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Mémoire des Laboratoires Nucléaires Canadiens

In the Matter of the

À l'égard de

Canadian Nuclear Laboratories

Laboratoires Nucléaires Canadiens

Application to renew its waste nuclear substance licence for the Port Hope Project

Demande concernant le renouvellement du permis de déchets de substances nucléaires pour le projet de Port Hope

Commission Public Hearing

Audience publique de la Commission

November 22, 2022

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Mark Hughey
General Manager, Historic Waste Program

Date

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Revision History

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EXECUTIVE SUMMARY

Canadian Nuclear Laboratories (CNL) currently has a Waste Nuclear Substance Licence (WNSL) for the Port Hope Project (PHP), expiring on December 31, 2022. CNL has submitted an application to the Canadian Nuclear Safety Commission (CNSC) for a 10-year licence renewal of the *Port Hope Long-Term Low-Level Radioactive Waste Management Project Waste Nuclear Substance Licence (WNSL)* [1]. As part of the renewal request, CNL is requesting the consolidation of the PHP licence with three other WNSLs: the *Port Granby Long-Term Low-Level Radioactive Waste Management Project licence* [2], the *Pine Street Extension Temporary Storage Site licence* [3] and the *Port Hope Radioactive Waste Management Facility licence* [4] into a single PHP WNSL. Each of these licenced activities form parts of the Port Hope Area Initiative (PHAI) cleanup of historic low-level radioactive waste (LLRW) in the municipalities of Port Hope and Clarington.

A combined Port Hope project licence will ensure efficiencies are applied to the PHAI project in alignment with CNL's Management System. A 10-year licence renewal will allow CNL to continue executing the PHAI, including completion of remediation and restoration activities in Port Hope and the transition to Phase 3 of the Port Granby Project (PGP).

This Commission Member Document (CMD) is presented to the Commission Registry in support of CNL's application for a 10-year renewal of the three WNSLs and the consolidation of all four licences into a single WNSL.

The information presented in this document demonstrates CNL's operating performance and ongoing commitment to excellence under the four WNSLs for the current licencing period, 2012 to 2022. It also outlines the plans to continue the implementation of the PHAI under a renewed and combined licence from the CNSC.

CNL respectfully acknowledges that CNL's Historic Waste Program Management Office and the PHAI projects are situated on the treaty lands of the Williams Treaties First Nations, specifically the treaty signed with the Mississauga First Nations of Alderville, Curve Lake, Hiawatha and Scugog Island.

The Mississauga First 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 CNL's project activities 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.

CNL is Canada's premier nuclear science organization and a world leader in developing technology for peaceful and innovative applications. Services offered through CNL include environmental remediation, research and development, design and engineering of specialized

technology, waste management and decommissioning. The PHAI falls under CNL's strategic priority to restore and protect Canada's environment and address federal nuclear waste liabilities.

The PHAI is a community-requested project designed to develop and implement a safe, local, long-term management solution for historic low-level radioactive waste within the municipalities of Port Hope and Clarington. CNL is implementing both projects on behalf of Atomic Energy of Canada Limited (AECL), a federal Crown corporation. 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* [5] (The Town of Port Hope and the Township of Hope have since merged to form the Municipality of Port Hope). The agreement stipulates that Canada will cleanup properties contaminated with historic LLRW so that all such properties can be used for 'all current and foreseeable unrestricted uses'.

CNL is responsible for the direction and execution of the PHAI in compliance with the Legal Agreement, the CNSC Licences and Environmental Assessment decisions.

The PHAI includes two distinct and separate projects:

The Port Granby Long-Term Low-Level Radioactive Waste Management Project (Port Granby Project, or PGP) comprising the construction of a new long-term waste management facility, removal of LLRW from the former Port Granby Waste Management Facility and the safe transportation and storage of the waste at the new facility constructed 700 m north of the lakeshore for safe, long-term storage. The current PGP licence expires on December 31, 2022.

The Port Hope Long-Term Low-Level Radioactive Waste Management Project (Port Hope Project, or PHP) includes the construction of a new long-term waste management facility developed on lands comprised of, and adjacent to, the former Welcome Waste Management Facility and the relocation of the historic waste located at the former Welcome Waste Management Facility to the new facility. The Port Hope Project will also excavate, transport and restore various Small-Scale Sites, large-scale sites and select industrial sites within the Municipality of Port Hope. The current licence for the Port Hope Project expires on December 31, 2022.

CNL also holds two additional licences ([3], [4]) covering the Pine Street Extension Temporary Storage Site, the Pine Street Consolidation Site, Strachan Street Consolidation Site and the Sewage Treatment Plant Temporary Storage Site.

A 10-year renewal and consolidation of the four WNSLs will enable CNL to continue the cleanup of historic waste under the PHAI, while reducing the administrative burden of holding separate licences for similar projects under the PHAI portfolio.

Port Granby Project remediation activities were completed in 2020; CNL safely moved 1.3 million metric tonnes of LLRW from the shores of Lake Ontario to safe storage in a newly constructed Long-Term Waste Management Facility (LTWMF). The engineered containment mound was capped and closed in 2021 and demobilization and restoration of the site is expected to be complete in 2022. Waste volumes were 25% higher than originally estimated at

the Port Granby site. CNL effectively managed the increased waste volumes using adaptive management practices, while maintaining focus on worker and public safety and ensuring protection of the environment. Lessons learned from the PGP are being incorporated into the PHP.

The relocation of waste to safe, long-term storage as part of the PHP has been underway since 2017. The Property Radiological Survey was launched in 2012 to resurvey every property in Port Hope. Results indicate that the number of properties requiring remediation, verification and restoration, originally estimated at 350, is now more than 1,200 with the associated waste volume expected to increase by over 300%. While this has drastically changed the scope and schedule of the PHP, CNL has effectively managed this change by applying the adaptive management practices and lessons learned from the PGP to improve efficiency, while performing work safely and maintaining protection of workers, the public and the environment.

CNL is committed to sharing timely, up-to-date and accurate information on current and planned PHAI activities to support the WNSLs. The Legal Agreement stipulates that CNL develop and administer programs and/or processes to support the dissemination of public information about the project. The *PHAI Phase 2 Public Information Program (PIP)* [6] supports CNL's overall mission to lead the cleanup of LLRW in Port Hope and Port Granby.

CNL seeks to build meaningful relationships with Indigenous communities and organizations while gaining an understanding of the cultural knowledge of Indigenous peoples. CNL acknowledges the continued need for open, honest and transparent communication with Indigenous rights and interest holders and is committed to evolving its communication and engagement strategies. CNL provides information to Indigenous communities and organizations as well as maintains an open dialogue about the potential effects of project activities on Indigenous and/or treaty rights, including rights to hunt, trap, fish, and conduct cultural ceremonies. Historically, the PHAI Public Information Program has included Indigenous communities and organizations as a priority audience. In support of CNL's objective to advance Reconciliation through meaningful actions to move toward increased inclusion and participation, CNL is implementing a distinct PHAI Indigenous Communications & Engagement Program in 2022.

CNL shares information with all the public and stakeholders in a manner that earns public trust, identifies and acknowledges issues and values, and maintains community acceptance and support of the PHAI. Ongoing dialogue ensures that members of the public and key stakeholders are knowledgeable about upcoming work and project activities, and that questions, issues and concerns are identified and addressed. As the PHAI evolves, CNL continually adapts communications approaches and frequency to meet evolving needs.

CNL maintains a robust Environmental Protection Program for all operations and activities that may affect the environment in and around PHAI sites. The program is applied to all employees and personnel (e.g., contractors, consultants) conducting work at CNL sites.

CNL's Environmental Assessment Follow-up Program was developed based on the PHAI Environmental Assessments [7], and [8] and Screening Reports [9] [10]. The program includes

monitoring of air quality and dust, noise, surface water, groundwater, soil and effluent from the wastewater treatment plants. Socio-economic effects are also monitored [11] [12].

CNL submits this document for consideration to support the renewal and consolidation of the waste nuclear substance licences for continued implementation of the PHAI project.

As demonstrated throughout this Commission Member Document, CNL ensures that safety, environmental protection, meaningful engagement and protection of the public are our top priority. CNL has a strong history of success managing and executing the PHAI project to date. Throughout the execution of the project, CNL has safely and effectively moved 1.3 million metric tonnes of LLRW at Port Granby and has successfully capped and closed the engineered containment mound, the PG LTWMF. CNL continues to apply lessons learned from Port Granby on the Port Hope Project and utilizes effective adaptive management practices to evaluate and manage the dynamic and complex nature of the PHAI project.

CNL continues to manage and implements a world-class Management System which enables compliance to regulatory and industry best practices while ensuring continuous learning and improvement. This is clearly outlined in CNL's exemplary performance, as rated by the CNSC, in the current licence period.

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Land Acknowledgement

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

The Mississauga First 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 is respected through a renewed agreement with Canada and the Province of Ontario.

The area in which the Port Hope Area Initiative projects 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.

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."*

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.

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

1 INTRODUCTION

The Port Hope Area Initiative (PHAI) represents the Government of Canada's commitment to respond to the community-requested solution for the cleanup and safe, long-term management of historic low-level radioactive waste (LLRW) in the municipalities of Port Hope and Clarington in southern Ontario. The waste is the result of the refining practices of the former Crown corporation Eldorado Nuclear Ltd. (Eldorado) 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.

This Commission Member Document (CMD) provides a summary of the PHAI scope of work and activities completed in the past ten years under the four licences outlined below in Section 1.1, granted to CNL from the Canadian Nuclear Safety Commission (CNSC). The CMD also outlines plans to continue the implementation of the PHAI under a renewed and proposed combined licence from the CNSC should CNL be successful in the licence renewal process.

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 PHAI's two projects – the Port Hope Project (PHP) and the Port Granby Project (PGP). Canadian Nuclear Laboratories (CNL) is implementing both projects on behalf of Atomic Energy of Canada Limited (AECL), a federal Crown corporation. In January 2012, Natural Resources Canada announced a $1.28 billion federal commitment to complete Phase 2 of the PHAI.

The PHAI is being implemented in three phases – Phase 1, Planning; Phase 2, Implementation; and Phase 3, Maintenance and Monitoring. Refer to Section 1.4 for more detail about the three phases of the PHAI project.

The PGP is nearing completion of activities in Phase 2, in preparation for transition to Phase 3 including:

- The remediation of the former Port Granby Waste Management Facility containing LLRW in the Municipality of Clarington.
- The transfer to and long-term management of the waste in a new long-term waste management facility that was constructed approximately 700 metres north of the existing Port Granby Waste Management Facility.

The PHP is progressing with activities in Phase 2, including:

- The remediation of sites containing LLRW and specified industrial waste located in the Municipality of Port Hope, including the Port Hope Harbour (the "Harbour").
- The transfer to and long-term management of the waste in a new long-term waste management facility on, and adjacent to, the site of the former Welcome Waste Management Facility.

The Pine Street Extension Temporary Storage Site (referred to in the 182 licence [3]) comprises two asphalt storage pads and a Quonset hut storage building (discussed in Section 1.3.3). The purpose of the Pine Street Extension Temporary Storage Site was to temporarily store soil and

debris contaminated with LLRW before the implementation of the PHAI. More details on the Pine Street Temporary Storage Site can be found in Section 1.3.3.

The Port Hope Radioactive Waste Management Facility (referred to in the 344 licence [4]) comprised three temporary storage sites to store LLRW, primarily consisting of soil and debris, consolidated until the Port Hope facility was constructed and is operational and waste could be relocated as part of the PHP. More information on the three sites can be found in Section 1.3.4.

1.1 Licence Amendment Request

In 2021 CNL was granted a one-year licence extension for the PGP licence [2] as well as the Pine Street Extension Temporary Storage Site licence [3] to align the licence renewal dates to that of the PHP licence [1]. The one-year license extension permitted CNL to request renewal and consolidation of the four licences listed below into a single Port Hope licence, *The Port Hope Long-Term Low-Level Radioactive Waste Management Project* licence, in a single commission hearing. A combined Port Hope project licence will ensure efficiencies are applied to the PHAI project in alignment with CNL's Management System.

CNL is seeking CNSC approval for the renewal of the Waste Nuclear Substance Licence Port Hope Long-Term Low-Level Radioactive Waste Management Project, WNSL-W1.2310.02/2022 [1] (expiring in 2022), for a 10-year period as well as the consolidation of this licence with the three WNSLs [1][2][3] outlined below, including the indeterminate Licence [4] into a single PHP WNSL.

- Waste Nuclear Substance Licence Port Granby Long-Term Low-Level Radioactive Waste Management Project, WNSL-W1-2311.02/2022 [2].
- Waste Nuclear Substance Licence Pine Street Extension Temporary Storage Site WNSL-W1-182.0/2022 [3].
- Waste Nuclear Substance Licence Port Hope Radioactive Waste Management Facility WNSL-W1-344-1.8/ind. [4].

A 10-year licence renewal will allow CNL to continue executing the PHAI, including completion of remediation and restoration activities in Port Hope and Phase 3 monitoring at the PGP. It is also expected that during this licence period, the Pine Street Extension temporary storage site and three sites under the Port Hope Radioactive Waste Management Facility will be remediated and upon final inspection by CNSC staff, transferred to the Municipality of Port Hope. CNL would apply for these sites to be removed from the licence. In the previous licence period, CNL has had a "satisfactory" rating for all applicable safety and control areas. Safety and environmental performance have been, and will continue to be, ensured through the dedication of staff and safety culture that is established through the implementation of processes, procedures and programs governed by CNL's Management System.

CNL is requesting the PHP Wastewater Treatment Plant (WWTP) effluent release limits be incorporated into the licensing basis for the consolidated licence. Additional information can be found in Section 5.3.2.1.

CNL can also confirm the intent to meet the requirements of the CNSC's recently published or revised waste management and decommissioning REGDOCs for the PHAI. Details related to

these REGDOCs and how they fit into CNL's waste management and decommission programs can be found in Section 6.11.3.

As part of the original Port Hope licence renewal application submitted in March 2020, CNL requested that the CNSC amend the values for arsenic and uranium in the PHAI cleanup criteria as identified in Appendix C of the PHP Waste Nuclear Substance Licence [1]. This request followed two years of engagement with the CNSC, Indigenous communities and organizations members of the public, the Municipality of Port Hope and other regulators on CNL's proposal to change the criteria during which CNL provided supplementary information based on the feedback received.

CNL is continuing to engage with the CNSC and other regulators, Indigenous rights holders, key stakeholders, the public, and interest holders on changes to the cleanup criteria. However, since resolution of this topic has not yet been reached, CNL submitted an addendum to the Port Hope licence renewal application in March 2022 requesting the amendment to the cleanup criteria for arsenic and uranium be removed from the application. This CMD does not contain discussions on the cleanup criteria change.

1.2 Canadian Nuclear Laboratories Strategic Priorities

CNL is Canada's premier nuclear science and technology organization and a world leader in developing innovative applications for nuclear technology. Services offered through CNL include environmental remediation, research and development, design and engineering of specialized technology, waste management, and decommissioning. CNL is committed to ensuring that Canadians and people around the world are confident that they are safely and securely receiving energy, health, and environmental benefits from nuclear science and technology. CNL works to deliver all work activities safely. CNL also strives to provide the highest level of performance in meeting its commitments to regulators, Indigenous rights holders, customers, stakeholders, and the public.

CNL's strategic priorities are outlined in Figure 1 below.

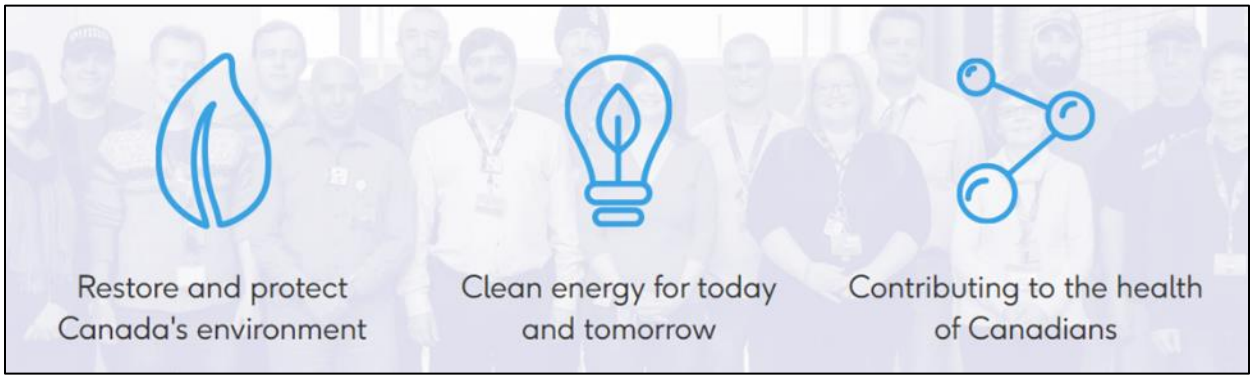


Figure 1: CNL's Strategic Priorities

The PHAI falls under CNL's strategic priority to restore and protect Canada's environment.

As such, CNL is responsible for the following:

- Managing and reducing the historic LLRW liabilities at numerous sites of varying size located throughout Canada, on behalf of AECL and the Government of Canada, in compliance with any permits, licences, approvals and agreements issued by or with municipalities in which the Government of Canada has accepted liability for LLRW located there
- Delivering interim waste management programs for historic LLRW in the Municipality of Port Hope, in addition to the PHAI
- Providing technical advice to the Government of Canada on the latest national and international developments related to the management of historic LLRW
- Addressing public information needs concerning historic LLRW.

1.2.1 Management Structure

AECL delivers its mandate through a government-owned, contractor-operated model, whereby a private-sector organization, CNL, is responsible for managing and operating AECL's sites and fulfilling the Government of Canada's responsibilities related to radioactive waste management and decommissioning (Figure 2). Under the government-owned, contractor-operated model, AECL owns the sites, facilities, assets, intellectual property, and responsibility for environmental remediation and radioactive waste management. CNL is responsible for the day-to-day operations of the sites and manages larger projects such as the PHAI.

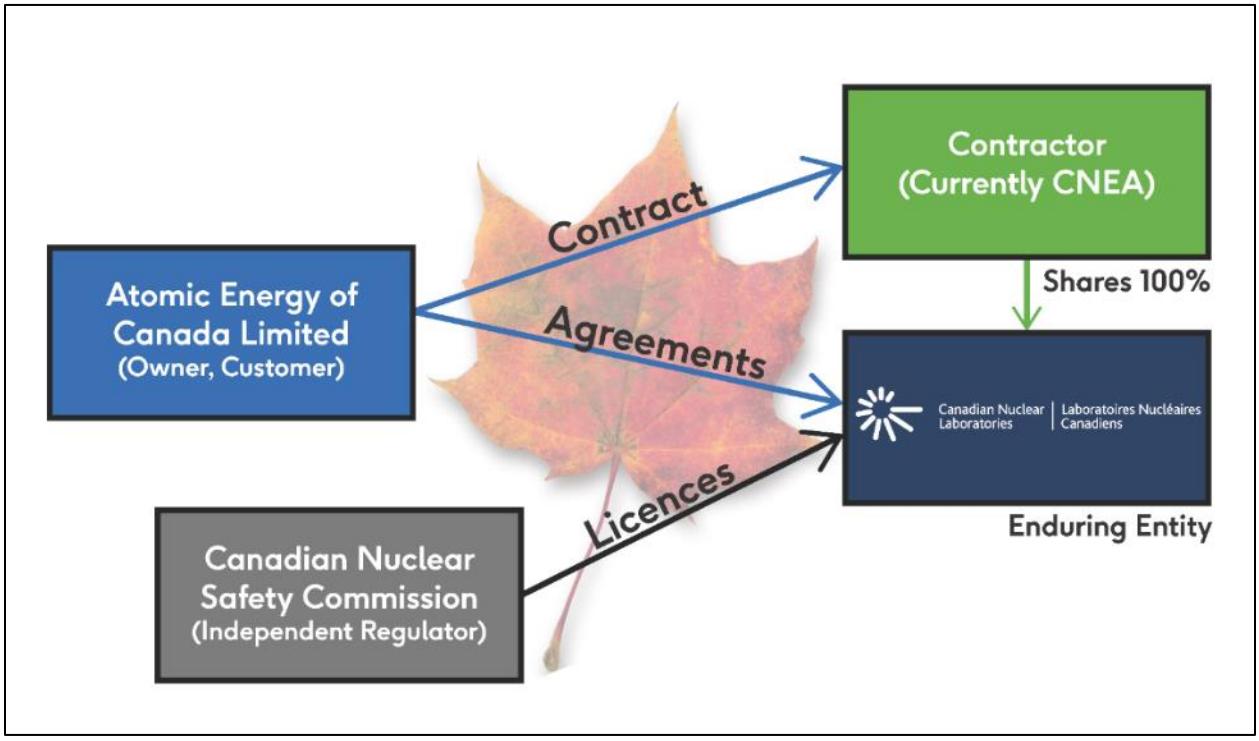


Figure 2: Canadian Nuclear Laboratories and Atomic Energy of Canada Limited Government-Owned Contractor-Operated Model

CNL's overall organizational chart as related to the Historic Waste Program and the PHAI is shown in Appendix A.

1.2.2 PHAI Project Organization

CNL is implementing the PHAI project under its Historic Waste Program, through which CNL manages historic LLRW that is the responsibility of the Government of Canada to restore and remediate the areas that were impacted.

The General Manager of the Historic Waste Program has overall responsibility for the PHAI, is the CNSC licence holder for the PHAI project and reports to CNL's Vice President of Environmental Remediation Management and Stewardship and Renewal Group.

The Historic Waste Program leadership team is responsible for ensuring that the management, administrative and functional reporting relationships within the integrated PHAI project team work in a way that best supports the program's missions, while providing clear guidance and direction for the employees involved.

Comprehensive communications, Indigenous engagement programs, stakeholder relations, Environmental Assessment (EA) follow-up activities and regulatory compliance programs support all PHAI activities.

An organization chart showing the management positions and the reporting structure for the Historic Waste Program is included in Appendix B of this document.

1.3 PHAI Project Description

By 1933, Port Hope had become the centre for radium refining in Canada and waste was stored by Eldorado at various planned sites and deposited at unplanned locations within the town. In keeping with the knowledge and practices of the day, the residual soil and surplus building materials from the plant site were offered to the public, free of charge. As a result, parks, ravines, and residential properties were backfilled with contaminated soil, and some homes and other structures were constructed or updated with contaminated building materials.

The LLRW in Port Hope consists primarily of contaminated soil, granular fill and associated rocks, harbour sediment, and contaminated reused or recycled building materials.

In the late 1970s, remediation of select contaminated areas of Port Hope was completed. During that period of time, the sites were selected based on their potential to exceed the public dose limit as part of a dose-reduction program in Port Hope. Approximately 120,000 m^3 of LLRW contaminated soil was excavated and sent for management at AECL's Chalk River Laboratories facility.

In the 1980s, AECL established the Construction Monitoring Program, an interim solution to manage LLRW waste present when property owners or municipal services engaged in activities with the potential to uncover LLRW. The Construction Monitoring Program ensures any waste uncovered is removed and safely stored, to prevent further spread of waste around Port Hope. Waste identified and managed by the Construction Monitoring Program was stockpiled at the

Pine Street Extension Temporary Storage Site under CNL's "182" licence [3] until 2018 when the PH LTWMF began receiving waste.

In 2009, to assist in defining project scope, cost and schedule, a Small-Scale Sites resurvey and remediation trial cost-assessment project was initiated involving survey activities on 35 selected sites in Port Hope and culminated with the remediation on one residential site on King Street.

AECL, and subsequently CNL, obtained two WNSLs from the CNSC to monitor and manage waste in Port Hope on an interim basis. The two licences, the Pine Street Extension Temporary Storage Site (182 Licence [3]) and the Port Hope Radioactive Waste Management Facility (344 Licence [4]) were used to consolidate material from removed from sites in Port Hope during various dose-reduction campaigns in the 1980s and 1990s.

The Pine Street North Extension Temporary Storage Site (182 Licence [3]) was created in 1988 to allow storage of historic LLRW collected through the Construction Monitoring Program and the Property Compliance Program.

Port Hope Radioactive Waste Management Facility (344 Licence [4]) was licenced to allow for the consolidation of wastes from AECL-owned land on Cavan Street and historic waste removed from the back yards of properties on the north side of Highland Drive in 1989 and 1990. These two licences were used to manage and consolidate waste in Port Hope until a long-term solution was developed.

The PHAI is a community-requested project to develop and implement safe, local, long-term management solutions for LLRW within the municipalities of Port Hope and Clarington. 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 Town of Port Hope and the Township of Hope have since amalgamated to form the Municipality of Port Hope).

The Legal Agreement defines the framework and responsibilities for the PHP and the PGP. It stipulates that Canada has taken responsibility for cleaning up properties contaminated with historic LLRW so that all such properties can be used for "all current and foreseeable unrestricted uses," and includes the requirement for a comprehensive communications program and programs to address potential loss of property value and municipal tax revenue loss resulting from the plans and activities of the PHAI.

CNL is responsible for the direction and execution of the PHAI in compliance with the Legal Agreement, CNSC licences and Environmental Assessment decisions.

1.3.1 Port Granby Long-Term Low-Level Radioactive Waste Management Project

The PGP comprises the long-term management of the historic LLRW located at the former Port Granby Waste Management Facility, adjacent to the shoreline of Lake Ontario in the Municipality of Clarington; the construction of a new long-term waste management facility (PG LTWMF); the removal of historic LLRW from the former facility and the safe transportation of the waste to the new PG LTWMF away from the lakeshore for safe, long-term storage.

Eldorado's uranium refining processes at the Port Hope plant site changed over time and the former Port Granby facility received a variety of chemical wastes, industrial refuse and contaminated soils during its 33 years of operation. The waste was buried throughout the site, in the East and West Gorges, and in 76 trenches located in the flatter areas above the East Gorge and in the Central Plateau (refer to Figure 6 below). Waste at the former site, along the shorelines of Lake Ontario was considered part of the PHAI but was not subject to consolidation efforts as had been undertaken-in Port Hope where dose-reduction measures were conducted, removing and transporting historic waste to designated locations for storage and monitoring.

Remediation activities at the former Port Granby facility have been completed. CNL safely moved 1.3 million metric tonnes of waste away from the shores of Lake Ontario to the newly constructed long-term waste management facility and the engineered containment mound was capped and closed in 2021. Waste volumes were 25% higher than originally estimated at the former Port Granby facility. CNL effectively managed the increase in waste volume using adaptive management practices while maintaining focus on worker and public safety and ensuring protection of the environment. Lessons learned from the PGP are being incorporated into the PHP.

The PGP is discussed in detail in Section 4.

1.3.2 Port Hope Long-Term Low-Level Radioactive Waste Management Project

The PHP involves the construction of a new long-term waste management facility (PH LTWMF) developed on lands comprised of, and adjacent to, the former Welcome Waste Management Facility. The historic LLRW formerly located at the Welcome Waste Management Facility has been excavated and placed in the newly constructed PH LTWMF. Historic LLRW is being removed from various public (municipal) sites, known as Major Sites, and private (residential and business) sites, known as Small-Scale Sites, in the Municipality of Port Hope. The historic waste is being safely transported to the newly constructed PH LTWMF for long-term storage and monitoring. The Legal Agreement also stipulates the removal, transportation and storage of industrial (non-radioactive) waste from select sites, known as Industrial Sites, in the municipality.

The number of properties requiring remediation, verification and restoration has increased from the original estimate of 350 properties to more than 1,200. Expected waste volumes from Small-Scale Sites have increased by over 300% as a result of the increased number of properties requiring remediation. This has drastically changed the scope and schedule of the PHP. CNL has effectively managed this increased scope of work and is using adaptive management practices and lessons learned from the PGP to improve efficiency in all aspects of the project while performing work safely and maintaining protection of workers, the public and the environment.

The PHP is discussed in detail in Section 5.

1.3.3 Pine Street Extension Temporary Storage Site (182 Licensed Site)

CNL operates the Pine Street Extension Temporary Storage Site (PSE TSS) (Figure 3, Pre-Remediation and Figure 4, Post-Remediation) under the WNSL-W1-182.0/2022 licence

Figure 3: PSE TSS – Pre-Remediation – September 2018

The PSE TSS is comprised of two asphalt storage pads and a Quonset hut storage building (Figure 4). The purpose of the PSE TSS was to temporarily store soil and debris contaminated with LLRW, generated by the Construction Monitoring Program in the Municipality of Port Hope. LLRW was temporarily stored under secure tarps (Pad 1 and Pad 2 in Figure 3), until the new storage facility was constructed and operational.

Through the Construction Monitoring Program, CNL monitors excavations that are part of municipal, industrial, commercial or residential projects for the presence of historic LLRW. If material contaminated with historic LLRW is detected in the area of development, CNL removes it safely. Until 2018, impacted material generated by the Construction Monitoring Program was consolidated at the PSE TSS (182 Licence [3]).

It is anticipated that CNL will request an amendment to the proposed consolidated CNSC licence at a later time to remove the PSE TSS (current 182 Licence [3]) following remediation of this sites.

Figure 4: Pine Street Extension TSS – Pads and Quonset Hut, Post-Cleanup of LLRW (2019)

Since 2018, all waste removed through the Construction Monitoring Program is transported directly to the newly constructed PH LTWMF to avoid double-handling of the waste. The site remains licenced and houses temporary storage bins containing residual amounts of impacted soil and equipment from offsite remediation activities prior to final storage at the PH LTWMF. The asphalt pads are used as staging areas for remediation of sites in the Highland Drive Landfill area. Large volumes of contaminated material are no longer stored at the site.

1.3.4 Port Hope Radioactive Waste Management Facility (344 Licensed Sites)

Port Hope Radioactive Waste Management Facility WNSL covers three sites in the Municipality of Port Hope (see Figure 5):

- Pine Street Extension Consolidation Site – (PSE CS)
- Strachan Street Consolidation Site – (SS CS)
- Sewage Treatment Plant Temporary Storage Site – (STP TSS)

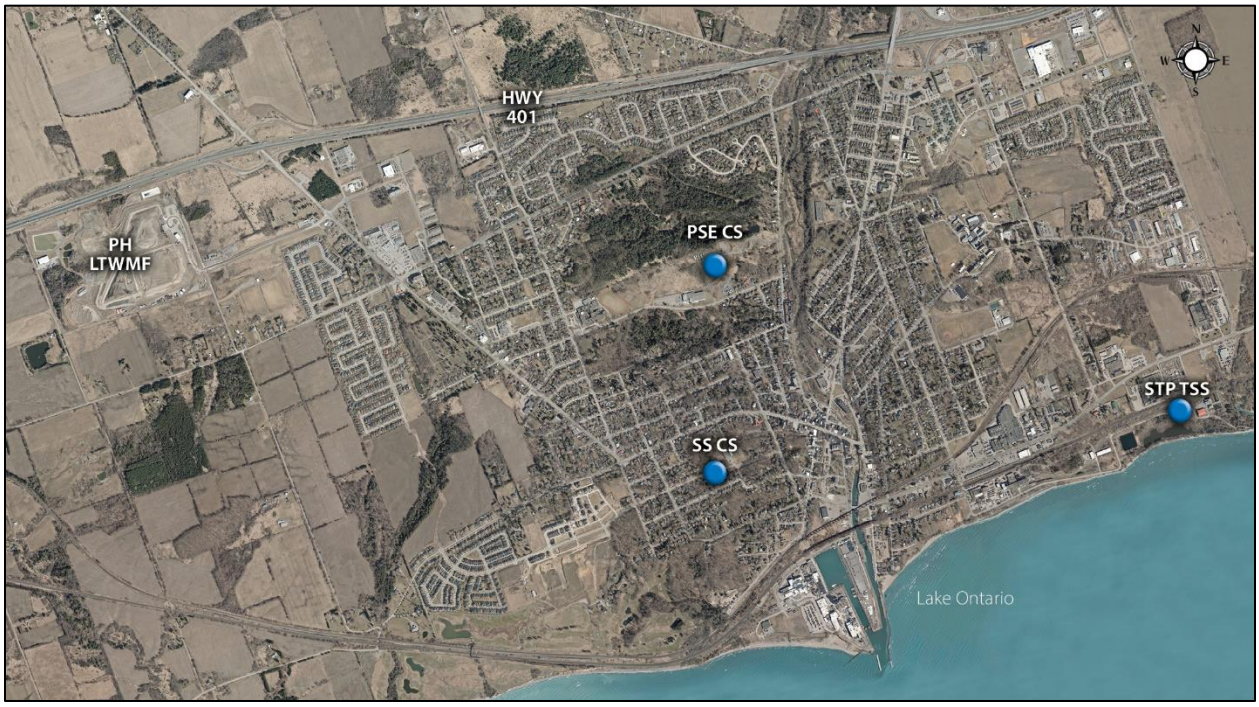


Figure 5: Port Hope Radioactive Waste Management Facility Licensed Sites (344 Sites)

The purpose of these sites was to temporarily store LLRW, primarily soil and debris, until the PH LTWMF was constructed and operational. Waste at the three sites has now been transferred to the PH LTWMF and restoration of the sites has been completed or is nearing completion.

It is anticipated that CNL will request an amendment to the proposed consolidated CNSC licence at a later time to remove the PH Radioactive Waste Management Facility (current 344 Licence [4]) following remediation of these sites.

1.4 PHAI Project Phases

The PHAI is being implemented in three phases:

Phase 1 – Planning: Environmental Assessment (EA) and regulatory reviews of the projects, which took place from 2001 through 2012. This phase is complete for both the PGP and PHP.

Phase 2 – Implementation: All work necessary for the development of the waste facilities, cleanup and consolidation of wastes from within the respective communities, as well the closure of former facilities. The PGP is transitioning from Phase 2 to Phase 3 in stages and the PHP is currently in Phase 2.

Phase 3 – **Maintenance and Monitoring**: Maintenance and monitoring of the facilities in accordance with the terms and conditions of the Legal Agreement and CNSC licences. The PGP is currently transitioning into Phase 3, and the PHP is expected to do so after 2030. Phase 3 will last well into the future and CNL will perform ongoing monitoring and maintenance of both facilities.

1.4.1 Phase 1: Planning

Phase 1 involved planning for the execution of the work, the completion of an Environmental Assessment (EA) for the PGP [8] and PHP [7], and regulatory reviews. Phase 1 also included the CNSC licencing process to ensure CNL met the requirements of the *Nuclear Safety and Control Act*. The outcomes of Phase 1 included program commitments, the EA decisions from the designated Responsible Authorities – Natural Resources Canada (lead Responsible Authority), Department of Fisheries and Oceans, and the CNSC – and the licences issued by the CNSC to undertake PHAI scopes of work for both Port Hope and Port Granby. Health Canada, Environment and Climate Change Canada, the Canadian Environmental Assessment Agency and Transport Canada identified themselves as federal authorities (FAs) for the purpose of providing expert assistance during the environmental assessment.

As part of the Environmental Assessment for each project, two studies [11] [12] were undertaken on the socioeconomic and biophysical impacts of the proposed projects, which entailed extensive consultation with the municipalities, local residents and community groups, as well as provincial and federal regulators, and engagement with Indigenous communities. The overall conclusion of the environmental assessment was that, with the implementation of the mitigation measures identified through the assessment, neither project is likely to cause significant adverse effects to the environment.

Several requirements of the Legal Agreement were met through the efforts of representatives of the Legal Agreement signatories (the Government of Canada and the municipalities of Port Hope and Clarington). Among these were the Interim Waste Management Program, Payment In Lieu of Taxes, the Property Value Protection Program, Municipal Administrative Cost Recovery, Municipal Tax Revenue Loss Program, and a public communications protocol. A basic complaints resolution process framework was also established. These programs are not subject to requirements outlined in CNL's CNSC licences.

By 2012 the preliminary plans for the cleanup of historic LLRW for the PGP and PHP had been transformed into detailed designs and the necessary approvals and funding for implementation (Phase 2) had been obtained.

1.4.2 Phase 2: Implementation Phase

Port Granby Project

Phase 2 of the PGP involved the construction of a long-term waste management facility and supporting infrastructure including a dedicated wastewater treatment plant, and the remediation of the former Port Granby Waste Management Facility used by Eldorado as a waste disposal location from 1955 to 1988. From 2016 to 2020, the LLRW located in and adjacent to the bluffs on the shore of Lake Ontario was transferred to a newly constructed facility approximately 700 m north of the former facility and encapsulated in an engineered containment mound. In total, 1.3 million tonnes (~650,000 m^3) of historic LLRW were safely excavated and transported to long-term storage, significantly more than the 1.036 million metric tonnes (518,000 m^3) anticipated at project onset.

The former site is approximately one kilometre east of the hamlet of Port Granby in southeast Clarington, during the Environmental Assessment a commitment was made that no waste would travel on public roads to limit community impact. To meet this commitment Lakeshore Road was diverted over a newly constructed overpass and all heavy equipment and project-related vehicles traveled on internal haul roads. In 2021 the overpass was removed and Lakeshore Road was realigned to pre-project specifications.

The PGP is transitioning to Phase 3 – maintenance and monitoring – in stages, beginning with the closing and successful capping of the mound in 2021. Site restoration and demobilization activities will be complete in 2022.

Phase 2 will be deemed complete once a number of close-out criteria requirements are met, including the acceptance by AECL and the CNSC of the final close-out reports submitted by CNL. As restoration activities are completed, additional Phase 3 activities will commence.

Port Hope Project

Phase 2 of the PHP involves the construction of the PH LTWMF and supporting infrastructure including a dedicated wastewater treatment plant; the radiological survey of approximately 6,000 sites in urban Port Hope and a select few in the rural area (and where historic LLRW is identified, the delineation, remedial design, remediation and restoration of the sites); and the transportation and emplacement of historic LLRW in the engineered containment mound at the new PH LTWMF. The project also includes the remediation and restoration of several sites with industrial (non-radioactive) waste. The PHP is being carried out in parallel with the PGP.

Criteria requirements are being established to determine when Phase 2 will be effectively deemed complete, including the cap and closure of the engineered containment mound; remediation verification and restoration of cleanup sites; and the acceptance by AECL and the CNSC of the final close-out reports submitted by CNL. The PHP is expected to be complete in 2030.

The PHP will begin transitioning to Phase 3 after the engineered containment mound has been capped and closed.

1.4.3 Phase 3: Maintenance and Monitoring Phase

The Maintenance and Monitoring Phase, also known as institutional control will evaluate site safety and performance to ensure design expectations and assumptions are met. Phase 3 will involve CNL's continuing commitment to meet all requirements outlined in the CNSC licence(s) for the PHAI.

CNL's primary objective for Phase 3 of the PHAI is long-term protection of human health and the environment; this is to be accomplished through the continuation/implementation of performance monitoring, environmental effects monitoring, inspections and maintenance activities and institutional controls for the licensed sites in Port Hope and Port Granby to meet commitments made by Canada in the Legal Agreement for the PHAI.

It is expected that long-term maintenance and monitoring of the LTWMF will continue until institutional controls are no longer required. The CNSC defines institutional controls as:

> "The control of residual risks at a site after it has been decommissioned. Institutional controls can include active measures (requiring activities on the site such as water treatment, monitoring, surveillance and maintenance) and passive measures (that do not require activities on the site, such as land use restrictions, markers)"

The removal of institutional controls will require approval of the CNSC after an application by CNL.

Maintenance and monitoring will be conducted as required and will include such aspects as groundwater and leachate management, site control and access features (security fence maintenance), environmental effect monitoring and site and engineering performance monitoring.

The WWTPs will continue operations in Phase 3 to support the treatment of leachate and ground water from the PH and PG LTWMFs. The WWTPs and any ancillary features will be decommissioned once monitoring activities demonstrate that ground water treatment is no longer required, and leachate volumes are reduced.

Maintenance of the sites and WWTPs will be implemented to ensure institutional controls are being met including routine inspections and regularly scheduled maintenance of the engineered containment mounds, WWTPs, leachate pumping stations, storm-water management system, onsite access roads and ditches, fencing and security features and any other ancillary features located at the sites.

Performance monitoring focuses on monitoring the performance of the engineered containment mounds. This includes readings related to base and cap liner performance, leachate sampling, site walk-downs to evaluate for slumping, animal burrows and rooting plants.

Environmental effects monitoring conducted during Phase 1 and Phase 2 will continue into the Maintenance and Monitoring Phase. Under the *Environmental and Biophysical Monitoring Plan* [14] [15], atmospheric environment (radiological and non-radiological air quality, etc.), geology and groundwater environment (groundwater quality, groundwater flow, etc.), and aquatic environment will be monitored. A review of the monitoring program will be conducted every

five years to ensure monitoring requirements continue to be relevant and to assess the assumptions made in the EA.

During the first 30 years of Phase 3, sites at which historic LLRW was left behind under the Special Circumstances Protocol [18] may require remediation or waste removal. CNL is currently working closely with AECL and the Municipality of Port Hope to develop a program to ensure waste left behind under the Special Circumstance Protocol – after the PHAI is completed – is appropriately monitored and managed. Special Circumstances are discussed in greater detail in Section 5.4.2.7.

The PGP is currently transitioning to Phase 3 in stages. Table 1 below outlines specific CNL document submissions to the CNSC.

Table 1: Example of Phase 3 Documentation

Document	Description	Status
Phase 3 – Long-Term Management Plan	The Phase 3 Long-Term Management Plan provides a fulsome overview of project details including: site identification and description; summary of remedial/risk management activities; areas of environmental concern following remedial activities; site conditions following remediation; summary of stakeholders; overview of regulatory and third-party programs; roles and responsibilities; funding; long-term monitoring requirements and information and records management.	Submitted to CNSC and is currently undergoing revisions based on comments received.
Phase 3 – Site and Facility Maintenance and Monitoring Plan	This plan functions as an annex to the Phase 3 Long-Term Management Plan and details the long-term care requirements of the site. This plan includes specific details relating to the sites, structures, systems and components that are within scope, details on regularly scheduled inspections and maintenance, an overview on integration and turnover, and information on institutional controls, unscheduled inspections, contingency repair, and post-closure corrective maintenance.	Submitted to CNSC and is currently undergoing revisions based on comments received.
LTWMF Instrumentation Procedure	This procedure functions as an annex to the Phase 3 Long-Term Management Plan and documents the required information to operate and produce records specific to the instrumentation in the Port Granby Long-Term Waste Management Facility. The instrumentation includes: the electrical conductivity sensors, vibrating wire piezometers,	Submitted to CNSC and is currently undergoing revisions based on comments received.

Document	Description	Status
	and moisture (theta probe moisture sensors) and thermal conductivity sensors (fredlund thermal conductivity sensors).	
End-State Report	An End-State Report will be drafted for any land area (i.e. including land areas that are neither Class I nor Class II) that will never be reused by CNL but will remain under institutional control. The End-State Report provides an overview of project activities, deviations from the original Detailed Decommissioning Plan or Remedial Action Plan, a description of future use of the lands, waste quantities, among other information.	Under development expected completion date: end of fiscal year 2022/23
Project Milestone Report	The Project Milestone Report is a contractor document that confirms, on behalf of qualified representatives (i.e. Engineer of Record), that the major milestones of the PGP have been constructed to the contract and design specifications.	Under development
Preliminary Decommissioning Plan	The PGP Preliminary Decommissioning Plan documents the plan for decommissioning the PG WWTP including the ancillary buildings and features located on the PGP LTWMF including ancillary buildings and facilities including, but not limited to the East Gorge groundwater collector system, East Gorge groundwater collector system substation and utility and internet services infrastructure. The Preliminary Decommissioning Plan also includes information relating to the period of storage with surveillance, hazards, worker protection, applicable programs and standards, training and qualifications and decommissioning strategy, among other details.	Submitted to the CNSC
Detailed Decommissioning Plan	A Detailed Decommissioning Plan will evolve from the preliminary plan to document detailed work program(s), safety and environmental protection procedures, and management systems that will be followed in the decommissioning of a licensed activity and/or facility.	Future Plan required once PG WWTP is considered for decommissioning. This document will be submitted to the CNSC based on operational need for continued operation of the WWTP and

Document	Description	Status
		will build on the information provided in the Preliminary Decommissioning Plan.

Phase 3 is anticipated to last many decades into the future. CNL will continue to follow all CNSC licence requirements to protect workers, the public and the environment.

2 INDIGENOUS COMMUNICATIONS & ENGAGEMENT

CNL is committed to sharing timely, up-to-date and accurate information about current and planned PHAI activities to support the PH and PG project licences. The Legal Agreement establishing the PHAI requires the implementation of a communications programs and/or processes to support the dissemination of information about the project. The *PHAI Public Information Program* [6] supports CNL's overall mission to lead the cleanup of historic low-level radioactive waste in Port Hope and Port Granby in an environmentally responsible and cost-effective manner while minimizing negative impacts to the community to the extent possible.

Historically, the *PHAI Public Information Program* [6] 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 and will implement a distinct PHAI Indigenous Communications & Engagement Program in 2022. The program is being developed in consultation with Indigenous representatives and will be implemented in tandem with the *PHAI Public Information Program* [6] and in alignment with CNL's company-wide Indigenous engagement efforts. In addition, CNL continues to enhance all communications, plans and reporting with balanced language and acknowledgement of Indigenous constitutional rights and perspectives. As CNL advances on its reconciliation journey with Indigenous communities, Indigenous knowledge will be integrated into CNL project planning and activities.

Although the PHAI is not a Class 1 or Class 2 Nuclear Facility, the PHAI Indigenous Communications & Engagement Program will be guided by the requirements in CNSC regulatory document REGDOC-3.2.2 *Indigenous Engagement* [16] in addition to those found in REGDOC-3.2.1, *Public Information and Disclosure* [17] and will align with the *PHAI Public Information Program* [6].

Recognizing Indigenous engagement as a critical component of the PHAI, CNL acknowledges the continued need for open, honest and transparent communication with Indigenous rights and interest holders. An open dialogue between CNL and Indigenous communities and organizations is maintained throughout the engagement process and CNL uses feedback to further refine project planning and messaging. Through discussion with Indigenous communities and organizations over the course of the PHAI, CNL has noted preferences for communications and engagement methods, and remains open to continual refinement of approaches based on the interest and needs of the communities.

Since 2013, CNL communications staff have actively participated in Indigenous awareness training including sessions on effective Indigenous engagement, cultural sensitivity, cultural awareness, the Kairos blanket exercise, trauma-informed communications and sacred medicines.

CNL continues to evolve its corporate Indigenous Relations Program to ensure an integrated approach across all CNL sites. In 2021, CNL created the new position of Director of Indigenous Relations. This position is focused on developing a fulsome Indigenous Relations program by creating new policies and procedures and the integration of Indigenous considerations into all aspects of CNL's business and operations, while supporting ongoing relationship building through engagement with Indigenous communities. In January 2022, CNL further expanded its PHAI resources with the addition of a Senior Advisor, Indigenous Relations.

2.1 Indigenous Communities and Organizations

CNL remains committed to actively engaging with Indigenous communities and organizations about current and planned PHAI activities. Over the past 10-years, engagement has evolved both in the frequency of engagements as well as with level of participant involvement.

Soon after the PHAI moved into Phase 2 in 2012, the Mississauga communities of the Williams Treaties First Nations began receiving regular updates about the projects at their request. In recent years CNL has also shared PHAI updates with representatives from the Anishinabek Nation and Métis Nation of Ontario.

Other Indigenous communities including Mohawks of the Bay of Quinte and local Métis Councils have been identified as potentially having interest in the project based on their proximity and interest in other projects in the area local to PHAI activities. Indigenous communities are contacted and engaged on routine project activities and provided with project updates through project information mailings and meetings. CNL also circulates invitations to these communities for special events including Industry Day, career fairs and information sessions. Additionally, special outreach occurs when there are significant project changes such as a proposed change to the PHAI Cleanup Criteria and a license extension and consolidation.

Detailed information is provided below for each Indigenous community and organization that engages with CNL on the PHAI. Background information has been adapted from each community's website and other public sources.

2.1.1 Williams Treaties First Nations

The Williams Treaties First Nations are the Chippewas of Beausoleil, Georgina Island and Rama, and the Mississaugas of Alderville, Curve Lake, Hiawatha and Scugog Island. These seven First Nations are signatories to various 18th and 19th century treaties that covered lands in different parts of south-central Ontario. In 1923, the Chippewas and Mississaugas signed the Williams Treaties, which included one large tract of land between Lake Huron and the Ottawa River bounded on the north by the Mattawa River-Lake Nipissing and French Line and on the south by earlier concluded treaties.

From 2012 to 2019, CNL staff met annually with representatives from Hiawatha First Nation, Curve Lake First Nation, Mississaugas of Scugog Island First Nation and Alderville First Nation. Most of these engagement sessions were full-day events with in-person roundtable discussions, project updates, site visits and demonstrations. Topics included environmental protection and monitoring, economic opportunity and heritage resource protection.

In March 2021, at the request of Curve Lake First Nation, CNL's Indigenous engagement team established monthly meetings with representatives from the Mississauga First Nations as well as the Chippewa communities (Beausoleil, Georgina Island and Rama First Nations). Meetings are organized and agenda topics determined with input from the community representatives, and each meeting is focused on CNL environmental remediation projects and/or the interests identified by these Nations. From March 2021 to June 2022, twelve meetings were held. PHAI-related topics included an overview of the PGP including the application for a one-year renewal of the Port Granby licence; the Port Hope waterfront remediation and CNL's two applications to the CNSC – one to amend the PHAI Cleanup Criteria and the second to renew the PHP licence. The June 2022 meeting was the first meeting to take place in person and was held in Port Hope. The meeting included updates from each of the Nations, an update on the PHAI and a tour of project sites in Port Hope and Port Granby. As of March 2022, all presentations (including those made to public groups and stakeholders) included detailed updates on CNL licensing activities: the applications, status and ways to become actively involved in the licensing process.

2.1.2 Alderville First Nation

Alderville has been home to the Mississauga Anishinabeg of the Ojibway Nation since the mid-1830s. Before that time the people lived in their traditional lands around Bay of Quinte (Grape Island) but with the influx of settlement after the American Revolution their existence found itself under increased pressure. The British having lost the American colonies after 1783, were forced to relocate the soldiers and civilians that had been loyal to the King during the conflict. For this reason, the Bay of Quinte became one area of settlement for those who became known as the United Empire Loyalists. The Mississauga then were directly involved in early "land surrenders" along the St. Lawrence River and the Bay, allowing this resettlement to occur.

Meetings with the Alderville First Nation were held annually between 2012 and 2017, resuming in 2020 and transitioned to monthly in 2021. In June 2012, Alderville First Nation attended a PHAI Indigenous engagement session which included a project update, overview of heritage resources protection, information on doing business with the federal government and PHAI employment opportunities. In 2013, the annual PHAI update included details on environmental and socio-economic protection measures. Alderville First Nation representatives participated in the 2015 annual update focused on details of archaeological investigations and a tour of the PG WWTP. In addition to the PHAI project update at the 2016 meeting, representatives of Alderville First Nation participated in a field demonstration of environmental monitoring. In 2017, CNL staff provided an overview of water quality monitoring for the PHAI projects and an in-depth look at the history of and work planned along the Northern Transportation Route, including Indigenous engagement.

In 2020, CNL launched an extensive engagement campaign in support of its application to the CNSC to amend the PHAI Cleanup Criteria. CNL staff met with Alderville First Nation representatives in December 2020 to provide information and solicit feedback on the proposed amendment. In February 2021, CNL provided a PHAI project update attended by a representative of Alderville First Nation which focused on the PHAI Public Information Program, environmental monitoring and radiation protection. In April 2021, a two-session PHAI presentation highlighted upcoming licensing activities lessons learned and the PHAI Cleanup Criteria change application.

CNL held a celebration to mark the completion of the PGP in May 2022. The Chief of Alderville First Nation participated in the event, bringing greetings and participating in a ceremonial tree planting to mark the occasion.

In March 2021, at the request of Curve Lake First Nation, CNL's Indigenous engagement team established monthly meetings with representatives of the Williams Treaties First Nations. Invitations are circulated to the Mississauga First Nations as well as the Chippewa communities (Beausoleil, Georgina Island and Rama First Nations). In June 2022, Alderville First Nation participated in the monthly Williams Treaties First Nations meeting held in-person, in Port Hope. The meeting included updates from each of the Nations, an update on the PHAI and a tour of project sites in Port Hope and Port Granby. The presentation included detailed updates on CNL licensing activities: the applications, status and ways to become actively involved in the licensing process.

2.1.3 Beausoleil First Nation

Beausoleil First Nation rests in the southern tip of Georgian Bay on Christian, Beckwith and Hope Islands. Beausoleil First Nation have been identified as potentially having interest in the project based on their proximity and interest in other projects in the area local to PHAI undertakings.

Over the years, CNL has provided them with updates through project information mailings and circulates invitations for special events including Industry Day, career fairs and information sessions.

Beausoleil First Nation has not requested any additional information on the PHAI.

In March 2021, at the request of Curve Lake First Nation, CNL's Indigenous engagement team established monthly meetings with representatives of the Williams Treaties First Nations. Invitations are circulated to the Mississauga First Nations as well as the Chippewa communities (Beausoleil, Georgina Island and Rama First Nations).

2.1.4 Georgina Island First Nation

Chippewas of Georgina Island is an Anishinaabe Nation located on the southern shores of Lake Simcoe. Their ancestors were inhabitants of the Lake Simcoe region long before the arrival of settlers. Six years after a government experiment to colonize the Chippewa people in 1830, Chief Joseph Snake moved his people back to Snake Island, and then to Georgina Island as the community grew. Georgina Island was the first community in Canada to ratify The Framework

Agreement on First Nation Lands Management and preserve inherent rights to hunt, fish, and gather.

Georgina Island First Nation have been identified as potentially having interest in the project based on their proximity and interest in other projects in the area local to PHAI undertakings. Over the years, CNL has provided them with updates through project information mailings and circulates invitations for special events including Industry Day, career fairs and information sessions.

In March 2021, at the request of Curve Lake First Nation, CNL's Indigenous engagement team established monthly meetings with representatives of the Williams Treaties First Nations. Invitations are circulated to the Mississauga First Nations as well as the Chippewa communities (Beausoleil, Georgina Island and Rama First Nations).

CNL held a celebration to mark the completion of the PGP in May 2022 and a representative from Georgina Island First Nation attended the event.

Georgina Island First Nation has not requested any additional information on the PHAI.

2.1.5 Chippewas of Rama First Nation

The Chippewas of Rama First Nation is located approximately one and a half hours north of Toronto, on 2,500 acres of interspersed land nestled in "Ontario's Lake Country", on the eastern side of Lake Couchiching. The Ojibwe peoples are part of the Three Fires Confederacy along with the Odawa and Pottawatomi Nations.

Chippewas of Rama First Nation have been identified as potentially having interest in the project based on their proximity and interest in other projects in the area local to PHAI undertakings. Over the years, CNL has provided them with updates through project information mailings and circulates invitations for special events including Industry Day, career fairs and information sessions.

Chippewas of Rama First Nation has not requested any additional information on the PHAI.

In March 2021, at the request of Curve Lake First Nation, CNL's Indigenous engagement team established monthly meetings with representatives of the Williams Treaties First Nations. Invitations are circulated to the Mississauga First Nations as well as the Chippewa communities (Beausoleil, Georgina Island and Rama First Nations).

2.1.6 Curve Lake First Nation

Curve Lake First Nation people are the Michi Saagig or Mississaugas of the great Anishinaabe (uhnishi-nahbe) nation. The name Anishinaabe is derived from an-ish-aw, meaning "without cause" or "spontaneous", and the word in-au-a-we-se, meaning "human-body". This translates to mean "spontaneous man". The Anishinaabe did not have a written alphabet, but they did have a set of picture symbols or pictographs which were used to educate through stories. Traditional teachings have taught that before contact they shared the land with the Odawa and Huron nations. They are the traditional people of the North shore of Lake Ontario and its tributaries; this has been Mississauga territory since time immemorial.

In June 2012, Curve Lake First Nation attended an Indigenous engagement day which included a PHAI update, an overview of heritage resources protection, doing business with the federal government and employment opportunities with the PHAI. In 2013, the annual PHAI update provided additional information on environmental and socio-economic protection measures. Curve Lake First Nation participated in the 2015 annual update which included a focus on the stages involved in conducting archaeological investigations and a tour of the PG WWTP. In addition to the PHAI project update at the 2016 annual engagement session, representatives of Curve Lake First Nation participated in a field demonstration of environmental monitoring. In 2017, CNL staff provided an overview of water quality monitoring of the PHAI projects and an in-depth look at the history of and work planned along the Northern Transportation Route including Indigenous engagement.

In 2019, Curve Lake First Nation participated in the launch of CNL's archaeology training program to educate PHAI front-line staff and contractors on the archaeology protocol, which included what to expect during field work, what to watch for, and the steps required when uncovering an object of potential significance. In 2019, CNL staff supported AECL staff with a presentation and site tour of the Port Granby lands identified as a potential nature reserve, including proposed governance and management structure. Representatives of Curve Lake First Nation were in attendance.

In 2020, CNL launched an extensive engagement campaign in support of its application to the CNSC to amend the PHAI Cleanup Criteria. CNL staff met with Curve Lake First Nation representatives in October and December 2020 and January 2021 to provide information and solicit feedback on the proposed amendment. In December 2021, CNL supported AECL with an onsite tour of the PGP sites for Indigenous communities and organizations as part of AECL's consultation regarding end-use planning. Curve Lake First Nation participated in the tour which included the PG LTWMF, the former waste management site and a walk-down of surplus Crown lands. The occasion also provided an opportunity for CNL to share updates on the status of the PGP and outline plans for the maintenance and monitoring of the engineered containment mound.

In 2021, as part of the dialogue with Indigenous communities about CNL's application to amend the PHAI Cleanup Criteria, Curve Lake First Nation provided technical feedback and recommendations on the *Review of Arsenic in Soil as Part of the PHAI* [19] report, which CNL has addressed in revisions and updates to the amendment submission. In 2022, the new PHAI website was circulated to Indigenous communities and organizations for review. Curve Lake First Nation provided comments and the feedback was incorporated into the content and design.

CNL currently holds an active Contribution Agreement with Curve Lake First Nation to support staff time related to administration, community liaison activities and meetings; technical documentation review; environmental and habitat assessments and community capacity building through skills training and job shadowing; understanding Aboriginal rights under Section 35 of the 1982 Constitution Act; and relations with Chief and Council.

In March 2021, at the request of Curve Lake First Nation, CNL's Indigenous engagement team established monthly meetings with representatives of the Williams Treaties First Nations.

Invitations are circulated to the Mississauga First Nations as well as the Chippewa communities (Beausoleil, Georgina Island and Rama First Nations). Representatives of Curve Lake First Nation attended the in-person meeting of the Williams Treaties First Nations meeting in June 2022. The meeting took place in Port Hope and included updates from each of the Nations, an update on the PHAI and a tour of project sites in Port Hope and Port Granby. The presentation included detailed updates on CNL licensing activities: the applications, status and ways to become actively involved in the licensing process.

2.1.7 Hiawatha First Nation

Hiawatha First Nation is located on the north-shore of Rice Lake, east of the Otonabee River in Otonabee Township, approximately 30 kilometres south of Peterborough. The First Nation consists of approximately 2,145 acres of land of which 1523 are under certificates of possession.

In 2012, Hiawatha First Nation attended a PHAI Indigenous engagement day which included a PHAI update, an overview of heritage resources protection, doing business with the federal government and employment opportunities with the PHAI. In 2013, the annual PHAI update provided additional information on environmental and socio-economic protection measures. Hiawatha First Nation participated in the 2015 annual update which included a focus on the stages involved in conducting archaeological investigations and a tour of the Port Granby wastewater treatment plant.

Following the PHAI project update at the 2016 annual engagement session, representatives of Hiawatha First Nation participated in a field demonstration of environmental monitoring. In 2017, CNL staff provided an overview of water quality monitoring of the PHAI projects and an in-depth look at the history and work planned along the Northern Transportation Route including Indigenous engagement. Representatives of Hiawatha First Nation attended the 2018 annual Indigenous engagement which included a guided tour of the Port Hope Harbour site and the Port Hope and Port Granby long-term waste management facilities with a focus on wastewater treatment.

In 2019, CNL staff supported AECL staff with a presentation and site tour of the Port Granby lands identified as a potential nature reserve, including proposed governance and management structure. Representatives of Hiawatha First Nation were in attendance.

In 2020, CNL launched an extensive engagement campaign in support of its application to the CNSC to amend the PHAI Cleanup Criteria. CNL staff met with Hiawatha First Nation representatives in October and December 2020 to provide information and solicit feedback on the proposed amendment.

In December 2021, CNL supported AECL with an onsite tour of the PGP sites for Indigenous communities and organizations as part of AECL's consultation regarding end-use planning. Hiawatha First Nation participated in the tour which included the PG LTWMF, the former waste management site and a walk-down of surplus Crown lands. The event also provided an opportunity for CNL to share updates on the status of the PGP and outline plans for the maintenance and monitoring of the engineered containment mound.

In March 2021, at the request of Curve Lake First Nation, CNL's Indigenous engagement team established monthly meetings with representatives of the Williams Treaties First Nations. Invitations are circulated to the Mississauga First Nations as well as the Chippewa communities (Beausoleil, Georgina Island and Rama First Nations). Hiawatha First Nation representatives participated in the June 2022 Williams Treaties First Nations meeting held in-person in Port Hope. The meeting included updates from each of the Nations, an update on the PHAI and a tour of project sites in Port Hope and Port Granby. The presentation included detailed updates on CNL licensing activities: the applications, status and ways to become actively involved in the licensing process.

2.1.8 Mississaugas of Scugog Island First Nation

The Mississaugas of Scugog Island First Nation moved into southern Ontario from their former homeland north of Lake Huron around the year 1700. The Mississaugas are a branch of the greater Ojibwa Nation, one of the largest native groups in Canada. From time immemorial, Mississauga people secured all their needs from the surrounding environment ("Mother Earth"); hunting and fishing and harvesting plant materials for food and medicines. Wild rice, an important food staple, grows in shallow water and was gathered in late summer using birch bark canoes.

In June 2012, Mississaugas of Scugog Island First Nation attended an Indigenous engagement day including a PHAI update, an overview of heritage resources protection, doing business with the federal government and employment opportunities with the PHAI. The Mississaugas of Scugog First Nation participated in the 2015 annual update which included a focus on the stages involved in conducting archaeological investigations and a tour of the Port Granby wastewater treatment plant. In addition to the PHAI project update at the 2016 annual engagement session, representatives of Mississaugas of Scugog Island First Nation participated in a field demonstration of environmental monitoring. In 2017, CNL staff provided an overview of water quality monitoring of the PHAI projects and an in-depth look at the history of and work planned along the Northern Transportation Route including Indigenous engagement.

In 2020, CNL launched an extensive engagement campaign in support of its application to the CNSC to amend the PHAI Cleanup Criteria. CNL staff met with Mississaugas of Scugog Island representatives in October and December 2020 to provide information and solicit feedback on the proposed amendment. In October and November 2021, a complete project overview was provided for new consultation staff with Mississaugas of Scugog Island First Nation.

In December 2021, CNL supported AECL with an onsite tour of the PGP sites for Indigenous communities and organizations as part of AECL's consultation regarding end-use planning. Representatives from Mississaugas of Scugog Island First Nation participated in the tour which included the PG LTWMF, the former waste management site and a walk-down of surplus Crown lands. The event also provided an opportunity for CNL to share updates on the status of the PGP and outline plans for the maintenance and monitoring of the engineered containment mound.

In March 2021, at the request of Curve Lake First Nation, CNL's Indigenous engagement team established monthly meetings with representatives of the Williams Treaties First Nations.

Invitations are circulated to the Mississauga First Nations as well as the Chippewa communities (Beausoleil, Georgina Island and Rama First Nations).

Representatives of Mississaugas of Scugog Island participated in a meeting in January 2022 with a focus on the dredging of the Port Hope Harbour. In April 2022, CNL staff met with representatives to discuss potential future business opportunities. The presentations included detailed updates on CNL licensing activities: the applications, status and ways to become actively involved in the licensing process.

2.1.9 Anishinabek Nation

The Anishinabek Nation (formerly known as Union of Ontario Indians) is a political organization that advocates for 40 member First Nations within Ontario, 6 of which are included and noted in the preceding sections (Alderville First Nation, Beausoleil First Nation, Chippewas of Georgina Island First Nation, Chippewas of Rama First Nation, Curve Lake First Nation and Mississaugas of Scugog Island First Nation).

In 2019, the Southeast Regional Deputy Grand Council Chief of Anishinabek Nation reached out to CNL and met with staff for an onsite project update and site tour. In December 2020, February 2021 and April 2021, PHAI updates were also provided to staff, consultants and other Grand Council representatives of Anishinabek Nation, including a general PHAI overview and sessions focused on radiation protection, environmental monitoring and details on the PHAI cleanup criteria amendment application. In February 2021, CNL provided a PHAI project update to Anishinabek Nation focusing on the PHAI Public Information Program, environmental monitoring and radiation protection. In April 2021 a two-session PHAI presentation highlighted upcoming licensing activities lessons learned and the cleanup criteria change application.

In May 2022, CNL held a celebration to mark the completion of the PGP. Anishinabek Nation's Regional Deputy Grand Council Chief participated in the event, bringing greetings and participating in a ceremonial tree planting to mark the occasion.

Later that month, CNL welcomed representatives of Anishinabek Nation for an in-person meeting in Port Hope. CNL staff provided an update on PHAI activities and provided a detailed tour of the PHP sites. The presentation included detailed updates on CNL licensing activities: the applications, status and ways to become actively involved in the licensing process.

2.1.10 Mohawks of Bay of Quinte

The Mohawks of the Bay of Quinte are a First Nation within Hastings County, Ontario. They control the Tyendinaga Mohawk Territory, which is a 7,362.5 ha reserve on the shores of Bay of Quinte in south-eastern Ontario, east of Belleville. The ancestral homeland of the Mohawk Nation is the Mohawk River Valley, which is in present day New York State. The Mohawks are considered the easternmost Nation within the Iroquois/Six Nation Confederacy and as such are referred to as the Keepers of Eastern Door. The original Five Nation Confederacy was made up of the Mohawk, Oneida, Onondaga, Cayuga and Seneca Nations. When the Tuscaroras were adopted into the Iroquois Confederacy around 1722, the Iroquois became known as the Six Nations Confederacy.

Although the Mohawks of Bay Quinte are not listed as one of CNL's identified communities to engage, the Mohawks of Bay of Quinte did provide comments on the 2017 NSDF Environmental Impact Statement through the formal environmental assessment process.

The Mohawks of Bay of Quinte have been on CNL's PHAI distribution list for over 10 years. In the fall of 2021, CNL reached out to determine if there might be interest in arranging future in-person meetings given the Mohawks of Bay of Quinte's interest in the 2021 PGP one-year licence extension application. At the suggestion of Mohawks of Bay of Quinte staff, CNL continues to connect and share project materials, with the intention of expanding this relationship once the capacity is available.

2.1.11 Métis Nation of Ontario

The Métis Nation of Ontario was formed in 1993 to represent communities and individuals recognized by the Métis Nation within Ontario and works to represent the rights, interests, and collective aspirations of Métis People and communities throughout the province CNL engages with representatives of Métis Nation of Ontario Regions 6 (eastern Ontario including Peterborough and Ottawa) and 8 (including Durham and the Greater Toronto Area.)

In February 2020, CNL provided a PHAI overview presentation and tour of the Port Hope and Port Granby LTWMF for representatives of the Métis Nation of Ontario as part of a combined project update and orientation for the PHAI and CNL's Near Surface Disposal Facility project. The 2020 meeting re-established a connection and relationship with Métis Nation of Ontario and the PHAI. In March 2021, during the COVID-19 pandemic, CNL provided a PHAI presentation and virtual tour of project sites for Métis Nation of Ontario representatives, staff and Regions 5 and 6 Councillors.

In February and March 2021, CNL staff provided an overview of the PHAI and Indigenous engagement. June 2021, a session with Métis Nation of Ontario representatives was focused on the remediation of the Port Hope Harbour and other waterfront-area sites, and CNL's environmental monitoring, and was followed by a session in November 2021 to share and discuss details related to CNL's application to amend the PHAI cleanup criteria.

In June 2022, CNL staff met with Métis Nation of Ontario Region 6 & 8 representatives to provide an update on the PHAI, discuss the PHAI environmental monitoring program and plan for a PHAI sites tour in fall 2022. The presentation included detailed updates on CNL licensing activities: the applications, status and ways to become actively involved in the licensing process.

2.2 Indigenous Input

CNL seeks input from Indigenous communities on the development of engagement programs and provides opportunity for review and feedback on project information, materials and engagement planning.

In 2021, as part of the dialogue with Indigenous communities about CNL's application to amend the PHAI Cleanup Criteria, Curve Lake First Nation provided technical feedback and recommendations on the *Review of Arsenic in Soil as Part of the PHAI* [19] report, which CNL

has addressed in revisions and updates to the amendment submission. It is expected that Curve Lake First Nation will provide feedback on the licence renewal application.

In December 2021, CNL supported AECL with an onsite tour of the PGP sites for Indigenous communities and organizations as part of AECL's consultation regarding end-use planning. The tour included the PG LTWMF, the former waste management site and a walk-down of surplus Crown lands. The event also provided an opportunity for CNL to share updates on the status of the PGP and outline plans for the maintenance and monitoring of the engineered containment mound.

In 2022, the new PHAI website was circulated to Indigenous communities and organizations for review, and their feedback was incorporated into the content and design. This includes the inclusion of a section titled "Indigenous History of the Port Hope Area" and feedback on appropriate graphical representation for the Indigenous Land Acknowledgement.

In July 2022, CNL circulated an initial draft of the *PHAI Indigenous Communications and Engagement Program* to the Indigenous communities and organizations for review and comment. Any feedback received will be considered for incorporation and the collaborative process will continue as CNL works toward a final version.

2.3 Indigenous Engagement

Issues and Concerns

Through its ongoing engagement with Indigenous communities, consistent issues and concerns have been identified for CNL to address including:

- How project development might interfere/accommodate animal movement and migration at Port Granby and Port Hope sites
- Accommodation/mitigation for Species at Risk in work areas
- Fish relocation and habitat restoration in harbour area
- Maintenance of groundwater quality and the prevention of seepage
- Frequency of well sampling/testing
- Plans to prevent the incursion of invasive species in work areas
- CNL archaeological protocols
- Arsenic and radiological cleanup criterion changes
- Indigenous participation/monitoring of project activities

Indigenous communities have urged CNL to leave remediated sites in better condition than when the project began, balancing the commitment to remove contaminated soils with the protection of lands and waters. There has been keen interest expressed in opportunities for deeper understanding, reviewing and providing input on the Port Hope and Port Granby *Environmental Protection Plans* [20][21].

Direct Notifications

CNL routinely distributes PHAI newsletters, media releases, public disclosures and invitations to special events to Indigenous communities and organizations. Invitations to CNL's Industry Day

and career fairs are also circulated to Indigenous contacts who have expressed interest in business opportunities and CNL contracting processes.

Site Tours

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

From 2012 to 2019, site tours were offered for each Indigenous engagement session to supplement information. As a result of COVID-19 restrictions from 2020 to 2022, CNL's communications were adapted, and virtual tours were provided through detailed photographs, diagrams and videos.

Archaeology Program

In 2011, CNL established a *Protocol for Archaeological and Forensic Discovery* [22], outlining the required procedure should items of potential archaeological, Indigenous or cultural heritage significance be discovered during PHAI work. The protocol includes engagement of Indigenous Cultural Heritage Monitors and notification to Indigenous communities.

Preparations for construction of the Lakeshore Road underpass at the Port Granby LTWMF involved Indigenous Cultural Heritage Monitors from the Mississauga First Nations in the Stage 3 archaeological investigation per the guidelines of the Ontario Heritage Act regulations, as a result of findings during the Stage 2 walk-down of the site.

In 2019, Curve Lake First Nation participated in the launch of CNL's training program to educate PHAI front-line staff and contractors on the archaeology protocol, which included what to expect during field work, what to watch for, and the steps required when uncovering an object of potential significance. This training remains part of the on-boarding process for new project task orders, new staff and contractors.

Contribution Agreements

CNL supports the development of Contribution Agreements with rights holders to provide funding to ensure communities remain actively involved in both CNL communications and engagement, and project planning.

Contribution Agreements can include financial support for staff time related to administration, community liaison activities and meetings; technical documentation review; environmental and habitat assessments and community capacity building through skills training and job shadowing; understanding Aboriginal rights under Section 35 of the 1982 Constitution Act; and relations with Chief and Council.

CNL currently holds an active Contribution Agreement with Curve Lake First Nation and is open to such PHAI-related agreements with other Indigenous communities if desired.

Documentation and Records

To measure the effectiveness of the program, CNL records all Indigenous communications and engagement including meetings, phone calls, emails and direct notifications.

Comments and questions are recorded, and responses are made available to all interested parties.

Program Evaluation and Improvement

CNL maintains an open two-way dialogue with Indigenous communities and organizations to monitor and gather opinions, concerns and input about PHAI activities, and to garner an understanding of Indigenous perspectives and relationship to the land. This knowledge is incorporated into the dissemination of information, project reporting, planning and execution.

Questions, concerns and input about the PHAI and project-related impacts are dispositioned with details on how this valuable feedback will be considered in project planning and activities, as well as explanations when feedback cannot be incorporated.

CNL continues to monitor the frequency and content of messaging as well as methods of communication. Once in place, CNL will evaluate the PHAI Indigenous Communications & Engagement Program on an ongoing basis to ensure messages and supporting information reach Indigenous communities and organizations in a timely fashion and through effective channels. Adjustments will continue to be made to tactics, strategies and products as required and in collaboration with Indigenous communities to provide access more successfully to PHAI information and to build and maintain awareness, support and confidence in PHAI activities.

Reporting

CNL keeps the CNSC apprised of Indigenous communications and engagement activities through quarterly and annual reporting.

As part of the PHAI licence renewal application process, CNL submitted the *PHAI Indigenous Communications and Engagement Interim Status Report – 2012 to 2022* [23] to CNSC staff in May 2022, outlining Indigenous engagement activities from April 2012 to March 2022. This report and a draft of a follow-up report - *PHAI Indigenous Communications and Engagement Supplementary Report – 2022,* outlining engagement from April to June 2022, were circulated to the Indigenous communities and organizations in July 2022 for review and comment. Feedback received will be incorporated into the supplementary report before it is submitted to CNSC staff in August 2022. At the time of writing of this CMD, the feedback had not yet been received.

CNSC and CNL interactions are supplemented by regular meetings with regulatory, licensing, project and program staff.

Traditional Knowledge

CNL is in the process of reviewing CNSC *Indigenous Knowledge Policy Framework* for incorporation into its projects on a go-forward basis. Insights and input received through previous engagements with Indigenous communities concerning PHAI have been noted by CNL so that considerations, issues and concerns can be addressed; for example, the migratory habits

of species potentially affected by CNL project activities and preferred plant and tree species for remediation planting. This will be an integral part of the restoration plans in Port Hope, on larger parcels of lands. Additionally, traditional knowledge about fish behaviour was discussed at length with the project team undertaking the cleanup of the Port Hope Harbour.

CNL will continue to engage on this subject in greater depth through ongoing collaboration with Indigenous communities and incorporate these insights into CNL environmental programming and project planning/execution. As noted in the CNSC framework, Indigenous knowledge is a body of knowledge gathered by generations of Indigenous peoples living in close contact with their traditional territories and resources. Indigenous knowledge is cumulative and dynamic. It is built on the historic experiences of a people and adapts to social, economic, environmental, spiritual and political change. As part of its Reconciliation Action Plan, currently in development, CNL embraces this definition as a basis for moving its operations forward in the spirit of meaningful engagement with Indigenous communities and peoples and inclusion of Indigenous perspectives.

3 PHAI PUBLIC INFORMATION PROGRAM

The PHAI Public Information Program ensures effective communication with the communities of Port Hope and Port Granby to build and maintain confidence in the CNL and the PHAI. An adaptive approach allows CNL to proactively share information and remain responsive to a diverse audience including residents, property owners, businesses, municipalities, media, as well as community and special interest groups. Interest in the PHAI often spans national and international borders, as this project is the first of its kind in Canada.

CNL is committed to sharing information with its stakeholders in a manner that earns public trust, identifies and understands stakeholder issues and values, and builds and maintains community acceptance and support of the PHAI. Strategic relationships are developed and maintained through information exchange and feedback to increase support as CNL advances the PHAI. Ongoing dialogue and opportunities to provide feedback ensure that members of the public and key stakeholders are knowledgeable about upcoming work and project activities, and that questions, issues and concerns are identified and addressed. The PHAI Public Information Program is reviewed and updated as necessary to ensure it continues to provide appropriate direction as the PHAI evolves.

3.1 General Communications

CNL communications staff responds to inquiries through email, telephone, drop-in meetings and via social media. The PHAI website – PHAI.ca – provides information on the Port Hope and Port Granby projects including descriptions of current and upcoming work, environmental monitoring reports and public disclosures. The website was re-launched in 2022 with a new design to make information more easily accessible and included the addition of Indigenous content including a land acknowledgment and Indigenous history of the Port Hope area.

PHAI Facebook and Twitter accounts were established in 2011 to provide project updates, engage in conversation, monitor dialogue of interest and respond to questions or comments by

those who may not necessarily have sought the information in other ways. Additional social media platforms have been added through the years.

Through frequent updates, CNL has maintained relationships with local business leaders in and around the Port Hope and Southeast Clarington areas to communicate the important economic benefits the PHAI brings to the area, delivering on an environmental assessment follow-up commitment for enhanced liaison with the economic development sector. CNL provides monthly updates to the Port Hope and District Chamber of Commerce on project progress, communications and project-related economic opportunities and 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. Members of the real estate industry are kept up to date on the PHAI through regular updates on the Property Value Protection Program and the Property Radiological Survey in Port Hope.

As representatives of the PHAI, CNL employees are kept apprised of PHAI activities through all-staff meetings at the corporate, division and project level. Invitations to PHAI events and community updates are circulated to employees and summaries of updates to local municipalities are posted on the employee intranet.

Residents and business owners in Port Hope and Port Granby are notified in advance of planned work and of notable changes to the schedule or nature of the work through phone calls, letters, newspaper advertisements and personal visits to keep residents well informed. Electronic and printed media advertisements and notices are used to create awareness about upcoming PHAI events to promote activities undertaken by CNL and to attract participation in engagement and outreach initiatives.

Presentations, site tours and program-specific information and demonstrations are provided on request to students at the elementary, high school, college and university levels. National and international education institutions, industry and professional groups also participate in PHAI presentations and site tours including visitors from Argentina, Japan, Finland, the United Kingdom, Germany and Slovakia.

Communications staff develops relationships with local reporters to ensure they have a full understanding of the projects. Media days are held on occasions to provide tours and more in-depth information on specific elements of the projects; media releases are issued to announce significant project milestones, promote special events and encourage participation in upcoming engagement opportunities. Media monitoring is ongoing to catalogue external interest in the projects and to detect and correct any misinformation.

A summary of PHAI communications tactics is provided in Table 2: Tactics, Products and Activities.

Table 2: PHAI Communications Tactics, Products and Activities

	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	TOTALS
Public info office visits	465	389	248	215	160	112	215	212	0	0	**2,016**
Phone calls, letters, emails, texts	845	1,021	1,202	790	2,020	2,171	2,453	3,767	4,492	4,075	**22,836**
Property owner meetings	34	28	25	15	7	137	272	291	206	209	**1,224**
Field visits								49	279	602	**930**
Key Stakeholder Relations	5	7	39	25	18	30	44	49	12	48	**277**
Communications Products	0	0	13	11	11	5	14	32	14	5	**105**
Presentations	65	61	23	39	35	30	35	37	21	18	**364**
Tours	33	31	24	25	12	6	9	18	0	1	**159**
Special Events	24	11	4	2	10	8	6	5	0	1	**71**
Community Notifications	42	28	22	15	14	14	19	18	12	29	**213**
PHAI. ca visits	25,022	12,542	13,810	21,298	28,978	31,603	31,880	27,960	31,208	33,526	**257,827**
PHAI.ca pages viewed	91,000	47,875	49,195	70,389	96,710	102,621	101,909	83,475	84,904	85,686	**813,764**
Social Media Posts						261	360	390	367	361	**1,739**

3.2 Outreach and Engagement

CNL provides presentations to varied audiences including all levels of government, local residents, community groups, education institutions, service clubs, and local/national/international audiences. Guided tours of project remediation sites, led by expert CNL staff, provide a first-hand look at PHAI work, promoting an in-depth understanding and appreciation for the complexity and significance of the Port Hope and Port Granby projects.

PHAI newsletters highlight CNL's ongoing commitment to completing the projects safely and provide updates to the community on upcoming and planned work, changes to planned work or programs and in-depth descriptions of key project facilities and processes. Newsletters are distributed by mail and email and posted on PHAI.ca.

3.3 Small-Scale Sites Communications

Launched in 2011, CNL is now concluding the Property Radiological Survey on approximately 6,000 properties in urban Port Hope and a small number in rural Port Hope, to confirm which properties require cleanup of historic LLRW.

All property owners included in the Property Radiological Survey received a Consent and Scheduling Package requesting written confirmation of their participation. Individual phone calls were made to schedule survey appointments and provide testing results for those properties with historic LLRW requiring remediation. Communications staff are available by phone, email and in person to respond to property owner inquiries and concerns. In 2017, dedicated design meetings began to provide details on the survey process, answer questions and review design plans for the remediation and restoration of each identified property. As work progresses, a dedicated meeting is held prior to the start of work for all property owners and adjacent residents in a neighbourhood to share information and discuss concerns. In 2019, CNL introduced dedicated field liaison communications staff to attend property sites where PHAI activities are underway to address any emerging issues.

3.4 Special Events

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

A 2012 session focused on the upcoming Property Radiological Survey in Port Hope. In 2015, at a session at Port Hope High School, CNL staff engaged high school students during the day and community members in the evening. In 2015 and 2016, CNL opened the doors to more than 100 visitors for tours of the PGP and PHP wastewater treatment plants. In 2016, CNL shared details on the renewed Property Value Protection Program at information sessions in Port Hope and Port Granby. A 2017 Port Hope information session focused on safely transporting waste in Port Hope with more than 50 people in attendance; staff noted a definitive shift from general information questions at previous sessions to specific questions about upcoming work and a particular interest in the radiological survey and remediation of private properties.

Approximately 75 attendees spoke with CNL subject matter experts at a 2019 information session focused on property owner options for partial property remediation to preserve features such as mature trees, and procedures for accommodating property owner needs during PHAI work. At a well-attended 2019 PHAI employment recruitment event, CNL wastewater treatment plant staff spoke with more than 50 attendees about project activities and specific job duties. Virtual Public Information Sessions in 2020 and 2021 focused on CNL's application to amend the PHAI Cleanup Criteria with approximately 75 attendees in each session. In March 2022, a virtual Information Session with more than 100 attendees provided technical details on remediation options provided to MPH for the cleanup of industrial waste at the Lion's Recreation Centre Park. In June 2022, CNL hosted a live webinar to provide an overview of the PHAI licence renewal process and how to participate in the process; the session was recorded and made available to anyone wishing the access the information.

CNL participates in external events to provide information about PHAI activities to broad audiences and increase awareness and understanding of the projects. Some examples include Port Hope Family Safety Day, the Fleming College Job Fair, Cameco Community Picnic and the Port Hope Environmental Fair. From 2012 to 2019, a PHAI presence was a staple at the three-day Port Hope Fall Fair with a large interactive booth displaying project information and updates, maps, and aerial project photographs and videos. During events, CNL representatives speak with visitors, provide information and answer questions about the projects.

3.5 Project Participation Opportunities

CNL provides opportunities for property owners and community members to give feedback on the PHAI Public Information Program. At the request of area residents during the PHAI Environmental Assessments, the Port Granby Discussion Group was formed in 2006 to allow representatives of the South East Clarington Ratepayers Association, Municipality of Clarington and local residents to engage directly, express concerns and ask questions. Many of the suggestions put forward by the residents have been integrated into the PGP.

In 2013, the Port Hope Citizen Liaison Group and Port Granby Citizen Liaison Group 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.

In 2018, with remediation and restoration of major sites and residential properties in Port Hope underway, CNL's communications evolved, and the Port Hope Citizen Liaison Group was replaced with targeted engagement opportunities. CNL enhanced community communications with a more targeted approach to gather input on potential communication strategies and ensure Port Hope residents, business owners and visitors are well informed about the day-to-day impacts of project activities as remediation progresses. Opportunities include target and focus groups, neighbourhood meetings and opportunities to observe remediation activities. Engagement sessions have focused on topics including the concept of property-owner directed remediation on Port Hope properties, CNL's social media approach, waterfront remediation and CNL's application to amend the PHAI Cleanup Criteria.

With the PGP moving into Phase 3, maintenance and monitoring, the Port Granby Citizen Liaison Group was discontinued in the spring of 2022, with opportunities for feedback on Phase 3 remaining through contacting CNL staff directly.

3.6 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 informed of PHAI plans and progress. CNL provides regular project and communications updates to municipal councils, committees and staff. Quarterly meetings of the Agreement Monitoring Group bring together representatives of both municipalities and representatives of AECL as signatories to the Legal Agreement, and include updates on project activities, budget and schedule to ensure project commitments outlined in the agreement are implemented and reviewed.

Formed in 2012, the CNL/MPH Communications Working Group ensures alignment on common interests involving public communications by CNL and the Municipality of Port Hope through quarterly meetings of communications staff from to discuss upcoming projects and initiatives. A CNL/Cameco Communications Working Group was formed in 2013 to identify and plan for intersecting scopes of work in the Port Hope waterfront area with high visibility or potential for public concern. Meetings are held as required and are less frequent as the Cameco work on the Centre Pier at Port Hope Harbour has been completed.

3.7 Program Evaluation and Improvement

Using objective assessments acquired from the tactics described, CNL evaluates its Public Information Program on an ongoing basis to ensure messages and supporting information reach target audiences through effective channels in a timely fashion. CNL adjusts tactics, strategies and products as required to maintain support and confidence in PHAI activities. CNL periodically researches public attitudes through a formal survey to monitor awareness of the PHAI, identify issues and concerns, determine the communication needs of the public and provide data regarding attitudes and preferences. Data collected through the Public Attitude Survey informs CNL about perception and attitudes about the project and how best to focus future communication efforts.

3.8 Reporting and Disclosure

Reports on environmental impact, including environmental monitoring program results and PHAI Annual Compliance Reports to the CNSC, are posted on PHAI.ca. Sharing performance reports provides a level of transparency to the PHAI and CNL has received excellent community feedback on this practice.

CNL is committed to providing open and transparent public disclosure, in alignment with CNSC regulatory document REGDOC-3.2.1 *Public Information and Disclosure* [17], about unplanned project activities and non-routine events that have offsite effects or could result in public interest and concern and/or media attention. Disclosures about unplanned project activities and events are posted, typically within four business days, while key stakeholders may be notified through direct contact. Consistent with REGDOC 3.2.1, *Public Information and*

Disclosure [17], CNL informs the CNSC of disclosures made under this protocol at the time of or before the disclosure and posts the information on the Public Disclosure page on PHAI.ca.

4 PORT GRANBY PROJECT

4.1 Introduction

The purpose of the PGP is to clean up and provide appropriate local, long-term management of the historic LLRW located at the former Port Granby Waste Management Facility in the Municipality of Clarington. Due to continuous bluff erosion, the waste contained at the former facility was at risk of eroding into Lake Ontario and needed to be moved to a more secure location further north in an engineered long-term waste management facility. Approximately 1.3 million metric tonnes of waste was safely excavated and transported to long-term storage at the newly constructed PG LTWMF.

The PGP is currently transitioning to Phase 3, the remaining Phase 2 restoration activities that are underway are final grading and landscaping, and tree planting at the former site and the PG LTWMF.

The work completed to date on the PGP was conducted in compliance with the project licence [2] and associated licence condition handbook [24]. Details related to applicability of the various safety and control areas are outlined in Section 6 of this document. On top of the required safety and control areas, CNL implements a robust management system which applies industry best practices. Details on these additional programs related to the PGP can be found in Section 7.

4.2 Port Granby Long-Term Waste Management Facility

4.2.1 History and Background

The former Port Granby Waste Management Facility received wastes related to Eldorado's Port Hope refinery operations from 1955 until June 1988.

In September 1988, Cameco Corporation (Cameco) entered into a purchase agreement for the sale of assets of Eldorado Nuclear (now Canada Eldor Inc.). In order to proceed with construction of the PG LTWMF, Her Majesty the Queen in Right of Canada needed access to these lands. The agreement was finalized March 1, 2004 between Her Majesty the Queen in Right of Canada, as represented by the Minister of Natural Resources, Cameco, and Canada Eldor Inc. (Eldor). Whereas Her Majesty entered into an Agreement dated March 29, 2001 with The corporations of the Town of Port Hope, the Township of Hope and the Municipality of Clarington for the cleanup and the long-term safe management of historic LLRW situated in the Town of Port Hope, the Township of Hope and the Municipality of Clarington referred to as the Legal Agreement.

Prior to remediation activities at the former Port Granby Waste Management Facility site, historical file reviews and site characterization identified four distinct waste burial areas as displayed in Figure 6: the East Gorge, the West Gorge; the Central Plateau including the

Northwest Trenches; and the Northeast Plateau (also referred to as Northern Plateau). Figure 7 shows a close up look at the East and West gorge along with the former wastewater treatment plant building.

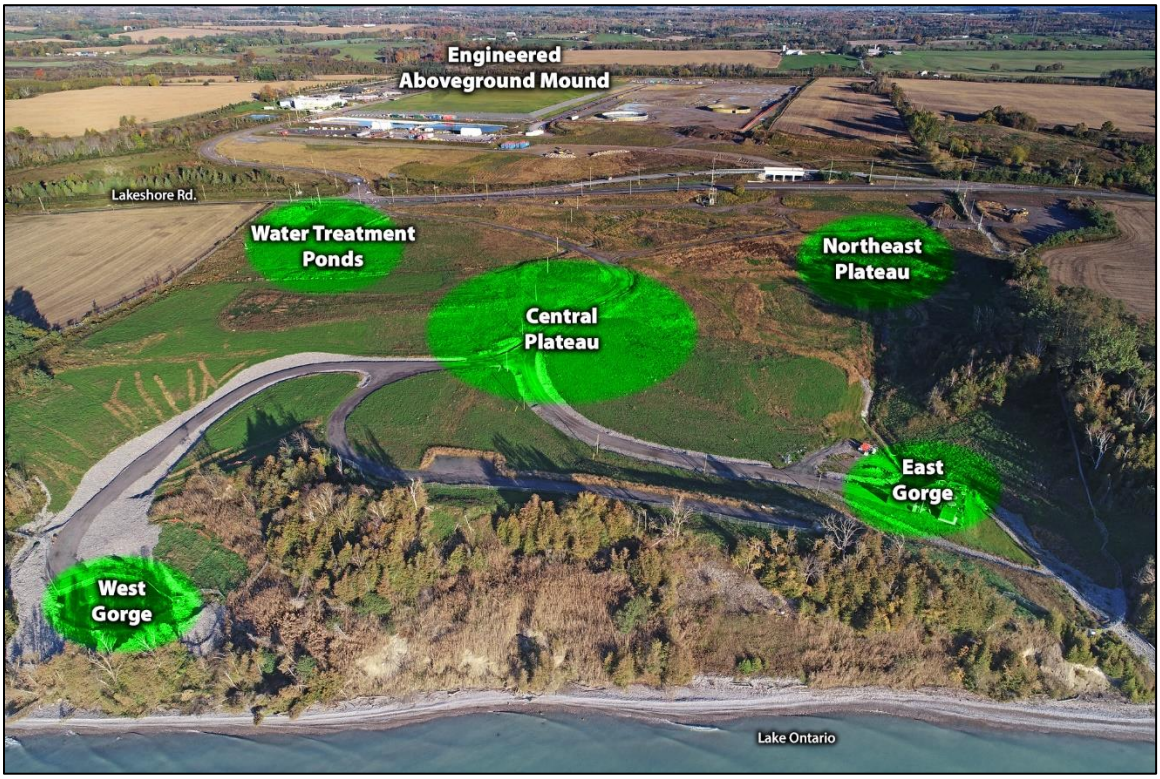


Figure 6: Port Granby Former Waste Management Facility Layout of Waste Management Locations

In the East Gorge area waste was end-dumped directly from trucks into the gorge. This practice was used from 1955 to 1966.

The West Gorge area was used from 1955 to 1970 to store scrap equipment, rubble, scrap drums and some of the residue/soil mixtures from remedial programs in Port Hope.

The Central Plateau was in use from 1960 until approximately 1980 for burial of wastes in trenches. During this period, some 53 trenches were excavated, filled with mixed waste covered with clean soil, contoured and seeded.

The Northeast Plateau was used after 1980 for similar trench burial operations.

In addition to the LLRW, the site contained marginally contaminated soil that was contaminated either by direct contact with the LLRW or groundwater/leachate flows from the waste.

Figure 7: Former PG Waste Water Treatment Plant, Legacy Sedimentation Ponds, East Gorge and West Gorge (Pre-Remediation)

4.2.2 Design

The PG LTWMF engineered containment mound consists of two contiguous cells of the same size. The overall mound footprint is 410 metres by 230 metres. Each cell has a highly engineered composite liner system, leachate collection system and a multi-layer final cover system. The PG LTWMF engineering features followed the "site specific" design approach of Ontario Regulation 232/98. The base liner system is a composite liner consisting of a 2 mm thick high-density polyethylene geomembrane on top of a 750 mm thick compacted natural clay liner. On top of the composite base liner system is a leachate collection system that facilitates leachate/liquid monitoring, collection and removal. The leachate collection system consists of drainage layers with a network of coarse sand and gravel drains leading to a sump area in each cell to facilitate the monitoring, collection and removal of leachate. The multi-component cover system will reduce surface water infiltration through the waste, provide protection of the mound from inadvertent intrusion into the waste by burrowing animals, and reduce levels of gamma radiation on the surface of the mound to background levels. Figure 8 provides a representative cross section of the base liner and cover system of the mound.

The PG LTWMF was designed to accommodate the historic LLRW and marginally contaminated soil (MCS) from the former Port Granby Waste Management Facility. The mound was designed for a total volume capacity of 518,500 m^3 including daily and interim cover. During remediation activities the actual amount of waste and MCS encountered was far greater than anticipated, reaching ~650,000 m^3, totaling 1.3 million metric tonnes. The final shape of the engineered containment mound was modified to reflect the change in volume, slope grades of Cell 1 and 2

were increased from a 10:1 to a 4:1 to accommodate the increased waste volumes encountered. The potential need to increase the capacity of the Engineered Containment Mound was contemplated in the Environmental Assessment Study Report (July 2009).

The completed Engineered Containment Mound incorporates international best practices and operating experience to effectively isolate waste from the surrounding environment and safely store the material for 500+ years.

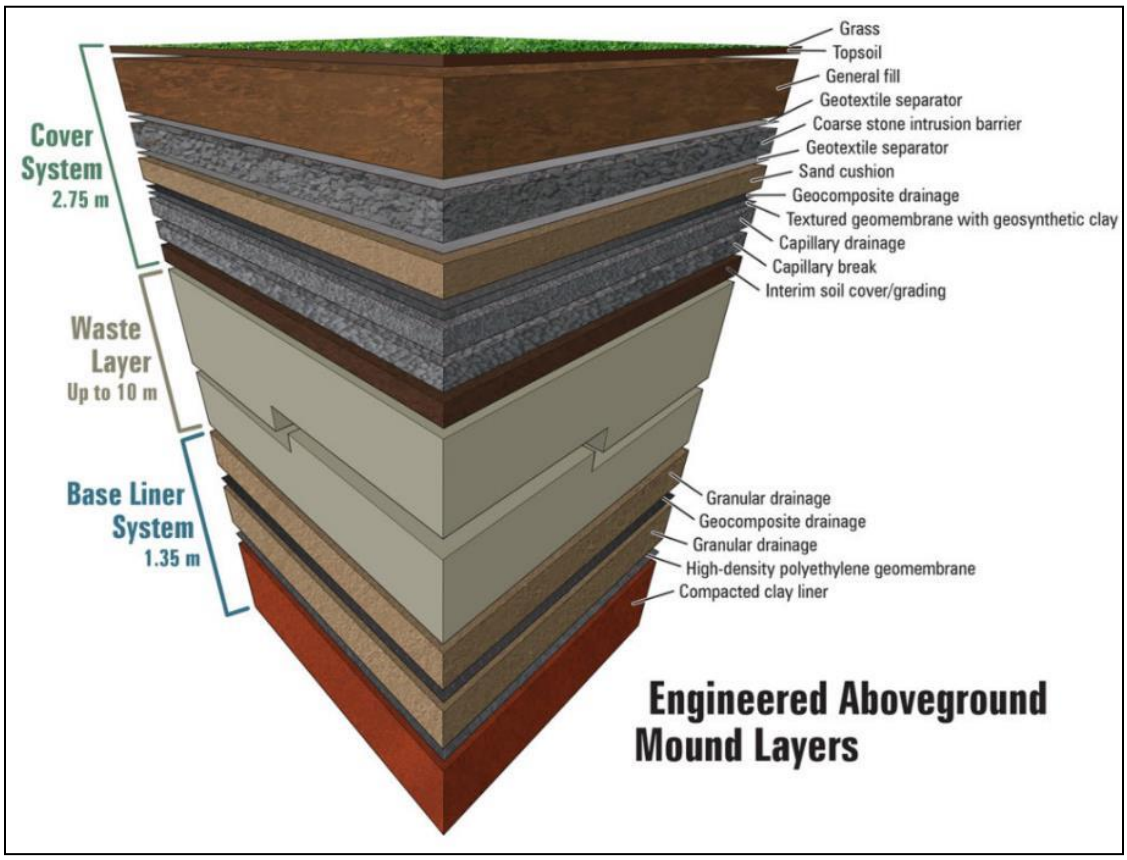


Figure 8: Cross Section of Cover and Baseliner System, Port Granby

4.2.3 Remediation, Construction and Operation of the PG LTWMF

The PGP was divided into three stages that consisted of the following scope of work:

- Construction and operation of the PG WWTP (see Section 4.3)
- Renovation and upgrades to Elliott Road, including Lay-Down Area and North and South Storm Water Management Ponds
- Construction of the engineered containment mound, waste transfer from the former PG Waste Management Facility to the newly constructed PG LTWMF, remediation and decommissioning of the former PG Waste Management Facility, decommissioning of selected portions of the PG LTWMF and remediation of selected areas of Nichols Road, Lakeshore Road and Townline Road.

Figure 9 outlines some key construction timelines for construction milestones during 2016-2021 period.

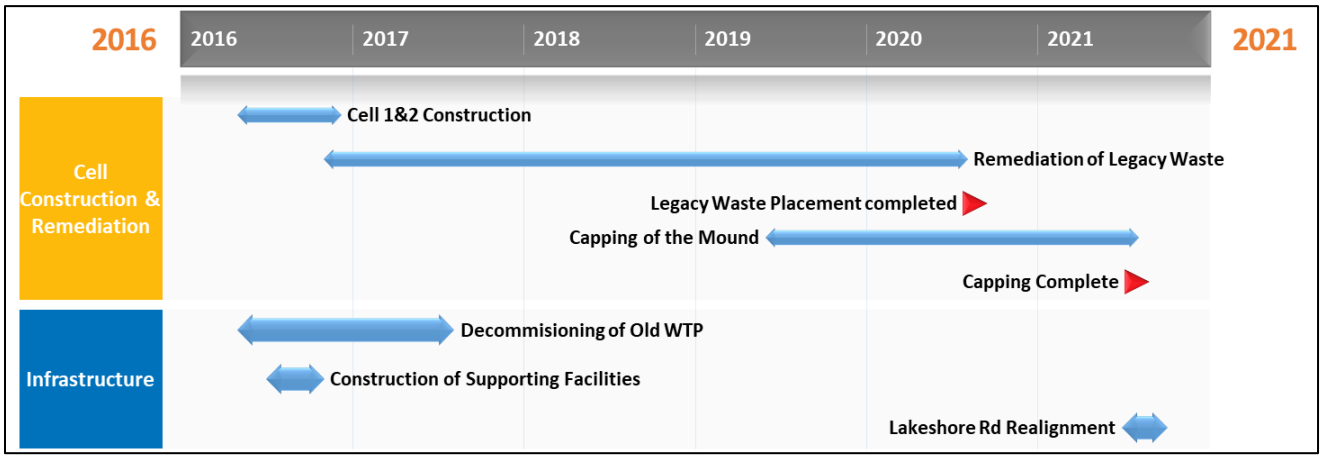


Figure 9: PG LTWMF Facility Construction & Operations Timeline.

4.2.4 Remediation of the former Port Granby Waste Management Facility

The work scope for the former Port Granby Waste Management Facility included:

- Excavation and transfer of legacy contaminated material to the PG LTWMF
- Remediation, verification and restoration of the site

The remediation verification process, following the Remediation Verification Standard Operating Procedure (RVSOP), was implemented once all contaminated soil was removed from a dedicated “survey unit” at the Port Granby Waste Management Facility. Survey units were areas of the remediated site broken into smaller, manageable sized areas. Survey unit gamma surveys and x-ray fluorescence (XRF) analysis were performed to help evaluate the success of remediation. Once it was determined through on site testing that the survey unit was remediated, soil samples were taken for each subsection and submitted for analysis at an accredited third-party laboratory. The laboratory test results, along with gamma survey and X-Ray fluorescence results were used to evaluate the success of the remediation when compared to the project cleanup criteria outlined in the Port Granby CNSC licence [2]. If the soil did not meet verification requirements, excavation activities continued and the verification process was repeated until the survey unit was confirmed to meet the CNSC approved project cleanup criteria.

Remediation verification of the former Port Granby Waste Management Facility was completed in the summer of 2020. An aerial view of the restored site is shown in Figure 10. Final grading and hydro-seeding has been completed and new green vegetation is now established.

Figure 10: Former Port Granby Waste Management Facility 2021

Lessons Learned

Some of the major challenges faced during the remediation of the former Port Granby Waste Management Facility, which had significant impacts on schedule and cost, were the unanticipated waste types (compressed gas cylinders) discovered during excavation in 2017, and the unexpected rainfall events during excavation in 2017 and 2019. The action management plans for each challenge are further explained below, along with examples of lessons learned that are continued to be applied across the PHAI project and at other CNL sites as part of CNL's commitment to continuous improvement.

Unanticipated compressed gas cylinder - Upon discovery of a pressurized cylinders with unknown gas, all waste removal activities were halted during the investigation and did not resume until all personal protective equipment (PPE) was donned and training was complete to ensure safe resumption of excavation activities.

CNL implemented operational changes to mitigate the risk with any future pressurized cylinders with unknown gases, including:

- A two-stage operation with Level B PPE, including supplied air and a respirator crew stockpiling excavated material, which was then loaded by a crew in Level D PPE and transferred to the PG LTWMF cells
- Heavy equipment, including bulldozers and excavators, were equipped with a one-inch-thick plexiglass blast shield to protect equipment operators

- Proactive procurement of additional enhanced air monitoring equipment and services to monitor the changes in conditions at the Port Hope Welcome Waste Management Facility site, The heavy equipment was outfitted with continuous monitoring direct-read equipment with data-logging capabilities that, in the event that volatile organic compounds and airborne concentrations trigger an action level, the heavy equipment operators would become aware of the alarm levels to take the necessary steps for action.

Heavy precipitation – The site experienced several unpredictable precipitation events that resulted in surface-water runoff and collection points in several areas of the former PG Waste Management Facility that restricted excavation activities of LLRW from the former Port Granby Waste Management Facility. Excavation and transportation to the PG LTWMF was immediately suspended.

CNL implemented changes to mitigate the impact of heavy precipitation at both the Port Hope and Port Granby sites:

- Additional surface water storage tanks were installed at the PG LTWMF to store excess surface water onsite can be seen in Figure 11.
- At the PH LTWMF site, in addition to the pond-expansion activities described in Section 5.3.4, CNL improved the civil infrastructure with the increase in culverts and pathway of surface water travelling to the treatment pond and expedited the construction of an Emergency Storage Pond as contingency to manage the risk of surface water fluctuation during the peak of the base liner construction. Additionally, CNL put the necessary equipment and supplies in place, including pumps, hoses and stockpiled clay, to mitigate any unplanned release of untreated water from the licensed site.

Figure 11: PG LTWMF Lake Tanks for Bulk Storage of Impacted Water

4.2.4.1 Construction of the Engineered Containment Mound

CNL implemented several upgrades on Elliot Road, as the main access route to the PG LTWMF, to support project-related vehicles and traffic levels (Figure 12). A two-lane paved road was installed and drainage culverts were upgraded. CNL continues to work with the Municipality of Clarington on bringing Elliot Road to a final state and it will continue to service as primary access to the PG LTWMF for long-term maintenance and monitoring activities.

Figure 12: Elliot Road, Before and After Construction Upgrades

Both cells of the engineered containment mound (Cells 1 and 2) were constructed in the same season. Construction began on both cells in May 2016 and was completed on Cell 1 on October 31, 2016 and on Cell 2 on December 3, 2016. Figure 13 illustrates some of the construction elements of the base liner system for both cells. These activities were closely monitored throughout all phases of construction including ongoing visual inspections and testing of systems and components, including field inspections, observations of earthworks, clay compaction inspections and geosynthetic installation. Figure 14 shows the final capping of the mound, removal of the box culverts and realignment of Lakeshore Road as well as final hydroseeding activities in the former Port Granby Waste Management Facility site. Refer to Section 7.5 for more information on CNL's construction program.

The construction was completed consistent with the design basis outlined in the *RS3: Detailed Design Description Report: Long-Term Waste Management Facility* [25], and the Issued for Construction Technical Specifications and Drawings (May 2015). Quality control testing has been performed at the specified frequency and acceptable results were achieved. Refer to Section 6.1.1.2 for CNL's quality program.

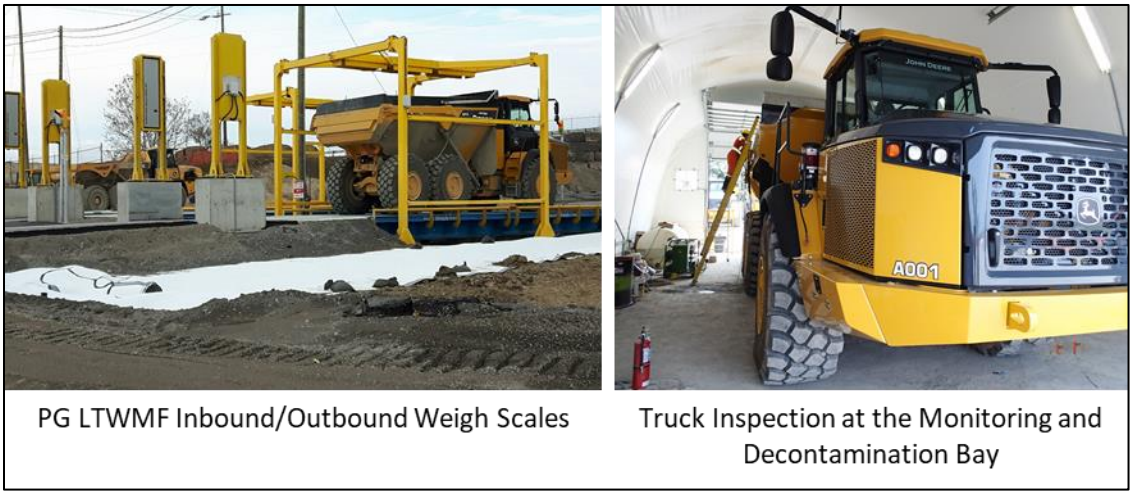
Figure 13: Photos Taken During Construction of the PG LTWMF Engineered Containment System

Figure 14: Final Construction Activities for the PG LTWMF and the former Waste Management Facility

4.2.4.2 Operations of the PG LTWMF

The PG LTWMF started receiving waste in November 2016; hours of operations were between 0700 hrs and 1900 hrs, Monday to Friday, and varied based on seasonal daylight hours and daily weather conditions. Waste at the former Port Granby Waste Management Facility was loaded into articulated rock trucks, and transported via the internal haul route constructed under the Lakeshore Road overpass. Waste placement was carried out on a year-round basis.

The PG LTWMF was equipped with two enclosed survey and decontamination structures, one in the Port Granby Waste Management Facility site and the other at the LTWMF site, including inbound and outbound weigh scales containing gamma radiation portals (Figure 15).



PG LTWMF Inbound/Outbound Weigh Scales

Truck Inspection at the Monitoring and Decontamination Bay

Figure 15: PG LTWMF Weigh Scales and Monitoring/Decontamination Station

All waste has been successfully removed from the former Port Granby Waste Management Facility to the newly constructed PG LTWMF by September 2020. Final waste volumes were 1.3 million metric tonnes (~650,000 m^3), significantly higher than the original forecast volume of 1.036 million metric tonnes (518,000 m^3).

The nature of the waste processed was primarily soil and soil-like bulk waste including historic LLRW and waste from clearing and grubbing operations containing historic LLRW or impacted soil.

To meet a commitment in the Environmental Assessment, Lakeshore Road was temporarily reconfigured to ensure the safe haulage of waste materials and clean fill to and from the former Port Granby Waste Management Facility. Specifically, Lakeshore Road was relocated to allow for the installation of box culverts (Figure 16) to facilitate the road bypass and to create an internal haul road underneath Lakeshore Road. In 2021, once the waste transfer was complete, the overpass was removed and Lakeshore Road was realigned to its original configuration.

Internal roadways were also constructed for traffic hauling of waste material and clean fill between the former Port Granby Waste Management Facility and the PG LTWMF, some of the

internal roads were constructed with hard-surface treatment to facilitate regular maintenance activities including debris and dust management. While most roads will be removed during site restoration activities, some roads will remain in place for access and maintenance purposes.

Figure 16: Realignment and Installation of Box Culverts under Lakeshore Rd

4.2.5 Planned Activities (2022 – 2033 Period)

The PGP will transition from Phase 2 (Implementation Phase) to Phase 3 (Maintenance and Monitoring Phase) within the 2022/2023 calendar year.

Restoration and rehabilitation activities, including tree planting activities, began in early spring 2022 and will continue until all restoration and rehabilitation activities are complete.

Phase 3 objectives will be accomplished through the implementation of the *Port Granby Project – Phase 3 – Long-Term Management Plan*. This plan, in conjunction with the *Port Granby Project Site and Facility Maintenance and Monitoring Plan* [26], and the *Environmental and Biophysical Monitoring Plan* [15], documents CNL's long-term care requirements for the PG LTWMF, specifically, maintenance of the East Gorge collector system which collects the groundwater in that area and pumps it to the PG WWTP for treatment and collecting data from sensors in LTWMF to monitor performance.

Please refer to CNL's *Environmental and Biophysical Monitoring Plan* [15] for full details on CNL's Environmental Monitoring and/or Performance Monitoring programs.

A monitoring program review will be conducted after the first five years and routinely thereafter to allow for revisions to individual monitoring program components based on ongoing monitoring results.

4.3 Port Granby Wastewater Treatment Plant

4.3.1 History and Background

In 1977, a water collection and treatment system was installed at the former Port Granby Waste Management Facility to collect and treat groundwater and surface water at the site. The system involved reservoirs at the bottom of each gorge to capture surface water and groundwater, which was then subsequently pumped to the former wastewater treatment facility to reduce Arsenic and Radium concentrations in the water before it is discharged to Lake Ontario. The treatment process involved ferric chloride ($FeCl_3$) addition and settling to remove Radium-226 and Arsenic from solution. A perimeter sub drain intercepted clean groundwater and diverted it around the waste storage area for release into Lake Ontario.

The Responsible Authorities (Natural Resources Canada and the CNSC) requested a detailed analysis of treatment options and discharge criteria for the water that would be generated from the PGP (e.g., surface water, groundwater, and leachate). In 2008, an assessment was conducted to identify water treatment requirements and options for the PHP and PGP [27]. The assessment included a detailed analysis of treatment requirements and options for the various waters that will be generated as a result of both the PHP and the PGP.

The CNSC reviewed the design documentation for both the PH and PG WWTPs and the design of a full-scale treatment system was completed, based on data collected during bench-scale and pilot-scale testing of the preferred treatment concept. The PG WWTP was designed to accept all site stormwater and leachate generated through the remedial activities under the PGP.

The primary elements of the treatment system included:

- Equalization, consisting of an 11,000 cubic metre (m^3) equalization pond for the storage of stormwater and leachate
- Influent screening, consisting of two 2 mm perforated plate drum screen.
- Biological treatment (Membrane BioReactor), consisting of a pair of bioreactor tanks for nitrogen removal, via an activated sludge process (nitrification/denitrification) and membrane filtration system
- Reverse Osmosis (RO), consisting of two units for primary water treatment
- Residuals management equipment, consisting of chemical precipitation equipment, dryers, filter press and an evaporator, for Reverse Osmosis brine management.

The full-scale treatment system is capable of treating an average influent flow rate of 1200 m^3 per day, for a discharge to lake capacity of 960 m^3/day.

In 2018, the bio-treatment system was discontinued as Nitrogen species (ammonia, nitrate, nitrite) were not present in anticipated concentrations, thus removing the need for bio-treatment from the overall wastewater treatment process. Removal of nitrogen species via reverse osmosis (primary treatment), coupled with brine management, was deemed satisfactory to remove nitrogen species below licence limits. CNL utilized the engineering

change control process to bypass and remove the bio-treatment system from the processing pathway.

In 2019, to supplement brine management, a secondary (external) evaporator was purchased.

A picture of the PG WWTP is shown below in Figure 17.

Figure 17: PG WWTP

4.3.2 Construction and Commissioning

Construction of the PG WWTP began in early in 2013 and was substantially completed in December 2014. Figure 18 outlines some key construction and commissioning activities.

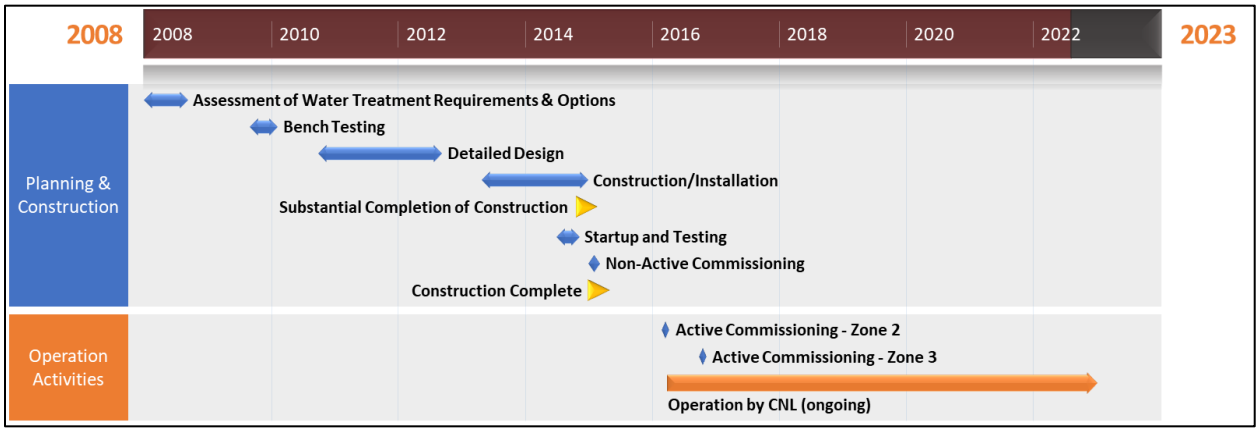


Figure 18: PG WWTP Planning, Construction & Operations Timeline

With CNSC-accepted plans in place for active and non-active commissioning of the PG WWTP, successful commissioning was a hold point for waste acceptance to the LTWMF. Non-active commissioning was completed in 2015, and active commissioning was completed in 2016.

In April 2016, contaminated water from the Port Granby Waste Management Facility was treated at the new PGP WWTP, with treated effluent being discharged to Lake Ontario, meeting all discharge criteria. The original treatment system at the former Port Granby Waste Management Facility was shut down and decommissioned in 2016 as it was no longer required.

4.3.3 Operational Performance

4.3.3.1 Effluent Discharge

Between 2016 and 2022, the new PG WWTP discharged approximately 883,000 m^3 to Lake Ontario. Effluent is monitored for several licensed parameters, including total suspended solids (TSS), pH, Radium-226, total arsenic, cadmium, cobalt, copper, phosphorus, selenium, thallium, uranium, and vanadium, total nitrite, nitrate and ammonia, as well as toxicity. PGP quarterly effluent monitoring reports (2016 – 2022) are updated as the data becomes available, the most current reports are publicly available on the PHAI website (Port Granby Project WWTP Quarterly Effluent Monitoring Reports - PHAI).

During development of operating procedures, action levels were established. Action levels are set at a fraction of the discharge criteria and used as early warning to indicate possible issues before discharge criteria levels are reached. Action level exceedances are reportable to the CNSC.

In 2021, the Port Granby engineered containment mound was capped and closed. Surface water that traditionally required treatment, due to contact with impacted waste material is now, diverted away from the mound and treated as clean surface water. As can be seen in Table 3 below, the diversion of clean surface water has significantly decreased the amount of water requiring processing at the PG WWTP. From 2020 to 2021 there was a 55% decrease in the amount of water discharged from the PG WWTP, owing to the decreased influent volume. At the same time, plant solids production decreased by 83% from 277,000 kg to 47,300 kg. It is

anticipated that the amount of impacted water requiring treatment will continue to trend downward as other catchment areas are cleaned and removed from the collection network.

4.3.3.2 Solids Management Systems

The PG residual solids management system was commissioned in late 2016 to remove solids from wastewater during treatment. Residual solids were generated from two streams: the filter press, which dewatered clarified Reverse Osmosis concentrate and slurry solids, generated from the slurry dryers and evaporators, which processed the clarified Reverse Osmosis concentrate to reduce volume. Specific influent, effluent and solids production values are outlined in Table 3. Since 2016, approximately 936,000 kg of filter press solids were produced and placed in the PG LTWMF.

To manage the volume of Reverse Osmosis, evaporator, and slurry dryer concentrate (brine), several processes were employed. Slurry solids were "gelled / solidified" by mixing the slurry solids with a water-absorbing polymer; brine was also vitrified in a cementation process and exempt evaporator concentrate was sent to an offsite facility for disposal. Since early 2021, Reverse Osmosis and evaporator concentrate has been shipped to the PH WWTP for treatment and discharge once it meets the criteria established for the PH WWTP. An estimated 6,100 m^3 have been shipped to the PH WWTP for processing.

Table 3: PG WWTP Effluent and Residual Solids Production during the Licencing Period

Year	Final Effluent Discharge (m^3)	Filter Press Solids (kg)	Slurry Solids (kg)	Cement Solids (kg)	Evaporator Concentrate for offsite disposal facility (m^3)
2016	21,000	--[2]	--[2]	--[2]	--[2]
2017	173,000	--[2]	--[2]	--[2]	--[2]
2018	195,000	262,500	79,500	--[2]	--[2]
2019	239,000	349,500	1,282,500	756,000	261
2020	123,000	277,000	--[2]	--[2]	2,402
2021	55,000	47,300	--[2]	--[2]	972
2022	77,000	--[2]	--[2]	--[2]	--[2]
Total	**883,000**	**936,300**	**1,362,000**	**756,000**	**3,635**

4.3.4 Plant Improvements and Current Conditions

In an effort to improve operation of the facility, CNL utilized Chalk River Laboratories Design Engineering to implement fixes and upgrades to existing equipment following CNL's Engineering

[2] None Produced

Change Control process. Several challenges arose in managing overall site water volumes that had been influenced by a number of factors including the compression of the PG LTWMF implementation schedule and the prevalence of extreme weather events during the construction phase. To improve operation of the facility, CNL utilized an engineering control process to and implemented several enhancements and upgrades to facilitate the safe, compliant management of impacted water.

Major upgrades included the integration of an enhanced equalization system that included an additional 52,000 m^3 of storage capacity in temporary lake tanks. CNL also enhanced the residuals management portion of the facility with the addition of evaporative capacity and a solidification process. The enhancements facilitated the overall reduction in salt balance and staged the system to move into Phase 3 of the project.

All of this infrastructure is anticipated to be fully dismantled and removed from site by the end of 2022 and, as contaminated water volumes continue to decrease, the WWTP will only run periodically and operations adjusted accordingly to suite any influent condition changes.

4.3.5 Long-Term Monitoring

The PG WWTP will continue operations extending into the Maintenance and Monitoring Phase. Phase 3 activities relating to the PG WWTP will consist of regular inspections and maintenance of the WWTP for continued, safe operation of the plant including maintenance of ancillary features supporting WWTP operations and continued compliant treatment of LTWMF leachate, and impacted ground water runoff. CNL will continue to report as required to the CNSC.

Monitoring data will form the basis for determining the need for continued collection and treatment of water and the PG WWTP will continue to operate as required to ensure that there are no significant adverse effects to the environment.

5 PORT HOPE PROJECT

5.1 Introduction

The PHP involves the cleanup of approximately 1.9 million m^3 of historic LLRW from various sites in the Municipality of Port Hope. The following sites are included in the PHP:

PH LTWMF (Section 5.2)

- Welcome Waste Management Facility

Port Hope Wastewater Treatment Plant (PH WWTP) (Section 5.3)
Small-Scale Sites, (Section 5.4) which include:

- Private Properties
- Municipal Properties
- Commercial/Industrial Properties
- Private Road Allowances
- Municipal Road Allowances

Large-Scale Sites (Section 5.5), which include:

- Major Sites
- Known Sites
- Industrial Sites
- Cameco Waste

The overall project schedule for the PHP related to waste excavation and hauling to the PH LTWMF is outline in Figure 36, and divided into Small-Scale Sites, large-scale, and industrial sites.

As of July 1, 2022, 674,720 m^3 of historic LLRW has been transported and placed into storage at the PH LTWMF. A listing of the sites, their estimated waste volume as of July 1, 2022, and revised estimate to be completed is provided below in Table 4. As can be shown in Table 4, waste volumes have increased significantly from original project estimates driven largely by the significant increase in small-scale site volumes which have increasing by 309 % over original estimates.

Table 4: Summary of PHP Sites and Waste Volumes

SITE		Original *In-situ* Waste from DDR (m^3)	Actual Volume[3] Rec'd at PH LTWMF (m^3)	Revised Forecast (m^3)	% Change from Original
Welcome Waste Management Facility		455,000	438,216	452,205	-0.6%
Small-Scale Sites		148,500	56,946	607,520	309.1%
Large-Scale Sites	**Major Sites**	403,100	146,431	574,126	42.4%
	Industrial Sites	51, 250[4]	10,847	60,023	17.1%
	Known Sites	-	2,160	28,714	NA
Cameco Waste		150,000	20,120	150,000	0.0%
Total		**1,207,850**	**674,720**	**1,872,588**	**55.0%**

The work completed to date at the PHP has been conducted in compliance with the project licences [1] and associated licence condition handbook [24]. Details related to applicability of the various safety and control areas are outlined in Section 6. In addition to the required safety and control areas, CNL implements a robust management system which applies industry best practices; details are outlined in Section 7.

[3] Waste is measured in Metric Tonne, values are calculated based on a conversion factor MT / 2 = m^3 (density of 2 grams per cubic centimetre)

[4] Original estimate based on *Settlement Agreement, Industrial Sites: Issue Q,* Dated April 2017

5.2 Port Hope Long-Term Waste Management Facility

5.2.1 History and Background

The former Welcome Waste Management Facility received radium and uranium ore processing waste from Eldorado between 1948 and 1955. The waste was generally placed directly on the ground surface and subsequently capped with soil. To address impacted surface water from the waste, an interception and treatment system was constructed onsite in 1978 including two treatment ponds and a water treatment facility. The existing Welcome Waste Management Facility treatment system has since been upgraded.

Ownership of the former Welcome Waste Management Facility was transferred from Cameco Corporation to the Government of Canada on March 31, 2010. The land on which the facility is located is registered to Her Majesty the Queen in Right of Canada, as represented by the Minister of Natural Resources Canada.

Figure 19 illustrates the boundary of the site, cell locations and key features prior to significant site development.

Figure 19: PH LTWMF Site Boundary and Features (facing southward toward Lake Ontario)

5.2.2 Design

The PH LTWMF features an aboveground engineered containment system, with three waste management cells built in phases. The engineered containment system includes a multilayer base liner and cover system (refer to Figure 20), where waste is placed in between the base liner and cover system. Waste is covered as each cell is filled. The design of the PH LTWMF is

similar to an engineered municipal landfill but with much more robust engineering features, which meet or exceed national guidelines for hazardous waste landfills [29]. The engineered containment mound is designed with the flexibility to accommodate a wide range of actual volume (up to the 1.9 million m^3) to allow appropriate closure to match the estimates for PHAI wastes, which is still being characterized.)

The PH LTWMF will accommodate the waste associated with the PHAI scope in the Municipality of Port Hope including large and small-scale sites, industrial sites, the waste inventory within the existing Welcome Waste Management Facility, and the specified quantity of Cameco decommissioning waste per the agreement between Canada and Cameco. The completed site will isolate the waste from the surrounding environment and safely store the material for 500+ years and incorporates international best practices and operating experience.

The multi-component cover system will reduce surface water infiltration through the waste, provide protection from inadvertent intrusion by burrowing animals and reduce levels of gamma radiation on the surface of the mound to background levels. These layers form components of the cover and baseliner that, independently, are robust enough to prevent contaminants from entering the environment. Together, they function as a multiple barrier safety system.

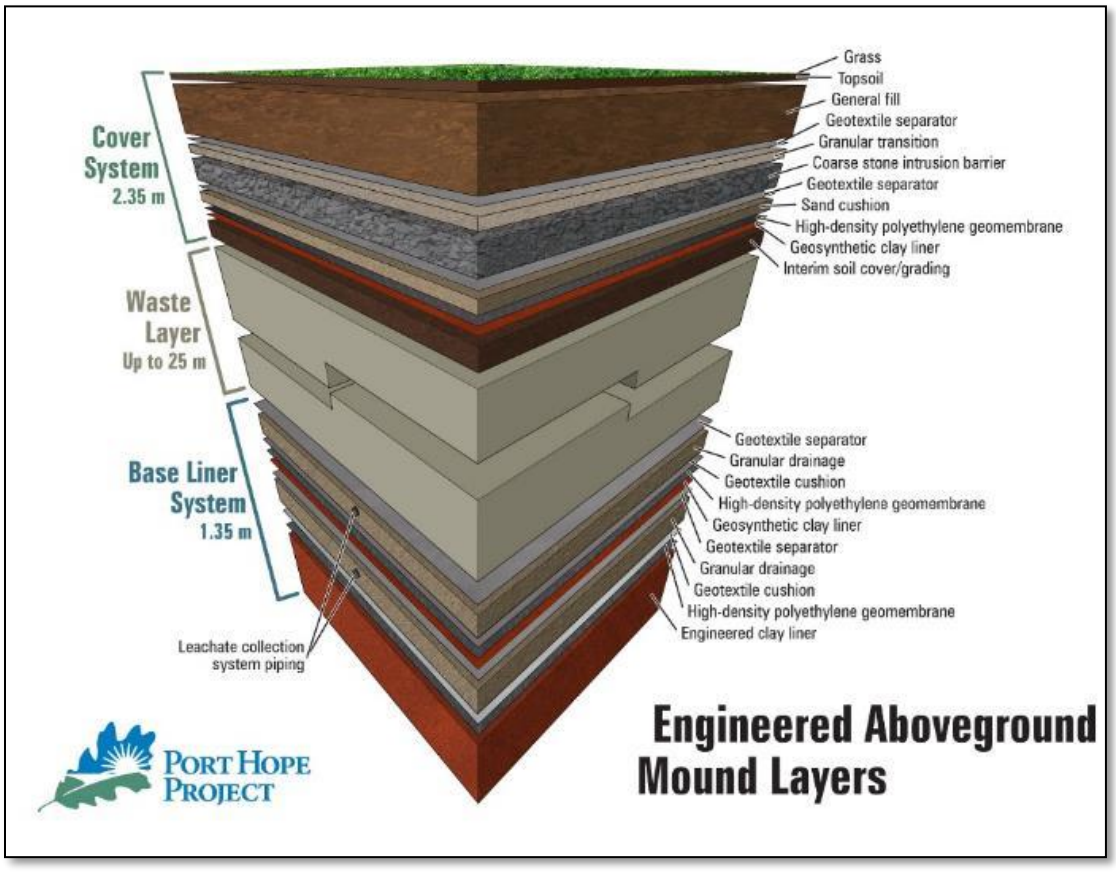


Figure 20: Cross Section of Cover and Baseliner System, PH LTWMF

5.2.3 Remediation, Construction and Operation of the Port Hope LTWMF

The remediation of the former Welcome Waste Management Facility and the construction of the PH LTWMF occurred in stages (Figure 21):

- Clearing trees and shrubs from the site including the PH LTWMF and PH WWTP, completed in March 2013.
- Cleanup and verification to confirm the soil under the future engineered mounds were below project cleanup criteria, completed at various construction periods: Cell 1 in March 2016, and Cell 2 in December 2020.
- Construction of the base liner system, completed at various construction periods: Cell 1 in November 2018, Cell 3 in December 2018, Cell 2A in September 2019 and Cell 2B in October 2021
- Movement of waste material from the former Welcome Waste Management facility to the newly constructed engineered containment mound (cells 1 and 3), Figure 22 shows existing conditions and location of cells

Figure 21 outlines key construction timelines for construction activities and milestones performed during 2012-2022 period.

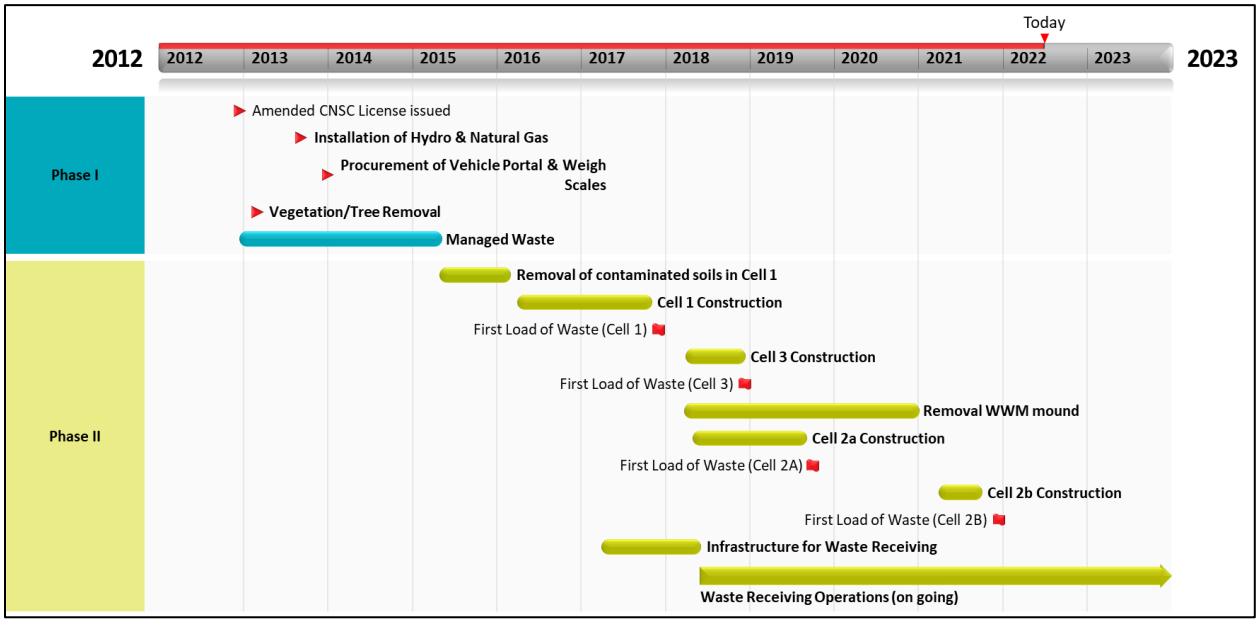


Figure 21: PH LTWMF Construction & Operations Timeline

Figure 22: PH LTWMF Existing Conditions Map as of November 2021

5.2.3.1 Remediation of the Port Hope LTWMF Site

Remediation of the site began with early works, consisting of excavation of impacted surficial soils from areas outside the perimeter of the former Welcome Waste Management Facility, completed in March 2016. The next phase consisted of the remediation within the Cell 2A and Cell 2B footprint that commenced in 2017, and under the Cell 2B footprint commenced in the fall of 2018. The initial approach to the remediation employed bulk removal of soil in the area that would be occupied by Cell 2A. This included removal of additional stockpiled materials outside of the Welcome Waste Management Facility mound footprint. For the area under Cell 2B footprint, lessons learned were applied and the bulk remediation commenced on the eastern limit with an initial bulk remediation of above grade waste. A total of 438,216 m^3 of waste, primarily type 1 (soil and soil-like bulk waste) was moved from the Welcome Waste Management Facility to cell 1 and 3, slightly below the original estimate.

Figure 23 illustrates the areas where remediation has been completed following the Remediation Verification Standard Operating Procedure (RVSOP), the process by which the area is assessed against the project cleanup criteria to confirm all waste was successfully removed. It also highlights future areas identified for remediation which still under development.

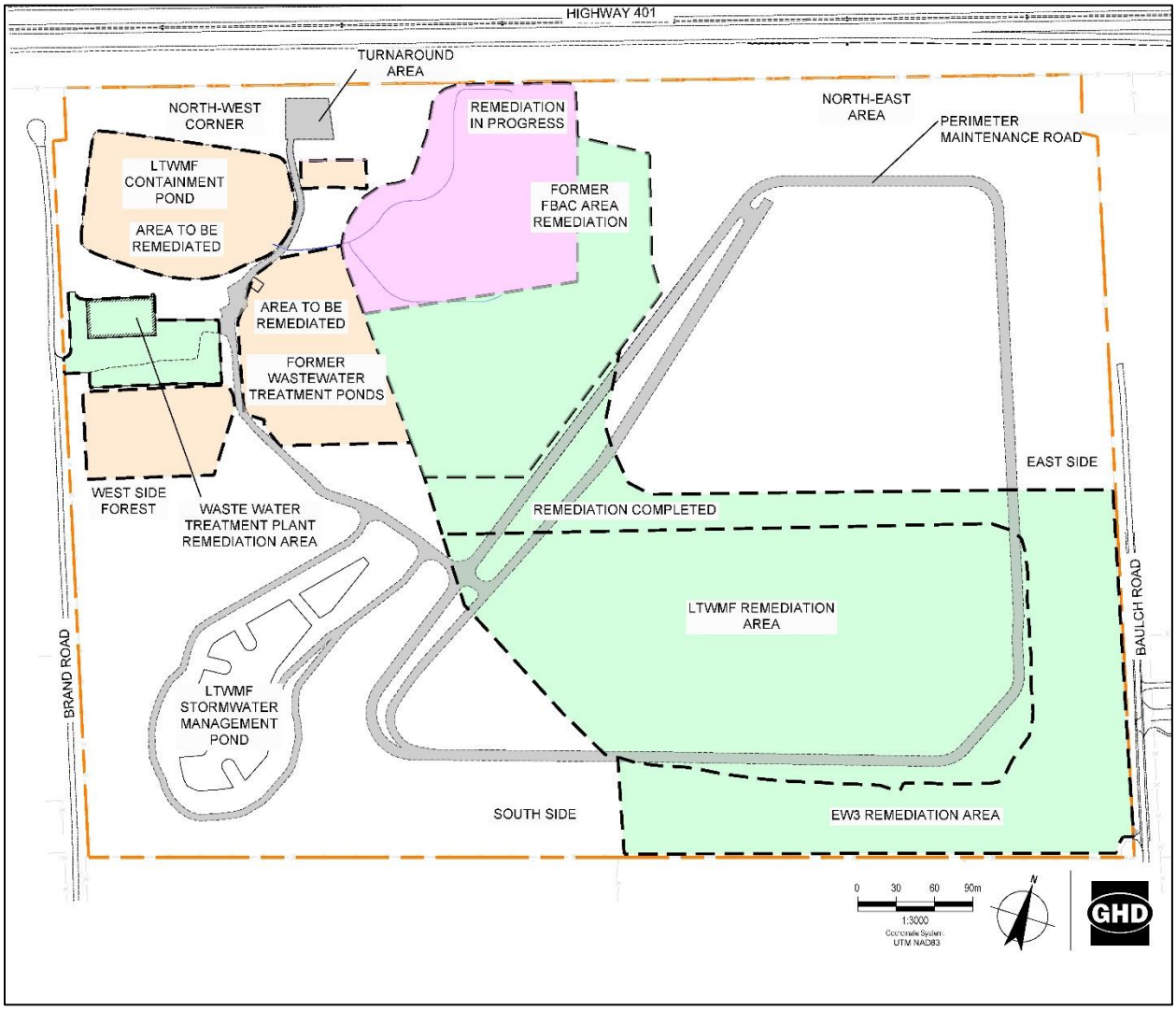


Figure 23: PH LTWMF Remediation Areas

5.2.3.2 Construction of the Engineered Containment Mound

The engineered containment mound was constructed in a series of cells (Cell 1, 2A, 2B, and 3), beginning with Cell 1, followed by Cell 3, and lastly Cell 2 which was constructed in two parts as Cell 2A and Cell 2B. (Figure 21)

The installation of composite base liner systems was verified at each stage to confirm each layer was capable of performing its intended function, consistent with the design basis outlined in the Detailed Design Description Report [30], and the Specifications [31] and Drawings [32]. Quality-control testing has been performed at the specified frequency and acceptable results were achieved (Figure 24).

Personnel collecting Shelby tube samples

Personnel performing compaction testing

Fusion Welding HDPE panels

Deploying GCL panels on Cell floor

A patch repair over a defect

Performing an Electrical Leak Location Survey

Figure 24: Construction & Testing of the PH LTWMF Engineered Containment Mound

5.2.3.3 Operations of the Port Hope LTWMF

Construction activities are carried out on a year-round basis with higher activity levels through the summer season. The hours of operations have been limited to the hours between 7:00 am and 7:00 pm, Monday to Friday, and vary based on seasonal daylight hours and daily weather conditions.

Figure 25: PH LTWMF Waste Receiving/Unloading Area

PH LTWMF waste receiving and unloading area, as illustrated in the overhead view in Figure 25, is equipped with:

- Two-bay enclosed survey and decontamination structure with concrete containment pads (Figure 26)
- Inbound and outbound weigh scales, with gamma radiation portals
- IAEA neutron-detector portal monitors
- Grey water unloading facility
- Two bulk waste unloading platforms
- Packaged waste unloading area
- Personnel decontamination facility

The facility can handle a steady influx of a variety of delivery vehicles with a typical processing time from arrival to final release of approximately 15-20 minutes for bulk waste deliveries and approximately 40 minutes for wastewater and packaged waste deliveries. As of July 1, 2022, approximately 28,500 offsite haulage vehicles have moved through the facility, including dump trucks, covered/enclosed trailers, water haulage trucks and roll-off truck/flat beds.

Figure 26: Performing Truck Inspection at the Monitoring and Decontamination Bay

The waste-acceptance and waste-placement criteria established for all waste streams have been implemented successfully. Procedures and methods for waste handling and placement into the PH LTWMF have been established for long-term management, this ensures it meets engineering requirements and ensures performance and integrity of the PH LTWMF over the long-term. The PH LTWMF waste acceptance criteria [33] are based on the physical, chemical, biological and radiological properties of the waste, and have been categorized in different Waste Types in accordance with their physical properties. These waste types are found in Table 5.

Table 5: Waste Material Types for Waste Placement at PH LTWMF

Waste Type	Physical Characteristics
Type 1	Soil and soil-like bulk waste including LLRW and contaminated soil
Type 2	Co-mingled LLRW/soil/municipal refuse
Type 3	Non-soil-like bulk waste e.g., such as slag, dried sewage sludge
Type 4	Decommissioning and demolition waste
Type 5	Drummed waste and other rigid packaged waste
Type 6	Miscellaneous waste
Type 6A	Oversized waste
Type 7	Packaged waste
Type 8	Waste from clearing and grubbing operations containing LLRW or impacted soil/waste
Type 9	Dewatered harbour sediment
Type 10	Fibrous peat material
Type 11	Wet waste

Waste Type	Physical Characteristics
Type 12	Oversized pieces of concrete or rock with minimum dimension more than 0.3 mm and maximum dimension less than 1 m
Type 13	Investigation derived waste
Type 14	Off-site greywater
Type 15	Water and solids transported by vacuum truck and not suitable for transport by bulk transport (i.e., not Type 1 or Type 11)

Since December 2017, the PH LTWMF has safely received and processed all waste from the former Welcome Waste Management Facility as well as offsite waste from other Port Hope sites and will continue to do so as required based on project activities. A total of approximately 1.35 million metric tonnes, or ~675,000 m^3 of onsite and offsite waste have been transferred and placed in the PH LTWMF waste mound (Table 4). The main waste types processed to date consists of soil and soil-like bulk waste, demolition debris, process residue waste and wastewater.

PH LTWMF maintains an inventory of radioactive material stored in the engineered containment mound to ensure the source-term volumes and total radionuclide activity are not exceeded. As of July 1, 2022, 0.223 PBq of total allowable activity has been received - 22.3% of the site limit of 1 PBq.

5.2.4 Planned Activities (2022 – 2033 Period)

Construction of the PH LTWMF is complete and the facility is fully operational and receiving waste. Figure 27 outlines key construction activities and milestones schedule for the 2023-2033 period, these activities mainly consist of:

- Construction of the stormwater management pond
- Finalizing the leachate pump system installation and commissioning
- Finalizing the construction of maintenance roads
- Capping of engineered containment mound
- Site Restoration - Including final grading and hydroseeding within the footprint of the mound, and rehabilitation of all vegetation outside of the footprint of the mound and the ancillary facilities that are affected by the excavation work.
- Continuation of Performance/Operational Monitoring Program activities.
- Continuation of the Environmental Effects Monitoring Program activities.
- Continuation of the Compliance Monitoring Program activities.
- As part of the continued long-term care of the PH LTWMF site, institutional controls will be implemented to ensure long-term monitoring and public safety.
- Following the formal transition from Phase 2 to Phase 3 in Port Hope, routine inspections and regularly scheduled maintenance activities will begin to ensure the proper, effective functioning of all site features.

- Designs for how the site will be restored at the end of Phase 2 and utilized in Phase 3 are currently being developed in conjunction with stakeholders to meet the commitments of the Environmental Assessment.

Though still in the planning stages, it is anticipated there will be a need for a temporary storage area at the PH LTWMF to store any waste related to the Special Circumstances Protocol [18] in Phase 2 that may require removal in Phase 3 of the PHP. This program will be further defined as more information becomes available on the volume and type of properties that go through the Special Circumstances Protocol.

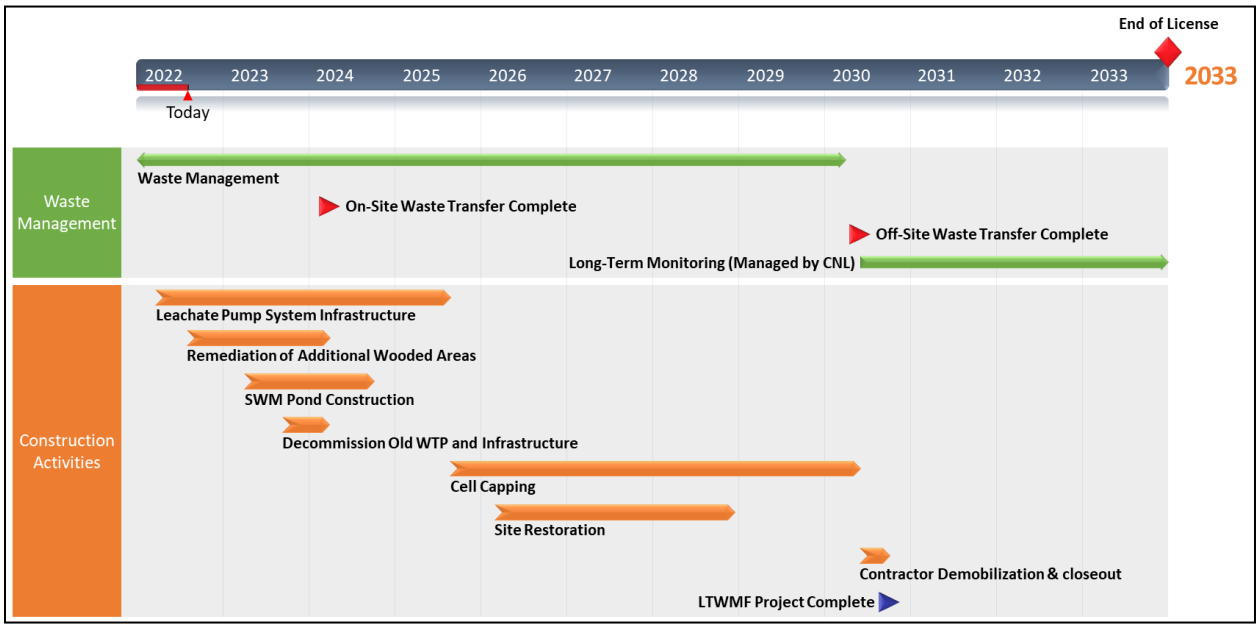


Figure 27: Port Hope LTWMF Remaining Construction/Operational Activities for 2023-2033

5.3 Port Hope Wastewater Treatment Plant

A dedicated wastewater treatment plant (WWTP was constructed at the PH LTWMF and is operating full time. Waste water is collected from several areas at the PH LTWMF via interceptor ditches which run to a main collection pond. Waste water is also transported from various remediation sites in Port Hope to the PH LTWMF for treatment at the PH WWTP.

5.3.1 History and Background

Historically, groundwater and surface water at the former Welcome Waste Management Facility was collected and treated with ferric chloride precipitation technology water management system installed in 1979. The system was operational until the new WWTP was fully commissioned in 2017.

The PH LTWMF component of the PHP required upgrades to the existing wastewater collection ponds and the design and construction of a new water treatment system to meet the demands of anticipated increased wastewater generation, higher concentrations of Contaminants of Potential Concern in the influent, and more stringent effluent criteria as a result of

development of the PH LTWMF. The Contaminants of Potential Concern identified were Arsenic, Uranium, and Radium-226.

The Responsible Authorities, Natural Resources Canada and the CNSC, requested a detailed analysis of treatment options and discharge criteria for the full range of wastewater that would be generated as a result of the PHP (e.g., surface water, groundwater, leachate, etc.).

In 2008, an assessment was conducted to determine water treatment requirements and options for the PHP at the Welcome Waste Management Facility [27]. The assessment included a detailed analysis of treatment requirements and options for the full range of wastewater that will be generated as a result of the PHP. The full-scale treatment system needed to be capable of treating an average flow rate of 818 m^3 per day (150 US gallons per minute).

Improvement in treated water quality was intended to fulfil three objectives:

1. To achieve a high level of assurance for human health and environmental protection by further reductions in potentially harmful effluent constituents.
2. In accordance with Canadian policy, to reduce potentially deleterious discharges, especially radiological discharges, to levels as low as reasonably achievable (ALARA), taking into account social and economic factors.
3. To minimize total loading to Lake Ontario, in light of higher anticipated future discharge volumes associated with the LTWMF.

The assessment identified that the preferred treatment concept involved the continued operation of the existing Welcome Waste Management Facility treatment system together with the addition of reverse osmosis (RO) technology, which represents best available technology for treatment of the anticipated Project wastewater.

Bench-scale testing was performed through 2009, which confirmed the feasibility of the Reverse Osmosis technology.

Pilot scale testing was carried out in 2010 to define the sizing, operation parameters, and performance criteria for the full-scale system.

Detailed design was carried out from 2010 to 2012 and included the design of a new wastewater treatment plant building adjacent to the existing Welcome Waste Management Facility treatment system. The new reverse osmosis-based treatment system continues to utilize the existing Welcome Waste Management Facility collection ponds and has the capability to work in conjunction with the existing Welcome Waste Management Facility ferric chloride treatment system. The treated effluent from the new Reverse Osmosis-based treatment system is discharged via the existing twin forcemains to Lake Ontario.

5.3.2 Construction and Commissioning

Construction and commissioning of the PH WWTP collection and treatment system followed the engineered design consisting of interceptor ditches, a main collection pond, a treatment system including primary treatment, Reverse Osmosis and residual management, and twin

discharge pipelines. The design of the system ensured ground and surface water that had come in contact with the waste was treated to reduce Arsenic and Uranium levels, and discharge the treated water to Lake Ontario.

Ditches around the perimeter of the waste storage area collect surface runoff and direct it overland toward the northwest quadrant of the facility, where the surface water and groundwater are intercepted by a large ditch that leads to the collection pond. The WWTP utilizes state of the art technologies including:

- Chemical pre-treatment and clarification processes consisting of coagulant addition, flocculant addition, and clarification.
- Reverse Osmosis processes consisting of pressure filtration, pH adjustment (acidification), Reverse Osmosis, and pH adjustment (permeate buffering).
- Reverse Osmosis concentrate systems consisting of evaporation (mechanical vapour compression) and slurry drying.

Clarifier sludge dewatering consisting of polymer addition and sludge dewatering (belt filter press). The installation contract for the WWTP was awarded in September 2012, and Construction was carried out between 2012 and 2015.

The PH WWTP was commissioned by CNL with the support of the engineering design consultants and the installation Contractor. The commissioning was carried out in accordance with the overall PH LTWMF commissioning plan, developed in 2012.

Due to delays with the contractor completion and handover of residuals management equipment, CNL elected to move forward with commissioning of the facility in two phases, implementing lessons learned from the similar methodology used to commission the Port Granby WWTP. The water handling portion of the facility was commissioned at an earlier date and the residuals management portion was commissioned as it became available. This two-step process gave CNL the capability of releasing cleaner effluent water to the environment in the earliest possible manner. Active commissioning of the water handling portion of the facility occurred from November to December, 2016. Active commissioning of the residuals management portion occurred between November and December, 2017.

Active Commissioning was conducted in accordance with Port Hope Active Commissioning Plan, and the Port Hope Commissioning Specifications & Objectives and was completed in December 2017. Training of CNL Operations staff was also conducted during the commissioning process by the engineer of record with additional equipment-specific training to be completed in conjunction with Standard Operating Procedure development.

Key timelines in the PH WWTP facility construction are outlined in Figure 28.

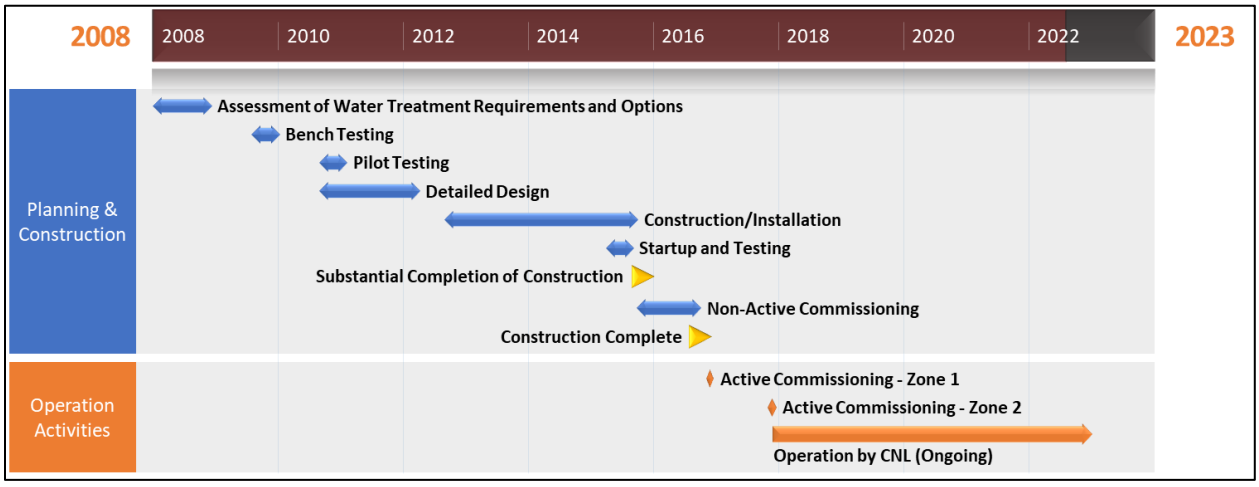


Figure 28: PH WWTP Facility Planning, Construction & Operations Timeline

5.3.2.1 Discharge Criteria

In 2018, CNL initiated discussions with the CNSC to develop discharge criteria (release limits) for the PH WWTP. In the 2009 Record of Proceedings for the PHP licence renewal, the Commission required that CNL amend the PHP licence to revise release limits as soon as practicable after the new PH WWTP is operational. With two years of operation experience and historical effluent characterization in hand, CNL performed a review of the discharge criteria in 2019. Criteria recommendations were submitted to the CNSC in 2019 and were accepted by CNSC and adopted by the PH WWTP facility in 2020.

As part of this licence renewal and consolidation, CNL is requesting that the discharge criteria for the PH WWTP be incorporated into the Licence Basis for the PHP. The discharge criteria, outlined below in Table 6 have been added to the Port Hope Biophysical Monitoring Plan [14]. CNL will seek Commission approval if an increase to these proposed limits are required in the future.

Table 6: Proposed Release Limits at the PH WWTP

Contaminant	Units	Weekly Concentration in a Composite Sample	Monthly Mean Concentration
Radium-226	Bq/L	0.74	0.37
Total Arsenic (As)	mg/L	0.30	0.15
Total Aluminium (Al)	mg/L	0.22	0.11
Total Copper (Cu)	mg/L	0.03	0.015
Total Lead (Pb)	mg/L	0.046	0.023
Total Uranium (U)	mg/L	0.30	0.15
Total Zinc (Zn)	mg/L	0.42	0.21
pH	pH	6.0-9.0	6.0-9.0

Contaminant	Units	Weekly Concentration in a Composite Sample	Monthly Mean Concentration
Total Suspended Solids	mg/L	30	15
Acute Toxicity	-	-	Cannot be Toxic[5]

5.3.3 Operational Performance

The new PH WWTP was put into service and began discharging to Lake Ontario in January 2017 after successful commissioning of the water handling equipment in 2016. The new PH WWTP has operated on a fulltime basis from 2017 to present. In general, the PH WWTP water treatment system has had an operational uptime of greater than 96%.

5.3.3.1 Effluent Discharge

Between 2017 and 2021, the new PH WWTP has discharged approximately 821,000 m^3 to Lake Ontario. PH WWTP effluent is monitored for a number of licensed parameters, including Total Suspended Solids, pH, Radium-226, total Aluminum, Arsenic, Copper, Lead, Uranium, and Zinc, as well as toxicity.

5.3.3.2 Solids Management Systems

Residual solids management systems were commissioned late 2017. Since 2017, the PH WWTP has produced 1,711,000 kg of belt press solids, 1,533,100 kg of slurry dryer solids, and 284,700 kg of gelled slurry solids. Residual solids are transferred to the PH LTWMF. Details of Influent, Effluent and Solids produces at the PH WWTP since it was commissioned can be found in Table 7.

Table 7: PH WWTP Effluent and Residual Solids Production during the Last Five years of Operation

Year	Final Effluent Discharge (m^3)	Plant Influent (m^3)	Belt Press Solids Production (kg)	Slurry Dryer Solids Production (kg)	Gelled Slurry Production (kg)
2017	173,300	272,000	--[6]	--[6]	--[6]
2018	149,400	317,000	59,000	4,100	--[6]
2019	156,300	380,000	304,000	71,000	273,000
2020	140,200	296,000	373,000	360,000	11,000
2021	125,000	291,000	593,000	670,000	700
2022	77,000	186,000	382,000	428,000	--
Total	**821,200**	**1,742,000**	**1,711,000**	**1,533,100**	**284,700**

[5] Acute toxicity testing is to be performed at a frequency no less than quarterly.

[6] None Produced

5.3.3.3 Old Welcome Wastewater Treatment Plant

After successful commissioning of the water handling equipment of the new PH WWTP, the old water treatment plant was taken out of service in December 2016. However, operation of the old water treatment plant occurred on two occasions to supplement water treatment at the new PH WWTP:

- The old water treatment plant was operated from April 23, 2018 to May 31, 2018 in response to abnormal rain events that preceded the requirement to lower the collection pond level ahead of planned pond expansion activities. Approximately 27,700 m^3 of effluent was discharged during this period.
- The old water treatment plant was operated from April 23, 2019 to June 17, 2019 in response to abnormal rain events that would have allowed the collection pond level to rise to an unsafe operating level. Approximately 41,700 m^3 of effluent was discharged during this period. In both instances the CNSC was notified of the operation.

5.3.4 Plant Improvements and Current Conditions

Engineering Upgrades

As the PHAI progress has advanced with the LTWMF coming online and various projects becoming active in Port Hope, the PH WWTP has had to adapt to variations in overall volume of water being treated. In 2017, the original pond infrastructure was stressed from a volume perspective. CNL initiated a project to upgrade the systems equalization capacity to 52,000 m^3. The enhanced storage volume allowed the system to better manage the extreme weather events that were prevalent from 2017 through to 2020.

Although the equalization pond expansion proved effective, CNL remained in a position where it was reliant on the old wastewater treatment system for extreme weather events. To limit this reliance, CNL undertook an effort to expand its treatment capacity at the PH WWTP. In 2020, CNL initiated a project to expand its daily treatment capacity. This project was successfully implemented and commissioned in 2021. It is noted that the old treatment system was not required in both 2021 and 2022.

5.3.5 Long-Term Monitoring

The PH WWTP will continue operating during the proposed re-licensing period (2023-2033). Once the PGP transitions into Phase 3, Maintenance and Monitoring , as outlined in Section 1.4.3 water treatment activities will consist primarily of regular inspections and maintenance for continued, safe operation of the plant, including the on-going maintenance of ancillary features supporting WWTP operations and continued treatment of LTWMF leachate, impacted surface water runoff, non-impacted precipitation and groundwater. Required reporting to the CNSC will continue in Phase 3.

Monitoring data will form the basis for determining the need for continued collection and treatment of water and the PH WWTP will remain in operation for as long as required to ensure that there are no significant adverse effects to the aquatic environment.

5.4 Small-Scale Sites

The Small-Scale Site (SSS) project involves the investigation of 5,878 sites in Port Hope, primarily residential properties, municipal roads and some commercial sites. As of April 2022, 1,111 exterior properties, 218 interiors and 98 road segments have confirmed historic LLRW requiring remediation under the current project cleanup criteria. Fewer than 100 sites have undergone remediation and the current projections for SSS is approximately 600,000 m^3 of historic LLRW waste to be transported and safely stored in the PH LTWMF.

5.4.1 History and Background

In 2014, characterization surveys were initiated in five geographic campaigns to further define project scope. This Property Radiological Survey includes interior radon testing, interior and exterior gamma testing and soil sampling. As the survey advanced, it became apparent that the number of impacted sites had been significantly underestimated at approximately 375 properties.

In 2015, AECL and MPH executed a Settlement Agreement for cleanup criteria (Issue N) and Special Circumstances (Issue P). The agreement established that most of the SSS properties fall under the more restrictive cleanup criteria specified for residential, parks and institutional properties, and identified which sites fall under the less restrictive commercial and landfill categories.

By 2018, it was recognized that the scope had expanded to approximately 800 sites identified to have historic LLRW requiring remediation. To better facilitate remediation of the increased number of sites and minimize property owner disruption, an approach was developed to divide the municipality into 70 individual neighbourhoods, each with approximately 20 sites. In 2021, these 70 neighbourhoods were bundled into seven geographic areas across the municipality to align with a revised contracting strategy as shown in Figure 29.

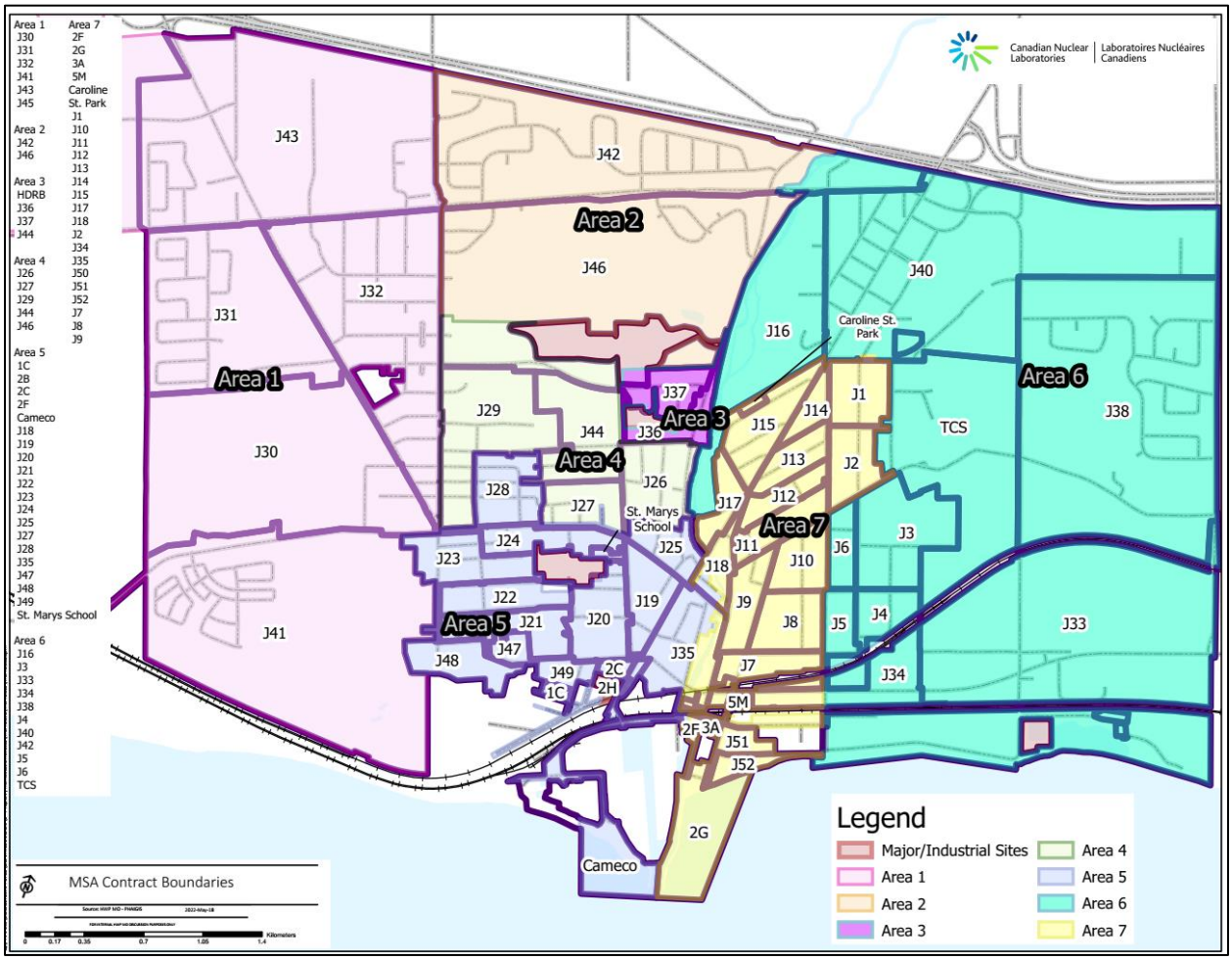


Figure 29: Seven Geographic Areas within the Municipality of Port Hope

5.4.2 SSS Planning

The SSS project involves several steps as follows:

1 - Historical File Review
2a - Characterization
2b - Delineation
3 - Design
4 - Remediation & Restoration
5 - Close-out

5.4.2.1 Historical File Review

This step involves the assessment of historical data drawn largely from initial 1970s remediation cleanups and input from the Municipality of Port Hope and other knowledgeable stakeholders to determine the potential and extent of LLRW contamination at each site.

5.4.2.2 Characterization

Before progressing to subsequent steps involving field work, a Property Survey Access Consent must be obtained from the site owner. For privately owned properties, this involves consultation with thousands of primarily residential stakeholders who may change over time. For MPH owned sites consisting primarily of roads, parks and other municipal owned sites, this requires review and consultation with MPH. Stakeholder management includes many forms of communication throughout the project lifecycle which are summarized in Figure 30.

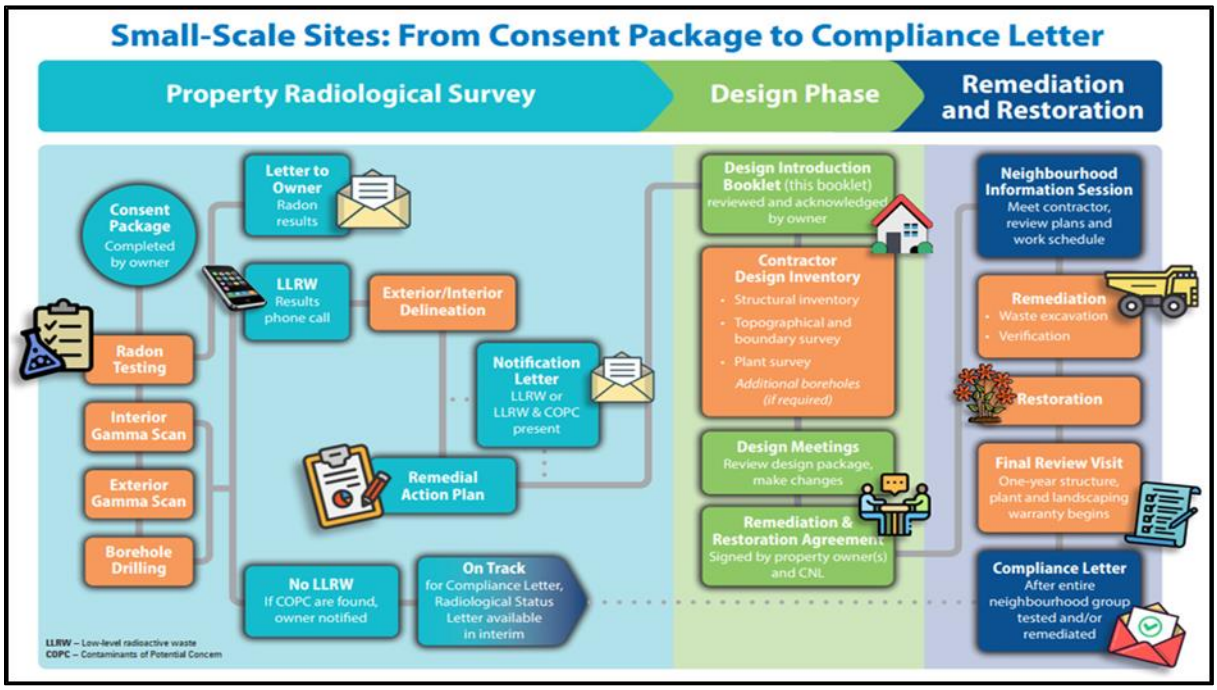


Figure 30: SSS - Project Lifecycle Summary & Property Owner Communication Plan

5.4.2.3 Characterization

Characterization, also known as the initial survey, is used to confirm the presence of LLRW on a given site and determines how the site is subsequently managed. Characterization field activities include interior Radon gas detector deployment, and a preliminary above surface gamma survey followed by an intrusive subsurface investigation. The intrusive subsurface investigation involves borehole drilling, soil sampling and possibly sampling of building or other types of material; gamma radiation measurements of boreholes and soil cores; and x-ray fluorescence (XRF) measurements of soil boring samples for uranium and arsenic.

Selected soil samples undergo independent, accredited analytical laboratory testing to determine the presence of the four signature contaminants of potential concern which are indicative of historic LLRW: Arsenic, Uranium, Radium-226 and Thorium-230. Where historic LLRW is suspected to be present, further analysis for 17 secondary contaminants of potential concern is undertaken.

The outcome of characterization determines how the site is subsequently managed. If the presence of LLRW is confirmed then the site proceeds to delineation followed by design, remediation and restoration activities. When characterization confirms historic LLRW is not present the site moves through a verification process followed by close-out activities.

Figure 31: Exterior Gamma Scanning and Borehole Drilling/Soil Sampling

5.4.2.4 Delineation

Once characterization confirms the presence of historic LLRW, delineation is performed to determine the extent of contamination. This involves further intrusive subsurface investigations followed by a summary report, the “Remedial Action Plan (RAP)” which is used to guide design and remediation. An example Remedial Action Plan can be found below in Figure 32.

Figure 32: Example of a Remedial Action Plan for 35 Hayward Street, Port Hope Design

The design process starts with a suite of field inspections and surveys (legal, topographical, utility locates, landscape inventory, species at risk, structural, civil, heritage assessments) and this information along with the Remedial Action Plan is used to develop a site-specific design package. The site-specific design package involves several consultations with individual property owners as illustrated in Figure 30. Figure 33 shows an example of a completed design.

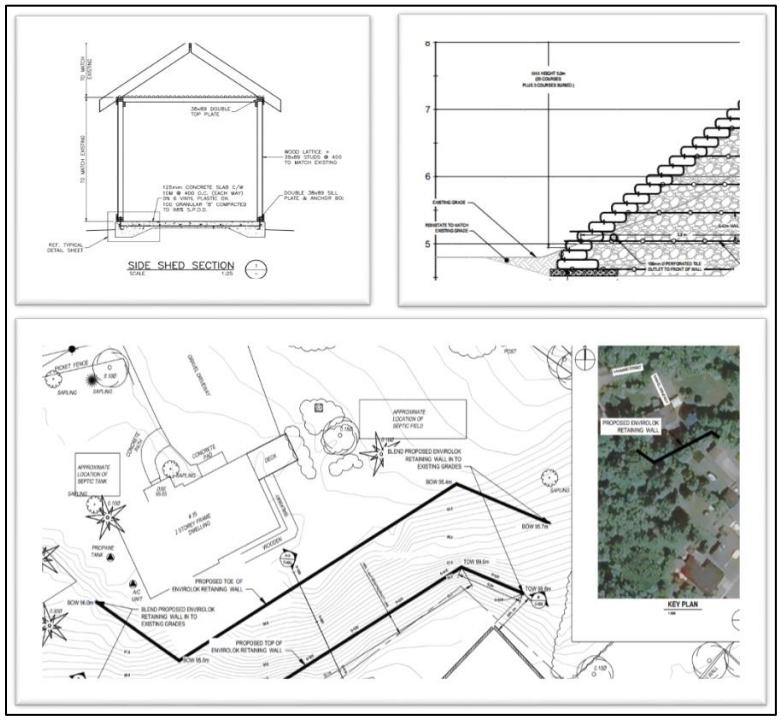


Figure 33: Example of the design package with retaining wall for 35 Hayward Street, Port Hope

5.4.2.5 Remediation and Restoration

This step requires detailed planning prior to field execution to ensure compliance with the CNSC licence; federal and provincial regulatory requirements; municipal permits and requirements; technical codes and standards and specific contractual obligations with property owners. Pre-construction planning is structured into a series of steps including pre-mobilization, mobilization, site preparation, excavation, remediation verification, back-filling, restoration, stakeholder property walk-down inspections, issue of Certificate of Substantial Performance and warranty period. Some sites have added complexities such as a high water table or historical buildings with challenging structural integrity issues. Soil remediation activities can involve detailed geotechnical assessments, engineered shoring, precision excavations, specialized equipment and detailed water management strategies. The range of restoration scopes are broad and can require the complete demolition of a home and/or occupant relocation. Construction planning is typically performed on a group of contiguous properties and roads to limit property owner disruptions. Figure 34 outlines some remedial activities (upper images), as well as restoration activities (lower images). Hydroseeding is evident in the lower images.

Remediation activities in progress at 35 Hayward Street

Restoration activities in progress at 35 Hayward Street

Figure 34: Remediation & Restoration Activities at 35 Hayward Street, Port Hope

5.4.2.6 Close-out

Site closeout includes the issuance of a Property Compliance Letter by CNL to the property owner to confirm the removal of LLRW exceeding the PHAI cleanup criteria and that no further testing of the property is required. Closeout activities also ensure that institutional controls and post remediation management is properly executed per restoration warranty obligations.

5.4.2.7 Special Circumstances Protocol

Special Circumstances Protocol is applied in some instances, where the remediation of a site or a portion of a site is not considered practical or reasonably achievable. In these cases, the Special Circumstances Protocol [18] is applied. Under the Protocol, dose and risk assessments are performed to ensure that the total dose of any residual radiological material is less than the prescribed limit of 1 mSv/annum above background and the risk to the environment and human health is negligible. The application of the Special Circumstance Protocol is typically identified at the beginning of design when one of the following constraints are identified:

- **Access constraint** - property access not provided by the property owner
- **Physical constraint** - required to maintain structural integrity or stability of a property
- **Operational constraint** - cleanup below a specified depth is not reasonably feasible
- **Environmental constraint** - removal of historic LLRW will have a detrimental impact on an environmental feature
- **Social/heritage constraint** - high community impact with low safety return
- **Property owner directed remediation** - property owner requests a portion of the historic LLRW be left in place.

5.4.3 Work Completed to Date

The current schedule for SSS indicates completion of remediation and restoration activities in 2030; project status is summarized in Table 8.

The first three steps in Table 8 are close to completion. Properties not yet characterized are typically those involving property owners who have not provided consent to access to their property or newly identified sites. Only those properties identified with historic LLRW proceed with steps 2b, 3 and 4, however all properties will undergo step 5 for full close-out. Approximately half of the properties with identified LLRW are in the design phase with a portion of those with finalized designs.

Seven neighbourhood construction packages have been initiated, three have been completed in the field and four are undergoing completion. Close-out of properties without identified LLRW as well as properties that have completed the remediation and restoration process is ongoing.

Table 8: Status of the Small-Scale Sites Project for each process step to-date

Step	Number of Sites required at each Step[7]	Sites[7] Complete (% Complete)
1 - Historical File Review	5878	5464 (93%)
2a - Characterization	5878	5069 (86%)
2b - Delineation	1209	1066 (88%)
3 - Design	1209	214 (18%)
4 - Remediation & Restoration	1209	49 (4%)
5 - Close-out	5878	611 (10%)

5.4.4 Planned Activities (2022 – 2033 Period)

CNL will continue progressing all remaining properties through Steps 1-3 outlined in Table 8, and progressing remediation, restoration and close-out of properties under Steps 4 and 5 during the licensing period 2022-2033.

5.5 Large-Scale Sites

Large-Scale Sites constitute a significant portion of the PHAI scope and are handled separately from small-scale residential-type sites due to their size and complexity. A list of sites and

[7] Sites includes external properties and roads and does not include sites with interior impacts.

expected waste volumes is listed in Table 4. Major, Industrial and Known sites are discussed below in more detail.

The locations of the Large-Scale Sites can be found below in Figure 35.

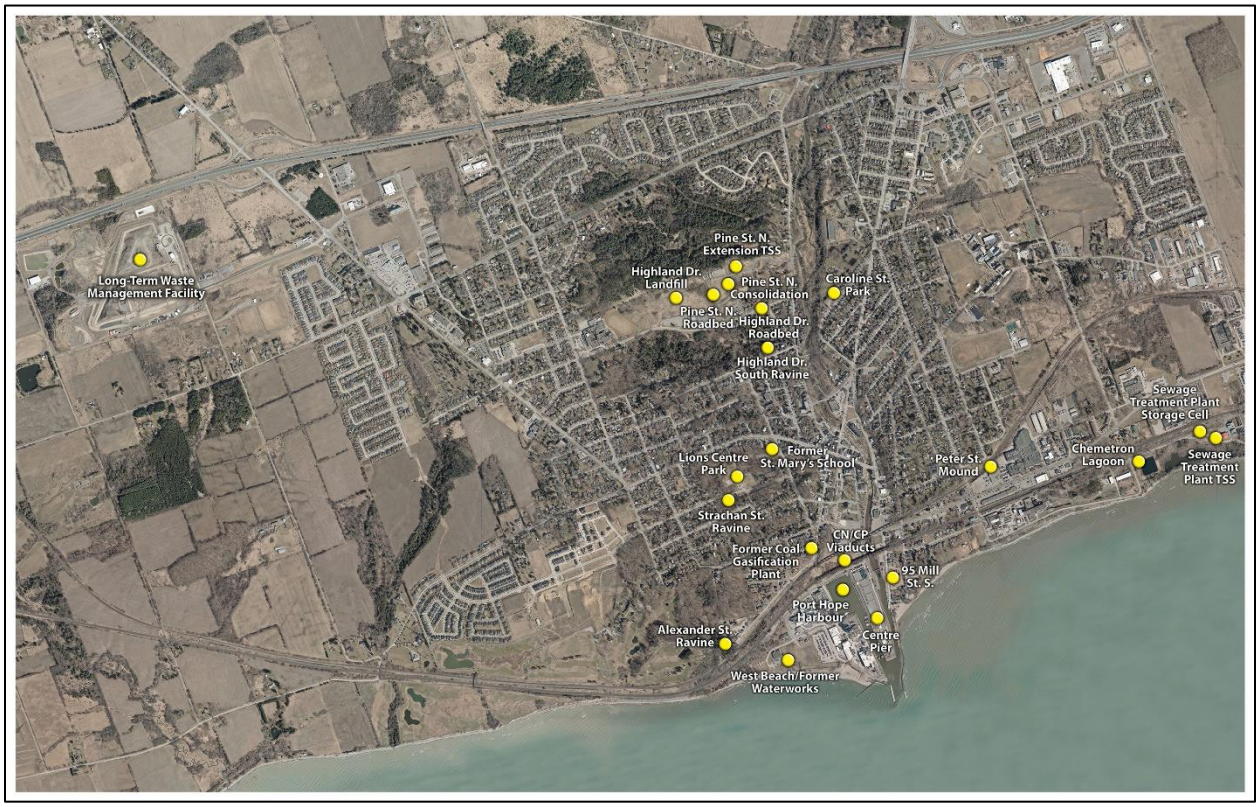


Figure 35: Location of the Large-Scale Sites

The overall project schedule for Large-Scale Sites is outline in Figure 36.

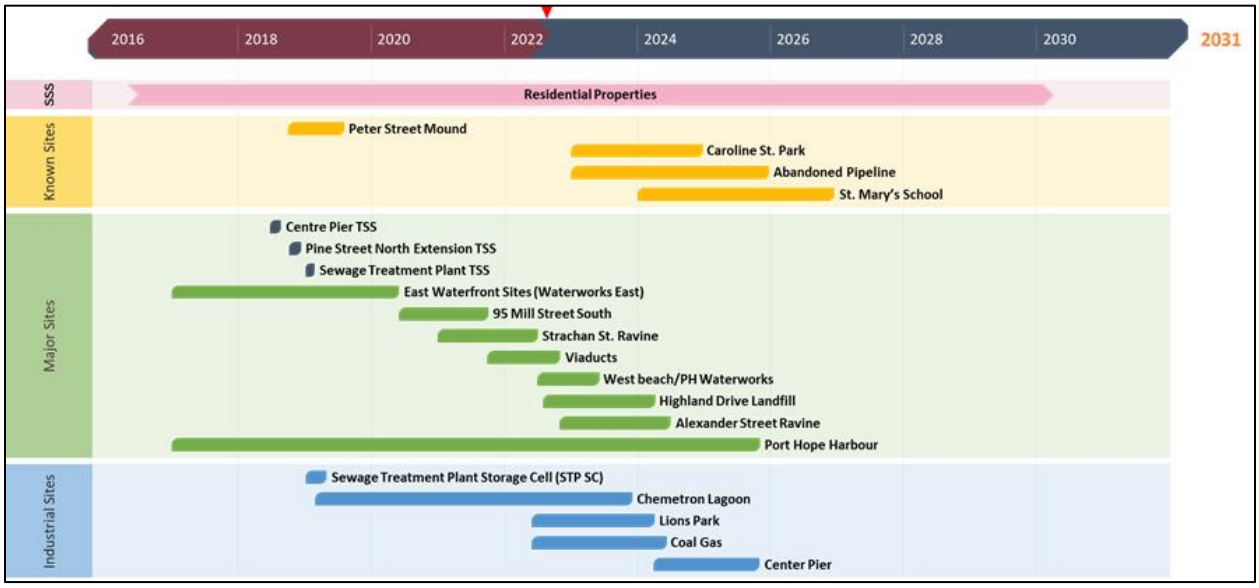


Figure 36: Large-Scale Sites Overall Schedule Timeline

5.5.1 History and Background

Large-Scale Sites have been identified through early radiological investigations in Port Hope and are included as part of the PHAI Project.

Large-Scale Sites include:

- Major Sites
- Industrial Sites
- Known Sites

Major, Industrial and Known sites are discussed below in more detail.

5.5.2 Major Sites

5.5.2.1 Summary of Work Completed to Date

Centre Pier Temporary Storage Site

The temporary storage site (TSS) was developed on the Centre Pier to accommodate historic LLRW excavated during the partial remediation of the former municipal waterworks site (located just west of the Cameco Conversion Facility) in 2003 during the construction of the new Port Hope Water Treatment Plant. The waste had been temporarily stored under tarps within a ring-wall containment structure on the Centre Pier. In 2018, 17,400 m^3 of historic LLRW was safely transported along designated transportation routes to the PH LTWMF. Remediation and waste transfer to the PH LTWMF have been completed.

Pine Street Extension Temporary Storage Site

The Pine Street Extension TSS (see Section 1.3.3) consists of two asphalt pads located on the site as shown in Figure 4.

CNL has removed and safely transported 9,200 m^3 of historic LLRW stored from the site to the PH LTWMF. Final site restoration will take place following the remediation of the adjacent Highland Drive Landfill.

Sewage Treatment Plant Temporary Storage Site

The Sewage Treatment Plant TSS is described in Section 1.3.4.

Remediation of the site is complete with 1,900 m^3 of historic LLRW transferred to the PH LTWMF.

Waterworks East

The remediation of the Waterworks East site included demolition the former municipal water treatment plant and remaining infrastructure, remediation of historic LLRW from the municipal property and the Cameco property within the site boundary and backfill and restoration of the site. Total waste removed was over 14,000 m^3, significantly exceeding the original estimate of 8,700 m^3.

Remediation of the Waterworks East site is complete.

Mill Street South

The Mill Street South property is owned by the Municipality of Port Hope.

The site was the former location of the Canadian Fire Fighter Museum; in 2018, the buildings were removed and a total of 18,300 m^3 of historic LLRW was removed exceeding the projected estimate by 34%.

Remediation of the Mill Street South site is complete.

Strachan Street Ravine

Site preparation for remediation of the Strachan Street Ravine began in June 2021 with the installation of sheet pile excavation supports along the adjacent roadway to protect municipal infrastructure (See Figure 37).

Remediation of Strachan Street Ravine is close to completion, but it is currently on hold, pending the preparation of a Special Circumstances application for historic LLRW remaining at inaccessible depths due to limitations of the excavation support structures. Details on the Special Circumstance Protocol can be found in Section 1.4.3 and Section 5.4.2.7.

A total of 4,000 m^3, of historic LLRW was removed from the site, exceeding the projected estimate by ~30%.

Figure 37: Strachan Street Ravine Waste Removal - February 2022

Pine Street Extension Consolidation Site

The Pine Street Extension Consolidation Site has been successfully remediated with 39,000 m^3 of historic LLRW safely transferred to the PH LTWMF. The site has been partially restored however, additional site perimeter work is required which will be completed in conjunction with the Highland Drive Landfill remediation scheduled to begin in 2022/23 calendar year.

CN/CP Viaducts

The Canadian National/Canadian Pacific (CN/CP) Viaducts site is bisected by two elevated rail lines supported on stone piers, constructed over 100 years ago on bedrock, . CNL is coordinating with private property owners and the railways (CN & CP) to determine safe working areas around the elevated railway piers.

Remediation requires removal of approximately 51,000 m^3 of historic LLRW and restoration to pre-existing conditions. A portable water treatment system has been installed and commissioned. Remediation started in October 2021 and is targeted for completion in fall 2022.

5.5.2.2 Planned Activities (2023-2033 Period)

Alexander Street Ravine

Approximately 2,150 m^3 of historic LLRW will be removed from the Alexander Street Ravine; the Special Circumstances Protocol will be applied due to environmental constraints at the remainder of the site.

The design is currently under revision due to the presence of sensitive nesting habitat and the combination of several adjacent municipally owned parcels. CNL continues to meet with the municipality to discuss plans and application of the Special Circumstance Protocol to mitigate an extensive loss of trees in this area.

There are also three privately owned woodlots in this area. The Special Circumstances Protocol will be applied to the bulk of one property and the entirety of the other two properties.

Highland Drive Landfill

The Highland Drive Landfill is a closed Municipal Solid Waste Landfill. The property is owned by the Municipality of Port Hope however, the Environmental Compliance Approval for the landfill is held by the County of Northumberland.

The remediation of this site will include the removal of approximately 150,000 m^3 of historic LLRW and co-mingled LLRW/municipal solid waste and transportation to the PH LTWMF for storage. Any excavated municipal solid waste not impacted by historic LLRW will be placed back into the landfill and the landfill will be capped. Remediation designs have been finalized and the work is scheduled to begin in 2022/23 calendar year.

Highland Drive South Ravine

The Highland Drive South Ravine Site contains approximately 20,000 m^3 of historic LLRW on the north slope and contaminated sediment in the lower ponds.

The remediation of this site is currently in the design phase and includes the removal of the sediment from the ponds and installation of a Permeable Reactive Barrier to intercept and treat the contaminated groundwater. In addition, the impacted sediment in the two ponds will be excavated and transported to the PH LTWMF. Restoration will include returning the site to a more natural environment while maintaining access for ongoing monitoring and maintenance of the Permeable Reactive Barriers.

Port Hope Harbour & Centre Pier

The Port Hope Harbour site is by far the most complex site of the PHAI. Contamination in the harbour exists as a sediment layer overlying the till and bedrock surface throughout the approach channel and turning basin. The sediment thickness varies, extending to as much as 4 m deep. The sediment is removed by both mechanical and hydraulic dredging, temporarily placed on the adjacent Centre Pier property to allow for dewatering and subsequently transported to the PH LTWMF. Water generated by the dewatering process will be treated by a temporary water treatment system located on the Center Pier and discharged back into the harbour.

Remediation will include the removal of contaminated sediment from the harbour down to bedrock or hard till, removal and replacement of the deteriorated harbour walls where required to support remediation, removal of historic LLRW and industrial waste from the Center Pier and restoring the harbour to a natural state.

The wave attenuator was installed in 2018/2019 at the harbour entrance from Lake Ontario to separate the work area from the lake. Erosion controls, a water treatment system and infrastructure for dewatering of sediments have been installed.

Figure 38 shows the state of the Harbour and Center Pier in June 2018, prior to the removal of waste from the Centre Pier Temporary Storage Site (large black tarped area at the center of the image) and Cameco infrastructure (three buildings located on the pier). Figure 39 shows the state of the Port Hope Harbour and Center Pier in May 2022. Visible are the wave attenuator at the mouth of the harbour, sediment drying areas (large open spaces on the Centre Pier) as well as storage tanks and the portable wastewater treatment system building (left side of the image and in detail in Figure 40).

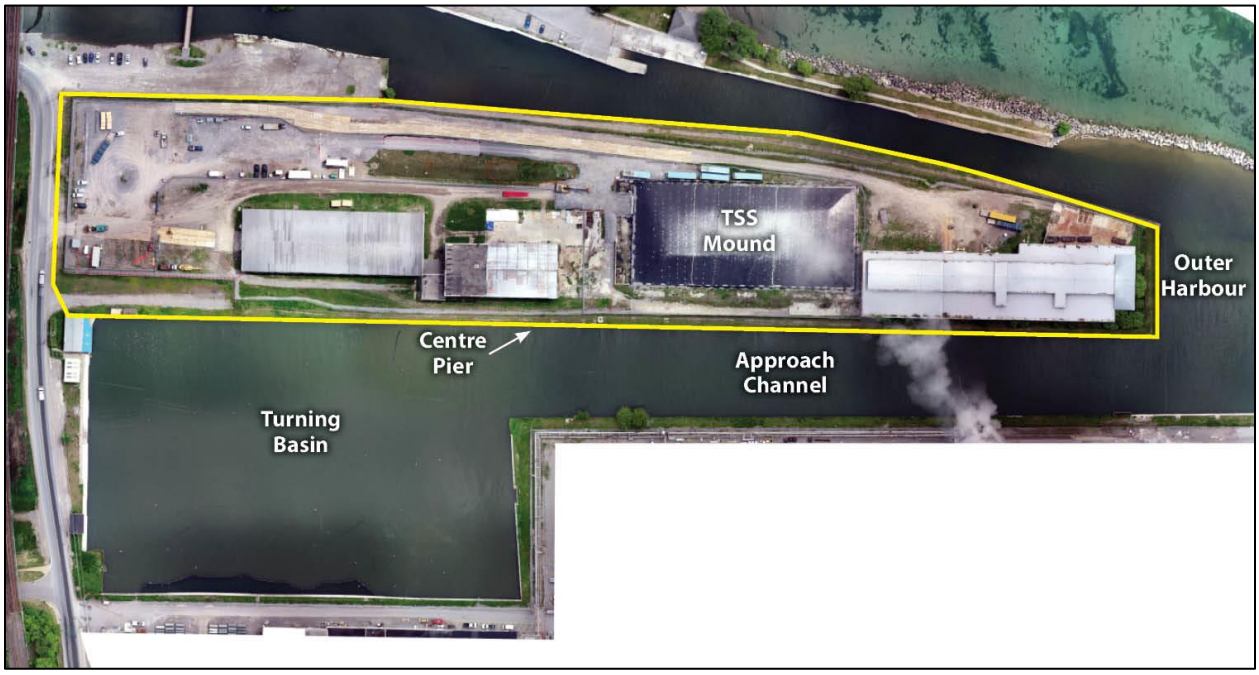


Figure 38: Harbour Center Pier June 2018

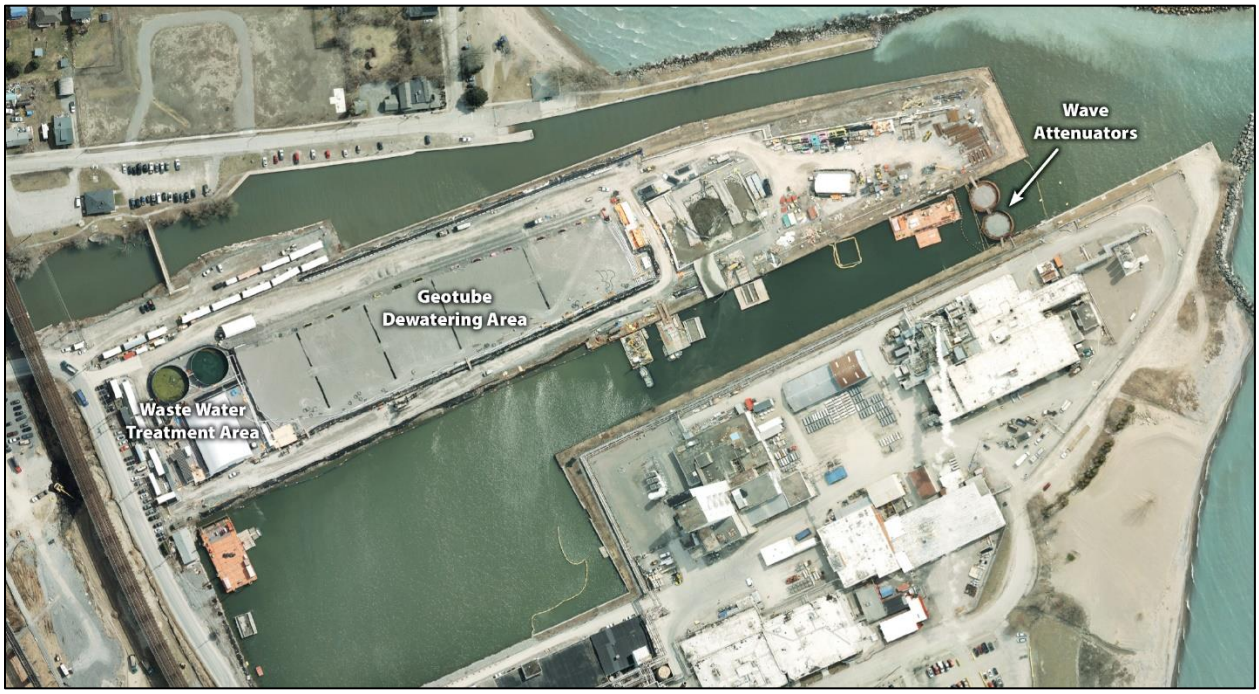


Figure 39: Harbour Center Pier May 2022

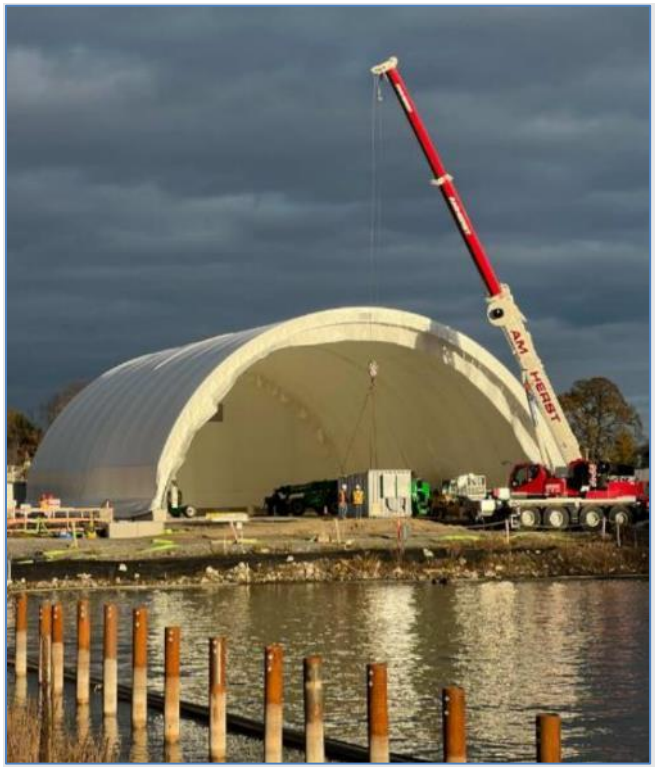


Figure 40: Harbour Water Treatment System Installation - November 2021

Figure 41 from March 2022 shows the mechanical dredging process. Waste is removed by a large excavator on a barge and transferred to bins for transport to Center Pier where it is processed, de-watered and loaded onto trucks for transport to the PH LTWMF.

Figure 41: March 2022 Mechanical Dredging in Process

Waterworks West

The Waterworks West site is planned to commence remediation in late summer 2022.

5.5.3 Industrial Sites

5.5.3.1 History and Background

Work completed on industrial sites as part of the PHAI does not fall under the requirements outlined in CNL's CNSC licences. Information regarding industrial sites is included in this CMD as some of the industrial waste may be transferred to the PH LTWMF for final management or routed to a conventional industrial waste management facility for final management.

In 2017, CNL and the Municipality of Port Hope entered into a Settlement Agreement [34] for select remediation at the following five industrial sites:

- Lions Recreation Centre Park
- Coal Gasification Plant site
- Centre Pier
- Chemetron Lagoon
- Sewage Treatment Plant Storage Cell

CNL has agreed to the removal of select industrial wastes from these sites with a total maximum volume of 51,250 m^3.

5.5.4 Known Sites

5.5.4.1 History and Background

Four sites within Port Hope were known to be contaminated with LLRW and are referred to as "known sites" (larger than a small-scale site, smaller than a major site).

5.5.4.2 Summary of Work Complete to Date

Abandoned Pipeline

A pipeline was in operation from 1956 to 2009 to transport treated water from the water treatment system at the former Welcome Waste Management Facility for discharge to Lake Ontario. The pipeline included sections of 75 mm diameter polyvinyl chloride (PVC) pipe and acrylonitrile butadiene styrene (ABS) pipe. The abandoned pipeline is located within the Brand Road right-of-way and extends southward approximately 3 kilometres to the outfall, approximately 7 metres into Lake Ontario. Figure 42 shows the location of the abandoned pipeline (white line in the figure below) running from the PH WWTP to Lake Ontario.

Figure 42: Abandoned Pipeline

Initial characterization work completed in 2013 included geotechnical investigation, groundwater monitoring, gamma survey, and closed-circuit television camera pipe inspection, as well as sampling from 36 test pits and 5 boreholes along the length of the pipeline. The results of this investigation identified two areas of suspected historic LLRW, one close to the PH LTWMF and the other near the pipeline outlet just north of the Lake Ontario shoreline. Follow-up testing is currently underway, and results are expected in December 2022.

Caroline Street Park

The outdoor rink facility at the Caroline Street Park was upgraded in the early 1990s. In advance

of this upgrade work, radiological investigations were conducted on the site that identified the presence of historic LLRW as well as marginally contaminated soil exceeding the PHAI cleanup criteria. In 1994, some material was excavated and transferred offsite to the Pine Street Extension Temporary Storage Site. The marginally contaminated soil was placed into an interim subsurface storage cell constructed beneath the current parking lot on the site. The engineered storage cell includes geotextile below and above the layer of marginally contaminated soil overlain by granular B material followed by a high-density polyethylene geomembrane liner and a final layer of granular B material with asphalt as the surface finish.

In 2013, characterization identified approximately 6,000 m^3 of historic LLRW contaminated soil remains including the marginally contaminated soil encased in the interim storage cell, with historic LLRW extending under the rink surface.

Characterization of the site has been completed and the site is in the design phase.

Former St. Mary's School

Early investigations of the former St. Mary's school site determined that historic LLRW fill material acquired from Eldorado had been used as backfill across the site. Some remedial work was undertaken in the 1970s however, it was limited to the removal of contaminated material from around the main structure as well as within the building footprint. Further investigation and remediation were undertaken in the mid-1990s and a radiological survey was undertaken in 2013. Investigations indicate that approximately 9,500 m^3 of historic LLRW remains on the site, however it is anticipated that the total volume is approximately 12,000 m^3.

Peter Street Mound

A commercial site on Peter Street, formerly a lumber yard Canadian Pacific Railways warehouse was redeveloped in the early 1980s.

In 2013, a radiological survey undertaken at this site concluded that approximately 2,200 m^3 of historic LLRW contaminated soil exceeding the PHAI Cleanup Criteria was present on the site.

This site has been remediated and was restored in 2019.

5.5.4.3 Planned Activities (2023-2033 Period)

Abandoned Pipeline

Work remaining for this site includes follow-up characterization and delineation to fill data gaps, followed by remedial design and remediation of the 3 km pipeline and associated LLRW.

Caroline Street Park

The remedial design will be finalized and the site remediated.

Former St. Mary's School

The former St. Mary's school site has recently undergone new ownership. Final delineation is required as well as a geotechnical and/or hydrogeological assessment before progressing this design to finalization, followed by remediation and restoration.

6 SAFETY AND CONTROL AREAS

This section provides discussion on each of the 14 Safety and Control Areas, as related to the current CNSC Licenses subject to this CMD and the proposed consolidated Port Hope licence. This section provides a brief description of the CNL functions that incorporate the requirements of the safety and control areas and the relevance of the function to the PHAI Project.

Table 9 below provides a breakdown of the applicable safety and control areas by licence as well as that of the proposed consolidated licence for the PHAI.

Table 9: Safety and Control Areas Relevant to the four CNSC Licences

Functional Area	SCA	PH	PG	344	182	Proposed Consolidated CNSC Licence
Management	Management System	yes	yes	no	yes	yes
	Human Performance Management - Training	yes	yes	no	yes	yes
	Operating Performance - Reporting Requirements	yes	yes	yes	yes	yes
Facility and Equipment	Safety Analysis	no	no	no	no	no
	Physical Design	yes	yes	no	no	yes
	Fitness for Service	no	no	no	no	yes
Core Control Processes	Radiation Protection	yes	yes	yes	yes	yes
	Conventional Health & Safety	yes	yes	yes	yes	yes
	Environmental Protection	yes	yes	yes	yes	yes
	Emergency Management and Fire Protection	yes	yes	no	yes	yes
	Waste Management	no	no	yes	no	yes
	Security	yes	yes	yes	yes	yes
	Safeguards and non-Proliferation	yes	no	no	no	yes
	Packaging and Transport	yes	yes	no	yes	yes
Total Number of Applicable Safety and Control Areas out of a total of 14		**11**	**10**	**6**	**9**	**13**

6.1 Management System

This section describes CNL's robust management system, which is aligned to the required safety and control areas outlined in the respective licence condition handbooks for the current CNSC licences [24][28][35].

6.1.1 Relevance and Management

CNL has a management system comprised of an integrated set of documented policies, expectations, standards, procedures, and responsibilities through which CNL is governed and managed. CNL's integrated management system demonstrates and documents the

commitment to maintaining a high level of quality and excellence in the management of all CNL activities in an environment that prioritizes safety and fosters continual improvement.

The CNL Management System provides the framework of processes, procedures and practices used to ensure that CNL can fulfill all tasks required to achieve our objectives safely and consistently. This foundational framework delivers quality research and development; design engineering; procurement; manufacturing; qualification testing; construction; commissioning; operations; decommissioning; demolition; waste management; inspection; maintenance and plant life management and project management for nuclear power plants, research reactors, nuclear or non-nuclear facilities and installations.

The Management System provides, enables, and defines a detailed framework for full nuclear facility life cycle phases, including construction, commissioning, operations, decommissioning and long-term safety of the nuclear facilities and laboratories at all CNL sites, including the PHP and PGP. The various mature programs and processes already in place will continue to evolve as required to meet changes to regulatory requirements.

Effective corporate governance of CNL's management system is achieved through the establishment and implementation of controls that are defined within the *CNL Management System Manual* [36]. A Functional Authority Structure is applied to all CNL management system components, with assigned Responsible Executives and Functional Support Manager roles to ensure CNL functions meet external requirements; protect workers, the public and the environment; and adequately address other vulnerabilities (e.g., financial, legal, or security).

CNL utilizes the following suite of management system document types to encompass the top tier of the CNL management system: a Program Description Document, a Program Requirements Document, and a Program Governing Document Index. The Functional Support Areas and the associated top tier documents (i.e., Program Description Document and Program Requirements Document) are listed in the project Licence Condition Handbooks [24][28] and [35] under their respective Safety and Control Area, as applicable, and form part of the CNSC Compliance Verification Criteria of CNL's performance.

Other key management system documents for the PHAI includes *CNL's Historic Waste Program Governing Document Index* [37] and Historic Waste Program Organization Document.

6.1.1.1 Corrective Action Program

Supporting CNL's management system is a robust Corrective Action Program for the management of incidents, events, opportunities for improvements and corrective actions.

The corrective action program applies to all CNL sites, all its employees and contractors.

The Corrective Action Program is described as a process for:

- Identifying, prioritizing, investigating, documenting, trending, tracking, preventing and resolving problems
- Capturing opportunities for improvement and actions from Operating Experience
- Documenting non-conformities and verifying their disposition

The ActionWay software application contains the data and tracking functionality to allow CNL to monitor the health of the Corrective Action Program and other associated processes. The metrics are defined and communicated using the ImpAct Process Health Report and the Contractor Assurance System corporate scorecard.

In collaboration with the Corrective Action Program, Human Performance events are identified and trended in the Contractor Assurance System scorecard. The Corrective Action Program process supports timely identification, corrective action development and resolution of these events.

The Corrective Action Program is used to identify, track and trend human performance-related events as a primary metric of the company scorecard. These results are communicated through all levels of the organization. These indicators reflect the effectiveness of management in improving organizational processes.

6.1.1.2 Quality Assurance Program

CNL's Quality Assurance Program is based on and meets the requirements of CSA N286-12*, Management System Requirements for Nuclear Facilities* [38] and ISO 9001:2015, *Quality Management Systems – Requirements* [39].

The CNL quality assurance program document serves the following purpose:

- Explains the CNL Quality Assurance Program and identifies CNL's top level required methods for operating within the Quality Assurance requirements
- Establishes Quality Assurance requirements for conducting activities or services that affect, or may affect, nuclear safety of facilities in a graded manner to ensure that environmental, safety and health risks or impacts are minimized
- Ensures that safety, reliability, products and performance are maximized by using effective management systems. The CNL graded approach is based on the importance of safety and the safety significance of structures, systems, and components and on a specific evaluation of regulations, risks, complexity, and history of previous implementation. All requirements apply to varying degrees, depending upon the safety significance and complexity of the work being performed.

Quality requirements are addressed for all CNL facilities, locations, and activities in the overall Management System using a graded and integrated approach, when possible, along with Health, Safety, Security, and Environment, statutory and regulatory requirements. All work is executed in accordance with controlled procedures to achieve a desired performance that includes both full compliance with the applicable customer requirements along with the efficient and effective delivery of results.

The PHP, PGP, 344 and 182 licences utilize the *Historic Waste Program Quality Assurance Plan* [40] and corporate *Quality Program Selection Procedure* [41] for the project activities. The Quality Assurance Plan defines an integral part of the processes used to design, analyze hazards, identify and apply standards and controls, procure equipment and services, perform work, and evaluate and improve performance.

PHAI activities are aligned with ISO 9001:2015*, Quality Management Systems – Requirements* [39] standard.

Supplier or contractor activities were and are subject to *HWP MO Field Oversight* [42] activities to confirm conformance to the accepted project specific Quality Assurance Plans.

6.1.1.3 Information Management

The information management functional support area implements and monitors controls that apply to all Information assets, including structured, unstructured, or transitory, and extends to all activities throughout CNL. Information management follows the requirements of all relevant certifications as well as other standards that have been adopted by CNL as best practices. All CNL employees are responsible for abiding by the controls that Information Management processes define, especially relating to the information in their direct care.

The mandate of the Information Management is as follows:

- Govern the creation, classification, capture, use, dissemination, retention, preservation, and disposition processes of information throughout the enterprise
- Preserve company records that are centrally archived
- Uphold the integrity of the Management System document framework
- Uphold the quality of document capture into the Electronic Document and Records Management System
- Provide personnel with information resources onsite and access to worldwide resources through online subscriptions and inter-library loans

Information management facilitates compliance with all applicable requirements to retain and manage information, to deliver targeted services and solutions to the business groups, and to ensure that records remain available and usable until they are no longer required to meet operational or regulatory obligations. The Information Management group is responsible for setting the strategies to manage information, and the governance framework and procedures that guide employees from the creation to the disposition of information assets. Information Management establishes standards and procedures to facilitate the following:

- The ownership and stewardship of information assets
- The creation, capture, and use of information
- The storage and protection of records to guarantee their accessibility and usability for the length of time required
- The disposition of records with due diligence when their retention expires

Storing and handling information is a controlled activity at CNL. The Information Management group develops and maintains processes to ensure the authenticity and integrity of records so that CNL can meet its long-term information requirements.

Documents related to the PHAI are controlled to ensure they are prepared and accepted by qualified staff, reviewed for adequacy, approved for use and distributed to the required personnel, as required by the Information Management function. Essential and non-essential records are identified, controlled, filed, and maintained in accordance with company-

wide procedures including project documentation, operating and maintenance procedures, waste data records, regulatory correspondence and non-conformance reports.

Information Management applies during all phases of the PHAI Project, and the appropriate records will be retained as a permanent record to be used by future generations. For example, CNL has recently transitioned to a modern electronic waste tracking system to ensure reliability and efficiency of waste tracking while safeguarding the information in a secure, retrievable and traceable manner to meet business and regulatory requirements. The new system has the capability to capture, storing, and retrieve information related to waste data including a transactional history from generation through processing to storage and/or disposal.

6.1.2 Past Performance

The CNL Management System implements the requirements in REGDOC-2.1.2, *Safety Culture* [43], CSA N286-12, *Management System Requirements for Nuclear Facilities* [44] and ISO 9001:2015, *Quality Management Systems – Requirements* [45] and ensures compliance with these regulatory requirements at CNL.

CNL continually assesses the Management System performance through the following mechanisms:

- Nuclear Performance Assurance Review Board, which reviews the performance of CNL's nuclear facilities and Safety and Control Areas on a quarterly basis
- Corrective Action Review Board, which reviews the status of the corrective action program, its outcomes, and the results of Nuclear Oversight audits
- Contractor Assurance System, which is used to integrate various performance measures and indicators to provide an evaluation of CNL performance
- Facility Authorities / Chief Nuclear Officer monthly meeting reviews of nuclear facilities safety performance

The CNL management system is relevant to all phases of the PHP, PGP, 344 and 182 Licence requirements to ensure safe, effective and efficient conduct of design, construction, commissioning, operations, decommissioning of the nuclear facilities and delivering against commitments within appropriate accountabilities and controls.

The CNL Management System is built on years of experience at multiple sites, conducting work through the full nuclear facility life cycle phases, including the long-term safety of the nuclear facilities.

6.1.3 Future Plans

CNL's Management System enables continued safe operational practices at CNL throughout the next licence period. CNL will continue to apply the Management System, adapting as required to changing conditions and regulatory requirements.

6.2 Human Performance Management

The Human Performance Safety and Control Area consists of the Training and Development

Function. The Training and Development Functions requires all functional support areas, line management, and employees to complete general companywide, and position specific required training and implement specific documented programs and processes in their respective areas. To achieve this goal, Training and Development provides tools, methods, training, and expertise. Training and Development interface with other programs within CNL to ensure training programs are implemented in accordance with requirements and that risks are managed, related to variability in human performance while maintaining a high level of line engagement to provide efficient delivery of program services.

6.2.1 Relevance and Management

The main objectives of the Training and Development function are to:

- Strengthen the safety culture at CNL
- Ensure human performance effectiveness through highly trained, competent employees
- Maintain the company-wide training standards required to ensure rigorous and compliant training programs
- Provide training oversight, guidance and resources to support all CNL missions
- Provide oversight
- Evaluate all training programs to ensure quality and compliance with requirements
- Maintain a Learning Management System that ensures employee qualifications are recorded and accessible to CNL management

The Training and Development Function ensures that employees are adequately and efficiently trained to perform their roles and responsibilities safely and competently. CNL's Training and Development organization maintains the training program's governing documents and oversees the implementation of a systematic approach to training and satisfies the licensing conditions and legislative/regulatory requirements.

The Systematic Approach to Training processes are applied to the development of training programs for positions performing licensed activities. The Systematic Approach to Training is based on fundamental processes and sound practices that systematically assess the need for training, type of training, and the training content as well as provide standards for the development, implementation, and evaluation of training. CNL's Training and Development Program implements the requirements in REGDOC-2.2.2, *Personnel Training, Version 2* [46] to ensure compliance with regulatory requirements.

Training and Development has assigned a dedicated resource to support the implementation and maintenance of the PHAI training programs. CNL has and will ensure that PHAI training requirements are identified, conducted, and documented for PHAI workers. This includes ensuring that PHAI training plans are structured within CNL's new learning management system, enabling more efficient training reports and increased rigour in tracking worker training compliance.

In 2020, Training and Development defined a list of CNL positions and roles that require SAT compliant training programs. The requirements set out in 900-51200-LST-001 – *Application of*

the Systematic Approach to Training at CNL, align with CNL operating licence requirements and the CNSC REGDOC 2.2.2 – *Personnel Training*, Version 2 [46]. The following positions PHAI position and roles are included on the List: Radiation Protection Technician, TDG Handler, TDG Shipper, Health Physicist, Design Authority, and Certified Industrial Hygienists.

In 2022, Training and Development implemented a new standard to the management system governing documents, 900-510200-STD-005 – *CNL Learning and Development.* Positions not listed in 900-51200-LST-001 – *Application of the Systematic Approach to Training at CNL* follow the new standard developed in 2022. The standard enables a flexible approach to the identification, development, implementation and maintenance of training programs and will be used to train positions and roles at CNL that are not included on the list. The CNL Learning and Development standard aligns with the requirements of CSA-N286-12 [38].

PHAI utilizes external contractors to carry out much of the field work and all contracts stipulate the prerequisite qualification requirements for contract staff performing specific work at CNL. Contract companies are responsible for ensuring that these prerequisites are met for their own staff before sending workers to CNL sites. In addition to these prerequisites, contractors working at CNL sites are required to complete CNL-specific training including general safety orientation, facility-specific training and radiation protection training.

6.2.2 Past Performance

In March 2019, the CNSC conducted a Type II training inspection at CNL's PHP. The focus of the inspection was on the training programs for the Radiation Protection Technician, Environmental Technologist, Occupational Safety Officer, and the Wastewater Treatment Plant Operator positions. The inspection resulted in one directive and three action notices, identifying that the PHAI training program did not align with the requirements of CNL's governing Training & Development management system documents and that CNL did not have documented evidence that PHAI personnel had completed their required training. CNL completed a two-year corrective action plan which resulted in the closure of the directive in April 2020 and the three action notices in April 2021.

Significant improvements have been made to the PHAI training programs in relation to the CNSC inspection findings include the:

- Implementation of new Training Analyses and Training Plans for the following positions:
  - PH/PG WWTP Operations Technician
  - PH/PG WWTP Operations Supervisor
  - Environmental Technologist
  - Environmental Remediation Management Health and Safety Specialist
  - Radiation Protection Technician
  - Group 2 Radiation Protection Remediation Verification Contractor
- Implementation of Training Qualification Cards for the position of PH/PG Wastewater Treatment Plant Operation Technician
- Implementation of actions from quarterly Curriculum Review Committee meetings

- Implementation of training matrix reports to highlight compliance to Training Plans (to be replaced in future by new Learning Management System)
- Completion of all corrective actions to address the directive and three actions notices resulting from the 2018 CNSC type II training inspection
- Dedicated Training and Development consultant has been assigned to support PHAI training programs on an ongoing basis

6.2.3 Future Plans

During the next licence period, the Training and Development program will continue to provide centralized leadership and management of training functions at CNL and will remain responsible for the assessment, development, implementation and monitoring effectiveness of training programs and authorization activities throughout CNL including PHAI. CNL's Training and Development staff administer the CNL Systematic Approach to Training documentation, the CNL required training, and the Learning Management System, and will continue to maintain this accountability.

The Learning Management System at CNL will be updated and new software implemented in 2022 to enable more efficient and effective management of training records. This will provide managers and supervisors with immediate access to worker training records.

6.3 Operating Performance

The Operating Performance Safety and Control Area for PHAI includes only reporting requirements.

6.3.1 Relevance and Management

The reporting procedure, *CNL Reporting to Regulatory Agencies* [47], describes the requirements, processes, and responsibilities for reporting by CNL to the CNSC as required by the *Nuclear Safety and Control Act* [48] and associated regulations as well as other regulatory agencies, as per the applicable legislation. CNL is required to report to CNSC staff on unplanned situations or events, along with providing annual safety and compliance monitoring reports as outlined in in the respective licence conditions handbooks [24][28][35].

The requirements of CNL Reporting to Regulatory Agencies describe the requirements for consistent reporting to regulatory agencies and are applicable to all sites operated by CNL.

The document applies to the CNL employees who are Designated Representatives of the Licence who are responsible for communicating with CNSC staff and to the CNL staff responsible for reporting to other regulatory agencies. This document is written to comply with the requirements in REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills* [49] and REGDOC-3.1.3, *Reporting Requirements for Waste Nuclear Substance Licensees, Class II Nuclear Facilities and User of Prescribed Equipment, Nuclear Substances and Radiation Devices* [50].

6.3.2 Past Performance

In the current licence period, 2012 to 2022, CNL has reported to the CNSC events as required under REGDOC 3.1.2 or REGDOC 3.1.3 and the *General Nuclear Safety and Control Regulations* as well as submitting monthly, quarterly and annual reporting as required in the project licence condition handbooks [24][28], and [35].

Figure 43 shows a bar chart of reportable events broken down by licence from 2012 to 2022. As is evident from Figure 43, the number of reportable events increased from 2016 to 2018 owing to the complexity of work being performed on the PGP and PHP. Since 2018 CNL has effectively reduced the number of reportable events due to effective issue and adaptive management practices.

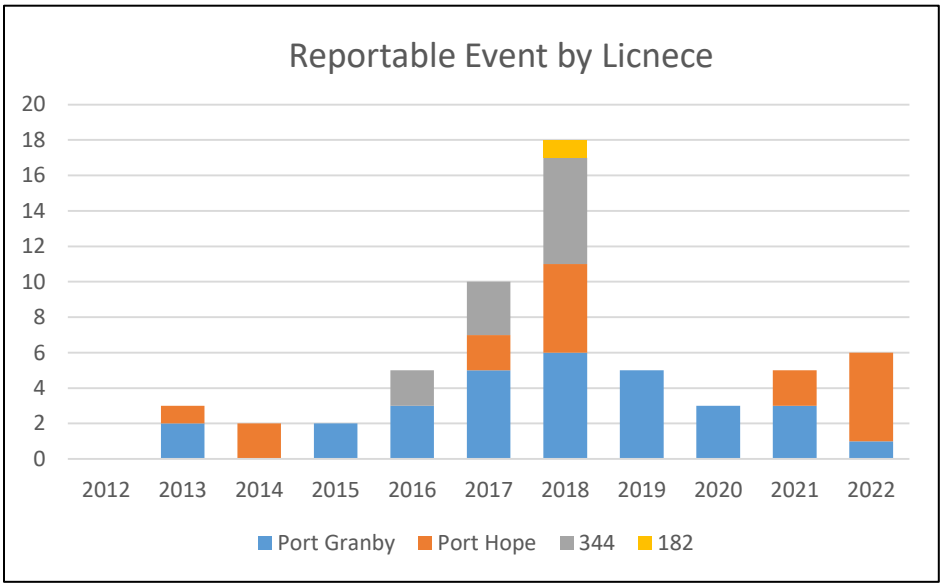


Figure 43: Reportable Events by Licence – 2012-2022

Action Level Exceedances

CNL reports action level and regulatory limit exceedances to the CNSC as required. Figure 44 below outlines the number of Action Level Exceedances by year and licence during the current licence period. CNL notified the CNSC of all Action Level Exceedances.

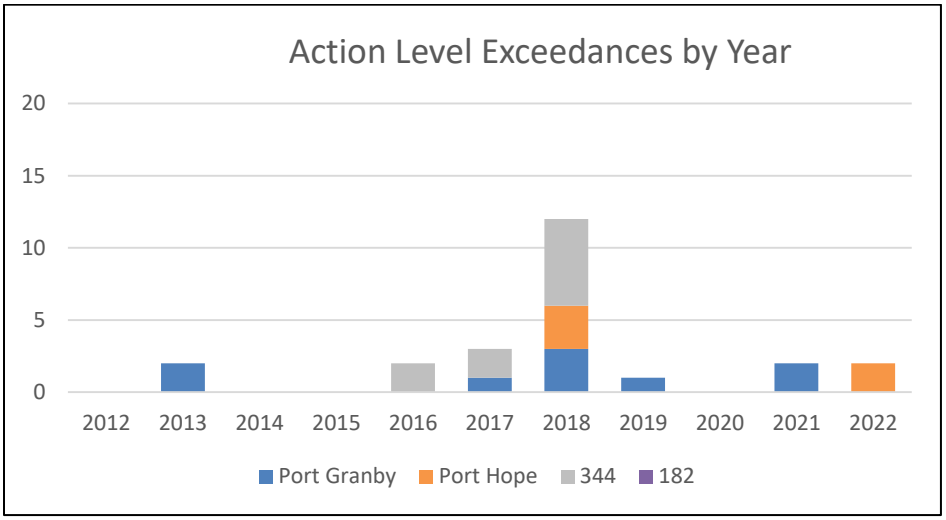


Figure 44: Action Level Exceedances by Year and Licence

During the current licensing period, CNL has had three incidents of significance that required Event Initial Reports to the CNSC. These events are discussed in Table 10 below. CNL reported these incidents to the CNSC as required. CNL's corrective action program was utilized to document the incidents, evaluate the extent of condition and assign appropriate remedial actions for each event to prevent recurrence.

Table 10: Significant Events resulting in an Event Initial Reports (2012-2022)

Event Date	Event Description
Site: Port Hope Date: June 23, 2017 Event Initial Report CMD-17-M38	On June 23, 2017 as a result of the large amount of rain, water management was overwhelmed at both the Port Hope and the Port Granby projects. **Port Hope:** One of the treatment ponds from the old Port Hope Waste Management Facility wastewater treatment plant overflowed into the parking lot, and ultimately into Clark's ditch. The volume of overflow water was difficult to quantify. The source of water was mostly surface water run-off from the forested area east of the ponds. An analysis of water samples collected from the treatment pond overflow indicated that contaminant levels were close to discharge objectives accepted by the CNSC. The heavy rain would have diluted the storm water such that contaminant levels in Brand Creek and Lake Ontario were considered to have been negligible.

Event Date	Event Description
	On June 24/25, 2016, CNL took additional precautionary measures to ensure that no surface water from other sources was entering the storm water catch basin and Clark's ditch by constructing an earthen berms to collect any seeps. An Order was issued to CNL by the CNSC on July 7, 2017. **Port Granby:** Due to the severity of the June 23, 2017 rainfall event, approximately 2-5 m^3 of untreated groundwater/surface water overflowed the East Gorge Reservoir sump and flowed off the site via pre-existing engineered standpipe overflow systems. CNL completed a review of the Contingency, Water Management and Spill Response plans which include the identification, quantities, storage and deployment of emergency equipment, personnel and supplies, are immediately available to mitigate accidental releases of untreated water from licenced sites. Personnel received training on new maintenance and operating procedures for both normal and upset conditions.
Site: Port Granby Date: January 9, 2019 Event Initial Report # CMD-19-M9	At approximately 11:00 am 2019 January 9, a bin was being unloaded at the Port Granby Long-Term Waste Management Facility. During the unloading of the bin, a CNL sub-contractor worker had a lower leg struck and pinned by the unloading mechanism on the truck. Emergency services was contacted and this worker was airlifted from the Port Granby site to a hospital. A second worker, a CNL employee, was in the work area and witnessed the injury. The worker exhibited signs of shock and was transported to a hospital by ambulance. CNL conducted a Root Cause analysis of this incident and a number of corrective actions were determined. Significant changes were made to CNL's work control process, via the implementation of Integrated Work Controls and more thorough hazard identification procedures. The cause of the incident was the unanticipated activation of a remote controller in the workers pocket while working.

Event Date	Event Description
Week Ending June 1, 2022 Event Initial Report CMD-22-M38	During routine compliance sampling at the PH WWTP it was determined that the final effluent produced by the plant for the week ending 1-June-2022 exceeded regulated weekly composite release limit for copper and the action level for zinc. Results are summarized as follows: Copper Results Concentration Summary - 53 ppb (Quality Assurance sample), 52.1 ppb (Primary) and 52.9 ppb (retest) (compliance limit is 30 ppb weekly). Copper exceeded both the Action Level and the regulatory limit. Zinc Results Concentration Summary – 39 ppb (Quality Assurance sample), 42 ppb (Primary), and 44.7 ppb (retest) (action level is 15 ppb – note that compliance limit is 420 ppb). Zinc exceeded the established Action Level but not the regulatory limit. Upon confirmation of results, the PH Wastewater Treatment facility ceased discharge to the environment. The source investigation determined that the copper and zinc exceedance were the result of brass components on the cooling loop that had lost their protective layer over time and began corroding. An extent of condition was performed and all suspect fittings have been replace to prevent recurrence.

6.3.3 Future Plans

CNL will continue to provide notification to the CNSC as required, based on licence conditions outlined in the licence condition handbook. CNL will continue to provide monthly, quarterly and annual reporting as required as well as reports on project progress, completion and significant milestones as required in the associated licence condition handbook.

6.4 Safety Analysis

6.4.1 Relevance and Management

The Safety Analysis Safety and Control Area was not applicable in the current licence period at PHAI. Although not applicable, information about CNL's Safety Analysis Program can be found in Section 7.2.

6.4.2 Future Plans

In 2021, CNL performed a gap analysis of CNSC *REGDOC-2.11.1 Volume III, Waste Management, Volume III: Safety Case for the Disposal of Radioactive Waste* [51] to identify aspects of the Safety Analysis Program that will be applicable in the future - the Safety Case. The Safety Case presents a body of evidence supporting the disposal or long-term management of radioactive waste. Primary inputs to the Safety Case include the safety assessments, which are typically broken down into an operational safety assessment and a post-closure safety assessment. Safety assessments for the PHAI will be developed in support of the facility Safety Case. The timelines associated with the development of the Safety Case are being developed at this time. CNL is currently discussing the implementation plans, expectations and timelines with CNSC staff.

6.5 Physical Design

The Physical Design Safety and Control area is comprised of the Design Program and the Configuration Management Program.

6.5.1 Relevance and Management

6.5.1.1 Design

The Design Authority and Design Engineering Functional Support Area maintains and controls the design basis of CNL within approved safety margins and regulatory requirements. It establishes the requirements for CNL design work and applies to all design engineering activities performed at CNL across all sites, including the PHAI. The purpose of the Design Engineering Functional Support Area is to ensure that design is planned, executed, verified, and documented according to applicable codes, standards, and regulatory and design customer requirements.

PHAI employs the CNL suite of design planning, development, and review procedures to the design works produced internally, and the *Oversight of Engineering Agencies* [52] procedure to design works produced by others, which form the majority of designs related to the PHAI.

With respect to design efforts, the Manager of Engineering Oversight is the Designated Engineering Manager and delegated a Design Authority by the CNL Chief Engineer to be a local point of responsibility.

6.5.1.2 Configuration Management

The Configuration Management Functional Support Area provides the framework to maintain and control the physical configuration of structures, systems and components at CNL. Configuration Management applies to all design, operations, decommissioning and maintenance activities at CNL sites. Configuration Management applies to all non-nuclear and nuclear documents, policies, programs and procedures that contain information or instructions that could impact the following:

- Design (both regulatory and owner prescribed) and licensing basis
- Any plant physical configuration

- Any configuration item or information

Configuration Management allows for maintaining and controlling the configuration of nuclear facilities within approved safety margins and regulatory requirements when changes or non-identical replacement parts are required. Configuration Management ensures that changes are assessed, approved, designed, implemented, commissioned and placed into service within the safety envelope at all CNL sites in accordance with the design requirements.

PHAI employs CNL's *Engineering Change Control* [53] program and *PHAI's Historic Waste Program Management Office Application of Engineering Change Control and Oversight* [54] procedure to all temporary and permanent modifications to facilities and sites. The process combines industry best practices for managing risks and ensuring ongoing configuration management. The Engineering Change Control process is overseen by the Historic Waste Program Design Authority and an assigned Operations Authority, which is the designated operational or project individual responsible for the safe operation of the facility and configuration management of the plant or site. Configuration Management personnel provide assistance with and oversight on the execution of the Engineering Change Control program by operational and project sites.

During construction, any design changes or deviations from technical specifications proposed by the construction contractor are required to meet the intent of Engineering Change Control process. The change management process will ensure design changes and improvements do not affect the overall design basis without thorough review and appropriate engagement and authorization and comply with established program requirements. Together, the Design Authority and Operations Authority are responsible for:

- Approving and authorizing all changes controlled by the Engineering Change Control process
- Ensuring that facility or project staff delegated to review proposed changes have full knowledge of their change control responsibilities, the change intent, and requirements of the facility or site
- Ensuring proposed design changes are reviewed with the same level of rigour as the original design
- Implementing, waiving or delegating existing hold points in the Engineering Change Control process
- Ensuring early engagement with the Historic Waste Program Licensing Manager and CNSC staff with respect to proposed changes that could reasonably be expected to have an impact on the design bases of facilities or project sites

6.5.2 Past Performance

To ensure systems, components and structures meet and maintain their design basis, PHAI project sites utilize effective change management principles. CNL has maintained and improved the physical design program over the licence period (2012 to 2022). Since 2016 PHAI has implemented CNL's Engineering Change Control program [53]. Figure 45 outlines the number of

Engineering Change Controls put in place since 2016. The majority of new change requests are for minor works at the WWTPs.

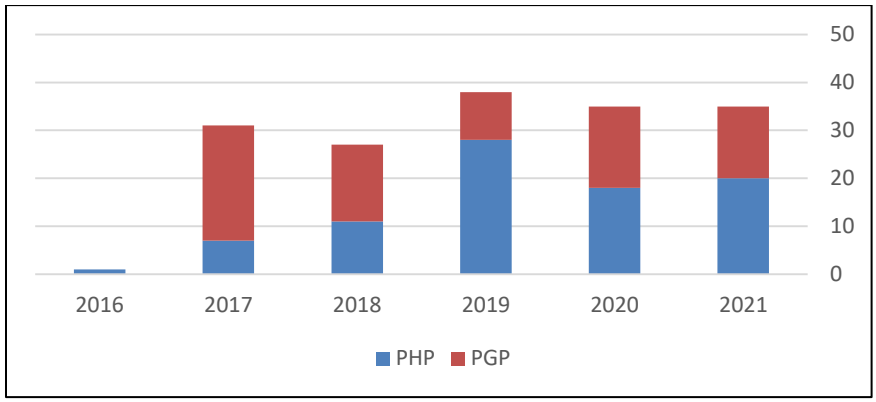


Figure 45: PHAI Engineering Change Requests Since 2016

The PGP engineering services, design services, and contract administration are contracted out to an external engineering consultant and due to the successful progression of the project, it was not deemed reasonable to migrate entirely to the Engineering Change Control program. Instead, additional focus was put on generating evidence of CNL review and acceptance of further technical decisions, in alignment with Engineering Change Control and regulator expectations.

The specific PHAI operational and project areas managed by this Safety Control Area include the PG and PH engineered containment mounds water treatment system for the PGP and the LTWMF containment mound and the wastewater treatment system for the PHP, and the large-scale, small-scale and industrial site remediation.

Port Granby LTWMF

The design of the LTWMF is an above-ground engineered mound with multi- barrier system. As per IAEA *Classification of Radioactive Waste* [55], this type of near surface facility is suitable for management of historic LLRW with limited regulatory control. CNSC staff assessed the PG Detailed Design Description Report [56] and Addendum [57] concluding that the proposed landfill type design will provide adequate long-term containment and isolation of the waste from the environment. The PG Detailed Design Description Report [56] and Addendum [57] are included as “Documents that Require Notification of Change” in the Port Granby Licence Condition Handbook [28]

PG Wastewater Treatment Plant

CNSC staff assessed the *PG Water Treatment Definition* [58] and considered AECL’s choice of technology acceptable in that it met the best demonstrated available technology principle in being economically achievable and capable of achieving high contaminant removal efficiencies. The PG WWTP is designed to meet the ongoing treatment requirements for the contaminants of potential concern associated with the LTWMF.

The treated water release criteria for the Port Hope and Port Granby wastewater treatment facilities were individually developed based on the unique characterization of the anticipated waste at the individual sites.

The PG WWTP does not have identified nuclear safety-related systems or nuclear pressure boundary requirements. Any proposed changes that had or have the potential impact the quality of the final effluent are identified as of concern to the CNSC.

The PG Design Basis Document is included as "Documents that Require Notification of Change" in the Port Granby Licence Condition Handbook [28].

Port Hope LTWMF

The design of the LTWMF is an engineered containment mound with multi- barrier system. As per IAEA *Classification of Radioactive Waste* [59] this type of near surface facility is suitable for management of LLRW with limited regulatory control. CNSC staff assessed the *PH LTWMF Detailed Design Description Report* [30] prior to the previous licensing and concluded that the proposed landfill type design for the PH LTWMF will provide adequate long-term containment and isolation of the waste from the environment. The *PH LTWMF Detailed Design Description Report* [30] is listed in the *PHP Licence Condition Handbook* [24] and required CNL approval prior to implementing any changes.

The PH LTWMF does not have identified nuclear safety-related systems or nuclear pressure boundary requirements. Any proposed changes that had or have the potential to reduce contaminant containment effectiveness, increase the maximum volume of the cells beyond existing contingencies, or reduce the effective lifespan of the containment mound are identified as of concern to the CNSC.

PH Wastewater Treatment Plant

CNSC staff assessed the Water Treatment Definition [60] and considered AECL's choice of technology acceptable in that it met the best demonstrated available technology principle in being economically achievable and capable of achieving high contaminant removal efficiencies. The PH WWTP has been designed to meet the ongoing treatment requirements for the contaminants of potential concern associated with the LTWMF. The *PH WWTP Design Basis Document* [61] is listed in the *PHP Licence Condition Handbook* [24] and required CNL approval prior to implementing any changes.

The treated water release criteria for the Port Hope and Port Granby wastewater treatment facilities were individually developed based on the unique characterization of the anticipated waste at the individual sites.

The PH WWTP does not have identified nuclear safety-related systems or nuclear pressure boundary requirements. Any proposed changes that had or have the potential impact the quality of the final effluent are identified as of concern to the CNSC.

Remediation of Large-Scale Sites

CNSC staff assessed the Detailed Design Description Reports [61], [62], [63], [64], and [65] for remediation sites prior to current licensing. The detailed engineering, design, and contract

specifications for the large-scale remediation sites are complete. The cleanup criteria are available in Appendix C of the current PHP WNSL licence [1].

The large-scale sites do not have identified nuclear safety-related systems. However, any changes to the existing cleanup criteria values, outside of the existing project Special Circumstances Protocol [18], are identified as of concern to the CNSC.

Remediation of Small-Scale Sites

The Small-Scale Sites do not have identified nuclear safety-related systems. However, any changes to the existing cleanup criteria values, outside of the existing project Special Circumstances Protocol are identified as of concern to the CNSC.

6.5.3 Future Plans

Future plans within this Safety Control Area include:

- Ongoing application of the Design and Design Authority and Configuration Management programs
- Ongoing participation in CNL Engineering Self-Assessments and performing additional HWP Engineering Oversight Self-Assessments

6.6 Fitness for Service

6.6.1 Relevance and Management

The Fitness for Service Safety Control Area has not been applicable during the current licencing period for the PGP, PHP, 344 or 182 licences. Fitness for Service is proposed to be included in the revised licence.

The focus of the maintenance program is to eliminate equipment related down time where possible and to minimize the loss of production due to equipment breakdowns.

The maintenance program for the Port Hope and Port Granby WWTPs follows the guidelines in CNL's company-wide fitness for service program. Company-wide requirements are used in conjunction with the computerized maintenance management system called PMXpert for which six additional procedures were developed and implemented for the PHP and PGP. The use of PMXpert allows for scheduling of preventative maintenance work orders at various intervals to maintain equipment service as recommended by the original equipment manufacturers thereby extending life expectancy of the equipment and minimizing down-time. Corrective maintenance work orders are used when equipment needs repair or replacement. The completed work orders are saved in the system for future troubleshooting and investigation purposes.

Through the categorization of all assets within the plants, a critical spares catalogue has been created and is constantly updated to include major equipment and various common parts/fittings required by the tradespeople for day-to-day maintenance.

6.6.2 Past Performance

Although not explicitly required under current PHAI licences, fitness for service is managed to ensure compliance with CNL's corporate fitness for service program including a comprehensive maintenance program. Operational uptime has been CNL's primary measure of the current maintenance program's success. This is of particular importance during periods of significant snow melt and/or precipitation. In the early years of operation, CNL was heavily dependent on contingency measures detailed in the site-specific Water Management and Contingency Plans to manage volumes of impacted water. Contingency planning included the utilization of large volume lake tanks (PG, refer to Figure 11), emergency storage ponds (PH) and the original wastewater treatment system (PH). As operation uptime has improved and system upgrades have been integrated, reliance on these contingencies has dramatically decreased. Current operational uptime at both Port Granby and Port Hope has improved to the point that all impacted water can be managed with the Port Granby and Port Hope WWTPs - CNL's primary wastewater treatment infrastructure. Improved system maintenance has been critical to this success.

6.6.3 Future Plans

The PHAI Maintenance Program, following guidance from the company-wide fitness for service program continues to evolve in a flexible, scalable fashion to mimic and right-scale the greater corporate maintenance program for the PHAI.

Ongoing program evolution and adaptive management continue to be implemented for the PHAI. A few specific details being evaluated include:

- **Maintenance Department** – CNL is currently in the process of enhancing its current maintenance team with Red Seal Certified trades such that ongoing maintenance activities can be self-executed.
- **Inventory Control** – The current PHAI inventory is typically limited to critical spares such that essential equipment can be assured to operate. CNL intends to expand this inventory to include general facility process components such as process piping, instrument gauges, etc.
- **Radiologically Active Maintenance Shop** – PHAI maintenance-related activities are currently limited by CNL's ability to complete maintenance and refurbishments in a suitably active maintenance facility. Planning is currently underway to enhance the Port Hope WWTP with an active maintenance area to facilitate maintenance and repair of contaminated or potentially contaminated equipment.

6.7 Radiation Protection

The Radiation Protection (RP) Program applies to the operation and activities that affect the safety of staff and equipment in terms of exposure to ionizing radiation at all CNL sites and applies to all employees and other personnel (e.g., visitors and contract staff) conducting work at CNL sites. The Radiation Protection Program applies to all activities conducted where CNL holds a CNSC issued licence in Canada.

The objective of the Radiation Protection Program is to ensure and demonstrate compliance with applicable CNSC regulations to maintain doses to workers as low as reasonably achievable (ALARA), considering social and economic factors. CNL applies the ALARA principle to all activities involving the use of ionizing radiation. All radiation doses to personnel or members of the public must be justified, in accordance with the ALARA principle, and maintained below regulatory limits.

Dosimetry is a necessary component of the program, providing a quantitative measure of the effectiveness of the Radiation Protection Program, as it applies to both the individual worker and the collective workforce. Radiation dosimetry is a key tool to demonstrate compliance with regulatory obligations mandated by the site licence. Dosimetry services for personnel and visitors are provided by CNL and other CNSC licensed dosimetry providers and are managed according to the CNL Dosimetry Program. These services include monitoring, assessing, recording, and reporting doses of ionizing radiation received by all individuals while onsite.

6.7.1 Relevance and Management

CNL's Radiation Protection Program

CNL's Radiation Protection Program is designed and implemented to ensure CNL complies with, or exceeds, the level of radiation safety that is required by the relevant regulations pursuant to the *Nuclear Safety and Control Act*. The fundamental objectives of the CNL radiation protection program are to:

- Limit the doses to less than the regulatory limits
- Limit detrimental stochastic health effects in employees and members of the public to levels as low as reasonably achievable, social and economic factors being taken into account (ALARA principle)
- Prevent detrimental non-stochastic (deterministic) health effects caused in employees and members of the public by the CNL use of radiation.

PHAI Radiation Protection Program

The PHAI Radiation Protection Program objectives continue to be achieved through continuous reviews, planning and control of work, personnel qualification and training, provision of internal and external dosimetry, radiation and contamination exposure control procedures, work supervision, and planning for abnormal hazards and exposures. As part of the program, the *PHAI Radiation Protection Plan* [66] provides a management framework and processes that are designed to ensure that radiation exposures arising from project activities will be maintained below regulatory dose limits and kept ALARA, economic and social factors taken into account.

The *PHAI Radiation Protection Plan* [66] is consistent with the requirements outlined in CNL's Corporate Radiation Protection Program and will evolve along with the corporate Radiation Protection program as required.

A comprehensive ALARA Program has been designed and implemented to ensure the provision of radiation protection is optimized for activities involving sources of radiation exposure so that the magnitude of individual and collective doses and the likelihood of incurring exposures

resulting from activities are kept ALARA, economic and social factors taken into account. This ALARA program includes the assessment and management of both stochastic and deterministic risks, and includes hazards resulting in effective, equivalent and committed effective doses.

PHAI Radiation Protection Plan

The *PHAI Radiation Protection Plan* [66] is an element of the overall CNL Corporate Radiation Protection Program and defines how the requirements of the corporate program are applied in the PHAI. This plan specifically:

- Demonstrates the application of CNL Radiation Protection and dosimetry processes if CNL is selected as the service provider to PHAI personnel and CNL contractors
- The criteria the Radiation Protection and dosimetry processes provided by external organizations to meet CNL Corporate Radiation Protection program requirements.

As such, the *PHAI Radiation Protection Plan* [66] describes which aspects of the program are applicable; the responsibilities of individuals managing and overseeing their application; the processes to be implemented; and the requirements to be met by contractors in order to provide effective RP and dosimetry coverage for the PHAI.

6.7.2 Past Performance

PHAI utilizes the Canadian Nuclear Laboratories CNSC licensed dosimetry services for external and internal radiation dosimetry for PHAI staff, contingent workers and some sub-contractors. External dosimetry is used to monitor for total whole body (effective) dose as well as shallow/skin (equivalent) dose. Extremity dosimetry are not typically required for PHAI project work due to the radiological source term in the waste from Port Hope and Port Granby. The PGP and PHP remediation contractors, performing work on behalf of CNL, may use an alternate CNSC-licensed dosimetry service provider for whole body (effective) and shallow/skin (equivalent) dose determination.

Radon dosimetry is provided through external radon dosimetry service providers.

All radiation dose obtained by both CNL, contract staff are consolidated and reported to the CNSC annually as part of the annual compliance monitoring reports. Public radiation dose estimates are determined as required based on environmental monitoring as outlined in Section 6.9.2.

6.7.2.1 Worker Dose Control

Radiological hazards result from exposure to uranium and decay progeny, including Thorium-230, Radium-226 and short-lived radon decay products and to a lesser extent isotopes in the natural Thorium-232 decay chain. The primary exposure pathway is external gamma radiation, followed by inhalation of radon gas and progeny. Inhalation and ingestion of long-lived radioactive dust also contributes to total effective dose but at a lower proportion due to effective dust management strategies. Radiation exposures of persons are monitored to ensure compliance with the CNSC's regulatory dose limits, PHAI Action Levels and to maintain radiation doses As Low As Reasonably Achievable (ALARA).

Each employee designated as a Nuclear Energy Worker (NEW), including attached staff, long-term contractors and long-term visitors working at a CNL licensed or non-licensed site, are assigned a dose control point. Dose control points are used for individual dose management and work planning purposes only and are considered Administrative Control Levels.

PGP Dose

The maximum annual effective dose received by a Nuclear Energy Worker at the PGP during the licensing period was 3.13 mSv in 2018, which is below the CNSC's regulatory effective dose limit for Nuclear Energy Workers of 50 mSv in a one-year dosimetry period.

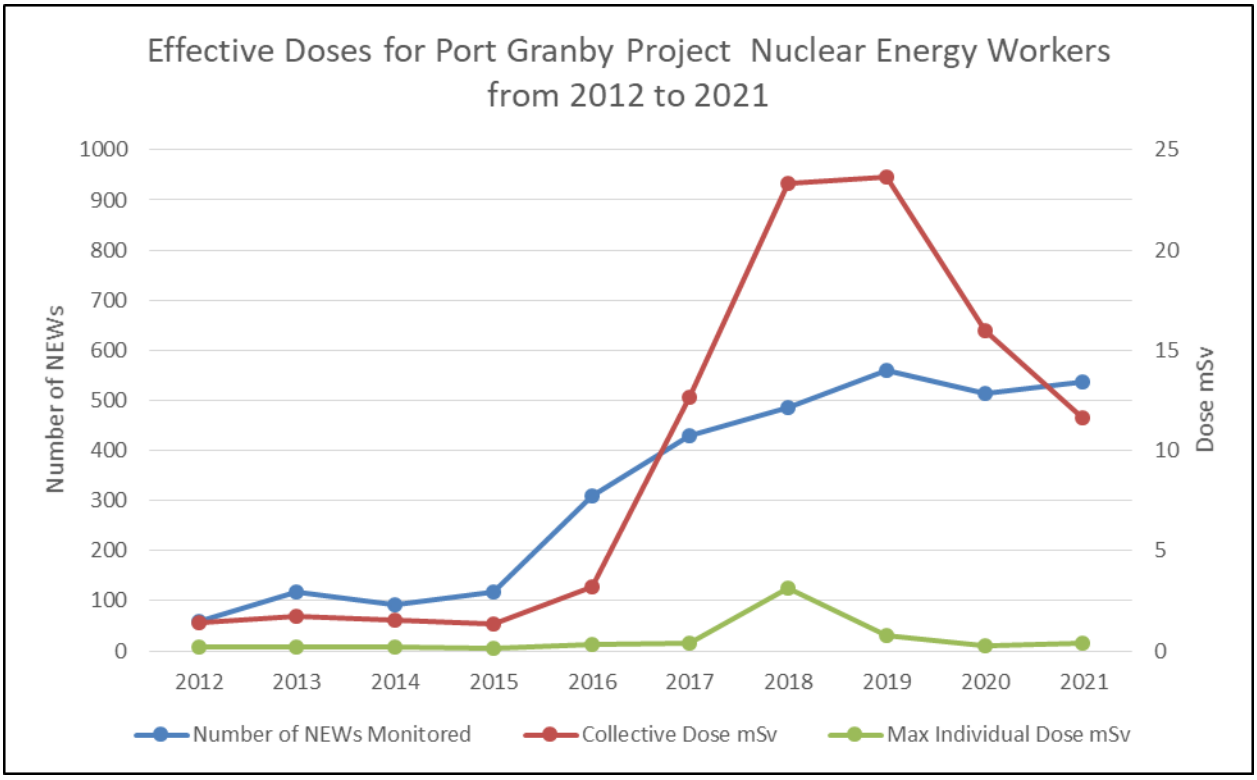


Figure 46: Dose Summary for PGP Nuclear Energy Workers from 2012 to 2021

For the five-year dosimetry periods that occurred during the licensing period - January 1, 2011 to December 31, 2015 and January 1, 2016 to December 31, 2020, the maximum cumulative effective doses received by Nuclear Energy Workers at the PGP were 0.58 mSv and 5.04 mSv respectively, which are well below the CNSC's regulatory effective dose limit of 100 mSv in a five-year dosimetry period. See Figure 46 for the collective dose and maximum individual dose for PGP Nuclear Energy Workers from 2012 to 2021, with a direct comparison against the total number of Nuclear Energy Workers. In the 5-year dosimetry period of January 1, 2016 to December 31, 2020 the PGP had an increase in scope of work, including remediation of the former site and capping of the engineered containment mound.

Equivalent dose to the skin for the PGP Nuclear Energy Workers are outlined below in Table 11. Equivalent dose to the skin closely mirrors the whole body effective dose on the PGP and are all well below the annual regulatory dose limit of 500 mSv/annum and below CNL's action levels.

Table 11: PGP, Equivalent Dose to the Skin, 2012-2021

Year	Average Skin Dose (mSv)	Maximum Individual Skin Dose (mSv)
2012	0.02	0.18
2013	0.01	0.20
2014	0.01	0.16
2015	0.01	0.16
2016	0.01	0.30
2017	0.04	0.34
2018	0.05	2.44
2019	0.05	0.79
2020	0.03	0.27
2021	0.03	0.44
Regulatory Dose Limit	-	500 mSv/annum

The recent dose results confirm that dose reduction measures were effectively executed and reflect the fact that the mound has been capped and the handling and hauling of radioactive waste was largely complete. Continuous ALARA practices and improvements have contributed to the low individual doses and collective doses in Figure 46.

Controlled Areas have decreased in size as source term has been effectively removed from active work areas, and activities at PGP are limited since the containment mound has been capped.

PHP Dose

The maximum single-year effective dose received by a Nuclear Energy Worker working on the PHP during the licensing period was 0.59 mSv in 2018, which is well below the CNSC's regulatory effective dose limit for Nuclear Energy Workers of 50 mSv in a one-year dosimetry period.

For the five-year dosimetry periods that occurred during the licensing period - January 1, 2011 to December 31, 2015, and January 1, 2016 to December 31, 2020, the maximum cumulative effective doses received by Nuclear Energy Workers at the PHP were 0.58 mSv and 1.16 mSv respectively, which are well below the CNSC's regulatory effective dose limit of 100 mSv in a five-year period.

Project collective and maximum individual dose for PHP Nuclear Energy Workers from 2012 to 2021 are outlined in Figure 47, with a direct comparison against the total number of Nuclear Energy Workers. In the 5-year dosimetry period of January 1, 2016 to December 31, 2020 the PHP had increased in scope of work, while currently peaking on volume of materials and soil handled. ALARA work practices and work control improvements have contributed to the low individual doses and collective doses in Figure 47. Evident in 2021, an increase of Nuclear Energy Workers numbers still showed an overall decrease in Nuclear Energy Worker collective dose owing to the comprehensive ALARA program implemented by CNL.

Equivalent dose to the skin for the PHP Nuclear Energy Workers are outlined below in Table 12. Equivalent dose to the skin closely mirrors the whole body effective dose on the PHP and are all well below the annual regulatory dose limit of 500 mSv/annum and below CNL's action levels.

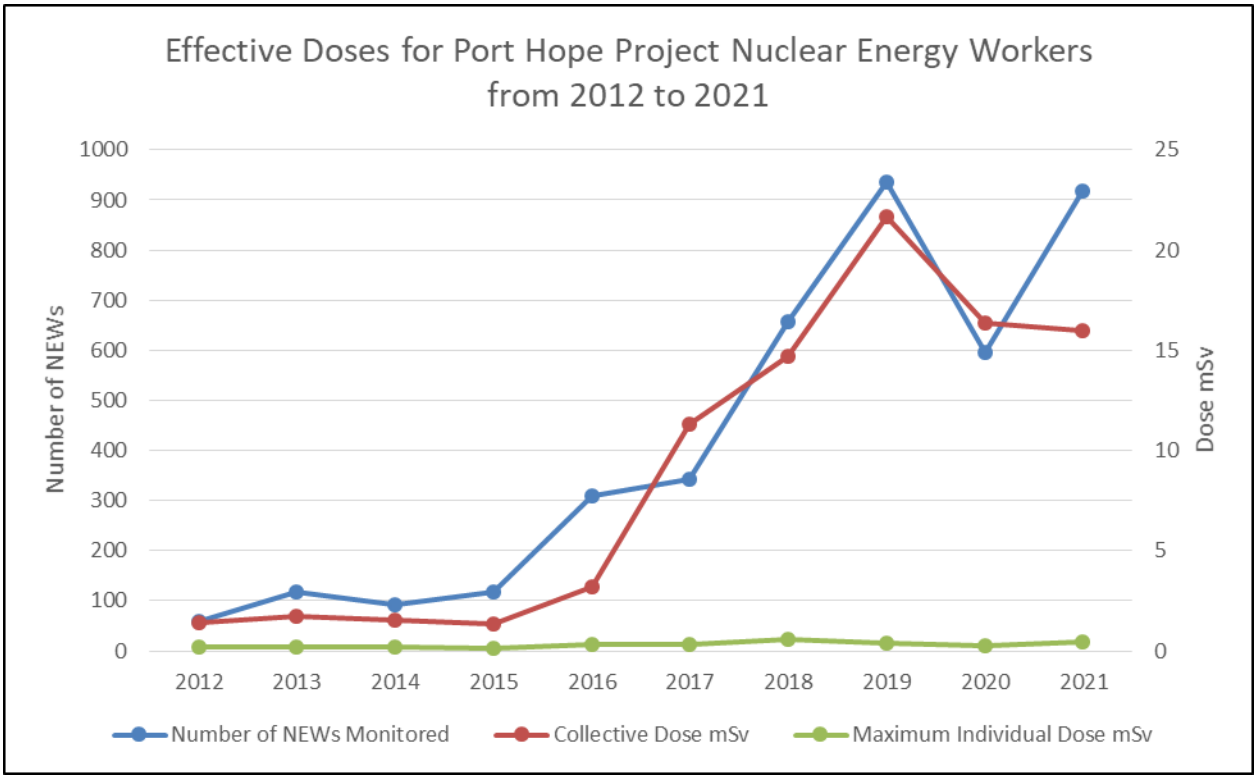


Figure 47: Dose Summary for PHP Nuclear Energy Workers from 2012 to 2021

Table 12: PHP, Equivalent Dose to the Skin, 2012-2021

Year	Average Skin Dose (mSv)	Maximum Individual Skin Dose (mSv)
2012	0.02	0.18
2013	0.01	0.20
2014	0.01	0.16
2015	0.01	0.16
2016	0.01	0.30
2017	0.04	0.34
2018	0.04	0.33
2019	0.04	0.60
2020	0.03	0.27
2021	0.02	0.44
Regulatory Dose Limit	-	500 mSv/annum

Port Hope Radioactive Waste Management Facility Project and Pine Street Extension Temporary Storage Site

CNL staff, who work at the PHP, PGP, Port Hope Radioactive Waste Management Facility (WNSL-W1-344-1.8/ind.) (i.e., 344 sites), and Pine Street Extension Temporary Storage Site (WNSL-W1-182.1/2021) (i.e., 182 sites) wear the same dosimetry between sites. Consequently, the dose information for the 344 sites and 182 site is incorporated in the reportable dose above for the PHP.

6.7.2.2 Public Dose Estimates

As of 2014, CNL began providing public dose estimates to the CNSC in its annual reporting resulting from exposure to gamma radiation from site activities. In 2014 to 2016 for the PHP, an occupancy factor of approximately 158 hours per year was used in calculation of public dose estimates from environmental gamma monitoring sites. Starting in 2017, PHP adjusted the occupancy factor to 60 hours. In 2018, the PHP provided a modified approach to calculate public total effective dose inclusive of radon exposure.

In 2014, PGP began providing public dose estimates using an occupancy factor of 60 hours/a as described in the 2015 response to the CNSC, Public Dose Estimates for the former Port Granby Waste Management Facility [67]. In 2019, the PGP report modified the approach to calculate public total effective dose, inclusive of radon dose estimates. Figure 48 below provides the public dose estimates during the licensing period for both the PHP and PGP.

Over the licensing period, the highest recorded public dose estimate was 93.52 µSv for the year of 2015 for the PHP which is approximately 9.4% of the annual public dose limit of 1 mSv (1000 µSv). In more recent years (2021), PHP and PGP public dose estimates were 23 µSv and 41 µSv respectively, which represents 2.3% and 4.1% of the annual public dose limit respectively.

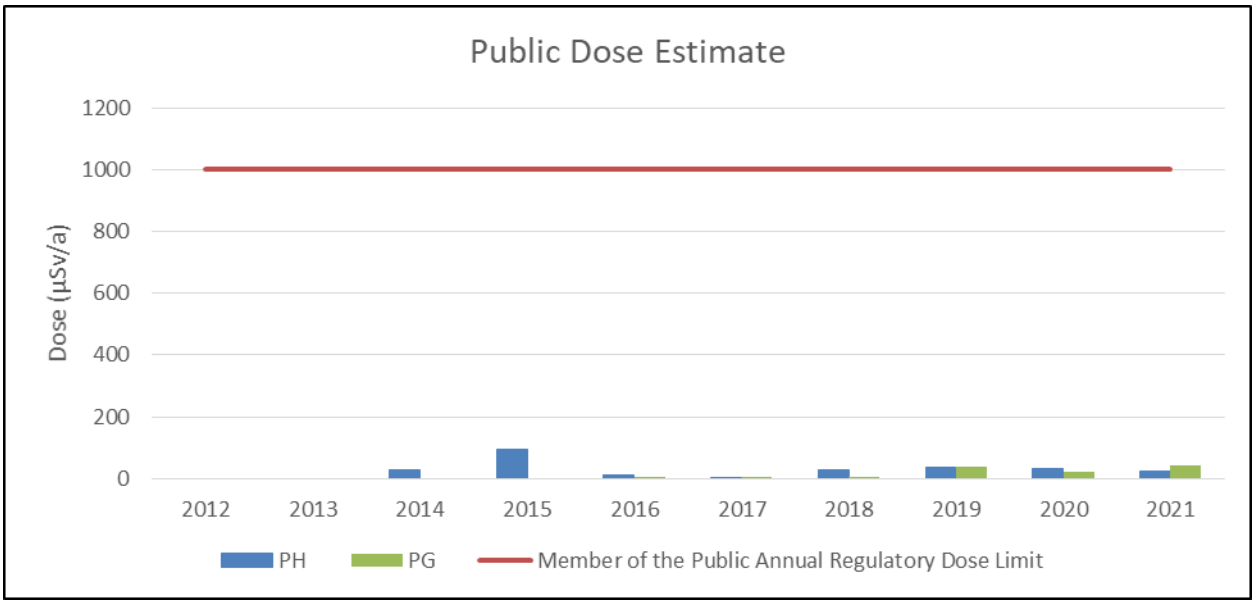


Figure 48: Public Dose Estimate

6.7.2.3 Radiation Protection Program Performance

CNL maintains and implements a robust RP program as required by the CNSC's *Radiation Protection Regulations* [68]. The *PHAI Radiation Protection Plan* [66] aligns with CNL's corporate RP program. The radiation protection program has been maintained and improved over the licensing period through a model of continuous improvement. The PHAI Radiation Protection program ensures contamination levels and radiation doses received by individuals are monitored, controlled, and maintained ALARA. The PHAI Radiation Protection program manages and describes requirements to be met by remediation contractors to provide effective Radiation Protection controls for all PHAI sites.

CNL performs frequent oversights, self-assessments and regularly evaluates its processes against industry best practices and CNSC regulations to ensure an effective Radiation Protection program.

Radiation Protection Compliance Oversight

The *PHAI Radiation Protection Plan* [66] describes the requirements to be met by contractors in order to provide effective radiation protection practices for the PHAI. CNL performs frequent oversight on the implementation of the Radiation Protection Program by external contractors to ensure compliance with CNL approved plans, processes and CNSC regulations.

Action Level Exceedances

CNL has established Action Levels for parameters including total effective, equivalent, and committed effective doses for Nuclear Energy Workers over a corresponding dosimetry monitoring period. Action Level exceedances are reported to the CNSC when they occur and detailed investigations and corrective actions are evaluated by CNL. Details on Action Level exceedances over the licencing period can be found in Section 6.3.2.

6.7.3 Future Plans

CNL continues to utilize the *PHAI Radiation Protection Plan* [66] and apply the Radiation Protection Program to all project sites. The Radiation Protection program will continue to align with both regulatory and corporate radiation protection objectives and meet industry best practices. CNL will continue to utilize performance indicators to improve its Radiation Protection Program.

6.8 Conventional Health and Safety

The PHAI has both federal and provincially regulated project sites and workers. To address these broad and complex dynamics, CNL has developed the *PHAI Occupational Safety and Health Plan* [69] to outline all applicable conventional health and safety programs and practices implemented through all phases of the PHAI. The *PHAI Occupational Safety and Health Plan* comprises and is consistent with all applicable components of Canadian Nuclear Laboratories' (CNL) Occupational Safety and Health Program. CNL employs guidance from *CNSC REGDOC-2.8.1, Conventional Health and Safety*. The purpose of the *PHAI Occupational Safety and Health Plan* is to ensure that the health and safety of all applicable personnel, members of the public

and the community at-large, are adequately protected, that all conventional health and safety regulatory requirements are met and that risk is controlled to as low a level as reasonably achievable in line with applicable regulatory expectations.

6.8.1 Relevance and Management

The *PHAI Occupational Safety and Health Plan* differentiates and outlines specifics criteria with respect to federally and provincially regulated worksites. Federally regulated worksites and personnel are bound by the Canada Labour Code and must comply with all CNL internal corporate program, practices and policies as outlined in CNL's Occupational Safety and Health program. These sites are controlled and operated by CNL personnel and staff. Provincially regulated worksites and contractor personnel are bound by Ontario's regulatory framework. These workplaces at minimum must comply with the *Ontario Occupational Health and Safety Act* (OHSA) [70] and its applicable regulations. A significant portion of PHAI-related activity falls under the Ontario definition of a Construction Project. For these activities, CNL clearly identifies the scope and boundaries of such Construction Project activities. Construction Project activity undertaken by a provincially regulated contractor have a Constructor designated and defined by CNL per the *Ontario Occupational Health and Safety Act,* to complete the work and ensure the Project work activities comply with all applicable health and safety legal requirements.

To ensure a consistent approach with respect to CNL's conventional health and safety expectation for contractors, *CNL has further created the Historic Waste Management Contractor Health and Safety Plan Submission Criteria* [72]. This standard has been integrated within the *PHAI Occupational Safety and Health Plan*. The standard's criteria outline CNL's minimum expectation for contractor's project-specific health and safety plans, programs and practices. Additionally, CNL has developed the *Port Granby Phase 3 Long-Term Waste Management Health and Safety Plan* [71] further appended as a supplement to the *PHAI Occupational Safety and Health Plan* to outline Phase 3 health and safety criteria for the PGP.

CNL has established an active Site Safety and Health Committee for CNL controlled PHAI work sites under federal jurisdiction. The committee adapts to meet the evolving needs of the PHAI and ensures appropriate representation and function with time. CNL's corporate Safety and Health Policy Committee further oversees company-wide health and safety matters. CNL's Policy Committee has PHAI representation in its membership. Provincially regulated contractors are required to have health and safety representation or joint health & safety committees per legislative requirements for their workplaces and construction project sites.

6.8.2 Past Performance

CNL monitors performance against conventional health and safety requirements through a variety of leading and lagging indicator measures. Extensive work has been completed throughout the current licence period to improve the rigour and tracking of these measures across the PHAI. Proactive monitoring of the project's compliance with applicable regulatory, program and procedural requirements, occurs through formal and informal oversight activities. CNL completes extensive contractor pre-qualification, readiness reviews, qualification verification audits and routine monitoring of contractors to help ensure contractor compliance

to their project-specific and legislative obligations. CNL's conventional health and safety oversight activities comply with CNL's overall oversight procedure [42]. Oversight activities are completed by dedicated CNL Occupational Health and Safety staff embedded within CNL's project management functions, project management staff, workplace supervisors and site health and safety committees. For sites that have a designated provincial constructor, CNL oversight activity occurs to complement the constructor's provincial accountability to help ensure all provincial health and safety statutory requirements are implemented. These observations result as a consequence of routine field presence where staff conducted site walkthroughs, inspections and audits.

Table 13 outlines lagging indicator injury performance metrics for the PHAI. Measured across both federally regulated sites and contractor-controlled provincially regulated sites, the average annual Lost Time Injury Frequency rate for PHAI activities was 0.0 during 2012 to 2016. Since 2017, where the volume and complexity of Phase 2 activities began to grow, the average annual Lost Time Injury Frequency is 0.43. As Canada's largest, and most historic, environmental construction remediation project, PHAI Lost Time Injury Frequency rates are amongst the lowest in Ontario compared to comparable WSIB industry rate averages [73]. This outcome can be attributed to CNL's unyielding dedication to focus on conventional health and safety expectations and continual improvement.

Table 13: PHAI lost-time events – Inclusive of CNL and Contractor Data.

Parameter/Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Lost Time Events[8]	0	0	0	0	0	0	0	3	0	2
Lost Time Injury Frequency Rate	0	0	0	0	0	0	0	1.77	0	0.40
Lost Time Injury Severity Rate	0	0	0	0	0	0	0	234.7	0	2.43

CNL has further completed extensive investigation, follow up activities and the implementation of robust correction actions in relation to five CNSC occupational and safety-related serious reportable events utilizing CNL's Corrective Action Program. This includes implementation of enhanced and robust controls and measures in relation to safe work practices, personnel training and use of appropriate personal protective equipment during work activities that may pose a hazard in relation to hydrogen sulfide. Extensive review, investigation and implementation of robust safe work practices, including equipment design changes, in relation to tasks involving roll-off bin utilization as a follow up to a leg fracture event in 2019 (see Table 10 in Section 6.3.2 for further details) and the completion of a comprehensive incident

[8] Lost-Time definitions follow Ontario WSIB criteria.

investigation to identify and implement corrective actions across PHAI activities relating to the hazard of making contact with overhead powerlines.

Independent of injury performance CNL promotes a culture of health and safety reporting across the PHAI and encourages the reporting of all safety issues and incidents regardless of significance for tracking, trending and follow up purposes. CNL ensures all reported events are assessed for their potential risk level. Throughout the current licence period CNL has engaged in extensive follow up activities on CNL-controlled and contractor-controlled sites, in collaboration with our contractor partners, to review, assess and implement applicable corrective actions for reported hazard observations, low significant events and identified health and safety areas of opportunity. CNL has completed several project-wide "safety-pauses" as a result of undesired incident trends. During these safety pauses, staff have the opportunity to review and reset workplace practices, review incident trends and common causes, complete workplace inspection and training and provide the opportunity for workers to discuss any health and safety concerns.

CNL has implemented the *Integrated Work Control* [74] across all PHAI sites inclusive of contractors. Integrated Work Control ensures robust rigour and discipline during work planning and execution. This includes a structured approach for hazard and risk identification, involvement of applicable personnel to help develop work-control practices and improved coordination and communication practices for the work execution and follow up phases of work activities. CNL has allocated a significant amount of resources to support the implementation of Integrated Work Control.

Since the start of the COVID-19 pandemic in March 2020, CNL implemented IAEA-recognized globally recognized COVID-19 protocols across all PHAI activities exceeding all Government of Canada and provincial recommendations. Robust protective measures were implemented at all CNL and contractor-controlled project sites including comprehensive training, awareness and compliance monitoring campaigns.

6.8.3 Future Plans

CNL will continually improve its practices and approach to manage its health and safety obligations and strive for a culture of excellence in safety through a variety of practices, awareness campaigns and initiatives including:

- Implementation of a comprehensive CNL-wide safety culture excellence initiative with dedicated PHAI representation
- Implementation of a comprehensive CNL-wide safety culture excellence initiative with dedicated PHAI representation
- Significant enhancement of communication with PHAI personnel empowering them with the authority to stop unsafe work
- Continued implementation of CNL's Integrated Work Control program
- Increased health and safety personnel resourcing to supporting the PHAI through the presence of field-level safety specialists to support, coach and mentor project workers for maximum success and compliance.

- Initiation of a PHAI-wide contractor safety forum and safety recognition program in collaboration with CNL's contractor partners

Health and safety are core CNL values. CNL will continue its unyielding commitment to ensure all health and safety obligations are met and continually improve.

6.9 Environmental Protection

6.9.1 Relevance and Management

The Environmental Protection Program implements CNL's Environment Policy and ensures environmental compliance and obligations are fulfilled, as applicable, at CNL-operated sites in Canada.

The Environmental Protection Program applies to operations and activities that may affect the environment in and around CNL sites. A graded approach to requirements is applied based on environmental risks or events that could occur at any given location and considering the amount of control or influence that CNL has on the activity. The Environmental Protection Program also applies to all CNL employees, contractors and consultants conducting work at CNL sites.

CNL has implemented and maintained an Environmental Protection Program that includes a set of action levels to monitor against CNSC-approved environmental parameters, to ensure protection of workers, the public and the environment from licenced nuclear activities. CNL has also established action levels for the WWTP effluent discharges at PH and PG. These action levels include Radon-226, arsenic, uranium and a suite of other non-radiological parameters.

CNL's Environmental Protection Program applies to these licenses sites and the work performed on the PHAI. Each CNSC license includes defined release limits and action levels that were established and implemented to control releases to the environment in compliance with CSA N288.8-17, *Establishing and implementing action levels to control releases to the environment from nuclear facilities* [75]. Action levels are set below release limits to identify potential loss of control events so that problems are addressed before they reach the release limit level. Both action levels and release limits are set to be highly protective of the environment. PHAI has reported to the CNSC, as required, when an action level or release limit has been reached.

In the current licensing period, CNL has established environmental monitoring action levels associated with radon in air concentrations and environmental gamma exposure at site perimeters. These radon in air concentrations were established for all licences and projects sites during the early years of the licensing period. In 2018, with the CNSC approval of the *PHAI Radiation Protection Plan*, Rev 5, action levels for the Port Hope and Port Granby Projects were replaced with trigger levels. Action levels continued to be applicable to the 344 sites and 182 sites post-2018 and have been reported to the CNSC when exceeded.

When action levels are exceeded, CNL initiates an investigation to evaluate any loss of control and impact on personnel, the public and the environment. After an investigation is complete, CNL takes any required steps to evaluate the potential public or environmental impact and prevent recurrence. Should CNL be successful in its licence renewal and consolidation

application, the PHAI trigger level for radon, outlined in the *PHAI Radiation Protection Plan* [66], established at 150 Bq/m^3 will become applicable for both 344 and 182 licenced sites. Action levels for ambient gamma radiation or radon concentrations will not be established. Action levels specific to radiation dose to workers or a member of the public have been established and accepted by the CNSC and will be used exclusively. Trigger levels, if reached, initiate a health physics assessment using site-specific parameters to assess the potential dose to workers or members of the public.

Figure 49 presents the total number of action level and release limit exceedances reported to the CNSC, for all four licenses, between 2012 and 2022; only a single regulatory limit has been reached in the current licencing period.

Figure 44 above provides additional detail on the action level exceedances, demonstrating the number of exceedances associated with each license for the same reporting period.

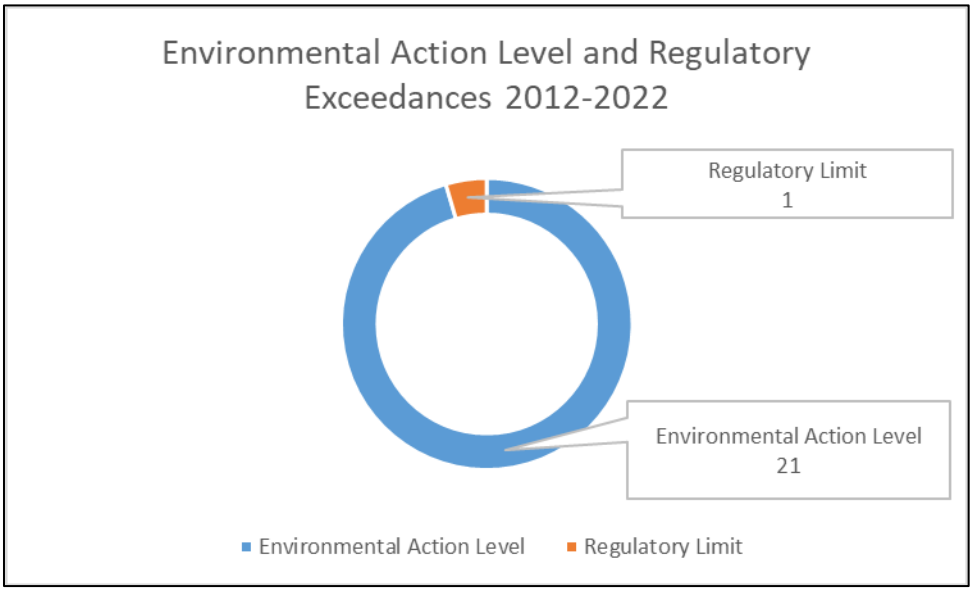


Figure 49: Action Levels and Release Limit Exceedances, 2012-2022

6.9.1.1 EA Follow-Up Program Overview

The Environmental Assessment (EA) Follow-up Program was designed to monitor the effects of the PHAI including effluent and environmental monitoring [14] [15]. The program was developed based on guidance from the EAs for Port Hope [7] and Port Granby [8] and their respective Screening Reports [76] [77].

The EA Follow-up Program includes the following elements as presented in Figure 50, which are discussed in more detail in Section 6.9.1.3 and 6.9.1.4.

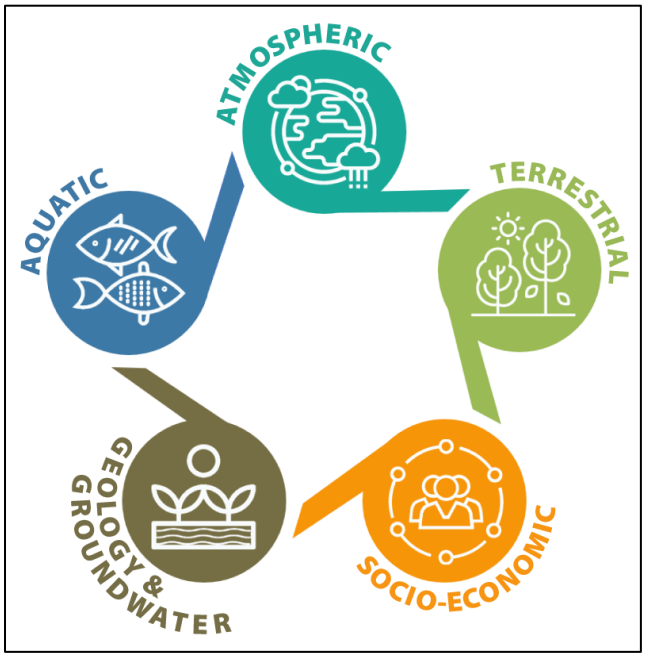


Figure 50: EA Follow-up Program Elements

These programs are tailored to site-specific conditions, and individual Environmental Protection Plans are developed for each site based on the characteristics and features present on that site. This includes monitoring of effluent from the Port Hope and Port Granby WWTPs.

6.9.1.2 EA Follow-up Program Development and Management

EA follow-up programs have been developed for the PHP and the PGP, which provide the framework for the development and implementation of a follow-up program. The plans have the following objectives:

- Document commitments for both the biophysical and socio-economic aspects of the PHAI considering the requirements of the EA Screening Report and the associated record of decisions
- Verify the accuracy of the EA predictions
- Confirm implementation of mitigation measures
- Assess the efficacy of the mitigation measures
- Identify any unanticipated environmental effects

The EA follow-up programs provide the schedule for implementing the various follow-up program elements over the course of the Port Hope and Port Granby projects and are aligned with the project phases as outlined in Section 1.4.

Phase 1 included activities to confirm and supplement baseline monitoring data undertaken during the EA. Phase 2 includes the verification of predicted environmental effects and the effectiveness of mitigation measures. Phase 3 will include long-term monitoring and maintenance of the remaining licensed sites. Performance of the Port Hope and Port Granby projects to date indicates that the anticipated effects of the projects, and the mitigation

measures chosen to reduce or eliminate those effects, were well documented in the environmental assessment reports. The Socio-Economic Effects Monitoring Program and the Biophysical Monitoring Program, and the associated implementation plans have ensured that CNL is being protective of the human and physical environment.

In cases where the follow-up requirements include the provision to 'verify implementation of mitigation measures', the provision is included as a specific feature of the follow-up program. It is to be noted, however, that as the proponent for the projects, CNL is required to ensure and verify that all identified mitigation measures prescribed in the EA Screening Reports are implemented as intended. This is performed through a variety of means, including proponent-led monitoring activities, incorporation of project-specific requirements of contractors and quality assurance inspections during the work.

Adaptive Management

During the environmental assessment process, it was recognized that conditions during project implementation may differ slightly from what had been planned/predicted, which is why the adaptive management approach was used to allow for the continuous improvement of environmental management practices by learning from their outcomes. The concept of adaptive management is at the core of an EA follow-up program which is, by definition, a process which has the objective of evaluating environmental conditions CNL can identify and, if necessary, implement new or improved mitigation measures in response to changes in those conditions.

Adaptive management as it relates to effects mitigation and environmental monitoring, integrates design, management and monitoring data to systematically test assumptions, learn from experience, and apply the knowledge gained (e.g., adapt) to subsequent actions. As stated in the *Screening Reports for the Port Hope and Port Granby Long-Term Low-Level Radioactive Waste Management Project* [76] [77]:

> *'Through the follow-up program, if the environmental effects related to the Project are found to differ significantly from those predicted, the RAs would work with the proponent to re-evaluate and adjust mitigation measures to ensure successful completion of the project without significant adverse effects.'*

Adaptive management ensures the program remains valid, appropriately encompassing, and responsive to the objectives. CNL is committed to ensure adaptive management protocols encompass all project parameters.

The monitoring programs are routinely evaluated and their scopes adjusted to consider such aspects as changing site conditions or the need to re-focus on specific operational or environmental issues of uncertainty or concern. Plans are reviewed periodically reflecting construction and implementation activities.

6.9.1.3 EA Follow-up – Socio-Economic Monitoring Program

The socio-economic monitoring programs incorporates the EA follow-up requirements of the Screening Reports while considering the guiding principles proposed during the EA studies. They consist of the following individual monitoring plans:

- **Real Estate Monitoring & Property Effects Monitoring**: The Property Value Protection and real estate transaction monitoring program were established during the preconstruction period and will continue through the construction period (Phase 2).
- **Business Monitoring**: Business and tourism surveys were conducted during the preconstruction period to establish baseline conditions. These surveys will continue annually throughout the construction period.
- **Traffic and Transportation System Monitoring**: Road & bridge baseline conditions were established under a comprehensive assessment performed in 2010 and repeated in 2012. This included a survey of roads in Port Hope, an assessment of bridges and multiple culverts (as per the provincial guidelines for bridge inspections), an assessment of manholes, catch basins and water valves and traffic counts at different predetermined locations. Meetings with school boards were conducted to discuss potential impacts during Phase 2 of bus pickup/drop off along transportation routes. These meetings and presentations will continue during Phase 2 and will include parent council meetings.
- **Archaeological and Heritage Resources Monitoring**: A qualified and licensed archaeologist has been retained for the construction phase to ensure identification, protection, documentation and preservation of any artefacts or human remains encountered during excavation activities and to ensure that workers are trained in identifying such artefacts and their responsibilities upon discovering such items.
- **Traditional Use of Land and Resources Monitoring**: CNL has established communication channels with interested Indigenous communities and organizations to incorporate their input into pertinent project components (see Section 2).
- **Cumulative Effects Monitoring**: Public Attitude Surveys have been completed and will continue through the construction period (see Section 2).

The socio-economic monitoring program is routinely re-evaluated and adjusted to reflect evolving site conditions or the need to focus on aspects or issues of uncertainty or concern.

6.9.1.4 EA Follow-up – Biophysical Monitoring Program

The Biophysical Monitoring Program incorporates the EA follow-up monitoring requirements in the atmospheric environment, aquatic environment, geology and groundwater environment, terrestrial environment and human health and safety. See Figure 51 and Figure 52 for an overview of the EA follow-up monitoring locations in Port Hope and Port Granby, respectively.

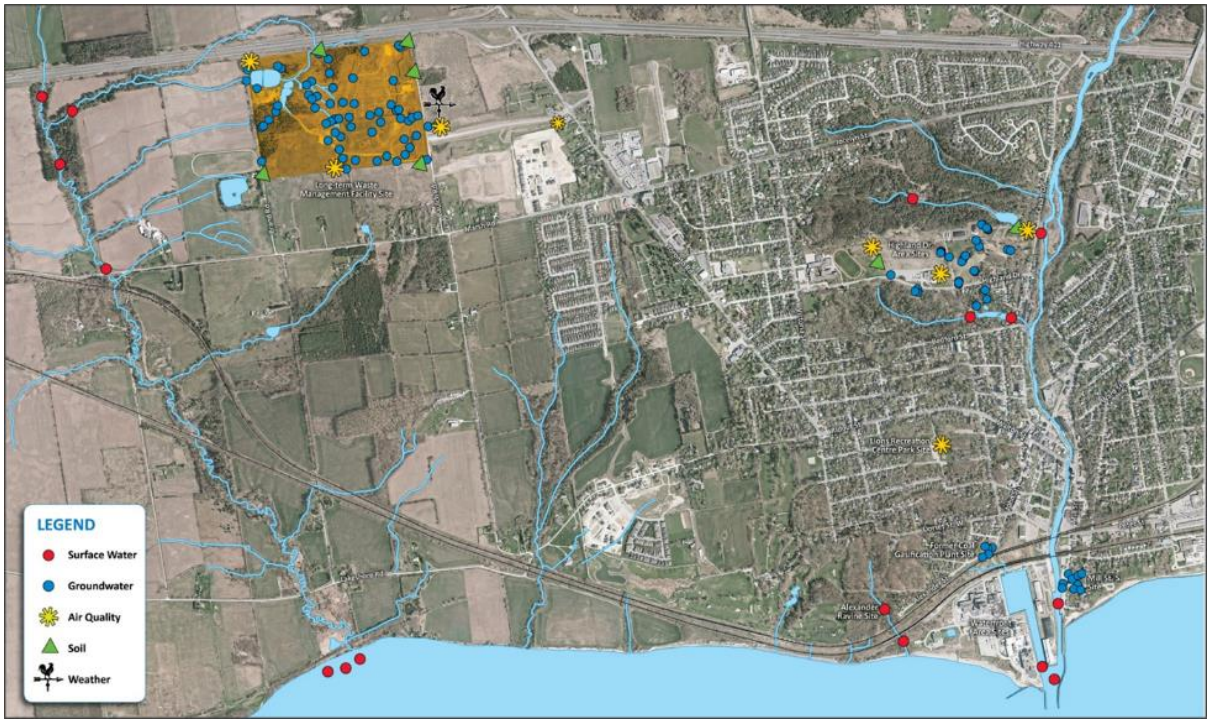


Figure 51: EA Follow-Up Monitoring Locations – Port Hope.

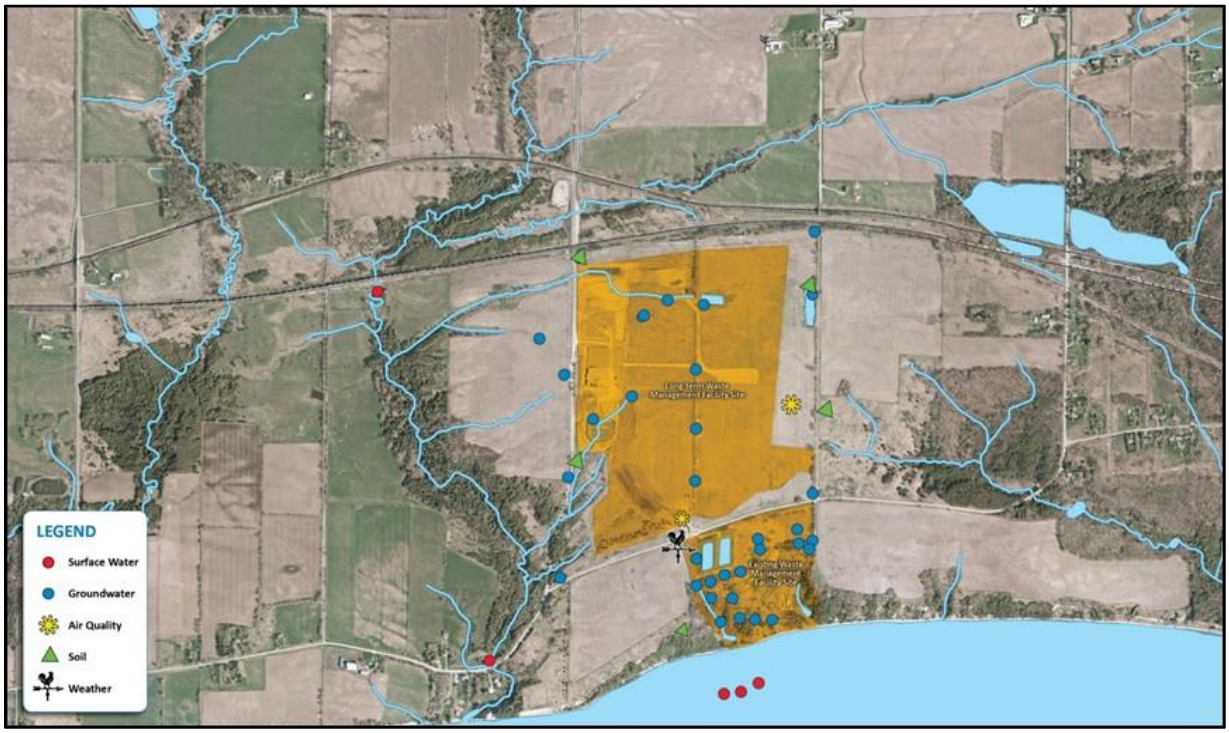


Figure 52: EA Follow-Up Locations – Port Granby.

- **Atmospheric Environment***:* The monitoring associated the atmospheric environment subcomponents (e.g., air quality, both radiological and non-radiological parameters, noise, odour, VOC, PAH and dust) is completed during all phases of the PHAI. The prescribed EA follow-up monitoring activities in the atmospheric environment include elements associated with air quality (radiological and non-radiological parameters), noise and odour. EA follow-up in the atmospheric environment was required in advance of construction activities and during both Phase 2 and Phase 3.
- **Aquatic Environment***:* The aquatic environment monitoring sub-components (e.g., surface water and sediment quality including both radiological and non-radiological parameters, and hydrology) are required during all phases of the PHAI. The prescribed follow-up monitoring activities in the aquatic environment include elements associated with surface water quality (non-radiological parameters) and sediment quality (i.e., with regard for the beneficial effects of improved quality in the Port Hope Harbour).
- **Geology and Groundwater Environment***:* a comprehensive program of monitoring of geology and groundwater environment sub-components (e.g., soil, groundwater and drainage water quality including both radiological and non-radiological parameters, and groundwater flow) are required during all phases of the PHAI. The prescribed follow-up monitoring activities in the geology and groundwater environment includes elements associated with soil quality; groundwater quality; and drainage water volume, groundwater levels and flow.
- **Terrestrial Environment***:* The monitoring of the terrestrial environment regarding the recovery of vegetation loss is performed at points in time following completion of the construction activities to evaluate and compare reinstated conditions to preconstruction conditions. The data collected during this program will meet the EA follow-up needs and will be used and interpreted for the EA follow-up commitments.
- **Human Health and Safety***:* The monitoring of radiation doses for workers and oversight with regards to occupational safety and health during Phase 2 of the PHAI. The data collected will meet the EA follow-up needs and will be used and interpreted for the EA follow-up commitments.

In addition to these elements of the Biophysical Monitoring Program, CNL staff regularly monitors the effluent produced at the Port Granby and Port Hope WWTPs. Monitoring of the effluent aids in the assessment of the overall performance and design features of the LTWMFs and WWTP effluent. Section 4.3.3 describes the performance of the Port Granby WWTP and effluent streams. Section 5.3.3 describes the performance of the Port Hope WWTP and effluent streams.

6.9.1.5 EA Follow-up Program Assessment

The effectiveness of the Environmental Protection Program is assessed and reviewed through several venues including:

- Annual Environmental Management System Review conducted through the Environmental Protection Program, which covers a summary of required inputs and outputs for the ISO 14001:2015, Standard for Environmental Management Systems [78].
- Annual Effluent and EA follow-up reporting (Annual Compliance Monitoring Reports) to the CNSC.
- Quarterly Nuclear Performance Assurance Review Board meetings including line management and Senior Management, where specific environmental performance updates are provided for the previous quarter.

Figure 53 below shows some of the environmental monitoring activities performed by CNL as part of the EA Follow-Up Monitoring program.

Figure 53: EA Follow-Up Monitoring Activities

6.9.2 Past Performance

Changes from the baseline are minimal and generally within the EA predictions, though when a deviation is found between predicted effects and what is being measured, adaptive management practices are applied to determine what additional mitigation measures are required.

An example of this occurred at the Port Hope Harbour dredging operations and contaminant migration. The original EA prediction used theoretical/predicted data inputs to the model and made certain assumptions regarding inflows and how the inner harbour would be isolated. In

the fall of 2021, it was determined that actual conditions related to daily inputs of water to the inner harbour during dredging were different than anticipated during the EA, which resulted in a different set of conditions. Specifically, levels of total and dissolved arsenic and uranium exceeded predicted levels in the water column.

CNL engaged the regulators (Canadian Nuclear Safety Commission; Environment and Climate Change Canada; Department of Fisheries and Oceans; Ministry of the Environment; Conservation and Parks; Ministry of Northern Development, Mines, Natural Resources and Forestry; and Ganaraska Region Conservation Authority) to ensure transparency and solicit feedback in the development of a path forward to ensure the ongoing protection of Lake Ontario and the Ganaraska River. This has resulted in the creation of a robust monitoring program to ensure the protection of the aquatic environment while dredging activities continue at the Port Hope Harbour.

CNL's comprehensive EA follow-up program expands sampling requirements as remediation activities continue to proceed through the phases. Table 14 summarizes the number of samples collected, based on project and media since 2016. It is important to note that remediation activities commenced in 2016 on a select few sites and in 2018, activity expanded to residential sites and large-scale sites. In addition to CNL sampling, third-party daily monitoring of dust and odour supports remediation activities.

From the start of the COVID-19 pandemic in March 2020, CNL continued to conduct the EA follow-up monitoring to ensure program requirements were met. CNL followed all pandemic guidelines to ensure the health and safety of staff and the public.

Table 14: Number of EA Follow-Up monitoring samples collected (2016-2021)

Sample Media	2016			2017			2018			2019			2020			2021		
	Port Hope	Port Granby	Total	Port Hope	Port Granby	Total	Port Hope	Port Granby	Total	Port Hope	Port Granby	Total	Port Hope	Port Granby	Total	Port Hope	Port Granby	Total
Air	1663	1512	3175	1688	1529	3217	2749	1575	4324	2096	1460	3556	1693	1453	3146	2871	1405	4276
Noise	12	37	49	22	39	61	142	40	182	77	42	119	50	31	81	96	40	136
Groundwater	91	77	168	99	76	175	84	66	150	146	64	210	146	89	235	178	85	263
Soil	8	6	14	8	11	19	8	12	20	9	7	16	9	14	23	8	7	15
Surface Water	47	56	103	55	69	124	116	73	189	85	63	148	240	71	311	126	78	204
Sediment	5	5	10	4	6	10	8	6	14	3	4	7	3	3	6	3	6	9
Total	1826	1693	**3519**	1876	1730	**3606**	3107	1772	**4879**	2416	1640	**4056**	2141	1661	**3802**	3282	1621	**4903**

Dust Management

CNL created the *Dust Management and Requirements Plan* [79] and *Small-Scale Sites Dust Management and Requirements Plan* [80] to ensure the protection of the local community from re-suspension of contaminated dust during remediation activities. The *Dust Management and Requirements Plans* [79] [80] continue to adaptively change to ensure protection of the local communities during remedial activities based on lessons learned from completed remediation sites.

Species at Risk

In addition to the *Environmental Protection Plans* [20] [21] and *Environmental and Biophysical Monitoring Plans* [14] [15], CNL has engaged in a rigorous program to identify and protect species at risk (SAR) on our sites. Each individual site undergoes a systematic desktop review to identify SAR that may be present in the area, and a series of field visits are performed to confirm the presence or absence of SAR at the site. If SAR are present, site-specific mitigation measures are developed for implementation and the appropriate regulatory agencies are contacted.

During the desktop review for SAR it was noted that many sites contained Butternut trees which are protected both provincially and federally. Mitigation measures were developed to ensure ongoing protection of the trees until genetic assessments could be undertaken for those considered Category 2 or 3 trees based on visual observations only (not affected or mildly affected by canker disease). Genetic assessments have shown that most trees are hybrid Butternut and Black Walnut, which are not afforded protection. Two trees to date have been confirmed as pure Butternut strains but were heavily affected by canker and not suitable for retention.

CNL actively monitors for changes in legislation related to SAR species. Recent changes to the *Migratory Bird Convention Act* have resulted in additional protection for 16 listed species, including the Great Blue Heron and the Pileated Woodpecker. CNL consultant biologists are actively undertaking a new round of site assessments to determine the presence of these species on our sites so that the proper mitigation measures and protections can be developed in advance of remediation.

Heritage Sites

A robust process is followed for designated Heritage Sites within the municipality. Should a designated Heritage Site require remediation, the nature of the remediation is considered in the preparation of a Cultural Heritage Evaluation Report. For properties where there is the likelihood of a potential impact to a heritage feature, a Cultural Heritage Impact Assessment is prepared and submitted to the Ontario Ministry of Tourism, Culture and Sport to determine if the proposed mitigation measures are adequate. If it is determined that a Heritage attribute will be impacted by remedial activities a Heritage Permit is requested from the Municipality of Port Hope prior to remediation taking place.

Archeological Assessments

CNL has also engaged in developing rigorous plans and protocols for the identification and protection of archaeological and cultural heritage resources that may be uncovered during remedial activities. To support the protection of potential archaeological resources, CNL developed the *Protocol for Archaeological and Forensic Discovery* [81], which provides clear instruction for CNL contractors and staff should a potential archaeological resource be uncovered, including early engagement with Indigenous monitors should it be required.

Port Granby

Stage 1, 2 and 3 archaeological assessments were undertaken at the Port Granby site in Clarington as part of the EA process. Indigenous contacts were engaged and assisted the consultant archaeologists in walking the land to look for artifacts. Horse teeth, animal bones, clay smoking-pipe fragments and buttons from the 1800s were some of the more than 1,000 items discovered along with a large quantity of items from a house and possibly other outbuildings, such as a barn or shed, including iron nails, bricks, mortar and window glass (see Figure 54 below). A report was prepared and submitted to the Ontario Ministry of Tourism, Culture and Sport in 2016, and construction of the Access Road and PG LTWMF site was allowed to proceed.

Figure 54: Archaeological Assessment, Port Granby, 2016

Port Hope

A Stage 1/Stage 2 archaeological assessment was undertaken prior to the construction of the PH LTWMF Access Road in Port Hope. No discoveries were made, and construction of the road moved forward.

Prior to remediation activities in 2018, all major and industrial sites underwent a Stage 1 Archaeological Assessment to determine the likelihood of uncovering a buried archaeological resource [81]. This report and its associated recommendations for applicable mitigation measures was submitted to the Ontario Ministry of Tourism, Culture and Sport for review. Subsequently, the Ministry requested that CNL prepare a supplementary plan focused on remediation of the Port Hope Harbour, which resulted in the development of the *Port Hope Harbour Remediation Inadvertent Marine Archaeological Discoveries Plan* [82].

In 2022, CNL was informed of a potential Indigenous burial site at the Lions Recreation Centre Park remediation site east of St. Mary's Catholic school. Though this information is anecdotal in nature, out of an abundance of caution, archaeological test-pitting and related measures will be undertaken in tandem with the site remediation and will include the participation of Indigenous monitors from the Williams Treaties First Nations.

CNL, in consultation with its contractor, has developed a training program for all staff and contractors related to the potential discovery of either archaeological artefacts or forensic discoveries, to ensure the protection of these resources until a qualified archaeologist and/or Indigenous monitor is available to attend the site.

Radiological Monitoring

Environmental monitoring for ambient gamma radiation levels and radon gas concentrations are ongoing and will continue until all sites are remediated and regulatory control requirements are removed by the CNSC.

6.9.2.1 Port Granby Project

CNL staff and independent contractors monitored the environmental effects of the PGP throughout Phase 2 activities. Of particular importance to members of the public during the EA were potential effects associated with dust, and potential effects associated with surface and groundwater movement of contaminants to the aquatic environment.

CNL remains committed to the protection of the environment and transparency regarding its daily operations. Results of dust monitoring at the Port Granby site are available to the public by accessing the PHAI website (Dust Monitoring Results - Port Granby Waste Remediation - PHAI).

CNL must meet specific effluent discharge criteria set by the CNSC to ensure the processed water leaving the Port Granby WWTP will not cause harm to the aquatic environment. Quarterly results of the effluent monitoring program are publicly available on the PHAI website (Port Granby Project WWTP Quarterly Effluent Monitoring Reports - PHAI). Section 4.3.3 describes the performance of the Port Granby WWTP and effluent streams.

CNL also monitors water quality in the vicinity of the diffuser, where the effluent from the Port Granby WWTP enters Lake Ontario. These results may be found in Table 15 and are evidence of the level of environmental protection that is maintained during the course of the project.

Table 15: Water Quality Results, Averaged for the Year, Lake Ontario WWTP Diffuser, Port Granby, Location W

Parameter	Units	Criteria		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
		PWQO[9]	CWQG[10]	Average									
Arsenic	µg/L	**100**[11]	**5**	<1.0	1.0	1.0	0.9	0.8	<1.0	<1.0	<1.0	0.9	0.9
Uranium	µg/L	**5**	**15**	0.5	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.3	0.3
Radium-226	Bq/L	**1**	-	0.02	<0.01	<0.01	<0.01	0.02	<0.04	<0.04	<0.04	<0.01	<0.01
Thorium-230	Bq/L	-	-	<0.01	<0.01	<0.02	<0.02	<0.02	<0.07	<0.07	<0.07	<0.02	<0.02

[9] Provincial Water Quality Objectives, Ministry of the Environment, February 1999

[10] Canadian Water Quality Guidelines for Protection of Aquatic Life, 2015

[11] **Bold Values** in this table indicate an exceedance of a PWQO or CWQG value

Radiation dose rates are also monitored during the course of the project as waste is placed in the PG LTWMF. Figure 55 depicts a trend in gamma exposure rates for the PG site. Dose rates at the site perimeter remained relatively stable throughout the construction of the PG LTWMF and associated waste movement activities.

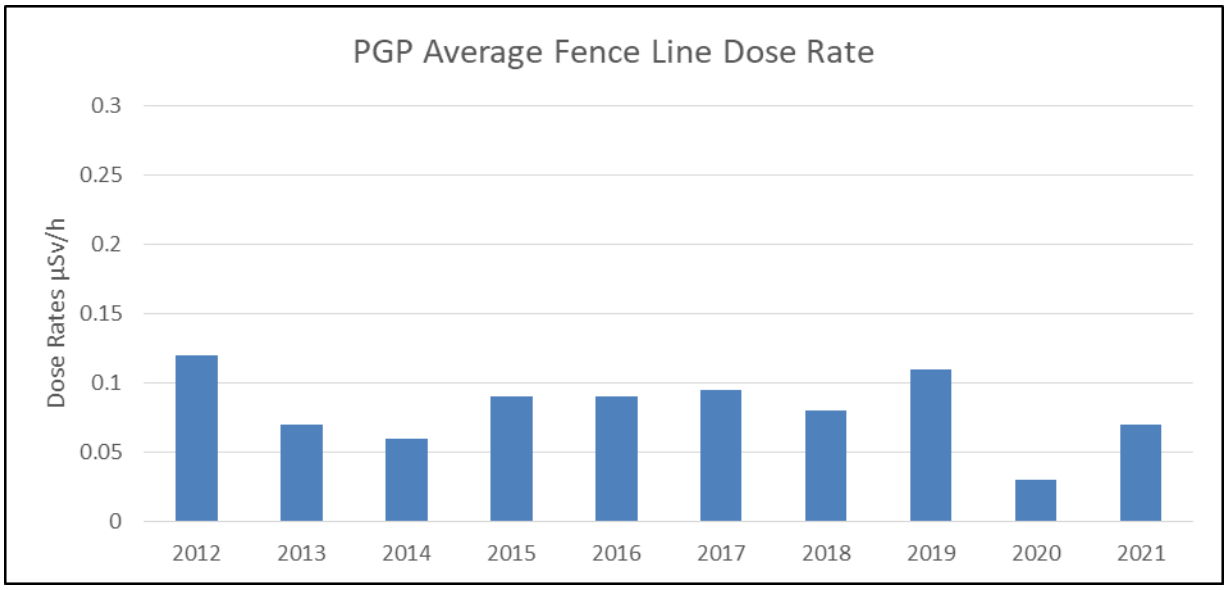


Figure 55: PGP Average Fence Line Dose Rate

To put these fence line gamma radiation readings into perspective, if using the highest average dose rate of 0.12 µSv/h (2012 value), a person would need to spend 8,333 hours (347 days of continuous 24 hour per day exposure) to reach the CNSC public dose limit of 1 mSv (1000 µSv).

Environmental radon gas concentrations during the licensing period at the Port Granby site can be seen in Figure 56 below. Concentrations of radon gas peaked between 2015 and 2018 when peak movement of waste occurred with large areas of excavations being exposed to the environment. Gradual decrease of existing waste volumes resulted in lower radon gas concentrations around the site until the cap and close of the engineered containment mound was completed in 2021. Action Level exceedances were reported to the CNSC.

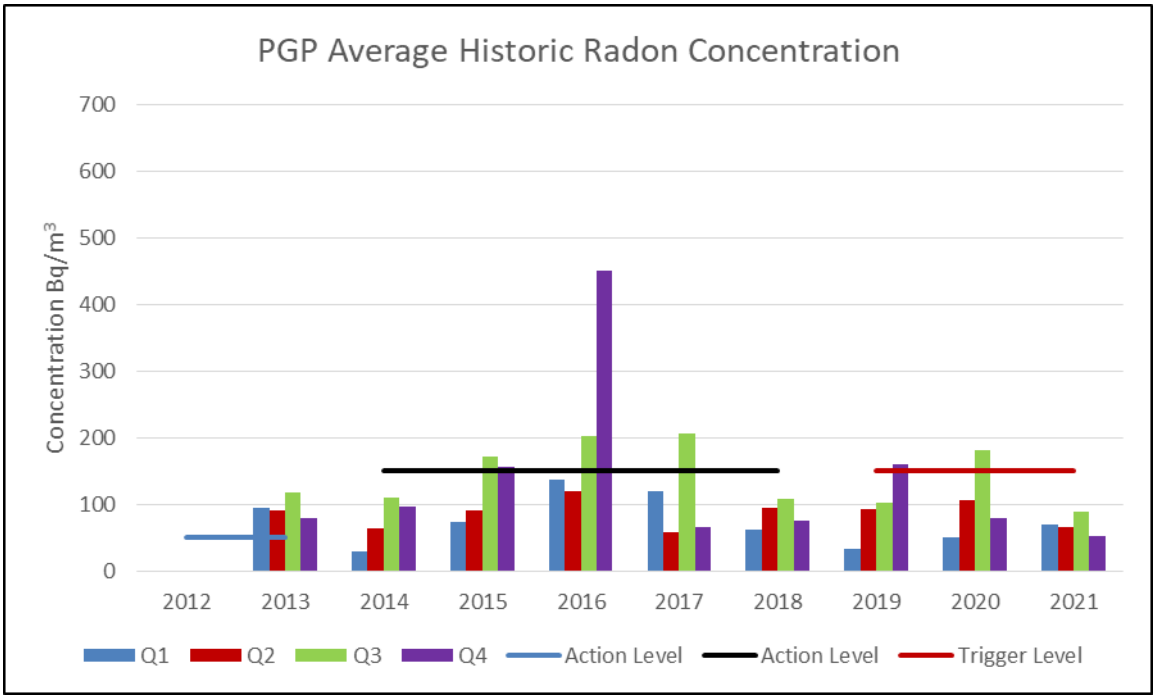


Figure 56: PGP Historic Average Radon Concentration

6.9.2.2 Port Hope Project

CNL staff and independent contractors continue to monitor the environmental effects of the PHP during Phase 2 activities, anticipating that Phase 2 will extend to approximately 2030/2031. During the EA, members of the public expressed concerns about the potential effects associated with dust, especially as much of the remedial activities occur in an urban environment (Ward 1 of the Municipality of Port Hope). Protection of the aquatic environment was also very important given the proximity of the Ganaraska River and the associated concerns of Indigenous peoples and the angling community.

Results of dust monitoring at the Port Hope site are publicly available on the PHAI website (Dust Monitoring Results - Port Hope Project LTWMF Construction - PHAI).

CNL must meet a specified effluent discharge criteria set by the CNSC to ensure that the processed water leaving the Port Hope WWTP will not cause harm to the aquatic environment. Quarterly results of the effluent monitoring program are publicly on the PHAI website (Port Hope Project WWTP Quarterly Effluent Monitoring Reports - PHAI). Section 5.3.3 describes the performance of the Port Hope WWTP and effluent streams.

CNL monitors water quality in the vicinity of the diffuser, where the effluent from the Port Hope WWTP enters Lake Ontario. These results may be found in Table 16.

The annual average for uranium at the Port Hope diffuser in 2018 shows elevated results, above the Provincial Water Quality Objectives (PWQO) but below the Canadian Water Quality Guidelines (CWQG). This was due to a May 2018 quarterly sample that showed elevated concentrations for uranium of 19 µg/L. With concurrence obtained from the CNSC, from April

23 to May 31, 2018, CNL operated the old Port Hope Water Treatment system in addition to the newly constructed water treatment plant. This was to increase the treatment capacity required as a result of dewatering of the west collection pond at the PH LTWMF so that expansion operations of the pond could be undertaken. As reported to the CNSC, on the day of sampling Lake Ontario was calm and the diffuser was visible (i.e. normal mixing of the water column was not occurring). Results obtained from nearby sampling locations for the same quarter did not show elevated results for uranium. In July 2018, during the next quarterly sampling period, the uranium result at this location had returned to historical levels (0.4 µg/L).

Table 16: Water Quality Results, Averaged for the Year, Lake Ontario WWTP Diffuser, Port Hope, Location D

Parameter	Units	Criteria		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
		PWQO[9]	CWQG[10]	Average									
Arsenic	µg/L	**100**[11]	**5**	**14**	1.1	1.4	0.8	0.9	<1.0	2.4	<1.0	0.8	1.0
Uranium	µg/L	**5**	**15**	**5**	1.0	1.9	2.7	0.4	0.3	**9.7**	0.4	0.3	0.4
Radium-226	Bq/L	**1**	**-**	0.04	<0.01	<0.02	<0.01	0.02	<0.04	<0.04	<0.04	0.01	0.01
Thorium-230	Bq/L	**-**	**-**	<0.01	<0.01	<0.02	<0.02	<0.02	<0.07	<0.07	<0.07	<0.02	<0.02

Table 17: Water Quality Results, Averaged for the Year, Ganaraska River, Port Hope, Location PHH-1

Parameter	Units	Criteria		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
		PWQO[9]	CWQG[10]	Average									
Arsenic	µg/L	**100**[11]	**5**	-	1.0	0.7	0.4	0.6	<1.0	<1.0	<0.1	0.7	0.5
Uranium	µg/L	**5**	**15**	-	0.9	0.9	0.8	0.8	0.7	0.8	0.7	0.8	0.8
Radium-226	Bq/L	**1**	**-**	-	0.01	0.02	<0.01	<0.01	<0.04	<0.04	<0.04	<0.01	<0.01
Thorium-230	Bq/L	**-**	**-**	-	0.02	0.02	<0.02	<0.02	<0.07	<0.07	<0.07	<0.02	<0.02

Table 18: Water Quality Results, Averaged for the Year, south of the Port Hope Harbour, Location PHH-4

Parameter	Units	Criteria		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
		PWQO[9]	CWQG[10]	Average									
Arsenic	µg/L	**100**[11]	**5**	-	1.0	1.0	0.9	0.8	<1.0	<1.0	1.0	0.9	0.8
Uranium	µg/L	**5**	**15**	-	0.7	0.4	1.0	0.7	0.3	0.6	0.4	0.4	0.4
Radium-226	Bq/L	**1**	**-**	-	0.02	<0.01	<0.01	0.01	<0.04	<0.04	<0.04	<0.01	<0.01
Thorium-230	Bq/L	**-**	**-**	-	<0.02	<0.02	<0.02	<0.02	<0.07	<0.07	<0.07	<0.02	<0.02

Water quality is also assessed in the Ganaraska River and south of the Port Hope Harbour outlet to Lake Ontario on a quarterly basis (locations shown in Figure 57). Annual averages at these locations are presented in Table 17 and Table 18, respectively. In the past, sampling at the outer harbour location (PHH-4) had been more difficult to complete due to wave action and shallow water depths in this area. However, technological advances have recently allowed CNL to use drone technology to obtain these water samples more consistently, another example of how the project is continuing to find innovative ways to ensure compliance with our monitoring requirements and protection of the natural environment.

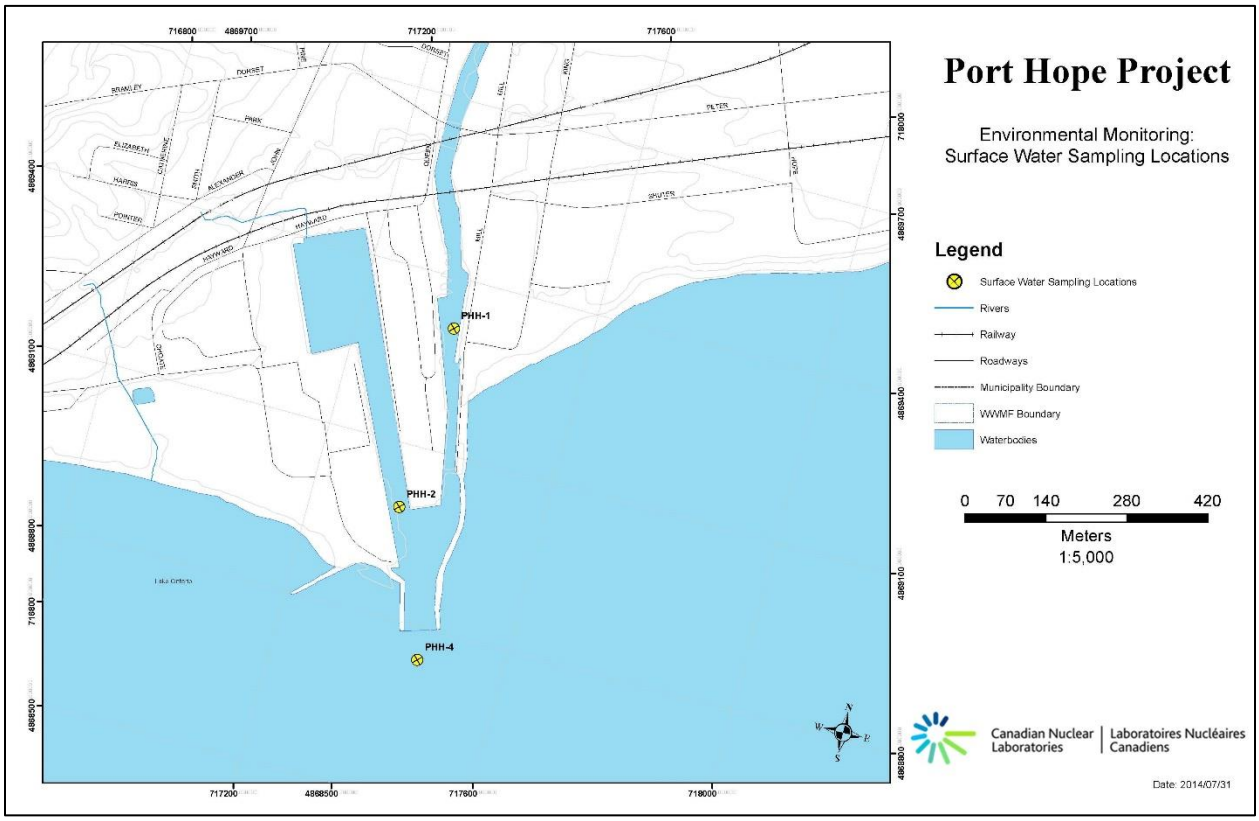


Figure 57: Environmental Monitoring Surface Water Sampling Locations, Ganaraska River (PHH-1) and Port Hope Harbour (PHH-4)

Radiation dose rates are also monitored as waste is placed in the PH LTWMF. Fence line perimeter gamma dose rates for the current licence period are summarized in Figure 58 below. Similar to environmental radon gas concentrations, a peak in gamma exposure was experienced during early construction of the first cell at the PH LTWMF and a series of engineered shielding berms were implemented to effectively decrease gamma exposure at the fence lines.

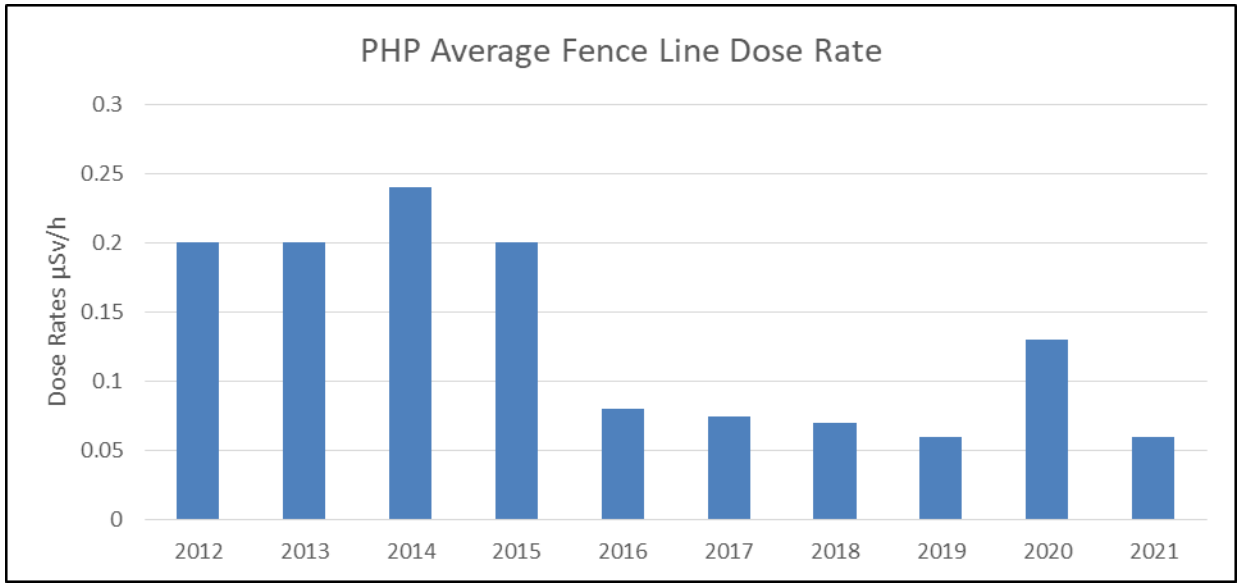


Figure 58: PHP LTWMF Average Fence Line Dose Rate

To put these fence line gamma radiation readings into perspective, if using the highest average dose rate of 0.24 µSv/h (2014), a person would need to spend 4,167 hours (173 days of continuous 24 hour per day exposure) at the site perimeter fence line to receive a radiation dose at the CNSC public dose limit of 1 mSv (1000 µSv).

Environmental radon gas concentrations during the licensing period at the PH LTWMF can be seen in Figure 59 below. Average concentrations of radon gas peaked between 2013 and 2015 when existing waste was being moved around the former Welcome Waste Management Facility to accommodate construction of the first cell in the engineered containment mound. In 2013, the radon housing north of the mound was moved from the boundary fence to a new dedicated post located closer to the buried waste, to accommodate the removal of the fence around the containment mound. This movement accounts for the noticeable increase in concentration values after April 2013. Construction of the PH LTWMF took place in 2017 and aligns with the observed reduction in environmental radon gas and reduction of exposed waste at the site.

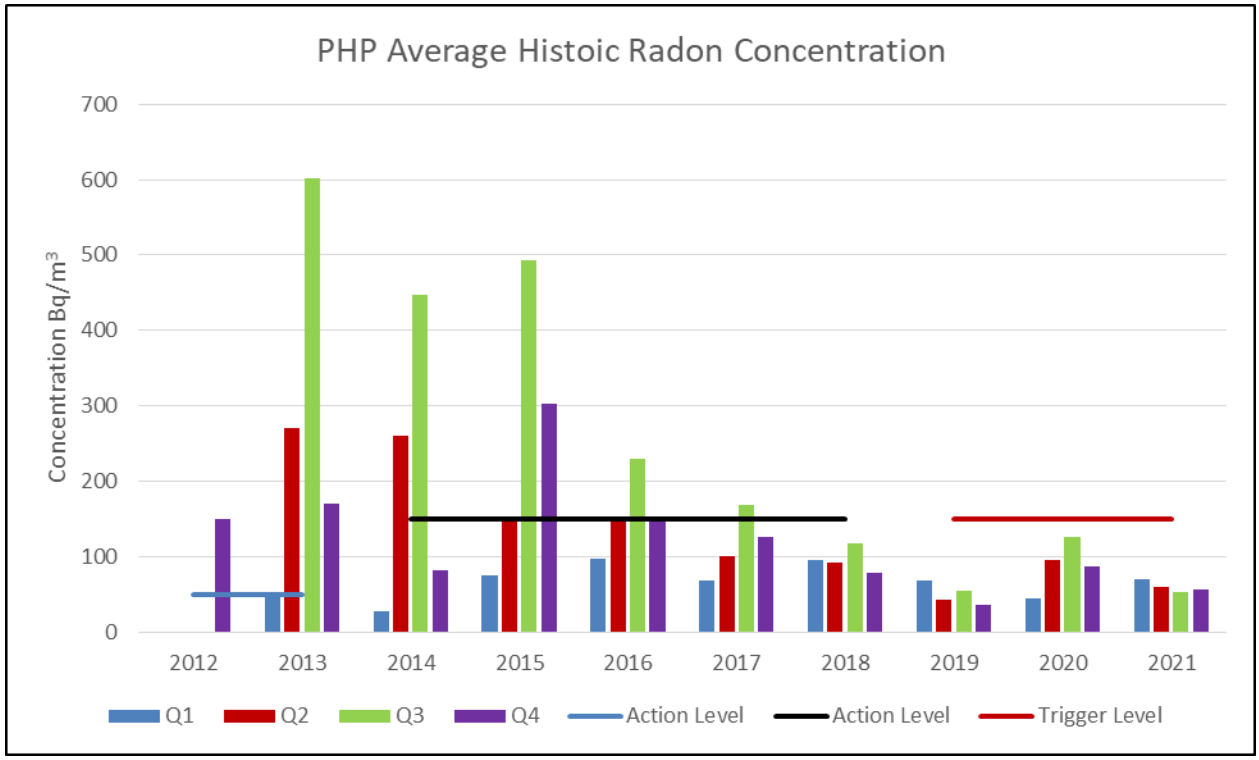


Figure 59: PHP Historic Average Radon Concentration

6.9.2.3 WNSL-344 Site Historic Radiological Measurements

As can be seen in Figure 60, there were no recorded gamma readings exceeding the Action Level of 0.3 µSv/h during the licensing period at the WNSL-344 sites. The Sewage Treatment Plant Temporary Storage Site remediation started in 2018 December and was fully remediated, resulting in the discontinuation of ambient gamma monitoring in 2019.

CNL continues to perform routine quarterly gamma surveys at the Pine Street and Strachan Street Consolidation sites.

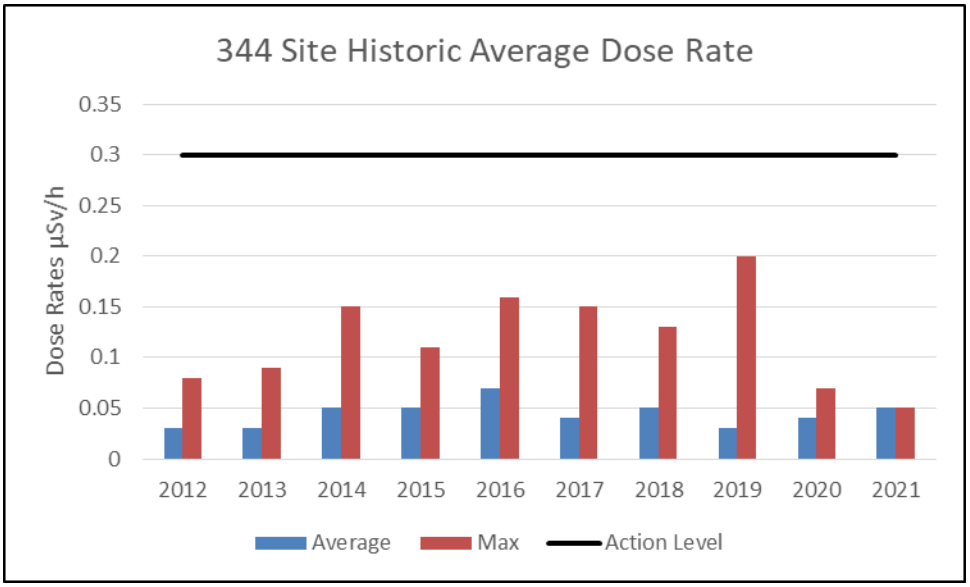


Figure 60: WNSL-344 Site Historic Average Dose Rate

As seen below in Figure 61, the average radon concentrations at the WNSL-344 licensed sites are below the action level of 50 Bq/m^3, however there were quarterly readings that exceeded the Action Level. All Action Level exceedances were reported to the CNSC as required and investigations and corrective actions evaluated. The observed radon levels pose no risk to employees, the public and the environment. In 2018, the PHAI trigger level for Radon, established at 150 Bq/m^3 has been added to put the levels into perspective which will become relevant for the next licencing period should CNL be successful in our licence renewal and consolidation effort.

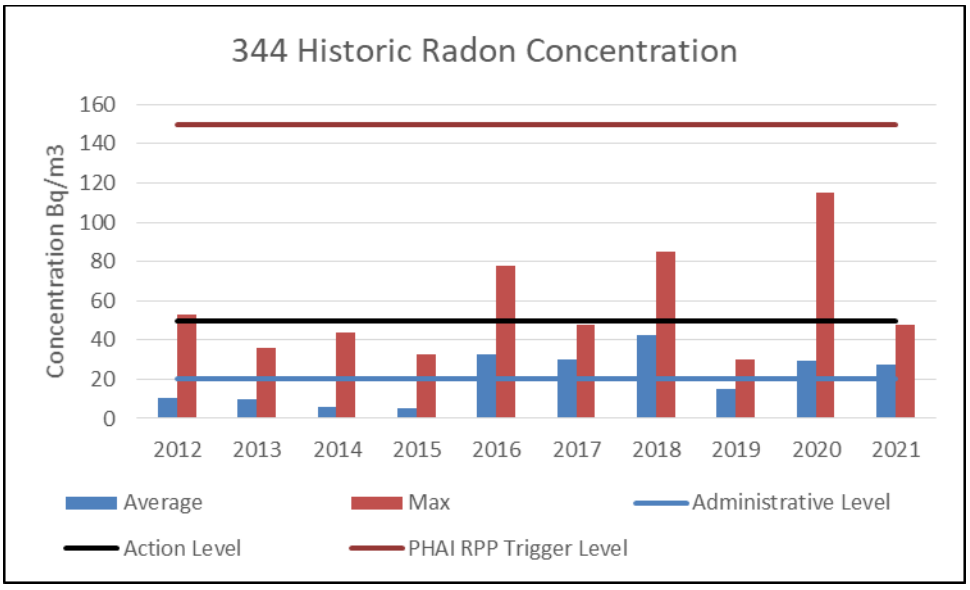


Figure 61: WNSL-344 Site Historic Average Radon Concentrations

6.9.2.4 WNSL-182 Site Historic Radiological Measurements

Figure 62 highlights the average dose rates (in µSv/h) for the WNSL-182 site. There have been no recorded gamma readings exceeded the site Action Level of 0.3 µSv/h during the licensing period. CNL continues to perform routine quarterly gamma surveys at the Pine Street pads. The WNSL-182 site was previously utilized to temporarily store large volumes of stockpiled historic LLRW generated through the activities of the Construction Monitoring Program. The material previously located at on pads 1 and 2 at the Pine Street Extension TSS was removed in 2018 as part of the PHAI and has been transferred to the PH LTWMF.

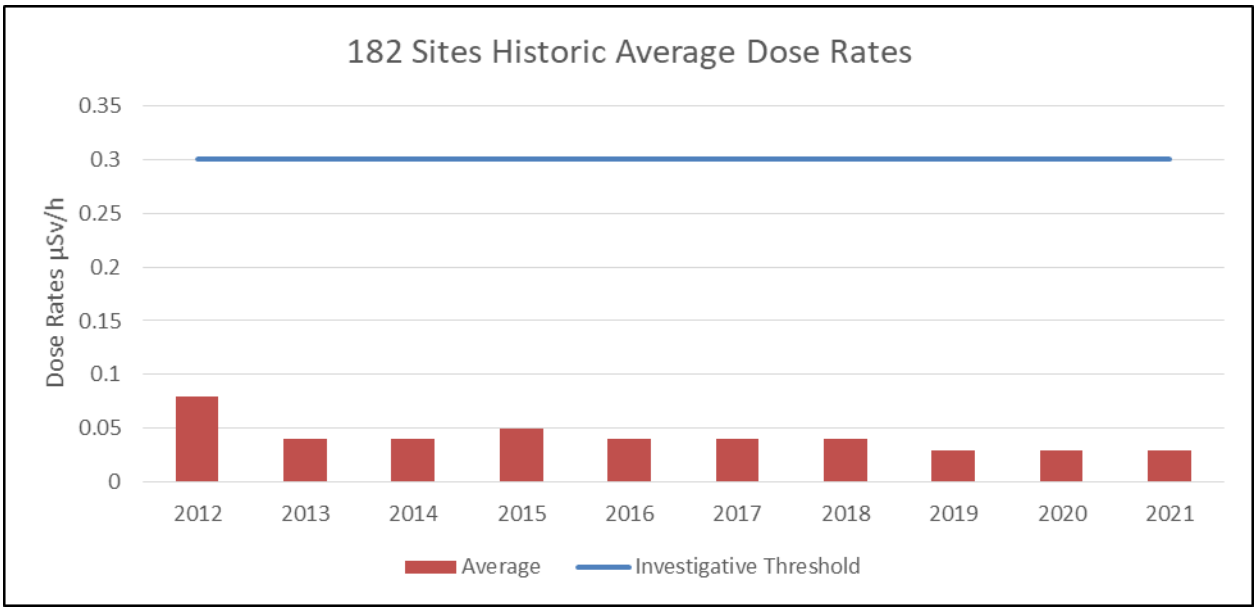


Figure 62: WNSL-182 Sites Historic Average Dose Rates

Figure 63 outlines the average radon concentration at WNSL-182 licensed sites. Average radon concentrations were below the Action Level of 40 Bq/m^3, however there were instances where the individual quarterly radon measurements exceeded both the Administrative Control Level (20 Bq/m^3) and Action Level (40 Bq/m^3) at the WNSL-182 licensed locations throughout the licensing period. Action Level exceedances were reported to the CNSC as required and investigations and corrective actions evaluated. The observed radon levels pose no risk to employees, the public and the environment.

The WNSL-182 site was previously utilized to temporarily store large volumes of stockpiled historic LLRW generated through the Construction Monitoring Program remedial activities. The Construction Monitoring Program generated wastes are now diverted to the PH LTWMF. In 2018, the PHAI Trigger Level for Radon, established at 150 Bq/m^3 has been added which will become relevant for the next licencing period should CNL be successful in our licence renewal and consolidation effort.

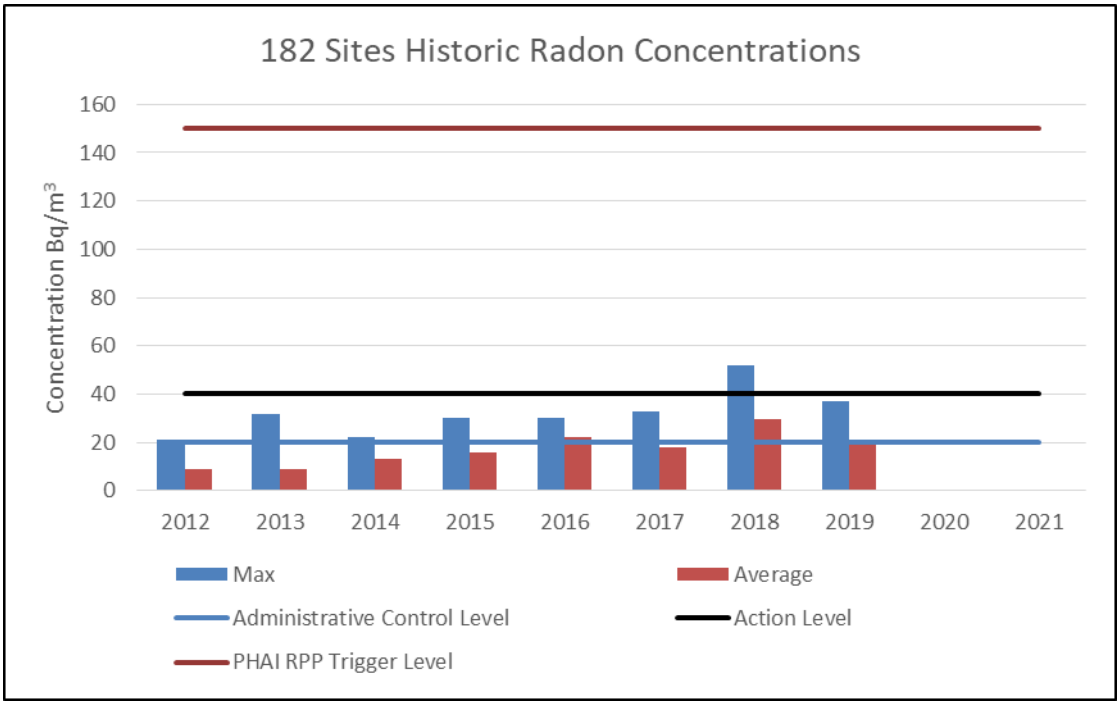


Figure 63: WNSL-182 Sites Historic Average Radon Concentrations

6.9.3 Future Plans

Over the next proposed licensing period, CNL will continue to conduct environmental monitoring as per CNL's Environmental Biophysical Monitoring Plans [14] [15] for the PHP.

As the Port Granby Project transitions into Phase 3, maintenance and monitoring activities will be established at this site. These plans are currently being developed and additional groundwater monitoring wells are planned for installation in 2022 and 2023 to support this program. CNL is working closely with the regulators and our internal project transition team to ensure that EA commitments for maintenance and monitoring are met.

CNL will continue to adhere to stringent corporate, site-specific and regulatory environmental protection requirements at the federal, provincial and municipal levels, as appropriate.

6.10 Emergency Management and Fire Protection

The Emergency Management and Fire Protection Safety and Control Area includes the Emergency Preparedness Program and the Fire Protection Program.

6.10.1 Relevance and Management

6.10.1.1 Emergency Preparedness

The Emergency Preparedness Program provides an operational framework to implement CNL's Safety and Health Policy and Environment Policy with respect to necessary emergency response measures and compliance with company priorities. The focus of the program is the prevention

and mitigation of, preparedness for, response to, and recovery from abnormal or emergent events. The Emergency Preparedness Program Requirements Document specifies the program requirements in the relevant legislations and regulations.

The *PHAI Emergency Plan* [83] outlines all necessary emergency response measures and compliance requirements consistent with applicable sections of the Emergency Preparedness Program to ensure all PHAI activities comply with applicable corporate and regulatory requirements. The PHAI plan is and extension of CNL's corporate emergency program and support functions. The focus of the plan is the prevention and mitigation of, preparedness for, response to, and recovery from abnormal or emergent events. It specifies program requirements and relevant regulations applicable to CNL's controlled sites under federal jurisdiction and contractor-controlled project sites under provincial jurisdiction. CNL uses Incident Management System methodology in its approach to emergency preparedness to ensure a standardized approach to emergency preparedness and response.

The *PHAI Emergency Plan* differentiates and outlines specific criteria for CNL-controlled, federally regulated worksites and contractor-controlled, provincially regulated worksites. CNL-controlled sites must comply with all provisions of CNL's emergency preparedness program where applicable. Provincially regulated worksites at minimum must comply with applicable emergency preparedness requirements per the Ontario Occupational Safety and Health Administration and its applicable regulations. Construction Project activity undertaken by a provincially regulated contractor have a Constructor designated and defined by CNL who is responsible to ensure all emergency preparedness requirements are implemented and complied. To meet this obligation all contractor-controlled Project sites must further provide CNL a Project specific emergency preparedness plan that meets the requirements of the *PHAI Emergency Plan*. The PHAI Emergency Preparedness Program components as outlined in the *PHAI Emergency Plan* ensures:

- All project sites have a state of readiness to prevent or mitigate the effects of an emergency or abnormal situation to protect the health and safety of workers, the public, the environment.
- All personnel, employees and contractors working on PHAI sites on emergency response measures through training, documentation, exercises, and drills.
- All applicable necessary liaison and coordination functions are ready and capable to ensure applicable local stakeholders, municipal officials, and emergency response organizations are informed and involved as necessary during an emergency event.
- Minimum requirements for all project sites to have specific emergency plans and procedures for the response to and mitigation of harmful effects of emergencies.
- Contractor-controlled sites under the control of a provincially designated constructor have a project-specific emergency response plan meeting all applicable requirements, and these contractors have the capability to respond emergency events that may occur on their project sites.

During an emergency event CNL:

- Takes on a leadership and coordination role to ensure response measures are

appropriately effective
- Provides leadership and work closely with regional municipalities and responsible provincial agencies to facilitate the implementation of necessary complementary emergency preparedness and response measures to address the incident
- Ensures all necessary and applicable cross-project coordination, stakeholder communication, and post-event recovery measures are followed up with as necessary where applicable
- Provides notification to the CNSC as required

Across both CNL and contractor-controlled project sites, emergency preparedness is coordinated through dedicated internal resources to ensure all preventative, readiness and response measures are implemented. When necessary, PHAI activities rely on local external, municipal, and provincial emergency responder organizations. CNL has longstanding relationships with local emergency services organizations that are further strengthened through various Memorandum of Understanding agreements between CNL and local emergency response organizations [84], [85], [86], [87], and [88].

CNL completes drills and exercises per all statutory requirements and has created the *PHAI Five Year Drill Plan* [89] and ensures compliance with the plan for all CNL-controlled and contractor-controlled PHAI sites.

6.10.1.2 Fire Protection

The Fire Protection Program provides an overall framework, including requirements, processes and responsibilities to fulfill CNL's Safety and Health Policy, Security Policy and Environment Policy and regulatory responsibilities pertaining to fire protection at CNL. The Fire Protection Program applies to all CNL employees and to other personnel (e.g., contractors and consultants) conducting work at CNL sites and applies to the design, operations and other activities that may affect fire protection in and around CNL sites. The Fire Protection Program applies a risk-graded approach in conjunction with the defence-in-depth principles to its operations and activities to the extent that they may affect fire protection.

CNL's Fire Protection Program ensures all applicable projects and sites are assessed to determine risk and the necessary fire protection control measures comply with corporate and regulatory requirements. PHAI activities are differentiated between CNL-controlled federally regulated worksites and contractor-controlled provincially regulated worksites. Federally regulated worksites and personnel are bound by Canada Labour Code and must comply with all applicable CNL corporate program, practices and policies as outlined in CNL's Fire Protection program. These activities must at minimum comply with the National Fire Code of Canada [90] and National Building Code of Canada [91]. Provincially regulated worksites and personnel are bound by Ontario's various regulatory framework. These workplaces at minimum must comply with the Ontario Fire Code [92], Ontario Building Code [93], Ontario Occupational Health and Safety Act [70] and all applicable regulations. For provincially regulated Project activities CNL requires contractors to identify and develop fire prevention related hazards and control measures for their designated project sites and ensure all necessary fire protection measures are implemented.

CNL has created the *PHAI Fire Protection Plan* [94] that outlines all necessary fire protection measures and compliance requirements that PHAI activities must comply with. The *PHAI Fire Protection Plan* complies and is consistent with all applicable components in CNL's Fire Protection Program. It further provides the overall framework, requirements, processes and responsibilities to fulfill CNL's corporate and regulatory responsibilities pertaining to fire protection across PHAI activities. The *PHAI Fire Protection Plan's* prime focus is the prevention and mitigation of, preparedness for, response to, and recovery from fire related events.

CNL completes regular fire screening assessment per CNL's Engineering Change Control [53] program as necessary design, operation, or maintenance related changes when applicable. This approach ensures fire screening results remain relevant and updated in relation to proposed changes and CNL baseline fire screening assessments that CNL completed for the PGP and PHP [95] and [96].

6.10.1.3 Past Performance

All PHAI sites have emergency plans in place outlining specific measures commensurate with identified risks and credible emergency events.

CNL completes routine monitoring of PHAI activities to ensure all fire and emergency related program and drill requirements are completed per statutory and applicable corporate requirements. In 2021, CNL completed more than 100 field-level emergency preparedness and fire protection related inspections and observations to help verify compliance to regulatory and programmatic expectations across PHAI contractor Project sites. All non-compliance findings are communicated to CNL's contractor management personnel and the contractor for follow up and correction. In 2021, PHAI work sites completed 14 full emergency and fire-related drills involving personnel evacuation exercises. Additionally, CNL has conducted numerous fire risk assessments related to facility and process related changes to ensure modifications are assessed for the introduction of potential fire hazards. In 2021, CNL completed 25 fire risk assessment evaluations, the results of which have been used to modify design and change proposals where necessary to help reduce the risk of potential fire hazards.

Throughout the current licence period several physical and program improvements have been made to fire prevention and emergency features of PHAI facilities. These improvements include:

- Extensive repair and maintenance of building emergency features at field operating offices and the PH WWTP, including improved and updated monitoring capability
- Significant improvement of communication and coordination practices across PHAI work sites in response to emergency scenarios
- Several interactions and coordination activities with local emergency responder organizations to improve emergency preparedness. This includes involving the local fire departments in mock environmental drills and tabletop exercises, engagement of the local police force for input and advice on preparations for potential social disturbances and field level tours for emergency response leadership. Examples of mock emergency drills are shown in Figure 64 and Figure 65.
- Extensive training and re-education campaign on emergency preparedness and fire

response duties of CNL personnel applicable to their roles. During COVID-19 all emergency preparedness programs were adjusted and adapted to COVID-19 dynamics. This includes a requirement to train a broad set of individuals to take on new emergency response duties.

- Completion of practical fire-extinguisher training for all HWP staff
- Extensive field-level chemical and spill response procedure training and updates for operating staff and field staff that included 40 Hour HAZWOPER training and a comprehensive update to spill response procedure and the installation of Diphoterine stations at both PHAI wastewater treatment plants to enhance spill personal chemical exposure response effectiveness.
- Improved involvement and oversight inspections of contractor-controlled sites by CNL's corporate Fire Protection Program representatives.
- Completion of comprehensive program self-assessments to ensure components meet all applicable current-state dynamics and any applicable changes to statutory requirements.

Figure 64: PH LTWMF Mock Emergency Preparedness Drill involving a person down scenario.

Figure 65: Mock environmental emergency drill for release of propane

6.10.2 Future Plans

CNL will continue its commitment to ensure all PHAI emergency management and fire protection statuary and program obligations are met and continually improve. It will further ensure routine interaction with local stakeholders and emergency response organization to support their needs and readiness.

6.11 Waste Management

The licences associated with the PHAI are waste nuclear substance licences, as such this SCA is encompassed by the licence itself. The waste management Safety and Control Area had not previously been applicable to any of the four CNSC licences subject to this CMD. CNL has a robust Waste Management Program that is implemented at all CNL licenced sites. Key components are outlined below in Section 6.11.1.

Waste Management is proposed to be included as a required Safety Control Area in the revised licence.

6.11.1 Relevance and Management

Although not applicable under the current licence, CNL continues to operate a robust Waste Management program in Port Hope and Port Granby at all licensed sites to ensure waste is managed, tracked and diverted to appropriate waste receipt facilities.

CNL's Waste Management Program

The Waste Management Program provides a framework to manage clean, hazardous, and radioactive waste consistently across all CNL managed sites and translates the specific waste requirements from provincial and federal regulatory documents and standards into requirements that are specific to CNL-managed sites.

6.11.2 Past Performance

The radioactive wastes involved in the PHAI are primarily soil and soil-like materials and building debris containing elevated levels of radionuclides (e.g., uranium decay products), arsenic and metals.

This Project generates the following types of waste:

- Historic LLRW situated at consolidation sites, major sites such as the Harbour, and Small-scale Sites such as privately owned lots and dwellings.
- Industrial Waste includes non-radioactive materials at five sites specified in the Legal Agreement [5]. Some of the industrial waste from the Industrial Sites has been sent transferred to the PH LTWMF.

Waste management strategies for incompatible waste are being developed as part of the Industrial Sites project planning and may involve the placement of the waste at off-site hazardous waste facilities.

In addition, Canada has agreed to accept up to 150,000 m^3 of historic LLRW currently situated in the Municipality of Port Hope, from Cameco Corporation. This inventory includes LLRW resulting from the decommissioning of Cameco processing facilities utilized by Eldorado Nuclear Limited prior to 1988 and kept in storage. CNL works very closely with Cameco to coordinate its project activities with the operation of the PH LTWMF for the receipt the Cameco decommissioning waste.

6.11.3 Future Plans

It is anticipated that the Waste Management Safety Control Area will be applicable in proposed licensing period.

CNL's Waste Management Program is responsible for:

- Developing and setting CNL's Waste Management governance, including procedures and other supporting materials (e.g., documentation and training materials), in compliance with applicable requirements (e.g., Acts, regulations, codes, standards, and guidance documents), internal interfaces, and other stakeholders, and based on industry best practices
- Developing and maintaining CNL's Integrated Waste Strategy [97] that describes how CNL optimizes its strategic approach to waste management
- Identifying best available options and developing plans for all phases of the waste management life cycle process at CNL operated sites
- Identifying and addressing gaps in existing waste management life cycle processes

through observation, assessments and reviews at CNL operated sites, and benchmarking against other facilities (nuclear and non-nuclear)

- Providing waste oversight and subject matter expert support to Waste Generators to ensure that the Waste Management life cycle process and Waste Hierarchy are implemented in accordance with the applicable policies, procedures, and standards governing these activities
- Implementing standardized waste characterization across CNL-operated sites to ensure that waste meets the acceptance criteria for current and planned storage or disposal facilities
- Managing the requirements for waste inventory data and forecasting reporting
- Maintaining cross-functional knowledge spanning the various specialty areas associated with CNL's Waste Management Program (including radiological, mixed, hazardous, and clean waste; waste storage and/or disposal options and facilities; waste minimization and reduction practices; international practices with regards to the long-term management of waste)

The Waste Management Program ensures that all waste generated or received at CNL-operated sites not only meets waste management requirements but is managed in a safe and environmentally responsible manner in accordance with CNL's Safety and Health Policy and CNL's Environment Policy.

The Waste Management Program mandate applies to the full life cycle of waste from the point of generation to its final disposition. This includes all operations and activities that results from the planning, generation, transportation, processing, storage, and/or disposal of waste generated by CNL-managed sites or received by CNL-managed sites from external organizations. The Waste Hierarchy (Figure 66) is applied throughout the waste management process. Effective use of diversion (e.g., recycle and reuse routes) currently supplied by offsite service providers, requires options analysis, inventory recording and characterization. Specifically, the prevention option is largely favoured to reduce the volume of waste sent to the PH LTWMF. These diversions methods are incorporated in the waste planning and verified through site surveillance activities. For example, efforts are made to isolate clean materials from contaminated materials/waste materials. The Waste Management Program adheres to CNL's Environment Policy, which states that waste should be dealt with at the highest practicable level in the hierarchy.

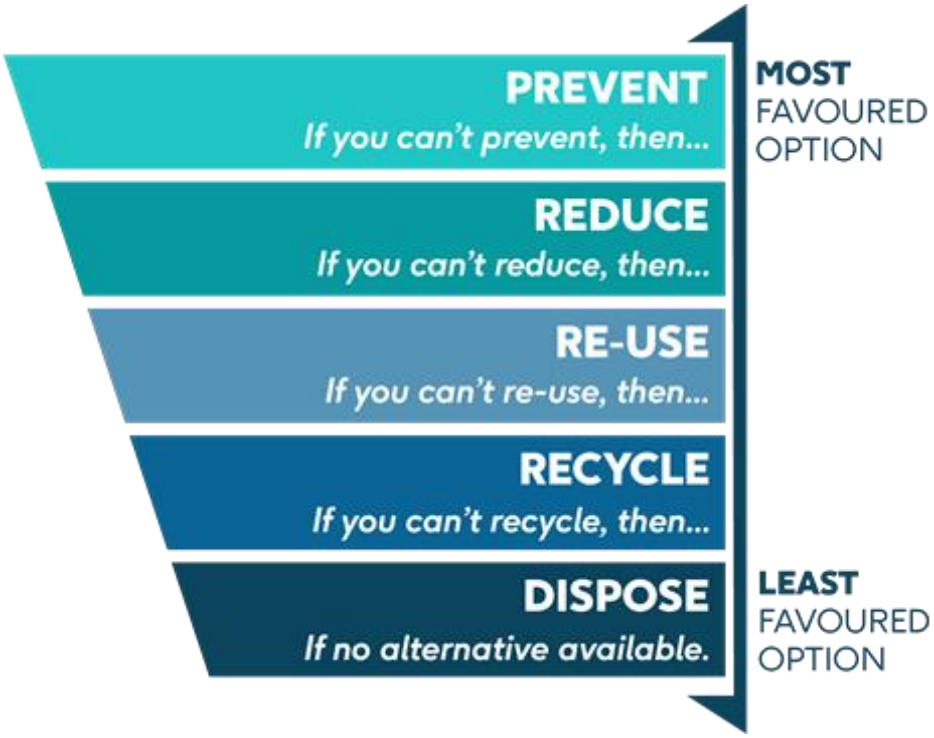


Figure 66: Waste Hierarchy

Cleanup Function

The Cleanup Function (formerly the Decommissioning and Demolition Function) provides consistent processes and procedures to enable all CNL sites and projects to establish and meet the right next land uses and end states, in order to address the decommissioning of buildings and environmental remediation of lands impacted by past, present, and future CNL operations. The Function is comprised of three programs and specifies the requirements for Land Use, Decommissioning and Demolition, and Environmental Remediation.

In 2021, the CNSC updated its regulatory documents related to waste management and decommissioning. The documents relevant to the PHAI are:

- REGDOC-2.11, *Framework for Radioactive Waste Management and Decommissioning in Canada* [98]
- REGDOC-2.11.1, *Waste Management, Volume I: Management of Radioactive Waste* [51]
- REGDOC-2.11.1, *Waste Management, Volume III: Safety Case for the Disposal of Radioactive Waste* [99]
- REGDOC-2.11.2, *Waste Management Decommissioning* [100]

The current PHAI Waste Nuclear Substance Licences ([1], [2], [3], and [4]) were last updated between 2011 and 2017, and therefore do not refer to these updated REGDOCs. At the request of CNSC staff, CNL has prepared implementation plans and gap analyses of both the waste management and the decommissioning regulatory documents, with respect to the PHAI

licences. In addition to the new regulatory documents, CNL also performed similar gap analyses for the following CSA standards:

- N292.0-19, *General Principles for the Management of Radioactive Waste and Irradiated Fuel* [101]
- N292.3-14, *Management of Low- and Intermediate-Level Radioactive Waste* [102]
- N292.5-11, *Guideline for the Exemption or Clearance from Regulatory Control of Materials that Contain or Potentially Contain, Nuclear Substances* [103]
- N292.6-18, *Long-term management of radioactive waste and irradiated fuel* [104]
- N294-19, *Decommissioning of facilities containing nuclear substances* [105]

CNL has committed to implementing the applicable radioactive waste management regulatory documents and Canadian Standard Association standards outlined above, into the Waste Management Program and Safety Analysis Programs for the PHAI.

The PHP waste acceptance criteria was accepted at the time of its creation (2008) and is generally compliant with modern applicable clauses (REGDOC 2.11, *Framework for Radioactive Waste Management and Decommissioning in Canada* [98]). Relevant information that satisfies these applicable clauses is found in various locations throughout the PHP's documentation, including the Environmental Assessment (EA) and supporting studies, detailed design, and subsequent property-specific characterization studies. As part of the implementation of the applicable regulatory documents and standards, CNL has committed to consolidating the various components of the waste acceptance criteria into a single document. This is being tracked as a Regulatory Commitment by CNL.

6.12 Security

CNL has developed and implemented the *PHAI Security Plan* [106] to outline and ensure compliance to all applicable legal and corporate security requirements throughout the Project's duration. The *PHAI Security plan* complies, and is consistent, with all applicable sections of CNL's Security Program.

The *PHAI Security Plan* ensures all project activity complies with all applicable legal and corporate security requirements. The *PHAI Security plan* applies to employees, personnel (e.g., visitors and contract staff) and contractors completing PHAI activities.

6.12.1 Relevance and Management

PHAI activities do not involve Category I, II, or III nuclear materials nor are there any Protected Areas across PHAI activities. While PHAI activities are not subject to the *Nuclear Security Regulations* [107], CNL implements the principals of prudent management practices per the *General Nuclear Safety and Control Regulations* in relation to Project activities. For activities undertaken by contractors CNL requires, and has in place for existing active projects, project-specific security plans that must comply with the PHAI Security Plan's minimum criteria. The *PHAI Security Plan* outlines a blend of practices that must be in place across all sites and requires projects to identify project-specific risks and control measures following prudent management practices. CNL regularly monitors several security related socio-political factors

and contextual dynamics to help identify, control, and monitor security risk parameters. PHAI activities further comply with CNSC REGDOC 2.12.3, *Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material* that sets out minimum physical and personal security measures to be implement while using, handling and storing sealed sources. Sealed sources are utilized across CNL and PHAI activities for equipment calibration purposes.

CNL further adopts robust cyber security practices to address requirements arising from licences and contractual obligations, as well as business needs to provide a secure infrastructure for its business functions. These practices include appropriate focus on all information technology related activities, their governance, management, and execution, and applies to everyone using CNL information technology assets. Specific to the PHAI, this includes appropriate security provisions for control and data acquisition systems which provide monitoring and control of PHAI wastewater treatment plants. All sites further have the necessary measured security measures in place in relation to the site's risk profile and the type of nuclear substance (e.g., LLRW) being handled or stored. Project sites have means in place to prevent unauthorized access to sites and the removal of low-level radioactive material, prevent acts of sabotage or attempted sabotage, and protect information.

6.12.2 Past Performance

Throughout the current licence period CNL has experienced four security-related CNSC reportable events. All events were assessed to have been minor in nature without any material security impacts. These events are attributed to members of the public breaching site perimeter fencing while traversing along site boundaries that intersect with large green field sites used for outdoor recreational purposes. Access to all PHAI sites is controlled via fencing and gate access control points in accordance with PHAI Security Plan requirements. CNL procedures require the site perimeter to be inspected and ensure perimeter barriers are in good working condition. At times, CNL has put in place transient augmented security measures in response to identified elevated risk scenarios that were identified to expose PHAI activities to potentially increased security risk. CNL has completed security program audits and oversight for all current contractors to ensure contractor sites comply with site specific security plans. Between April 2021 and March 2022 CNL completed 46 field-level security related field observations to verify compliance with PHAI's security plan expectations. Future Plans

CNL will continue to employ a risk-based graded approach to security to ensure prudent management practices are implemented and consistently improved throughout the lifecycle of PHAI activities.

6.13 Safeguards

CNL manages a mature company-wide Nuclear Materials and Safeguards Management Program which provides compliance oversight and services to the PHAI. Some nuclear material received from Cameco has been deemed as safeguarded by the International Atomic Energy Agency (IAEA). Safeguards is proposed to be included in the revised licence.

6.13.1 Relevance and Management

The Nuclear Materials and Safeguards Management Program provides Nuclear Materials and Safeguards Management compliance and services to CNL. The Nuclear Materials and Safeguards Management Program's primary focus is on facilities that contain Fissionable Materials, therefore, are subject to regulatory safeguards measures and reporting requirements.

The Nuclear Materials and Safeguards Management Program applies to all nuclear material and safeguards management activities performed at CNL facilities. The Nuclear Materials and Safeguards Management Program requirements apply to all CNL Sites, CNL employees, and non-CNL Personnel that work at these sites. The Nuclear Materials and Safeguards Management Program requirements applies to all activities involving the procurement and receipt of radioisotopes and radiation sources, as well as the procurement, receipt, disposition, transfer, accounting, safeguards management, storage, and inventory management of nuclear material.

The Nuclear Materials and Safeguards Management Program implements the requirements in REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy* [108] and ensures compliance with these regulatory requirements at CNL.

6.13.2 Past Performance

The PH LTWMF has received many shipments of safeguarded materials from the Cameco facility, and the waste has been emplaced in accordance with the facility design, under the ongoing monitoring of the CNSC and the IAEA.

6.13.3 Future Plans

The emplacement of Cameco waste, both safeguarded and non-safeguarded, is forecasted to continue for the duration of the PHAI until the planned waste shipments from Cameco are complete in accordance with the Legal Agreement and all relevant regulatory requirements.

6.14 Packaging and Transport

The CNL Transportation of Dangerous Goods Program applies to all activities involving the transportation of dangerous goods performed by CNL across all managed sites. Transportation encompasses all operations associated with the movement of dangerous goods, including classification, documentation, packaging, safety marks, security, emergency response, training and regulatory permits and licences.

The main objective of the Transportation of Dangerous Goods Program is to protect persons, property and the environment from the effects of radioactive and hazardous material during transport by establishing and maintaining requirements and processes necessary to facilitate the safe transport of dangerous goods to and from CNL sites in accordance with regulatory requirements.

The Transportation of Dangerous Goods program implements and ensures compliance with the requirements in the following:

- *Transportation of Dangerous Goods Regulations* [109]
- *Packaging and Transport of Nuclear Substances Regulations* [110]
- *IAEA SSR-6, Regulations for the Safe Transport of the Radioactive Material* [111]
- *Nuclear Security Regulations*, SOR/2000-209 [112]
- *PHAI Transport of Dangerous Goods Plan*, 4500-508520-PLA-001 [113]

6.14.1 Relevance and Management

All waste and material transport takes place on municipal, county and provincial roads and transport-related activities comply with applicable legislation and regulations. Transport of radioactive material is executed in accordance with CNL's Transport of Dangerous Goods Program with operational details provide in the *PHAI Transport of Dangerous Goods Plan* [113].

The trucks used for transporting waste are vehicles of sizes and configurations suited for the waste types. The trucks are carefully, methodically loaded within the controlled work areas at the remediation sites. Each vehicle is confirmed to be below the requisite contamination limits as stipulated in *Packaging and Transport of Nuclear Substances Regulations* [110] on its exterior surfaces and is verified prior to departure. The cargo box is covered with a dust-tight load covering, and other controls are implemented to prevent the loss of materials during transportation to the PH LTWMF. Placarding is placed on each vehicle as required in accordance with *TDG Regulations* [109]. Each truck is identified with project-specific information, affixed to the side. All vehicles are dedicated to the transport operation until decontaminated and released to the CNSC-approved release limits. Before leaving the remediation site each vehicle is issued a trip ticket which is surrendered when the shipment is verified as received at the LTWMF. Trip tickets are reconciled daily as part of the inventory control procedure.

CNL contractors are responsible for carrying out the work scope and obligations as set out in the contracts with CNL, including implementation of the Transportation of Dangerous Goods Program and CNL conducts ongoing oversight of implementation.

CNL contractors responsible for transporting waste must demonstrate in writing that they meet the following requirements by providing a Transportation of Dangerous Goods Plan specific to their work package that demonstrates:

- Training and experience with Class 7, radioactive material consignments
- Adequate knowledge of TDG Regulations [109], *Packaging and Transport of Nuclear Substances Regulations* [110], *IAEA Regulations for the Safe Transport of Radioactive Material* [111] and the *Nuclear Safety and Control Act* [48].
- Understanding of the process to ship radioactive material in accordance with the regulations
- Having a CNL-approved radiation protection program

CNL reviews the contractor's transportation of dangerous goods plan to confirm all requirements of CNL program have been satisfactorily addressed through its procedures and systems. CNL requests copies the contractor's Emergency Response Action Plan, approved by Transport Canada (if required), for CNL records.

CNL conducts routine field inspections to verify the procedures and systems are being implemented by the contractor as stated in the contractor's plans.

6.14.2 Past Performance

CNL promotes the reporting of issues and all incident types, including transportation incidents, for tracking, trending purposes through the corporate Impact System. CNL ensures all reported events are assessed for their potential risk level. The Impact system promotes a culture of health and safety reporting across the Project.

In addition, periodic self-assessments of PHAI Transportation of Dangerous Goods Plan are scheduled and conducted in the corporate Integrated Assessment Plan. Actions plans may be developed and used to define program goals and targets, and to evaluate program effectiveness.

Since the start of remediation, each shipment of waste from the sites has been transferred to the LTWMFs in accordance with TDG regulations. There have been no major issues related the shipments.

6.14.3 Future Plans

As the PHAI progresses, the focus of the remediation will shift from project sites with large volumes of waste to much smaller remediation sites, with limited waste transfers. Regardless of site scale, each shipment will continue to be performed in compliance with Transport Canada and CNSC regulations with respect to packaging and transport of nuclear substances. Consistent and ongoing CNL oversight of contractor performance will ensure the transportation of dangerous goods plans and contractor performance meet CNL's program.

7 OTHER FUNCTIONAL SUPPORT AREAS RELEVANT TO PHAI

Section 6 outlined the CNL compliance with Safety and Control Areas outlined in the various licences and licence conditions handbooks. CNL has a robust Management System which includes many additional functional areas, while not part of the licensing requirement, are still applicable to the PHAI. These areas and their applicability to the PHAI are described below.

7.1 Supply Chain Program

The Supply Chain Program describes the organizational framework and operational arrangements through which procurement, contracting, and Supply Chain Management activity is undertaken and governed pursuant to CNL's Supply Chain policy and policy standards. Supply Chain management represents a key enabling capability and critical success factor for CNL. Solid industry practices are drawn from both internal and external sources, including resources from CNL parent corporations to optimize processes to improve speed to market, flexibility, and commercial innovation.

Procurement activity is organized into the five top-level process stages to cover the entire purchasing life cycle, including Contract Strategy and Planning, Solicitation and Evaluation,

Contract Award, Management of Contract, and Closeout. These process stages apply to both the material acquisitions and contract management activities.

CNL's Supply Chain Program implements the requirements in CSA N286-12, *Management system requirements for nuclear facilities* [38], ISO 9001:2015, *Quality Management Systems – Requirements* [39], CSA ISO 14001:2015, *Environmental Management Systems – Requirements With Guidance for Use* [114], CSA N285.0-08, *General requirements for pressure-retaining systems and components in CANDU nuclear power plants* [115] and ensures compliance with these requirements at CNL as required in the respective site CNSC licence(s).

The PHP contracting strategy has evolved through adaptive management over the course of the PHAI, incorporating lessons learned from both the PGP and PHP.

7.2 Safety Analysis

CNL manages a comprehensive safety analysis program that supports the licensing basis of all nuclear facilities. CNL's program applies to all safety analysis activities involving CNL structures, systems, and components and all management, supervisors, and staff. The relevant hazards are identified, including radiological, nuclear criticality, fire, and chemical. However, with respect to compliance with the *Nuclear Safety and Control Act* [48] and regulations, the CNSC requirement is limited to consideration of the effects of all relevant hazards on radiological safety and prevention of nuclear criticality accidents or chemical hazards directly associated with CNSC licensed radioactive material. Assessment of non-radiological hazards is included in the scope of other Functional Safety Areas, such as Conventional Health and Safety and Fire Protection with aspects relevant to nuclear safety considered in Safety Analysis.

7.2.1 Port Granby

Although not required under the current PGP licence there are two supporting documents that contain information related to the safety analysis performed prior to the construction of the PG LTWMF:

- *Human Health and Safety Considerations Study for the PGP* [116], which characterizes the existing levels of stressors on health and safety conditions as they apply to the PHAI and members of the public
- Human Health and Safety Considerations Environmental Effects Assessment Report [116], which identifies and assesses the potential interactions between the PGP and workers, the public and the environment, including scenarios for the very long-term

The appendices of Human Health and Safety Considerations Environmental Effects Assessment Report [116] contain the quantitative assessment of radiological dose and exposure to both workers and the public resulting from the PGP. Similar receptors were studied for Port Granby as for Port Hope.

The Port Granby assessment also examines long-term scenarios, such as inadvertent human intrusion and containment failure scenarios.

7.2.2 Port Hope

Related to the PHP there are two supporting documents that contain information related to the safety analysis performed prior to construction of the PH LTWMF:

- The *Human Health and Safety Considerations Study for the PHP* [117], which characterizes the existing levels of stressors on health and safety conditions as they apply to the Project and member of the public.
- The *Human Health and Safety Considerations Environmental Effects Assessment Report* [118], which identifies and assesses the potential interactions between the PHP with workers, the public, and the environment.

7.3 Performance Assurance

Human Performance training is required for all employees, which is generally delivered during new employee orientation week. This training introduces safety culture and human performance fundamentals. In addition, a set of discrete behaviours and techniques, known as Event Free Tools, is introduced that assists employees in maintaining positive control of a work situation. This training is conducted virtually in order to provide consistent messaging to all employees at all sites.

The Performance Assurance Function employs the Event Free Day Reset process, to enhance communication of and learning from human performance-related events across the organization.

7.4 Conduct of Operations

The Conduct of Operations Program provides a compliance framework to ensure facility operations are managed, organized, and conducted in a manner that results in high levels of safety, performance, and reliability while maintaining compliance with the applicable acts, standards, codes, regulations and regulatory requirements.

The Conduct of Operations Program applies to PHAI through a series of working-level procedures during operations, including:

- Operating procedures
- Maintenance procedures
- Response to alarms procedures
- Emergency procedures
- Surveillance and monitoring procedures
- Waste management procedures
- Operating limits and conditions

7.5 Construction

The CNL Construction Program applies to all construction and installation activities. The complexity of the work is based on the regulatory rating of the structure or system, the design intent, technical specifications, the requirements of applicable codes and standards, and the

grading level identified for each contract. The Construction Functional Support Area manages, controls, and monitors construction and installation activities in accordance with the contract and in compliance with requirements.

The Quality Plan*, Historic Waste Program* [119] and *HWP Construction Oversight* [120] are in alignment with the CNL Construction program requirements and require an extensive testing regime as detailed in the design specifications and confirm administrative controls are adequate to ensure:

- Staff training and staffing levels are adequate
- Operating procedures and response to alarm procedures are effective and correct
- Safety systems function as expected (where practical to do so)
- Individual systems and overall process control performance can operate safely and yield results within the acceptable design range limits

Through the implementation of the Construction process, CNL demonstrates and provides confidence to customers, stakeholders and regulatory authorities that:

- Construction and installation activities are efficiently, effectively and safely delivered
- Construction and installation activities are adequately controlled and documented
- The system modifications and equipment installation results are deemed safe and appropriate for the intended use
- Construction and installation activities address and adhere to the applicable regulatory and statutory requirements

The Construction Program implements guidance from the requirements in REGDOC-2.3.1, *Conduct of Licensed Activities: Construction and Commissioning Programs* [121] however the overall requirements of REGDOC-2.3.1 are not applicable to operations at PHAI.

Specifically, the PHAI applies the *HWP Construction Oversight* [120] procedure which outlines site-specific requirements related to the CNL's construction oversight program.

7.6 Commissioning

The CNL Commissioning Program applies to all new or refurbished facilities at CNL. This includes current operating facilities where new systems are installed, or an existing system is modified that alters the design intent of the original system configuration. Commissioning starts with planning the commissioning scope, phases, and control points, and ends with the Commissioning Completion Assurance process.

The Commissioning Program defines processes to ensure that commissioning is planned, documented, executed, and verified according to applicable codes, standards, and regulatory and customer requirements.

The ultimate commissioning objective is to obtain a building or facility whose systems function in all respects according to the design intent and meet the needs of the occupants. To achieve this, the Commissioning Program provides a systematic objective method that will enable commissioning to safely proceed in a controlled manner and to a high level of quality. The

Commissioning Program will also provide the necessary assurances and/or evidence that the facility has been constructed in accordance with the design intent and can be operated safely.

The Commissioning Program implements the requirements in REGDOC-2.3.1, *Conduct of Licensed Activities: Construction and Commissioning Programs* [121] and ensures compliance with these requirements at CNL.

Commissioning developed in alignment with the CNL Commissioning program requirements, establishes methods for ensuring accountability in addition to the preparation, review, and approval and revision control of the components. The pre-commissioning and commissioning activities follow the documentation hierarchy in accordance with CNL's Commissioning Program and *HWP Construction Oversight* [120].

8 OTHER MATTERS OF REGULATORY INTEREST

8.1 Cost Recovery

With regards to cost recovery, the PHAI is exempt from CNSC's Cost Recovery Fee Regulations [122] under Section 2(e) as CNL, acting as a Sub-Contractor to AECL, as an Agency of the Federal Government, is applying for a licence from the Commission in respect of contaminated sites where the contamination did not result from the activities of the applicant.

8.2 Financial Guarantees

AECL is a Schedule III, Part 1 Crown Corporation under the Financial Administration Act and an agent of Her Majesty in Right of Canada. As an agent of Her Majesty in Right of Canada, AECL's liabilities are ultimately liabilities of Her Majesty in Right of Canada. While the restructuring of AECL (the GoCo) has seen the oversight of the PHAI transferred to a private-sector contractor, the Canadian National Energy Alliance, AECL retains ownership of the lands, assets and liabilities associated with CNL's licences.

These liabilities have been officially recognized by the Federal Minister of Natural Resources in a letter dated July 31, 2015. This letter states that AECL will retain ownership of the lands, assets and liabilities associated with CNL's licences, and states that the liabilities of AECL are the liabilities of Her Majesty in Right of Canada. CNL confirmed that the provisions in the 2015 letter remain valid on August 25, 2020 [123].

REGDOC-3.3.1, *Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities* [124], states that an expressed commitment from a federal or provincial Government is an acceptable form of financial guarantee.

8.3 Nuclear Liability Insurance

This section is not relevant as past and future Waste Nuclear Substance Licences are not related to a nuclear installation or radioactive waste management facility containing high-level radioactive waste as defined in the *Nuclear Liability and Compensation Regulations* [125].

9 REFERENCES

[1] Canadian Nuclear Safety Commission Waste Nuclear Substance Licence: WNSL-W1.2310.02/2022 - Waste Nuclear Substance Licence Port Hope Long-Term Low-Level Radioactive Waste Management Project.

[2] Canadian Nuclear Safety Commission Waste Nuclear Substance Licence: WNSL-W1-2311.00/2022 - Waste Nuclear Substance Licence Port Granby Long-Term Low-Level Radioactive Waste Management Project.

[3] Canadian Nuclear Safety Commission Waste Nuclear Substance Licence: WNSL-W1-182.0/2022 - Waste Nuclear Substance Licence Pine Street Extension Temporary Storage Site.

[4] Canadian Nuclear Safety Commission Waste Nuclear Substance Licence: WNSL-W1-344-1.8/ind.- Waste Nuclear Substance Licence Port Hope Radioactive Waste Management Facility

[5] Port Hope Area Initiative, An Agreement for the Cleanup and the Long-Term Safe Management of Low-Level Radioactive Waste Situate in the Town of Port Hope, the Township of Hope and the Municipality of Clarington, 4500-513700-110-000 Rev.0, 2001, June 22.

[6] Canadian Nuclear Laboratories, Plan PHAI Phase 2 Public Information Program, 4500-513000-PLA-004, 2020 March 05.

[7] Marshall Macklin Monaghan Limited, Port Hope Project, Environmental Assessment Study Report, LLRWMO-03710-ENA-12003, 2006 January.

[8] Golder Associates Ltd., Environmental Assessment Study Report for the Port Granby Project, LLRWMO-03710-ENA-13004, Rev. 1. 2007 July.

[9] Government of Canada, Screening Report – The Port Hope Long-Term Low-Level Radioactive Waste Management Project, Rev. 0, 2006 December.

[10] Government of Canada, Screening Report – The Port Granby Long-Term Low-Level Radioactive Waste Management Project, 2009 August.

[11] Socio-economic Effect Management Program – Port Hope Project, 4501-509246-PLA-002, Rev. 2, 2011 February 4.

[12] Socio-economic Effects Monitoring Plan, Port Granby Project, 4502-509246-PLA-003, Rev. 0, 2011 February 25.

[13] Canadian Nuclear Laboratories, Site and Facility Maintenance and Monitoring Plan, Port Granby Project, 4502-508000-PLA-002, Revision 1, 2021 June.

[14] Canadian Nuclear Laboratories, Environmental and Biophysical Monitoring Plan, Port Hope Project, 4501-509247-PLA-001, Rev. 4, 2018 October.

[15] Canadian Nuclear Laboratories, Environmental and Biophysical Monitoring Plan, Port Granby Project, 4502-509247-PLA-001, Rev. 1, 2019 January.

[16] Canadian Nuclear Safety Commission, Indigenous Engagement, version 1.1, REGDOC-3.2.2, 2018 April.

[17] Canadian Nuclear Safety Commission, Public Information and Disclosure, REGDOC-3.2.1, 2018, May.

[18] Canadian Nuclear Laboratories, PHAI Special Circumstances Protocol, 4501-01611-OP-001, Rev 5, 2022 March.

[19] Canadian Nuclear Laboratories, Review of Arsenic in Soil as Part of the PHAI, 4501-121258-REPT-001, Revision 1, 2021 August 26.

[20] Canadian Nuclear Laboratories, Port Hope Project, Environmental Protection Plan, 4501-509200-PLA-003, Rev. 0, 2012 June.

[21] Canadian Nuclear Laboratories, Port Granby Project, Environmental Protection Plan, Port Granby Project, 4502-508120-041-000-0072, Rev. 0, 2011 January.

[22] Canadian Nuclear Laboratories, Protocol for Archaeological and Forensic Discovery, 4500-509246-REQ-001, Revision 2, April 15 2022.

[23] Canadian Nuclear Laboratories, PHAI Indigenous Communications and Engagement Interim Status Report 2012 – 2022, 236-513400-REPT-002, 2022 April 25.

[24] Canadian Nuclear Safety Commission, Port Hope Long-Term Low-Level Radioactive Waste Management - Licence Conditions Handbook, WNSL-W1.LCH-2310, Revision 1, 2014 December 04.

[25] Canadian Nuclear Laboratories, Port Granby Project – RS3: Detailed Design Description Report: Long-Term Waste Management Facility, Revision A. AECL, PHAI MO. December 2010.

[26] Canadian Nuclear Laboratories, Site and Facility Maintenance and Monitoring Plan, Port Granby Project, 4502-508000-PLA-002, Revision 1, 2021 June.

[27] Conestoga Rovers and Associates, Assessment of Water Treatment Requirements and Options, Port Granby Project, 2008.

[28] Canadian Nuclear Safety Commission, Port Granby Long-Term Low-Level Radioactive Waste Management Project- Licence Conditions Handbook, WNSL-LCH-W1.2311.00/2022, Revision 0, 2020 Dec 20.

[29] Government of Canada, Canadian Council of Ministers of Environment [CCME], National Guidelines for Hazardous Waste Landfills, 2006.

[30] Canadian Nuclear Laboratories, Port Hope Project RS3 Detailed Design Description Report, Long-Term Waste Management Facility, 4501-508120-REPT-002 Revision 1, November 2010.

[31] Canadian Nuclear Laboratories, Issued for Construction – Specifications – Port Hope Long-Term Waste Management Facility Construction and Operation, 4501-508640-TS-003, Revision 2, 2017 January.

[32] Canadian Nuclear Laboratories, CNL Projects 42104 AND 42105 – Long-Term Waste Management Facility, Construction and Operation - Issued for Construction, Port Hope Area Initiative Port Hope Project, 4501-508640-TS-004, Revision 2, 2017 January.

[33] Canadian Nuclear Laboratories, PH LTWMF Waste Acceptance Criteria, 4501-508600-WAC-001, Rev 0, 2022 May

[34] Port Hope Area Initiative, Settlement Agreement, 2015 October 30.

[35] Canadian Nuclear Safety Commission, Licence Condition Handbook, LCH-WNSL-W1-182.0/2022, 2022.

[36] Canadian Nuclear Laboratories, CNL Management System Manual, 900-514100-MAN-00, Revision 2, 2021 August 23.

[37] Canadian Nuclear Laboratories, HWP MO Governing Documentation Index, 236-514200-GDI-001, Revision 1, 2019 July 04.

[38] Canadian Standards Association N-286-12, Management System Requirements for Nuclear Facilities, 2018.

[39] ISO 9001:2015. Quality Management Systems - Requirements. Reaffirmed in 2015 September.

[40] Historic Waste Program Quality Assurance Plan, 236-514200-QAP-001, Revision 2, 2022 January.

[41] Canadian Nuclear Laboratories, Quality Program Selection, 900-514200-MCP-007, Revision 3, 2022 March 20.

[42] Canadian Nuclear Laboratories, HWP MO Field Oversight Activities, 236-514200-PRO-001, Revision 2, 2021 December 15.

[43] Canadian Nuclear Safety Commission, REGDOC-2.1.2, Safety Culture, 2018 April.

[44] Canadian Standards Association N-286-12, Management System Requirements for Nuclear Facilities, 2018

[45] ISO 9001:2015. Quality Management Systems - Requirements. Reaffirmed in 2015 September.

[46] Canadian Nuclear Safety Commission, Human Performance Management, Personnel Training, REGDOC 2.2.2 Version 2, 2016 December.

[47] Canadian Nuclear Laboratories, CNL Reporting to Regulatory Agencies, 900-514300-MCP-006, 2018 December 31.

[48] Canadian Nuclear Safety Commission, Nuclear Safety and Control Act, S.C 1997, c.9.

[49] Canadian Nuclear Safety Commission, Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills, REGDOC 3.1.2, 2018 January.

[50] Canadian Nuclear Safety Commission – REGDOC-3.1.3, Reporting Requirements for Class II Nuclear Facilities and Users of Prescribed Equipment, Nuclear Substances and Radiation Devices, 2020 February.

[51] Canadian Nuclear Safety Commission, REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste, 2021 January.

[52] Canadian Nuclear Laboratories, Oversight of Engineering Agencies, 900-508120-MCP-006, Revision 0, 2021 May 15.

[53] Canadian Nuclear Laboratories, Engineering Change Control, 900-508130-MCP-001, Revision 5, 2022 April 26.

[54] Canadian Nuclear Laboratories, *Historic Waste Program Management Office Application of Engineering Change Control and Oversight*, 236-508130-COP-001, Rev 0, 2022, February.

[55] IAEA Safety Standards Series GSG-No 1, Classification of Radioactive Waste, General Safety Guide. IAEA, Vienna 2009.

[56] Canadian Nuclear Laboratories, Port Granby Project – RS3: Detailed Design Description Report: Long-Term Waste Management Facility, 4502-508120-041-000-0038, Revision A. AECL, PHAI MO. December 2010.

[57] Canadian Nuclear Laboratories, *Port Granby Project – Addendum to Detailed Design Description Report: Long-Term Waste Management Facility*, Revision A. AECL, PHAI MO. February 2011.

[58] Canadian Nuclear Laboratories, *PHAI Port Granby Project Water Treatment Definition*, Revision 0. AECL, PHAI MO. January 2011.

[59] IAEA Safety Standards Series GSG-No 1, Classification of Radioactive Waste, General Safety Guide. IAEA, Vienna 2009.

[60] Canadian Nuclear Laboratories, PHAI Port Hope Project *Design Basis Document: Water Treatment Definition*, 4501-121256-DBD-001, Revision 0, 2011 February 28.

[61] Canadian Nuclear Laboratories, *Port Hope RS3: Detailed Design Description Report - Low-Level Radioactive Waste Remediation Sites Group 1B*, 4501-508120-041-000-0039, November 2010.

[62] Canadian Nuclear Laboratories, *Port Hope RS3: Detailed Design Description Report - Low-Level Radioactive Waste Remediation Sites & Industrial Waste Remediation Sites Group 2A*, 4501-508120-041-000-0041, November 2010.

[63] Canadian Nuclear Laboratories, *Port Hope RS3: Detailed Design Description Report - Low-Level Radioactive Waste Remediation Sites & Industrial Waste Remediation Port Hope Harbour* 2B, 4501-508120-041-000-0040, November 2010.

[64] Canadian Nuclear Laboratories, *Port Hope RS3: Detailed Design Description Report - Low-Level Radioactive Waste Remediation Sites & Industrial Waste Remediation Sites Group 2C*, 4501-508120-041-000-0042, November 2010.

[65] Canadian Nuclear Laboratories, *Port Hope RS3: Detailed Design Description Report - Low-Level Radioactive Waste Remediation Sites Group 2D*, 4501-508120-041-000-0043, 2010 November.

[66] Canadian Nuclear Laboratories, *Port Hope Area Initiative Radiation Protection Plan,* 4500-508740-PLA-001, Rev 6, 2021 September.

[67] J. Brake (CNL) to J. Thelen (CNSC), Public Dose Estimate for Port Granby Waste Management Facility, 4502-CNNO-15-0004-L, 2015 February 16.

[68] Canadian Nuclear Safety Commission, Radiation Protection Regulations SOR/2002-203.

[69] Canadian Nuclear Laboratories*, Port Hope Area Initiative Occupational Safety & Health Plan,* 4500-510400-PLA-001, Revision 4, 2022 May 06.

[70] Ontario Occupational Health and Safety Act (R.S.O. 1990, c. O.1).

[71] Canadian Nuclear Laboratories, *Port Granby Phase 3 Long-Term Waste Management Health & Safety Plan*, 4502-510400-PLA-008, Revision 0, 2021 July 14.

[72] Canadian Nuclear Laboratories, *Historic Waste Management Contractor Health & Safety Plan Submission Criteria*, 236-510400-PLA-001, Revision 2, 2021 November 15.

[73] WISB Ontario, By the Numbers: Schedule 1-Industry Sector Claims and LTI Rate, https://www.wsib.ca/en/bythenumbers/schedule-1-industry-sector-claims-and-lti-rate.

[74] Canadian Nuclear Laboratories *Integrated Work Control* Management System Document 900-514100-STD-002, Revision 4, 2022 July 6.

[75] CSA N288.8-17, Establishing and implementing action levels to control releases to the environment from nuclear facilities, 2017 February.

[76] Government of Canada, Screening Report – The Port Hope Long-Term Low-Level Radioactive Waste Management Project, Rev. 0, 2006 December.

[77] Government of Canada, Screening Report – The Port Granby Long-Term Low-Level Radioactive Waste Management Project, 2009 August.

[78] ISO 14001:2015, Standard for Environmental Management Systems, 2015 September.

[79] *Dust Management Requirements and Plan*, 4500-509200-PLA-001, Rev. 3, 2018 March.

[80] *Dust Management and Requirements Plan – Small-Scale Sites Remediation*, 4501-509200-PLA-010, Rev. 0, 2018 March.

[81] Canadian Nuclear Laboratories, Port Hope Area Initiative, Protocol for Archaeological and Forensic Discovery, 4500-509246-RRD-001, 2022 April 12.

[82] Golder Associates Ltd., *Port Hope Harbour Remediation, Port Hope, Ontario, Inadvertent Marine Archaeological Discoveries Plan*, 4501-121250-041-000-0578, 2019.

[83] Canadian Nuclear Laboratories, *Port Hope Area Initiative Emergency Plan*, 4500-508730-PLA-001, Revision 3, 2021 July 15.

[84] *Emergency Response Agreement between the Port Hope Area Initiative and the Northumberland Detachment of the Ontario Provincial Police*, 4501-508730-110-000-0011, 2012 July 30.

[85] *Emergency Response Agreement between Port Hope Area Initiative [PHAI] and Whitby Detachment of the Ontario Provincial Police*, 4501-508730-110-000-0012, 2012 August 02.

[86] *Emergency Response Agreement between CNL and the Corporation of the Municipality of Port Hope*, 4501-508730-110-000-0015, 2015 December 22.

[87] *Emergency Response Agreement between PHAI - Durham Regional Police Service - Durham Region EMS and Clarington Fire Services*, 4502-508730-110-000-0009, 2017 November 20.

[88] *Emergency Response Agreement between Port Hope Area Initiative [PHAI] and Northumberland Emergency Medical Services (EMS),* 4502-508730-110-000-0008, 16 October 2012.

[89] Canadian Nuclear Laboratories, *Port Hope Area Initiative 5 Year Drill Plan*, 4500-508730-PLA-004, 2021, July 21.

[90] National Fire Code of Canada, National Research Council Canada, 2015.

[91] National Building Code of Canada, National Research Council Canada, 2015.

[92] Ontario Fire Code, Ontario Regulation 213/07. Fire Protection and Prevention Act, 1997.

[93] Ontario Building Code, Ministry of Municipal Affairs and Housing. 2012.

[94] Canadian Nuclear Laboratories, *PHAI Fire Protection Plan*, 4500-508720-PLA-001, Revision 0, 2022 April 08.

[95] Canadian Nuclear Laboratories, *Screening Report for the Port Granby Long-Term Low-Level Radioactive Waste Management Project*, 4502-03710-041-000-0002, 2009, August 30.

[96] Canadian Nuclear Laboratories, *Fire Screening Report for the Port Hope Long-Term Low-Level Radioactive Waste Management Project*, 4501-03710-041-000-0002, 2006 December.

[97] Canadian Nuclear Laboratories, *Integrated Waste Strategy*. CW-508600-PLA-002. Revision 1. March 2019.

[98] Canadian Nuclear Safety Commission, Framework for Radioactive Waste Management and Decommissioning in Canada, REGDOC-2.11, 2021 March.

[99] Canadian Nuclear Safety Commission, Waste Management, Volume III: Safety Case for the Disposal of Radioactive Waste, REGDOC-2.11.1, 2021 January.

[100] Waste Management Decommissioning, REGDOC-2.11.2, 2021 January.

[101] Canadian Standards Association, N292.0-19, General Principles for the Management of Radioactive Waste and Irradiated Fuel, 2019.

[102] Canadian Standards Association, N292.3, Management of Low- and Intermediate-Level Radioactive Waste, 2014.

[103] Canadian Standards Association, N292.5, Guideline for the Exemption or Clearance from Regulatory Control of Materials that Contain or Potentially Contain, Nuclear Substances, 2011 (reaffirmed 2016).

[104] Canadian Standards Association, N292.6, Long-term Management of Radioactive Waste and Irradiated Fuel, 2018.

[105] Canadian Standards Association N294-19, Decommissioning of Facilities Containing Nuclear Substances. 2019.

[106] Canadian Nuclear Laboratories, *Port Hope Area Initiative Security Plan*, 4500-508710-PLA-001, 2022 April 29.

[107] Canadian Nuclear Safety Commission, Nuclear Security Regulations, SOR/2000-209, 2015 June.

[108] Canadian Nuclear Safety Commission, REGDOC-2.13.1, Safeguards and Nuclear Material Accountancy, 2018 February.

[109] Transport Canada, Transportation of Dangerous Goods Regulations, SOR/2001-286, 2021 June.

[110] Canadian Nuclear Safety Commission, Packaging and Transport of Nuclear Substances Regulations, SOR/2015-145, 2015.

[111] International Atomic Energy Agency, Regulations for the Safe Transport of the Radioactive Material, SSR-6, 2018.

[112] Canadian Nuclear Safety Commission, Nuclear Security Regulations, SOR/2000-209, 2015 June.

[113] Canadian Nuclear Laboratories, *PHAI Transportation of Dangerous Goods Plan*, 4500-508520-PLA-001, 2018 June.

[114] CSA, ISO 14001:2015, *Environmental Management Systems - Requirements with Guidance for Use,* 2015.

[115] CSA, N285.0-08, *General requirements for pressure-retaining systems and components in CANDU nuclear power plants*, 2008.

[116] Canadian Nuclear Laboratories, *Human Health and Safety Considerations Study for the Port Granby Project*, LLRWMO-03710-ENA-13007, Revision 0, 2005 April.

[117] Canadian Nuclear Laboratories, *Human Health and Safety Considerations Study for the Port Hope Project*, LLRWMO-03710-ENA-12006, Rev 0. March 2005.

[118] Canadian Nuclear Laboratories, *Port Hope Project Human Health and Safety Considerations Environmental Effects Assessment Report*, LLRWMO-03710-ENA-12009, 2005 April 6.

[119] *Historic Waste Program Quality Plan,* 236-514200-QAP-001, Revision, 2019 July.

[120] Canadian Nuclear Laboratories, *HWP Construction Oversight,* 4500-505240-OV-001, 2020 July 30.

[121] Canadian Nuclear Safety Commission, Conduct of Licenced Activities: Construction and Commissioning Programs, REGDOC 2.3.1, 2016 January.

[122] Canadian Nuclear Safety Commission, Cost Recovery Fees Regulations, SOR/2003-212, 2015 June.

[123] Letter to K. Murthy, Director General – Directorate of Nuclear Cycle and Facilities Regulations, CNSC from Phil Boyle, Vice-President, Operations and Chief Nuclear Officer, CNL. *Submission of Information Regarding Financial Guarantees for all Atomic Energy of Canada Limited Sites Operated by Canadian Nuclear Laboratories*. 2020 August 25.

[124] Canadian Nuclear Safety Commission, Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities, REGDOC-3.3.1, 2021 January.

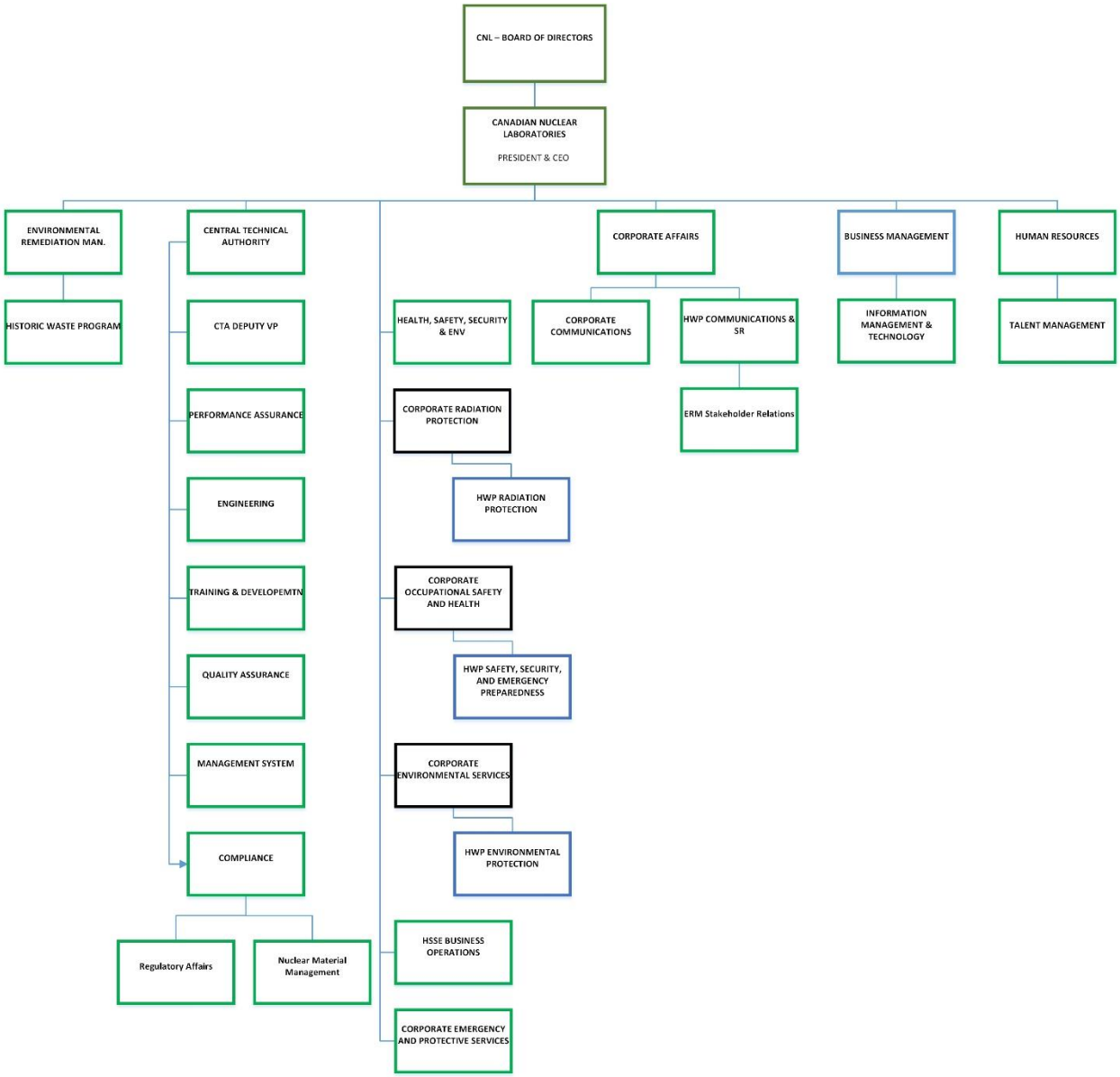
[125] Nuclear Liability and Compensation Regulations, Ministry of Natural Resources, 2016 May.

10 GLOSSARY

10.1 Acronyms and Initialisms

Acronym	Full Text
AECL	Atomic Energy Canada Limited
ALARA	As Low as Reasonably Achievable
CMD	Commission Member Document
CNSC	Canadian Nuclear Safety Commission
CWQG	Canadian Water Quality Guidelines
EA	Environmental Assessment
HWP	Historical Waste Program
LLRW	Low Level Radioactive Waste
LTWMF	Long Term Waste Management Facility
MPH	Municipality of Port Hope
PG	Port Granby
PG WWTP	Port Granby Wastewater Plant
PGP	Port Granby Project
PH	Port Hope
PH WWTP	Port Hope Wastewater Treatment Plant
PHAI	Port Hope Area Initiative
PHP	Port Hope Project
PWQO	Provincial Water Quality Objectives
REGDOC	CNSC Regulatory Document
SCA	Safety and Control Area
SSS	Small Scale Sites
TDG	Transport of Dangerous Goods
TSS	Temporary Storage Site
WNSL	Waste Nuclear Substance License
WWTP	Wastewater Treatment Plant

Appendix A CNL Organizational Structure



Appendix B Historic Waste Program Organizational Structure