
| Thallium (dissolved) | µg/L | | **510** | 0.016 | 0.100 | < 0.050 | < 0.050 | | | | | | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.112 | 0.200 | 0.140 | < 0.100 | | | | | | 0.042 | 0.042 |
| Vanadium (dissolved) | µg/L | | **250** | 0.78 | 1.50 | < 0.50 | < 0.50 | | | | | | 0.57 | 0.57 |
| Zinc (dissolved) | µg/L | | **1100** | 9 | 10 | < 5 | < 5 | | | | | | 4 | 4 |
| Lead-210 | Bq/L | **0.2** | | 0.04 | 0.02 | 0.08 | < 0.10 | | | | | | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **0.49** | | 0.06 | 0.17 | 0.05 | < 0.04 | | | | | | 0.03 | 0.03 |
| Thorium-230 | Bq/L | **0.65** | | 0.03 | < 0.07 | < 0.07 | < 0.07 | | | | | | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | 0.02 | < 0.06 | < 0.06 | < 0.06 | | | | | | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | | | | | | 42.8 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | | | | | | -14.9 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | | | | | | 4813 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | | | | | | 7.882 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | | | | | | 37.42 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | | | | | | 7.39 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

-- - No data.

# Table 63: PG-MW3B-02

| | | Criteria | | PG-MW3B-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | Average | | | | | 2022/02/21 | 2022/06/22 | 2022/08/26 | 2022/12/01 | **Average** |
| pH | pH | | | 8.20 | 8.12 | 8.23 | 8.31 | 8.19 | 8.31 | 8.28 | 8.20 | 8.31 | 8.28 |
| Alkalinity | mg/L as $CaCO_3$ | | | 113 | 128 | 128 | 327 | 189 | 249 | 193 | 165 | 241 | 212 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.7 | 1.6 | 2.0 | 2.8 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 110 | 125 | 123 | 325 | 189 | 249 | 193 | 165 | 241 | 212 |
| Total Dissolved Solids | mg/L | | | 162 | 154 | 158 | 177 | 147 | 174 | 129 | 154 | 154 | 153 |
| Fluoride | mg/L | **1.5** | | 0.33 | 0.34 | 0.32 | 0.38 | 0.35 | 0.37 | 0.34 | 0.36 | 0.35 | 0.36 |
| Total Organic Carbon | mg/L | | | 1.4 | 0.8 | 2.0 | < 1.0 | < 1.0 | < 1.0 | 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Dissolved Organic Carbon | mg/L | | | 0.8 | < 0.5 | 0.5 | < 1.0 | 1.3 | < 1.0 | 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.16 | 0.22 | 0.20 | 0.09 | 0.17 | 0.18 | 0.15 | 0.18 | 0.18 | 0.17 |
| Chloride (dissolved) | mg/L | | | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Sulphate (dissolved) | mg/L | | | 16 | 15 | 15 | 16 | 16 | 15 | 16 | 16 | 15 | 16 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | 0.01 | < 0.01 | 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 86 | 85 | 87 | 489 | 470 | 844 | 532 | 303 | 310 | 497 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | < 5 | 32 | < 5 | 6 | 8 | 5 | 13 | 127 | 11 | 39 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.7 | 2.3 | 2.2 | 2.4 | 2.4 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 58.3 | 57.0 | 57.5 | 54.3 | 52.3 | 55.0 | 53.0 | 56.8 | 56.7 | 55.4 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | 0.022 | < 0.007 | 0.011 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 65 | 65 | 66 | 63 | 57 | 55 | 64 | 64 | 68 | 63 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | 0.009 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 15000 | 15750 | 15500 | 16125 | 16250 | 17000 | 16800 | 28800 | 15700 | 19575 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | < 0.003 | 0.003 | < 0.003 | < 0.003 | 0.004 | < 0.003 | 0.003 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.009 | 0.013 | < 0.004 | 0.014 | 0.144 | 0.016 | 0.045 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.11 | 0.14 | 0.10 | 0.12 | 0.20 | < 0.08 | 0.13 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | < 1.0 | < 0.2 | 0.2 | < 0.2 | < 0.2 | 0.4 | < 0.2 | 0.3 |
| Iron (dissolved) | µg/L | | | < 100 | < 105 | < 100 | 15 | 17 | 19 | 17 | 253 | 24 | 78 |
| Potassium (dissolved) | µg/L | | | 718 | 750 | 708 | 704 | 696 | 761 | 774 | 756 | 675 | 742 |
| Magnesium (dissolved) | µg/L | | | 11500 | 11250 | 11250 | 10983 | 10825 | 11700 | 10900 | 11400 | 11200 | 11300 |
| Manganese (dissolved) | µg/L | | | 2.90 | 4.50 | 3.08 | 4.29 | 4.49 | 4.03 | 5.20 | 29.00 | 4.26 | 10.62 |
| Molybdenum (dissolved) | µg/L | | **9200** | 1.55 | 1.40 | 1.50 | 1.41 | 1.47 | 1.31 | 1.39 | 1.41 | 1.54 | 1.41 |
| Sodium (dissolved) | µg/L | | | 16750 | 16500 | 17250 | 16850 | 16225 | 17100 | 16700 | 16400 | 16500 | 16675 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | 3.0 | < 1.0 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.2 | < 0.1 | 0.1 |
| Phosphorus (dissolved) | µg/L | | | 5 | 1 | 7 | 4 | 4 | < 3 | 6 | 63 | 3 | 19 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.02 | 0.07 | < 0.09 | < 0.09 | 0.37 | < 0.09 | 0.16 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 | < 0.04 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.10 | 0.07 | < 0.06 | < 0.06 | 0.06 | < 0.06 | < 0.06 |
| Strontium (dissolved) | µg/L | | | 275 | 270 | 265 | 286 | 288 | 286 | 289 | 295 | 294 | 291 |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.27 | 0.39 | 0.25 | 0.51 | 8.57 | 0.56 | 2.47 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.133 | 0.103 | < 0.100 | 0.110 | 0.082 | 0.062 | 0.080 | 0.726 | 0.069 | 0.234 |
| Vanadium (dissolved) | µg/L | | **250** | < 0.63 | < 0.50 | < 0.50 | 0.06 | 0.09 | 0.05 | 0.08 | 0.38 | 0.04 | 0.14 |
| Zinc (dissolved) | µg/L | | **1100** | 5 | < 5 | < 5 | < 2 | 2 | 2 | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | 0.08 | < 0.10 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | 0.03 | 0.03 | 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | 0.06 | 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | 0.05 | 0.05 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 27.6 | 27.4 | 34.8 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 85.1 | 115.5 | 134 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 235.8 | 2528 | 239.9 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 11.484 | 10.906 | 8.656 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 283.69 | 377.78 | 256.44 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 8.43 | 8.43 | 8.18 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for field parameters

-- - No data.

# Table 64: PG-MW3C-02

| | | Criteria | | PG-MW3C-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | Average | | | | | 2022/02/21 | 2022/06/22 | 2022/08/26 | 2022/12/01 | **Average** |
| pH | pH | | | 7.92 | 7.87 | 7.79 | 7.66 | 7.59 | 7.7 | 7.54 | 7.64 | 7.53 | 7.60 |
| Alkalinity | mg/L as $CaCO_3$ | | | 253 | 270 | 265 | 522 | 357 | 1052 | 434 | 324 | 364 | 544 |
| Carbonate | mg/L as $CaCO_3$ | | | 2.0 | 1.9 | 1.6 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 253 | 270 | 263 | 522 | 357 | 1050 | 434 | 324 | 364 | 543 |
| Total Dissolved Solids | mg/L | | | 407 | 423 | 458 | 432 | 405 | 440 | 463 | 457 | 414 | 444 |
| Fluoride | mg/L | **1.5** | | < 0.10 | 0.11 | 0.11 | 0.12 | 0.09 | 0.10 | 0.07 | 0.08 | 0.07 | 0.08 |
| Total Organic Carbon | mg/L | | | 2.9 | 1.1 | 1.6 | 1.0 | 1.3 | < 1.0 | < 1.0 | 1.0 | < 1.0 | < 1.0 |
| Dissolved Organic Carbon | mg/L | | | 1.0 | 0.7 | 0.7 | 1.0 | 1.3 | < 1.0 | 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.05 | 0.10 | 0.15 | < 0.04 | 0.05 | 0.05 | < 0.04 | 0.05 | 0.04 | 0.05 |
| Chloride (dissolved) | mg/L | | | 22 | 21 | 21 | 23 | 25 | 27 | 29 | 31 | 24 | 28 |
| Sulphate (dissolved) | mg/L | | | 59 | 57 | 58 | 61 | 61 | 65 | 57 | 63 | 59 | 61 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | 0.01 | 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | | 5.96 | 5.69 | 5.35 | 4.96 | 4.58 | 4.24 | 4.39 | 3.79 | 3.80 | 4.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 5.96 | 5.69 | 5.35 | 4.96 | 4.58 | 4.24 | 4.39 | 3.79 | 3.80 | 4.06 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 340 | 343 | 350 | 2444 | 1580 | 381 | 959 | 496 | 522 | 590 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | 6 | < 5 | < 5 | 3 | 5 | < 1 | 2 | 6 | < 1 | 3 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | 0.3 | 0.3 | < 0.2 | 0.3 | 0.3 | 0.3 | 0.3 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 77 | 81 | 83 | 85 | 86 | 79.4 | 85.8 | 71.8 | 70 | 77 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 11 | 15 | 13 | 12 | 11 | 8 | 14 | 13 | 15 | 13 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | 0.027 | < 0.010 | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 82000 | 84750 | 85250 | 92350 | 95400 | 87100 | 102000 | 88100 | 80900 | 89525 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.024 | 0.035 | < 0.004 | 0.026 | 0.065 | 0.060 | 0.039 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 1.18 | 1.16 | 0.83 | 1.12 | 0.64 | 0.43 | 0.76 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | < 1.0 | 0.4 | 0.4 | < 0.2 | 0.3 | 0.3 | 0.4 | 0.3 |
| Iron (dissolved) | µg/L | | | < 100 | < 100 | < 100 | < 7 | 20 | < 7.0 | < 7.0 | 19.0 | < 7 | 10 |
| Potassium (dissolved) | µg/L | | | 1150 | 1225 | 1100 | 1288 | 1263 | 884 | 1250 | 785 | 477 | 849 |
| Magnesium (dissolved) | µg/L | | | 31750 | 31500 | 33500 | 33725 | 34025 | 32100 | 33600 | 33100 | 34200 | 33250 |
| Manganese (dissolved) | µg/L | | | 2.0 | < 2.0 | 2.63 | 2.38 | 2.13 | 7.49 | 3.11 | 10.90 | 22.88 | 11.10 |
| Molybdenum (dissolved) | µg/L | | **9200** | < 0.50 | < 0.50 | < 0.50 | 0.32 | 0.42 | 0.26 | 0.31 | 0.46 | 0.50 | 0.38 |
| Sodium (dissolved) | µg/L | | | 9675 | 8900 | 10000 | 8918 | 9495 | 11400 | 10400 | 12800 | 19300 | 13475 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.2 | 0.1 | 0.1 | < 0.1 | 0.3 | 0.2 | 0.2 |
| Phosphorus (dissolved) | µg/L | | | 19 | 3 | 3 | 4 | 5 | < 3 | 4 | < 3 | < 3 | 3 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.02 | 0.10 | < 0.09 | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | 0.32 | 0.34 | 0.33 | 0.33 | 0.33 | 0.19 | 0.30 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.09 | 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Strontium (dissolved) | µg/L | | | 270 | 280 | 293 | 348 | 320 | 320 | 333 | 318 | 386 | 339 |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.15 | 0.63 | < 0.05 | 0.14 | 0.49 | 0.08 | 0.19 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.845 | 0.820 | 0.875 | 0.936 | 0.792 | 0.801 | 0.895 | 1.660 | 1.094 | 1.113 |
| Vanadium (dissolved) | µg/L | | **250** | 0.75 | 0.75 | 0.76 | 0.77 | 0.91 | 0.69 | 0.83 | 0.78 | 0.72 | 0.76 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | < 5 | 3 | 6 | < 2 | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | 0.08 | < 0.10 | < 0.02 | 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | < 0.04 | < 0.04 | 0.01 | < 0.01 | < 0.01 | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 84.9 | 47.4 | 59 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 122.6 | 131.8 | 162.1 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 732 | 688 | 715 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 11.523 | 11.22 | 8.246 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 809.96 | 3773.6 | 2041.4 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | -[2] | 7.56 | 7.90 | 7.49 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for field parameters

-- - No data.

# Table 65: PG-MW3D-02

| | | Criteria | | PG-MW3D-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| **Parameter** | **Units** | **COPC** | **Table 3** | Average | | | | | 2022/02/28 | 2022/06/23 | 2022/08/31 | 2022/12/01 | **Average** |
| pH | pH | | | 7.80 | 7.81 | 7.74 | 7.61 | 7.34 | 7.43 | 7.32 | No Sample[2] | No Sample[2] | 7.38 |
| Alkalinity | mg/L as $CaCO_3$ | | | 278 | 280 | 265 | 313 | 294 | 249 | 339 | | | 294 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.6 | 1.7 | 1.4 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | | | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 275 | 280 | 265 | 313 | 294 | 249 | 339 | | | 294 |
| Total Dissolved Solids | mg/L | | | 388 | 358 | 385 | 325 | 360 | 303 | 466 | | | 385 |
| Fluoride | mg/L | **1.5** | | < 0.10 | 0.11 | < 0.10 | 0.12 | 0.06 | 0.09 | 0.08 | | | 0.09 |
| Total Organic Carbon | mg/L | | | 3.4 | 2.5 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | | | 2.0 |
| Dissolved Organic Carbon | mg/L | | | 2.1 | 1.8 | 1.6 | 2.0 | 2.0 | 2.0 | 2.0 | | | 2.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | < 0.05 | 0.06 | 0.12 | 0.05 | < 0.04 | < 0.04 | | | < 0.04 |
| Chloride (dissolved) | mg/L | | | 38 | 19 | 23 | 7 | 44 | 27 | 46 | | | 37 |
| Sulphate (dissolved) | mg/L | | | 17 | 17 | 14 | 11 | 12 | 7 | 15 | | | 11 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | | | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | | | < 0.03 |
| Nitrate (as N) | as N mg/L | | | 1.86 | 1.90 | 1.16 | 1.23 | 1.19 | 2.26 | 0.89 | | | 1.58 |
| Nitrate + Nitrite (as N) | as N mg/L | | | 1.86 | 1.90 | 1.16 | 1.23 | 1.19 | 2.26 | 0.89 | | | 1.58 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | | | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 318 | 305 | 303 | 1263 | 413 | 296 | 378 | | | 337 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | | | < 0.05 |
| Aluminum (dissolved) | µg/L | | | 12 | < 5 | < 5 | 2 | 29 | < 1 | < 1 | | | < 1 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | < 0.2 | 0.3 | < 0.2 | < 0.2 | | | < 0.2 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 38 | 31 | 32 | 23 | 46 | 24.8 | 37.0 | | | 31 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.007 | < 0.007 | < 0.007 | < 0.007 | | | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 26 | 19 | 29 | 17 | 33 | 10 | 15 | | | 13 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | < 0.010 | < 0.010 | < 0.010 | | | < 0.010 |
| Calcium (dissolved) | µg/L | | | 112250 | 110667 | 107750 | 86150 | 138500 | 104000 | 130000 | | | 117000 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | 0.005 | 0.007 | < 0.003 | 0.006 | | | 0.005 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.027 | 0.174 | < 0.004 | 0.022 | | | 0.013 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.18 | 0.33 | 0.22 | 0.41 | | | 0.32 |
| Copper (dissolved) | µg/L | **1000** | **87** | 1.2 | < 1.0 | < 1.0 | 1.5 | 0.7 | 0.5 | 0.3 | | | 0.4 |
| Iron (dissolved) | µg/L | | | < 100 | < 100 | < 100 | < 7 | 19 | < 7 | 16 | | | 12 |
| Potassium (dissolved) | µg/L | | | 1800 | 1767 | 1550 | 1605 | 1330 | 1340 | 1010 | | | 1175 |
| Magnesium (dissolved) | µg/L | | | 9675 | 8567 | 9125 | 5745 | 10260 | 6850 | 11100 | | | 8975 |
| Manganese (dissolved) | µg/L | | | 5.70 | < 2.0 | < 2.0 | 0.140 | 5.485 | < 0.01 | 0.01 | | | 0.01 |
| Molybdenum (dissolved) | µg/L | | **9200** | < 0.50 | < 0.50 | < 0.50 | 0.18 | 0.22 | 0.12 | 0.08 | | | 0.10 |
| Sodium (dissolved) | µg/L | | | 8425 | 8033 | 8025 | 3925 | 14250 | 7690 | 16300 | | | 11995 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.3 | 1.3 | 0.1 | < 0.1 | | | < 0.1 |
| Phosphorus (dissolved) | µg/L | | | 569 | 255 | 768 | 5 | 5 | < 3 | < 3 | | | < 3 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.02 | < 0.09 | < 0.09 | < 0.09 | | | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | 0.56 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | < 0.90 | < 0.90 | | | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | 0.15 | 0.27 | 0.36 | 0.12 | | | 0.24 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.11 | 0.07 | < 0.06 | < 0.06 | | | < 0.06 |
| Strontium (dissolved) | µg/L | | | 233 | 217 | 208 | 186 | 263 | 203 | 295 | | | 249 |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.09 | 0.78 | 0.06 | < 0.05 | | | 0.06 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | | | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.260 | 0.227 | 0.210 | 0.203 | 0.213 | 0.164 | 0.254 | | | 0.209 |
| Vanadium (dissolved) | µg/L | | **250** | 0.51 | < 0.50 | 0.50 | 0.35 | 0.49 | 0.36 | 0.46 | | | 0.41 |
| Zinc (dissolved) | µg/L | | **1100** | 5 | < 5 | < 5 | 3 | 3 | < 2 | 2 | | | 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | < 0.02 | < 0.04 | < 0.02 | | | 0.03 |
| Radium-226 | Bq/L | **0.49** | | < 0.04 | < 0.04 | 0.03 | 0.02 | < 0.01 | < 0.01 | < 0.01 | | | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | 0.06 | < 0.02 | < 0.02 | < 0.02 | 0.02 | | | 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | 0.05 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | | | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | 80.3 | 68.1 | | | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | 100.9 | 188.8 | | | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | 549 | 783 | | | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | 8.508 | 12.795 | | | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | 0.75 | 0.36 | | | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | 7.35 | 7.28 | | | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Insufficient volume of groundwater for full sample collection

-- - No data.

## Table 66: PG-MW4A-02

| | | Criteria | | PG-MW4A-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| Parameter | Units | COPC | Table 3 | Average | | | | | 2022/04/01 | 2022/06/17 | 2022/08/25 | 2022/11/24 | Average |
| pH | pH | | | 8.13 | 8.05 | 7.87 | 8.30 | 8.06 | No Sample[2] | 8.35 | 8.24 | 8.24 | 8.28 |
| Alkalinity | mg/L as $CaCO_3$ | | | 76 | 75 | 69 | 123 | 138 | | 94 | 71 | 83 | 83 |
| Carbonate | mg/L as $CaCO_3$ | | | 1.0 | 1.0 | < 1.0 | 1.5 | < 1.0 | | 3.0 | < 1.0 | < 1.0 | 1.7 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 75 | 74 | 69 | 122 | 138 | | 90 | 71 | 83 | 81 |
| Total Dissolved Solids | mg/L | | | 409 | 384 | 412 | 399 | 376 | | 354 | 331 | 363 | 349 |
| Fluoride | mg/L | **1.5** | | 0.60 | 0.59 | 0.61 | 0.72 | 0.69 | | 0.63 | 0.70 | 0.75 | 0.69 |
| Total Organic Carbon | mg/L | | | 1.9 | 1.2 | 1.4 | 1.0 | < 1.0 | | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Dissolved Organic Carbon | mg/L | | | 0.8 | 0.6 | 0.7 | 1.0 | 1.0 | | 1.0 | 1.0 | < 1.0 | < 1.0 |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.56 | 0.58 | 0.55 | 0.50 | 0.53 | | 0.46 | 0.51 | 0.50 | 0.49 |
| Chloride (dissolved) | mg/L | | | 200 | 198 | 193 | 188 | 190 | | 200 | 190 | 190 | 193 |
| Sulphate (dissolved) | mg/L | | | < 1 | 1 | 2 | < 0 | < 0 | | < 0 | < 0 | < 0 | < 0 |
| Bromide (dissolved) | mg/L | | | 3.1 | 2.6 | 3.2 | 2.3 | 2.4 | | 2.3 | 2.3 | 2.2 | 2.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.08 | < 0.10 | < 0.01 | < 0.01 | | 0.10 | 0.01 | < 0.01 | 0.04 |
| Hardness | mg/L as $CaCO_3$ | | | 93 | 91 | 95 | 331 | 409 | | 132 | 75 | 131 | 113 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | < 5 | < 5 | 5 | 10 | 3 | | 4 | < 1 | < 1 | 2 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | < 1.0 | < 1.0 | < 1.0 | < 0.2 | 0.5 | | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 100 | 98 | 93 | 87 | 103 | | 91.6 | 108 | 100 | 100 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.007 | < 0.007 | | < 0.007 | < 0.007 | < 0.007 | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 185 | 170 | 177 | 163 | 182 | | 172 | 183 | 167 | 174 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | 0.009 | | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 18750 | 18750 | 19333 | 18475 | 21150 | | 19100 | 15900 | 19400 | 18133 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | < 0.003 | < 0.003 | | < 0.003 | < 0.003 | 0.004 | 0.003 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.028 | 0.019 | | 0.015 | 0.024 | 0.020 | 0.020 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.16 | 0.25 | | < 0.08 | 0.15 | 0.08 | 0.10 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | < 1.0 | 1.1 | < 0.2 | | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Iron (dissolved) | µg/L | | | < 100 | < 100 | 107 | 31 | 40 | | 35 | 40 | 47 | 41 |
| Potassium (dissolved) | µg/L | | | 1875 | 1825 | 1833 | 1713 | 1858 | | 1710 | 1590 | 1920 | 1740 |
| Magnesium (dissolved) | µg/L | | | 11250 | 10750 | 11333 | 9565 | 10165 | | 10100 | 8560 | 11100 | 9920 |
| Manganese (dissolved) | µg/L | | | 3.05 | 2.8 | 2.5 | 2.408 | 3.740 | | 2.05 | 1.83 | 1.01 | 1.63 |
| Molybdenum (dissolved) | µg/L | | **9200** | 2.80 | 2.73 | 2.53 | 2.60 | 2.75 | | 2.65 | 2.33 | 2.12 | 2.37 |
| Sodium (dissolved) | µg/L | | | 112500 | 110000 | 116667 | 104050 | 109500 | | 108000 | 102000 | 106000 | 105333 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | < 0.1 | 0.1 | | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Phosphorus (dissolved) | µg/L | | | 588 | 296 | 21 | < 3 | 4 | | < 3 | < 3 | 3 | < 3 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.02 | 0.08 | | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | < 0.04 | 0.29 | | < 0.04 | < 0.04 | 0.11 | 0.06 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.09 | 0.35 | | 0.10 | < 0.06 | 0.07 | 0.08 |
| Strontium (dissolved) | µg/L | | | 1350 | 1375 | 1300 | 1270 | 1405 | | 1410 | 1230 | 1210 | 1283 |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.13 | 0.18 | | 0.19 | < 0.05 | 0.25 | 0.16 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | < 0.005 | | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | < 0.100 | < 0.100 | < 0.100 | 0.013 | 0.025 | | 0.006 | 0.002 | 0.005 | 0.004 |
| Vanadium (dissolved) | µg/L | | **250** | < 0.50 | < 0.50 | < 0.50 | 0.05 | 0.19 | | 0.05 | 0.01 | 0.02 | 0.03 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | < 5 | 3 | < 2 | | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | < 0.02 | | < 0.02 | 0.02 | 0.03 | 0.02 |
| Radium-226 | Bq/L | **0.49** | | < 0.03 | < 0.04 | < 0.04 | 0.02 | 0.01 | | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 23.7 | 25.3 | 29 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 2.4 | 77.8 | 14.5 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 724 | 714 | 706 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 11.838 | 13.202 | 8.867 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 61.8 | 16.27 | 60.5 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 8.29 | 8.53 | 8.34 | -- |

**Note:**

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Could not access due to snow conditions

-- - No data.

# Table 67: PG-MW4B-02

| | | Criteria | | PG-MW4B-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| Parameter | Units | COPC | Table 3 | Average | | | | | 2022/04/01 | 2022/06/17 | 2022/08/25 | 2022/11/24 | Average |
| pH | pH | | | 8.13 | 8.08 | 8.13 | 8.16 | 8.04 | No Sample[2] | 8.07 | 8.15 | 8.15 | 8.12 |
| Alkalinity | mg/L as $CaCO_3$ | | | 155 | 160 | 163 | 227 | 182 | | 253 | 148 | 165 | 189 |
| Carbonate | mg/L as $CaCO_3$ | | | 2.0 | 1.8 | 2.0 | < 1.0 | < 1.0 | | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 153 | 158 | 160 | 227 | 182 | | 253 | 148 | 165 | 189 |
| Total Dissolved Solids | mg/L | | | 207 | 188 | 228 | 236 | 199 | | 226 | 194 | 217 | 212 |
| Fluoride | mg/L | **1.5** | | 0.26 | 0.25 | 0.23 | 0.27 | 0.26 | | 0.29 | 0.25 | 0.27 | 0.27 |
| Total Organic Carbon | mg/L | | | 1.2 | 1.4 | 1.3 | 1.0 | 1.0 | | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Dissolved Organic Carbon | mg/L | | | 0.8 | 0.7 | 0.7 | 1.3 | 1.0 | | 1.0 | 2.0 | < 1.0 | < 1.3 |
| Ammonia+Ammonium (N) | as N mg/L | | | 0.09 | 0.14 | 0.10 | 0.08 | 0.09 | | 0.09 | 0.08 | 0.11 | 0.09 |
| Chloride (dissolved) | mg/L | | | 12 | 12 | 12 | 14 | 14 | | 13 | 23 | 11 | 16 |
| Sulphate (dissolved) | mg/L | | | 22 | 22 | 22 | 23 | 23 | | 24 | 26 | 23 | 24 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | 0.07 | < 0.06 | | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Nitrate + Nitrite (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | 0.07 | < 0.06 | | < 0.06 | < 0.06 | < 0.06 | < 0.06 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.10 | < 0.10 | < 0.01 | < 0.01 | | 0.04 | 0.01 | < 0.01 | 0.02 |
| Hardness | mg/L as $CaCO_3$ | | | 153 | 165 | 160 | 423 | 367 | | 566 | 151 | 299 | 339 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | 5 | 36 | < 5 | 91 | 1 | | 9 | < 1 | < 1 | 4 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | 1.7 | 1.8 | 1.9 | 2.2 | 2.3 | | 2.1 | 2.2 | 2.4 | 2.2 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 65 | 68 | 65 | 66 | 75 | | 72 | 90 | 70 | 78 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | 0.014 | < 0.007 | | < 0.007 | < 0.007 | 0.010 | 0.008 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 35 | 31 | 29 | 30 | 32 | | 38 | 37 | 29 | 35 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | 0.009 | | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 24250 | 28000 | 26000 | 35425 | 27800 | | 26800 | 25800 | 27800 | 26800 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | 0.005 | 0.004 | | < 0.003 | < 0.003 | 0.004 | 0.003 |
| Cobalt (dissolved) | µg/L | | **66** | < 0.50 | < 0.50 | < 0.50 | 0.118 | 0.018 | | 0.024 | 0.036 | 0.030 | 0.030 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.26 | 0.23 | | < 0.08 | 0.19 | 0.21 | 0.16 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | < 1.0 | 0.4 | < 0.2 | | 0.4 | < 0.2 | < 0.2 | 0.3 |
| Iron (dissolved) | µg/L | | | < 100 | 150 | < 100 | 229 | 36 | | 51 | 10 | 13 | 25 |
| Potassium (dissolved) | µg/L | | | 1075 | 1075 | 1067 | 1030 | 1133 | | 1040 | 1010 | 1160 | 1070 |
| Magnesium (dissolved) | µg/L | | | 22500 | 23250 | 23333 | 23250 | 24425 | | 23900 | 21100 | 27100 | 24033 |
| Manganese (dissolved) | µg/L | | | 8.35 | 15.0 | 8.3 | 25.843 | 8.635 | | 9.14 | 8.03 | 9.28 | 8.82 |
| Molybdenum (dissolved) | µg/L | | **9200** | 0.98 | 0.95 | 0.97 | 0.91 | 1.01 | | 1.07 | 0.96 | 0.84 | 0.96 |
| Sodium (dissolved) | µg/L | | | 14500 | 14000 | 14333 | 13050 | 14100 | | 15000 | 12600 | 12500 | 13367 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.2 | < 0.1 | | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Phosphorus (dissolved) | µg/L | | | 3 | 2 | 1 | 61 | 5 | | < 3 | < 3 | 7 | 4 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.18 | 0.07 | | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | < 0.04 | 0.29 | | < 0.04 | < 0.04 | 0.13 | 0.07 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 0.18 | 0.09 | | 0.07 | 0.08 | 0.06 | 0.07 |
| Strontium (dissolved) | µg/L | | | 365 | 380 | 370 | 404 | 421 | | 418 | 377 | 383 | 393 |
| Titanium (dissolved) | µg/L | | | < 5.0 | 6.2 | < 5.0 | 5.66 | 0.10 | | 0.57 | 0.06 | 0.14 | 0.26 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | < 0.005 | | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.205 | 0.210 | 0.180 | 0.295 | 0.166 | | 0.126 | 0.383 | 0.223 | 0.244 |
| Vanadium (dissolved) | µg/L | | **250** | < 0.50 | < 0.50 | < 0.50 | 0.33 | 0.04 | | 0.10 | 0.21 | 0.06 | 0.12 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | 5 | < 5 | 3 | < 2 | | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 | 0.03 | 0.02 |
| Radium-226 | Bq/L | **0.49** | | 0.03 | < 0.04 | 0.03 | 0.01 | < 0.01 | | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | 0.05 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | 0.04 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 35.6 | 46 | 82.3 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 3.7 | 163.5 | 93.1 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 363.9 | 368.7 | 359.3 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 12.016 | 11.226 | 9.233 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 1630.3 | 238.29 | 152.58 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 8.04 | 7.91 | 8.00 | -- |

**Note:**

[2] Could not access due to snow conditions

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Could not access due to snow conditions

-- - No data.

# Table 68: PG-MW4C-02

| | | Criteria | | PG-MW4C-02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | | | | |
| Parameter | Units | COPC | Table 3 | Average | | | | | 2022/04/01 | 2022/06/17 | 2022/08/25 | 2022/11/24 | Average |
| pH | pH | | | 8.06 | 7.98 | 7.98 | 7.90 | 7.86 | No Sample[2] | 7.79 | 7.91 | 7.84 | 7.85 |
| Alkalinity | mg/L as $CaCO_3$ | | | 195 | 203 | 253 | 363 | 324 | | 242 | 194 | 228 | 221 |
| Carbonate | mg/L as $CaCO_3$ | | | 2.1 | 1.8 | 2.2 | < 1.0 | < 1.0 | | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Bicarbonate | mg/L as $CaCO_3$ | | | 195 | 200 | 250 | 363 | 324 | | 242 | 194 | 228 | 221 |
| Total Dissolved Solids | mg/L | | | 289 | 280 | 325 | 314 | 275 | | 269 | 297 | 254 | 273 |
| Fluoride | mg/L | **1.5** | | 0.12 | 0.11 | 0.11 | 0.13 | 0.12 | | 0.10 | 0.10 | 0.13 | 0.11 |
| Total Organic Carbon | mg/L | | | 0.8 | 2.0 | 1.9 | < 1.0 | 1.0 | | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| Dissolved Organic Carbon | mg/L | | | 0.7 | 0.6 | 0.6 | 1.0 | < 1.0 | | 1.0 | 2.0 | < 1.0 | < 1.3 |
| Ammonia+Ammonium (N) | as N mg/L | | | < 0.05 | 0.11 | 0.20 | 0.06 | 0.05 | | < 0.04 | < 0.04 | 0.06 | 0.05 |
| Chloride (dissolved) | mg/L | | | 4 | 4 | 4 | 4 | 4 | | 3 | 3 | 3 | 3 |
| Sulphate (dissolved) | mg/L | | | 53 | 47 | 47 | 51 | 51 | | 49 | 53 | 46 | 49 |
| Bromide (dissolved) | mg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.3 | < 0.3 | | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Nitrite (as N) | as N mg/L | | | < 0.01 | < 0.01 | < 0.01 | < 0.03 | < 0.03 | | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| Nitrate (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | | 0.09 | < 0.06 | < 0.06 | 0.07 |
| Nitrate + Nitrite (as N) | as N mg/L | | | < 0.10 | < 0.10 | < 0.10 | < 0.06 | < 0.06 | | 0.09 | < 0.06 | < 0.06 | 0.07 |
| Mercury (dissolved) | µg/L | **1** | **0.29** | < 0.10 | < 0.08 | < 0.10 | < 0.01 | 0.01 | | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Hardness | mg/L as $CaCO_3$ | | | 235 | 233 | 243 | 2612 | 776 | | 8040 | 239 | 371 | 2883 |
| Silver (dissolved) | µg/L | | **1.5** | < 0.10 | < 0.10 | < 0.10 | < 0.05 | < 0.05 | | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aluminum (dissolved) | µg/L | | | < 5 | < 5 | 6 | 19 | 63 | | 28 | 4 | < 1 | 11 |
| Arsenic (dissolved) | µg/L | **25** | **1900** | 2.1 | 2.2 | 2.0 | 1.9 | 2.2 | | 2.1 | 2.0 | 2.0 | 2.0 |
| Barium (dissolved) | µg/L | **1000** | **29000** | 118 | 140 | 163 | 160 | 177 | | 165 | 179 | 165 | 170 |
| Beryllium (dissolved) | µg/L | | **67** | < 0.50 | < 0.50 | < 0.50 | < 0.007 | 0.008 | | < 0.007 | < 0.007 | < 0.007 | < 0.007 |
| Boron (dissolved) | µg/L | **5000** | **45000** | 13 | < 10 | < 10 | 11 | 12 | | 11 | 38 | 22 | 24 |
| Bismuth (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | < 0.007 | 0.009 | | < 0.010 | < 0.010 | < 0.010 | < 0.010 |
| Calcium (dissolved) | µg/L | | | 53000 | 51750 | 55667 | 53575 | 62975 | | 59300 | 54500 | 54500 | 56100 |
| Cadmium (dissolved) | µg/L | **5** | **2.7** | < 0.10 | < 0.10 | < 0.10 | < 0.003 | 0.005 | | < 0.003 | < 0.003 | 0.006 | 0.004 |
| Cobalt (dissolved) | µg/L | | **66** | 1.58 | 0.91 | 0.67 | 0.583 | 0.667 | | 0.406 | 0.267 | 0.203 | 0.292 |
| Chromium (dissolved) | µg/L | | **810** | < 5.0 | < 5.0 | < 5.0 | 0.08 | 0.31 | | < 0.08 | 0.15 | 0.16 | 0.13 |
| Copper (dissolved) | µg/L | **1000** | **87** | < 1.0 | < 1.0 | 1.1 | 0.5 | 0.3 | | 0.6 | < 0.2 | < 0.2 | 0.3 |
| Iron (dissolved) | µg/L | | | < 100 | < 100 | 110 | 119 | 296 | | 245 | 210 | 217 | 224 |
| Potassium (dissolved) | µg/L | | | 1325 | 1275 | 1433 | 1358 | 1468 | | 1410 | 1390 | 1450 | 1417 |
| Magnesium (dissolved) | µg/L | | | 25000 | 25000 | 25667 | 24375 | 26675 | | 26100 | 24900 | 27600 | 26200 |
| Manganese (dissolved) | µg/L | | | 11.0 | 9.5 | 8.9 | 9.2 | 17.1 | | 12.10 | 10.70 | 9.27 | 10.69 |
| Molybdenum (dissolved) | µg/L | | **9200** | 0.78 | 0.79 | 0.76 | 0.73 | 0.72 | | 0.69 | 0.70 | 0.57 | 0.65 |
| Sodium (dissolved) | µg/L | | | 6200 | 6100 | 6033 | 5475 | 5970 | | 5800 | 5600 | 4770 | 5390 |
| Nickel (dissolved) | µg/L | | **490** | < 1.0 | < 1.0 | < 1.0 | 0.1 | 0.2 | | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Phosphorus (dissolved) | µg/L | | | 132 | 3 | 8 | < 3 | 13 | | 29 | < 3 | 4 | 12 |
| Lead (dissolved) | µg/L | **10** | **25** | < 0.50 | < 0.50 | < 0.50 | 0.02 | 0.11 | | < 0.09 | < 0.09 | < 0.09 | < 0.09 |
| Antimony (dissolved) | µg/L | **6** | **20000** | < 0.50 | < 0.50 | < 0.50 | < 0.90 | < 0.90 | | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Selenium (dissolved) | µg/L | **10** | **63** | < 2.0 | < 2.0 | < 2.0 | < 0.04 | 0.32 | | < 0.04 | < 0.04 | 0.09 | 0.06 |
| Tin (dissolved) | µg/L | | | < 1.0 | < 1.0 | < 1.0 | 1.57 | < 0.06 | | 0.07 | 0.07 | < 0.06 | 0.07 |
| Strontium (dissolved) | µg/L | | | 223 | 233 | 233 | 232 | 248 | | 249 | 245 | 229 | 241 |
| Titanium (dissolved) | µg/L | | | < 5.0 | < 5.0 | < 5.0 | 0.09 | 5.02 | | 1.76 | 0.16 | 0.09 | 0.67 |
| Thallium (dissolved) | µg/L | | **510** | < 0.050 | < 0.050 | < 0.050 | < 0.005 | 0.006 | | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| Uranium (dissolved) | µg/L | **20** | **420** | 0.198 | 0.205 | 0.153 | 0.175 | 0.143 | | 0.160 | 0.162 | 0.108 | 0.143 |
| Vanadium (dissolved) | µg/L | | **250** | < 0.50 | < 0.50 | < 0.50 | 0.10 | 0.19 | | 0.11 | 0.04 | 0.03 | 0.06 |
| Zinc (dissolved) | µg/L | | **1100** | < 5 | < 5 | < 5 | 4 | < 2 | | < 2 | < 2 | < 2 | < 2 |
| Lead-210 | Bq/L | **0.2** | | < 0.02 | < 0.10 | < 0.10 | < 0.02 | 0.03 | | < 0.02 | < 0.02 | 0.02 | 0.02 |
| Radium-226 | Bq/L | **0.49** | | 0.03 | < 0.04 | < 0.04 | 0.01 | 0.01 | | 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Thorium-230 | Bq/L | **0.65** | | < 0.07 | < 0.07 | < 0.07 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Thorium-232 | Bq/L | **0.6** | | < 0.06 | < 0.06 | < 0.06 | < 0.02 | < 0.02 | | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| **Field Parameters** | | | | | | | | | | | | | |
| ODO % Sat | % | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 35.2 | 36.8 | 46.2 | -- |
| ORP | mV | | | -[1] | -[1] | -[1] | -[1] | -[1] | | -62 | 88.5 | 18.9 | -- |
| SPC | µs/cm | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 477.3 | 466.9 | 456.4 | -- |
| Temperature | °C | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 11.179 | 10.38 | 9.009 | -- |
| Turbidity | FNU | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 8013.4 | 848.87 | 235.07 | -- |
| pH | Units | | | -[1] | -[1] | -[1] | -[1] | -[1] | | 7.68 | 7.82 | 7.74 | -- |

**Note:**

[2] Could not access due to snow conditions

*COPC = Contaminants of Potential Concern criteria for Potable Groundwater Conditions derived from Table A2.3 – Water Quality Criteria for Potable 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.*

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

[1] Field parameters included for current sampling year only.

[2] Could not access due to snow conditions

-- - No data.

## Appendix D Environmental Assessment Follow-Up Program Summary Table

**Table 69: EA Follow-Up Monitoring Plan Summary, 2022**

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
|---|---|---|---|---|---|---|
| **Atmospheric Environment** | | | | | | |
| Air Quality:<br>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 a high level of dust control measures at waste site. | No residual adverse effects. | The *Dust Management and Requirements Plan* [41] was followed during construction activities. This included not working above certain wind thresholds.<br><br>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.<br>Hydro seeding and tree planning were undertaken on areas where work was completed. | Dust monitoring (TSP and $PM_{2.5}$) at sites adjacent to construction activities during the Construction and Development Phase. The proponent should use recent/up-to-date data to establish baseline conditions. | There were two exceedances of the Canadian Council of Ministers of the Environment (CCME) Air Quality Criteria for $PM_{2.5}$ in 2022 May and July at the Northwest Mini-Vol location. The 2022 May exceedance was attributed construction work on the railways just north of the PG Northwest station. The 2022 July 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. | High volume (Hi-Vol) air samplers were installed and operated at two (2) locations in Port Granby in 2022 (Port Granby South and Port Granby East), to measure both TSP and $PM_{2.5}$. Mini-Vol portable air samplers (both TSP and $PM_{2.5}$) 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.<br><br>Three exceedances of the overriding limit of 120 micrograms per cubic metre ($\mu g/m^3$) as defined in the *Dust Management and Requirements Plan* [41] at the Port Granby East location was noted in 2022. These exceedances, 2022 January, May, and June were attributed to off-site activities. These exceedances are 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 |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
|---|---|---|---|---|---|---|
| | | | | | | dust monitoring. A confirmed source could not be identified. The exceedance represents approximately 1.5 % of total samples collected at Port Granby East and Port Granby Northwest.<br><br>The sample containing the highest net weight of TSP collected each 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 were no exceedances of the Ambient Air Quality Criteria [43] at Port Granby East or Port Granby South in 2022.<br>Radionuclide analysis results are discussed under *Radiological, Particulate Radioactivity*. |
| *Noise:*<br>Levels will increase by 6 dBA to 56 dBA at both the LTWMF and the existing facility in predicted zones of maximum influence as worst-case scenarios. There will be nuisance noise impacts on local receptors. | 1. Construction equipment will comply with emission standards as outlined in NPC-115 of the *Ontario Model Municipal Noise Control By-law*.<br>2. Trucks and other equipment will be equipped with mufflers. Tailgate banging will be avoided.<br>3. Empty trucks will be | No likely residual adverse effects. | 1. Construction equipment complied with emission standards outlined in NPC-115 of the *Ontario Model Municipal Noise Control By-law* and had operable mufflers.<br>2. Construction activities were limited to specified hours in accordance with the Municipality of Clarington | Verify implementation of mitigation measures.<br><br>Periodically measure noise levels at receptor locations near the Site Study Area during the Construction and Development Phase.<br><br>Incorporate additional post-EA data collection results | The 2022 monitoring results during daytime hours, when compared to the baseline noise levels measured in 2015, revealed a slight increase or similar noise levels.<br><br>Readings above 56 dBA were observed, however this prediction was based on | Continuous sound level data was collected at a total of nine locations in Port Granby during the 2022 monitoring period. The 2022 monitoring results during daytime hours were compared to average 2015 daytime results. Outdoor construction was not occurring in 2015, and therefore 2015 results are |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
|---|---|---|---|---|---|---|
| | required to reduce speed at construction sites and on local roads to avoid excessive cargo box and tray noise.<br>4. Construction hoarding will be erected where practicable.<br>5. All construction activities would be limited to daylight hours. | | Noise By-law 2007-071.<br>3. Tailgate banging was avoided, and tailgates were secured as required.<br>4. Contractors complied with posted speed limits on local public roads and avoided generating excessive cargo box or tray noise. | and use to verify EA predictions. | 2004 data. Elevated levels may be influenced by an increase in local road traffic and trains since the initial environmental assessment.<br><br>It was predicted that there will be nuisance noise impacts on local receptors. There were no noise complaints in 2022. | more representative of baseline conditions than those results from 2004 (Section 9.4.2.3). |
| *Radiological Effects: Radon*<br>The highest predicted annual average radon concentration is 5.1 Bq/$m^3$ during construction and development. | 1. Working areas containing contaminated materials will be minimized.<br>2. Application of dust suppressants including water and possibly chemical suppressants.<br>3. Covering of stockpiles and exposed areas overnight and on weekends using foam agents, geotextiles, or other appropriate materials.<br>4. Placing wind fencing around exposed stockpiles.<br>5. Possible cessation of activities under high wind conditions.<br>6. 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.<br><br>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.<br>In 2022, CNL continued to perform monthly radon monitoring, and increased the total number of monitoring locations at the PG LTWMF and PG WMF to 13, 6 to monitor the capped mound. The average annual radon concentration measured at these locations was 40 Bq/$m^3$. The trigger level for radon monitoring is 150 Bq/$m^3$. | Radon gas was monitored on a routine monthly basis at the PG WMF and LTMWF during the 2022 calendar year. |
| *Radiological Effects:* Particulate Radioactivity<br>The maximum predicted annual concentrations for the radionuclides are below the Health Canada reference | No additional mitigation measures.<br><br>*(See mitigation measures for Atmospheric Environment – Radiological Effects, Radon).* | No likely residual adverse effects. | The *Dust Management and Requirements Plan* [41] was followed during construction activities. This included not working above certain wind thresholds. | Measure levels of radionuclides to verify modelling predictions. | No residual adverse effects.<br><br>TSP high volume air filters were sent for additional laboratory analysis in 2022. Uranium, radium-226, | 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 |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
|---|---|---|---|---|---|---|
| values. | | | 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.<br><br>Hydro seeding and tree planting were undertaken on areas where work was completed. | | thorium-230 and thorium-232 remained well below the Health Canada reference values [44]. 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. | concentration of contaminants of potential concern in suspended dust (Section 9.4.2.1). |
| **Aquatic Environment** | | | | | | |
| *Sediment Quality:*<br>*Non-Radiological Effects:*<br>Improvement to sediment quality by a decreasing contaminant transport.<br><br>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.<br>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 2022, 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.<br>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 2022.<br><br>Sediment monitoring along the Lake Ontario shoreline is performed twice per year (Section 9.3.3). |
| *Surface Water Quality:*<br>*Non-Radiological and Radiological*<br>*Effects:*<br>Long-term improvement to | Groundwater, stormwater and drainage water collection and treatment systems, including flow control and quality control, | Beneficial long-term effects. | Construction of the PG LTWMF for the treatment and control of groundwater is complete. Active commissioning commenced | Conduct additional background data collection, field data collection and analysis and benchtop testing necessary to finalize | No residual adverse effects.<br><br>Based on the predicted effluent concentrations from the pilot scale work, effluent | Preferred treatment technology was evaluated in 2011 through the *Water Treatment Definition – Port Granby Project* [53] |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
|---|---|---|---|---|---|---|
| down-gradient surface water quality; reduced contaminant loading to down-gradient lake; and no measurable change to Port Granby Creek. | will be in place. | | in 2016 April. | the preferred treatment technology.<br>Verify predicted improvements in surface water at existing and new water treatment system once the preferred treatment technology has been established.<br>Compare the effluent quality performance with the predicted performance for the preferred technology.<br>Proponent must ensure that discharge is not deleterious to the aquatic environment at the point of discharge. This must be confirmed through appropriate monitoring and toxicity testing.<br><br>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. | 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.<br><br>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. | Toxicity testing was conducted monthly. (Appendix B, Table 16).<br><br>Effluent quality at the WWTP was measured in 2016 April once the plant was commissioned, based on the design objectives in the PGP LCH [3]. As of 2018 April 4, approved release limits [53] have been implemented at the PG WWTP and updated in the PGP Quarterly Effluent Reports.<br><br>Groundwater seepage samples from the bluffs are collected on a quarterly basis (Section 9.3.2). |
| **Geology and Groundwater Environment** | | | | | | |
| *Soil Quality: Radiological Effects:* The mean incremental concentrations of | *(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* [41] as followed during construction activities. This included not | Monitor soil quality in all project phases as described for the Terrestrial Environment component. | No residual adverse effects. | Soil samples are collected at perimeter locations on an annual basis (Section 9.4.3). |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
|---|---|---|---|---|---|---|
| radiological contaminants are expected to be less than 20% of background.<br><br>The exception is thorium-230, with an expected 38% increase in concentration over baseline, during Construction and Development Phase of the LTWMF. | | | working above certain wind thresholds.<br><br>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.<br><br>Polymer spray was used to cover stockpiles and excavations at end of day.<br><br>Hydro seeding and tree planting were undertaken on areas where work was completed. | | Thorium-230 soil concentration in 2022 have remained consistent with baseline data and monitoring data from previous years. | |
| *Groundwater Quality: Non-Radiological and Radiological Effects:*<br>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.<br><br>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 2022. 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 9.4.3). |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
|---|---|---|---|---|---|---|
| *Groundwater Flow:*<br>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.<br>Measure groundwater levels at monitoring wells four times yearly during Construction and Development Phase, and annually during Early, Mid and Late Life Phases.<br><br>Prior to the beginning of the construction a number of monitoring wells will require proper abandonment in accordance with *Ontario Regulation 903* [61]. | No residual adverse effects. | Groundwater levels are measured quarterly at the current groundwater network (Section 9.4.3).<br><br>Wells that were decommissioned in 2016 were completed as per *Ontario Regulation 903* [61]. |
| *Groundwater:*<br>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.<br><br>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 | No residual adverse effects. | Groundwater samples are collected on a quarterly basis at perimeter locations of the LTWMF (Section 9.3.1).<br><br>Operational groundwater monitoring was not conducted in 2022. The wells were decommissioned in 2016 as they were located within or adjacent to the PG WMF excavation areas. All wells were decommissioned as per *Ontario Regulation* |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
|---|---|---|---|---|---|---|
| | | | | the current PG WMF and in the East and West Gorges. | | *903* [61].<br>Sampling of the bluff seepage is performed on a quarterly basis (Section 9.3.2). |
| *Design of LTWMF, including liner and cover:*<br>Clay Liner Unit would have maximum hydraulic conductivity of $1x10^{-7}$ cm/s.<br>Cover would have a maximum hydraulic conductivity of $1x10^{-7}$ cm/s.<br>Volume of leachate generated within the LTWMF is predicted to be 100 $m^3$ /year based on the assumption of 1 mm/a leakage through the cover.<br>Volumes of excavated wastes to be stored in the LTWMF are predicted to be as follows: 204,400 $m^3$ of low-level radioactive waste (LLRW), 101,000 $m^3$ of marginally contaminated soils (MCS). | No mitigation measures necessary. | No residual adverse effects. | No mitigation measures necessary. | Monitor leakage through the liner system to verify hydraulic conductivity of the liner unit.<br><br>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.<br><br>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.<br><br>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 environmental effects. | No residual adverse effects. | Monitoring of volume of excavated waste was performed when active waste removal commenced in 2016 November.<br>Radioactivity levels were monitored through the vehicle portal monitor before emplacement in the LTWMF.<br><br>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.<br><br>Settlement monitoring to be performed in the maintenance and monitoring phase.<br>Rate of infiltration monitoring to be performed in the maintenance and monitoring phase. |
| **Terrestrial Environment** | | | | | | |
| Preparation of the LTWMF site will result in temporary loss of vegetation of 2.2% in the Local Study Area and 6% | Relocation of the LTWMF stormwater management pond out of the cultural thicket and into an | No residual adverse effects. | The existing pond located to the east of the LTWMF was removed in 2016 as part of the site preparation work | Verify relocation of stormwater management pond.<br>Verify development of | No residual adverse effects. | The existing stormwater management pond was relocated in 2016. |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
|---|---|---|---|---|---|---|
| in the Site Study Area, with permanent conversion of vegetation communities in 6.1% of Local Study Area and 15.3% of Site Study Area. | agricultural field.<br>Development of site-specific Landscape Plan by a qualified landscape architect or biologist for terrestrial environment at each work site.<br>Development of new vegetation communities at the LTWMF site rather than simply re-creating pre-construction conditions.<br>Development of a Protection and Rehabilitation Plan for the fen vegetation near the East Gorge. | | and has been replaced with the new north stormwater management pond.<br><br>Development of a site-specific Landscape plan is completed and vegetation planting commenced in 2022.<br><br>Development of new vegetation communities at the LTWMF site will take place after the completion of the LTWMF construction.<br><br>The development of a protection and rehabilitation plan for the fen vegetation near the East Gorge was completed (4500-03710-REPT-004). | protection and rehabilitation plans for the fen vegetation near the East Gorge.<br>Verify implementation of erosion and sediment control structures; application of dust suppression techniques, and rehabilitation of sites.<br>Monitor radiological and non-radiological COPC in surficial soil during Construction and Development Phase and Early Life Maintenance and Monitoring Phase.<br><br>Verify extent and duration of temporary and permanent vegetation loss/change. | | The development of a protection and rehabilitation plan for the fen vegetation near the East Gorge was completed [62].<br><br>Verification of erosion and sediment control structures are performed as part of compliance monitoring during the period of active construction.<br><br>Soil samples are collected at perimeter locations on an annual basis (Section 9.4.3).<br><br>The extent of vegetation/loss change will be evaluated upon completion of the Construction and Development Phase. |
| **Human Health and Safety** - *Workers: Non-Radiological Effects* | | | | | | |
| Particulate matter is not predicted to have a measurable effect on workers' health.<br><br>For construction activities – estimations<br>predict a total of 4.6 lost time accidents<br>and 15.3 recordable accidents.<br><br>Noise level would reach 93 to 95 dBA within 15 m of the LTWMF and existing PG | Use of personal protection equipment such as dust masks and respirators to reduce the exposure to arsenic.<br><br>Personal protection equipment to mitigate noise, if necessary.<br><br>Adopt a policy that all occupational illnesses and injuries are preventable and the formal establishment of the objective of zero-time | 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.<br><br>Accident rate is being monitored (Section 8).<br><br>CNL reviewed and approved contractor plans for the | Monitor compliance with federal legislation related to protection of health and safety.<br><br>Monitor accident rate. | For construction activities there were no recordable accidents in 2022, 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.<br><br>If they occur, accident reports and causes are reviewed with the contractors to ensure that appropriate measures are in |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
|---|---|---|---|---|---|---|
| WMF. | occupational illnesses and injuries.<br><br>Develop and implement a formal Health and Safety Program. | | Health and Safety Program. | | | place to reduce the possibility of recurrence.<br><br>Continuous sound level data was collected at a total of nine locations in Port Granby during the 2022 monitoring period. The 2022 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 2004 (Section 9.4.2.3). |
| **Human Health and Safety -** *Members of the Public: Non-Radiological Effects* | | | | | | |
| 1. Air Quality and Noise:<br><br>2. Non-radiological contaminants:<br>Risk assessment on non-radiological contaminants predicted that any incremental risks associated with the Project would not pose an unreasonable risk to human health.<br><br>3. General health and well-being:<br>Reduced feelings of health and sense of wellbeing; | (*See Atmospheric Environment Component*)<br>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.<br><br>Continued and consistent protocols for delivering information and receiving input to/from residents in the Local and Regional Study Areas. | No likely residual adverse effects.<br><br>Some residual adverse effects predicted. However, these are considered to be minor. | Effluent sampling takes place on a weekly schedule from the PG WWTP. These results are presented in Section 9.2. No exceedance of these specified limits occurred during the reporting period.<br><br>Bluff seepage sampling takes place on a quarterly basis. The results are presented in Section 9.3.2. It is noted that there are elevated levels fluoride, arsenic and uranium in the seepage water that are above Ontario's *Provincial Water Quality Objectives* (PWQO) [32] and the Canadian | Monitor communication protocols.<br>Survey members of the public to confirm the level of satisfaction within the community.<br>*(See Aquatic Environment Components)*<br>Monitor complaints resolution process. | No residual adverse effects. | Surveys are performed routinely. Consult the Port Granby *Socio-Economic Effects Monitoring Report* for more information.<br>Complaints Resolution Program is being regularly monitored (See Section 15.2). |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
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| feelings of personal security; and feelings of satisfaction with living in the community. | | | Council of the Ministers of the Environment (CCME) *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (CWQG) [34] however, the total contaminant plume to Lake Ontario remains small. The majority of the plume is estimated to have contaminant concentrations equivalent to 1% of the original concentration observed in the bluff seepage samples.<br><br>Continuous engagement with the Port Granby community continued in 2022. A summary of the communications and outreach activities related to the PGP are presented in Section 15. The Complaints Resolution Program was regularly monitored in 2022 results are presented in Section 15.2. | | | |
| **Human Health and Safety -** *Workers: Radiological Effects* | | | | | | |
| Annual radiation doses are predicted to range between 2.1 and 7.1 mSv/a.<br><br>During the Maintenance and Monitoring Phase, doses are predicted to be around 0.1 mSv/a. | Application of the ALARA principle.<br>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 0.42 mSv. The collective radiation dose was 16.85 person-mSv. The average annual dose was 0.02 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 |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
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| | | | | | | mound has been capped. |
| **Human Health and Safety -** *Members of Public: Radiological Effects* | | | | | | |
| During construction and development, the only measurable radiation doses predicted are to adjacent resident child and infant; 0.12 to 0.14 mSv/a for median dietary intakes and 0.12 to 0.15 mSv/a for upper 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. | Application of the ALARA principle.<br>Radiation Protection Program<br>No additional proposed mitigation. | No residual adverse effects. | Excavation and transfer of waste commenced in 2016 November. 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. | The radiation dose to public was estimated to be 0.3% of the annual dose limit of 1 mSv for exposures for members of the public. Total effective dose to the public was assessed with the inclusion of radon exposure at the fence-line. A total effective dose was estimated to be around 3.3% for occupational exposures for members of the public. | Upon comparison of the actual and predicted public doses, the doses exposed to the public are below the predicted levels. This has proven the mitigation measures were effectively executed. |
| **Cumulative Effects** | | | | | | |
| *Radiological:*<br>The combined predicted incremental annual average radon concentration associated with both the Port Hope and PGPs would be indistinguishable from background at a distance of approximately 2 km. | 1. Working areas containing contaminated materials will be minimized.<br>2. Application of dust suppressants including water and possibly chemical suppressants.<br>3. Covering of stockpiles and exposed areas overnight and on weekends using foam agents, geotextiles, or other appropriate materials.<br>4. Placing wind fencing around exposed stockpiles.<br>5. Possible cessation of activities under high wind conditions.<br>6. Mulching or re-vegetating completed cells and excavation areas as soon as | No likely residual adverse effects. | Mitigation measures are implemented as outlined. | Verify radon concentrations and radiological constituents of resuspended dust at a distance of 2 km. | Radon monitoring commenced at 3 locations around the PG LTWMF in 2017 December. These locations were less than 2 km distance from the LTWMF Controlled Area fenced boundary. The average radon concentration for 2022 at these locations read 11.5 $Bq/m^3$. The highest noted radon concentration level was 30 $Bq/m^3$ which is below the environmental trigger level for radon 150 $Bq/m^3$. | Assessment of average radon concentrations at 2 km will be performed on a quarterly basis. |

| Predicted Effects | Mitigation Measures | Residual Effects after Mitigation | Status of Mitigation Measures - 2022 | EA Follow-Up Monitoring Requirements | Predicted Environmental Effect – 2022 | Status of EA Commitments - 2022 |
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| | possible. | | | | | |
| The radiological constituents of re-suspended dust would not be measurable beyond approximately 2 km from the sites. | 1. Working areas containing contaminated materials will be minimized.<br>2. Application of dust suppressants including water and possibly chemical suppressants.<br>3. Covering of stockpiles and exposed areas overnight and on weekends using foam agents, geotextiles, or other appropriate materials.<br>4. Placing wind fencing around exposed stockpiles.<br>5. Possible cessation of activities under high wind conditions.<br>6. Mulching or re-vegetating completed cells and excavation areas as soon as possible | No likely residual adverse effects. | The *Dust Management and Requirements Plan* [41] was followed during construction activities. This included not working above certain wind thresholds.<br><br>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.<br><br>Hydro seeding and tree planting were undertaken on areas where work was completed. | Verify radiological constituents of resuspended dust at a distance of 2 km. | No residual adverse effect. | Radiological constituents in dust was measured at the perimeter of the Site at the locations of CNL's high volume air samplers as further discussed in Section 9.4.2.1.<br><br>A yearly soil (dust deposition) monitoring program at a residential property located approximately 1 km east of the Site commenced in 2016 June. The soil results are compared yearly to verify radiological constituents in soil as a result of dust deposition. |