



CMD 26-H7 - CNSC Staff Submission

Ontario Power Generation Application to Refurbish Pickering Units 5 to 8 and Renew the Operating Licences of the Pickering Nuclear Generating Station and Pickering Waste Management Facility

Classification	UNCLASSIFIED
CMD Type	Original
CMD Number	26-H7
Reference CMD(s)	N/A
Type of Licensing CMD	A Licence Renewal
Hearing	Commission Public Hearing - Part 1 (CNSC staff and proponent)
Date of Hearing	June 23, 2026
ID #	O4M5N6FSBVFS-972809725-189
Summary	<p>This CMD presents information on matters of regulatory interest, as well as CNSC staff's assessments and recommendations, with respect to Ontario Power Generation Inc.'s application to:</p> <ul style="list-style-type: none">• Refurbish and continue to operate the Pickering Nuclear Generating Station units 5-8• Consolidate the operating licences for the Pickering NGS and WMF into a single licence• Renew the operating licences for the Pickering Nuclear Generating Station (NGS) and Pickering Waste Management Facility (WMF) for a period of 10 years <p>CNSC staff recommend that the Commission:</p> <ul style="list-style-type: none">• Authorize OPG to refurbish and continue to operate Pickering NGS Units 5-8• Issue a consolidated 10-year operating licence for the Pickering site that includes both the Pickering NGS and Pickering WMF. <p>The following items are attached:</p> <ul style="list-style-type: none">• the current PROL 48.04/2028 and WFOL W4-350.02/2028



	<ul style="list-style-type: none">• the proposed PROL 48.00/2036 and change summary• the draft licence conditions handbook
Sommaire	<p>Le présent CMD présente de l'information sur des questions d'intérêt réglementaire, ainsi que les évaluations et recommandations du personnel de la CCSN au sujet de la demande de permis d'Ontario Power Generation Inc. visant ce qui suit :</p> <ul style="list-style-type: none">• la réfection et la poursuite de l'exploitation des tranches 5 à 8 de la centrale nucléaire de Pickering• la fusion des permis d'exploitation de la centrale nucléaire de Pickering et de l'IGDP en un seul permis renouvelé• le renouvellement des permis d'exploitation de la centrale nucléaire de Pickering et de l'installation de gestion des déchets de Pickering (IGDP) pour une période de 10 ans <p>Le personnel de la CCSN recommande que la Commission :</p> <ul style="list-style-type: none">• autorise OPG à remettre à neuf et à poursuivre l'exploitation des tranches 5 à 8 de la centrale nucléaire de Pickering• délivre un permis d'exploitation consolidé d'une durée de 10 ans pour le complexe de Pickering qui comprend à la fois la centrale nucléaire et l'IGDP. <p>Les pièces suivantes sont jointes :</p> <ul style="list-style-type: none">• le PERP 48.04/2028 et le WFOL W4-350.02/2028 en vigueur• le PERP 48.00/2036 proposé et un résumé des modifications• l'ébauche du manuel des conditions de permis.



26-H07 – Mémoire du personnel de la CCSN

Demande d'Ontario Power Generation visant à remettre à neuf les tranches 5 à 8 de Pickering et à renouveler les permis d'exploitation de la centrale nucléaire de Pickering et de l'installation de gestion des déchets de Pickering

Classification	NON CLASSIFIÉ
Type de CMD	Version initiale
Numéro de CMD	26-H27
CMD(s) de référence	S.O
Type de CMD relatif à une décision de permis	Renouvellement d'un permis
Audience	Audience publique de la Commission – Partie 1 (personnel de la CCSN et promoteur)
Date de l'audience	23 juin 2026
N°	O4M5N6FSBVFS-972809725-189
Summary	<p>This CMD presents information on matters of regulatory interest, as well as CNSC staff's assessments and recommendations, with respect to Ontario Power Generation Inc.'s application to:</p> <ul style="list-style-type: none">• Refurbish and continue to operate the Pickering Nuclear Generating Station units 5-8• Renew the operating licences for the Pickering Nuclear Generating Station (NGS) and Pickering Waste Management Facility (WMF) for a period of 10 years• Consolidate the operating licences for the Pickering NGS and WMF into a single renewed licence.



	<p>CNSC staff recommend that the Commission:</p> <ul style="list-style-type: none">• Authorize OPG to refurbish and continue to operate Pickering NGS Units 5-8• Issue a consolidated 10-year operating licence for the Pickering site that includes both the Pickering NGS and Pickering WMF. <p>The following items are attached:</p> <ul style="list-style-type: none">• the current PROL 48.04/2028 and WFOL W4-350.02/2028• the proposed PROL 48.00/2036 and change summary• the draft licence conditions handbook
Résumé	<p>Le présent CMD présente de l'information sur des questions d'intérêt réglementaire, ainsi que les évaluations et recommandations du personnel de la CCSN au sujet de la demande de permis d'Ontario Power Generation Inc. visant ce qui suit :</p> <ul style="list-style-type: none">• la réfection et la poursuite de l'exploitation des tranches 5 à 8 de la centrale nucléaire de Pickering• le renouvellement des permis d'exploitation de la centrale nucléaire de Pickering et de l'installation de gestion des déchets de Pickering (IGDP) pour une période de 10 ans• la fusion des permis d'exploitation de la centrale nucléaire de Pickering et de l'IGDP en un seul permis renouvelé. <p>Le personnel de la CCSN recommande que la Commission :</p> <ul style="list-style-type: none">• autorise OPG à remettre à neuf et à poursuivre l'exploitation des tranches 5 à 8 de la centrale nucléaire de Pickering• délivre un permis d'exploitation consolidé d'une durée de 10 ans pour le complexe de Pickering qui comprend à la fois la centrale nucléaire et l'IGDP. <p>Les pièces suivantes sont jointes :</p> <ul style="list-style-type: none">• le PERP 48.04/2028 et le WFOL W4-350.02/2028 en vigueur• le PERP 48.00/2036 proposé et un résumé des modifications• l'ébauche du manuel des conditions de permis.



CMD 26-H7

Ontario Power Generation Application to Refurbish Pickering Units 5 to 8 and Renew the Operating Licences of the Pickering Nuclear Generating Station and Pickering Waste Management Facility

2026-05-15

Signed by:

**Viktorov,
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Table of contents

Land acknowledgement.....	1
Plain Language Summary	1
1 Overview	4
1.1 Background.....	4
1.2 Highlights.....	6
1.3 Overall conclusions	7
1.4 Overall recommendations.....	8
2 Environmental Review	9
3 Refurbishment of Units 5-8	9
3.1 Background.....	10
3.2 Periodic Safety Review (PSR).....	10
3.3 Proposed Refurbishment Scope.....	14
3.4 Conduct of Refurbishment	16
3.5 Deep-water Intake	18
3.6 Return to Service and Regulatory Hold Points.....	19
3.7 CNSC Staff Regulatory Oversight.....	21
3.8 Refurbishment Conclusions and Recommendations	22
4 Decommissioning of Pickering NGS Units 1-4.....	23
4.1 Detailed Decommissioning Plan (DDP)	23
4.2 Conduct of Decommissioning Activities.....	25
4.3 Storage with Surveillance (SwS) of Units 1-4	26
4.4 Decommissioning Conclusions and Recommendations	27
5 Consolidation of the Operating Licences for the Pickering NGS and Pickering WMF.....	28
6 General assessment of SCAs	29
6.1 Management System	29
6.2 Human Performance Management	35
6.3 Operating Performance.....	41
6.4 Safety Analysis.....	49

6.5	Physical Design	56
6.6	Fitness for Service	62
6.7	Radiation Protection	69
6.8	Conventional Health and Safety.....	77
6.9	Environmental Protection	80
6.10	Emergency Management and Fire Protection	88
6.11	Waste Management.....	92
6.12	Security.....	98
6.13	Safeguards and Non-Proliferation.....	102
6.14	Packaging and Transport.....	106
7	Consultation and Engagement.....	109
7.1	Indigenous consultation and engagement.....	109
7.2	Public consultation and engagement.....	115
7.3	Licensee public information and engagement.....	115
7.4	Participant funding program	117
8	Other matters of regulatory interest	118
8.1	Cost recovery.....	118
8.2	Financial guarantees	119
8.3	Fisheries Act Authorization	120
8.4	Nuclear liability insurance	121
8.5	Delegation of authority	122
9	Overall Conclusions and Recommendations	124
	APPENDIX A : Basis for the Recommendation(s).....	135
A1:	Detailed Summary of CNSC Assessment of Application	135
A2:	Technical Basis.....	139
A3:	Specific Areas for this Facility Type	139
	APPENDIX B : Indigenous Nations, communities and organizations that have traditional and/or treaty territories and/or interests within proximity to the licensed facilities.....	143
	APPENDIX C : Proposed Licence Changes.....	144
	Overview	144
	Licence Changes	144



Licence Format	152
Licence Period	152
Current Licence	1
Proposed Licence	2
Draft Licence Conditions Handbook.....	3
APPENDIX D : Consultation and Engagement Report	4



Land acknowledgement

The Canadian Nuclear Safety Commission acknowledges that the Pickering Nuclear Generating Station (NGS) and Pickering Waste Management Facility (WMF) are located within the traditional lands and waters of the Michi Saagiig Anishinaabeg, the Gunshot Treaty (1787-88), the Williams Treaties (1923), and the Williams Treaties Settlement Agreement (2018).

Plain Language Summary

The Ontario Power Generation (OPG) Pickering Nuclear Site is located on the north shore of Lake Ontario, in the City of Pickering, Ontario, and lies within the traditional territory of the Michi Saagiig Anishinaabe people. It includes 2 distinct facilities, the [Pickering Nuclear Generating Station](#) (NGS) and the [Pickering Waste Management Facility](#) (WMF). The Pickering NGS consists of 8 nuclear power reactor units. Units 2 and 3 have been in safe storage since 2010, while units 1 and 4 were permanently shutdown in 2024. Units 5-8 are authorized to operate until the end of 2026. The Pickering WMF spans 2 separate areas, phase I and phase II, within the Pickering Nuclear Site. It is made up of several buildings and structures, which handle and store used nuclear fuel and other radioactive material generated at the Pickering NGS. The operating licences for both facilities are valid until August 2028.

In June 2025, OPG submitted an application to refurbish and continue to operate units 5-8 of the Pickering NGS and renew and consolidate the operating licences of the Pickering NGS and Pickering WMF into a single licence, valid for a 10-year period.

During the proposed refurbishment of units 5-8, OPG plans to replace major reactor components (e.g., fuel channels, feeders, and steam generators) and make other enhancements to improve plant safety, reliability, and performance. These planned enhancements include a deep-water intake (DWI), a containment filtered venting system, and high wind hazard protections.

As required by the licence, OPG is conducting a periodic safety review (PSR) to assess the current state of the plant against modern codes and standards and to determine reasonable and practical safety improvements to enhance safety. OPG has also conducted various assessments in support of the licence application, including:

- A predictive environmental risk assessment (PERA) that evaluates the environmental risks associated with the activities at the Pickering site, including the refurbishment and continued operations of units 5-8, decommissioning of units 1-4, and operation of the Pickering WMF.



- Climate change resilience assessments (CCRA) that assessed climate change-related hazards that may impact the Pickering NGS and Pickering WMF.
- A limited scope detailed decommissioning plan (DDP) for Pickering NGS units 1-4, that describes the plans associated with the removal of outbuildings and non-nuclear components on the secondary side of the station while the reactor units remain in Storage with Surveillance (SwS).

Through a preliminary assessment and discussion with potentially impacted Indigenous Nations and communities, CNSC staff have found that the activities proposed in OPG's application, such as the planned construction of a DWI, may have potential impacts to potential or established Aboriginal and/or treaty rights of Indigenous Nations and communities. Therefore, CNSC staff are recommending that the Commission determine that the Duty to Consult is applicable in this matter. CNSC staff have engaged and consulted, as applicable, with interested and potentially impacted Indigenous Nations and communities to discuss concerns, impacts, and potential accommodations, in collaboration with Fisheries and Oceans Canada, the federal organization responsible for the protection of the lake. CNSC staff will continue these engagement and consultation efforts during 2026.

The CNSC made funding available through its Participant Funding Program to assist Indigenous Nations and communities, members of the public, and stakeholders in participating in the regulatory process and to provide value-added information to the Commission through informed and topic-specific interventions. Based on recommendations from an external Funding Review Committee, the CNSC awarded \$343,584.86 to ten applicants.

Based on CNSC staff's assessments of OPG's application, supporting documents, and past performance, CNSC staff conclude that OPG remains qualified to carry out the licensed activities and has made, and will continue to make, adequate provisions for the protection of the environment, the health and safety of persons and the maintenance of national security measures required to implement international obligations to which Canada has agreed.

CNSC staff recommend that the Commission, contingent on the duty to consult being fulfilled, authorize OPG to refurbish units 5-8 of the Pickering NGS and renew the licences for the Pickering NGS and WMF as a single operating licence for a 10-year period from January 1, 2027, to December 31, 2036. CNSC staff recommend that the Commission include 4 regulatory hold points for the return to service of each unit undergoing refurbishment.

Referenced documents in this CMD are available to the public upon request, subject to confidentiality considerations.



CMD Structure

This Commission Member Document (CMD) includes the following:

- An overview of the matter being presented
- Overall conclusions and recommendations
- Specific discussions on areas of focus in Ontario Power Generation's application
- General discussion pertaining to the safety and control areas (SCAs) that are relevant to this submission
- Discussion about other matters of regulatory interest
- Appendices that complement the content of the CMD, including:
 - Basis for the recommendations
 - Indigenous Nations, communities and organizations that have traditional and/or treaty territories and/or interests within proximity to the licensed facilities
 - An Indigenous Nations and communities Consultation and Engagement Report
 - Current licence
 - Any proposed changes to the conditions, licensing period, or formatting of an existing licence
 - Proposed licence
 - Draft licence conditions handbook

1 Overview

1.1 Background

The Pickering Nuclear Site (hereinafter the Pickering site) is located in the Province of Ontario on the north shore of Lake Ontario, in the City of Pickering and the Regional Municipality of Durham and lies within the traditional territory of the Michi Saagiig Anishinaabe people. These lands are covered by the Williams Treaties between Canada and the Mississauga and Chippewa Nations. The site lies 32 km northeast of downtown Toronto and 21 km southwest of Oshawa. The facility is owned by Ontario Power Generation Incorporated (OPG).

The Pickering site includes 2 separate facilities, the [Pickering Nuclear Generating Station](#) (NGS) and the Pickering Waste Management Facility (WMF). Figure 1 shows an aerial shot of the Pickering site, where the Pickering NGS is visible in the foreground and the Pickering WMF is towards the right.

Figure 1 – Pickering Nuclear Site



The Pickering NGS is currently licensed under a power reactor operating licence (PROL) and consists of 8 CANDU pressurized heavy water nuclear power reactors (units) and their associated equipment. Construction of the facility started in 1966 for units 1-4 (formerly referred to as Pickering NGS A) and in 1974 for units 5-8 (formerly referred to



as Pickering NGS B). The first criticality for unit 1 was on February 25, 1971, and for unit 5 was on October 23, 1982. The in-service dates for units 1-4 ranged from 1971 to 1973, and for units 5-8 ranged from 1983 to 1986. Units 2 and 3 were defueled in 2008 and have remained in a safe storage state since 2010. Units 1 and 4 were permanently shut down in 2024, and OPG is currently undertaking stabilization activities to transition these units to a safe storage state. Units 5-8 are authorized to continue operations until the end of 2026; each unit has a net electrical output of about 516 MWe.

OPG also produces cobalt-60 (Co-60) at the Pickering NGS, a radioactive isotope used for sterilization of medical equipment and food products. Co-60 is harvested from irradiated reactor components (adjuster rods) that are removed from the reactors during planned outages.

The Pickering WMF is currently licensed under a separate Class 1B Waste Facility Operating Licence (WFOL). The Pickering WMF handles and stores used nuclear fuel produced at the Pickering NGS. After cooling in the station's irradiated fuel bays (IFBs) for a minimum of 6 years, fuel is placed in dry storage containers (DSCs) and transferred to the Pickering WMF for handling and storage.

The Pickering WMF spans 2 phases within the overall boundary of the Pickering site. Phase I is situated within the protected area of the Pickering NGS and includes the DSC processing building, and DSC storage buildings #1 and #2. Phase II is located northeast of phase I within its own protected area. It includes DSC storage buildings #3 and #4, dry storage modules (DSMs), and the currently under construction DSC storage building #5. The DSMs were recently relocated from phase I to phase 2 and contain intermediate-level waste components from past retube activities at Pickering NGS units 1-4. The Pickering WMF also includes the currently under construction Pickering Component Storage Structure (PCSS), which is located adjacent to phase II. The PCSS is planned to store low- and intermediate-level waste resulting from the proposed refurbishment of Pickering NGS units 5-8 and future decommissioning activities.

Pickering Site Licensing

In February 2018, the Commission renewed the WFOL for the Pickering WMF (1) (2), and in August 2018, the Commission renewed the PROL for the Pickering NGS (3) (4). Both licences are valid for a period of 10 years, until August 31, 2028. OPG's current PROL and WFOL are included in Appendix C.

In 2018, OPG had planned to cease operation of all Pickering NGS units by December 31, 2024, and transition all units into a state of Storage with Surveillance (SwS). However, in February 2024, OPG informed the CNSC (5) of its intent to refurbish Pickering NGS units 5-8. Later in 2024, the Commission amended OPG's PROL (6) to authorize operation of units 5-8 until the end of 2026 and increase the operating limit of units 5-8 pressure



tubes to up to 305,000 EFPH. Operation of any unit beyond December 31, 2026, requires the authorization of the Commission.

With respect to the Pickering WMF, at the time of its licence renewal in 2018, OPG informed the Commission that it intended to construct 3 additional DSC storage buildings during the licence period and that DSC storage buildings #5 and #6 would be combined into a single double-capacity building. The Commission authorized the construction of these DSC storage buildings as part of the renewed WFOL and limited the Pickering WMF to 6 total DSC storage buildings. In 2025, the Commission amended OPG's WFOL (7) for the Pickering WMF to also authorize construction and operation of the PCSS.

As part of the previous relicensing hearings, the Commission noted several actions it expected CNSC staff to complete over the licence periods. As of January 2026, all such actions have been closed, with the exception of an action to provide updates to the Commission on the ongoing work of Environment and Climate Change Canada (ECCC) regarding the nomination of radionuclides as Chemicals of Mutual Concern. In 2024, the Canada Water Agency (CWA) was established and took over responsibility on this matter from ECCC. CNSC staff continue to support the CWA as needed and will provide an update to the Commission following a final decision on the nomination (8).

1.2 Highlights

In October 2024, OPG informed the CNSC of its intent to apply for early renewal of the Pickering NGS PROL and Pickering WMF WFOL (9), and on June 27, 2025, OPG submitted its application (10). While OPG's PROL and WFOL will remain valid until 2028, OPG has indicated that the purpose of this early renewal is to align with the proposed refurbishment of Pickering NGS units 5-8. OPG's application and responses to CNSC staff questions (11) make several requests of the Commission:

- Renew the PROL and WFOL for a 10-year period, beginning January 1, 2027.
- Consolidate the PROL and WFOL into a single PROL.
- Authorize the refurbishment, including construction of a proposed deep-water intake (DWI), and the continued operations of Pickering NGS units 5-8.
- Include a licensed activity in the PROL pertaining to the decommissioning of Pickering NGS units 1-4.
- Remove WFOL licence condition 9.2 from the renewed PROL, which states: "The licensee shall implement an environment assessment follow-up program" since the program has been completed.
- Authorize the expansion of the capacity of Pickering WMF DSC storage building #5 from 1,200 DSCs to a total capacity of 1,410 DSCs.



- Accept a deviation from the requirements of [REGDOC-2.2.3, Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2](#), regarding the reinstatement of certified staff during the return to service of unit 5.

In addition to its application, OPG has also:

- Submitted a predictive environmental risk assessment (PERA) (12), that considers potential risks to people and the environment that could result from the activities during the proposed licence period.
- Submitted a climate change resilience assessment (CCRA) (13) that assessed climate change-related hazards that may impact the Pickering NGS.
- Prepared a limited-scope detailed decommissioning plan (DDP) (14) that describes the anticipated decommissioning activities during the proposed licence period.
- Initiated a comprehensive periodic safety review (PSR) to support the proposed refurbishment and continued operation.

This CMD includes outcomes of CNSC staff's review of OPG's application and supporting documents, with information pertaining to:

- The environmental review requirements of this application.
- The proposed refurbishment of Pickering NGS units 5-8.
- The decommissioning of Pickering NGS units 1-4.
- Consolidation of the existing PROL and WFOL into a single renewed PROL.
- Performance assessments in all SCAs.
- Engagement with the public and Indigenous Nations and communities.
- Other matters of regulatory interest.

1.3 Overall conclusions

CNSC staff's review of OPG's application and supporting documents concludes the following:

1. OPG's application meets the applicable regulatory requirements and establishes an adequate licensing basis for the continued operations of the Pickering NGS and Pickering WMF.
2. Consolidation of the existing PROL and WFOL into a single PROL is administrative in nature and will not change the licensing basis or regulatory oversight at the 2 facilities.



3. OPG's PERA demonstrates, in accordance with regulatory requirements, that the proposed activities are not predicted to result in adverse effects to human and/or ecological receptors and that any anticipated impacts will be minimized through mitigation measures and monitoring.
4. OPG has demonstrated, in accordance with regulatory requirements, that it has suitable programs and processes in place for the refurbishment and return to service of Pickering NGS units 5-8, including construction of a DWI.
5. OPG has demonstrated, in accordance with regulatory requirements, that it has suitable programs and processes in place to execute the decommissioning activities described in the DDP.
6. OPG has adequately completed the applicable commitments associated with the existing WFOL licence condition 9.2 pertaining to an environment assessment follow-up program.
7. OPG has assessed, in accordance with regulatory requirements, the storage of up to 1,410 DSCs at Pickering WMF DSC storage building #5.
8. The construction of the double capacity DSC storage building #5 at the Pickering WMF represents both the fifth and sixth storage buildings for the purpose of the current Commission authorized limit of 6 buildings.
9. OPG's certification strategy for the proposed restart of unit 5, the first unit to restart following refurbishment, provides an adequate temporary alternative to the required period of "work under supervision".

1.4 Overall recommendations

Based on the review of the application and supporting documentation, CNSC staff conclude that OPG:

- a) **Is qualified** to carry on the activities authorized by the licence.
- b) **Will make adequate provisions** for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

CNSC staff recommend that the Commission:

1. **Renew** the Pickering PROL, for a period of 10 years from January 1, 2027, until December 31, 2036, to authorize OPG to:
 - a. Refurbish and continue to operate Pickering NGS units 5-8;
 - b. Continue to operate the Pickering WMF; and

- c. Carry out the licensed activities listed in part IV of the proposed PROL.
2. **Consolidate** into the renewed PROL the licensed activities in WFOL-W4-350.02/2028 and concurrently revoke this WFOL.
3. **Delegate** authority as set out in section 8.5 of this CMD.
4. **Accept** OPG's proposed deviation from the requirements of licence condition 2.4, specifically section 20.5.4 of REGDOC-2.2.3 pertaining to the required period of "work under supervision", of the Pickering PROL during the proposed restart of unit 5.
5. **Authorize** OPG to store up to 1,410 DSCs in storage building #5 at the Pickering WMF.

2 Environmental Review

CNSC staff reviewed OPG's licence application to identify the type of environmental review required. As part of this process, CNSC staff assessed whether an integrated impact assessment or a federal lands review under the [Impact Assessment Act](#) (IAA) were required. For this licence application, it was concluded that neither are required. The proposed activities of refurbishment, including the proposed DWI, and decommissioning of an existing nuclear facility are not listed in the IAA *Physical Activities Regulations*.

CNSC staff conduct environmental protection reviews (EPR) for all licence applications with potential environmental interactions. EPRs help support the Commission's conclusion on whether the applicant's proposal provides adequate protection of the environment and the health of people. An EPR was conducted for this licence renewal, the results of which are presented in section 6.9 of this CMD.

CNSC staff will continue to verify and ensure that, through ongoing licensing and compliance activities and reviews, the environment and the health of persons are protected and will continue to be protected.

3 Refurbishment of Units 5-8

In its application (10), OPG states that it intends to refurbish Pickering NGS units 5-8 during the proposed licence period. OPG is requesting Commission authorization to continue operation of units 5-8 beyond 2026, following completion of the proposed refurbishment project. To support continued operations of the Pickering NGS, OPG is also currently undertaking a comprehensive periodic safety review (PSR) in accordance with [REGDOC-2.3.3, Periodic Safety Reviews](#). Information on OPG's proposed



refurbishment project, including project scope, execution, return to service, and regulatory hold points, can be found in this section.

3.1 Background

OPG's current PROL for the Pickering NGS (6) authorizes the operation of units 5-8 until the end of 2026 and the transition of all units to SwS. The proposed refurbishment project is intended to extend the life of units 5-8 for an additional 30 or more years.

Planning for the proposed refurbishment project began in September 2022, when the Ontario government directed OPG to update its feasibility assessment for refurbishing Pickering NGS units 5-8 for operation beyond 2026. In January 2024, the Ontario government announced its support for OPG to proceed with a project to refurbish units 5-8 and OPG informed the CNSC of its intent to refurbish units 5-8 in February 2024 (5). Later that year, in October 2024, OPG notified the CNSC of its intent to apply for an early licence renewal for the purpose of seeking Commission authorization to refurbish units 5-8 and continue operations.

OPG submitted its application (10) in June 2025, which notes that OPG intends to conduct the refurbishment of units 5-8 during the proposed licence period from January 1, 2027, to December 31, 2036.

3.2 Periodic Safety Review (PSR)

Section 8.01 of the [*Class I Nuclear Facilities Regulations*](#) requires that licensees who are licensed to operate a nuclear power plant conduct a PSR at an interval specified in the licence. PSRs are generally initiated every 10 years or when necessary to support operational changes. The conduct of PSRs is verified and assessed by CNSC staff and is separate from the licence renewal process or the licence period. During the 2024 hearing to authorize continued operation of Pickering NGS units 5-8 until the end of 2026 (15), CNSC staff informed the Commission that OPG is expected to conduct a comprehensive PSR in support of the proposed refurbishment of units 5-8.

As outlined in REGDOC-2.3.3, a PSR is a comprehensive evaluation of the design, condition and operation of a nuclear power plant (NPP) against modern codes and standards. It obtains an overall view of objective plant safety and the quality of the safety documentation, as well as determines reasonable and practical improvements to ensure safety until the next PSR or, where appropriate, until the end of operations.

In addition to REGDOC-2.3.3, guidance on the PSR can be found in the International Atomic Energy Agency's (IAEA) Safety Standards Series, Specific Safety Guide No. SSG 25, *Periodic Safety Review for Nuclear Power Plants*, and CSA Group (formerly the



Canadian Standards Association) standard CSA N290.18-17, *Periodic Safety Review for Nuclear Power Plants*.

The PSR consists of 4 phases:

- Preparation of the PSR basis document.
- Conduct of Safety Factor reviews.
- Analysis of gaps in the Global Assessment Report (GAR).
- Preparation of the Integrated Implementation Plan (IIP).

The licensee first prepares the PSR basis document, which defines the scope and methodology for the PSR. This is then used to conduct the review, prepare reports for a set of Safety Factors, and prepare the GAR. The results of the PSR are used to establish the safety improvements to be included in the IIP. These documents are reviewed and/or accepted by CNSC staff, in accordance with REGDOC-2.3.3.

OPG's most recent PSR update, referred to as PSR2B, was completed to support the extension of operations of Pickering NGS units 5-8 until the end of 2026. The PSR being undertaken for the proposed refurbishment of Pickering NGS units 5-8 is referred to as PSR3.

3.2.1 PSR Basis Document

PSR3 is being carried out in accordance with OPG's PSR basis document. OPG submitted its initial PSR3 basis document to CNSC staff in March 2024 and a revised PSR3 basis document in May 2024 (16) that incorporated CNSC staff feedback. 98 laws, regulations, codes, and standards were selected for PSR3, which included CNSC regulatory documents, CSA Group and other Canadian standards and codes, and international standards and practices. CNSC staff accepted OPG's PSR3 basis document and found that it met the requirements of REGDOC-2.3.3 (17).

3.2.2 Safety Factor Reviews

Safety factor reviews cover all factors important to the safe operation of an NPP. Upon completion of the safety factor reviews, the licensee is required to prepare reports for submission to CNSC staff in accordance with the accepted PSR basis document. These safety factor reports document the findings and the comparisons against applicable modern codes, standards, and practices.

15 safety factors were addressed in PSR3, which are described in Table 1.



Table 1 – PSR3 safety factors and objectives

Safety Factor	Objective
1. Plant Design	To determine the adequacy of the design and its documentation in an assessment against current national and international standards and practices.
2. Actual condition of structures, systems and components (SSCs) important to safety	To determine the actual condition SSCs important to safety and whether it is adequate to meet their design requirements. In addition, the review should confirm that the condition of SSCs is properly documented.
3. Equipment qualification (environmental and seismic)	To determine whether equipment important to safety is qualified to perform its designated safety function throughout its installed service life.
4. Aging	To determine whether aging is being effectively managed so that required safety functions are maintained, and whether an effective Aging Management Program is in place for future operation.
5. Deterministic safety analysis (DSA)	To determine to what extent the existing DSA remains valid when actual plant design, actual condition of SSCs and their predicted state at the end of the PSR period, current deterministic methods, and current safety standards and knowledge have been taken into account. In addition, the review should identify any weaknesses relating to the defence in depth.
6. Probabilistic safety assessment (PSA)	To determine to what extent the existing PSA remains valid as a representative model of the plant when changes in the design and operation of the plant, new technical information, current methods, and new operational data have been taken into account.
7. Hazard analysis	To determine the adequacy of protection of the NPP against internal and external hazards with account taken of the actual plant design, actual site characteristics, the actual condition of SSCs and their predicted state at the end of the PSR3 period, and current analytical methods, safety standards, and knowledge.
8. Safety performance	To determine the safety performance of the NPP and its trends from records of operating experience.



Safety Factor	Objective
9. Use of experience from other plants and research findings	To determine whether there is adequate feedback of safety experience from other NPPs and of the findings of research.
10. Organization, the management system and safety culture	To determine whether the organization, management system, and safety culture are adequate and effective for ensuring safe operation.
11. Procedures	To determine whether procedures are adequate.
12. Human factors	To determine the status of the various human factors that may affect the safe operation of the NPP.
13. Emergency planning	To determine whether the operating organization has adequate plans, staff, facilities, and equipment for dealing with emergencies, as well as whether the operating organization's arrangements have been adequately coordinated with local and national systems and are regularly exercised.
14. Radiological impact on the environment	To determine whether the operating organization has an adequate program for surveillance of the radiological impact of the plant on the environment.
15. Radiation Protection	To determine the extent to which radiation protection has been accounted for in the design and operation of the reactor facility and whether radiation protection provisions (including design and equipment) provide adequate protection to persons from the harmful effects of radiation. It also ensures that contamination, radiation exposures, and doses to persons are monitored, controlled, and maintained as low as reasonably achievable (ALARA).

OPG submitted the 15 safety factor reports between December 2024 and May 2025. Overall, the safety factor reviews conducted by OPG concluded that all objectives of the safety factors were met.

CNSC staff found that the 15 safety factor reports were prepared in accordance with the methodology outlined in the PSR3 basis document.

3.2.3 Global Assessment Report

The GAR documents the results of the review of the actual plant design and condition against modern codes and standards. It presents the findings of the PSR, both strengths



and gaps, to provide a global assessment of the safety of the plant. It includes the overall conclusions and identifies safety improvements to be considered.

OPG plans to complete the PSR3 GAR by August 2026 and submit it to CNSC staff for review. CNSC staff anticipate completing this review and providing feedback to OPG by January 2027.

3.2.4 Integrated Implementation Plan

The IIP addresses the results of the global assessment and presents the proposed safety improvements resulting from the PSR, as well as timeframes for implementation. In accordance with REGDOC-2.3.3, the licensee is required to submit the IIP to CNSC staff for acceptance.

OPG plans to submit the IIP to CNSC staff for acceptance by August 31, 2027. CNSC staff's review and acceptance of the IIP is anticipated to be completed by November 30, 2027.

CNSC staff have included licence condition 3.4 in the proposed PROL (see appendix C) that would require OPG to conduct a PSR at least every 10 years and implement the associated IIP. OPG has implemented processes within its management system for the administration of the IIP, including IIP management, change control, completion and closure of actions, reporting, roles and responsibilities, and communication with CNSC staff. When an IIP commitment is completed, OPG is required to notify CNSC staff who will then verify that all relevant completion criteria are met prior to closing the commitment. OPG is required to notify CNSC staff of any changes to the IIP and report on the status of IIP commitments annually. CNSC staff will oversee OPG's execution of PSR3 IIP commitments during the proposed licence period.

OPG has committed to making summaries of the GAR and IIP publicly available on its website, once available. CNSC staff will continue to monitor OPG's progress in conducting PSR3 and verify that OPG completes the GAR and IIP in accordance with committed timelines. CNSC staff will update the Commission upon acceptance of the IIP as part of the status report on power reactors during a public meeting of the Commission.

3.3 Proposed Refurbishment Scope

OPG provided a list detailing the scope of major activities for the proposed refurbishment of units 5-8 (11). OPG anticipates completing the project definition phase and finalizing proposed scope in 2026. The scope of the proposed refurbishment project includes:



- Construction of a deep-water intake (DWI) to supply the forebay with water from deeper in the lake to improve plant reliability and reduce impingement and entrainment of aquatic species.
- Replacement of fuel channels, feeders, and boilers. Boilers would be removed through engineered openings in each reactor building. The removed nuclear components are planned to be stored at the PCSS.
- Inspection, repair, and replacement of components throughout the primary heat transport system and the main steam system.
- Emergency coolant injection (ECI) and emergency water supply (EWS) component inspection, refurbishment, or replacement, as necessary. This includes EWS piping and ECI valves, recovery motors, and heat exchangers.
- Fire protection system improvements.
- Turbine and generator upgrades and replacements to address aging equipment, integrate new digital controls, and enhance monitoring.
- Moderator and cover gas system improvements.
- Negative pressure containment, vacuum building, and pressure relief duct work to improve leakage rate performance.
- Digital control computer upgrades, including replacement of hardware, software, and other equipment as required.
- Air conditioning unit maintenance to improve reliability and reduce premature failures.
- Reactor Shutdown System maintenance, including the replacement of in-core flux detectors and ion chambers as needed.
- Replacement of unit 5-8 standby generators.
- Fuel handling improvements, including closure plug replacements, fuelling machine refurbishment, and inspection and repair of bridge, elevator, and conveyor components as necessary.
- Civil structures and components inspection, repair, or replacement as needed, including foundations, concrete, and floor slabs.
- Air system, including breathing, service, and instrument air, upgrades to ensure ongoing reliability.
- Class I, II, and III electrical system component replacements.

In addition, OPG has also identified safety improvement opportunities (SIOs) that it plans to implement during the proposed refurbishment. These include:

- Creating a diesel fire-water makeup system.
- Improvements to the EWS supply to boilers, the heat transport system, and moderator, including the elimination of single points of failure.
- A new alternative water supply for the moderator.
- A new containment filtered venting system.
- Installation of a shield tank over pressure system.
- Reinforce portions of the unit 7 control equipment room exterior wall to improve resistance to high winds.

CNSC staff are satisfied that OPG's proposed refurbishment scope adequately encompasses the life-limiting SSCs of Pickering NGS units 5-8, as well as other safety improvement opportunities to improve the overall safety and reliability of the Pickering NGS. CNSC staff expect that OPG's IIP, discussed in section 3.2.4, will also track the scope of the proposed refurbishment project, including the items listed above.

3.4 Conduct of Refurbishment

Refurbishment Organization

As described in section 2.1.2 of OPG's application (10), OPG has established a separate refurbishment management organization that is distinct from the station's operating organization. The intent of this new organizational structure is to allow both organizations to concentrate on their areas of responsibilities and expertise. The refurbishment organization is responsible for the development, implementation, and assurance of the refurbishment project and is overseen by the Senior Vice President (SVP) of Pickering Projects.

Refurbishment Programs, Processes and Project Plans

The Pickering Refurbishment Program (PRP) is described in section 1.2.1.2 of OPG's application (10). The PRP covers the planning, preparation, and execution of activities required to complete the proposed refurbishment of Pickering NGS units 5-8 and bring the units back to service. The PRP is defined in the overarching *Pickering Refurbishment Program Management Plan* (18). It includes several lower-level program management plans that describe how the program is managed to meet the requirements of OPG's nuclear management systems, as well as project management plans that outline the specific objectives that the projects will accomplish. The project management plans describe how the individual PRP projects would be planned, executed, monitored,



controlled, and closed. These include the proposed projects for the replacement of fuel channels, feeders, and steam generators; construction of the DWI; turbine generator work; facility and infrastructure work; and operations and maintenance work.

The *Pickering Refurbishment Program Management Plan* (18) notes that the PRP leverages OPG's existing management system in place at the Pickering NGS. OPG has also indicated (10) that staff within the operations and maintenance organization will transition to the PRP. CNSC staff assessed the PRP and found that it meets regulatory requirements (19).

Contractor Oversight

OPG intends to use "Engineer, Procure, Construct" (EPC) contractors to perform the majority of refurbishment work (10). EPC contractors are qualified by OPG to ensure that the contractor has developed and implemented a management system that meets the requirements of CSA N286-12, *Management System Requirements for Nuclear Facilities*. OPG oversees the activities of EPC contractors, including review and acceptance of all plans and deliverables, surveillance and witnessing of activities, as well as initial and ongoing acceptance of the EPC contractor's management system.

Operating Experience (OPEX) and Benchmarking

OPG has indicated (10) that lessons learned from the refurbishment of the Darlington NGS, the Bruce Power major component replacement project, as well as external OPEX, have been actively incorporated into the Pickering refurbishment planning and design process. Many of the same OPG and contractor staff who led the Darlington refurbishment project are expected to be used for the Pickering refurbishment project.

Training and Mock-up

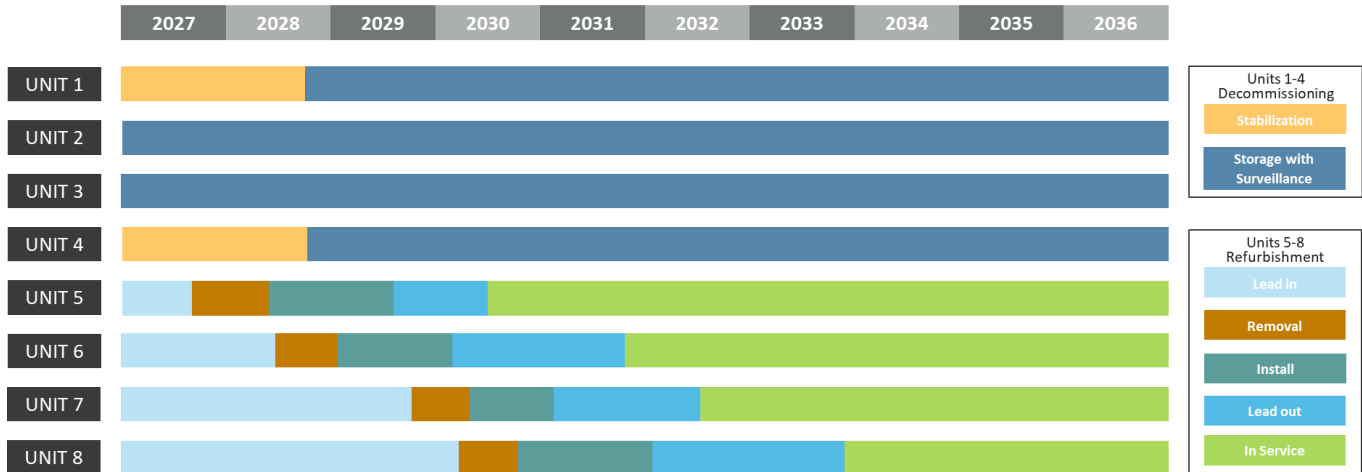
In preparation for refurbishment, OPG plans to train staff using mock-ups prior to performing disassembly and installation work in the field. These mock-ups will be constructed specifically for the proposed refurbishment project and associated tooling and equipment. This will help ensure worker familiarity with tasks and tooling when refurbishment execution begins. OPG also intends to perform some training activities on Pickering NGS units 2 and 3 to provide representative experience.

Refurbishment Timeline

OPG is required to shut down units 5-8 by the end of 2026, in accordance with the current PROL. OPG intends to proceed with the proposed refurbishment following the completion of defueling and dewatering of each unit. Based on current planning assumptions, which are subject to change, OPG intends to return units to service sequentially, starting with unit 5 in 2030, unit 6 in 2031, unit 7 in 2032, and unit 8 in

2033, as shown in Figure 2. OPG has indicated (11) that some project scope will continue after the units have returned to service during the proposed licence period.

Figure 2 – Planned timeline for the status of Pickering NGS units



Predictive Environmental Risk Assessment

OPG's PERA (12) includes an assessment of the activities associated with conduct of the proposed refurbishment of units 5-8, including construction of the proposed DWI. The PERA concluded that most refurbishment activities are not predicted to result in adverse effects to human an/or ecological receptors. However, the PERA identified that some aquatic habitat would be disturbed or removed due to construction of the proposed DWI and noted the possibility of some individual exceedances of air quality and noise guidelines. To address identified impacts, the PERA recommends various monitoring and mitigation measures, which CNSC staff would verify are put in place for the conduct of proposed refurbishment activities. Further information on CNSC staff's assessment of the PERA is included in section 6.9.

3.5 Deep-water Intake

The proposed DWI is part of the overall PRP, with its own associated project management plan (20). The DWI is comprised of a roughly 1.5 km long tunnel that will bring water from deeper in Lake Ontario into the Pickering NGS forebay. The DWI would be located on the Pickering site, outside of the Pickering NGS and WMF facilities, and within and beneath the lake. The DWI is intended to provide several benefits over the current surface water intake, including improved operational margin by accessing cooler water during summer months and warmer water during winter months, fewer impacts from debris and algae, and reduced fish impingement (10) (11).



In response to CNSC staff's request for further information on the DWI, OPG provided additional information regarding design requirements, construction methodologies, environmental management plans, and operational considerations (21). OPG intends to begin construction of the DWI during the proposed licence period, concurrently with the conduct of other proposed refurbishment activities, and to complete the DWI prior to the proposed return to service of unit 5. CNSC staff have been satisfied with the information provided by OPG on the DWI to date and will assess further DWI information against the requirements of applicable SCAs as it becomes available.

The DWI project management plan (20) and OPG's response to CNSC staff's request for DWI information (21) list various permits with other municipal, provincial, and federal government organizations that are necessary for the construction of the DWI. Most importantly, OPG is required to receive authorization from Fisheries and Oceans Canada (DFO) prior to the conduct of any in-water-work. DFO is the federal organization responsible for Canada's fisheries and marine resources. OPG has provided preliminary project information to DFO and intends to apply for a Fisheries Act Authorization (FAA) to construct the DWI. This construction FAA is independent from OPG's existing operational FAA for the Pickering NGS, which is discussed in section 8.3.

OPG's PERA (12), which OPG provided to both CNSC staff and DFO, identified that aquatic habitat would be impacted due to construction of the proposed DWI. The PERA also described mitigation measures to minimize the effects of this habitat loss. OPG has committed to provide an updated PERA by May 2026 to CNSC staff and DFO that incorporates further details on the DWI design and associated environmental interactions. OPG would also be required to meet DFO requirements, including the implementation of fish habitat compensation measures to offset the loss of habitat. Therefore, based on the information currently available, CNSC staff are satisfied that there are measures in place to ensure that the effects of habitat loss associated with the DWI would be minimal with implementation of mitigation measures, which CNSC staff and DFO will verify during the proposed licence period.

Since construction of the DWI would disturb areas of the lakebed, it has the potential to impact potential or established Aboriginal and/or treaty rights of Indigenous Nations and communities. CNSC staff and DFO are consulting with Indigenous Nations and communities collaboratively regarding the DWI, as part of CNSC staff's broader consultation activity on OPG's application. More information on CNSC staff's Indigenous consultation efforts is included in section 7.1.

3.6 Return to Service and Regulatory Hold Points

OPG has established a return to service plan as part of the proposed refurbishment project. Return to service involves returning each unit back to operation and includes



demonstration that the associated work meets specified requirements and that management arrangements have been updated appropriately.

OPG's *Pickering Return to Service Program Management Plan* (22) describes the processes, procedures and organization that will be used by OPG to manage the commissioning and restart activities of units 5-8. The plan also describes the return to service phases and hold points which will be used to ensure pre-requisite activities are complete and that the required approvals are obtained prior to progressing to subsequent states.

As outlined in [REGDOC-2.3.1, *Conduct of Licensed Activities: Construction and Commissioning Programs*](#), return to service is accomplished through 4 commissioning phases:

1. **Phase A:** Prior to fuel load. This phase focuses on ensuring that systems required to ensure safety with fuel loaded in the reactor have been adequately tested and must be successfully completed prior to loading fuel in the reactor.
2. **Phase B:** Prior to leaving reactor guaranteed shutdown state (GSS). This phase focuses on ensuring the fuel is loaded in the reactor safely, and on confirming that the reactor is in a suitable condition for start up and that all prerequisites for permitting the reactor to go critical have been met. This phase must be successfully completed prior to removal of GSS.
3. **Phase C:** Approach to critical and low-power tests. This phase focuses on confirming reactor behaviour at the stage of initial criticality and subsequent low-power tests. It includes activities that cannot be performed during GSS.
4. **Phase D:** High-power tests. This phase focuses on demonstrating reactor and systems behaviour at higher power levels, including activities that could not be carried out at the power levels in Phase C.

The process of returning the reactor to operation includes regulatory hold points (RHPs), which are typically aligned with the 4 phases of commissioning described above. The licensee may not proceed to subsequent commissioning phases while the associated RHP is in place. RHPs strengthen the CNSC's regulatory oversight by requiring verification that work has been conducted in accordance with applicable requirements before the RHPs are removed.

Based on OPEX gained during other refurbishment projects, CNSC staff have identified 4 RHPs for the return to service of each Pickering NGS unit undergoing refurbishment. The proposed RHPs are:

1. Prior to fuel load (Phase A)
2. Prior to removal of the GSS (Phase B)



3. Prior to exceeding 1% full power (Phase C)
4. Prior to exceeding 65% full power (Phase D)

CNSC staff have included 2 licence conditions in the proposed PROL, attached in appendix C, relating to return to service and RHPs:

- Licence condition 15.1 would require OPG to implement a return to service plan for units 5-8.
- Licence condition 15.2 would require OPG to obtain approval from the Commission or consent of a person authorized by the Commission prior to removal of an established RHP.

The removal of RHPs would be informed by comprehensive CNSC staff compliance verification activities during the proposed licence period. Further information on Compliance Verification Criteria (CVC) pertaining to return to service and RHPs is described in sections 15.1 and 15.2 of the draft Licence Conditions Handbook (LCH) included in appendix C.

Similar to past refurbishment projects, CNSC staff recommend that the authority to provide consent to remove RHPs with respect to licence condition 15.2 of the proposed Pickering PROL be delegated to the CNSC's Executive Vice President and Chief Regulatory Operations Officer (EVP-CROO) and Director General, Directorate of Power Reactor Regulation (DG DPRR).

3.7 CNSC Staff Regulatory Oversight

During refurbishment project execution, CNSC staff will maintain regulatory oversight to verify that work has been carried out in accordance with OPG's refurbishment program plans and processes, and that regulatory requirements are being met. CNSC staff will conduct compliance verification activities in accordance with a specific compliance verification plan. On-site CNSC inspectors will be present throughout the project to perform these compliance verification activities, including witnessing specific start up and commissioning tests. In addition, technical specialists in various disciplines will review project execution and technical submissions to ensure regulatory requirements continue to be met.

Following the completion of each commissioning phase, OPG will formally request that the CNSC remove the associated RHP and submit completion assurance documentation to provide evidence that all prerequisite commitments for removal of the RHP have been met. Specific prerequisites for the removal of each RHP are discussed in section 15.2 of the draft LCH included in appendix C. CNSC staff and OPG are also currently developing a return to service protocol that will detail CNSC staff's expectations



regarding the necessary submissions to demonstrate the completion of all RHP prerequisites.

Completion assurance documentation submitted by OPG must include commissioning test results against pre-defined acceptance criteria and evidence that all necessary systems, equipment, procedures, and qualified staff are available and ready to proceed with the next commissioning phase. CNSC staff would verify OPG's completion assurance documentation through a combination of desktop reviews and on-site inspections.

Once CNSC staff are satisfied that all prerequisite commitments have been met, CNSC staff would issue a report to the CNSC staff delegated the authority to remove RHPs by the Commission (EVP-CROO or DG DPRR) recommending the removal of the RHP. If this individual is satisfied that all prerequisite commitments have been met, a *Record of Consent, Including Reasons for Decision* would be issued for the RHP removal and the licensee would then be notified of the RHP removal by letter.

The same process was used for the Darlington refurbishment project and is in use for the Bruce Power major component replacement project and the Darlington New Nuclear Project. CNSC staff will provide updates to the Commission on the status and removal of each RHP, as well as the overall status of the proposed refurbishment project, as part of the status report on power reactors during public Commission meetings.

3.8 Refurbishment Conclusions and Recommendations

Overall, CNSC staff are satisfied that OPG is qualified to perform the work associated with the proposed refurbishment of units 5-8 during the proposed licence period. CNSC staff are also satisfied that OPG's proposed refurbishment scope is adequate to replace aging components that limit the life of the Pickering NGS and to improve the overall safety and reliability of the plant for continued operation.

CNSC staff determined that OPG's refurbishment program and the elements of PSR3 submitted to date meet regulatory requirements, including of REGDOC-2.3.1, REGDOC-2.3.2, and CSA N286-12. CNSC staff further found that OPG has programs and processes in place to ensure that refurbished units will meet all applicable requirements during and following return to operations. Therefore, CNSC staff conclude that the safety of people and the environment would continue to be protected during the conduct of refurbishment activities and during future operation of units 5-8 during the proposed licence period.

CNSC staff recommend the following licence conditions, related to refurbishment of units 5-8, be included in the proposed licence:



- A condition requiring OPG to implement the PSR3 IIP, as well as perform a PSR at least every 10 years (licence condition 3.4).
- A condition requiring OPG to implement a return to service plan for refurbishment activities (licence condition 15.1).
- A condition requiring OPG to obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points (licence condition 15.2).

These proposed conditions are included in the proposed PROL and additional details are included in the draft LCH (see appendix C).

4 Decommissioning of Pickering NGS Units 1-4

In its application (10), OPG requested a new activity be authorized in the licence, specifically, the decommissioning of Pickering NGS units 1-4. During the proposed licence period, OPG intends to implement select dismantling and demolition activities described in its recent detailed decommissioning plan (DDP), transition units 1 and 4 into a state of Storage with Surveillance (SwS), and maintain units 1-4 in SwS. Requirements for decommissioning are described in [REGDOC-2.11.2, Decommissioning](#), which was implemented at the Pickering NGS in 2024. As per REGDOC-2.11.2, a DDP and a licence that authorizes decommissioning activities are required prior to the execution of decommissioning. Execution of decommissioning includes any period of SwS.

OPG maintains decommissioning plans for the Pickering site, in accordance with licence condition 11.2 of the PROL and WFOL. In addition to the recent DDP for Pickering NGS units 1-4, OPG continues to maintain a preliminary decommissioning plan (PDP) for the operating facilities. This section discusses the planning and conduct of work associated with the decommissioning of units 1-4, including OPG's recent DDP. OPG has also continued to maintain PDPs for the Pickering NGS and Pickering WMF, which are discussed in section 6.11.

4.1 Detailed Decommissioning Plan (DDP)

As per REGDOC-2.11.2, OPG is required to prepare a DDP prior to the execution of decommissioning activities. The DDP details the steps necessary to execute decommissioning activities, including hazard characterizations and waste estimates. It must be updated at least every 5 years and is expected to be built up over the course of decommissioning, providing the most details for the work anticipated over the next 5-

year period. CNSC staff acceptance is required prior to the implementation of the DDP to ensure that all activities align with the Commission approved licensing basis. For deferred decommissioning strategies, REGDOC-2.11.2 also requires that a licensee prepare a SwS plan.

OPG's DDP for Pickering NGS units 1-4 is structured into a series of volumes pertaining to different planning envelopes (PEs). DDP Volume 0 describes the overall decommissioning approach, and each subsequent volume describes (or will describe) a particular PE that is comprised of a group of related SSCs. In 2024, OPG submitted a DDP package (14) that included DDP volumes 0 (23), 1 (24), and 2 (25), as well as the Pickering NGS units 1-4 SwS Plan (26). OPG intends to submit subsequent volumes as decommissioning work progresses, and in advance of executing work on that PE. The various DDP volumes and associated PEs are detailed in Table 2.

Table 2 – Pickering NGS units 1-4 planned DDP Volumes

PICKERING NGS UNITS 1-4 DDP		
DDP Volume	Planning Envelope	Description
Volume 0 (23)	All	Program overview
Volume 1 (24)	PE-A	Outbuilding Removal – including structures and systems within the protected area that are not part of the main Powerhouse.
Volume 2 (25)	PE-B	Non-Nuclear Component Removal – Removal of components and systems not considered a nuclear system.
Volume 3*	PE-C	Nuclear Component Removal – Removal of component and systems that are considered part of a nuclear system (including IFB-A and AIFB)
Volume 4*	PE-D	Reactor Segmentation – Disassembly and removal of the reactor and internals
Volume 5*	PE-E	Powerhouse Structure – Removal of the Turbine Hall, Turbine Auxiliary and Reactor Auxiliary Bays structures, which make up part of the Powerhouse. This envelope also includes the IFB-A and AIFB.
Volume 6*	PE-F	Reactor Building Structural Demolition – Removal of the Reactor Building structures that make up part of the Powerhouse

PICKERING NGS UNITS 1-4 DDP		
DDP Volume	Planning Envelope	Description
Volume 7*	PE-G	Site Remediation – Remediation of the site within the protected area, including environmental clean-up and restoration.

*Not yet submitted to CNSC staff and planned as part of future DDP submissions.

CNSC staff performed a detailed review and assessment of OPG's DDP submission and concluded that it met the requirements of REGDOC-2.11.2 and CSA N294-19, *Decommissioning of Facilities Containing Nuclear Substances*. CNSC staff accepted OPG's DDP submission in 2025 (14), which allowed OPG to begin conducting activities described in the DDP that fall within the current licensing basis. This acceptance included a condition that OPG notify CNSC staff at least 1 week prior to the conduct of any work associated with the accepted DDP to allow CNSC staff to plan compliance verification activities such as field inspections. To date, OPG has provided notifications of the conduct of decommissioning work that have met all CNSC staff expectations.

4.2 Conduct of Decommissioning Activities

OPG is currently conducting decommissioning activities at the Pickering NGS associated with PE-A and PE-B, as described in DDP volumes 1 (24) and 2 (25), which will continue during the proposed licence period. These include activities to reduce risks at the facility, such as the demolition of non-nuclear outbuildings, reduction of asbestos hazards, and removing and recycling of non-nuclear SSCs. CNSC staff determined that these activities could proceed under the current PROL for the Pickering NGS (27). This determination is based on the following:

- CNSC staff found that the activities described in OPG's DDP submission are consistent with the risk reduction activities discussed in REGDOC-2.11.2.
- The activities are limited to non-nuclear SSCs outside of the reactor area.
- The activities are sufficiently captured within the bounds of OPG's existing programs, processes, and assessments in place at the Pickering NGS.
- The activities will not result in any adverse safety consequences nor result in any increased risk to the environment or to the health and safety of people.

OPG has further divided PE-A and PE-B into subcategories. For PE-A, these are planned to be conducted in order as SSCs are end stated and include:

- PE-A1 – Outbuildings not required after units 1-4 shutdown.

- PE-A2 – Outbuildings not required after units 1-4 and units 5-8 common systems are separated.
- PE-A3 – Outbuildings not required after units 1-4 irradiated fuel bays (IFBs) are emptied, drained, and dried.

Similarly, PE-B1 and PE-B2 pertain to SSCs within the turbine hall and turbine auxiliary bay respectively. However, these PE-B subcategories may be conducted simultaneously.

OPG is required to update the DDP submission at least every 5 years to provide up-to-date detail on activities anticipated over the next 5-year period. OPG's next DDP update, expected in 2030, would include a detailed discussion of work associated with PE-A3, which is anticipated to begin in 2034. CNSC staff found that the anticipated work associated with PE-A3 is similar to that of PE-A1 and PE-A2. Therefore, CNSC staff have no concerns with OPG initiating work on PE-A3 during the proposed licence period under the existing decommissioning program, once DDP Volume 1 (24) is suitably updated and accepted by CNSC staff.

While the SSCs within PE-A and PE-B are non-nuclear, there does exist the potential for contamination. Conventional hazardous waste is also expected to be encountered, such as asbestos, lead, and mould. CNSC staff have found that OPG has robust programs in place at the Pickering NGS, including radiation protection, waste management, conventional health and safety, and environmental protection programs, to safely and adequately handle the small volumes of hazardous material anticipated during the decommissioning of PEs A and B in accordance with regulatory requirements.

Licence Considerations for Execution of Decommissioning Activities

In its application (10), OPG notes that work on PE-C and beyond is planned to commence after 2036 and is not within the scope of the proposed licence period. Since this work has not been assessed by CNSC staff for consideration during this hearing, such activities would not be permitted under the proposed PROL and would require the future authorization of the Commission. Section 11.2 of the proposed LCH included in appendix C describes the scope of decommissioning work associated with PE-A and PE-B that OPG has indicated would occur during the proposed licence period.

4.3 Storage with Surveillance (SwS) of Units 1-4

In 2018 the Commission authorized (3) the continued maintenance of units 2 and 3 in SwS (also referred to as safe storage) and the transition of units 1 and 4 to SwS during the licence period, as shown in Figure 2. Licence condition 15.2 and 15.4 were included in the current PROL pertaining to maintaining units 2 and 3 in SwS and planning for the end of operations.



In accordance with licence condition 15.4, OPG implemented a Stabilization Activities Plan (SAP) at the Pickering NGS in 2021 and has continued to provide annual SAP updates to CNSC staff. The SAP describes activities such as defueling, dewatering, and end-stating of SSCs that are necessary for the transition of units into SwS. With the extension of operations until the end of 2026 (6) and the proposed refurbishment of units 5-8 (10), OPG's current SAP (28) pertains only to units 1 and 4. During the licence period, CNSC staff have found that OPG's SAP has continued to meet regulatory requirements. CNSC staff continue to monitor OPG's stabilization work on units 1 and 4 as part of ongoing compliance verification activities, including inspections. As of December 2025, units 1 and 4 have been defueled and dewatered.

Following the completion of stabilization during the proposed licence period, units 1 and 4 will join units 2 and 3 in SwS. In accordance with REGDOC-2.11.2, OPG prepared a SwS plan for Pickering NGS units 1-4 (26) that describes the SSCs that will remain operational during SwS to ensure the safety of workers, people, and the environment. The SwS plan also includes information on maintenance activities and hazard identification. OPG is required to update the SwS plan at least every 5 years for the duration of the SwS period. Since units 2 and 3 entered SwS prior to the publishing and implementation of REGDOC-2.11.2, the same requirements were not applicable at the time.

4.4 Decommissioning Conclusions and Recommendations

In 2025 CNSC staff accepted (27) OPG's DDP submission (14), which includes DDP volumes 0, 1, and 2, as well as the SwS plan for Pickering NGS units 1-4. CNSC staff concluded that OPG has provided adequate information to demonstrate that it is qualified to safely execute the decommissioning activities noted in the accepted DDP package and ensure the safety of workers, people, and the environment. The scope of these decommissioning activities is limited to maintaining units 1-4 in SwS and conducting decommissioning activities associated with the non-nuclear SSCs of PE-A and PE-B.

With respect to decommissioning, CNSC staff recommend that the proposed licence:

- Include a licensed activity to decommission units 1-4 for the purpose of SwS, which is considered part of the execution of decommissioning and includes the risk reduction activities of the removal of outbuildings and non-nuclear components.
- Remove licence conditions 15.2 and 15.4 of the current PROL, pertaining to the SwS of units 2 and 3 and the end of operations, since such requirements are now captured under licence condition 11.2.



Section 11.2 of the proposed LCH describes the CVC pertaining to the transition of units 1 and 4 to SwS, the maintenance of units 1-4 in SwS, and the execution of decommissioning activities. The proposed PROL, licensing changes, and LCH are included in appendix C.

5 Consolidation of the Operating Licences for the Pickering NGS and Pickering WMF

In its application (10), OPG has requested that the PROL for the Pickering NGS and the WFOL for the Pickering WMF be consolidated into a single renewed PROL. OPG has stated (11) that this would be an administrative change with no impact to the safe operations, regulatory requirements, or governance programs of either facility. At this time, OPG does not plan to modify the management systems and programs at the 2 facilities should the licences be consolidated.

Currently, the Pickering NGS is licensed under PROL 48.04/2028 (4) and the Pickering WMF is licensed under WFOL-W4-350.02/2028 (2). Both licences are valid until August 31, 2028, and are formatted similarly, with many of the same licence conditions. Each licence also has an associated LCH that describes the requirements under each licence condition. Since both facilities are operated by OPG, many of the same high-level governance documents are identified as CVC in both LCHs. However, there are also many different programs across the 14 SCAs of the 2 facilities.

The proposed consolidation is similar to the approach for the Point Lepreau NGS, where both the NGS and WMF facilities are included under a single PROL. CNSC staff conclude that such a licence consolidation would not reduce the scope of applicable regulatory requirements nor CNSC staff oversight activities at either facility, since all licence conditions, and associated CVC would be identified under the single consolidated licence and LCH as appropriate for each facility. Therefore, CNSC staff conclude that consolidation of the PROL and WFOL into a renewed PROL is an administrative change only.

A proposed PROL that consolidates the existing PROL and WFOL, an associated LCH, and a description of all licence changes are included in appendix C. To accommodate the proposed consolidation and ensure that the original intent is maintained, minor changes have been made to the numbering and wording of some licensed activities and licence conditions.

6 General assessment of SCAs

This section provides information, organized by Safety and Control Area (SCA), regarding CNSC staff's assessment of OPG's licence renewal application for the Pickering NGS and Pickering WMF (10), as well as OPG's responses (11) to CNSC staff requests for additional information (29). Information on the CNSC's SCA framework and the specific areas that comprise the SCAs for these facilities is included in Appendix A.

The intent of this section is to provide the Commission with information on the adequacy of OPG's licence renewal application, as well as the adequacy of existing and proposed programs, across the 14 SCAs for the proposed refurbishment and continued operation of Pickering NGS units 5-8, the decommissioning of units 1-4, and the continued operation of the Pickering WMF. In its application (10), OPG submitted that the existing programs will remain in place at the facilities and that the proposed refurbishment project will be conducted under a new dedicated refurbishment program that has been built based on the experience and lessons learned during OPG's Darlington NGS refurbishment project. In all instances of ongoing or planned safety improvements during the proposed licence period, CNSC staff will monitor and assess OPG's progress towards completion of actions.

Details on CNSC staff's assessment of OPG's application (10) are included in Appendix A. CNSC staff assessed OPG's application against the requirements of the *General Nuclear Safety and Control Regulations* (GNSCR), *Class I Nuclear Facility Regulations* (CINFR), *Radiation Protection Regulations* (RPR), and *Nuclear Security Regulations* (NSR). CNSC staff found that OPG's application has met all applicable regulatory requirements.

The proposed refurbishment of Pickering NGS units 5-8 and the decommissioning of units 1-4 are discussed in sections 3 and 4 respectively. Where appropriate, further information regarding these activities is included within the appropriate SCA section.

6.1 Management System

The management system SCA covers the framework that establishes the processes and programs required to ensure an organization achieves its safety objectives, continuously monitors its performance against these objectives, and fosters a healthy safety culture.

The specific areas that comprise this SCA include:

- Management system
- Organization
- Performance assessment, improvement, and management review
- Operating experience (OPEX), Problem Identification and Resolution (PI&R)
- Change management
- Safety culture

- Configuration management
- Records management
- Supply and Contractor Management
- Business continuity

6.1.1 Trends

The following table indicates the management system SCA rating trends for the past 5 years of the licence period:

TRENDS FOR MANAGEMENT SYSTEM				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)
Comments OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the management system SCA meet regulatory requirements.				

6.1.2 Discussion

Section 2.1 of OPG's application (10) provides information pertaining to the management system SCA at the Pickering NGS and Pickering WMF.

OPG is required to implement and maintain the management system requirements set out in CSA N286-12, *Management System Requirements for Nuclear Facilities*. The management system brings together, in a planned and integrated manner, the processes necessary to satisfy the requirements that must be met to safely carry out the licensed activity. OPG's nuclear management system is applicable to both the Pickering NGS and Pickering WMF. Several processes and programs, such as OPEX, change management, configuration management, and contractor management, are used at both facilities. During the licence period, OPG has implemented and maintained a suitable management system at the Pickering NGS and Pickering WMF facilities.

During the licence period, CNSC staff conducted compliance verification activities to evaluate OPG's performance in the management system SCA at the Pickering NGS and WMF. These activities include inspections related to program implementation, change management, records management, supply management, the OPEX program, and the



event investigation process, among others. CNSC staff have found that OPG has met regulatory requirements and proposed or implemented satisfactory corrective actions to address any findings related to the management system SCA.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

Management System

The OPG nuclear management system is documented in the OPG nuclear charter (30) and takes its authority from the Nuclear Safety and Security Policy (31). The charter provides a framework for programs and governance to operate and maintain the Pickering NGS and WMF in accordance with the licensed activities and licence conditions included in the current PROL and WFOL and described in the associated LCH. This charter is applicable for activities conducted at the Pickering NGS, including refurbishment and decommissioning activities, and activities at the Pickering WMF. The Chief Nuclear Officer is accountable for the implementation and the effectiveness of the nuclear management system, in compliance with the requirements of CSA N286-12. This includes activities conducted by external organizations for OPG.

OPG has established a dedicated nuclear refurbishment management organization for the proposed refurbishment of Pickering NGS units 5-8 that is subject to the nuclear management system and its governance. Execution of work related to the decommissioning of units 1-4 will continue to be managed under OPG's existing nuclear management system programs.

Pickering Refurbishment Program

In its application (10), OPG has indicated that it has established a dedicated refurbishment management organization under the nuclear management system. This nuclear refurbishment organization encompasses the planning, design, procurement, construction, and commissioning of the SSCs necessary for continued operation of units 5-8 following the proposed refurbishment.

The Pickering Refurbishment Program (PRP) is defined in the *Pickering Refurbishment Program Management Plan* (19). It comprises a suite of subordinate program management plans that describe how the requirements of OPG's nuclear management system are to be implemented. Supporting this framework, individual project management plans—such as those for major component replacement and the construction of the DWI—define specific project objectives and the approach to planning, execution, monitoring, control, and close-out.

OPG has submitted the governance documentation underpinning the PRP to CNSC staff. Based on this information, CNSC staff are satisfied that the PRP meets applicable regulatory requirements. This assessment will be maintained through the ongoing



review of program- and project-level management plans as they evolve over the course of the proposed refurbishment.

Organization

OPG's nuclear management system defines the organizational structure. OPG maintains organizational charts that include the organizational structure for operations, refurbishment, and decommissioning activities, as well as waste management. CNSC staff verify that OPG's programs and processes describe the authorities, accountabilities, and responsibilities of positions, how and by whom decisions are made, and describes interfacing organizations.

During the licence period, CNSC staff have reviewed the roles and responsibilities of OPG's employees against the descriptions set out in their programs and processes. CNSC staff remain satisfied that the descriptions of these roles and responsibilities meet regulatory requirements.

Performance Assessment, Improvement and Management Review

During the licence period, CNSC staff have confirmed that the programs that make up the nuclear management system are assessed independently by the OPG Nuclear Oversight division. Audit frequency of the programs is based on performance risk, operational impact, and past performance. The audit frequency of programs varies from 1 to 5 years.

CNSC staff have also verified that OPG management is engaged in conducting self-assessments in their area of responsibility to identify early signs of decline, opportunities for continual improvement, and to confirm that work meets the requirements of the management system in accordance with OPG's self-assessment and benchmarking procedure. Both the results of audits and self-assessments are inputs to the management review of program effectiveness done annually by the Nuclear Executive Committee.

Operating Experience (OPEX), Problem Identification and Resolution (PI&R)

During the licence period, CNSC staff have verified that OPG employees document observed adverse conditions (malfunctions, errors, defects, non-compliances, events, problems, gaps, etc.) related to nuclear activities and self-report adverse conditions without fear of reprisal.

OPG first line management review any adverse conditions and forward them for categorization in accordance with the Processing Station Condition Records procedure. Once categorized, adverse conditions are reviewed within 7 calendar days by management and those deemed significant are reviewed by the corrective action review board.



OPG communicates OPEX to external organisations, including the World Association of Nuclear Operators (WANO) and Conexus Nuclear Inc. (formerly CANDU Owner's Group - COG), as well as to OPG employees. OPG also collects external OPEX from a variety of sources, including the International Atomic Energy Agency (IAEA) and WANO.

Change Management and Configuration Management

During the licence period, CNSC staff have verified that changes are controlled, tracked to completion, and traceable throughout the life of the facility. OPG's Engineering Change Control procedure (32) defines the process for all design basis changes, including modifications to, removal of, or abandonment of any SSCs, software, and engineering tooling designs. The change control process also ensures that changes are within the safe operating envelope (SOE), safety and design envelope, design basis, and licensing basis.

During the licence period, CNSC staff have found that the physical configuration of the facilities is consistent with the applicable documentation.

Safety Culture

OPG fully implemented CNSC REGDOC-2.1.2, *Safety Culture* at the Pickering NGS in 2020. In 2022, OPG performed a station-wide nuclear safety and security culture assessment to identify areas for improvement and areas of strength. OPG's 2022 assessment found that Pickering NGS has a healthy nuclear safety and security culture. OPG indicated that it will continue to conduct station-wide assessments every 5-years and have tentatively scheduled the next assessment for Pickering NGS staff and on-site contractors for 2026.

In addition, OPG has indicated (10) (11) that it maintains a Pickering Nuclear Safety and Security Culture Monitoring Panel (NSSCMP). OPG has also developed the "NSSCMP Power App" to enable frontline station personnel to evaluate the attributes of a healthy nuclear safety and security culture and provide input directly to the NSSCMP. The NSSCMP Power App is used by nuclear staff to rate the attributes of a healthy nuclear safety and security culture and consolidate this information to assist the NSSCMP in assessment and communication.

Records Management

OPG has implemented a nuclear quality assurance records procedure at the Pickering NGS and Pickering WMF (33). This procedure provides instructions for the preservation of nuclear Quality Assurance (QA) records and QA vaults and ensures that electronic and paper-based records are protected against deterioration and destruction during their retention period.



During the licence period, CNSC staff have found that OPG preserves records in accordance with regulatory requirements. CNSC staff are satisfied with OPG records management practices and the actions taken to maintain compliance with CSA N286-12.

Supply and Contractor Management

OPG maintains a list of qualified suppliers for its nuclear activities and conducts audits at suppliers' sites at least every 3 years. CNSC staff have verified that OPG takes measures to ensure that suppliers have controls in place for the prevention and detection of counterfeit, fraudulent, and suspect items.

During the licence period, CNSC staff found that purchasing requirements were complete and adequate, that the verification of services was completed as planned, that purchased items were examined when received, and that storage and handling were adequate.

OPG intends to use "engineer, procure, construct" (EPC) contractors to perform work associated with the proposed refurbishment of Pickering NGS units 5-8. EPC contractors are approved under OPG's supply chain to ensure that the contractor has developed and implemented a management system that continues to meet the requirements of CSA N286-12. OPG oversees the activities of EPC contractors, including through surveillance of activities and review and acceptance of all plans and deliverables. As the licensee, OPG is accountable for ensuring that the health, safety, and security of people and the environment continue to be protected, and this accountability cannot be delegated to contractors. CNSC staff will verify that OPG continues to maintain the necessary measures for contractor oversight during the proposed refurbishment.

Business continuity

CNSC staff have found that OPG has developed adequate contingency plans to maintain or restore critical safety and business functions in the event of disabling circumstances such as a pandemic, severe weather, or labour actions. OPG revised these plans to incorporate lessons learned from the COVID-19 pandemic, and the most recent update was completed in 2024. CNSC staff have been satisfied with OPG's implementation of these plans and with OPG's business continuity performance.

6.1.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.



6.1.3.1 Past Performance

OPG's management system at the Pickering NGS and Pickering WMF continues to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.

6.1.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance in the management system SCA through regulatory oversight activities including inspections and reviews of licensee submissions. Of particular focus in the management system SCA will be verifying that the nuclear refurbishment program meets regulatory requirements, including OPG's oversight of EPC contractors.

6.1.3.3 Proposed Improvements

There are no proposed major changes to OPG nuclear management system. As part of OPG's separately established nuclear refurbishment program, OPG has developed governance for contractor management and is developing project specific oversight plans for contractors. These plans will be updated during the proposed licence period to ensure that safety and quality requirements are met during all project phases.

6.1.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's management system at the Pickering NGS and Pickering WMF meets CNSC regulatory requirements, including CSA N286-12. CNSC staff further conclude that the information pertaining to the management system SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence.

6.2 Human Performance Management

The human performance management SCA covers activities that enable effective human performance through the development and implementation of processes that ensure that a sufficient number of workers are in all relevant job areas and have the necessary knowledge, skills, procedures, and tools in place to safely carry out their duties.

The specific areas that comprise this SCA include:

- Human performance program
- Personnel training

- Personnel certification
- Work organization and job design
- Fitness for duty

6.2.1 Trends

The following table indicates the human performance management SCA rating trends for the past 5 years of the licence period:

TRENDS FOR HUMAN PERFORMANCE MANAGEMENT				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)
Comments OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the human performance management SCA meet regulatory requirements.				

6.2.2 Discussion

Section 2.2 of OPG's application (10) provides information pertaining to the human performance management SCA at the Pickering NGS and Pickering WMF.

Programs within the human performance management SCA are intended to ensure that OPG has a sufficient number of qualified workers available in all relevant job areas and that workers have the necessary knowledge, skills, procedures, and tools in place to safely carry out their duties. CNSC staff determined that OPG continues to maintain programs in human performance, personnel training, personnel certification, work organization and job design, and fitness for duty that meet CNSC regulatory requirements. OPG has implemented these programs at both the Pickering NGS and Pickering WMF. However, requirements pertaining to personnel certification and minimum shift complement (MSC) are not applicable to the Pickering WMF, since there are no positions at the Pickering WMF that require certification by the CNSC or are associated with the MSC.

During the licence period, CNSC staff conducted compliance verification activities to evaluate OPG's performance in the human performance management SCA. These activities include inspections related to the human performance program, the training program, certification examinations and tests, and the fitness for duty program, as well



as reviews of required submissions such as event reports and staffing reports. CNSC staff have found that OPG has met regulatory requirements and proposed or implemented satisfactory corrective actions to address any findings related to the human performance SCA.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

Human performance program

A human performance program contains an organization's processes and procedures that support workers in safely carrying out their tasks to the desired levels of performance. The program considers and manages the factors that can influence human performance, such as the fitness for duty of workers (workers are physically and mentally capable of performing their duties competently and safely), training, staffing, properly developed procedures and processes, and the design of equipment.

OPG has implemented and maintained a human performance program at the Pickering NGS and Pickering WMF. OPG indicated in its application (10) that an OPG fleetwide strategic plan is developed each year in response to human performance trends and events noted in the previous year. CNSC staff are satisfied that OPG continuously improves the human performance program to ensure that it continues to equip workers to conduct activities safely.

Personnel training

The systematic approach to training (SAT), as described in [REGDOC-2.2.2, Personnel Training](#), is the framework endorsed by the CNSC for establishing and maintaining training for persons working in nuclear facilities. An SAT-based training system provides the basis for the analysis, design, development, implementation, evaluation, documentation, and management of training for workers. It also provides a methodology to demonstrate that the required knowledge, skills, and safety-related attributes have been attained through a performance-based assessment and that program evaluations are carried out to ensure training programs reflect the state of the facility.

OPG's training program defines the training system for regular staff, contractors, temporary personnel, and other staff assigned work at OPG facilities. OPG identified (10) that the same training system will be used during the proposed licence period for operation of the Pickering NGS and WMF, refurbishment of units 5-8, and decommissioning of units 1-4. OPG's training program incorporates a well-established SAT-based training system that refers to other associated processes, procedures, instructions and job aids. CNSC staff found that this training system continued to meet the training requirements described in REGDOC-2.2.2.

During the licence period, CNSC staff found that OPG's training programs at the Pickering NGS and Pickering WMF were defined, designed, developed, evaluated, and managed in accordance with OPG's SAT-based training system.



Personnel certification

License condition 2.4 of OPG's current and proposed PROL for the Pickering NGS requires that OPG implement and maintain certification programs in accordance with [REGDOC-2.2.3, Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2](#). REGDOC-2.2.3, Volume III specifies the requirements to be met by persons working, or seeking to work, in the various positions for which a certification by the CNSC is required. It also specifies the requirements regarding the programs and processes supporting certification of their workers that nuclear power plant licensees must implement to train and examine persons seeking or holding a certification issued by the CNSC.

The positions at the Pickering NGS that require certification by the CNSC are:

- Responsible health physicist
- Authorized nuclear operator
- Control room shift supervisor
- Shift manager

No positions at the Pickering WMF require certification by the CNSC.

OPG plans to shut down Pickering NGS units 5-8 by the end of 2026 prior to the proposed refurbishment. In its application (10) and responses to CNSC staff questions (11), OPG indicated that it intends to maintain compliance with REGDOC-2.2.3, Volume III during the proposed refurbishment period. Certified staff will continue to perform their roles until units 5-8 are defueled, they would then be assigned to inactive status and continue receiving required training.

In January 2026, OPG provided an operations certification plan (34) that further details OPG's strategy to maintain the qualification of certified staff, and in April 2026, OPG provided a response to CNSC staff requests for additional information (35). CNSC staff assessed OPG's plan and found that OPG's proposed strategy requires a deviation from section 20.5.4 of REGDOC-2.2.3, Volume III and, therefore, does not fully meet the requirements of licence condition 2.4 as currently implemented.

Section 20.5.4 of REGDOC-2.2.3, Volume III requires a period of "work under supervision", where returning certified staff work with active certified staff prior to returning to active status. Since no Pickering units will be operating when unit 5 is expected to return to service, there will be no certified staff still in active status to provide this necessary supervision. Instead, OPG proposes for a core group of certified staff to use work performed during the time unit 5 is maintained in an over poisoned guaranteed shutdown state (OPGSS) as a substitution for this supervision period. No credible design basis accident scenarios exist during the OPGSS, and release of a CNSC RHP (see sections 3.6 and 3.7) is required prior to proceeding beyond the OPGSS. CNSC staff are satisfied that OPG's proposed certification strategy for the return to service of unit 5 provides a suitable time limited alternative to the requirement for the period of "work under supervision" described in section 20.5.4 REGDOC-2.2.3, Volume III.



CNSC staff recommend that the Commission accept OPG's proposed deviation from the requirements of licence condition 2.4 during the return to service of unit 5 and prior to the removal of the OPGSS by allowing OPG to substitute the required period of "work under supervision" with the performance of duties during the OPGSS. CNSC staff will only recommend removal of the associated RHP upon OPG's demonstration that staff are qualified to proceed, in accordance with REGDOC-2.2.3, Volume III and OPG's proposed certification plan. Additionally, CNSC staff expect OPG to capture any system changes that may result from the proposed refurbishment of units 5-8 or implementation of PSR3 in certified staff's required training. CNSC staff are satisfied that OPG has measures in place to ensure that certified staff at the Pickering NGS will remain qualified to perform their duties during the proposed licence period.

Work organization and job design

MSC is a well-established concept that ensures that there are a sufficient minimum number of qualified staff, including certified staff, at the Pickering NGS at all times in case of a resource-intensive event. There are no positions at the Pickering WMF associated with the MSC.

In January 2025, OPG provided notification to CNSC staff of a change to the Pickering NGS units 1-4 MSC for the period following the defueling of units 1 and 4. Once these units are defueled, the existing MSC is no longer required. In its application (10), OPG indicated that this will allow some certified staff to be redeployed elsewhere, such as to units 5-8 in support of the proposed refurbishment. OPG also indicated that MSC reductions will be introduced during the proposed refurbishment at units 5-8 following the defueling of units. OPG does not intend to modify emergency response team or security MSC levels during the proposed refurbishment.

As per REGDOC-3.1.1, OPG is required to report MSC violations to the CNSC. During the licence period, all MSC violations reported to the CNSC were of short duration and had negligible safety significance. In each case, OPG took appropriate corrective actions. CNSC staff have found that OPG has processes and procedures in place to ensure the availability of a sufficient number of qualified staff and continues to meet regulatory requirements.

Fitness for duty

OPG has a fitness for duty program that includes a range of provisions to provide reasonable assurance that workers fit for duty. During the licence period, OPG implemented 3 regulatory documents related to fitness for duty at the Pickering NGS and Pickering WMF.

The most detailed CNSC requirements apply to staff who are certified by the CNSC and others who fill safety-sensitive or safety-critical positions, including operations personnel, emergency response team members, and nuclear security officers.



Fatigue Management and Hours of Work

OPG monitors the number of hours worked by workers who perform safety-sensitive work at the Pickering NGS and WMF, in accordance with the requirements detailed in [REGDOC-2.2.4, *Fitness for Duty: Managing Worker Fatigue*](#). OPG has an hours-of-work process that ensures that hours worked do not exceed regulatory limits, that workers have adequate recovery periods between shifts, and that worker fatigue is identified and managed. CNSC staff will continue to monitor OPG's performance in managing worker fatigue during the proposed licence period, including the proposed refurbishment of units 5-8.

Managing Alcohol and Drug Use

[REGDOC-2.2.4, *Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 3*](#) sets out requirements and guidance for managing the fitness for duty of workers occupying safety-sensitive and safety-critical positions in relation to alcohol and drug use at all high-security sites. OPG implemented REGDOC-2.2.4, Volume II in July 2021, with the exception of random and pre-placement testing, which was put on hold pending a legal review. In January 2026, OPG fully implemented the requirements of REGDOC-2.2.4 Volume II. CNSC staff will verify the implementation of random and pre-placement testing in future compliance activities as part of routine compliance verification activities.

Nuclear Security Officer Medical, Physical, and Psychological Fitness

OPG has implemented [REGDOC-2.2.4, *Fitness for Duty, Volume III: Nuclear Security Officer Medical, Physical, and Psychological Fitness*](#) at the Pickering NGS and Pickering WMF, which includes fitness for duty requirements specific to nuclear security officers. More information on OPG's security program at the Pickering NGS and Pickering WMF is included in section 6.12.

6.2.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.2.3.1 Past Performance

OPG's human performance, training, certification, MSC, and fitness for duty programs at the Pickering NGS and Pickering WMF continue to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.



6.2.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance in the human performance SCA through regulatory oversight activities including inspections and reviews of licensee submissions. Of particular focus in the human performance SCA will be verifying the qualification of certified staff during return to service activities following the proposed refurbishment of units 5-8 and the implementation of random and pre-placement drug and alcohol testing.

6.2.3.3 Proposed Improvements

There are no proposed major changes to OPG's human performance programs.

6.2.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's human performance programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the human performance management SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence and makes adequate provisions to ensure that workers are qualified to perform their assigned duties. CNSC staff also conclude that OPG's proposed strategy to deviate from the requirements of REGDOC-2.2.3, Volume III for the proposed return to service of unit 5 is acceptable.

6.3 Operating Performance

The operating performance SCA includes an overall review of the conduct of the licensed activities and the activities that enable effective performance.

The specific areas that comprise this SCA include:

- Conduct of licensed activity
- Procedures
- Reporting and trending
- Outage management performance
- Safe operating envelope
- Severe accident management and recovery
- Accident management and recovery

6.3.1 Trends

The following table indicates the Operating Performance SCA rating trends for the past 5 years of the licence period:

TRENDS FOR OPERATING PERFORMANCE				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)
SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)
Comments				
OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the operating performance SCA meet regulatory requirements.				

6.3.2 Discussion

Section 2.3 of OPG's application (10) provides information pertaining to the operating performance SCA at the Pickering NGS and Pickering WMF.

The operations program establishes safe, uniform, and efficient operating practices within the nuclear facility, under all operating conditions, and provides the ability to ensure the facility is operated in accordance with the licensing basis. This includes the documents that define the safe operating envelope (SOE) of the reactor facility. The operating performance SCA also requires OPG to provide notification and reports to the CNSC, in accordance with licence condition 3.3 of the proposed PROL that requires OPG to implement [REGDOC-3.1.1, Reporting Requirements for Nuclear Power Plants](#) for the Pickering NGS and [REGDOC-3.1.2, Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills](#) for the Pickering WMF.

During the licence period, CNSC staff conducted compliance verification activities to evaluate OPG's performance in the operating performance SCA at the Pickering NGS and WMF. These activities include inspections related to the conduct of licensed activities, procedures, reporting and trending, outage management performance, the safe operating envelope, and accident management and recovery, as well as reviews of required submissions such as routine performance reports and event reports. CNSC staff have found that OPG has met regulatory requirements and proposed or implemented satisfactory corrective actions to address any findings related to the operating performance SCA.



In response to CNSC staff's request (36), OPG has provided (37) implementation plans for 23 new and revised CNSC regulatory documents and CSA Group standards in anticipation of OPG's licence application (10). OPG intends to implement the majority of the requested regulatory documents and standards at the Pickering NGS and Pickering WMF prior to the start of the proposed licence period. CNSC staff are satisfied with the current status of OPG's implementation plans and expect OPG to fully implement the remaining standards during the proposed licence period.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

6.3.2.1 Pickering Nuclear Generating Station

Conduct of licensed activity

OPG has implemented operating policies and principles (OP&Ps) for units 1-4 and units 5-8 at the Pickering NGS. The OP&Ps state the operating boundaries within which the station may be operated safely and specify how OPG will operate, maintain, and modify station systems while controlling risk to people.

OPG indicated in its application (10) that it will update the existing OP&Ps for Pickering NGS unit 5-8 to reflect the changing state of the units as the proposed refurbishment project progresses. This includes the addition of specific conditional revisions for the defueled state, the drained state, the loading of new fuel state, and the ramp up to full power state. In accordance with licence condition G.2, OPG submitted revised OP&Ps for units 5-8, as well as a safety case basis document, to the CNSC in October 2025 (38). CNSC staff found OPG's updated OP&Ps and safety case basis for units 5-8 acceptable and provided additional feedback that could improve future revisions of the OP&Ps (39).

With respect to units 1 and 4, which permanently shut down at the end of 2024, OPG submitted updated OP&Ps to the CNSC in September 2024 (40). These updates reflect changes in the operating state of the units during stabilization activities and the planned transition to SwS. CNSC staff found that OPG's updated OP&Ps are consistent with the Safety Report (41), and are satisfied they continue to meet regulatory requirements.

In accordance with REGDOC-3.1.1, OPG provides information to the CNSC on the operation of the Pickering NGS. This includes information on unplanned transients or power changes, which could indicate problems within the plant equipment and can place undesired strain on plant systems. Reactor transients include reactor trips, stepbacks, and setbacks. Table 3 shows the number of unplanned reactor transients at the Pickering NGS since 2020. During this time, OPG has maintained performance that is in line with the industry average.

Table 3 – Unplanned transients reported for Pickering NGS units 1, 4, & 5–8

	2020	2021	2022	2023	2024
Unplanned reactor trips	0	0	2	1	3
Stepbacks	0	0	0	0	0
Setbacks	3	5	1	5	1
Total	3	5	3	6	4

During the licence period, CNSC staff found that all transients were properly controlled and that a power reduction was automatically initiated by the reactor control systems.

Procedures

CNSC staff oversight in this specific area focuses on verifying that the licensee has an adequate process for the development, verification, validation, implementation, modification, and use of procedures, which takes into account human performance considerations. CNSC staff also verify that there are demonstrated mechanisms to show that procedures are developed in a consistent manner using technical guides for accuracy and usability. These mechanisms ensure appropriate adherence to properly written procedures.

During the licence period, CNSC staff have found that OPG continues to maintain mature and efficient governance to ensure that procedures are written in a consistent and usable manner. OPG has clearly documented expectations for procedural use and adherence, as well as a process to manage procedural change, for the Pickering NGS.

With respect to the potential refurbishment of units 5-8, OPG has indicated (10) that it will establish a specific procedures group to author and manage refurbishment procedure updates. Procedures related to the decommissioning of units 1-4 will continue to be authored and maintained in accordance with the existing Pickering NGS management system. CNSC staff have developed specific compliance plans for these activities and will verify that OPG continues to conduct work in accordance with established procedures during the proposed licence period.

Reporting and trending

OPG submits reports for the Pickering NGS in accordance with REGDOC-3.1.1. Effective January 1, 2025, OPG implemented version 3 of REGDOC-3.1.1 at the Pickering NGS. These reports include required unscheduled event reports, as well as routine scheduled



reports such as quarterly safety performance indicator reports. During the licence period, CNSC staff found that OPG continues to meet regulatory requirements for reporting and trending.

Outage management performance

To ensure that the Pickering NGS remains fit for service, OPG plans and undertakes outages to conduct maintenance, testing, or inspections that cannot be performed while the reactor is at power.

In addition to planned outages, OPG also undertakes forced unplanned outages as required to fix or replace equipment. These outages and their outcomes are communicated to the Commission via Event Initial Reports, the status report on power reactors, or as part of annual reporting as required.

Units 1 and 4 are permanently shutdown for transition to SwS and will not undergo further outages. OPG is proposing to shutdown units 5-8 for a prolonged refurbishment outage before the end of 2026. This proposed refurbishment outage will be managed under a separate refurbishment program. The existing outage management program will continue following the proposed refurbishment and the return to service of units 5-8. During the licence period, CNSC staff found that OPG continues to meet regulatory requirements regarding outage management.

Safe operating envelope (SOE)

The SOE is the set of limits and conditions within which the NPP must be operated, and which is monitored and controlled by the operator. The objective of the SOE is to ensure conformance with the assumptions and results of safety analyses. OPG has implemented an SOE program at the Pickering NGS in accordance with CSA N290.15-10, *Requirements for the Safe Operating Envelope of Nuclear Power Plants*. The limits and conditions defined by the SOE are documented in OPG's operational safety requirements (OSRs).

To support the transition of units 1 and 4 to SwS, OPG submitted revised OSRs for Pickering NGS units 1-4 to the CNSC in 2024. These updated OSRs reflect the permanent shutdown of units 1 and 4.

Regarding the proposed refurbishment of units 5-8, OPG indicated in its application (10) that it would manage changes to the SOE during refurbishment through the revised OP&Ps. OPG also indicated (11) that, following the potential refurbishment of units 5-8, the SOE will be updated to reflect plant improvements, modifications, and repairs. OPG is required to submit such updates to CNSC staff prior to implementation.



CNSC staff are satisfied that OPG continues to meet regulatory requirements with respect to the SOE at the Pickering NGS. The SOE will continue to be a focus of CNSC staff compliance verification activities during the proposed licence period.

Integrated accident management and recovery

OPG has abnormal incident manuals and emergency operating procedures in place to respond to abnormal incidents and return the NGS to a safe and controlled state, as well as to prevent the escalation of abnormal incidents into more serious accidents. A severe accident management program provides an additional layer of defence against the consequences of beyond design basis accidents (BDBAs), including severe accidents. Severe accident management guidelines ensure that personnel involved in managing a BDBA have the information, procedures, and resources necessary to carry out effective on-site actions.

[REGDOC-2.3.2, Accident Management, Version 2](#) sets out requirements and guidance for the development, implementation, and validation of integrated accident management for reactor facilities. OPG implemented REGDOC-2.3.2, Version 2 during the licence period, and CNSC staff are satisfied that OPG continues to meet regulatory requirements related to accident management and recovery. Additional information pertaining to emergency management, including the conduct of exercises, can be found in section 6.10.

6.3.2.2 Pickering Waste Management Facility

Conduct of Licensed Activity

At the Pickering WMF, OPG processes and stores DSCs containing used nuclear fuel generated at the Pickering NGS. OPG also manages the above ground DSMs that contain intermediate-level waste generated during the past retube of Pickering NGS units 1-4 at the Retube Component Storage Area (RCSA).

The Pickering WMF's operating limits and conditions are defined in its safety report (42). During the licence period, CNSC staff have found that OPG has implemented and maintained an effective operating program that supports the safe conduct of licensed activities at the Pickering WMF.

During the proposed licence period, OPG plans to encapsulate damaged/defective fuel currently stored in the IFB-A and AIFB for storage in DSC storage buildings at the Pickering WMF. This project is in the preliminary design phase, and CNSC staff will review applicable information once submitted. OPG also plans to commission redesigned DSCs (MKIII) in 2027 to improve efficiency and increase DSC production.

DSC Storage Buildings



DSCs are currently stored in 4 DSC storage buildings at the Pickering WMF. The fourth DSC storage building was commissioned in 2021. During the licence period, until the end of 2024, 421 DSCs were processed and stored at the Pickering WMF. At the end of 2024, there were a total of 1,334 DSCs in storage.

In 2025, OPG submitted a construction notification for storage building #5. The current WFOL for the Pickering WMF limits the total number of DSC storage buildings to 6. However, OPG plans to combine the fifth and sixth storage buildings into the double-capacity storage building #5. Therefore, CNSC staff consider this to represent both the fifth and sixth storage buildings for the purpose of the WFOL limit. As a result, CNSC staff recommend minor changes in the proposed PROL included in appendix C, to specify that no more than these 5 DSC storage buildings may exist at the Pickering WMF without further Commission authorization. Currently, OPG is not seeking authorization to construct further storage buildings.

In its application (10) (11), OPG requested authorization to store up to 1,410 DSCs in storage building #5, which has currently been authorized to store a total of 1,200 DSCs. CNSC staff are satisfied with the information OPG has provided regarding the storage of an additional 210 DSCs.

6-Year Cooled Fuel

In August 2024, the Commission authorized (43) OPG to process and store up to 100 DSCs containing a minimum of 6-year cooled nuclear fuel at the Pickering WMF at any one time. This authorization allows OPG to create additional space in Pickering NGS IFB-B to accommodate future unit defueling activities.

Retube Component Storage Area

OPG manages the intermediate-level radioactive waste generated from the retube of Pickering NGS Units 1–4 in 34 above-ground DSMs that had been located at the RCSA within Phase I of the Pickering WMF. The DSMs undergo periodic inspections, as well as regular monitoring and maintenance. No additional storage of waste has been inputted in the RCSA since 1993.

In 2024, in accordance with licence condition G.2 of the current WFOL, OPG submitted a notification of change to the CNSC regarding the relocation of the DSMs from the RCSA in phase I of the Pickering WMF to phase II. All existing requirements, such as regular monitoring and maintenance, continue to apply to the relocated DSMs. The relocation provides the necessary space for activities related to the construction of the proposed DWI at the Pickering NGS. The DSMs relocated to phase II of the Pickering WMF are closed to the receipt of any new waste and are separate from the PCSS.

Pickering Component Storage Structure

In July 2025, the Commission amended OPG's Pickering WMF licence to authorize OPG to construct the Pickering Component Storage Structure (PCSS). The PCSS will be used to store low- and intermediate-level waste that results from the proposed refurbishment of Pickering NGS units 5 to 8 and future decommissioning activities.

OPG submitted a construction notification to CNSC staff which included an environmental management plan, a construction verification plan, and the project design requirements. CNSC staff found that the information provided by OPG was adequate and authorized OPG to proceed with construction of the PCSS following the Commission decision in July 2025.

Procedures

As with the Pickering NGS, OPG has an established process to ensure procedures are developed, maintained, and updated to support safe operations of the Pickering WMF. During the licence period, CNSC staff found that OPG's procedures are well maintained and effective in supporting safe operations.

Reporting and Trending

OPG submits reports for the Pickering WMF in accordance with REGDOC-3.1.2, which OPG implemented in February 2019. These reports include required event reports, as well as routine reports such as annual compliance reports. OPG will continue to be required to submit reports for the Pickering WMF in accordance with REGDOC-3.1.2 during the proposed licence period.

In May 2024, OPG discontinued the submission of the quarterly operations report for the Pickering WMF at the suggestion of CNSC staff. Following a review of the reporting requirements, CNSC staff determined that there is no regulatory requirement for quarterly reporting and are satisfied that submission of annual compliance reports is acceptable. During the licence period, CNSC staff found that OPG continues to meet regulatory requirements with respect to reporting and trending.

6.3.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.3.3.1 Past Performance

OPG's operations programs at the Pickering NGS and Pickering WMF continue to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period. OPG also continues to maintain



satisfactory performance with respect to the reporting requirements of REGDOC-3.1.1 for the Pickering NGS and REGDOC-3.1.2 for the Pickering WMF.

6.3.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance and compliance with regulatory requirements in all aspects of the operating performance SCA through regulatory oversight activities including inspections and reviews of compliance reports and other licensee submissions. Of particular focus in the operating performance SCA will be the verification of OPG's SOE and adherence to the revised OP&Ps and OSRs for the Pickering NGS during the proposed refurbishment of units 5-8. For the Pickering WMF, CNSC staff will monitor the construction and commissioning of DSC storage building #5 and the PCSS.

6.3.3.3 Proposed Improvements

There are no proposed major changes to OPG's operating performance programs. During the proposed licence period, the refurbishment of units 5-8 is expected to result in improvements that OPG will reflect in future updates to OSR and OP&P documents for the Pickering NGS.

6.3.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's existing operations programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the operating performance SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence and makes adequate provisions to ensure the safe operations of the Pickering NGS and Pickering WMF.

6.4 Safety Analysis

The safety analysis SCA covers maintenance of the safety analyses that support the overall safety case for the facility. Safety analysis is a systematic evaluation of the potential hazards associated with the conduct of a proposed activity or facility and considers the effectiveness of preventative measures and strategies in reducing the effects of such hazards.

The specific areas that comprise this SCA include:



- Deterministic safety analysis
- Hazard analysis
- Probabilistic safety analysis
- Criticality safety
- Severe accident analysis
- Management of safety issues (including R&D programs)

6.4.1 Trends

The following table indicates the Safety Analysis SCA rating trends for the past 5 years of the licence period:

TRENDS FOR SAFETY ANALYSIS				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)
SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)
Comments OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the safety analysis SCA meet regulatory requirements.				

6.4.2 Discussion

Section 2.4 of OPG's application (10) provides information pertaining to the safety analysis SCA at the Pickering NGS and Pickering WMF.

OPG's programs within the safety analysis SCA at the Pickering NGS and Pickering WMF ensure that the station meets relevant safety requirements, and that the facilities' design continues to provide adequate prevention and mitigation to protect against accidents. The safety analysis program includes deterministic and probabilistic safety analyses for the Pickering NGS.

During the licence period, CNSC staff conducted compliance verification activities to evaluate OPG's performance in the safety analysis SCA at the Pickering NGS and Pickering WMF. These activities include inspections and the technical assessment of OPG submissions, such as safety reports and safety analyses. CNSC staff have found that OPG has met regulatory requirements and adequately addressed any findings.



Details pertaining to the specific areas within this SCA are presented in the following subsections.

6.4.2.1 Pickering Nuclear Generating Station

Deterministic Safety Analysis

Implementation of REGDOC-2.4.1, *Deterministic Safety Analysis*

The Pickering NGS was designed to standards and regulatory requirements that pre-date the issuing of [REGDOC-2.4.1, *Deterministic Safety Analysis*](#). Where compliance with the requirements cannot be demonstrated by the existing design, the requirements of REGDOC-2.4.1 are applied commensurate with risk in accordance with CSA N286-12. OPG continues to provide annual status updates on its implementation of REGDOC-2.4.1, most recently in December 2025 (44). CNSC staff have found OPG's implementation plan updates acceptable, and OPG has committed to continue to provide updates on the implementation during the proposed licence period. Any new safety analyses are undertaken in compliance with REGDOC-2.4.1.

Implementation of REGDOC-2.4.5, *Nuclear Fuel Safety and Qualification*

In March 2025, OPG fully implemented [REGDOC-2.4.5, *Nuclear Fuel Safety and Qualification*](#) at the Pickering NGS.

Safety Report Update

OPG is required to provide an updated safety report at least every 5 years, or when requested to do so by the CNSC. The Pickering NGS safety report is comprised of 3 parts. For Pickering NGS units 5-8, OPG most recently submitted updates to Part 1 (Plant/Site Description) and Part 2 (Design Description) in October 2022 (45), and updates to Part 3 (Accident Analysis) in October 2024 (46). OPG also updated the units 1-4 safety report parts in 2022 (47) and 2023 (48), prior to the permanent shutdown of units 1-4. CNSC staff have found that OPG's safety report for the Pickering NGS meets regulatory requirements.

Impact of Aging on the Safety Analysis Margins

In November 2024, as committed to in the PSR2-B IIP for continued operation until the end of 2026, OPG submitted the safety analyses (49) (50) for the impact of aging on safety margins for small loss of coolant accidents, loss of regulation, and loss of flow. CNSC staff found OPG's submission and responses to CNSC staff comments acceptable (51). The heat transport conditions assumed in these safety analyses are expected to bound the safety case for the operational period following refurbishment.



Hazard Analysis and Probabilistic Safety Assessment

A hazards analysis is used to demonstrate the ability of the NPP design to effectively respond to common-cause events by confirming that the NPP design incorporates sufficient diversity and physical separation to cope with these events. It also confirms that credited SSCs are qualified to survive and can function as required during an event.

For Pickering NGS, hazard screening analysis is conducted as the initial step in the probabilistic safety assessment (PSA). This involves the assessment and screening of various internal and external hazards, and results in the selection of hazards that will be included in the scope of the PSA. The high-level objective of the PSA is to provide a systematic analysis of the facility to demonstrate compliance with qualitative and quantitative safety goals. OPG has leveraged the current PSA results to support refurbishment planning and the selection of Safety Improvement Opportunities (SIO). For example, OPG has developed an SIO to provide additional resistance to safety related equipment from high wind hazards based on insights from the 2022 High Wind PSA. The SIOs are discussed further in section 3.3.

CNSC staff reviewed and accepted OPG's most recent Pickering NGS PSA updates submitted through 2022 and 2023. The analysis was conducted in accordance with [REGDOC-2.4.2, Probabilistic Safety Assessment for Nuclear Power Plants](#) and followed CNSC staff accepted PSA methodologies. OPG intends to implement the updated [REGDOC-2.4.2, Probabilistic Safety Assessment \(PSA\) for Reactor Facilities, Version 2](#) during the proposed licence period.

In 2025, OPG submitted a Shutdown Plan PSA (52), which assessed the impacts to units 5-8 from the shutdown of units 1 and 4. The assessment identified risk insights with respect to the operation and potential shutdown sequence of units 5-8. These results have been used to support configuration management during operation and will inform the shutdown planning of units 5-8 prior to the proposed refurbishment.

OPG has submitted a plan for updating the Pickering NGS PSA during the proposed refurbishment period (53), which CNSC staff have accepted. The scope of OPG's typical 5-year PSA update is planned to be reduced because all units will be shut down and defueled during the proposed refurbishment. The plan was developed to meet the requirements of REGDOC-2.4.2 and includes:

- Updating the Hazard Screening Analysis and Non-Reactor Source PSA by 2027.
- Updating the PSA covering the post-refurbishment configuration of unit 5 and refurbishment activities across the site by 2029, prior to the restart of the first unit (unit 5) following refurbishment.

- Submitting the complete PSA update supporting the final end-state of the Pickering NGS post refurbishment by 2032, prior to the final unit restart (unit 8) following refurbishment.

Climate Change Considerations

In June 2024, CNSC staff requested OPG to conduct a climate change resilience assessment of the Pickering NGS units 5-8 design against available climate projections (54). The purpose of this assessment is to demonstrate the resilience of the Pickering NGS to the impacts of climate change for the proposed extended operational life.

OPG submitted the results of this assessment in April 2025 (13), which included a report summarizing these results (55). OPG's assessment identified climate susceptible SSCs of the Pickering NGS and related short- and long-term adaptation measures. OPG concluded that nuclear safety analyses remain valid and that the Pickering NGS is prepared for extreme weather events. Routine monitoring and maintenance programs are expected to be sufficient to discover any changes to the Pickering NGS due to climate change prior to any impacts. OPG is planning further detailed analysis prior to the implementation of adaptation measures and has committed to provide a Pickering climate change risk assessment to CNSC staff in January 2028 (56). CNSC staff reviewed OPG's submission and provided several recommendations for OPG's consideration. Overall, CNSC staff found that OPG's assessment is in line with best practice, including the Environment and Climate Change Canada (ECCC) [*Draft technical guide related to the Strategic Assessment of Climate Change: Assessing climate change resilience*](#).

Criticality Safety

Criticality safety focuses on the prevention of the criticality of fuel outside of the core, for both new and irradiated fuel. Pickering NGS reactors use natural uranium fuel which cannot achieve a criticality in air or in light water. New fuel is stored in such a manner that it cannot be made critical. Irradiated natural uranium fuel is stored under light water and cannot be made critical in any configuration; therefore, no criticality risk exists in the IFBs of Pickering NGS.

Severe Accident Analysis

REGDOC-2.4.1 requires performance of deterministic analysis of BDBAs to support the evaluation of safety goals and to demonstrate that the procedures/guidelines and equipment put in place to mitigate consequences of severe accidents can handle the severe accident management needs. REGDOC-2.4.2 requires that assessments of severe accidents be included as part of the Level 2 PSA.

Management of Safety Issues (including R&D programs)

During the licence period, CNSC staff continued to undertake systematic evaluations of OPG research and development (R&D) program activities, as submitted to CNSC staff through annual reports in accordance with REGDOC-3.1.1. These evaluations confirm that OPG maintains, or has access to, a robust R&D capability to address any emerging issues.

As detailed at the 2018 relicensing hearing (3), OPG has been participating in the resolution of CANDU safety issues (CSIs). CSIs are generic safety issues related to CANDU NPPs, which are addressed in three categories based on the adequacy and effectiveness of existing control measures. Since 2014, three category 3 CSIs have remained with respect to the Pickering NGS. In 2024, OPG submitted a threshold break size (TBS) analysis to support recategorization of these three remaining Category-3 CSIs (57) and a Large Break Loss of Coolant Accident (LBLOCA) deterministic safety analysis for units 5-8 (58). CNSC staff provided OPG with comments and recommendations on these analyses. As of March 2026, CNSC staff continue to assess OPG's request to recategorize the remaining category 3 CSIs with respect to the Pickering NGS to category 2 and anticipate completion of this assessment by June 2026.

6.4.2.2 Pickering Waste Management Facility

Deterministic Safety Analysis

In 2025, OPG implemented the requirements of REGDOC-2.4.4, *Safety Analysis for Class 1B Nuclear Facilities* within the governance documentation of the Pickering WMF. Full implementation of REGDOC-2.4.4 will be achieved upon completion of the updated Pickering WMF safety analysis report. OPG is expected to submit the updated safety analysis report that meets the requirements of REGDOC-2.4.4 by the end of 2028.

In its application (10) (11), OPG requested authorization to store up to 1,410 DSCs in the still under construction storage building #5. Currently, DSC storage building #5 has been authorized for storage of a total of 1,200 DSCs. OPG submitted a safety assessment to support this request in December 2025 (59). CNSC staff have reviewed OPG's submission and are satisfied with the information provided regarding the storage of an additional 210 DSCs. CNSC staff provided comments to OPG to improve the safety analysis and are satisfied that storage of 1,410 DSCs within storage building #5 is acceptable and will not have a negative impact on the safety of people or the environment. Therefore, CNSC staff recommend that the Commission authorize OPG to store up to 1,410 DSCs within storage building #5.

During the proposed licence period, OPG plans to transition to a redesigned DCS (MKIII) that modifies the DSC lid-to-base welding design to improve efficiency and increase DSC



production. In January 2026, OPG submitted (60) a notice of intent to change the DSC design that includes safety analyses to support this change. CNSC staff are currently reviewing OPG's submission. OPG also intends to encapsulate damaged/defective fuel that is currently residing in Pickering NGS unit 1-4 IFBs for storage in the Pickering WMF. Prior to the implementation of this activity, OPG is required to submit supporting safety analysis for CNSC staff review.

OPG intends to incorporate the safety analyses regarding DSC storage building #5, the MKIII DSC, and the encapsulation of damaged/defective fuel into the Pickering WMF safety analysis report after all requirements for implementation of these activities are complete.

Regarding the consideration of climate change, OPG submitted a climate change resilience assessment for the Pickering WMF in April 2026, which is currently being reviewed by CNSC staff.

6.4.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.4.3.1 Past Performance

OPG's safety analysis programs at the Pickering NGS and Pickering WMF continue to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.

6.4.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance and compliance with regulatory requirements in all aspects of the safety analysis SCA through regulatory oversight activities including inspections and reviews of licensee submissions. Of particular focus in the safety analysis SCA will be the review of OPG's PSA and updated safety reports with respect to the proposed refurbishment and continued operation of Pickering NGS units 5-8.

6.4.3.3 Proposed Improvements

During the licence period, the SIOs associated with the proposed refurbishment of units 5-8 are expected to result in strengthening resistance to high wind hazards for safety related equipment and structures. OPG is also expected to implement version 2 of REGDOC-2.4.2 at the Pickering NGS during the proposed licence period. With respect to

the Pickering WMF, OPG is expected to be fully compliant with REGDOC-2.4.4 following completion of the revised Pickering WMF safety analysis report in 2028.

6.4.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's existing safety analysis programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the safety analysis SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence.

6.5 Physical Design

The physical design SCA relates to activities that impact the ability of SSCs to meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.

The specific areas that comprise this SCA include:

- Design governance
- Facility design
- Structure design
- System design
- Component design

6.5.1 Trends

The following table indicates the Physical Design SCA rating trends for the past 5 years of the licence period:

TRENDS FOR PHYSICAL DESIGN				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)
SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)



Comments

OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the physical design SCA meet regulatory requirements.

6.5.2 Discussion

Section 2.5 of OPG's application (10) provides information pertaining to the physical design SCA at the Pickering NGS and Pickering WMF.

OPG's programs within the physical design SCA at the Pickering NGS and Pickering WMF ensure that facility design is managed using a well-defined systematic approach. The program ensures that SSCs and software meet and maintain the design basis given new information arising over time and taking changes in the external environment into account. CNSC staff determined that OPG's design programs continue to meet applicable regulatory requirements.

During the licence period, CNSC staff conducted compliance verification activities to evaluate OPG's performance in the physical design SCA at the Pickering NGS and Pickering WMF. These activities include inspections and technical assessments of OPG submissions. CNSC staff have found that OPG has met regulatory requirements and adequately addressed any findings with respect to the physical design SCA.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

6.5.2.1 Pickering Nuclear Generating Station

Design governance

Design program

OPG maintains a design management program at the Pickering NGS that covers changes to systems, structures, components, software, and engineered tools. This program describes the interrelationship between interfacing engineering programs and documentation. CNSC staff monitor the design management program through regular compliance verification activities.

Pressure boundary program

OPG has an established pressure boundary program that is comprised of many sub-programs, processes, and procedures to ensure compliance with regulatory requirements, including CSA N285.0, *General Requirements for Pressure-Retaining Systems and Components in CANDU Nuclear Power Plants*. As required by licence



condition 5.2 of the current and proposed PROL, OPG has a formal service agreement with the Technical Standards and Safety Authority as the authorized inspection agency. During the licence period, CNSC staff found that the OPG's pressure boundary program met CNSC regulatory requirements.

The pressure boundary program will continue to govern all pressure boundary activities at OPG nuclear facilities during the proposed licence period, including the refurbishment of units 5-8 and decommissioning activities related to units 1-4. OPG has also provided an implementation plan to update the pressure boundary programs to full compliance with the 2023 version of CSA N285.0 by January 1, 2027. OPG has further committed to meeting the requirements of this version of CSA N285.0 for the entirety of the proposed refurbishment project.

Human factors in design

OPG's human factors engineering process is developed under the engineering change control (ECC) program and modifications are reviewed for identifying human factors considerations in design, in accordance CSA N290.12, *Human Factors in Design for Nuclear Power Plants*. OPG has committed to fully implementing the 2023 version of CSA N290.12 in advance of the proposed licence period.

Environmental qualification

OPG's environmental qualification (EQ) program (61) establishes an integrated and comprehensive set of requirements that provides assurance that essential equipment can perform as required if exposed to harsh DBA conditions and that this capability is preserved over the life of the facility. Implementation of program requirements provides consistent methodology, programmatic controls, and interfaces for establishing and maintaining EQ of equipment and components at the Pickering NGS. EQ program controls are integrated into ECC program to ensure engineering changes conform to EQ requirements.

The EQ program at the Pickering NGS is in accordance with CSA N290.13-05, *Environmental Qualification of Equipment for CANDU Nuclear Power Plants*. OPG has committed to fully implement the 2018 version of this standard by September 30, 2026.

OPG routinely evaluates the effectiveness of the EQ program at the Pickering NGS, and the results of these evaluations have indicated that the program continues to be effective. CNSC staff found that OPG's EQ program complies with regulatory requirements and industry best practices.

Facility Design and Structure Design

The concrete containment structures of Pickering NGS units 5-8 are planned to be modified during the replacement of steam generators as part of the proposed



refurbishment project discussed in section 3. 2 openings would be temporarily created in the reactor building (RB) dome of each unit to remove the original steam generators and install replacements. OPG has performed early design engineering activities, including preliminary conceptual analyses to evaluate the impacts of the openings created on the structural integrity of the concrete containment structure. These analyses have shown that the 2 openings in the RB domes would have negligible effect on the structural behavior of the RB domes during construction and after return to service.

OPG also intends other design changes to the Pickering NGS (11), such as modifications to the containment system to isolate units 1-4. Additionally, OPG's SwS plan (26) includes information on SSCs that have been necessary to support both units 1-4 and units 5-8. These include air, water, electrical, security, and vacuum building systems. Common systems will be reconfigured to ensure the independent operation of units 5-8 once they are no longer needed to support units 1-4. OPG plans to complete these modifications prior to dewatering the units 1-4 IFBs.

CNSC staff will review OPG's engineering activities as they are performed and verify that they continue to meet regulatory requirements.

System Design and Component Design

System design and component design pertain to the adequacy of the design of specific systems and components. These include, but are not limited to, special safety systems, electrical power systems, instrumentation and control systems, and fuel bundles. CNSC staff verify OPG's design programs through inspections and the review of required submissions, such as the annual risk and reliability report.

Electrical Power Systems and Cables

CNSC staff are satisfied with the performance of electrical power systems and cables at the Pickering NGS and found that OPG has a mature aging management program in place for cables. OPG has taken appropriate corrective actions to address all identified findings during the licence period and has committed to fully address any cable related concerns during the proposed refurbishment of Pickering NGS units 5-8.

Fire protection design

OPG maintains effective fire protection programs at the Pickering NGS that meet regulatory requirements. CSA N293-12, *Fire Protection for CANDU Nuclear Power Plants* provides the regulatory requirements related to fire protection for the design, construction, commissioning, operating, and decommissioning of nuclear power plants, including SSCs that directly support the plant and protected area.



Fire Protection Assessments (FPAs) are engineering evaluations that assess facilities against the requirements of CSA N293-12, to ensure safety in the event of a fire in any facility location. OPG has committed to ensuring that the FPA for both Pickering NGS units 1-4 and 5-8 comprehensively addresses any anticipated modifications or changes to fire hazards and fire protection systems resulting from potential decommissioning and refurbishment activities.

OPG has maintained satisfactory performance in fire protection during the licence period. OPG's existing fire protection programs and anticipated improvements and modifications at the Pickering NGS are adequate for the proposed refurbishment and continued operation of units 5-8. More information on OPG's fire protection program is included in section 6.10.

6.5.2.2 Pickering Waste Management Facility

Design governance

Design program

Over the licence period, OPG has continuously maintained an effective design program at the Pickering WMF and implemented design changes with established control processes in accordance with the design basis and licensing basis of the facility.

In its application (10), OPG notes activities relevant to this SCA at the Pickering WMF. These include submission of the construction notification for DSC storage building #5, the construction notification for the PCSS, and design calculations in support of dry storage module relocation from the phase I to phase II site. CNSC staff reviewed these submissions and found that OPG meets all applicable regulatory requirements.

During the proposed licence period, OPG intends to commission a new DSC design (MKIII) in 2027. The new MKIII DSC modifies the lid-to-base closure weld, with the objective of improving efficiency. In January 2026, OPG submitted (60) a notice of intent to change the DSC design that includes supporting analyses. CNSC staff are currently reviewing this submission. OPG also intends to encapsulate damaged/defective fuel that is currently residing in Pickering NGS unit 1-4 IFBs. This project is in the design phase, and CNSC staff will review designs once submitted.

Pickering units 5-8 refurbishment activities do not have significant impact on the physical design of the Pickering WMF. The anticipated on-going refurbishment activities may impact the availability of the transporter route for DSCs, and OPG has extended this route to allow for more transportation flexibility. CNSC staff found that OPG's extension of the transporter route adequately met physical design requirements.



Pressure boundary program

The Pickering WMF shares the same OPG governance for pressure boundaries as the Pickering NGS, ensuring all pressure boundary activities are performed in alignment with the OPG pressure boundary program. OPG continues to implement a pressure boundary program at the Pickering WMF and maintains a formal agreement with an authorized inspection agency. CNSC staff found that OPG's pressure boundary program documentation complies with CNSC regulatory requirements, including the requirements of CSA N285.0. OPG will also implement the 2023 version of CSA N285.0 at the Pickering WMF by January 1, 2027.

6.5.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.5.3.1 Past Performance

OPG's design, pressure boundary, and equipment and structure qualification programs at the Pickering NGS and Pickering WMF continue to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.

6.5.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance and compliance with regulatory requirements in the physical design SCA through regulatory oversight activities including inspections and reviews of licensee submissions. Of particular focus in the physical design SCA will be the return to service and commissioning of units 5-8 following the proposed refurbishment.

6.5.3.3 Proposed Improvements

OPG has committed to implement the 2023 version of CSA N285.0 at the Pickering NGS and Pickering WMF by January 1, 2027.

6.5.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's existing design, pressure boundary, and equipment and structure qualification programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further

conclude that the information pertaining to the physical design SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence.

6.6 Fitness for Service

The fitness for service SCA covers activities that impact the physical condition of structures, systems and components to ensure that they remain effective over time. This area includes programs that ensure all equipment is available to perform its intended design function when called upon to do so.

The specific areas that comprise this SCA include:

- Equipment fitness for service / equipment performance (reliability)
- Maintenance
- Aging management
- Periodic inspection and testing
- Structural integrity
- Chemistry control

6.6.1 Trends

The following table indicates the Fitness for Service SCA rating trends for the past 5 years of the licence period:

TRENDS FOR FITNESS FOR SERVICE				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)
SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)
Comments OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the fitness for service SCA meet regulatory requirements.				

6.6.2 Discussion

Section 2.6 of OPG's application (10) provides information pertaining to the fitness for service SCA at the Pickering NGS and Pickering WMF.



During the licence period, CNSC staff conducted compliance verification activities to evaluate OPG's performance in the fitness for service SCA at the Pickering NGS and WMF. These activities include inspections and assessments of OPG submissions, including reliability reports and results of maintenance activities. CNSC staff have found OPG's programs to ensure the fitness for service of SSCs at the Pickering NGS and Pickering WMF continue to meet regulatory requirements.

As discussed in section 3, OPG plans to replace many of the major components at the Pickering NGS most relevant for fitness for service during the proposed refurbishment of units 5-8. Therefore, this section does not provide a detailed assessment of the current operational condition of these SSCs.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

6.6.2.1 Pickering Nuclear Generating Station

OPG has implemented or is in the process of implementing the following regulatory documents and standards at the Pickering NGS related to the fitness for service SCA:

- [REGDOC-2.6.1, Reliability Programs for Nuclear Power Plants](#)
- [REGDOC-2.6.2, Maintenance Programs for Nuclear Power Plants](#)
- [REGDOC-2.6.3, Aging Management](#)
- CSA N285.4-19, *Periodic Inspection of CANDU Nuclear Power Plant Components* (Full implementation by December 2027)
- CSA N285.5-22, *Periodic Inspection of CANDU Nuclear Power Plant Containment Components* (Full implementation by June 2027)
- CSA N285.8-23, *Technical Requirements for In-Service Inspection Evaluation of Zirconium Alloy Pressure Tubes in CANDU Reactors*
- CSA N287.1-14, *General Requirements for Concrete Containment Structures for Nuclear Power Plants*
- CSA N287.2-17, *Material Requirements for Concrete Containment Structures for Nuclear Power Plants* (Full implementation by January 2027)
- CSA N287.7-17, *In-service Examination and Testing Requirements for Concrete Containment Structures for Nuclear Power Plant Components*
- CSA N287.8-15, *Aging Management for Concrete Containment Structures for Nuclear Power Plants* (Full implementation by January 2027)



Equipment Fitness for Service / Equipment Performance (Reliability)

CNSC staff have verified that OPG has adequate processes and procedures in place to monitor the fitness for service of SSCs to ensure continued safe operation of the Pickering NGS following the proposed refurbishment of units 5-8 and the during the proposed licence period. During the licence period, CNSC staff have been satisfied that equipment performance at the Pickering NGS meets regulatory requirements.

Reliability Program

During the licence period, CNSC staff have been satisfied that OPG's reliability program continues to meet the regulatory requirements of REGDOC-2.6.1. OPG indicated (11) that the proposed SIO included in the scope of the proposed refurbishment project were informed by the reliability program. CNSC staff anticipate that the reliability of the Pickering NGS units 5-8 will be improved following the proposed refurbishment.

In 2025, OPG updated its list of systems and components important to safety (62) in accordance with the Pickering NGS risk and reliability program, which CNSC staff found acceptable. These updates reflect the reduction in risk from the permanent shutdown, defueling, and dewatering of units 1 and 4. OPG has committed to continue to monitor and report on the reliability performance of components supporting the safe operation of the unit 1-4 IFBs through a pilot project associated with the annual risk and reliability report. Pending the results of this pilot project, OPG may use the same approach during the refurbishment period of units 5-8.

CNSC staff conclude that the reliability program in place at the Pickering NGS is adequate to support operations during the proposed licence period, including the period of shutdown during the proposed refurbishment of Pickering NGS units 5-8 and the continued operations of units 5-8 following this proposed refurbishment. CNSC staff will continue to monitor the implementation of OPG's reliability program during the proposed licence period.

Maintenance

OPG has policies, processes, and procedures in place at the Pickering NGS that provide direction and support for its maintenance program. During the licence period, CNSC staff have found that OPG's maintenance program at the Pickering NGS has met the requirements and expectations set out in REGDOC-2.6.2.

The critical corrective maintenance backlog, deficient maintenance backlog, and the number of critical preventive maintenance deferrals at the Pickering NGS over the last 5 years are shown in Table 4. The average preventive maintenance completion ratio in 2024 was 97%. CNSC staff are satisfied with OPG's performance during the licence period.

Table 4 – Trend of maintenance backlogs and deferrals for critical components at the Pickering NGS, 2020-24

	Average quarterly work orders per unit					2024 Industry Average
	2020	2021	2022	2023	2024	
Corrective maintenance backlog	0	0	0	0	0	1
Deficient maintenance backlog	2	3	2	2	4	3
Deferrals of preventive maintenance	5	4	2	4	1	2

Aging Management / Structural Integrity

CNSC staff confirmed that OPG continues to implement its aging and obsolescence management programs and processes within a systematic and integrated framework in accordance with CNSC REGDOC-2.6.3. OPG has implemented lifecycle management plans at the Pickering NGS that establish the strategy and identify necessary actions to ensure that aging effects on major reactor SSCs are appropriately managed for the operating life of the Pickering NGS. These include plans for reactor components and structures, fuel channels, feeders, and steam generators. CNSC staff are satisfied that OPG's lifecycle management plans continue to meet applicable regulatory requirements, and OPG has committed to update these plans to incorporate any design and material changes of SSCs resulting from the proposed refurbishment.

Fuel Channels

As detailed in its application (10) and further discussed in section 3, OPG plans to replace the Pickering NGS units 5-8 fuel channels during the proposed refurbishment project. This includes the pressure tubes, calandria tubes, and associated components. OPG indicated that it has leveraged industry best practices and OPEX to improve the manufacturing and installation process of new fuel channels.

For example, improvements to pressure tubes are intended to mitigate known major life-limiting mechanisms, such as the amount of trace impurities that contribute to the decline of material properties over the operating life of the unit. This is expected to improve fracture toughness of the pressure tubes and reduce susceptibility to delayed hydride cracking. With respect to calandria tubes, improvements are intended to increase the overall integrity of the calandria tube during accident scenarios, reduce sag



during long term operation, and reduce the potential for contact between calandria tubes and liquid injection shutdown system (LISS) nozzles. OPG has also implemented design changes to the annulus spacers to eliminate known material degradation issues and spacer movement issues with pre-refurbishment annulus spacers.

Licence condition 6.2 of the current PROL requires OPG to maintain an enhanced fitness for service program for fuel channels in extended operations. Since OPG does not intend to operate any Pickering NGS unit beyond 2026 until completion of the proposed refurbishment project, no fuel channels will be in extended operations during the proposed licence period. For this reason, CNSC staff recommend the removal of licence condition 6.2 from the proposed PROL. Additionally, CNSC staff also recommend the removal of the existing operating limit on pressure tubes of 305,000 EFPH. Licence condition 6.1 will continue to require OPG to implement and maintain a fitness for service program at the Pickering NGS that includes fuel channels, as described in section 6.1 of the LCH included in appendix C.

Fuel Channel Feeders

As with fuel channels, OPG plans to replace the fuel channel feeders during the proposed refurbishment of Pickering NGS units 5-8. These new feeders will also leverage OPEX to improve the fabrication and installation processes and mitigate the effects of known major degradation mechanisms.

Steam Generators

As discussed in section 3, OPG plans to replace all 12 steam generators at each unit during the proposed refurbishment of Pickering NGS units 5-8. OPG has made improvements to the material selection of steam generator internal components to improve long term reliability and corrosion resistance.

Civil Structures, including Containment

OPG maintains an aging management plan for concrete containment structures and safety related structures, which includes the requirements for periodic inspections and testing. The plan provides the strategy and activities for managing the effects of aging of concrete containment structures and safety-related structures. OPG is required to update this plan at least every 6 years. CNSC staff are satisfied that OPG's aging management plan for concrete containment structures and safety related structures continues to meet regulatory requirements.

OPG has noted (11) that modifications to the concrete containment structures during the proposed refurbishment (see section 3 and section 6.5) would have an impact on the aging management plan. To date, the inspections have shown that the RB domes are in overall good condition. CNSC staff will continue to assess OPG's activities in this



regard to ensure regulatory requirements are met with respect to the fitness for service of concrete containment structures.

To further improve the performance of containment following the proposed refurbishment, OPG has also committed (11) to replace bulkhead seals between the pressure relief duct (PRD) and RBs of Pickering units 5 to 8, to replace instrument air isolating valves with an improved design less prone to leaks, and to apply a floor coating to the vacuum building floor slab to enhance its leak-tightness.

Periodic Inspection and Testing

OPG has implemented periodic inspection program (PIP) plans for pressure boundary components, containment components, containment structures, and safety-related structures in accordance with applicable standards. CNSC staff monitor OPG's ongoing implementation of these plans through various compliance verification activities, including reviews of OPG's inspection reports. OPG have committed to continue performing the required periodic inspections as per CNSC accepted PIP plans during the proposed refurbishment of units 5-8.

As part of OPG's implementation of the 2019 version of CSA N285.4 and the 2022 version of CSA N285.5, OPG intends to update associated PIP plans during the proposed licence period and submit them to CNSC staff for acceptance. OPG has committed to update PIP plans associated with CSA N285.4 by December 2027 and PIP plans associated with CSA N285.5 by June 2027. OPG will perform baseline inspections for modifications, repairs and replacements during the proposed refurbishment project in accordance with these updated PIP plans.

OPG also carries out inspections on non-nuclear balance-of-plant pressure boundary components that have the potential to impact nuclear safety. Findings related to these inspections are reported to CNSC staff. OPG is currently developing a plan to implement CSA N285.7-21, *Periodic Inspection of CANDU Nuclear Power Plants Balance of Plant Systems and Components* at the Pickering NGS during the proposed licence period.

PIP plans and testing requirements for concrete containment structures and safety-related structures are maintained in accordance with CSA N287.7 and CSA N291. OPG plans to implement the 2019 version of CSA N291 prior to the beginning of the proposed licence period. These PIP plans and testing requirements include periodic inspections and leakage rate testing of the RBs, vacuum building, and PRD.

CNSC staff are satisfied that OPG's PIP plans and testing requirements continue to meet regulatory requirements and that they are adequate for the continued operation of Pickering NGS units 5-8 following the proposed refurbishment.



Chemistry Control

OPG maintains a chemistry control program at the Pickering NGS that ensures critical plant equipment performs safely and reliably over its lifetime. This program specifies processes, overall requirements, and accountabilities to ensure effective control of plant chemistry. It includes consideration of operational and lay-up conditions, control of laboratory methods, sampling and analyses, process chemicals, chemistry control performance monitoring, and reporting.

During the licence period, CNSC staff conducted inspections and reviewed quarterly reports on chemistry compliance. CNSC staff have found that OPG's chemistry control program continues to meet regulatory requirements.

6.6.2.2 Pickering Waste Management Facility

OPG has implemented REGDOC-2.6.3 at the Pickering WMF that includes requirements related to the fitness for service SCA. OPG maintains aging management plans and inspection plans for DSCs and DSMs that are stored at the Pickering WMF. During the licence period, CNSC staff have conducted various compliance verification activities at the Pickering WMF, including inspections and the review of annual compliance reports. CNSC staff have found that OPG's fitness for service programs at the Pickering WMF continue to meet regulatory requirements and that OPG sufficiently manages the aging of SSCs.

CNSC staff are satisfied that OPG has adequate programs in place to maintain the fitness for service of SSCs at the Pickering WMF and that the fitness for service programs remain adequate for the proposed licence period.

6.6.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections

6.6.3.1 Past Performance

OPG's fitness for service programs at the Pickering NGS and Pickering WMF continue to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.



6.6.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance in the fitness for service SCA through regulatory oversight activities including inspections and reviews of licensee submissions.

6.6.3.3 Proposed Improvements

OPG intends to replace major reactor SSCs at Pickering NGS units 5-8 during the proposed refurbishment, which will reset life limiting parameters associated with fitness for service. OPG has also committed to implement updated versions of various CSA Group standards at the Pickering NGS, including the 2017 version of CSA N287.2, the 2015 version of CSA N287.8, the 2019 version of CSA N285.4, and the 2022 version of CSA N285.5 prior to or during the proposed licence period.

6.6.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's existing reliability, maintenance, aging management, periodic inspection, and chemistry control programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the fitness for service SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence and makes adequate provisions to ensure that SSCs remain fit for service.

6.7 Radiation Protection

The radiation protection SCA covers the implementation of a radiation protection program in accordance with the [Radiation Protection Regulations](#). The program must ensure that contamination levels and radiation doses received by individuals are monitored, controlled and maintained as low as reasonably achievable (ALARA).

The specific areas that comprise this SCA include:

- Application of ALARA
- Worker dose control
- Radiation protection program performance
- Radiological hazard control



6.7.1 Trends

The following table indicates the Radiation Protection SCA rating trends for the past 5 years of the licence period:

TRENDS FOR RADIATION PROTECTION				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)
SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)
Comments OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. No worker received a radiation dose in excess of regulatory dose limits as a result of the licensed activities conducted at the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the radiation protection SCA meet regulatory requirements.				

6.7.1.1 Average And Maximum Effective Doses to Workers

The following table describes doses to workers at the Pickering NGS and Pickering WMF over the past 5 years. The *Radiation Protection Regulations* define an effective dose limit for nuclear energy workers (NEW) of 50 millisieverts (mSv) in a 1-year dosimetry period.

Average and Maximum Annual Effective Doses to Workers						
Facility	2020	2021	2022	2023	2024	Limit
Average Effective Dose (mSv)						
Pickering NGS	2.4	1.7	1.8	1.8	1.4	N/A
Pickering WMF	0.6	0.8	0.6	0.4	0.5	
Maximum Individual Effective Dose (mSv)						
Pickering NGS	16.6	14.2	13.4	13.6	10.6	50.0 mSv/one- year dosimetry period
Pickering WMF	1.3	1.4	1.2	1.4	1.4	

Note: arithmetic average dose values are based on the non-zero results only.

6.7.2 Discussion

Section 2.7 of OPG's application (10) provides information pertaining to the radiation protection SCA at the Pickering NGS and Pickering WMF. OPG has implemented and maintains an effective radiation protection program at the Pickering NGS and Pickering WMF, as required by the *Radiation Protection Regulations*.

During the licence period, CNSC staff conducted compliance verification activities to evaluate OPG's performance in the radiation protection SCA at the Pickering NGS and Pickering WMF. These activities include inspections related to the implementation of the radiation protection program with respect to the application of ALARA, worker dose control, radiation protection program performance, and radiological hazard control, as well as reviews of required submissions such as routine performance reports and event reports. CNSC staff have found that OPG has met regulatory requirements and adequately addressed any findings with respect to the radiation protection SCA.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

6.7.2.1 Pickering Nuclear Generating Station

Application of ALARA

OPG's radiation protection program at the Pickering NGS adheres to the ALARA principle by integrating ALARA measures into planning, scheduling, and work control. OPG also monitors its performance against ALARA targets for work conducted at the Pickering NGS.

In its application (10), OPG identified that it has implemented a site ALARA strategy which applies to all Pickering NGS units, whether the unit is operating, shutdown for planned maintenance, shutdown for safe storage, or undergoing refurbishment, which applies to all staff, contractors, and visitors. Current and ongoing ALARA initiatives include:

- Implementation of dose goals
- Application of lessons learned and operating experience
- Use of mock-ups and simulations prior to radiological work
- Early identification of indicators in decline of radiation protection performance
- Tooling improvements to reduce personnel dose exposure

During the licence period, CNSC staff found that OPG's efforts in applying the ALARA principle to keep worker doses ALARA met regulatory requirements.



Worker dose control

OPG's radiation protection program is designed to ensure that doses to workers are controlled and do not exceed regulatory limits. During the current licence period, OPG has maintained radiation doses to NEWs at the Pickering NGS below regulatory dose limits, as shown in section 6.7.1.1. OPG uses a CNSC licensed dosimetry service to monitor, assess, record, and report doses of ionizing radiation received by employees, visitors, and contractors. OPG uses a combination of action levels, staff training and qualification, work planning and oversight, and personal protective equipment to ensure radiation doses to workers are controlled and kept ALARA.

All radiological work at the Pickering NGS is planned and includes evaluation of radiation hazards, as well as selection of appropriate protective measures and dosimetry. OPG's radiation protection program defines requirements for planning and executing radiological work, as well as the criteria and procedures for selection and use of dosimetry. OPG also uses engineered barriers (e.g., dedicated rooms, barrier chains, gates, temporary shielding, etc.) within the Pickering NGS to prevent workers from entering radiation fields and receiving unintended doses.

OPG establishes a series of exposure control levels (ECLs) and administrative dose limits (ADLs) for every individual worker, which are set well below regulatory limits. These are used to provide an additional defence to ensure that individual workers' doses do not exceed regulatory limits.

Action level, as per the *Radiation Protection Regulations*, means a specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee's radiation protection program and triggers a requirement for specific action to be taken. OPG's dose-based action levels for the Pickering NGS consider both unplanned external dose and unplanned intakes of radionuclides.

During the current licence period, OPG reported 2 radiation protection action level exceedances to the CNSC for internal intakes of tritium. In both cases, the dose received by the individual was well below the regulatory limit of 50 mSv in a 1-year dosimetry period. CNSC staff confirmed that OPG took appropriate measures to ensure the well-being of the affected workers and implemented corrective actions to prevent recurrence.

Regarding the proposed refurbishment of units 5-8, OPG has indicated that it will utilize the existing radiation protection action levels and ADLs for the Pickering NGS. Additionally, OPG radiation protection staff will provide oversight to contractors to ensure the requirements of OPG's radiation protection program are met. During project execution, work plans will be reviewed to achieve dose reduction and minimization, and work scope will be monitored for potential dose reduction benefits.



During the licence period, CNSC staff found that OPG's efforts to control the radiation doses received by workers at the Pickering NGS met regulatory requirements.

Radiation protection program performance

CNSC staff assess OPG's radiation protection program performance at the Pickering NGS through CNSC compliance verification activities, including inspections, assessments, and routine review of required OPG submissions.

In accordance with REGDOC-3.1.1, OPG submits quarterly and annual performance reports that include information on collective radiation exposure, personnel contamination events, unplanned dose / unplanned exposure, and loose and/or fixed contamination events. During the licence period, CNSC staff have remained satisfied that OPG maintains acceptable performance of its radiation protection program.

As per the *Radiation Protection Regulations*, OPG has implemented a set of dose-based and contamination-based action levels at the Pickering NGS that if reached, require OPG to investigate and take action to restore the effectiveness of their radiation protection program. OPG last reviewed and updated its radiation protection action levels in 2022. CNSC staff found that the parameters of the action levels are appropriate and are satisfied that OPG has suitably applied these action levels at the Pickering NGS during the licence period.

OPG continually measures the performance of its radiation protection program against industry benchmarks and station targets. OPG also conducts self-assessments on the radiation protection program to identify opportunities for improvement and maintains processes for the incorporation of lessons learned into its radiation protection program. For example, the industry lessons learned regarding neutron dose rates associated with irradiated reactor components during refurbishment have been fully integrated into OPG's radiation protection program at the Pickering NGS.

With respect to the proposed refurbishment of units 5-8, OPG plans to incorporate operating experience from the Darlington NGS refurbishment project into radiation protection planning. OPG will also continuously incorporate lessons learned throughout the refurbishment, including ensuring lessons learned from the initial unit are applied to subsequent units.

During the licence period, CNSC staff found that the performance of OPG's radiation protection program at the Pickering NGS met regulatory requirements.

Radiological hazard control

OPG's radiation protection program monitors and controls all radiological hazards at the Pickering NGS. This is accomplished through radiological zoning, contamination control, dose rate control, and area and airborne radiation monitoring and control. Radiological



hazards are eliminated when possible or controlled with engineered barriers, temporary shielding, and signage.

Radiological hazard monitoring includes performing routine contamination surveys of the facilities and performing non-routine surveys during the conduct of radiological work. Radiological hazard monitoring also includes monitoring personnel and material as they move throughout the facility, particularly at zone boundaries and at exits from radiological work areas. During the licence period, there have been no exceedances of any contamination-based action levels at the Pickering NGS.

Regarding the activities planned for the proposed licence period (10), OPG intends to follow the existing program for surveying and zoning during the planned decommissioning of Pickering NGS units 1-4. OPG has indicated that the current access control system for units 1-4 will no longer be required following removal of hazards during SwS. Access to radiological zones and the control of radiological hazards will continue to be controlled through OPG's radiation protection program. OPG has also established routine radiological surveys to monitor the potential increase in tritium and changes in gamma hazards that may result from decommissioning activities. Regarding the proposed refurbishment of units 5-8, OPG does not anticipate any changes to the radiation protection program for the control of radiological hazards.

During the licence period, CNSC staff found that OPG's implementation of radiological hazard controls to protect workers and ensure radioactive contamination is controlled within the Pickering NGS met regulatory requirements.

6.7.2.2 Pickering Waste Management Facility

Application of ALARA

OPG's radiation protection program at the Pickering WMF adheres to the ALARA principle. CNSC staff note that due to the lower risk and well-defined nature of the radiological work performed at the Pickering WMF, the procedure for controlling exposures ALARA at the Pickering NGS does not fully apply to the Pickering WMF. CNSC staff have found that OPG continues to follow applicable radiation protection program procedures to ensure that worker doses at the Pickering WMF are kept ALARA.

CNSC staff confirmed that OPG develops annual and quarterly ALARA dose targets for the Pickering WMF. The target values are based on the planned processing and storage of DSCs for the year and are informed by historical trends. OPG reports ALARA dose targets and performance against those targets CNSC staff annually. CNSC staff are satisfied that OPG is committed to ensuring that doses to workers are maintained ALARA in all areas of operations at the Pickering WMF.



Worker dose control

During the current licence period, OPG has maintained radiation doses to NEWs at the Pickering WMF below regulatory dose limits, as shown in section 6.7.1.1. ECLs and ADLs are utilized at the Pickering WMF to ensure doses to workers are controlled. Radiation protection action levels have been established at the Pickering WMF for unplanned dose. There have been no radiation protection action level exceedances during the licence period.

To assess the dose received by non-NEWs who may pass near the Pickering WMF, OPG has installed thermoluminescent dosimeters at various locations along the perimeter fence. OPG uses the results from quarterly analysis of these dosimeters to confirm that dose rates remain within acceptable levels. These dose rate results are reported to CNSC staff annually. During the licence period, none of OPG's reported perimeter dose rates exceeded the target, and no measurable dose was assigned to a non-NEW at the Pickering WMF.

CNSC staff are satisfied with OPG's efforts over the current licence period in controlling the radiation doses to workers at Pickering WMF.

Radiation protection program performance

CNSC staff assess OPG's radiation protection program performance at the Pickering WMF through various CNSC compliance verification activities, including inspections and reviews of OPG's regular performance reports. CNSC staff's review of the regular performance reports submitted by OPG for the Pickering WMF during the current licence period found that the reported information met the regulatory requirements specified in REGDOC-3.1.2, and no adverse trends were noted.

CNSC staff are satisfied with the performance of OPG's radiation protection program at the Pickering WMF over the current licence period.

Radiological hazard control

OPG monitors and controls all radiological hazards at the Pickering WMF, including the conduct of routine contamination surveys and non-routine surveys during the conduct of radiological work. Signage is used to identify the locations and magnitude of hazards that exist within the facility.

At the Pickering WMF, radiation protection action levels are established for contamination control. There were no radiation protection action level exceedances during the current licence period for contamination control.

Regarding the proposed refurbishment of Pickering NGS units 5-8, OPG noted (10) that it intends to deploy new radiological instrumentation at the Pickering WMF for neutron detection and dosimetry purposes.



CNSC staff are satisfied with OPG's efforts to continue to implement its radiological hazard controls to protect workers and ensure radioactive contamination is controlled within the Pickering WMF.

6.7.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.7.3.1 Past Performance

OPG's radiation protection program at the Pickering NGS and Pickering WMF continues to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.

6.7.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance and compliance with regulatory requirements in all aspects of the radiation protection SCA through inspections and reviews of required submissions, including maintaining radiation protection instruments and equipment, mitigating and controlling contamination, and verifying that the protection of workers is optimized and that worker doses are kept ALARA.

6.7.3.3 Proposed Improvements

There are no proposed major changes to OPG's radiation protection programs.

6.7.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's existing radiation protection programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the radiation protection SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence and makes adequate provisions to ensure that people are protected from radiological hazards.

6.8 Conventional Health and Safety

The conventional health and safety SCA covers the implementation of a program to manage workplace safety hazards and to protect personnel and equipment.

The specific areas that comprise this SCA include:

- Performance
- Practices
- Awareness

6.8.1 Trends

The following table indicates the Conventional Health and Safety SCA rating trends for the past 5 years of the licence period:

TRENDS FOR CONVENTIONAL HEALTH AND SAFETY				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)
Comments OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the conventional health and safety SCA meet regulatory requirements.				

6.8.2 Discussion

Section 2.8 of OPG's application (10) provides information pertaining to the conventional health and safety SCA at the Pickering NGS and Pickering WMF.

A conventional health and safety program minimizes the risk to the health and safety of workers posed by conventional (non-radiological) hazards in the workplace. Pursuant to regulations made under the [Canada Labour Code](#), OPG's conventional health and safety program is regulated by the Ontario Ministry of Labour, Immigration, Training and Skills Development in accordance with the [Ontario Occupational Health and Safety Act](#) (OHSA) and the [Ontario Labour Relations Act](#). Related legislation includes the [Ontario Workplace Safety and Insurance Act](#) and the [Ontario Human Rights Code](#).

During the licence period, CNSC staff have observed safe work practices during inspections and other activities at the Pickering NGS and Pickering WMF. This includes

observations of good housekeeping, compliance with applicable labour codes (e.g., scaffolding and worker protection such as barriers and hazard signs), and proper use of personal protective equipment. OPG has continued to take appropriate corrective actions, generally immediately and without the need for enforcement action, to address any CNSC staff findings. CNSC staff have found that OPG has met regulatory requirements and adequately addressed any findings with respect to the conventional health and safety SCA at the Pickering NGS and Pickering WMF.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

Performance

As required by REGDOC-3.1.1, OPG reports on accident severity rate (ASR), accident frequency (AF), and industrial safety accident rate (ISAR). CNSC staff have found that OPG has continued to meet the reporting requirements related to conventional health and safety during the licence period. Table 5 includes the recent annual ASR, AF, and ISAR during the licence period, along with the industry average (in brackets).

Table 5 – Annual ASR, AFR, and ISAR for the Pickering NGS from 2020 to 2024

	2020	2021	2022	2023	2024
Accident Severity Rate (Industry average)	0.00 (0.50)	0.35 (0.05)	0.00 (0.35)	0.00 (0.10)	0.00 (0.27)
Accident Frequency (Industry average)	0.14 (0.25)	0.10 (0.16)	0.22 (0.25)	0.14 (0.16)	0.18 (0.16)
Industrial Safety Accident Rate (Industry average)	0.00 (0.03)	0.03 (0.01)	0.00 (0.03)	0.00 (0.02)	0.00 (0.01)

Since there has never been a lost time injury at the PWMF, the ASR, AF, and ISAR at the Pickering WMF have remained 0 during the licence period.

Over the last 5 years, OPG has maintained performance that has generally remained in line with the industry average. These performance indicators for the conventional health and safety SCA are reported annually to the Commission. OPG also posts information related to accident frequency [on its website](#) as part of the quarterly Pickering Nuclear Performance Report. CNSC staff are satisfied with OPG's performance with respect to this SCA during the licence period.



Practices

In its application, OPG indicated that it maintains a joint health and safety committee at the Pickering NGS and Pickering WMF to improve health and safety in the workplace. All OPG facilities apply an internal responsibility system where employees are encouraged to raise concerns on potential safety issues to ensure that hazards are addressed promptly and effectively.

The CNSC has a Memorandum of Understanding with the Ontario Ministry of Labour, Immigration, Training and Skills Development (MLITSD) to cooperate and exchange information and technical expertise related to their respective areas of jurisdiction, such as occupational health and safety practices at nuclear facilities.

Awareness

During the licence period, CNSC staff confirmed that the conventional health and safety work practices at the Pickering NGS continued to achieve a high degree of personnel safety. OPG personnel at all levels exhibit a proactive attitude towards anticipating work related hazards and preventing unsafe conditions. CNSC staff found that there continues to be a safe and efficient working environment where situational awareness and safe work practices are ensured.

Refurbishment and Decommissioning Work

During the proposed licence period, OPG is planning to conduct work activities related to the decommissioning of units 1-4 and the refurbishment of units 5-8. These activities are expected to result in changing hazards across the Pickering NGS site that could increase the risk of injury to workers. OPG has indicated to CNSC staff (11) that it has developed a health and safety integration plan to identify key risks and ensure all workers are aware of any increased risk of injury. To address hazards, OPG will incorporate relevant OPEX from the Darlington NGS refurbishment project and use a mock-up facility to practice high risk tasks. CNSC staff have developed compliance verification plans for the stabilization and SwS of units 1-4 and the proposed refurbishment of units 5-8 that include field walkdowns to observe safe work practices.

As noted in sections 3 and 6.1, OPG plans to use EPC contractors to perform work during the proposed licence period. OPG is responsible for ensuring the health and safety of workers, and OPG's conventional health and safety programs and requirements apply to all workers at the Pickering NGS and WMF, including EPC contractors.

6.8.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.



6.8.3.1 Past Performance

OPG's conventional health and safety programs at the Pickering NGS and Pickering WMF continue to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.

6.8.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance and compliance with regulatory requirements in all aspects of the conventional health and safety SCA through inspections and on-site walk downs. Of particular focus in the conventional health and safety SCA will be the health and safety of workers during the proposed refurbishment of Pickering NGS units 5-8.

6.8.3.3 Proposed Improvements

There are no proposed major changes to OPG's conventional health and safety programs.

6.8.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's existing health and safety programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the conventional health and safety SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence and makes adequate provisions to ensure the health and safety of workers.

6.9 Environmental Protection

The Environmental Protection SCA covers programs that identify, control and monitor all releases of radioactive and hazardous substances and effects on the environment from facilities or as the result of licensed activities.

The specific areas that comprise this SCA include:

- Environmental risk assessment (ERA)
- Effluent and emissions control (releases)
- Assessment and monitoring
- Protection of people



- Environmental management system (EMS)

6.9.1 Trends

The following table indicates the Environmental Protection SCA rating trends for the past 5 years of the licence period:

TRENDS FOR ENVIRONMENTAL PROTECTION				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)
SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)
Comments OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the environmental protection SCA meet regulatory requirements.				

6.9.1.1 Maximum Effective Dose to a Member of the Public

The following table describes doses to the public at Pickering site over the current licensing period. In accordance with the *Radiation Protection Regulations*, the regulatory limit for dose to a member of the public in a single year is 1000 micro sieverts (μSv).

MAXIMUM ANNUAL EFFECTIVE DOSE TO A MEMBER OF THE PUBLIC						
Dose Statistic	2020	2021	2022	2023	2024	Limit
Maximum Effective Dose (μSv)	1.2	2.0	1.9	1.5	1.4	1000

6.9.2 Discussion

Section 2.9 of OPG's application (10) provides information pertaining to the environmental protection SCA at the Pickering NGS and Pickering WMF.

OPG's environmental protection program for the Pickering site includes policies, station instructions, methods, and procedures to identify, control, and monitor releases of radioactive and hazardous substances, and to protect the health and safety of people and the environment. During the licence period, CNSC staff conducted compliance verification activities to evaluate the performance of OPG's environmental protection program at the Pickering NGS and Pickering WMF. These activities include technical



assessments of quarterly and annual reports, reviews of event reports, and inspections. CNSC staff have found that OPG has met regulatory requirements and adequately addressed any findings with respect to the environmental protection SCA.

OPG has implemented the following regulatory documents and standards pertaining to the environmental protection SCA at the Pickering NGS and Pickering WMF:

- [REGDOC-2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2](#)
- CSA N288.1-20, *Guidelines for Modelling Radionuclide Environmental Transport, Fate, and Exposure Associated with the Normal Operation of Nuclear Facilities*
- CSA N288.3.4-13, *Performance Testing of Nuclear Air-Cleaning Systems at Nuclear Facilities*
- CSA N288.4-19, *Environmental Monitoring Programs at Nuclear Facilities and Uranium Mines and Mills*
- CSA N288.5-22, *Effluent and Emissions Monitoring Programs at Nuclear Facilities*
- CSA N288.6-22, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills*
- CSA N288.7-23, *Groundwater Protection and Monitoring Programs for Nuclear Facilities and Uranium Mines and Mills*
- CSA N288.8-17, *Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities*

OPG has committed to implement [REGDOC-2.9.2, Environmental Protection: Controlling Releases to the Environment](#) at the Pickering NGS and WMF by January 1, 2030.

The following subsections detail CNSC staff's assessment of the SCA across the relevant specific areas. Additional detailed information on CNSC staff's assessment of OPG's past performance in the environmental protection SCA can be found in the [Environmental Protection Review Report](#) (EPRR) (63) for the Pickering site, which is available on the CNSC's website.

Environmental risk assessment

REGDOC-2.9.1 requires the licensee to submit an environmental risk assessment (ERA) conducted in accordance with CSA N288.6 every 5 years or when a project moves to a new lifecycle phase. An ERA is a systematic process used by licensees to identify, quantify, and characterize the potential risks posed by radiological and non-radiological hazardous substances, as well as physical stressors in the environment on human and other biological receptors. This includes the magnitude and extent of the potential effects associated with an existing and/or proposed facility. Risks to human receptors



are assessed through a human health risk assessment and ecological receptors are addressed through an ecological risk assessment.

An ERA can be predictive, retrospective, or include elements of both. The ERA serves as the basis for the development of site-specific environmental protection measures and as the tool to determine whether the facility's environmental protection measures are effective. The environmental monitoring data, in turn, provide further updates to refine ERA conclusions.

Predictive Environmental Risk Assessment

In June 2025, OPG submitted a predictive ERA (PERA) (12) in support of its licence renewal application (10), in accordance with CSA N288.6-22. The scope of the PERA encompasses the planned activities across the entire Pickering site, including the refurbishment of Pickering NGS units 5-8 and construction of the associated DWI, decommissioning of units 1-4, and continued operations of the Pickering NGS and WMF. The PERA includes a summary of the most recent 2022 site-wide retrospective ERA as well as predictive effects assessments completed for the Pickering site. Further information regarding these previous assessments along with CNSC staff's conclusions are provided in the CNSC's EPRR (63).

CNSC staff reviewed the 2025 PERA and found that it met the requirements of REGDOC-2.9.1 and CSA N288.6-22. The PERA concluded that most proposed activities are not predicted to result in adverse effects to human and/or ecological receptors. Certain impacts, such as aquatic habitat disturbance associated with DWI construction, are anticipated but are expected to be minimized through mitigation measures and monitoring. These include erosion control, replacement of disturbed habitat features, and monitoring lake temperatures to confirm thermal plume assumptions. OPG has committed to develop a series of environmental plans and control specifications (21) prior to commencing DWI construction activities that will further describe mitigation and monitoring measures. When available, CNSC staff will verify that these plans are in accordance with the PERA. OPG also intends to apply for an FAA from DFO regarding the proposed DWI construction, which is expected to be required due to the possible loss of aquatic habitat and would include further measures to offset any impacts as determined by DFO.

The PERA also recommends additional monitoring of air quality to further characterize the existing environment and the collection of additional aquatic environment data as the design of the DWI evolves, which is expected to be included in an updated revision of the PERA. OPG has committed to providing an updated PERA by May 2026 that includes this information, among other updates. CNSC staff further expect that OPG will address specific recommendations and technical comments made by CNSC staff to



improve the PERA quality, as well as to verify the technical validity of the PERA conclusions.

Effluent and emissions control (releases)

OPG has implemented an effluent and emissions monitoring program at the Pickering NGS that is compliant with REGDOC-2.9.1 and CSA N288.5-22. OPG's effluent and emissions monitoring program defines the methods and procedures for monitoring radioactive, nuclear, and hazardous substances; identifies and monitors discharge pathways for releases to the environment; and is used to inform the control of releases below regulatory limits and action levels.

The derived release limits (DRLs) represent the maximum acceptable level of emitted nuclear substances at the Pickering site that arise from the facility's processes and are derived from the dose limit for members of the public. The DRLs are established with a methodology consistent with CSA N288.1-20. OPG has revised the DRLs to reflect the changes to effluent resulting from the permanent shutdown of Pickering NGS units 1-4 and is currently developing the set of DRLs that will come into effect when units 5-8 stop operating during refurbishment. For the proposed licence period, OPG has committed to implementing REGDOC-2.9.2, which will result in the adoption of licence release limits.

The radiological releases to air and water from the Pickering NGS have been maintained well below the established DRLs throughout the current licence period.

At the Pickering WMF, OPG measures gamma dose rates at several locations on the fence line of the facility to ensure that dose rates remain below the dose rate target. CNSC staff review the results of this monitoring, which are currently included in OPG's annual report for the Pickering WMF.

In accordance with licence condition 9.1 of the PROL, OPG has environmental action levels (EALs) that are established using a methodology compliant with CSA N288.8-17. During the licence period, CNSC staff have found that OPG responded to EAL exceedances appropriately.

Additionally, OPG monitors non-radiological substance release to air and water. Releases of hazardous substances have largely been below the limits established by the Ontario Ministry of Environment Conservation and Parks. Where exceedances did occur, they have posed negligible risk to human health and the environment.

During the licence period, CNSC staff have found that the effluent monitoring program currently in place at the Pickering site continues to protect human health and the environment and is adequate for the activities proposed in OPG's application.

Assessment and monitoring



OPG maintains an environmental monitoring program (EMP) that meets the requirements of REGDOC-2.9.1 and CSA N288.4-19. OPG's EMP is designed to measure environmental radioactivity and radiation in the vicinity of the Pickering site which includes the Pickering WMF. Based on this program, environmental samples from different pathways of exposure are collected from various offsite locations and analyzed. Data from the EMP are also used to assess public doses resulting from the routine operation of the Pickering site, and to verify predictions made in environmental risk assessments.

OPG also maintains a comprehensive Groundwater Protection Program (GWPP) and Groundwater Monitoring Program (GWMP), in accordance with N288.7-23. These programs are designed to prevent or minimize impacts to groundwater and to confirm that control measures remain effective. Groundwater is sampled at more than 100 dedicated monitoring wells across the Pickering site to evaluate both radiological and non-radiological constituents, as well as hydrogeological parameters. OPG's 2025 PERA, as well as the results from OPG's GWMP and EMP, concluded that radiological and non-radiological releases of contaminants of potential concern (COPCs) to groundwater remain low. There are no adverse effects on groundwater quantity or quality and no anticipated impacts to groundwater protection associated with work planned for the proposed licence period.

During the licence period, CNSC staff have found that the environmental monitoring programs in place at the Pickering NGS and Pickering WMF met regulatory requirements. CNSC staff are satisfied that OPG's environmental monitoring program will continue to be adequate for the proposed licence period.

Protection of people

During the licence period, CNSC staff have reviewed the results of OPG's environmental monitoring programs. CNSC staff found that these results show that concentration of radionuclides in the environment resulted in dose to the public that are well below regulatory limits. The table in section 6.9.1.1 provides the doses to the public from the Pickering site from 2020 to 2024.

OPG's 2025 PERA included a human health risk assessment (HHRA) which evaluated exposures by critical human receptors to predicted radiological releases. No non-radiological COPCs nor physical stressors were identified for further assessment. The highest radiation dose predicted was 1.24 $\mu\text{Sv}/\text{yr}$, which is well below the regulatory annual public dose limit of 1000 $\mu\text{Sv}/\text{yr}$. As such, the human health risk assessment concluded that no health effects are anticipated due to exposure of potential critical groups to radiological releases from the Pickering site. CNSC staff requested OPG to address specific recommendations and technical comments made by CNSC staff pertaining to the HHRA included with the PERA to improve the PERA quality, as well as



to verify the technical validity of the PERA conclusions. CNSC staff reviewed OPG's responses and found them acceptable. Overall, CNSC staff agree with OPG's conclusion that the expected radiation dose resulting from the activities planned for the proposed licence period will remain well below the public dose limit, and that the risk posed by non-radiological COPCs and physical stressors will be negligible.

Environmental Management System

OPG has established and implemented an environmental management system in accordance with REGDOC-2.9.1 that is registered and certified under the international standards organization 14001 Standard, *Environmental Management Systems – Requirements with Guidance for Use*.

OPG's environmental management system and its supporting governing documents establish the provision of the protection of the environment at the Pickering site, as well as continual improvement of environmental performance as required by REGDOC-2.9.1.

Pickering WMF Environmental Assessment Follow-up Program

In its application (10), OPG requested the removal of WFOL licence condition 9.2, which states "the licensee shall implement an environment assessment (EA) follow-up program". OPG's application states that the EA follow-up program resulting from the phase II expansion project has been completed.

The EA follow-up program included requirements associated with stormwater management, visual screening, shoreline stability and public attitude as they pertained to the construction of DSC storage building #3 and #4 in phase II of the Pickering WMF. The construction of these storage buildings is complete, and the required reports have been submitted. The Pickering WMF phase II EA is also leveraged for the construction of the 5th DSC storage building (SB#5) and the PCSS. While acknowledging that these were not explicitly in the scope of the EA, CNSC staff have confirmed that the intent of each aspect of the EA follow-up program has been met for SB#5 and the PCSS.

CNSC staff concur with OPG's conclusion that the EA follow-up program has been completed. Therefore, CNSC staff recommend that the Commission remove WFOL licence condition 9.2 from the proposed PROL.

Independent Environmental Monitoring Program

The objective of the CNSC's Independent Environmental Monitoring Program (IEMP) is to build Indigenous and public trust in the CNSC's regulation of the nuclear industry, via an independent, technical, and accessible environmental sampling program around nuclear facilities, while using CNSC resources effectively and efficiently. Additionally, it helps to confirm the CNSC's regulatory position and supports decision making.



CNSC staff collected air, water, soil, sediment, sand, vegetation, and food samples in the vicinity of the Pickering site during the licence period, in 2021 and 2025. Indigenous Nations and communities were contacted and engaged by CNSC staff ahead of the development of the site-specific sampling plans.

The IEMP results are consistent with the monitoring results submitted by OPG, supporting CNSC staff's assessment that OPG's environmental protection program is effective. The results add to the body of evidence that people and the environment in the vicinity of the Pickering site are protected and that there are no anticipated health impacts from the operation of the Pickering NGS and Pickering WMF.

More information on the IEMP program at Pickering is available in the EPRR (63). Results from the sampling campaigns in the vicinity of the Pickering nuclear are available on the CNSC website, [Independent Environmental Monitoring Program: Pickering Nuclear Power Generating Site](#).

6.9.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.9.3.1 Past Performance

OPG's environmental protection program at the Pickering NGS and Pickering WMF continue to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.

6.9.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance and compliance with regulatory requirements in all aspects of the environmental protection SCA through regulatory oversight activities including inspections and reviews of licensee submissions.

6.9.3.3 Proposed Improvements

OPG has committed to implementing REGDOC-2.9.2, *Environmental Protection: Controlling Releases to the Environment* and CSA N288.6-22 during the proposed licence period.



6.9.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's existing environmental protection programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the environmental protection SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence and makes adequate provisions to ensure that people and the environment are protected.

6.10 Emergency Management and Fire Protection

The emergency management and fire protection SCA covers emergency plans and emergency preparedness programs that exist for emergencies and for non-routine conditions. This area also includes any results of participation in exercises.

The specific areas that comprise this SCA include:

- Conventional emergency preparedness and response
- Nuclear emergency preparedness and response
- Fire emergency preparedness and response

6.10.1 Trends

The following table indicates the Emergency Management and Fire Protection SCA rating trends for the past 5 years of the licence period:

TRENDS FOR EMERGENCY MANAGEMENT AND FIRE PROTECTION				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)
SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)
Comments				
OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the emergency management and fire protection SCA meet regulatory requirements.				

6.10.2 Discussion

Section 2.10 of OPG's application (10) provides information pertaining to the emergency management and fire protection SCA at the Pickering NGS and Pickering WMF.

OPG has implemented nuclear emergency preparedness and fire protection programs at the Pickering NGS and Pickering WMF in accordance with regulatory requirements, including [REGDOC-2.10.1, Nuclear Emergency Preparedness and Response](#). During the licence period, CNSC staff conducted compliance verification activities to evaluate the performance of OPG's emergency preparedness and fire protection programs at the Pickering NGS and Pickering WMF. These activities include inspections of full-scale nuclear exercises, the fire protection program, and the nuclear emergency preparedness and response program, as well as various field inspections, walk downs, and reviews of quarterly reports. CNSC staff have found that OPG has met regulatory requirements and adequately addressed any findings with respect to the emergency management and fire protection SCA.

Off-site emergency response planning for the Pickering site is the jurisdiction of the province of Ontario. Emergency Management Ontario (EMO) maintains the [Provincial Nuclear Emergency Response Plan](#) (PNERP), which establishes a framework for the response to a nuclear or radiological emergency in Ontario and was recently updated in 2025. EMO also maintains the [PNERP Implementing Plan for the Pickering NGS](#), which describes the measures that should be undertaken to mitigate the off-site effects of a nuclear emergency at the Pickering NGS, this plan will be updated to align with the latest version of the PNERP.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

6.10.2.1 Pickering Nuclear Generating Station

Conventional Emergency Preparedness and Response

During the licence period, CNSC staff have found that OPG continues to maintain satisfactory conventional emergency response programs at the Pickering NGS. Emergency response personnel are available on-site 24-hours per day to respond to any type of emergency. Training and equipment continue to be maintained for medical response, hazardous materials, and other conventional hazards that may be present.

Nuclear Emergency Preparedness and Response

The nuclear emergency preparedness program at the Pickering NGS is described in OPG's Consolidated Nuclear Emergency Plan (64). The plan identifies the concepts,



structure, roles, and resources to implement and maintain an effective OPG response capability in the event of a nuclear emergency.

During the licence period, CNSC staff have found that OPG continues to demonstrate its preparedness to respond to a nuclear emergency at the Pickering site in accordance with regulatory requirements. OPG has established and continues to maintain its emergency response organization and works together with off-site emergency management agencies and organizations.

OPG conducted 2 full scale emergency exercises during the licence period, in 2020 and 2023. CNSC staff participated in both exercises by activating the CNSC emergency operations centre and conducting on-site inspections. These exercises successfully demonstrated OPG's objectives to, among other things, test preparedness to respond to a nuclear emergency and assess the interoperability of participating organizations. The next scheduled full-scale exercise is in 2028. CNSC staff found that OPG's full scale nuclear exercises met the requirements of REGDOC-2.10.1.

In November 2025, CNSC staff made an information request pursuant to subsection 12(2) of the *General Nuclear Safety and Control Regulations* to OPG (65), following a CNSC staff emergency preparedness inspection at the Darlington NGS. The request pertains to deploying and validating emergency mitigating equipment (EME) and deployment guides. OPG has responded to CNSC staff's request for information and is currently working to assess the impact of these issues at the Pickering NGS.

Fire Emergency Preparedness and Response

Fire protection at the Pickering NGS is achieved through the implementation of a comprehensive fire protection program (FPP) to minimize the risk to the health and safety of persons and to the environment from fire. This is accomplished through appropriate fire protection system design, safe operation, and fire prevention. As part of the FPP elements, OPG is required to maintain a fire protection assessment (FPA) that includes the fire hazard assessment (FHA) and fire safety shutdown analysis (FSSA). Adequate maintenance of the FPA ensures that the plant continues to meet the nuclear fire safety objectives set out in CSA N293-12, *Fire Protection for Nuclear Power Plants*.

For Pickering NGS units 1-4, OPG has informed the CNSC (11) that the FPA will be updated as part of the project to transition the units to SwS, in compliance with CSA N293-12 frequency requirements. For Pickering NGS units 5-8, OPG noted that the FPA is planned to be updated in accordance with the CSA N293-12 frequency requirements. In addition, OPG has committed to revise the FPA to incorporate all refurbishment-related modifications and changes to fire protection systems as part of the refurbishment project planning cycle.



OPG has committed to ensuring that the FPA for both units 1-4 and units 5-8 comprehensively addresses any anticipated modifications or changes to fire hazards and fire protection systems at the Pickering NGS. OPG is expected to ensure that the FPA continues to meet regulatory expectations and accurately reflects the plant configuration throughout the proposed licensing period.

During the licence period, CNSC staff found that OPG continues to demonstrate its preparedness to prevent and respond to a fire through a dedicated fire brigade. OPG tests interoperability between the dedicated fire brigade and the municipal Pickering Fire Services annually through fire drills. Additionally, OPG has recently constructed a new fire hall within the Pickering NGS protected area.

In 2023, OPG implemented CSA N293-12, Update 1, at the Pickering NGS. OPG plans to implement the 2023 version of CSA N293 (CSA N293-23) during the proposed licence period, by the end of 2028.

6.10.2.2 Pickering Waste Management Facility

The dedicated Pickering NGS fire brigade is responsible for acting as the primary responder to Pickering WMF Phase I, which is within the Pickering NGS protected area. OPG has a formal agreement in place with the municipal Pickering Fire Services to provide primary fire response to Pickering WMF Phase II.

During the licence period, CNSC staff found that OPG has an adequate FPP in place at the Pickering WMF to minimize both the probability of occurrence and the consequences of fire. This FPP complies with the requirements of CSA N393-22, *Fire Protection for Facilities that Process, Handle or Store Nuclear Substances*.

6.10.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.10.3.1 Past Performance

OPG's emergency management and fire protection programs at the Pickering NGS and Pickering WMF continue to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.



6.10.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance in the emergency management and fire protection SCA through regulatory oversight activities including inspections and reviews of licensee submissions. Of particular focus will be verifying that OPG's fire protection program adequately considers changing fire hazards that result from decommissioning and refurbishment activities during the licence period.

6.10.3.3 Proposed Improvements

OPG plans to implement CSA N293-23 at the Pickering NGS by the end of 2028. In addition, OPG intends to install new firewater pumps for Pickering NGS units 5-8 as part of the proposed refurbishment project.

6.10.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's existing emergency management and fire protection programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the emergency management and fire protection SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence and makes adequate provisions to ensure that it is prepared to respond to an emergency.

6.11 Waste Management

The Waste Management SCA covers internal waste-related programs that form part of the facility's operations up to the point where the waste is removed from the facility to a separate waste management facility. This area also covers the planning for decommissioning.

The specific areas that comprise this SCA include:

- Waste characterization
- Waste minimization
- Waste management practices
- Decommissioning plans

6.11.1 Trends

The following table indicates the Waste Management SCA rating trends for the past 5 years of the licence period:

TRENDS FOR WASTE MANAGEMENT				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)
Comments OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the waste management SCA meet regulatory requirements.				

6.11.2 Discussion

Section 2.11 of OPG's application (10) provides information pertaining to the waste management SCA at the Pickering NGS and Pickering WMF.

OPG has implemented and maintained a waste management program at the Pickering NGS and Pickering WMF to minimize the generation of waste at the facilities and dispose of wastes and by-products in accordance with CNSC regulatory requirements. OPG's waste management program describes how waste is managed throughout its lifecycle to the point of disposal. This includes waste generation, storage, processing, recycling, and removal/transfer activities. OPG also maintains a preliminary decommissioning plan (PDP) for the Pickering NGS and the Pickering WMF, as well as a detailed decommissioning plan (DDP) for Pickering NGS units 1-4.

During the licence period, CNSC staff conducted compliance verification activities to evaluate OPG's performance in the waste management SCA at the Pickering NGS and WMF. These activities include inspections and reviews of quarterly reports and required submissions (e.g., DDP, PDP). CNSC staff have found that OPG has met regulatory requirements and proposed or implemented satisfactory corrective actions to address any findings related to the waste management SCA.

OPG has implemented the following regulatory documents and standards at the Pickering NGS and Pickering WMF related to the waste management SCA as of December 31, 2025:



- [REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste](#)
- [REGDOC-2.11.2, Decommissioning](#)
- CSA N292.0-19, *General Principles for the Management of Radioactive Waste and Irradiated Fuel*
- CSA N292.3-14, *Management of Low and Intermediate Level Radioactive Waste*
- CSA N292.4-23, *Storage of Radioactive Waste and Irradiated Fuel*
- CSA N292.8-21, *Characterization of Radioactive Waste and Irradiated Fuel*
- CSA N294-19, *Decommissioning of Facilities Containing Nuclear Substances*

Details pertaining to the specific areas within this SCA are presented in the following subsections.

6.11.2.1 Pickering Nuclear Generating Station

Waste Characterization and Waste Management Practices

OPG's waste management program at the Pickering NGS governs activities to minimize, control, and properly dispose of radioactive, hazardous, and conventional waste. OPG uses waste management procedures to ensure that waste generated at the facility is separated properly. Waste receptacles are located throughout the facility for "likely clean" and "active waste". Radioactive waste is further categorized as low-level waste (LLW), intermediate-level waste (ILW), or high-level waste (HLW), to meet the waste acceptance criteria for the waste receiving facilities. Non-radioactive waste is further segregated as conventional waste or hazardous chemical waste. To segregate and reduce active waste volumes, LLW is sorted into 3 categories: incinerable; compactable; and non-processible.

OPG's licence application (10) states that refurbishment and decommissioning activities at the Pickering NGS will produce increased radioactive and conventional waste volumes during the proposed licence period. OPG has established programs and procedures for radioactive waste management that consider all relevant information to identify the appropriate disposition pathway. Refurbishment and decommissioning wastes will be managed in accordance with the current waste management program. CNSC staff are satisfied that OPG has adequate waste management programs and procedures in place to manage waste from these planned activities. More information on these topics is included in sections 3 and 4. As the refurbishment activities and decommissioning projects progress, CNSC staff will continue to maintain regulatory oversight to ensure compliance with waste management regulatory requirements.



Furthermore, to accommodate these additional waste management activities and waste volumes, OPG plans to expand current waste operations and waste handling areas. CNSC staff are satisfied that OPG has established procedures and processes for managing these additional activities.

Waste Minimization

OPG implements strategies to minimize waste at the Pickering NGS, both by minimizing the volume of waste generated and reducing the quantity of radioactive waste which is generated. These goals are accomplished by utilizing waste segregation, volume reduction, and decontamination steps in the overall waste management process.

In accordance with REGDOC-3.1.1, OPG provides quarterly reports that include the volume of low- and intermediate-level radioactive solid waste generated at the Pickering NGS. During the licence period, CNSC staff have found that OPG's reports met the requirements of REGDOC-3.1.1.

Decommissioning Plans

In accordance with licence condition 11.2 of the current and proposed licences, OPG is required to maintain decommissioning plans throughout the life of the facilities. These plans take the form of a PDP during the operation of a facility, a stabilization activity plan (SAP) for the transition from a permanent shutdown state to a stable state for decommissioning, and a DDP for the execution of decommissioning activities following the permanent shutdown of a facility.

In March 2025 OPG submitted an updated PDP for Pickering NGS units 5-8, an updated overall Pickering site PDP, and an associated units 5-8 decommissioning cost study (66) that consider the proposed decommissioning of Pickering NGS units 1-4 and refurbishment of units 5-8. CNSC staff found that OPG's updated PDPs met the requirements of CSA N294-19 and REGDOC-2.11.2 and provided recommendations to OPG to improve future PDP revisions (67). CNSC staff anticipate that OPG will further revise the PDP for submission with the next OPG consolidated financial guarantee update, expected in 2027. Information on OPG's consolidated financial guarantee is included in section 8.2.

In December 2024, OPG submitted a detailed DDP package for Pickering NGS units 1-4 (14). This DDP submission describes planned decommissioning work associated with units 1-4 over the next 5 to 10 years, including SwS. CNSC staff found that OPG's DDP package met the requirements of CSA N294-19 and REGDOC-2.11.2 and are satisfied that OPG has adequately addressed all CNSC staff comments. CNSC staff accepted OPG's DDP submission in June 2025 (27) and confirmed that early decommissioning activities described in the DDP fall within the scope of hazard reduction and Storage with Surveillance activities, which are already authorized under the existing licensing basis.



OPG is expected to provide an updated DDP by 2030. More information on OPG's DDP package and the decommissioning of units 1-4 is included in section 4.

CNSC staff are satisfied that OPG's DDP and PDP for the Pickering NGS meet regulatory requirements. During the proposed licence period, CNSC staff will continue to verify that OPG updates its decommissioning plans at least every 5-years.

6.11.2.2 Pickering Waste Management Facility

Waste Characterization, Waste Minimization and Waste Management Practices

Minimal radioactive waste is generated from the waste management activities conducted at the Pickering WMF. Nonetheless, OPG has set a goal to minimize the generation of radioactive waste due to operational activities.

OPG uses waste management procedures to ensure that waste generated at the facility is separated properly. Waste receptacles are located throughout the Pickering WMF for likely clean and active waste. LLW generated at the Pickering WMF is typically restricted to floor sweepings that have a potential to contain contamination from preparing and welding DSCs. Volumes amount to less than 1 drum annually. This LLW is sent to the Pickering NGS for segregation as necessary and eventually transported to the WWMF for processing and/or interim storage. OPG does not generate ILW at the Pickering WMF. OPG's licence application states that the volume of LLW produced at Pickering WMF will remain minimal during the proposed licence period, with an expected slight increase proportional to the number of DSCs processed.

The PCSS will be used for interim storage of LLW and ILW resulting from the dismantlement of proposed refurbishment and decommissioning activities at the Pickering NGS. The Pickering WMF licence was amended by the Commission in July 2025 to authorize construction and operation of the PCSS (7). The estimated waste quantities resulting from proposed refurbishment activities that would be stored in the PCSS include 48 steam generators and 140 retube waste containers that contain pressure tubes, feeders, calandria tubes, and end fittings. The Pickering WMF waste acceptance criteria would be updated to account for the characteristics of the waste that would be accepted for storage in the PCSS, including limits on the total dose rates for each item.

The current waste characterization program accounts for the radiological activity of the wastes that will be stored in the PCSS. Operational wastes generated within the PCSS would be subject to characterization. Additionally, while wastes received by the Pickering WMF are expected to be characterized prior to receipt, there may be a need for future re-characterization at the Pickering WMF. As construction progresses of the PCSS, CNSC staff will continue to maintain regulatory oversight through compliance verification activities, such as inspections.



Decommissioning Plans

The PDP for the Pickering WMF was last updated and reviewed by CNSC staff in 2022. CNSC staff assessed the PDP against the requirements of CSA N294-19 and found that it met requirements. REGDOC-2.11.2 was implemented at the Pickering WMF after OPG's submission of the 2022 PDP. CNSC staff anticipate that the next revision of the Pickering WMF PDP will be submitted in 2027 with the next OPG consolidated financial guarantee update. CNSC staff will assess this revision against the requirements of CSA N294-19 and REGDOC-2.11.2.

CNSC staff are satisfied that the current PDP for the Pickering WMF meets regulatory requirements and will verify that OPG continues to meet the minimum update frequency of at least every 5-years for these plans.

6.11.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.11.3.1 Past Performance

OPG's waste management programs at the Pickering NGS and Pickering WMF continue to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period. OPG also maintains a satisfactory PDP for the Pickering NGS and Pickering WMF, as well as a satisfactory DDP for Pickering NGS units 1-4.

6.11.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance and compliance with regulatory requirements in all aspects of the waste management SCA through regulatory oversight activities including inspections and reviews of compliance reports and other licensee submissions, such as updated decommissioning plans.

6.11.3.3 Proposed Improvements

OPG has committed to implement the 2024 version of CSA N292.0, *Radioactive Waste Management: Common Requirements of the CSA N292 Series of Standards* during the proposed licence period.



6.11.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's existing waste management programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the waste management SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence.

6.12 Security

The Security SCA covers the programs required to implement and support the security requirements stipulated in the regulations, the licence, orders, or expectations for the facility or activity.

The specific areas that comprise this SCA include:

- Facilities and equipment
- Response arrangements
- Security practices
- Drills and exercises
- Cyber security

6.12.1 Trends

The following table indicates the Security SCA rating trends for the past 5 years of the licence period:

TRENDS FOR SECURITY				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS)	BE (NGS)	BE (NGS)	SA (NGS)	SA (NGS)
SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)
Comments OPG's performance in this SCA was rated below expectations (BE) in 2021 and 2022 at the Pickering NGS and satisfactory (SA) at the Pickering WMF during the current licence period. CNSC staff have increased regulatory scrutiny in this SCA and are satisfied that OPG is adequately addressing the identified issues. OPG received a rating of Satisfactory (SA) in 2023 and 2024 reflecting				

its progress. Overall, CNSC staff conclude that OPG's programs within the Security SCA meet regulatory requirements.

6.12.2 Discussion

Section 2.12 of OPG's application (10) provides information pertaining to the security SCA at the Pickering NGS and Pickering WMF.

OPG's nuclear security program describes the processes for the equipment, personnel, and procedures used to maintain security at the Pickering NGS and Pickering WMF, in accordance with the [Nuclear Security Regulations](#). Pickering WMF Phase I is contained within the protected area of the Pickering NGS and Phase II is contained in a separate protected area located on the Pickering site. OPG's cyber security program is an OPG wide program that includes the Pickering NGS and Pickering WMF.

During the licence period, CNSC staff conducted compliance verification activities, including inspections, to evaluate OPG's performance in the security SCA at the Pickering NGS and WMF. In 2021 and 2022, CNSC staff assigned a rating of below expectation (BE) in the security SCA to OPG at the Pickering NGS due to findings in the specific areas of facilities and equipment and security practices. CNSC staff issued OPG an Administrative Monetary Penalty in May 2023 as a result of a number of non-compliant findings across multiple SpAs. CNSC staff increased regulatory scrutiny of OPG's Security Program at Pickering NGS and continue to maintain increased regulatory oversight of this SCA.

In 2023, OPG increased corporate oversight of its security program to enhance internal oversight of the performance and trends. OPG has implemented and continues to implement several corrective actions to improve performance and CNSC staff are satisfied with OPG's improvements to date. Since 2023, CNSC staff have found that OPG's programs to ensure the security of the Pickering NGS and Pickering WMF are satisfactory and meet regulatory requirements.

OPG has implemented the following regulatory documents and standards at the Pickering NGS and Pickering WMF related to the security SCA:

- [REGDOC-2.12.1, High Security Facilities, Volume I: Nuclear Response Force, Version 2](#) (Pickering NGS only)
- [REGDOC-2.12.1, High-Security Facilities, Volume II: Criteria for Nuclear Security Systems and Devices](#)
- [REGDOC-2.12.2, Site Access Security Clearance](#)
- [REGDOC-2.12.3, Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1](#) (Pickering NGS only)



- CSA N290.7-21, *Cyber Security for Nuclear Facilities* (Full implementation by March 2027)

In 2025, the *Nuclear Security Regulations* were repealed and replaced. The new regulations came into force on October 30, 2025, and requirements for existing sites will come into force 2 years after this date. CNSC staff are engaging with OPG regarding the implementation of these requirements and will verify that OPG's Nuclear Security Program at the Pickering site comply with the revised [*Nuclear Security Regulations*](#) during the proposed licence period.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

Facilities and Equipment

OPG has a security program in place at the Pickering NGS and Pickering WMF that ensures the possession, deployment, and operation of required security facilities and equipment. During the licence period, CNSC staff have found that OPG's security program has met the requirements of the *Nuclear Security Regulations*, and REGDOC-2.12.1, Volume II.

OPG is planning modifications to security facilities and equipment at the Pickering NGS to accommodate the proposed separation of units 1-4 from units 5-8 and the proposed refurbishment of units 5-8 (68). For example, OPG intends to add a new vehicle entry point into the protected area and expand the capacity of worker points of entry. CNSC staff are satisfied that OPG has adequate plans in place regarding any potential changes to facilities and equipment.

Response Arrangements

OPG maintains an on-site response force and tactical response plan at the Pickering NGS. In addition, OPG has written arrangements with the Durham Regional Police Service to provide off-site armed response force support. During the licence period, CNSC staff found that OPG has submitted their annual threat and risk assessment in accordance with regulatory requirements and that OPG's response force meets the requirements of the *Nuclear Security Regulations* and REGDOC-2.12.1, Volume I.

Security Practices

OPG has procedures in place at the Pickering NGS and the Pickering WMF to guide facility and security personnel in security practices. OPG's security clearance process ensures that personnel requiring access to OPG locations or access to OPG security protected information do not pose a risk to the facilities. During the licence period, CNSC staff found that OPG's security practice processes are maintained in accordance with REGDOC-2.12.2.



Drills and Exercises

OPG regularly conducts security drills and exercises at Pickering NGS. Drills are conducted monthly to ensure compliance with regulatory requirements and identify security improvements. During the licence period, CNSC staff have been satisfied that OPG's monthly drills have met regulatory requirements.

During the licence period, OPG realigned the security training organization to report into the broader nuclear training organization, which enables the incorporation of lessons learned and best practices from across OPG. OPG's training program for security personnel at the Pickering NGS ensures that security officers are able to perform their duties as required by the *Nuclear Security Regulations*. CNSC staff found that OPG's training program meets the requirements of REGDOC-2.12.1, Volume I. CNSC staff also found that OPG adheres to the requalification periods for Nuclear Security Officers established in REGDOC-2.2.4, Volume III.

In accordance with the *Nuclear Security Regulations*, OPG also conduct security exercises every 2 years at the Pickering site. OPG conducted its most recent security exercise at the Pickering site in March 2026. CNSC staff are currently reviewing the results of the 2026 exercise and have been satisfied with OPG's exercise conduct for previous exercises during the licence period.

Cyber Security

OPG established its cyber security program at the Pickering NGS and Pickering WMF in 2019, in accordance with CSA N290.7-14. During the licence period, CNSC staff have been satisfied that OPG's cyber security program meets CNSC regulatory requirements.

OPG has committed to implement the 2021 version of CSA N290.7 (CSA N290.7-21). CNSC staff will continue to monitor OPG's implementation during the proposed licence period.

6.12.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.12.3.1 Past Performance

OPG's performance in the security SCA was below expectations (BE) in 2021 and 2022 at the Pickering NGS. Since 2023, OPG's nuclear and cyber security programs at the Pickering NGS and Pickering WMF have met CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA.



6.12.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance and compliance with regulatory requirements in all aspects of the security SCA. Of particular focus in the security SCA will be the implementation of the updated *Nuclear Security Regulations*. During the proposed licence period, CNSC staff will also monitor any changes to OPG's protected area boundary that may result from the proposed refurbishment of Pickering NGS units 5-8 and decommissioning activities related to units 1-4.

6.12.3.3 Proposed Improvements

OPG has committed to improvements of security systems at the Pickering NGS during the proposed licence period, including hardware updates, upgrades to the central alarm system, and integration of the entry control system. Specific details on these improvements are confidential in nature. OPG has also committed to implement CSA N290.7-21 during the proposed licence period, by March 2027.

6.12.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's existing nuclear and cyber security programs at the Pickering NGS and Pickering WMF meet CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the security SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence and makes adequate provisions to ensure the safety and security of the Pickering site.

6.13 Safeguards and Non-Proliferation

The safeguards and non-proliferation SCA covers the programs and activities required for the successful implementation of the obligations arising from the Canada/International Atomic Energy Agency (IAEA) safeguards agreements as well as all other measures arising from the *Treaty on the Non-Proliferation of Nuclear Weapons* (NPT).

The specific areas that comprise this SCA include:

- Nuclear material accountancy and control
- Access and assistance to the IAEA
- Operational and design information
- Safeguards equipment, containment and surveillance

- Import and export (requires separate authorization)

6.13.1 Trends

The following table indicates the Safeguards and Non-Proliferation SCA rating trends for the past 5 years of the licence period:

TRENDS FOR SAFEGUARDS AND NON-PROLIFERATION				
Overall Compliance Ratings				
2020	2021	2022	2023	2024
SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)	SA (NGS)
SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)	SA (WMF)
Comments OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the safeguards and non-proliferation SCA meet regulatory requirements.				

6.13.2 Discussion

Section 2.13 of OPG's application (10) provides information pertaining to the safeguards and non-proliferation SCA at the Pickering NGS and Pickering WMF.

Pursuant to the NPT, Canada has entered into a Comprehensive Safeguards Agreement and an Additional Protocol with the IAEA (safeguards agreements). The objective of the safeguards agreements is for the IAEA to provide annual assurance to Canada and to the international community that all declared nuclear material is in peaceful, non-explosive uses, and that there is no indication of undeclared material.

The CNSC provides the mechanism, through the NSCA, associated regulations, and licence conditions, for the implementation of safeguards. Requirements pertaining to the safeguards and non-proliferation SCA are described in [REGDOC-2.13.1, Safeguards and Nuclear Material Accountancy](#). OPG is required to provide timely reports on the movement and location of nuclear material, provide access and assistance to IAEA inspectors, support IAEA equipment, and submit necessary operational and design information.

During the licence period, CNSC staff conducted compliance verification activities to evaluate OPG's performance in the safeguards and non-proliferation SCA at the Pickering NGS and WMF, including review of the results of IAEA inspections and event reports. CNSC staff are satisfied that OPG has taken appropriate action to address any



findings. CNSC staff have found that OPG maintains an adequate safeguards program at the Pickering NGS and Pickering WMF that conforms to measures required by the CNSC to meet Canada's international safeguards obligations and that meets regulatory requirements.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

Nuclear material accountancy and control

CNSC staff determined that OPG has provided the CNSC and IAEA with all reports and information pertaining to the Pickering NGS and Pickering WMF necessary to comply with safeguards and non-proliferation regulatory requirements, including those related to nuclear material accounting and reporting in accordance with REGDOC-2.13.1.

Access and assistance to the IAEA

OPG has granted adequate access and assistance to the IAEA for safeguards activities during the licence period at the Pickering NGS and Pickering WMF. The IAEA performed numerous inspections, verifications, and other safeguards activities at the Pickering NGS, including physical inventory verifications (PIVs), design information verifications (DIVs), complementary accesses (CAs), and unannounced inspections (UIs). OPG has resolved all noted concerns to CNSC staff and IAEA satisfaction.

During the licence period, the IAEA identified an issue at Pickering NGS regarding irradiated bundles in the IFBs that were not accessible for verification to IAEA PIV standards. The IAEA has applied seals to IFB cranes and platforms in IFB-A and IFB-B to ensure that the remaining inaccessible spent fuel remains frozen and under surveillance. This safeguards measure will continue until the nuclear material is available for verification, such as during future decommissioning activities.

Operational and design information

CNSC staff are satisfied that OPG has generally provided annual operational program updates, design information questionnaires, and other required information pertaining to the Pickering NGS and Pickering WMF to the IAEA and the CNSC in a timely manner.

In its application (10), OPG provided information on the safeguards program with respect to the decommissioning of Pickering NGS units 1-4 and the proposed refurbishment of units 5-8. CNSC staff are satisfied that OPG has adequately discussed safeguards measures during these activities with the CNSC and IAEA.

At the Pickering WMF, OPG is constructing a 5th DSC storage building and intends to redesign the DSC lid-to-base welding design to increase DSC production. CNSC staff have confirmed that the IAEA has been informed of these projects to ensure safeguards measures can be implemented. Updates to the DSC design are expected to impact the

performance of current IAEA equipment, and OPG and the IAEA are undertaking actions to improve or enhance the capability of these devices.

During the licence period, CNSC staff engaged with OPG as part of compliance verification activities to highlight the importance of providing timely and accurate operational declarations to the IAEA. OPG is required to report any operational changes to the IAEA as soon as possible, and any such changes with less than 24 hours notice require notification by phone. CNSC staff have been satisfied with OPG's responses to date.

Safeguards equipment, containment, and surveillance

During this licensing period, OPG provided the required assistance to the IAEA at the Pickering NGS and Pickering WMF for activities to support the operation and maintenance of IAEA equipment.

The IAEA has proposed an equipment-based approach to verify the loading and transfer of spent fuel from wet to dry storage at CANDU stations that will improve safeguards effectiveness and efficiency. CNSC staff expect that this approach will be finalized and implemented at the Pickering site during the proposed licence period.

Import and Export

The scope of the non-proliferation program at the Pickering NGS and Pickering WMF is limited to the tracking and reporting of foreign obligations and origins of nuclear material. CNSC staff have determined that OPG has complied with the CNSC's regulatory requirements in this respect. The import and export of controlled nuclear substances, equipment, and information prescribed by [Nuclear Non-proliferation Import and Export Control Regulations](#) (NNIECR) requires separate licence authorization from the CNSC.

Under the current and proposed licences, OPG is authorized to import and export non-controlled nuclear substances that occur as contaminants in laundry, packaging, shielding, or equipment at the Pickering NGS. Such activities are conducted in accordance with OPG's packaging and transport program described in section 6.14.

6.13.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.13.3.1 Past Performance

OPG's safeguards program at the Pickering NGS and Pickering WMF continues to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.



6.13.3.2 Regulatory Focus

CNSC staff will continue to verify OPG's performance and compliance with regulatory requirements in all aspects of the safeguards and non-proliferation SCA through regulatory oversight activities including participation in IAEA inspections, performance of CNSC evaluations, and ongoing assessment of compliance with reporting requirements.

6.13.3.3 Proposed Improvements

There are no proposed major changes to OPG's safeguards and non-proliferation programs. However, the IAEA's equipment-based approach is expected to be implemented during the proposed licence period at the Pickering site.

6.13.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's safeguards program at the Pickering NGS and Pickering WMF meets CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the safeguards and non-proliferation SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence.

6.14 Packaging and Transport

The packaging and transport SCA covers the safe packaging and transport of nuclear substances to and from the licensed facility.

The specific areas that comprise this SCA include:

- Package design and maintenance
- Packaging and transport
- Registration for use

6.14.1 Trends

The following table indicates the Packaging and Transport SCA rating trends for the past 5 years of the licence period:

TRENDS FOR PACKAGING AND TRANSPORT
Overall Compliance Ratings



2020	2021	2022	2023	2024
SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)	SA (NGS) SA (WMF)
<p style="text-align: center;">Comments</p> <p>OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period at both the Pickering NGS and Pickering WMF. Overall, CNSC staff conclude that OPG's programs within the packaging and transport SCA meet regulatory requirements.</p>				

6.14.2 Discussion

Section 2.14 of OPG's application (10) provides information pertaining to the packaging and transport SCA at the Pickering NGS and Pickering WMF.

OPG has effectively implemented and maintains a packaging and transport program at the Pickering NGS and Pickering WMF that is applicable to both facilities. This program ensures that the transportation of radioactive material is conducted in accordance with the requirements of the [Transportation of Dangerous Goods Regulations](#) (TDGR) and the [Packaging and Transport of Nuclear Substances Regulations, 2015](#) (PTNSR 2015).

During the licence period, CNSC staff conducted compliance verification activities to evaluate OPG's performance in the packaging and transport SCA at the Pickering NGS and Pickering WMF. CNSC staff found that the packaging and transport of radioactive materials at the Pickering NGS and Pickering WMF continues to meet regulatory requirements.

Details pertaining to the specific areas within this SCA are presented in the following subsections.

Package Design and Maintenance

The PTNSR 2015 applies to the packaging and transport of nuclear substances, including the design, production, use, inspection, maintenance and repair of packages, and the preparation, consigning, handling, loading, carriage and unloading of packages. OPG's package designs and maintenance program meets these requirements. Where necessary, OPG package designs are certified by the CNSC.

Packaging and Transport

OPG has programs in place to ensure compliance with the requirements of both the PTNSR 2015 and the TDGR for all shipments of nuclear substances to and from the Pickering site. Shipments of nuclear substances within the nuclear facility where access to the property is controlled are exempted from the application of the PTNSR 2015 and



the TDGR. Such onsite transfers are controlled through the radiation protection program described in section 6.7.

In accordance with the TDGR, OPG personnel who handle, offer for transport, or transport dangerous goods at the Pickering site must be trained and issued a training certificate by OPG.

Registration for Use

OPG's packaging and transport program covers the registration for use of certified packages as required by the regulations.

6.14.3 Summary

A summary of OPG's past performance, CNSC staff's regulatory focus, and proposed improvements are presented in the following subsections.

6.14.3.1 Past Performance

OPG's packaging and transport program at the Pickering NGS and Pickering WMF continues to meet CNSC regulatory requirements, and OPG has maintained satisfactory performance in the specific areas of this SCA during the licence period.

6.14.3.2 Regulatory Focus

CNSC staff will continue to provide regulatory oversight of shipments transported to and from the Pickering site to ensure regulatory requirements are met during the proposed licence period.

6.14.3.3 Proposed Improvements

There are no proposed major changes to OPG's packaging and transportation programs.

6.14.4 Conclusion

Based on CNSC staff's assessment of OPG's application, supporting documentation, and performance during the licence period, CNSC staff conclude that OPG's packaging and transport program at the Pickering NGS and Pickering WMF meets CNSC regulatory requirements. CNSC staff further conclude that the information pertaining to the packaging and transport SCA included in OPG's application meets CNSC regulatory requirements and demonstrates that OPG remains qualified to perform the activities authorized in the proposed licence.

7 Consultation and Engagement

7.1 Indigenous consultation and engagement

The common-law duty to consult with Indigenous Nations and communities applies when the Crown contemplates actions that may adversely affect potential or established Aboriginal and/or treaty rights. The CNSC ensures that all of its licence decisions under the [NSCA](#) uphold the honour of the Crown and uphold Indigenous peoples' potential or established Aboriginal and/or treaty rights pursuant to section 35 of the [Constitution Act, 1982](#).

CNSC staff are committed to building long-term relationships with Indigenous Nations and communities who have the potential to be impacted by or have an interest in CNSC regulated facilities. The CNSC's Indigenous consultation and engagement practices include sharing information, discussing topics of interest, seeking feedback and input on CNSC processes, responding to and addressing concerns, oversight of licensee engagement activities and providing opportunities to participate in CNSC assessment, decision-making and monitoring processes. The CNSC also provides funding support (through the CNSC's Participant Funding Program and Indigenous and Stakeholder Capacity Fund) for Indigenous peoples to support their meaningful participation in Commission proceedings and ongoing regulatory activities.

CNSC staff have identified the following Indigenous Nations and communities as having potential or established Aboriginal and/or treaty rights in the vicinity of the Pickering site (referred to as "potentially impacted Indigenous Nations and communities"):

- Alderville First Nation (AFN)
- Curve Lake First Nation (CLFN)
- Chippewas of Beausoleil First Nation
- Chippewas of Georgina Island First Nation
- Hiawatha First Nation (HFN)
- Mississaugas of Scugog Island First Nation (MSIFN)
- Mnjikaning (Chippewas of Rama First Nation)

Additionally, based on information received and reviewed to date, the following Indigenous Nations and communities have expressed interest in the Pickering site (referred to as "interested Indigenous Nations and communities"):

- Mohawks of the Bay of Quinte
- Mississaugas of the Credit First Nation
- Six Nations of the Grand River



- Métis Nation of Ontario (Region 8)
- Saugeen Ojibway Nation

The potentially impacted Indigenous Nations and communities and the interested Indigenous Nations and communities are referred to collectively as the “identified Indigenous Nations and communities”.

7.1.1 Discussion

This section summarises the Indigenous consultation and engagement activities conducted to date by CNSC staff and OPG, in relation to the proposed activities outlined in OPG’s application (10) for authorization to refurbish Pickering NGS units 5-8 and renew the operating licences of the Pickering NGS and Pickering WMF. Due to the amount and complexity of information, as well as the collaborative nature of the development of the content of this section, details related to consultation and engagement activities with Indigenous Nations and communities are contained in a separate Consultation Report, which is included in Appendix D.

CNSC staff have been consulting and engaging, as applicable, with identified Indigenous Nations and communities with regards to the activities outlined in OPG’s application and notifications of intent (5) (9) on an on-going basis since 2023. CNSC staff will continue consultation activities on these activities up until the Part-2 Commission hearing and will provide an update to the Commission in a supplemental submission in advance of Part-2.

In relation to OPG’s current application, CNSC staff have provided numerous opportunities for Indigenous Nations and communities to identify and discuss concerns, including potential impacts on rights that may arise from the proposed activities. Consultation efforts during the license and regulatory review process included letters, emails, regular meetings, community meetings, meetings with leadership, funding support, technical discussions, collaboration on responding to and addressing concerns raised, and oversight of OPG’s engagement activities with the identified Nations. CNSC staff have also worked to conduct consultation and engagement in collaboration with the Department of Fisheries and Oceans Canada (DFO) to ensure a coordinated and efficient approach to consultation and engagement in relation to OPG’s application. CNSC staff have offered to work collaboratively with the Michi Saagiig First Nations on Nation-specific Rights Impact Assessments (RIA) in relation to OPG’s application, and this work is currently ongoing. The RIAs are to ensure there is a clearly documented assessment of any potential impacts to Indigenous and/or Treaty Rights that may result from OPG’s proposed activities along with an assessment of proposed mitigation and accommodation measures, should the activities proceed.



CNSC staff have ensured that the consultation and engagement process for OPG's application took into consideration recent changes and evolution of best practises and case law. This includes the United Nations Declaration on the Rights of Indigenous Peoples Act (UNDA), the CNSC's commitment to reconciliation and the Principles Respecting the Government of Canada's Relationship with Indigenous Peoples. CNSC staff also acknowledge that should the activities proposed in OPG's application proceed, there will be a continued obligation on the CNSC to continue to consult and engage Indigenous Nations and communities over the lifecycle of the proposed activities.

Based on CNSC staff's assessment as described in the Consultation Report, CNSC staff recommend that the Commission conclude that OPG's Pickering application raises the CNSC's legal duty to consult and, where appropriate, accommodate potentially affected Indigenous Nations and communities. CNSC staff's supplemental submission in advance of Part 2 of the hearing will include an update on CNSC staff's consultation activities, RIAs, updated issues tracking tables, an assessment of OPG's engagement activities, as well as CNSC staff's conclusions and recommendations regarding the Duty to Consult and, where appropriate, accommodate. Information regarding the outcomes of CNSC staff's efforts to reach a consensus on OPG's application, the position of potentially impacted Indigenous Nations with regards to their Free, Prior and Informed Consent (FPIC) in relation to OPG's application, as well as any concerns and key measures and commitments to address any potential impacts as a result of the activities proposed in OPG's application will also be included.

Asserted or Established Aboriginal and/or Treaty Rights

The Pickering site is located approximately 32 km east of Toronto in the City of Pickering and along the shores of Lake Ontario. It is located within the traditional lands and waters of the Michi Saagiig Anishinaabeg, the Gunshot Treaty (1787-88), the Williams Treaties (1923), and the Williams Treaties Settlement Agreement (2018). The Pickering site is located within the Region of Durham, Ontario which itself is within the boundaries of the Williams Treaties (1923) to which there are 7 signatory First Nations made up of Michi Saagiig (Mississauga) and Chippewa peoples:

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



This determination is a preliminary assessment that can be adjusted based on information received from Indigenous Nations and communities throughout the lifecycle of the proposed activities, should they proceed.

CNSC Staff-led Consultation Activities with Indigenous Nations and Communities

In order to fulfill the CNSC's consultation obligations on OPG's application, CNSC staff sent early notification upon receipt of the application to Indigenous Nations and communities and have provided multiple opportunities for consultation, engagement, and collaboration with Indigenous Nations and communities regarding their concerns and interests related to the application. CNSC staff offered and conducted multiple opportunities for dialogue through phone and video calls, correspondence, and meetings with leadership and community representatives, as well as through the provision of funding and capacity support in relation to this matter and related issues and concerns with identified Indigenous Nations and communities.

CNSC staff continue to encourage and support the participation of the identified Indigenous Nations and communities in the Commission's public hearing process so that they can advise the Commission of any concerns they may have, as well as proposed resolution to those concerns. Additional information about the specific consultation and engagement activities, as applicable, with each Indigenous Nation and community can be found in the Consultation Report included in Appendix D.

The CNSC have Terms of References (TOR) for long-term engagement and engagement work plans in place with Curve Lake First Nation (CLFN), Mississaugas of Scugog Island First Nation (MSIFN) and Hiawatha First Nation (HFN). CNSC and Alderville First Nation (AFN) are in the process of developing a TOR and engagement work plan. The TORs provide a commitment and process for collaboration and structure for regular engagement, meetings, collaboration, and dialogue, as well as the development of annual engagement work plans to address areas of interest or concern regarding CNSC-regulated facilities and activities, including OPG's application in this matter. The CNSC is open to developing and establishing TORs for long-term engagement and engagement work plans with other Indigenous Nations and communities, should there be interest.

During regular meetings and dialogue, CNSC staff provide updates specific to OPG's application, and continue to have discussions regarding each Nations' interests, concerns, and potential impacts on Aboriginal and/or Treaty Rights in relation to OPG's Pickering project.

OPG's Engagement Activities

In accordance with the requirements of [REGDOC-3.2.2, Indigenous Engagement](#), OPG has submitted an Indigenous Engagement Report to help inform CNSC staff's consultation process and obligations. In addition to OPG's Indigenous engagement



policy and activities, OPG's engagement specific to this application as reported by OPG through their Indigenous Engagement Report and regular updates has consisted of:

- Sharing and seeking input on a draft, site wide, Indigenous Engagement Plan for the Pickering site with Alderville First Nation, Beausoleil First Nation, Curve Lake First Nation, Chippewas of Georgina Island First Nation, Hiawatha First Nation, Mississaugas of Scugog Island First Nation, Chippewas of Rama First Nation, as well as Indigenous Nations and communities that express an interest (Mississaugas of the Credit, Six Nations of the Grand River, Métis Nation of Ontario Regions 8, Mohawks of the Bay of Quinte, Saugeen Ojibway Nation, Wendat Nation).
- Executing the Pickering Memorandum of Understanding (MoU) and Pickering Capacity Funding Agreement for engagement with Alderville First Nation, Curve Lake First Nation, Hiawatha First Nation, Mississaugas of Scugog Island First Nation.
- Drafting Terms of Reference with Curve Lake First Nation, Hiawatha First Nation, Mississaugas of Scugog Islands First Nation, Alderville First Nation for the establishment of a monthly OPG-Michi Saagiig Pickering Table.
- Providing Curve Lake First Nation, Hiawatha First Nation, Mississaugas of Scugog Island First Nation, and Alderville First Nation the opportunity to review a draft of OPG's application in May 2025 and CMD in April 2026.
- Providing Alderville First Nation, Beausoleil First Nation, Curve Lake First Nation, Chippewas of Georgina Island First Nation, Hiawatha First Nation, Mississaugas of Scugog Island First Nation, Chippewas of Rama First Nation the opportunity to review and provide feedback on the Draft DDP and Draft PERA.
- Providing ongoing updates and communications, including offers to meet, with Indigenous Nations and communities that express interest on the application.
- Provided opportunities to discuss the application and concerns through offering and facilitating site tours, Waste and Engagement Table discussions, framework meetings, and other meetings as requested.
- Collaborating on addressing key areas of interests and concerns including, but not limited to, supporting an ongoing terrestrial and marine archaeology assessment program at the Pickering NGS and working with the Michi Saagiig Nations on the assessment of offsetting and spoils management options for the DWI.
- Providing and facilitating opportunities for the Nations to participate in monitoring activities, including sharing a calendar of upcoming monitoring opportunities on a regular basis.

OPG continues to report engagement efforts to the CNSC throughout the licensing process through regular updates provided at monthly meetings. CNSC staff's conclusions



and assessment on OPG's engagement related to its application will be provided to the Commission as part of CNSC staff's supplemental submission to be submitted to the Commission in advance of the Part 2 Hearing.

7.1.2 Conclusion

CNSC staff have aimed to conduct a thorough consultation and regulatory process for OPG's application. All identified Indigenous Nations and communities were provided with multiple opportunities to participate in the regulatory review, engagement, and consultation process and funding was offered to support their participation. Indigenous Nations and communities who have raised issues and concerns related to the activities proposed in OPG's application were and continue to be offered opportunities to collaboratively develop sections of the Consultation Report and issues tracking tables.

CNSC staff will continue to monitor and assess OPG's engagement activities throughout the regulatory review process as per REGDOC-3.2.2, and staff's conclusions and assessment on OPG's engagement related to its application will be included in CNSC staff's supplemental submission prior to Part 2 of the hearing. An update on consultation efforts with all identified Indigenous Nations and communities, as well as updated issues tracking tables, will be submitted as part of the public record for this matter in advance of Part 2 of the hearing.

Additionally, CNSC staff continue to offer and aim to work collaboratively in consultation with AFN, CLFN, HFN and MSIFN on project-specific RIAs. The assessments will include CNSC staffs' and each Nation's views on potential impacts to their Indigenous and/or Treaty Rights, as well as mitigation and/or accommodation measures to address any identified impacts. These reports will be included in CNSC staff's supplemental submission to the Commission before Part 2 of the hearing. The RIAs, issues and concerns tables and additional consultation activities, including collaborative efforts with each potentially impacted Indigenous Nation or community with regards to identifying, and agreeing to specific measures and commitments to address identified concerns and impacts to rights and interests to the greatest extent possible, as well as each potentially impacted Nation's position regarding their Free, Prior and Informed Consent (FPIC) for the activities proposed in OPG's application, will help to inform CNSC staff's conclusions and recommendations to the Commission with regards to the adequacy of consultation and engagement for OPG's application. CNSC staff will also continue to engage and collaborate with all interested Indigenous Nations and communities to address and respond to any outstanding concerns with regards to the activities proposed in OPG's application.

CNSC staff will involve OPG in these discussions and consultation activities as appropriate and continue to monitor OPG's engagement activities and implementation of commitments to Indigenous Nations through the proposed licence condition on Indigenous engagement (licence condition G.7). To date, CNSC staff's consultation and engagement activities and processes have been in line with current best practices and

legal requirements in relation to the Duty to Consult and Accommodate. CNSC staff's conclusions and recommendations with regards to consultation and potential impacts to Indigenous and/or Treaty Rights will be provided as part of CNSC staff's supplemental submission, prior to Part 2 of the hearing.

7.2 Public consultation and engagement

The [NSCA](#) mandates the CNSC to disseminate objective scientific, technical and regulatory information to the public concerning its activities and the activities it regulates. CNSC staff fulfill this mandate in a variety of ways, including hosting in-person and virtual information sessions and through annual regulatory reports.

7.2.1 Discussion

CNSC staff have engaged with members of the public during the licence period. In September 2023, CNSC staff held an open house in the community near the Pickering and Darlington nuclear sites. CNSC staff also set up public information booths attended by CNSC site inspectors at OPG's annual "community power exposition". On April 15, 2026, CNSC staff conducted a public webinar to provide information and answer public questions on OPG's application in this matter (10) and the CNSC hearing process.

CNSC staff post information about Commission proceedings, regulatory actions, and events on the [CNSC website regarding the Pickering NGS](#). Additionally, CNSC staff present information about the Pickering site at public Commission meetings, such as through the status report on power reactors.

CNSC public engagement specific to OPG's licence application in this matter is described further in section 7.4.

7.2.2 Conclusion

CNSC staff will continue to disseminate objective scientific, technical, and regulatory information to the public regarding the Pickering site, in accordance with the CNSC mandate.

7.3 Licensee public information and engagement

A Public Information and Disclosure Program (PIDP) is a regulatory requirement for licence applicants and licensees of Class I nuclear facilities, uranium mines and mills and certain Class II nuclear facilities. These requirements are found in [REGDOC-3.2.1, Public Information and Disclosure](#). These programs are supported by disclosure protocols that include information about what the licensee should share with the public, as well as details on how that information is to be disseminated.



The primary goal of the PIDP is to ensure that information related to the health, safety and security of people and the environment, and other issues associated with the lifecycle of nuclear facilities are effectively communicated to the public. The program must include a commitment to, and protocol for, ongoing, timely communication of information related to the licensed facility during the licence period.

CNSC's expectations of a licensee's public information program and disclosure protocol are commensurate with the level of risk of the facility, as well as the level of public interest in the licensed activities. The program and protocol may be further influenced by the complexity of the nuclear facility's lifecycle and activities, and the risks to public health and safety and the environment perceived to be associated with the facilities and activities.

7.3.1 Discussion

OPG maintains a fleet wide PIDP that meets CNSC regulatory requirements, which CNSC confirmed during a 2023 inspection. Pickering NGS and Pickering WMF adhere to the program outlined by OPG and fulfill the regulatory requirements of REGDOC-3.2.1 by providing accessible information to interested parties and the public regarding OPG's nuclear and waste facilities, including events, activities, and operations.

Annual reports prepared by OPG summarize the PIDP program and key communications activities. CNSC staff assess this report against the requirements of REGDOC-3.2.1 to determine compliance and identify opportunities for improvement. OPG has been responsive to CNSC staff's recommendations, and continues to demonstrate interest in continuous improvement. CNSC staff expect that OPG will continue to provide these reports annually during the proposed licence period.

During the licence period OPG has improved its PIDP and now publishes [annual monitoring reports](#) on its website, including for fish impingement monitoring and groundwater monitoring, as well as [operations](#) and [licensing](#) information. OPG demonstrates an awareness of the importance of relevant and timely communication with interested parties and indicates the intention to maintain ongoing and transparent communications in the future.

7.3.2 Conclusion

Based on CNSC staff's assessment of OPG's PIDP, OPG's responsiveness to CNSC staff's recommendations, and the information provided in the application, CNSC staff conclude that OPG's PIDP for the Pickering NGS continues to meet regulatory requirements.



7.4 Participant funding program

The CNSC made funding available through its participant funding program (PFP) to assist Indigenous Nations and communities, members of the public, and other stakeholders in participating in the regulatory process in this matter and to provide value-added information to the Commission through informed and topic-specific interventions regarding OPG's application to request authorization to refurbish the Pickering NGS, as well as to renew the power reactor operating licence for the Pickering NGS and the waste facility operating licence for the Pickering WMF for a 10-year period. This funding was offered to review OPG's application and associated documents, prepare interventions, and participate in the Commission's public hearing.

7.4.1 Discussion

The [Notice of Public Hearing](#), posted on July 21, 2025 and [revised](#) on January 22, 2026, included notification of a PFP opportunity indicating that the CNSC had made up to \$250,000 in funding available. The participant funding opportunity was also advertised on the CNSC website and was included in notification emails sent to potentially impacted and interested Indigenous Nations and communities. Those interested in obtaining participant funding were invited to submit a completed participant funding application before September 15, 2025.

An independent Funding Review Committee reviewed the applications and made recommendations on the allocation of funding to the eligible recipients for the provision of new, distinctive, and valuable information to the CNSC through informed and topic-specific interventions. Funding criteria are listed in the [PFP guide](#). Based on recommendations from the Funding Review Committee, [the CNSC awarded the following amounts](#) in participant funding to the following applicants, as shown in Table 6.

Table 6 – OPG Pickering Renewal Application PFP Disbursement Amounts

Applicant	Maximum Amount of Available Funding
Alderville First Nation	\$57,788.36
Canadian Association of Nuclear Host Communities	\$15,000.00
Canadian Coalition for Nuclear Responsibility	\$15,000.00
Canadian Environmental Law Association	\$18,112.50
Curve Lake First Nation	\$68,021.67
Hiawatha First Nation	\$61,869.08
Mississaugas of Scugog Island First Nation	\$62,685.70
Northwatch	\$15,107.55
Nuclear Transparency Project	\$15,000.00
Radiation Safety Institute of Canada	\$15,000.00
Total	\$343,584.86

7.4.2 Conclusion

The PFP offered to assist potentially impacted and interested Indigenous Nations and communities, members of the public, and other stakeholders to prepare for, and participate in, the Commission’s public hearing process. CNSC staff will continue to encourage the public and Indigenous Nations and communities to participate in the Commission’s public proceedings with value-added information and perspectives.

8 Other matters of regulatory interest

8.1 Cost recovery

Paragraph 24(2)(c) of the [NSCA](#) requires that a licence application is accompanied by the prescribed fee. The [CNSC Cost Recovery Fees Regulations](#) (CRFR) set out the specific requirements based on the activities to be licensed. An applicant for a Class I facility licence is subject to Part 2 of CRFR, which is based on Regulatory Activity Plan fees.

8.1.1 Discussion

CNSC staff have determined that OPG remains in good standing with respect to CRFR requirements for the Pickering NGS and Pickering WMF.



OPG's application is to request authorization to refurbish the Pickering NGS, as well as to consolidate and renew the power reactor operating licence for the Pickering NGS and the waste facility operating licence for the Pickering WMF for a 10-year period. Therefore, the applicant is not required to submit the initial fee of \$25,000 as described in paragraph 7(1)(a) of the NSCA. In this case, OPG is subject to paragraph 5(2) of the NSCA, which relates to quarterly invoices sent to licensees.

8.1.2 Conclusion

After reviewing CNSC records, CNSC staff conclude OPG is in good standing with respect to CRFR requirements for the Pickering NGS and Pickering WMF.

8.2 Financial guarantees

Under subsection 24(5) of the NSCA, "A licence may contain any term or condition that the Commission considers necessary for the purposes of this Act, including a condition that the applicant provide a financial guarantee in a form that is acceptable to the Commission". *General Nuclear Safety and Control Regulations*, paragraph 3(1)(l) stipulates that, "an application for a licence shall contain... a description of any proposed financial guarantee relating to the activity to be licensed". CNSC requirements for financial guarantees are found in [REGDOC-3.3.1, Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities](#).

8.2.1 Discussion

OPG maintains a consolidated financial guarantee for decommissioning its Ontario assets, including the Pickering NGS and Pickering WMF. The Commission accepted OPG's revised consolidated financial guarantee for the 2023-2027 period on December 6, 2022 (69).

In accordance with the current PROL and WFOL, and as described in section G.5 of the Pickering NGS LCH and section G.3 of the Pickering WMF LCH, OPG is required to revise decommissioning plans, including the associated cost estimates and financial guarantee, on a 5-year cycle. This 5-year cycle is separate from the licence period of OPG's active licences, and OPG's next financial guarantee submission is due in 2027. Further information on decommissioning plans is included in section 6.11.

OPG's financial guarantee includes segregated funds established pursuant to the Ontario Nuclear Funds Agreement between OPG and the Province of Ontario, as well as the trust fund for the management of used nuclear fuel established pursuant to the *Nuclear Fuel Waste Act*. The total required amount for each year in the 2023-2027 period is projected to be satisfied without the need for a provincial guarantee because the projected value of the Nuclear Funds exceeds the decommissioning liability.

OPG is required to submit annual reports on its financial guarantee. As of 2025, the current CNSC requirement is \$22,093 million and the total guarantee available is \$27,920 million (70). CNSC staff's review of OPG's 2025 report and applicable financial statements confirmed that OPG's available funds are sufficient to cover the required financial guarantee.

OPG's current financial guarantee is based on assumed operations of Pickering NGS units 5-8 until the end of 2025, which was OPG's intention in at the time the financial guarantee was accepted in 2022. As documented in CNSC staff CMD 24-H5 (15), OPG previously assessed the impact of operating units 5-8 until the end of 2026. In the 2025 annual report, OPG notes that it has assessed the impact of the potential refurbishment of units 5-8 and the initiation of a limited scope of decommissioning work related to units 1-4. OPG found that these projects would reduce the required financial guarantee by an estimated \$440 million. OPG intends to incorporate these noted operational changes into the updated 2027 financial guarantee submission. CNSC staff are satisfied that the financial guarantee amount remains sufficient.

8.2.2 Conclusion

OPG maintains a financial guarantee for the Pickering NGS and Pickering WMF in accordance with regulatory requirements, which was accepted by the Commission in 2022 for the 2023-2027 period. CNSC staff conclude that OPG's current financial guarantee remains adequate for the activities included the proposed renewed consolidated Pickering site PROL.

8.3 Fisheries Act Authorization

[*The Fisheries Act*](#) and Fisheries Act authorization (FAA) are under the purview of Fisheries and Oceans Canada (DFO). In a memorandum of understanding signed between CNSC and DFO outlining areas for cooperation and administration of the Fisheries Act, DFO remains accountable for issuing Fisheries Act authorizations including approving any offset measures.

8.3.1 Discussion

OPG's FAA was issued by DFO in 2018 and authorizes OPG to carry out certain activities related to the operation of the Pickering NGS that are likely to result in harm to fish. The FAA also requires OPG to install a fish diversion system and implement offsetting measures. OPG's FAA is specific to the operation of the Pickering NGS. Other site activity under DFO's jurisdiction that may impact aquatic life, such as the in-water-work required to construct a new DWI, would be permitted by the DFO separately.



In April 2023, OPG applied to DFO for an administrative amendment to their FAA for the Pickering NGS to reflect operation of Pickering NGS units 5-8 beyond 2024. DFO has confirmed that OPG's FAA remains valid until December 31, 2028 (71). OPG has informed the CNSC that it plans to seek an amendment to its FAA to reflect the layup period during the proposed refurbishment outage and a subsequent amendment to reflect continued operations of units 5-8 following refurbishment. OPG is currently in discussion with DFO regarding these future amendments and will notify the CNSC of changes to the status of the FAA.

OPG's proposed refurbishment project includes the construction of a deep-water intake (DWI). OPG is required to receive a separate authorization from DFO prior to conduct any in-water work associated with the construction of this proposed DWI. Further information on OPG's separate potential FAA for the construction of the DWI is included in section 3.5.

8.3.2 Conclusion

CNSC staff conclude that OPG continues to hold a valid FAA that expires in 2028 and is satisfied that OPG intends to apply for a renewed or amended FAA, as well as all other necessary DFO permits, during the proposed licence period as needed. While the issuance of a licence under the NSCA is not contingent on a licensee having a valid FAA, it is the duty of the licensee to ensure that they are in compliance with other Acts of Parliament.

8.4 Nuclear liability insurance

Pursuant to the [Nuclear Liability and Compensation Act](#), OPG is required to maintain nuclear liability insurance for designated nuclear installations.

The NLCA is administered by Natural Resources Canada (NRCan). The Pickering NGS site is currently designated, pursuant to section 7 of the NLCA, as a nuclear installation in Item 4, Column 1 of the Schedule of the [Nuclear Liability and Compensation Regulations](#) (NLCR).

8.4.1 Discussion

The Pickering site contains 2 facilities that are authorized to contain nuclear material as defined in the NLCA, those are an 8-unit power reactor facility and a facility for the storage of irradiated fuel. These facilities are listed in item 4, column 4 in the Schedule of the NLCR. Section 4 of the NLCR describes classes of nuclear installations and ranks the risk of each class. The Pickering site falls under the "Power Reactor Class" pursuant



to paragraph 4(2)(a) of the NLCR, and OPG's liability amount is prescribed at \$1 billion pursuant to paragraph 24(1)(d) of the NLCA.

8.4.2 Conclusion

CNSC staff confirmed that OPG is compliant with the NLCA financial security obligations.

8.5 Delegation of authority

The Commission may include in a licence any condition it considers necessary for the purposes of the NSCA. The Commission may also delegate authority to CNSC staff with respect to the administration of licence conditions, or portions thereof.

There are 5 licence conditions in the proposed PROL that contain the phrase "a person authorized by the Commission":

- Licence condition 3.2 – "The licensee shall not restart a reactor after a serious process failure without the prior written approval of the Commission, or prior written consent of a person authorized by the Commission."
- Licence condition 15.2 – "The licensee shall obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points."
- Licence condition 16.1 – "The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (vi) of Part IV of this licence until the submission of the proposed security arrangements and measures for the new building, or any potential modifications to the protected area that may be associated with this new building, that is acceptable to the Commission or a person authorized by the Commission."
- Licence condition 16.2 – "The licensee shall not carry out the activities referred to in paragraph (vi) of Part IV of this licence without the submission of an environmental management plan, a construction verification plan, and the project design requirements, and without prior written acceptance from the Commission or a person authorized by the Commission."
- Licence condition 16.3 – "The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (vi) of Part IV of this licence until the submission of a commissioning report that is acceptable to the Commission or a person authorized by the Commission."

With respect to licence conditions 3.2, 16.1, 16.2, and 16.3, CNSC staff recommend that the Commission delegate the applicable authority to the following CNSC staff:



- Director, Pickering Regulatory Program Division
- Director General, Directorate of Power Reactor Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch

With respect to licence conditions 15.2, CNSC staff recommend that the Commission delegate the applicable authority to the following CNSC staff:

- Director General, Directorate of Power Reactor Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch
-

9 Overall Conclusions and Recommendations

Based on the review of the application and supporting documentation, CNSC staff conclude that OPG:

- a) **Is qualified** to carry on the activities authorized by the licence.
- b) **Will make adequate provisions** for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

CNSC staff recommend that the Commission:

1. **Renew** the Pickering PROL, for a period of 10 years from January 1, 2027, until December 31, 2036, to authorize OPG to:
 - a. Refurbish and continue to operate Pickering NGS units 5-8;
 - b. Continue to operate the Pickering WMF; and
 - c. Carry out the licensed activities listed in part IV of the proposed PROL.
2. **Consolidate** into the renewed PROL the licensed activities in WFOL-W4-350.02/2028 and concurrently revoke this WFOL.
3. **Delegate** authority as set out in section 8.5 of this CMD.
4. **Accept** OPG's proposed deviation from the requirements of licence condition 2.4, specifically section 20.5.4 of REGDOC-2.2.3 pertaining to the required period of "work under supervision", of the Pickering PROL during the proposed restart of unit 5.
5. **Authorize** OPG to store up to 1,410 DSCs in storage building #5 at the Pickering WMF.



References

1. **CNSC Commission Decision.** *Record of Decision - Application to Renew the Waste Facility Operating Licence for the Pickering Waste Management Facility.* February 6, 2018. DEC 17-H5.
2. **CNSC Licence.** *Waste Facility Operating Licence - Pickering Waste Management Facility.* 2026. WFOL-W4-350.02/2028, E-Doc# 7604214.
3. **CNSC Commission Decision.** *Record of Decision - Application to Renew the Nuclear Power Reactor Operating Licence for the Pickering Nuclear Generating Station.* December 20, 2018. DEC 18-H6.
4. **CNSC Licence.** *Nuclear Power Reactor Operating Licence - Pickering Nuclear Generating Station.* 2026. PROL 48.04/2028, E-Doc# 7604178.
5. **OPG Letter.** *Pickering NGS – Notice of Intent for Refurbishment of Units 5-8.* February 1, 2024. CD# P-CORR-00531-23463 P, E-Doc# 7214149.
6. **CNSC Commission Decision.** *Record of Decision - Application to extend the operation of the Pickering Nuclear Generating Station Units 5 to 8 until December 31, 2026.* December 17, 2024. DEC 24-H5.
7. —. *Record of Decision - Application to Amend the Pickering Waste Management Facility (PWMF) Licence to Authorize Construction and Operation of the Pickering Component Storage Structure.* July 24, 2025. DEC 25-H101.
8. **CNSC Staff CMD.** *Update on Decision on Radionuclides as Chemicals of Mutual Concern.* January 7, 2026. CMD 26-M23.
9. **OPG Letter.** *Pickering NGS - Notice of Intent to Renew Power Reactor Operating Licence PROL 48.02/2028.* October 31, 2024. CD# P-CORR-00531-23838, E-Doc# 7396766.
10. —. *Renewal Application for Pickering Nuclear Generating Station Power Reactor Operating Licence and Pickering Waste Facility Operating Licence.* June 27, 2025. CD# P-CORR-00531-23980 P, E-Doc# 7542953.
11. —. *Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility.* October 10, 2025. CD# P-CORR-00531-24089, E-Doc# 7587673.



12. —. *Predictive Environmental Risk Assessment for Pickering Refurbishment, Decommissioning, and Continued Operations*. June 20, 2025. CD# P-CORR-00531-23947 P, E-Doc# 7538982.
13. —. *Pickering NGS, Units 5 to 8 – Submission of the Climate Change Resilience Assessment*. April 23, 2025. CD# P-CORR-00531-23985 P, E-Doc# 7507126.
14. —. *Pickering NGS, Units 1 to 4 – Submission of the Detailed Decommissioning Plan and Storage with Surveillance Plan*. December 9, 2024. CD# NA44-CORR-00531-37304, E-Doc# 7423802.
15. **CNSC Staff CMD**. *Application to extend the operation of Pickering Nuclear Generating Station Units 5 to 8 until December 31, 2026*. February 27, 2024. CMD 24-H5, E-Doc# 7082261.
16. **OPG Letter**. *Pickering NGS – Request for CNSC Staff's Acceptance of the Revised Periodic Safety Review 3 (PSR3) Basis Document*. May 17, 2024. CD# P-CORR-00531-23559 P, E-Doc# 7285578.
17. **CNSC letter**. *Pickering NGS – Request for CNSC staff's Acceptance of the Revised Periodic Safety Review 3 (PSR3) Basis Document*. May 31, 2024. E-Doc# 7291993.
18. **OPG Plan**. *Pickering Refurbishment Program Management Plan*. 2025. NK30-PLAN-00120-00002.
19. **CNSC Letter**. *Pickering NGS - CNSC Compliance Assessment - Review of Refurbishment Governance*. March 12, 2026. E-Doc# 7643896.
20. **OPG Plan**. *Pickering Deep Water Intake (DWI) and Site Improvement Modifications Project Management Plan*. 2025. NK30-PMP-09701-00007.
21. **OPG Letter**. *Pickering NGS – OPG Responses to CNSC Staff Requests on the Proposed Deep Water Intake, Action Item 2026-48-39109*. March 30, 2026. CD# P-CORR-00531-24279 P, E-Doc# 7651261.
22. **OPG Plan**. *Pickering Refurbishment Program Management Plan - Return to Service*. 2025. NK30-PLAN-00120-00022.
23. —. *PNGS-A Detailed Decommissioning Plan Volume 0 - Program Overview*. December 2, 2024. NA44-PLAN-00960-00004-00.
24. —. *PNGS-A Detailed Decommissioning Plan Volume 1 - Outbuildings Removal*. December 2, 2024. NA44-PLAN-00960-00005-00.
25. —. *PNGS-A Detailed Decommissioning Plan Volume 2 - Non-Nuclear Component Removal*. December 2, 2024. NA44-PLAN-00960-00006-00.
26. —. *PNGS-A Storage with Surveillance Plan*. December 2, 2024. NA44-PLAN-00960-00001-00.



27. **CNSC Letter.** *Pickering NGS, Units 1-4 – Submission of the Detailed Decommissioning Plan, Storage with Surveillance Plan, and P014 Decommissioning Cost Estimate.* June 26, 2025. E-Doc# 7528989.
28. **OPG Letter.** *Pickering NGS – Submission of the Stabilization Activity Plan – 2024 Update and Request for Closure of Action Item 2024-48-31973.* December 13, 2024. CD# P-CORR-00531-23849 P, E-Doc# 7427063.
29. **CNSC Letter.** *CNSC Staff Request for Additional Information - Renewal Application for Pickering Nuclear Generating Station Power Reactor Operating Licence and Pickering Waste Facility Operating Licence.* September 5, 2025. E-Doc# 7560134.
30. **OPG Charter.** *Nuclear Management System.* 2025. N-CHAR-AS-0002.
31. **OPG Policy.** *Nuclear Safety & Security Policy.* 2020. N-POL-0001.
32. **OPG Procedure.** *Engineering Change Control Process.* 2023. N-PROC-MP-0090.
33. —. *Nuclear Quality Assurance Records.* 2023. OPG-PROC-0179.
34. **OPG Email.** *Pickering NGS, Units 5-8 - Pickering Refurbishment Operations Certification Plan.* January 30, 2026. CD# NK30-CORR-00531-62614, E-Doc# 7626369.
35. —. *Pickering NGS – Response to CNSC Staff’s Request for Information - Pickering Unit 5 Certification Plan.* April 13, 2026. CD# NK30-CORR-00531-62688, E-Doc# 7655146.
36. **CNSC Letter.** *Pickering NGS - Notice of Intent to Renew Power Reactor Operating Licence PROL 48.02/2028 – Implementation of CSA standards and CNSC REGDOCs, New Action Item 2025-48-34809.* January 29, 2025. E-Doc# 7406684.
37. **OPG Letter.** *Pickering NGS and PWWF – Implementation of CSA Standards and CNSC REGDOCs, Action Item 2025-48-34809.* May 28, 2025. CD# P-CORR-00531-23928, E-Doc# 7527611.
38. —. *Pickering NGS – Prior Written Notification of Changes to Pickering NGS-B Operating Policies and Principles in Support of Units 5-8 Refurbishment.* October 23, 2025. CD# NK30-CORR-00531-09089 P, E-Doc# 7591097.
39. **CNSC Letter.** *Pickering NGS – Prior Written Notification of Changes to Pickering NGS-B Operating Policies and Principles in Support of Units 5-8 Refurbishment.* December 10, 2025. E-Doc# 7607810.
40. **OPG Letter.** *Pickering NGS – Prior Written Notification of Changes to Pickering NGS-A Operating Policies and Principles in Support of Safe Storage.* September 12, 2024. CD# NA44-CORR-00531-37259 P, E-doc# 7363324.
41. **CNSC Letter.** *Pickering NGS – Prior Written Notification of Changes to Pickering NGS-A Operating Policies and Principles in Support of Safe Storage.* October 29, 2024. E-Doc# 7390216.



42. **OPG Report.** *Nuclear Sustainability Services - Pickering Waste Management Facility - Safety Report.* October 19, 2023. 92896-SR-01320-10002-R007.
43. **CNSC Commission Decision.** *Application to Amend the Pickering Waste Management Facility (PWMF) Licensing Basis to Process and Store a Maximum of 100 Dry Storage Containers Containing a Minimum of 6-year Cooled Fuel at the PWMF.* September 26, 2024. DEC 24-H102.
44. **OPG Letter.** *Status Update on REGDOC-2.4.1 Deterministic Safety Analysis Implementation.* December 11, 2025. CD# N-CORR-00531-24731 P, E-Doc# 7611850.
45. —. *Pickering NGS Units 5 to 8: Updated Safety Report - Parts 1 and 2: Facility Description.* October 20, 2022. CD# NK30-CORR-00531-08586, E-Doc# 6905547.
46. —. *Pickering NGS - Submission of the Updated Pickering Nuclear 5-8 Safety Report Part 3: Accident Analysis.* October 28, 2024. CD# NK30-CORR-00531-08989 P, E-Doc# 7394283.
47. **OPG Report.** *Pickering A Safety Report (Part I & Part II).* July 8, 2022. NA44-SR-01320-00001-R017.
48. —. *Pickering Nuclear 1-4 Safety Report: Part 3 – Accident Analysis.* October 31, 2023. NA44-SR-01320-00002-R006.
49. **OPG Letter.** *Pickering NGS – Heat Transport Aging Safety Analysis, Request for Concurrence of Completion and Closure of PSR2-B Integrated Implementation Plan (IIP) Resolution Action: G24-RS2-04-09-B.* November 13, 2024. CD# P-CORR-00531-23834 P, E-Doc# 7405804.
50. —. *Pickering NGS – Submission of Heat Transport Aging Safety Analyses – Loss of Flow R02 and Small Break Loss of Coolant Accident R02.* November 27, 2024. CD# P-CORR-00531-23851 P, E-Doc# 7415960.
51. **CNSC Letter.** *Pickering NGS – Heat Transport Aging Safety Analysis, Request for Concurrence of Completion and Closure of PSR2-B Integrated Implementation Plan (IIP) Resolution Action: G24-RS2-04-09-B, New Action Item 2025-48-37437.* September 15, 2025. E-Doc# 7550190.
52. **OPG Letter.** *Pickering NGS - Submission of Pickering A and B Shutdown Plan Probabilistic Safety Assessment Update.* May 5, 2025. CD# NA44-CORR-00531-37324 P, E-Doc# 7513478.
53. **CNSC Letter.** *Pickering NGS – Plan for Updating Pickering B PSA during the Period of the Proposed Pickering Units 5 to 8 Refurbishment.* November 25, 2025. E-Doc# 7606088.



54. —. *Pickering NGS – Climate Change Resilience Assessment in Support of Pickering NGS Units 5-8 Refurbishment*. May 29, 2025. E-Doc# 7291779.
55. **OPG Report**. *Pickering NGS Units 5-8: Climate Susceptibility and Adaptation Summary Report*. March 31, 2025. NK30-REP-07007-00001.
56. **OPG Letter**. *Pickering NGS, Units 5 to 8 – Responses to CNSC Staff Comments on the Climate Change Resilience Assessment, Action Item 2025-48-37774*. November 6, 2025. CD# P-CORR-00531-24106 P, E-Doc# 7599844.
57. —. *Nuclear – Annual Update to CNSC on Progress of CSI Recategorization*. March 27, 2024. CD# N-CORR-00531-23980, E-Doc# 7251548 .
58. **OPG Report**. *Pickering Units 5-8 Large Break Loss of Coolant Analysis Using Composite Analytical Approach*. March 1, 2024. N-REP-03500-1348394, E-Doc# 7251572.
59. **OPG Report (CONTAINS PRESCRIBED INFORMATION)**. *Safety Assessment for PWMF Storage Building 5 with 1,410 Dry Storage Containers*. November 10, 2025. CD# 92896-REP-01320-00024.
60. **OPG Letter**. *Notification of Intent to Change the Dry Storage Container Lid-to-Base Closure Weld at OPG's Nuclear Sustainability Services Facilities for On-Site Storage*. January 23, 2026. CD# W-CORR-00531-02083 P, E-Doc# 7624346.
61. **OPG Program**. *Environmental Qualification*. 2024. N-PROG-RA-0006.
62. **OPG Letter**. *Pickering NGS – Prior Written Notification of Document Changes: P-REP-03611-00012, PNGS Systems and Components Important to Safety*. May 21, 2025. CD# P-CORR-00531-23858 P, E-Doc# 7523504.
63. **CNSC Report**. *Environmental Protection Review Report: Pickering Nuclear Site*. January 2024. <https://www.cnscccsn.gc.ca/eng/resources/publications/reports/eprpickering23/>.
64. **OPG Program**. *Consolidated Nuclear Emergency Plan*. 2024. N-PROG-RA-0001.
65. **CNSC Letter**. *Darlington NGS: Request pursuant to Subsection 12(2) of the General Nuclear Safety and Control Regulations: Darlington Emergency Exercise “Unified Command 2025”*. November 6, 2025. E-Doc #7593926.
66. **OPG Letter**. *Pickering NGS – Submission of the Preliminary Decommissioning Plans and the Associated Decommissioning Cost Estimate*. March 4, 2025. CD# P-CORR-00531-23910 P, E-Doc# 7475544.
67. **CNSC Letter**. *Pickering NGS – Submission of the Preliminary Decommissioning Plans and the Associated Decommissioning Cost Estimate*. August 8, 2025. E-Doc# 7558845.



68. **OPG Letter (CONFIDENTIAL).** *Additional Security Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility.* September 26, 2025. CD# 8690-CORR-00531-22732, E-Doc# 7583022.
69. **CNSC Commission Decision.** *Record of Decision - Application for Acceptance of Ontario Power Generation's Revised Consolidated Financial Guarantee.* December 6, 2022. DEC 22-H104.
70. **OPG Letter.** *Submission of the 2025 Annual Report for the 2023-2027 CNSC Financial Guarantee.* February 28, 2025. CD# N-CORR-00531-24415, E-Doc# 7472543.
71. **Fisheries and Oceans Canada Letter.** *Amendment of Pickering Nuclear Generating Station 16-HCAA-00256 – Amendment not required.* September 29, 2023. 16-HCAA-00256, E-Doc# 7140497.



Glossary

For definitions of terms used in this document, see [REGDOC-3.6, Glossary of CNSC Terminology](#), which includes terms and definitions used in the [Nuclear Safety and Control Act](#) and the [Regulations](#) made under it, and in [CNSC regulatory documents](#) and other publications.

Additional terms and acronyms used in this CMD are listed below.

AF

Accident frequency

ALARA

As low as reasonably achievable

ASR

Accident severity rate

BE

Below expectations

CANDU

Canada deuterium uranium

CMD

Commission member document

COPCs

Contaminants of potential concern

CSIs

CANDU Safety Issues

CVC

Compliance Verification Criteria

DFO

Fisheries and Oceans Canada

DRLs

Derived release limits

EFPH

Effective full power hours / Equivalent full power hours

EMO

Emergency Management Ontario



EMS

Environmental management system

EPR

Environmental protection review

ERA

Environmental risk assessment

FAA

Fisheries Act authorization

FS

Fully satisfactory

GAR

Global assessment report

GWMP

Groundwater monitoring program.

GWPP

Groundwater protection program

IAA

Impact Assessment Act

IAEA

International Atomic Energy Agency

IEMP

Independent environmental monitoring program

IIP

Integrated implementation plan

ISAR

Industrial safety accident rate

LCH

Licence conditions handbook

MOL

Ministry of Labour (Ontario)

mSv

Millisievert

NGS

Nuclear generating station

NLCA

Nuclear Liability and Compensation Act



NLCR

Nuclear Liability and Compensation Regulations

NPP

Nuclear power plant

NRCan

Natural Resources Canada

NSR

Nuclear Security Regulations

OP&Ps

Operating policies and principals

OPEX

Operating experience

OPG

Ontario Power Generation

OSR

Operational safety requirements

PDP

Preliminary decommissioning plan

PERA

Predictive environmental risk assessment

PFP

Participant funding program

PI&R

Problem identification and resolution

PIDP

Public information and disclosure program

PIP

Periodic inspection program

PNERP

Provincial Nuclear Emergency Response Plan (Ontario)

PROL

Power reactor operating licence

PRP

Pickering refurbishment program

PSA

Probabilistic safety assessment



PSR

Periodic safety review

PSR3

OPG's PSR to support the 2026 Pickering relicensing

PSR2-B

OPG's reassessment of PSR2 to support continued operation beyond 2024

PTNSR

Packaging and Transport of Nuclear Substances Regulations

R&D

Research and development

ROR

Regulatory oversight report

SA

Satisfactory

SAP

Stabilization activities plan

SAT

Systematic approach to training

SCA

Safety and control area

SOE

Safe operating envelope

SOP

Sustainable operations plan

SSCs

Structures, systems, and components

TDGR

Transport of Dangerous Goods Regulations

WFOL

Waste Facility Operating Licence

WMF

Waste management facility

Appendix

APPENDIX A: Basis for the Recommendation(s)

A1: Detailed Summary of CNSC Assessment of Application

CNSC's staff assessment of OPG's licence application included a completeness check, a sufficiency check, and a technical assessment against regulatory requirements. The completeness check verified whether the application included the prescribed information in accordance with the [Nuclear Safety and Control Act](#) and applicable regulations. For all facilities (i.e., Class I and Class II facilities), it is important to consider and address all licence application requirements within the applicable CNSC regulations. As an application for renewal of an operating licence for a Class I facility that includes a new decommissioning activity, OPG is subject to the requirements pursuant to sections 3 and 5 of the [General Nuclear Safety and Control Regulations](#) (GNSCR) and sections 3, 6 and 7 of the [Class I Nuclear Facilities Regulations](#) (CINFR).

The sufficiency check verified whether the application included sufficient and quality information in order for CNSC staff to conduct the technical assessment. The technical assessment verified whether the application included adequate safety and control measures to address CNSC requirements. Documents originally submitted as part of the application may have been revised, updated, or replaced over the course of the assessment to address CNSC requirements.

Pursuant to Section 3 of the GNSCR Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by OPG	Complete?	Sufficient?	Adequate?
(1) An application for a licence shall contain the following information:				



Pursuant to Section 3 of the <i>GNSCR</i> Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by OPG	Complete?	Sufficient?	Adequate?
(a) the applicant's name and business address;	Cover Letter	Y	Y	Y
(b) the activity to be licensed and its purpose;	Section 1, Appendix C	Y	Y	Y
(c) the name, maximum quantity, and form of any nuclear substance to be encompassed by the licence;	Appendix C	Y	Y	Y
(d) a description of any nuclear facility, prescribed equipment, or prescribed information to be encompassed by the licence;	Sections 1.1 and 2.12	Y	Y	Y
(e) the proposed measures to ensure compliance with the Radiation Protection Regulations , the Nuclear Security Regulations and the Packaging and Transport of Nuclear Substances Regulations, 2015 ;	Sections 2.7, 2.12, and 2.14	Y	Y	Y



Pursuant to Section 3 of the <i>GNSCR</i> Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by OPG	Complete?	Sufficient?	Adequate?
(f) any proposed action level for the purpose of section 6 of the <i>Radiation Protection Regulations</i> ;	Sections 2.7 and 2.9	Y	Y	Y
(g) the proposed measures to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment, or prescribed information;	Section 2.12	Y	Y	Y
(h) the proposed measures to prevent loss or illegal use, possession, or removal of the nuclear substance, prescribed equipment, or prescribed information;	Sections 2.12 and 2.13	Y	Y	Y
(i) a description and the results of any test, analysis or calculation performed to substantiate the information included in the application;	Sections 1.2 and 2.4	Y	Y	Y



Pursuant to Section 3 of the <i>GNSCR</i> Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by OPG	Complete?	Sufficient?	Adequate?
(j) the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activity to be licensed, including waste that may be stored, managed, processed, or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste;	Section 2.11 Appendix C Appendix D	Y	Y	Y
(k) the applicant's organizational management structure insofar as it may bear on the applicant's compliance with the [NSCA] and the regulations made under it, including the internal allocation of functions, responsibilities and authority;	Section 2.1.2	Y	Y	Y



Pursuant to Section 3 of the <i>GNSCR</i> Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by OPG	Complete?	Sufficient?	Adequate?
(l) a description of any proposed financial guarantee relating to the activity to be licensed;	Section 4.1	Y	Y	Y
(m) any other information required by the <i>NSCA</i> or the regulations made under it for the activity to be licensed and the nuclear substance, nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence. (Section 5 of the <i>GNSCR</i> and sections 3, 6, and 7 of the <i>CINFR</i>)	Throughout Application, Detailed Decommissioning Plan (Reference 2), and Responses to CNSC staff requests for further information	Y	Y	Y

A2: Technical Basis

The technical basis for the recommendations presented in this CMD includes regulatory documents, national standards, and international guidance documents, and is discussed throughout section 6 and specified in the applicable sections of the Pickering Site LCH included in appendix C.

A3: Specific Areas for this Facility Type

The following table identifies the specific areas that comprise each SCA for the Pickering nuclear site.



SPECIFIC AREAS FOR THIS FACILITY TYPE		
Functional Area	Safety and Control Area	Specific Areas
Management	Management System	<ul style="list-style-type: none">Management SystemOrganizationPerformance Assessment, Improvement and Management ReviewOperating Experience (OPEX), Problem Identification and Resolution (PI&R)Change ManagementSafety CultureConfiguration ManagementRecords ManagementSupply and Contractor ManagementBusiness Continuity
	Human Performance Management	<ul style="list-style-type: none">Human Performance ProgramsPersonnel TrainingPersonnel CertificationWork Organization and Job DesignFitness for Duty
	Operating Performance	<ul style="list-style-type: none">Conduct of Licensed ActivityProceduresReporting and TrendingOutage Management PerformanceSafe Operating EnvelopeSevere Accident Management and RecoveryAccident Management and Recovery
Facility and Equipment	Safety Analysis	<ul style="list-style-type: none">Deterministic Safety AnalysisHazard AnalysisProbabilistic Safety AnalysisCriticality Safety



SPECIFIC AREAS FOR THIS FACILITY TYPE		
Functional Area	Safety and Control Area	Specific Areas
		<ul style="list-style-type: none"> Severe Accident Analysis Management of Safety Issues (including R&D Programs)
	Physical Design	<ul style="list-style-type: none"> Design Governance Site Characterization Facility Design Structure Design System Design Components Design
	Fitness for Service	<ul style="list-style-type: none"> Equipment Fitness for Service/Equipment Performance Maintenance Structural Integrity Aging Management Chemistry Control Periodic Inspection and Testing
Core Control Processes	Radiation Protection	<ul style="list-style-type: none"> Application of ALARA Worker Dose Control Radiation Protection Program Performance Radiological Hazard Control
	Conventional Health and Safety	<ul style="list-style-type: none"> Performance Practices Awareness
	Environmental Protection	<ul style="list-style-type: none"> Effluent and Emissions Control (releases) Environmental Management System (EMS) Assessment and Monitoring Protection of People Environmental Risk Assessment
	Emergency Management and Fire Protection	<ul style="list-style-type: none"> Conventional Emergency Preparedness and Response



SPECIFIC AREAS FOR THIS FACILITY TYPE		
Functional Area	Safety and Control Area	Specific Areas
		<ul style="list-style-type: none">▪ Nuclear Emergency Preparedness and Response▪ Fire Emergency Preparedness and Response
	Waste Management	<ul style="list-style-type: none">▪ Waste Characterization▪ Waste Minimization▪ Waste Management Practices▪ Decommissioning Plans
	Security	<ul style="list-style-type: none">▪ Facilities and Equipment▪ Response Arrangements▪ Security Practices▪ Drills and Exercises▪ Cyber security
	Safeguards and Non-Proliferation	<ul style="list-style-type: none">▪ Nuclear Material Accountancy and Control▪ Access and Assistance to the IAEA▪ Operational and Design Information▪ Safeguards Equipment, Containment and Surveillance▪ Import and Export
	Packaging and Transport	<ul style="list-style-type: none">▪ Package design and maintenance▪ Packaging and transport▪ Registration for use



APPENDIX B:

Indigenous Nations, communities and organizations that have traditional and/or treaty territories and/or interests within proximity to the licensed facilities

Facility	Indigenous Nations, communities and/or organizations
Pickering Nuclear Site	<p>Potentially impacted Indigenous Nations and communities:</p> <ul style="list-style-type: none">• Alderville First Nation• Curve Lake First Nation• Chippewas of Beausoleil First Nation• Chippewas of Georgina Island First Nation• Hiawatha First Nation• Mississaugas of Scugog Island First Nation• Mnjikaning (Chippewas of Rama First Nation) <p>Interested Indigenous Nations and communities:</p> <ul style="list-style-type: none">• Mohawks of the bay of Quinte• Mississaugas of the Credit First Nation• Six Nations of the Grand River• Métis Nation of Ontario (Region 8)• Saugeen Ojibway Nation

APPENDIX C:

Proposed Licence Changes

Overview

OPG has requested to consolidate the current PROL for the Pickering NGS and WFOL for the Pickering WMF into a single renewed PROL.

CNSC staff recommend that the Commission issue a consolidated PROL for the Pickering NGS and WMF. The proposed PROL includes a new limited scope decommissioning activity, new facility specific licence conditions related to the return to service of refurbished units, removal of licence conditions that are no longer relevant to the current facilities, and minor changes to align with the CNSC's updated standard licence format.

Licence Changes

Proposed changes to the licensed activities and licence conditions included in the proposed PROL are listed in the following tables.

PROPOSED LICENSED ACTIVITY CHANGES		
Existing Activity	Proposed Activity	Description of Change
PROL (i) operate the Pickering Nuclear Generating Station (hereinafter "the nuclear facility") at a site located in the City of Pickering, in the Regional Municipality of Durham, in the Province of Ontario WFOL (i) operate the Pickering Waste Management Facility ("the facility") located at the Pickering Nuclear Generating Station, City of Pickering, Regional Municipality of Durham, Province of Ontario;	(i) operate the Pickering Nuclear Generating Station (hereinafter "the reactor facility") and the Pickering Waste Management Facility ("the waste management facility" and together hereinafter "the facilities") at a site located in the City of Pickering, in the Regional Municipality of Durham, in the Province of Ontario;	Combined activity to include both the NGS and WMF.



PROPOSED LICENSED ACTIVITY CHANGES		
Existing Activity	Proposed Activity	Description of Change
<p>PROL</p> <p>(ii) possess, transfer, use, package, manage and store the nuclear substances that are required for, associated with, or arise from the activities described in (i);</p> <p>WFOL</p> <p>(ii) possess, transfer, use, process, package, manage, and store nuclear substances that are required for, associated with or arise from the activities described in (i);</p>	<p>(ii) possess, transfer, use, package, manage, and store at the facilities, as well as process at the waste management facility, the nuclear substances that are required for, associated with, or arise from the activities described in (i);</p>	<p>Clarify the applicable facility.</p>
<p>N/A</p>	<p>(iii) decommission units 1 to 4 of the reactor facility described in (i) up to and not beyond the period of storage with surveillance, including the risk reduction activities of the removal of outbuildings and non-nuclear components;</p>	<p>New activity as described in section 4 of the CMD.</p> <p>Numbering of subsequent activities updated accordingly</p>
<p>PROL</p> <p>(iii) import and export the nuclear substances, except controlled nuclear substances, that are required for, associated with, or arise from the activities described in (i);</p>	<p>(iv) import and export the nuclear substances, except controlled nuclear substances, that are required for, associated with, or arise from the activities described in (i) at the reactor facility;</p>	<p>Clarify the applicable facility.</p>
<p>PROL</p> <p>(vi) transport Category II nuclear material by road vehicle from the nuclear facility spent fuel bay to the onsite waste storage facility;</p>	<p>(v) transport Category II nuclear material by road vehicle from the reactor facility spent fuel bay to the waste management facility and transport Category II nuclear materials that are associated with the activities described in (i) at the waste management facility;</p>	<p>Clarify the applicable facility.</p>



PROPOSED LICENSED ACTIVITY CHANGES		
Existing Activity	Proposed Activity	Description of Change
WFOL (iv) Carry out the site preparation, construction, or construction modifications at the waste management facility associated with the authorized low & intermediate-level waste storage building, and authorized additional used fuel processing and storage buildings, when completion will result in a total of no more than 1 low & intermediate-level waste storage building, 1 dry storage container processing building, and 6 used fuel dry storage buildings;	(vi) carry out the site preparation, construction, or construction modifications at the waste management facility associated with the authorized low & intermediate-level waste storage building, and authorized additional used fuel processing and storage buildings, when completion will result in a total of no more than 1 low & intermediate-level waste storage building, 1 dry storage container processing building, and 5 used fuel dry storage buildings;	Limit the total number of dry storage container storage buildings to 5 instead of 6, to align with OPG's double-capacity storage building #5.
PROL (iv) possess, transfer, produce, package, manage, and store produce Cobalt-60;	(vii) possess, transfer, produce, package, manage, and store Cobalt-60 at the reactor facility;	Clarify the applicable facility.
PROL (v) possess, transfer, manage and store heavy water from other nuclear facilities;	(viii) possess, transfer, manage, and store heavy water from other nuclear facilities at the reactor facility;	Clarify the applicable facility.
PROL (vii) possess, transfer, export, package, manage and store nuclear substances, except controlled nuclear substances, from the Western Waste Management Facility;	(ix) possess, transfer, export, package, manage, and store nuclear substances, except controlled nuclear substances, from the Western Waste Management Facility at the reactor facility;	Clarify the applicable facility.
PROL (viii) possess and use prescribed equipment and prescribed information that are required for, associated	(x) possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i) and (iii) at the reactor	Clarify the applicable facility and include the new decommissioning activity.



PROPOSED LICENSED ACTIVITY CHANGES		
Existing Activity	Proposed Activity	Description of Change
with, or arise from the activities described in (i); WFOL (v) possess and use prescribed equipment and prescribed information that are required for, associated with or arise from the activities described in (i), (ii), (iii), and (iv)	facility and in (i), (ii), (v), and (vi) at the waste management facility; and	
PROL (ix) possess, use, manage and store enriched uranium as required for fission chambers for the Pickering Nuclear Generating Station units 1 and 4 Shutdown System Enhancement, including spares.	(xi) possess, use, manage, and store enriched uranium as required for fission chambers for the Pickering Nuclear Generating Station units 1 and 4 Shutdown System Enhancement, including spares at the reactor facility.	Clarify the applicable facility.

PROPOSED LICENCE CONDITION CHANGES		
Existing Licence Condition	Proposed Licence Condition	Description of Change
PROL and WFOL G.1 ... (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;	G.1 ... (ii) the conditions and safety and control measures described in the facilities' or activity's licence and the documents directly referenced in that licence; and	Updated to clarify multiple facilities.
PROL and WFOL G.2 The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.	G.2 The licensee shall give notification of changes to the facilities' safety and control measures that impact the licensing basis.	Updated to align with new standard wording and to clarify multiple facilities.



PROPOSED LICENCE CONDITION CHANGES		
Existing Licence Condition	Proposed Licence Condition	Description of Change
<p>PROL</p> <p>G.4 The licensee shall provide, at the nuclear facility and at no expense to the Commission, suitable office space for employees of the Commission who customarily carry out their functions on the premises of that nuclear facility (onsite Commission staff).</p>	<p>G.4 The licensee shall provide, at the reactor facility and at no expense to the Commission, suitable office space for employees of the Commission who customarily carry out their functions on the premises of that reactor facility (onsite Commission staff).</p>	<p>Updated facility name.</p>
<p>N/A</p>	<p>G.7 The licensee shall implement and maintain an Indigenous engagement program.</p>	<p>New standard licence condition added.</p>
<p>WFOL</p> <p>1.2 The licensee shall ensure that every contractor working at the facility complies with this licence.</p>	<p>Removed</p>	<p>Contractor management is part of the management system in general and fully covered within licence condition 1.1.</p>
<p>PROL</p> <p>2.2 The licensee shall implement and maintain the minimum shift complement and control room staffing for the nuclear facility.</p>	<p>2.2 The licensee shall implement and maintain the minimum shift complement and control room staffing.</p>	<p>Removed facility name to align with combined licence.</p>
<p>PROL</p> <p>2.3 The licensee shall implement and maintain training programs.</p> <p>WFOL</p> <p>2.2 The licensee shall implement and maintain a training program.</p>	<p>2.3 The licensee shall implement and maintain training programs for workers.</p>	<p>Updated to align with new standard licence condition wording.</p>
<p>PROL</p> <p>3.3 The licensee shall notify and report in accordance with</p>	<p>The licensee shall notify and report for the reactor facility in accordance with CNSC</p>	<p>Added REGDOC 3.1.2 and noted the specific facilities to clarify the</p>



PROPOSED LICENCE CONDITION CHANGES		
Existing Licence Condition	Proposed Licence Condition	Description of Change
CNSC regulatory document REGDOC-3.1.1, <i>Reporting Requirements for Nuclear Power Plants</i> .	regulatory document REGDOC 3.1.1, <i>Reporting Requirements for Nuclear Power Plants</i> and for the waste management facility in accordance with REGDOC 3.1.2, <i>Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills</i> .	differences in requirements between the WMF and NGS.
N/A	3.4 The licensee shall conduct, and submit results of, a periodic safety review at least every 10 years and implement the associated integrated implementation plan.	New standard licence condition added.
PROL 6.2 The licensee shall implement and maintain an enhanced fitness for service program for fuel channels in extended operations.	Removed	No longer necessary following refurbishment as no fuel channels will be in extended operations.
WFOL 9.2 The licensee shall implement an environmental assessment follow-up program	Removed	No longer necessary as this program has been completed.
PROL 11.2 The licensee shall maintain a decommissioning plan.	11.2 The licensee shall implement and maintain a decommissioning plan.	Updated to align with new standard licence condition wording.
PROL 14.1 The licensee shall implement and maintain a packaging and transport program. WFOL 14.1 The licensee shall implement and maintain a	14.1 The licensee shall implement and maintain a program for packaging and transport of nuclear substances.	Updated to align with new standard licence condition wording.



PROPOSED LICENCE CONDITION CHANGES		
Existing Licence Condition	Proposed Licence Condition	Description of Change
packaging and transport program.		
PROL 15.1 The licensee shall implement the Integrated Implementation Plan.	Removed	The Integrated Implementation Plan is included in the new standard licence condition 3.4.
PROL 15.2 The licensee shall maintain Units 2 and 3 in the safe storage phase.	Removed	Requirements pertaining to Storage with Surveillance are now captured under licence condition 11.2.
N/A	15.1 The licensee shall implement a return to service plan for refurbishment of Units 5 to 8.	New licence condition for refurbishment
PROL 15.4 The licensee shall implement and maintain plans for the end of commercial operations of all Pickering units.	Removed	Requirements pertaining to end of commercial operations are now captured under licence condition 11.2.
N/A	15.2 The licensee shall obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points.	New licence condition for refurbishment regulatory hold points
PROL 15.6 The licensee shall limit the import and export of nuclear substances to those occurring as contaminants in laundry, packaging, shielding or equipment.	15.4 The licensee shall limit the activities of import and export of nuclear substances to those occurring as contaminants in laundry, packaging, shielding or equipment.	Updated to align with new standard licence condition wording.
WFOL	16.1 The licensee shall not carry out the activities referred	Moved from section 12 to section 16,



PROPOSED LICENCE CONDITION CHANGES		
Existing Licence Condition	Proposed Licence Condition	Description of Change
12.2 The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (iv) of Part IV of this licence until the submission of the proposed security arrangements and measures for the new building, or any potential modifications to the protected area that may be associated with this new building, that is acceptable to the Commission or a person authorized by the Commission	to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (vi) of Part IV of this licence without the submission of the proposed security arrangements and measures for the new building, or any potential modifications to the protected area that may be associated with this new building, and without prior written acceptance of the Commission or prior written consent of a person authorized by the Commission.	numbering updated, and wording updated to align with similar intent across the licence.
WFOL 15.1 The licensee shall not carry out the activities referred to in paragraph (iv) of Part IV of this licence without the submission of an environmental management plan, a construction verification plan, and the project design requirements, and without prior written acceptance from the Commission or a person authorized by the Commission.	16.2 The licensee shall not carry out the activities referred to in paragraph (vi) of Part IV of this licence without the submission of an environmental management plan, a construction verification plan, and the project design requirements, and without prior written acceptance of the Commission or prior written consent of a person authorized by the Commission.	Numbering updated and wording updated to align with similar intent across the licence.
WFOL 15.2 The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction	16.3 The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (vi) of Part IV of this licence without	Numbering updated and wording updated to align with similar intent across the licence.



PROPOSED LICENCE CONDITION CHANGES		
Existing Licence Condition	Proposed Licence Condition	Description of Change
activities in paragraph (iv) of Part IV of this licence until the submission of a commissioning report that is acceptable to the Commission or a person authorized by the Commission.	the submission of a commissioning report, and without prior written acceptance of the Commission or prior written consent of a person authorized by the Commission.	

Licence Format

CNSC staff recommend that the licence format of the proposed PROL remain the same as the current PROL, with inclusion of the licensed activities and licence conditions of the current WFOL.

Licence Period

CNSC staff recommend that the renewed PROL be valid for a 10-year licence period, from January 1, 2027, to December 31, 2036.

Current Licence

The current Power Reactor Operating Licence (PROL 48.04/2028) for the Pickering NGS and Waste Facility Operating Licence (WFOL-W4-350.02/2028) for the Pickering WMF are attached on the following pages.



NUCLEAR POWER REACTOR OPERATING LICENCE

PICKERING NUCLEAR GENERATING STATION

- I) **LICENCE NUMBER:** **PROL 48.04/2028**
- II) **LICENSEE:** Pursuant to section 24 of the *Nuclear Safety and Control Act* this licence is issued to:
- III) **Ontario Power Generation Inc.** [Amended
1908 Colonel Sam Drive, 2026-03]
Oshawa, Ontario
L1H 8P7, Canada
- IV) **LICENCE PERIOD:** This licence is valid from September 1, 2018 to August 31, 2028, unless suspended, amended, revoked or replaced.

V) **LICENSED ACTIVITIES:**

This licence authorizes the licensee to:

- (i) operate the Pickering Nuclear Generating Station (hereinafter “the nuclear facility”) at a site located in the City of Pickering, in the Regional Municipality of Durham, in the Province of Ontario;
- (ii) possess, transfer, use, package, manage and store the nuclear substances that are required for, associated with, or arise from the activities described in (i);
- (iii) import and export the nuclear substances, except controlled nuclear substances, that are required for, associated with, or arise from the activities described in (i);
- (iv) possess, transfer, produce, package, manage, and store produce Cobalt-60;
- (v) possess, transfer, manage and store heavy water from other nuclear facilities;
- (vi) transport Category II nuclear material by road vehicle from the nuclear facility spent fuel bay to the onsite waste storage facility;
- (vii) possess, transfer, export, package, manage and store nuclear substances, except controlled nuclear substances, from the Western Waste Management Facility;
- (viii) possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i); and
- (ix) possess, use, manage and store enriched uranium as required for fission chambers for the Pickering Nuclear Generating Station units 1 and 4 Shutdown System Enhancement, including spares.

VI) EXPLANATORY NOTES:

- (i) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.
- (ii) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the *Nuclear Safety and Control Act* and associated Regulations.
- (iii) The Pickering NGS Licence Conditions Handbook (LCH) provides compliance verification criteria used to verify compliance with the conditions in the licence. The LCH also provides information regarding delegation of authority, applicable versions of documents and non-mandatory guidance on how to achieve compliance.

VI) CONDITIONS:**G. General**

G.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (CNSC, hereinafter "the Commission").

G.2 The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

G.3 The licensee shall control the use and occupation of any land within the exclusion zone.

G.4 The licensee shall provide, at the nuclear facility and at no expense to the Commission, suitable office space for employees of the Commission who customarily carry out their functions on the premises of that nuclear facility (onsite Commission staff).

G.5 The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

G.6 The licensee shall implement and maintain a public information and disclosure program.

1. Management System

1.1 The licensee shall implement and maintain a management system.

2. Human Performance Management

2.1 The licensee shall implement and maintain a human performance program.

2.2 The licensee shall implement and maintain the minimum shift complement and control room staffing for the nuclear facility.

2.3 The licensee shall implement and maintain training programs.

- 2.4 The licensee shall implement and maintain certification programs in accordance with CNSC regulatory document REGDOC-2.2.3, *Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2*. Workers who began an applicable initial training program in accordance with the requirements outlined in REGDOC-2.2.3, *Personnel Certification, Volume III: Certification of Persons Working at Nuclear Power Plants*, before January 31, 2025, may continue to be certified under requirements of this version until January 31, 2030. [Amended 2025-02]

Persons appointed to the following positions require certification:

- (i) Responsible Health Physicist;
- (ii) Shift Manager;
- (iii) Control Room Shift Supervisor; and
- (iv) Authorized Nuclear Operator.

3. Operating Performance

- 3.1 The licensee shall implement and maintain an operations program, which includes a set of operating limits.
- 3.2 The licensee shall not restart a reactor after a serious process failure without the prior written approval of the Commission, or prior written consent of a person authorized by the Commission.
- 3.3 The licensee shall notify and report in accordance with CNSC regulatory document REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*.

4. Safety Analysis

- 4.1 The licensee shall implement and maintain a safety analysis program.

5. Physical Design

- 5.1 The licensee shall implement and maintain a design program.
- 5.2 The licensee shall implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency.
- 5.3 The licensee shall implement and maintain an equipment and structure qualification program.

6. Fitness for Service

- 6.1 The licensee shall implement and maintain a fitness for service program.
- 6.2 The licensee shall implement and maintain an enhanced fitness for service program for fuel channels in extended operation. [Amended 2024-10]

7. Radiation Protection

- 7.1 The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

8. Conventional Health and Safety

- 8.1 The licensee shall implement and maintain a conventional health and safety program.

9. Environmental Protection

- 9.1 The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

10. Emergency Management and Fire Protection

- 10.1 The licensee shall implement and maintain an emergency preparedness program.
- 10.2 The licensee shall implement and maintain a fire protection program.

11. Waste Management

- 11.1 The licensee shall implement and maintain a waste management program.
- 11.2 The licensee shall maintain a decommissioning plan.

12. Security

- 12.1 The licensee shall implement and maintain a security program.

13. Safeguards and Non-Proliferation

- 13.1 The licensee shall implement and maintain a safeguards program.

14. Packaging and Transport

- 14.1 The licensee shall implement and maintain a packaging and transport program.

15. Nuclear Facility-Specific

- 15.1 The licensee shall implement the Integrated Implementation Plan.
- 15.2 The licensee shall maintain Units 2 and 3 in the safe storage phase.
- 15.3 (Removed) [Amended 2024-10]
- 15.4 The licensee shall implement and maintain plans for the end of commercial operations of all Pickering units.
- 15.5 The licensee shall implement and maintain a Cobalt-60 program for activities described under Part IV) of this licence.
- 15.6 The licensee shall limit the import and export of nuclear substances to those occurring as contaminants in laundry, packaging, shielding or equipment.

SIGNED at OTTAWA, this 6th day of March, 2026.

Pierre F. Tremblay, President
on behalf of the Canadian Nuclear Safety Commission



WASTE FACILITY OPERATING LICENCE

PICKERING WASTE MANAGEMENT FACILITY

- I) LICENCE NUMBER:** WFOL-W4-350.02/2028
- II) LICENSEE:** Pursuant to section 24 of the *Nuclear Safety and Control Act* this licence is issued to:
- Ontario Power Generation Inc.**
1908 Colonel Sam Drive,
Oshawa, Ontario
L1H 8P7, Canada
- III) LICENCE PERIOD:** This licence is valid from **July 24, 2025** to **August 31, 2028** unless suspended, amended, revoked, replaced, or transferred.
- IV) LICENSED ACTIVITIES:**

This licence authorizes the licensee to:

- (i) operate the Pickering Waste Management Facility (“the facility”) located at the Pickering Nuclear Generating Station, City of Pickering, Regional Municipality of Durham, Province of Ontario;
- (ii) possess, transfer, use, process, package, manage, and store nuclear substances that are required for, associated with or arise from the activities described in (i);
- (iii) transport Category II nuclear materials that are associated with the activities described in (i) on the site of the Pickering Nuclear Generating Station;
- (iv) carry out the site preparation, construction, or construction modifications at the facility associated with the authorized low & intermediate-level waste storage building, and authorized additional used fuel processing and storage buildings, when completion will result in a total of no more than 1 low & intermediate-level waste storage building, 1 dry storage container processing building, and 6 used fuel dry storage buildings; and,
- (v) possess and use prescribed equipment and prescribed information that are required for, associated with or arise from the activities described in (i), (ii), (iii), and (iv).

V) EXPLANATORY NOTES:

- (i) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the *Nuclear Safety and Control Act* and associated Regulations.
- (ii) The Pickering Waste Management Facility licence conditions handbook (LCH) provides compliance verification criteria used to meet the conditions of this licence. The LCH also provides information on delegation of authority and document version control.

VI) CONDITIONS:

G GENERAL

G.1 Licensing Basis for Licensed Activities

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter "the Commission").

G.2 Notification of Changes

The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

G.3 Financial Guarantee

The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

G.4 Public Information and Disclosure

The licensee shall implement and maintain a public information and disclosure program.

1 MANAGEMENT SYSTEM

1.1 Management System

The licensee shall implement and maintain a management system.

1.2 Management of Contractors

The licensee shall ensure that every contractor working at the facility complies with this licence.

2 HUMAN PERFORMANCE MANAGEMENT

2.1 Human Performance Program

The licensee shall implement and maintain a human performance program.

2.2 Training Program

The licensee shall implement and maintain a training program.

3 OPERATING PERFORMANCE

3.1 Operations Program

The licensee shall implement and maintain an operating program, which includes a set of operating limits.

3.2 Reporting Requirements

The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission.

4 SAFETY ANALYSIS

4.1 Safety Analysis Program

The licensee shall implement and maintain a safety analysis program.

5 PHYSICAL DESIGN

5.1 Design Program

The licensee shall implement and maintain a design program.

5.2 Pressure Boundary

The licensee shall implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency.

6 FITNESS FOR SERVICE

6.1 Fitness for Service Program

The licensee shall implement and maintain a fitness for service program.

7 RADIATION PROTECTION

7.1 Radiation Protection

The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

8 CONVENTIONAL HEALTH AND SAFETY

8.1 Conventional Health and Safety Program

The licensee shall implement and maintain a conventional health and safety program.

9 ENVIRONMENTAL PROTECTION

9.1 Environmental Protection

The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

9.2 Environmental Assessment Follow-up Program

The licensee shall implement an environment assessment follow-up program.

10 EMERGENCY MANAGEMENT AND FIRE PROTECTION

10.1 Emergency Preparedness Program

The licensee shall implement and maintain an emergency preparedness program.

10.2 Fire Protection Program

The licensee shall implement and maintain a fire protection program.

11 WASTE MANAGEMENT

11.1 Waste Management Program

The licensee shall implement and maintain a waste management program.

11.2 Decommissioning Plan

The licensee shall maintain a decommissioning plan.

12 SECURITY

12.1 Security Program

The licensee shall implement and maintain a security program.

12.2 Construction

The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (iv) of Part IV of this licence until the submission of the proposed security arrangements and measures for the new building, or any potential modifications to the protected area that may be associated with this new building, that is acceptable to the Commission or a person authorized by the Commission.

13 SAFEGUARDS AND NON-PROLIFERATION

13.1 Safeguards Program

The licensee shall implement and maintain a safeguards program.

14 PACKAGING AND TRANSPORT

14.1 Packaging and Transport Program

The licensee shall implement and maintain a packaging and transport program.

15 FACILITY-SPECIFIC

15.1 Construction Plans

The licensee shall not carry out the activities referred to in paragraph (iv) of Part IV of this licence without the submission of an environmental management plan, a construction verification plan, and the project design requirements, and without prior written acceptance from the Commission or a person authorized by the Commission.

15.2 Commissioning Report

The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (iv) of Part IV of this licence until the submission of a commissioning report that is acceptable to the Commission or a person authorized by the Commission.

SIGNED at OTTAWA, this 6th day of March 2026.

Pierre F. Tremblay, President
On behalf of the Canadian Nuclear Safety Commission

Proposed Licence

The proposed Power Reactor Operating Licence (PROL 48.00/2036) for the Pickering NGS and Pickering WMF is attached on the following pages.



PICKERING NUCLEAR SITE

NUCLEAR POWER REACTOR OPERATING LICENCE

- I) **LICENCE NUMBER:** **PROL 48.00/2036**
- II) **LICENSEE:** Pursuant to section 24 of the [Nuclear Safety and Control Act](#) this licence is issued to:

Ontario Power Generation Inc.
1908 Colonel Sam Drive
Oshawa, Ontario
L1H 8P7

- III) **LICENCE PERIOD:** This licence is valid from January 1, 2027, to December 31, 2036, unless suspended, amended, revoked or replaced.

IV) **LICENSED ACTIVITIES:**

This licence authorizes the licensee to:

- (i) operate the Pickering Nuclear Generating Station (hereinafter “the reactor facility”) and the Pickering Waste Management Facility (hereinafter “the waste management facility”) and together hereinafter “the facilities”) at a site located in the City of Pickering, in the Regional Municipality of Durham, in the Province of Ontario;
- (ii) possess, transfer, use, package, manage, and store at the facilities, as well as process at the waste management facility, the nuclear substances that are required for, associated with, or arise from the activities described in (i);
- (iii) decommission units 1 to 4 of the reactor facility described in (i) up to and not beyond the period of storage with surveillance, including the risk reduction activities of the removal of outbuildings and non-nuclear components;
- (iv) import and export the nuclear substances, except controlled nuclear substances, that are required for, associated with, or arise from the activities described in (i) at the reactor facility;
- (v) transport Category II nuclear material by road vehicle from the reactor facility spent fuel bay to the waste management facility and transport Category II nuclear materials that are associated with the activities described in (i), in relation to the waste management facility only, on the Pickering Nuclear Site;
- (vi) carry out the site preparation, construction, or construction modifications at the waste management facility associated with the authorized low & intermediate-level waste storage building, and authorized additional used fuel processing and storage buildings, when completion will result in a total of no more than 1 low & intermediate-level waste storage building, 1 dry storage container processing building, and 5 used fuel dry storage buildings;

- (vii) possess, transfer, produce, package, manage, and store Cobalt-60 at the reactor facility;
- (viii) possess, transfer, manage, and store heavy water from other nuclear facilities at the reactor facility;
- (ix) possess, transfer, export, package, manage, and store nuclear substances, except controlled nuclear substances, from the Western Waste Management Facility at the reactor facility;
- (x) possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i) and (iii) at the reactor facility and in (i), (ii), (v), and (vi) at the waste management facility; and
- (xi) possess, use, manage, and store enriched uranium as required for fission chambers for the Pickering Nuclear Generating Station units 1 and 4 Shutdown System Enhancement, including spares at the reactor facility.

V) EXPLANATORY NOTES:

- (i) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.
- (ii) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the [*Nuclear Safety and Control Act*](#) and associated Regulations.
- (iii) The Pickering Nuclear Site Licence Conditions Handbook (LCH) provides compliance verification criteria used to verify compliance with the conditions in the licence. The LCH also provides information regarding delegation of authority, applicable versions of documents and non-mandatory guidance on how to achieve compliance.

VI) CONDITIONS:

G. General

G.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facilities' or activity's licence and the documents directly referenced in that licence; and
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (CNSC, hereinafter "the Commission").

G.2 The licensee shall give notification of changes to the facilities' safety and control measures that impact the licensing basis.

G.3 The licensee shall control the use and occupation of any land within the exclusion zone.

G.4 The licensee shall provide, at the reactor facility and at no expense to the Commission, suitable office space for employees of the Commission who customarily carry out their functions on the premises of that reactor facility (onsite Commission staff).

G.5 The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

G.6 The licensee shall implement and maintain a public information and disclosure program.

G.7 The licensee shall implement and maintain an Indigenous engagement program.

1. Management System

1.1 The licensee shall implement and maintain a management system.

2. Human Performance Management

2.1 The licensee shall implement and maintain a human performance program.

2.2 The licensee shall implement and maintain the minimum shift complement and control room staffing.

2.3 The licensee shall implement and maintain training programs for workers.

2.4 The licensee shall implement and maintain certification programs in accordance with CNSC regulatory document REGDOC-2.2.3, *Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2*. Workers who began an applicable initial training program in accordance with the requirements outlined in REGDOC-2.2.3, *Personnel Certification, Volume III: Certification of Persons Working at Nuclear Power Plants*, before January 31, 2025, may continue to be certified under requirements of this version until January 31, 2030.

Persons appointed to the following positions require certification:

- (i) Responsible Health Physicist;
- (ii) Shift Manager;
- (iii) Control Room Shift Supervisor; and
- (iv) Authorized Nuclear Operator.

3. Operating Performance

3.1 The licensee shall implement and maintain an operations program, which includes a set of operating limits.

3.2 The licensee shall not restart a reactor after a serious process failure without the prior written approval of the Commission, or prior written consent of a person authorized by the Commission.

3.3 The licensee shall notify and report for the reactor facility in accordance with CNSC regulatory document REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants* and for the waste management facility in accordance with REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*.

3.4 The licensee shall conduct, and submit results of, a periodic safety review at least every 10 years and implement the associated integrated implementation plan.

4. Safety Analysis

4.1 The licensee shall implement and maintain a safety analysis program.

5. Physical Design

5.1 The licensee shall implement and maintain a design program.

5.2 The licensee shall implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency.

5.3 The licensee shall implement and maintain an equipment and structure qualification program.

6. Fitness for Service

6.1 The licensee shall implement and maintain a fitness for service program.

7. Radiation Protection

7.1 The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

8. Conventional Health and Safety

8.1 The licensee shall implement and maintain a conventional health and safety program.

9. Environmental Protection

9.1 The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

10. Emergency Management and Fire Protection

10.1 The licensee shall implement and maintain an emergency preparedness program.

10.2 The licensee shall implement and maintain a fire protection program.

11. Waste Management

11.1 The licensee shall implement and maintain a waste management program.

11.2 The licensee shall implement and maintain a decommissioning plan.

12. Security

12.1 The licensee shall implement and maintain a security program.

13. Safeguards and Non-Proliferation

13.1 The licensee shall implement and maintain a safeguards program.

14. Packaging and Transport

14.1 The licensee shall implement and maintain a program for packaging and transport of nuclear substances.

15. Reactor Facility-Specific

15.1 The licensee shall implement a return to service plan for refurbishment of Units 5 to 8.

15.2 The licensee shall obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points.

15.3 The licensee shall implement and maintain a Cobalt-60 operations program for activities described under paragraph (vii) of Part IV of this licence.

15.4 The licensee shall limit the activities of import and export of nuclear substances to those occurring as contaminants in laundry, packaging, shielding or equipment.

16. Waste Management Facility-Specific

- 16.1 The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (vi) of Part IV of this licence without the submission of the proposed security arrangements and measures for the new building, or any potential modifications to the protected area that may be associated with this new building, and without prior written acceptance of the Commission or prior written consent of a person authorized by the Commission.
- 16.2 The licensee shall not carry out the activities referred to in paragraph (vi) of Part IV of this licence without the submission of an environmental management plan, a construction verification plan, and the project design requirements, and without prior written acceptance of the Commission or prior written consent of a person authorized by the Commission.
- 16.3 The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (vi) of Part IV of this licence without the submission of a commissioning report, and without prior written acceptance of the Commission or prior written consent of a person authorized by the Commission.

SIGNED at OTTAWA _____

Pierre Tremblay
President
CANADIAN NUCLEAR SAFETY COMMISSION

Draft Licence Conditions Handbook

The draft Licence Conditions Handbook (LCH-PR-48.00/2036-R000) associated with the proposed PROL is attached on the following pages.



ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # **PENDING** (PDF)

DRAFT LICENCE CONDITIONS HANDBOOK

LCH-PR-48.00/2036-R000

**ASSOCIATED WITH
PICKERING NUCLEAR SITE
NUCLEAR POWER REACTOR OPERATING LICENCE**

LICENCE # PROL 48.00/2036



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Licence Conditions Handbook
LCH-PR-48.00/2036-R000

Effective: INSERT DATE

Associated with:
Pickering Nuclear Site
Nuclear Power Reactor Operating Licence
PROL 48.00/2036

SIGNED at OTTAWA,

Alex Viktorov, Ph.D.
Director General
Directorate of Power Reactor Regulation
Canadian Nuclear Safety Commission

Revision History

Effective Date	Revision	Word e-Doc and Version	Description of the Changes	DCR e-Doc
N/A	REV 000 DRAFT	INSERT	Original Document for Day 1 Hearing	N/A

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TABLE OF CONTENTS

INTRODUCTION	7
GENERAL.....	9
G.1 Licensing Basis for the Licensed Activities.....	9
G.2 Notification of Changes	13
G.3 Land Use and Occupation.....	15
G.4 Office for CNSC On-Site Inspectors	16
G.5 Financial Guarantees	17
G.6 Public Information and Disclosure	19
G.7 Indigenous Engagement	20
1 SCA – MANAGEMENT SYSTEM	25
1.1 Management System	25
2 SCA – HUMAN PERFORMANCE MANAGEMENT	29
2.1 Human Performance Program	29
2.2 Minimum Shift Complement	32
2.3 Training Programs	34
2.4 Personnel Certification	35
3 SCA – OPERATING PERFORMANCE.....	37
3.1 Operations Program	37
3.2 Approval to restart after a serious process failure.....	43
3.3 Reporting Requirements	45
3.4 Periodic Safety Review	47
4 SCA – SAFETY ANALYSIS.....	49
4.1 Safety Analysis Program	49
5 SCA – PHYSICAL DESIGN.....	56
5.1 Design Program	56
5.2 Pressure Boundary Program.....	60
5.3 Equipment and Structure Qualification Program	64
6 SCA – FITNESS FOR SERVICE	66
6.1 Fitness for Service Program	66
7 SCA – RADIATION PROTECTION	75
7.1 Radiation Protection Program	75
8 SCA – CONVENTIONAL HEALTH AND SAFETY	77
8.1 Conventional Health and Safety Program	77
9 SCA – ENVIRONMENTAL PROTECTION	78
9.1 Environmental Protection Program	78
10 SCA – EMERGENCY MANAGEMENT AND FIRE PROTECTION.....	81
10.1 Emergency Preparedness Program	81
10.2 Fire Protection Program	83
11 SCA – WASTE MANAGEMENT	85

11.1	Waste Management Program	85
11.2	Decommissioning Plan	87
12	SCA – SECURITY	90
12.1	Security Program	90
13	SCA – SAFEGUARDS AND NON-PROLIFERATION	93
13.1	Safeguards Program	93
14	SCA – PACKAGING AND TRANSPORT	95
14.1	Packaging and Transport Program	95
15	REACTOR FACILITY-SPECIFIC	96
15.1	Refurbishment – Return to Service	96
15.2	Regulatory hold points for the return to service of units 5-8.....	98
15.3	Cobalt-60 Program	101
15.4	Import and Export of Nuclear Substances.....	103
16	WASTE MANAGEMENT FACILITY-SPECIFIC	107
16.1	Security Arrangements and Measures	107
16.2	Construction Plans.....	108
16.3	Commissioning Report	109
APPENDIX A – ACRONYMS.....		110
APPENDIX B – GLOSSARY OF TERMS - DEFINITIONS		113

INTRODUCTION

The purpose of the Licence Conditions Handbook (LCH) is to identify and clarify the relevant parts of the licensing basis for each licence condition (LC).

Subsection 24 (1) of the NSCA states “The Commission may establish classes of licences authorizing the licensee to carry on any activity described in any of paragraphs 26 (a) to (f) that is specified in the licence for the period that is specified in the licence.”

Paragraph 26 (a) of the NSCA states “Subject to the regulations, no person shall, except in accordance with a licence,

- (a) possess, transfer, import, export, use or abandon a nuclear substance, prescribed equipment or prescribed information;
- (b) mine, produce, refine, convert, enrich, process, reprocess, package, transport, manage, store or dispose of a nuclear substance;
- (c) produce or service prescribed equipment;
- (d) operate a dosimetry service for the purposes of this Act;
- (e) prepare a site for, construct, operate, modify, decommission or abandon a nuclear facility; or
- (f) construct, operate, decommission or abandon a nuclear-powered vehicle or bring a nuclear-powered vehicle into Canada.”

The licence pertaining to this licence conditions handbook is for the Pickering Nuclear Generating Station (PNGS) and the Pickering Waste Management Facility (PWMF) at the Pickering Nuclear Site located in the City of Pickering, in the Regional Municipality of Durham, in the Province of Ontario.

The licence pertaining to this licence conditions handbook (LCH) authorizes the licensee to:

- (i) operate the Pickering Nuclear Generating Station (hereinafter “the reactor facility”) and the Pickering Waste Management Facility (hereinafter “the waste management facility”) and together hereinafter “the facilities”) at a site located in the City of Pickering, in the Regional Municipality of Durham, in the Province of Ontario;
- (ii) possess, transfer, use, package, manage, and store at the facilities, as well as process at the waste management facility, the nuclear substances that are required for, associated with, or arise from the activities described in (i);
- (iii) decommission units 1 to 4 of the reactor facility described in (i) up to and not beyond the period of storage with surveillance, including the risk reduction activities of the removal of outbuildings and non-nuclear components;
- (iv) import and export the nuclear substances, except controlled nuclear substances, that are required for, associated with, or arise from the activities described in (i) at the reactor facility;
- (v) transport Category II nuclear material by road vehicle from the reactor facility spent fuel bay to the waste management facility and transport Category II nuclear materials that are associated with the activities described in (i) at the waste management facility;
- (vi) carry out the site preparation, construction, or construction modifications at the waste management facility associated with the authorized low & intermediate-level waste storage building, and authorized additional used fuel processing and storage buildings, when completion will result in a total of no more than 1 low & intermediate-level waste

- storage building, 1 dry storage container processing building, and 5 used fuel dry storage buildings;
- (vii) possess, transfer, produce, package, manage, and store Cobalt-60 at the reactor facility;
 - (viii) possess, transfer, export, package, manage, and store nuclear substances, except controlled nuclear substances, from the Western Waste Management Facility at the reactor facility;
 - (ix) possess, transfer, manage, and store heavy water from other nuclear facilities at the reactor facility;
 - (x) possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i) and (iii) at the reactor facility and in (i), (ii), (v), and (vi) at the waste management facility; and
 - (xi) possess, use, manage, and store enriched uranium as required for fission chambers for the Pickering Nuclear Generating Station units 1 and 4 Shutdown System Enhancement, including spares at the reactor facility.

Unless otherwise indicated each licence condition applies to both PNGS and PWMF.

The LCH is organized in accordance with the LCs. The LCs themselves are organized, to a large degree, per the CNSC's safety and control area (SCA) framework [e-Doc 3410839, Safety and control areas].

The LCH content for each LC is typically applicable to all activities authorized by the licence. However, some LCs are specific to certain licensed activities; in such cases the LCH clarifies the licensing basis only in the context of the specific activity referenced in the LC.

The LCH typically has three parts under each LC: the Preamble, Compliance Verification Criteria (CVC), and Guidance. The Preamble explains, as needed, the regulatory context, background, and/or history related to the LC. CVC are criteria used by CNSC staff to verify compliance with the LC and hence are the basis of the compliance plan for this facility. Guidance may provide additional information relevant to implementation of the LC. For example, IAEA safety standards provide valuable guidance for many LCs. Note, however, that documents in the Guidance section are not surrogates for CVC.

Some documents, including licensee documents and publications, that are cited in this LCH are not publicly available (e.g., documents containing proprietary information or prescribed information as defined by the *General Nuclear Safety and Control Regulations*). Publicly-unavailable CNSC documents cited in the LCH are provided to the licensee upon request.

Interaction between the licensee and CNSC staff that is described in this LCH is governed by any communication protocols that may be established between the two, unless specified otherwise in the LCH.

Current versions of the licensee documents listed in this LCH are recorded in CNSC document 'Pickering Nuclear Site - Written Notification Documents in LCH' ([Pending SharePoint ID#](#)), which is controlled by the Pickering Regulatory Program Division (PRPD).

GENERAL

G.1 Licensing Basis for the Licensed Activities

Licence Condition G.1:

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facilities' or activity's licence and the documents directly referenced in that licence;
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (CNSC, hereinafter "the Commission").

Preamble:

CNSC regulatory document REGDOC-3.5.3, *Regulatory Fundamentals* describes what constitutes the licensing basis of a nuclear facility or activity.

This LC is not intended to inhibit the licensee's ability to implement changes that remain within the licensing basis.

For some specific changes, the licensing basis has provisions for CNSC staff to confirm whether the change would be in accordance with the licensing basis. These are referred to as 'CNSC staff authorizations.' Examples include terms or conditions in the licensing basis that permit or constrain a particular activity by means of a phrase such as:

- "approved in writing by the Commission or a person authorized by the Commission"
- "without the written approval of the Commission or a person authorized by the Commission"
- "requested by the Commission or a person authorized by the Commission"
- "prior written approval of the Commission, or prior written consent of a person authorized by the Commission"

As another example, licensing basis publications (e.g., CNSC regulatory documents or CSA Group standards) or other licensing basis requirements may include a requirement to obtain the acceptance or approval from the regulatory authority or authority having jurisdiction (AHJ).

For the four listed items, the Commission authorized CNSC staff (through CMD 00-M25 and its reference, CMD 00-M18) to grant approval if, among other things, staff were satisfied that the proposed change or action would not result in:

- an unreasonable risk to the environment or the health and safety of persons,
- an unreasonable risk to national security, or
- a failure to achieve conformity with measures of control and international obligations to which Canada has agreed

GENERAL

The three criteria have been effectively incorporated in the licensing basis concept.

This licence condition and CMD 00-M25 do not grant CNSC staff the authority to approve changes that are not in accordance with the licensing basis.

Unless otherwise indicated in the CVC of specific LCs in this LCH, delegation of authority by the Commission to act as a “person authorized by the Commission” is only applied to the incumbents of the following positions **[Future Reference and pending Commission Delegation]**

- Director, Pickering Regulatory Program Division
- Director General, Directorate of Power Reactor Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch

Changes that are within the licensing basis and do not require CNSC staff authorization may still require notification. See LC G.2 for further information on notification to CNSC staff of changes to safety and control measures.

In the event of any real or perceived inconsistency or conflict between elements of the licensing basis, the licensee is expected to consult CNSC staff for resolution. In the event of a conflict between CSA standards, the licensee is expected to consult with CSA Group to aid in its resolution.

In the event that the Commission grants approval to operate in a manner that is not in accordance with the previously established licensing basis, this would effectively revise the licensing basis for the facility. The appropriate changes would be reflected in the CVC of the relevant LC.

Compliance Verification Criteria:

Licensee Documents		
Document #	Title	Notification
CD# P-CORR-00531-23928 P	Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, “Pickering NGS and PWMF – Implementation of CSA Standards and CNSC REGDOCs, Action Item 2025-48-34809”, May 28, 2025, e-Doc 7527611	N/A
CD# P-CORR-00531-23980 P	Letter, P. Seguin, K. Aggarwal and L. Ceccato to C. Salmon, “Renewal Application for Pickering Nuclear Generating Station Power Reactor Operating Licence and Pickering Waste Facility Operating Licence”, June 27, 2025, e-Doc 7542953 and e-Doc 7542958.	N/A
CD# P-CORR-00531-24089 P	Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, “Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility”, October 10, 2025, e-Doc 7587673	N/A

GENERAL

Part (i) of the licensing basis, includes, but is not limited to, the following:

- *Nuclear Safety and Control Act* (NSCA)
- Regulations pursuant to the NSCA
- Canada/IAEA Safeguards Agreement

Parts (ii) and (iii) of the licensing basis refer to safety and control measures described in the licence, the documents directly referenced in that licence, the licence application and the documents needed to support that licence application. Safety and control measures are provisions to meet the purpose of the NSCA - in particular, to prevent unreasonable risk associated with the licensed activity or facility, including:

- programmatic elements
- engineering barriers and controls
- administrative and operational barriers and controls
- mitigating measures

Safety and control measures can be identified in licensing basis publications that are cited in the licence and the licence application. Safety and control measures can also be identified in programmatic licensee governance or supporting licensee documentation. The licensee documents and relevant licensing basis publications may, in turn, cite other documents and publications that also establish safety and control measures.

The applicable versions of licensing basis publications are listed in tables in this LCH under the most relevant LC. All “shall”, “must”, or normative statements in licensing basis publications are considered CVC unless stated otherwise.

LC G.1 requires the licensee to implement the safety and control measures identified in the licensing basis. Note, however, that not all details in referenced documents are necessarily considered to be safety and control measures. Details (even if in normative format) that are irrelevant to safety and control measures for facilities or activities authorized by the licence are excluded from the CVC of LC G.1.

The licensee may propose alternate approaches to implement safety and control measures already identified in the licensing basis. The licensee shall assess changes to confirm that licensed activities remain in accordance with the licensing basis and the proposed changes. In addition, for staff authorizations, the licensee shall carry out any other assessments or determinations identified in the requirements associated with the staff authorization. When it cannot be confirmed that the change is in accordance with the licensing basis, the licensee shall seek prior approval of the Commission for the change.

For unapproved operation that is not in accordance with the licensing basis, the licensee shall take action as soon as practicable to return to a state consistent with the licensing basis, taking into account the risk significance of the situation. The licensee shall report these situations to CNSC; see LC 3.3.

Guidance for LC G.1

CNSC REGDOC-1.1.3, *Licence Application Guide: Licence to Operate a Nuclear Power Plant*, describes a wide, but not necessarily exhaustive, range of safety and control measures that may be relevant to an operating nuclear power plant. In Version 1.2 of REGDOC-1.1.3, Section 4 discusses these measures for each of the 14 SCAs, while Section 5 discusses some safety and control measures that may be associated with other matters of regulatory interest that do not fall within the 14 SCAs.

GENERAL

A list of criteria that could help determine if a change would be in accordance with the licensing basis is provided in Appendix A of *Assessment of licensee changes to documents or operations* [e-Doc # 4055483]. Such criteria would also be used if the change requires CNSC staff authorization.

When the licensee is unsure if a proposed change or activity is in accordance with the licensing basis, it can consult CNSC staff. The licensee should take into account that certain types of proposed changes might require significant lead times before CNSC staff can make recommendations and/or the Commission can properly consider them. Examples of these types of changes are discussed under various LCs in this LCH. Guidance for notifications to the CNSC related to licensee changes is discussed under LC G.2.

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G.2 Notification of Changes

Licence Condition G.2:

The licensee shall give notification of changes to the facilities' safety and control measures that impact the licensing basis.

Preamble:

The safety and control measures subject to this notification are part of the licensing basis as described in LC G.1. Facility-specific safety and control measures are identified in the licensee documents listed in the CVC of this LCH. Current versions of the licensee documents listed in this LCH that require notification of change are recorded in CNSC document "Pickering Nuclear Site - Written Notification Documents in LCH" (e-Doc 7580262).

A notification is defined as a formal, recorded communication from the licensee to CNSC staff.

Licensee documents tabulated in the CVC of the LCH have different requirements for notification of change, depending on their significance. Some documents will require notification prior to a change being implemented (denoted as "PI" in the CVC tables) and others will require notification at the time of implementation (denoted as "TI" in the CVC tables).

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
OPG-PROG-0001	Information Management	TI	PNGS & PWWF

Compliance with this LC includes notification of changes to the licensee documents listed under CVC of all LCs in this LCH.

For any planned change for which it is not immediately obvious that the change will be in accordance with the licensing basis, the licensee shall opt for disclosure and notify CNSC staff prior to implementing the change.

Notifications shall include a summary description of the change, the rationale for the change, expected duration (if not a permanent change), and a summary explanation of how the licensee has concluded that the change remains in accordance with the licensing basis. The licensee shall provide enough information and time to review to facilitate CNSC staff's confirmation that the change remains in accordance with the licensing basis. This may include, for example, providing copies of references in the licensee document that are either changing or are pertinent to the change in the licensee document. Changes for which that conclusion is not obvious require further assessment of impact to determine if Commission approval is required in accordance with LC G.1.

For licensee documents designated as PI, the licensee shall submit the document to the CNSC prior to implementing changes. The licensee shall allow sufficient time for the CNSC to review the change proportionate to its complexity and the importance of the safety and control measures being affected. Typically, most changes require submission a minimum of 30 days prior to planned implementation. For

GENERAL

documents designated as TI, the licensee need only submit the revised document at the time of implementing the change.

OPG shall follow its process OPG-PROG-0001, Information Management, for any changes related to a document listed in the CVC sections of this LCH.

Guidance:

Appendix A of *Assessment of licensee changes to documents or operations* [e-Doc # 4055483] identifies some factors that could be addressed to confirm that a change remains in accordance with the licensing basis. For proposed changes that may not be in accordance with the licensing basis, the Guidance for LC G.1 applies.

The following scenarios, not necessarily mutually exclusive, are examples of changes that merit notification:

- a) The licensee plans to make changes to the facility or its operation, such as deviations from design, operating conditions, policies, programs or methods, and such changes are not explicitly permitted in the licensee's governance or other parts of the licensing basis.
- b) The licensee requires staff authorization (see description under CVC of LC G.1) for a planned change. The specific requirements for such notifications may be identified in the part of the licensing basis that establishes the basis for the staff authorization.
- c) The licensee plans to implement a new or revised regulatory document or industry standard. The notification would typically indicate the date by which implementation of the publication will be complete and describe any corresponding changes needed for implementation.

The following are two examples (in no way do they form a representative or exhaustive list) that are illustrative of changes in scenario a). These examples would not necessarily result in a change in a document identified in the LCH requiring notification of change.

- The licensee is changing certain responsibilities of a worker that could have a significant impact on emergency response.
- The licensee is planning a significant plant modification.

When in doubt, the licensee should opt for providing notification of a change.

G.3 Land Use and Occupation

Licence Condition G.3:

The licensee shall control the use and occupation of any land within the exclusion zone.

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

The exclusion zone is an area, immediately surrounding a nuclear facility where no permanent habitation is allowed. The siting guide used at the time of design of Pickering NGS (AECB-1059, e-Doc 3000249) stipulated an exclusion zone that extended at least 914 metres (3000 feet) from the reactor core.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
NA44-SR-01320-00001	Pickering A Safety Report (Part 1 and 2)	TI ¹	PNGS
NK30-D0A-10200-0001	Building Development Site Plan	TI	PNGS
NK30-SR-01320-00001	Pickering B Safety Report - Part 1	TI ¹	PNGS

¹ Updates to facility descriptions are required every 5 years or when requested by the CNSC as described in section 4.1.

The licensee shall ensure that the use and occupancy of land within the exclusion zone does not compromise the safety and control measures in the licensing basis. Specifically, the licensee shall consider emergency preparedness and ALARA when controlling land use within the exclusion zone. This applies to land the licensee occupies as well as to land occupied by others.

The licensee shall not permit a permanent dwelling to be built within the exclusion zone. "Permanent dwelling" refers to housing that is meant to be fixed. The licensee may erect, for a short time without prior notification, a temporary dwelling (e.g., a trailer).

OPG's document NK30-D0A-10200-0001, *Building Development Site Plan*, describes the exclusion zone and identifies the parcels of land within the exclusion zone that are controlled but not owned by OPG. The licensee shall notify the CNSC of changes to the use and occupation of any land within the exclusion zone.

Guidance:

None.

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G.4 Office for CNSC On-Site Inspectors

Licence Condition G.4:

The licensee shall provide, at the reactor facility and at no expense to the Commission, suitable office space for employees of the Commission who customarily carry out their functions on the premises of that reactor facility (onsite Commission staff).

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

CNSC staff require suitable office space at the reactor facility in order to satisfactorily carry out its regulatory activities.

Compliance Verification Criteria:

Any changes of accommodation shall be made based on discussion and subsequent agreement between the CNSC and the licensee.

Suitable office space is office space that is separated from the remainder of the building in which it is located by walls or other suitable structures.

Guidance:

None.

G.5 Financial Guarantees

Licence Condition G.5:

The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

Preamble:

The *General Nuclear Safety and Control Regulations* requires that a licence application contain a description of any proposed financial guarantee relating to the activity to be licensed.

Ontario Power Generation Inc. (OPG) maintains a consolidated financial guarantee to cover the future decommissioning of all OPG- and Bruce Power-operated nuclear facilities in Ontario. The financial guarantee is based upon the most up-to-date preliminary decommissioning plans (see LC 11.2) and cost estimates for decommissioning prepared by OPG for each facility. The financial guarantee must cover all costs of decommissioning. The licensee is responsible for providing an adequate financial guarantee that is acceptable to the Commission.

OPG is required to revise the financial guarantee and the associated decommissioning plans at least every 5 years or when requested by the Commission. The most recent OPG consolidated financial guarantee covering the 2023-27 period was accepted by the Commission on December 6, 2022.

Complete review of decommissioning cost estimates is also required as part of the 5-year Ontario Nuclear Funds Agreement reference plan update cycle.

To fund the financial guarantee, OPG maintains Nuclear Funds consisting of:

1. Ontario Nuclear Funds Agreement (ONFA) Funds established pursuant to the ONFA [O. Reg. 53/05: PAYMENTS UNDER SECTION 78.1 OF THE ACT \(ontario.ca\)](#) comprising of the Decommissioning Segregated Fund (DSF) and the Used Fuel Segregated Funds (UFSF).
2. [Nuclear Fuel Waste Act](#) (NFWA) Trust Funds for the management of used fuel established pursuant to the NFWA.
3. Provincial Guarantee pursuant to the Provincial Guarantee Agreement between the CNSC and the Province of Ontario.

The value of licensee's financial guarantee must be sufficient to cover the cost estimate for decommissioning the reactor facility and the waste management facility according to the facility's most up-to-date decommissioning plan that reflects the assumed decommissioning strategy and end state of the facility.

GENERAL

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Document Title	Notification	Facility
N/A	CNSC Financial Security and ONFA Access Agreement between OPG, the Province of Ontario and the CNSC effective January 1, 2023 ¹	PI	PNGS & PWMF
W-STD-WM-0006	Planning for Decommissioning	TI	PNGS & PWMF

¹ Commission Decision e-Doc 6930798 and CMD 22-H104 e-Doc 6811500

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.11.2	Decommissioning	2021	Implemented at PNGS & PWMF
CNSC	REGDOC-3.3.1	Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities	2021	Implemented at PNGS & PWMF
CSA	N294	Decommissioning of facilities containing nuclear substances	2019	Implemented at PNGS & PWMF

The financial guarantee for decommissioning the reactor facility and the waste management facility shall be reviewed and revised by the licensee at least every five years or when requested by the Commission. The next regular update to the 5-year reference plan for the financial guarantee is expected in 2027.

The licensee shall submit annually to the Commission a written report confirming that the financial guarantees for decommissioning costs remain valid and in effect and sufficient to meet the decommissioning needs. The licensee shall submit this report by the end of February of each year, or at any time as the Commission may request.

Guidance:

None.

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G.6 Public Information and Disclosure

Licence Condition G.6:

The licensee shall implement and maintain a public information and disclosure program.

Preamble:

A public information and disclosure program (PIDP) is a regulatory requirement for licence applicants and licensees under the *Class I Nuclear Facilities Regulations*, paragraph 3(j), which requires that a licence application contain a description of the proposed program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment, health and safety of persons that may result from the activity to be licensed.

The primary goal of the PIDP, as it relates to the licensed activities, is to ensure that information related to the health, safety and security of persons and the environment, and other issues associated with the lifecycle of nuclear facilities are effectively communicated to the public.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-STD-AS-0013	Nuclear Public Information and Disclosure	TI	PNGS & PWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-3.2.1	Public Information and Disclosure	2018	Implemented at PNGS & PWMF

Where the public has indicated an interest to know, the PIDP shall include a commitment to and disclosure protocol for ongoing, timely communication of information related to the licensed facility during the course of the licensing period.

Guidance:

OPG should submit annually a report summarizing the public outreach events and developments involving PNGS and PWMF.

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G.7 Indigenous Engagement

Licence Condition G.7:

The licensee shall implement and maintain an Indigenous engagement program.

Preamble:

[NOTE: The Preamble and Compliance Verification Criteria text for licence condition G.7 is based on the text published in the LCH for the Darlington NGS following the 2025 renewal and pertains to licensee engagement. This text is tentative and pending further consultation activities with Indigenous Nations and Communities specific to the Pickering Nuclear Site and OPG's application to refurbish units 5-8 and renew the operating licences of the PNGS and PWMF. An updated G.7 section will be provided prior to Part 2 of the hearing.]

The Pickering site resides on lands in which many Indigenous Nations and communities have a vested interest and rights, lying within the lands and waters of the Michi Saagiig Anishinaabeg, the Gunshot Treaty (1877-88), the Williams Treaties (1923), and the Williams Treaties Settlement Agreement (2018).

A public information and disclosure program is required by licence condition G.6, which requires that licensees describe and maintain a program to inform persons living in the area of the site of the nature and characteristics of the anticipated effects of the activity on the environment, as well as on the health and safety of people. REGDOC-3.2.1 – *Public Information and Disclosure* also specifies that Indigenous Nations and communities should be included as a target audience for the licensee's public information and disclosure program.

As per section 6 of REGDOC-3.2.2 – *Indigenous Engagement*, licensees may be required to continue to engage Indigenous Nations and communities after an Environmental Assessment or licensing decision. Licensees may also be required to update the CNSC about their ongoing Indigenous engagement activities—for example, the status of the implementation and effectiveness of mitigation and accommodation measures.

CNSC staff identified Indigenous Nations and communities who have interests and Aboriginal and/or Treaty rights in the area where the Pickering site is located within Section 7.1 of CMD 26-H7. The following Indigenous Nations and communities were identified as having Aboriginal and/or Treaty rights where the Pickering site is located:

- Alderville First Nation (AFN)
- Curve Lake First Nation (CLFN)
- Hiawatha First Nation (HFN)
- Mississaugas of Scugog Island First Nation (MSIFN)
- Chippewas of Beausoleil First Nation
- Georgina Island First Nation
- Chippewas of Rama First Nation

GENERAL

The following Indigenous Nations and communities were identified as having interest in the Pickering site:

- Mohawks of the Bay of Quinte
- Métis Nation of Ontario
- Six Nations of the Grand River
- Mississaugas of the Credit First Nation
- Saugeen Ojibway Nation

For the purposes of this Licence Condition, the term ‘identified Indigenous Nations and communities’ refers specifically to the Indigenous Nations and communities listed above.

The CNSC acknowledges that low-level and intermediate-level radioactive waste generated at the Pickering site is transferred to the Western Waste Management Facility (WWMF), which is located within Saugeen Ojibway Nation territory. The WWMF operates under a separate waste management facility operating licence.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
OPG-POL-0027	Indigenous Relations Policy	TI	PNGS & PWWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-3.2.1	Public Information and Disclosure	2018	Implemented at PNGS & PWWMF

Indigenous Engagement Program

The licensee shall develop an Indigenous Engagement Program (IEP) and submit it for CNSC staff review. The licensee should engage with and seek feedback from the identified Indigenous Nations and communities in the development of the IEP.

Pickering Site Specific Engagement Plan

The licensee shall develop a Pickering site specific engagement plan which outlines site specific engagement activities, commitments, and definitions, as outlined in this Licence Condition G.7. This Pickering site specific engagement plan must be clearly linked to and aligned with the licensee’s corporate-wide IEP. OPG shall make efforts to collaborate on the development of the Pickering site engagement plan with the identified Indigenous Nations and communities. The engagement plan shall be tailored to Indigenous Nation and communities’ rights and interests. Development of the Pickering-site specific engagement plan should begin once the Power Reactor Operating Licence is operational (January 1, 2027), and the licensee should work collaboratively with the identified Indigenous Nations and communities to establish a mutually agreed-upon timeframe for finalizing it.

GENERAL

On-Going Engagement

The licensee shall conduct ongoing engagement specific to the Pickering site throughout the licence period in accordance with the IEP and Pickering site engagement plan. This engagement shall be carried out with the identified Indigenous Nations and communities. If an Indigenous Nation and/or community is non-responsive, the licensee shall continue to share information and provide opportunities for engagement, unless the Indigenous Nation and/or community specifically declines the engagement opportunities and requests that OPG stop sharing information regarding the Pickering site.

To ensure ongoing engagement, the licensee shall collaborate and engage with the identified Indigenous Nations and communities on the following commitments:

1. Demonstrate efforts to collaborate with Indigenous Nations and communities to identify and implement approaches to engagement and communication that takes into consideration the knowledge, needs, preferences and interests of each Indigenous Nation and community.
2. Provide knowledge sharing opportunities such as site visits, workshops and information sessions, based on interest expressed by Indigenous Nations and communities.
3. Provide opportunities for two-way dialogue and collaboration in relation to ongoing operational activities, including but not limited to the following areas: environmental monitoring, emergency management response, scheduled reporting and event reporting.
4. Demonstrate efforts to collaborate with Indigenous Nations and communities on the management of waste from the on-going operations of the Pickering site.
5. Respond to questions, concerns or comments from Indigenous Nations and communities regarding the Pickering site and work collaboratively to reflect feedback and Indigenous Knowledge within the licensee's activities, as appropriate.

In addition to the commitments noted above, specific to the Michi Saagiig Nations of the Williams Treaties First Nations (AFN, CLFN, HFN and MSIFN) the licensee shall:

6. Demonstrate efforts to collaborate with AFN, CLFN, HFN and MSIFN to incorporate the outcomes of the Indigenous Knowledge Study (IKS), led by AFN, CLFN, HFN and MSIFN related to the Pickering site into ongoing oversight and monitoring of the Pickering site throughout the licensing period, as appropriate.
7. Hold at least semi-annual meetings to share operational updates, safety data, and environmental monitoring results.
8. Demonstrate efforts to collaborate with AFN, CLFN, HFN and MSIFN to incorporate the outcomes of assessments and studies relevant to the Pickering site into ongoing oversight and monitoring of the Pickering site throughout the licensing period, as appropriate.
9. Until the IEP is implemented, CNSC staff verification of items 1 through 8 will be performed on a case-by-case basis, following the licensee's establishment of descriptions for these engagement activities within the Pickering site-specific engagement plan. The descriptions of these engagement activities should be a collaborative process between the licensee and the identified Indigenous Nations and communities.

GENERAL

Reporting Requirements

The licensee shall submit to the CNSC, an annual report, submitted by May 1st, on the engagement and activities it has undertaken with the identified Indigenous Nations and communities. The development of the annual report should be a collaborative process between the licensee and the identified Indigenous Nations and communities. If direct comments from the identified Indigenous Nations and communities are received, they should be included in dedicated sections of the report without interpretation or editing by the licensee. The licensee should also provide a copy of the summary to each Indigenous Nation or community engaged in advance or at the same time it is filed with the CNSC. It is acknowledged that an Indigenous Nation or community may share information with the licensee in confidence. The licensee should work with the Indigenous Nation or community to ensure this information is not disclosed and the Indigenous Nation or community is comfortable with the level of detail communicated within the report.

The annual report shall describe:

- The name of the Indigenous Nation or community.
- The method(s), date(s), location(s), and topics of engagement activities with the Indigenous Nation or community.
- An update on the commitments (items 1 through 8 above) along with any relevant information and context regarding the status of, timelines, and progress made on the initiatives and commitments. The update shall include the perspectives of the identified Indigenous Nations and communities, when shared.
- A summary of any issues, interests, or concerns raised, including those in relation to any potential impacts on identified or established Aboriginal and/or Treaty rights. The summary shall include the perspectives of the identified Indigenous Nations and communities, when shared.
- The measures taken, or that will be taken, to address or respond to the issues or concerns. Alternatively, an explanation as to why no further action is required to address or respond to issues or concerns shall be provided.
- A description of any changes to project activities and/or programs to address and incorporate the measures taken to respond to issues or concerns, or to incorporate knowledge and feedback from Indigenous Nations and communities.
- The status of OPG's Indigenous Relations Policy initiatives.
- The status of development and implementation of the corporate-wide IEP.
- The status of development and implementation of the Pickering NGS-specific engagement plan.

Requirements and expectations pertaining to OPG's application to refurbish PNGS units 5-8 and renew the operating licences of the PNGS and PWMF

[NOTE: This section is a placeholder for inclusion of any items that may result following consultation with Indigenous Nations and communities on this matter]

GENERAL

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-3.2.2	Indigenous Engagement, Version 1.2	2022

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1 SCA – MANAGEMENT SYSTEM

The management system SCA includes the following specific areas (SpAs):

- Management system
- Organization
- Performance assessment, improvement and management review
- Operating experience (OPEX), Problem Identification and Resolution (PI&R)
- Change management
- Safety Culture
- Configuration management
- Records management
- Supply and Contractor Management
- Business continuity

1.1 Management System

Licence Condition 1.1:

The licensee shall implement and maintain a management system.

Preamble:

Safe and reliable operation requires a commitment and adherence to a set of management system principles and, consistent with those principles, the establishment and implementation of processes that achieve the expected results.

A management system brings together in a planned and integrated manner the processes necessary to satisfy requirements and to carry out licensed activity in a safe manner. Management system requirements provide direction to management to develop and implement management practices and controls. The elements of a management system include areas such as organization structure and culture, resources, equipment, and information. The management system must satisfy the requirements set out in the regulations made pursuant to the *Nuclear Safety and Control Act*, the licence and the measures necessary to ensure that safety is paramount.

An adequately established and implemented management system provides CNSC staff with confidence and evidence that the licensing basis under which the Commission made its decision and had issued a licence, remains valid.

The management system must satisfy the requirements set out in the NSCA, regulations made pursuant to the NSCA, the licence and the measures necessary to ensure that safety is of paramount consideration in implementation of the management system. An adequately established and implemented management system provides CNSC staff confidence and evidence that the licensing basis remains valid.

Compliance Verification Criteria:

MANAGEMENT SYSTEM

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Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-CHAR-AS-0002	Nuclear Management System	PI	PNGS & PWMF
N-POL-0001	Nuclear Safety and Security Policy	TI	PNGS & PWMF
N-PROC-AS-0077	Nuclear Safety and Security Culture Assessment	TI	PNGS & PWMF
N-PROC-MP-0090	Engineering Change Control Process	TI	PNGS & PWMF
N-PROC-RA-0022	Processing Station Conditions Records	TI	PNGS & PWMF
N-PROC-RA-0035	Operating Experience Process	TI	PNGS & PWMF
N-PROG-AS-0001	Nuclear Management System Administration	TI	PNGS & PWMF
N-PROG-MP-0001	Engineering Change Control	TI	PNGS & PWMF
N-PROG-RA-0003	Performance Improvement	TI	PNGS & PWMF
N-PROG-RA-0010	Independent Assessment	TI	PNGS & PWMF
N-STD-AS-0020	Nuclear Management Systems Organizations	TI	PNGS & PWMF
N-STD-AS-0023	Nuclear Safety Oversight	TI	PNGS & PWMF
N-STD-MP-0027	Configuration Management	TI	PNGS & PWMF
N-STD-OP-0024	Nuclear Safety Configuration Management	TI	PNGS & PWMF
OPG-PROC-0166	Organization Design Change	TI	PNGS & PWMF
OPG-PROG-0001	Information Management	TI	PNGS & PWMF
OPG-PROG-0005	Environment Health and Safety Managed Systems	TI	PNGS & PWMF
OPG-PROG-0009	Items and Services Management	TI	PNGS & PWMF
OPG-PROG-0033	Business Continuity Program	TI	PNGS & PWMF
OPG-PROG-0038	Contractor Management	TI	PNGS & PWMF
OPG-PROG-0039	Project Management	TI	PNGS & PWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.1.2	Safety Culture	2018	Implemented at PNGS & PWMF
CSA	N286	Management system requirements for nuclear facilities	2012	Implemented at PNGS & PWMF

MANAGEMENT SYSTEM

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Organization

The licensee's organization, including names of persons assigned to positions, is subject to the requirements of Paragraph 15(c) of the *General Nuclear Safety and Control Regulations*, which requires the licensee to inform the CNSC of organizational changes within 15 days. In addition, there are annual reporting requirements in accordance with REGDOC 3.1.1 *Reporting Requirements for Nuclear Power Plants*. See LC 3.3 for more information on REGDOC 3.1.1.

Configuration Management

With regard to modifications, the design basis for the plant should be documented and maintained to reflect design changes to ensure adequate configuration management. See LC 5.1, 5.2 and 5.3 for more information regarding the plant design.

Business Continuity

Refer to LC 2.2 for more information on the minimum shift complement.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.1.1	Management System	2019
CSA	N286.0.1	Commentary on N286-12 Management System	2021
CSA	N286.10	Configuration Management for High Energy Reactor Facilities	2016
CSA	N290.8	Technical specification requirements for nuclear power plant components	2015
CSA	N299.1	Quality assurance program requirements for the supply of items and services for nuclear power plants, Category 1	2019
CSA	N299.2	Quality assurance program requirements for the supply of items and services for nuclear power plants, Category 2	2019
CSA	N299.3	Quality assurance program requirements for the supply of items and services for nuclear power plants, Category 3	2019
CSA	N299.4	Quality assurance program requirements for the supply of items and services for nuclear power plants, Category 4	2019

Safety Culture

The management system should be used to promote and support a healthy safety culture. The CNSC recognizes the following characteristics that form the framework for a healthy safety culture:

- Safety is a clearly recognized value;
- Accountability for safety is clear;
- Safety is integrated into all activities;

MANAGEMENT SYSTEM

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- A safety leadership process exists, and
- Safety culture is learning-driven.

2 SCA – HUMAN PERFORMANCE MANAGEMENT

The human performance management SCA includes the following SpAs:

- Human performance program
- Personnel training
- Personnel certification
- Work organization and job design
- Fitness for Duty

2.1 Human Performance Program

Licence Condition 2.1:

The licensee shall implement and maintain a human performance program.

Preamble:

The human performance program addresses and integrates the range of human factors that influence human performance, including but not limited to:

- The provision of qualified workers;
- The reduction of human error;
- Organizational support for safe work activities;
- The continuous improvement of human performance; and
- Monitoring hours of work.

It is important that the licensee continuously monitors human performance and takes steps to identify human performance weaknesses and mechanisms to improve human performance and reduce the likelihood of nuclear safety events that are attributable to human performance.

Human factors are factors that influence human performance as it relates to the safety of a nuclear facility or activity over all design and operations phases. These factors may include the characteristics of the person, task, equipment, organization, environment, and training. The consideration of human factors in issues such as interface design, training, procedures, and organization and job design may affect the reliability of humans performing tasks under various conditions.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-CMT-62808-00001	Continuous Behaviour Observations Program – Participant Materials – Workbook Components	TI	PNGS & PWMF
N-LIST-09110-10005	Listing of Broad Population and Safety	PI	PNGS & PWMF

HUMAN PERFORMANCE MANAGEMENT

	Sensitive Job Codes		
N-PROC-OP-0047	Hours of Work Limits and Managing Worker Fatigue	PI	PNGS & PWMF
N-PROG-AS-0002	Human Performance	TI	PNGS & PWMF
N-STD-OP-0002	Communications	TI	PNGS & PWMF
N-STD-OP-0012	Conservative Decision Making	TI	PNGS & PWMF
OPG-PROC-0208	Fitness for Duty: Policy on Managing Alcohol and Drug Use	TI	PNGS & PWMF
P-PLAN-01900-00006	Pickering Human Performance Strategic Plan	TI	PNGS & PWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.2.1	Human Performance, Version 2	2024	Implemented at PNGS & PWMF
CNSC	REGDOC-2.2.4	Fitness for Duty: Managing Worker Fatigue	2017	Implemented at PNGS & PWMF
CNSC	REGDOC-2.2.4	Fitness for Duty, Volume II: Managing Alcohol and Drug Use, Version 3	2021	Implemented at PNGS & PWMF
CNSC	REGDOC-2.2.4	Fitness for Duty, Volume III Nuclear Security Officer Medical, Physical, Psychological Fitness	2018	Implemented at PNGS & PWMF

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.2.5	Minimum Staff Complement	2019
CNSC	REGDOC-2.5.1	General Design Considerations: Human Factors	2019

The Human performance program should address and integrate the range of human and organizational factors that influence human performance, which include, but may not be limited to the following:

- The provision of qualified staff
 - Certification and training
 - Staffing
 - Minimum shift complement
- The reduction of human error
 - Human factors in design
 - Procedures development

HUMAN PERFORMANCE MANAGEMENT

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- Procedural compliance
- Work protection and work permit systems
- Shift turnover
- Pre- and post-job briefings
- Human actions in safety analysis
- Safe work strategies/practices
- Organizational factors that influence safety performance through support of safe work activities
 - Organization and management processes and safety culture
- The continuous improvement of human performance
- Fitness for duty
 - Hours of work and fatigue management

In addition to certified personnel, the licensee should implement and maintain fitness for duty requirements for all workers, including security personnel. Oversight requirements should also be identified for supervisors of certified and security personnel. Licensees should have in place a documented fitness-for-duty program that provides confirmation that any person filling a minimum shift complement position does not have a physical or mental limitation that would make the person incapable of performing the duties of the applicable position.

2.2 Minimum Shift Complement

Licence Condition 2.2:

The licensee shall implement and maintain the minimum shift complement and control room staffing.

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

The [General Nuclear Safety and Control Regulations](#), require that the licensee ensure the presence of a sufficient number of qualified workers at the nuclear facility.

The minimum shift complement specifies the numbers of qualified staff that are required to operate and maintain unit(s) safely under all operating states including normal operations, anticipated operational occurrences, design basis accidents and emergencies.

This licence condition ensures the presence at all times of a sufficient number of qualified workers to ensure safe operation of the reactor facility, and to ensure adequate emergency response capability.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-INS-03490-10003	Minimum Shift Complement Resources, Qualifications and Procedures Required for Responding to Resource Limiting Events	TI	PNGS
P-INS-09100-00003	Pickering Minimum Shift Complement	PI	PNGS
P-INS-09260-00008	Duty Crew Minimum Complement Assurance	PI	PNGS

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.2.5	Minimum Staff Complement	2019
CNSC	REGDOC-2.5.1	General Design Considerations: Human Factors	2019

A verification and validation plan documents the set of activities within a specific project that will be carried out to demonstrate that the human factors considerations of the project conform to accepted

HUMAN PERFORMANCE MANAGEMENT

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human factors principles. This will ensure that the licensee enables personnel to perform their tasks safely and to meet operational goals.

The adequacy of the minimum shift complement should be determined through a systematic analysis of the most resource-intensive conditions under all operating states, design basis accidents, and emergencies. The results of the analysis should then be validated to determine the degree to which the minimum shift complement facilitates the achievement of the overall safety goals.

OPG has implemented the Minimum Complement Coordination Program (MCCP) to monitor the minimum shift complement at Pickering NGS at all times, which helps to ensure that even short-term violations are prevented.

The licensee should provide a rolling five-year staffing plan of certified workers on an annual basis.

2.3 Training Programs

Licence Condition 2.3:

The licensee shall implement and maintain training programs for workers.

Preamble:

As defined by the *General Nuclear Safety and Control Regulations*, a worker is a person who performs work that is referred to in a licence. Workers include contractors and temporary employees; therefore, training requirements apply equally to these types of workers as to the licensee's own employees.

This licence condition provides the regulatory requirements for the development and implementation of training programs for workers. It also provides the requirements for training programs and processes necessary to support responsibilities, qualifications and requalification training of persons at the reactor facility and the waste management facility.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROC-TR-0008	Systematic Approach to Training	TI	PNGS & PWMF
N-PROG-TR-0005	Training	TI	PNGS & PWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.2.2	Personnel Training, Version 2	2016	Implemented at PNGS & PWMF

Guidance:

None.

2.4 Personnel Certification

Licence Condition 2.4:

The licensee shall implement and maintain certification programs in accordance with CNSC regulatory document REGDOC-2.2.3, *Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2*.

Workers who began an applicable initial training program in accordance with the requirements outlined in REGDOC-2.2.3, *Personnel Certification, Volume III: Certification of Persons Working at Nuclear Power Plants*, before January 31, 2025, may continue to be certified under requirements of this version until January 31, 2030.

Persons appointed to the following positions require certification:

- (i) Responsible Health Physicist;
- (ii) Shift Manager;
- (iii) Control Room Shift Supervisor; and
- (iv) Authorized Nuclear Operator.

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

This Licence Condition provides the regulatory requirements for the programs and processes to be implemented in support of the certification and the renewal of the certification of workers employed in designated positions, including those related to initial and continuing training, certification examinations, and requalification testing.

The licensee's governance describes the roles and responsibilities of workers employed in designated positions.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-INS-08920-10001	Requalification Testing of Certified Shift Personnel	TI	PNGS
N-INS-08920-10002	Simulator-Based Initial Certification Examinations for Shift Personnel	TI	PNGS
N-INS-08920-10004	Written and Oral Initial Certification Examination for Shift Personnel	PI	PNGS
N-MAN-08131-10000-CNSC-007	Shift Manager, Pickering Nuclear	PI	PNGS

HUMAN PERFORMANCE MANAGEMENT

N-MAN-08131-10000-CNSC-010	Authorized Nuclear Operators	PI	PNGS
N-MAN-08131-10000-CNSC-028	Control Room Shift Supervisor, Pickering Nuclear	PI	PNGS
N-MAN-08131-10000-CNSC-031	Responsible Health Physicist	PI	PNGS

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.2.3	Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2	2023	Implemented at PNGS

Personnel Certification

Conduct of Examinations and Tests for Certified Personnel

Currently, the following three CNSC internal documents contain the requirements for administering the certification examinations and requalification tests required by REGDOC-2.2.3 Volume III:

- CNSC-EG1, Rev.0: *“Requirements and Guidelines for Written and Oral Certification Examinations for Shift Personnel at Nuclear Power Plants”*;
- CNSC-EG2, Rev.0: *“Requirements and Guidelines for Simulator-based Certification Examinations for Shift Personnel at Nuclear Power Plants”*; and
- CNSC document: *“Requirements for the Requalification Testing of Certified Shift Personnel at Nuclear Power Plants, Revision 2”*.

Under a pilot program approved by CNSC staff (e-Doc 7111965), OPG may choose to administer the General Written Initial Certification Examinations (specified in CNSC-EG1) using a Multiple-Choice Question (MCQ) format. During this pilot program, the development, conduct, and marking of MCQ General initial certification examinations shall be in accordance with the following OPG document: N-INS-08920-10004, Written and Oral Initial Certification Examination for Shift Personnel.

Certified Workers During Proposed Refurbishment of Units 5-8

[PENDING COMMISSION ACCEPTANCE] The CNSC has accepted OPG’s certification plan (NK30-CORR-00531-62614) that describes an alternative approach to return certified workers to active status for the return to service of unit 5 during the proposed refurbishment project.

Guidance:

None.

3 SCA – OPERATING PERFORMANCE

The operating performance SCA includes the following SpAs:

- Conduct of licensed activity
- Procedures
- Reporting and trending
- Outage management performance
- Safe operating envelope
- Severe accident management and recovery
- Accident management and recovery

3.1 Operations Program

Licence Condition 3.1:

The licensee shall implement and maintain an operations program, which includes a set of operating limits.

Preamble:

The operations program establishes safe, uniform, and efficient operating practices within the reactor facility and waste management facility, under all operating conditions (routine and non-routine) and provides the ability to ensure the facility is operated in accordance with the licensing basis.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROC-MA-0013	Planned Outage Management	TI	PNGS
N-PROC-MA-0049	Forced Outage Management	TI	PNGS
N-PROG-AS-0008	Heavy Water Management	TI	PNGS
N-PROG-MA-0019	Production Work Management	TI	PNGS
N-PROG-OP-0001	Nuclear Operations	PI	PNGS & PWMF
N-STD-AS-0002	Procedure Use and Adherence	TI	PNGS & PWMF
N-STD-MP-0016	Safe Operating Envelope	PI	PNGS
N-STD-MP-0019	Beyond Design Basis Accident Management	PI	PNGS
N-STD-OP-0009	Reactivity Management	TI	PNGS
N-STD-OP-0011	Operations Performance Monitoring	PI	PNGS & PWMF
N-STD-OP-0017	Response to Transients	TI	PNGS

OPERATING PERFORMANCE

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Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-STD-OP-0021	Control of Fuelling Operations	TI	PNGS
N-STD-OP-0025	Heat Sink Management	TI	PNGS
N-STD-OP-0036	Operational Decision Making	TI	PNGS & PWMF
NA44-OPP-03600	Pickering NGS-A Operating Policies and Principles	PI	PNGS
NA44-OSR-08131.02-00001	Pickering A Operational Safety Requirements: Shutdown Systems	TI	PNGS
NA44-OSR-08131.02-00002	Pickering A Operational Safety Requirements: Negative Pressure Containment	TI	PNGS
NA44-OSR-08131.02-00003	Pickering A Operational Safety Requirements: Fuel and Reactor Physics	TI	PNGS
NA44-OSR-08131.02-00004	Pickering A Operational Safety Requirements: Emergency Coolant Injection System	TI	PNGS
NA44-OSR-08131.02-00005	Pickering A Operational Safety Requirements: Boiler Emergency Cooling System	TI	PNGS
NA44-OSR-08131.02-00006	Pickering A Operational Safety Requirements: Emergency Boiler Water Supply System	TI	PNGS
NA44-OSR-08131.02-00007	Pickering A Operational Safety Requirements: Feedwater System	TI	PNGS
NA44-OSR-08131.02-00008	Pickering A Operational Safety Requirements: Service Water Systems	TI	PNGS
NA44-OSR-08131.02-00009	Pickering A Operational Safety Requirements: Powerhouse Emergency Venting System	TI	PNGS
NA44-OSR-08131.02-00010	Pickering A Operational Safety Requirements: Main Steam Supply System	TI	PNGS
NA44-OSR-08131.02-00011	Pickering A Operational Safety Requirements: Shutdown Cooling System	TI	PNGS
NA44-OSR-08131.02-00012	Pickering A Operational Safety Requirements: Moderator System	TI	PNGS
NA44-OSR-08131.02-00013	Pickering A Operational Safety Requirements: Heat Transport System	TI	PNGS

OPERATING PERFORMANCE

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Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
NA44-OSR-08131.02-00014	Pickering A Operational Safety Requirements: Reactor Regulating System	TI	PNGS
NA44-OSR-08131.02-00015	Pickering A Operational Safety Requirements: Electrical Power System	TI	PNGS
NA44-OSR-08131.02-00016	Pickering NGS-A Annulus Gas System	TI	PNGS
NA44-OSR-08131.02-00017	Pickering NGS-A Operational Safety Requirements: Fuel Handling System & Irradiated Fuel Bays	TI	PNGS
NA44-OSR-08131.02-00018	Pickering NGS-A Critical Safety Parameter Monitoring Instrumentation	TI	PNGS
NA44-OSR-08131.02-00019	Pickering NGS-A Operational Safety Requirements: Shield Cooling Systems	TI	PNGS
NA44-OSR-08131.02-00021	Pickering NGS-A Operational Safety Requirements: Interstation Transfer Bus (ISTB)	TI	PNGS
NA44-OSR-08131.02-00022	Pickering Nuclear 1-4 Operational Safety Requirements: Powerhouse Environmental Protection System	TI	PNGS
NK30-OPP-03600	Pickering NGS-B Operating Policies and Principles	PI	PNGS
NK30-OSR-08131.02-00001	Pickering B Operational Safety Requirements: Emergency Coolant Injection System	TI	PNGS
NK30-OSR-08131.02-00002	Pickering B Operational Safety Requirements: Fuel and Reactor Physics	TI	PNGS
NK30-OSR-08131.02-00003	Pickering B Operational Safety Requirements: Negative Pressure Containment	TI	PNGS
NK30-OSR-08131.02-00004	Pickering B Operational Safety Requirements: Shutdown Systems	TI	PNGS
NK30-OSR-08131.02-00005	Pickering B Operational Safety Requirements: Boiler Emergency Cooling System	TI	PNGS
NK30-OSR-08131.02-00006	Pickering B Operational Safety Requirements: Feedwater System	TI	PNGS

OPERATING PERFORMANCE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
NK30-OSR-08131.02-00007	Pickering B Operational Safety Requirements: Emergency Water Supply System	TI	PNGS
NK30-OSR-08131.02-00008	Pickering B Operational Safety Requirements: Service Water Systems	TI	PNGS
NK30-OSR-08131.02-00009	Pickering B Operational Safety Requirements: Main Steam Supply System	TI	PNGS
NK30-OSR-08131.02-00010	Pickering B Operational Safety Requirements: Moderator System	TI	PNGS
NK30-OSR-08131.02-00011	Pickering B Operational Safety Requirements: Powerhouse Emergency Venting System	TI	PNGS
NK30-OSR-08131.02-00012	Pickering B Operational Safety Requirements: Shutdown Cooling System	TI	PNGS
NK30-OSR-08131.02-00013	Pickering B Operational Safety Requirements: Heat Transport System	TI	PNGS
NK30-OSR-08131.02-00014	Pickering B Operational Safety Requirements: Emergency Power Supply	TI	PNGS
NK30-OSR-08131.02-00015	Pickering B Operational Safety Requirements: Reactor Regulating System	TI	PNGS
NK30-OSR-08131.02-00017	Pickering B Operational Safety Requirements: Group 1 Electrical Power Supplies	TI	PNGS
NK30-OSR-08131.02-00018	Pickering B Operational Safety Requirements: Fuel Handling & Irradiated Fuel Bays	TI	PNGS
NK30-OSR-08131.02-00019	Pickering NGS Operational Safety Requirements: HPECI Power Supplies	TI	PNGS
NK30-OSR-08131.02-00020	Pickering B Operational Safety Requirements: Annulus Gas System	TI	PNGS
NK30-OSR-08131.02-00021	Pickering B Operational Safety Requirements: Critical Safety Parameter monitoring Instrumentation	TI	PNGS
NK30-OSR-08131.02-00022	Pickering B Operational Safety Requirements: Shield Cooling System	TI	PNGS
W-PROG-WM-0001	Nuclear Waste Management	PI	PWMF

OPERATING PERFORMANCE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
92896-OPP-01911.1-00001	Operating Policies and Principles, Pickering Waste Management Facility	PI	PWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.3.2	Accident Management, Version 2	2015	Implemented at PNGS
CSA	N290.15	Requirements for the safe operating envelope for nuclear power plants	2019	Implemented at PNGS

¹ OPG has implemented CSA N292.0:24 at the PWMF except for clause 12.7.3.4 and has committed to fully implement this standard by December 31, 2028.

Outage Management Performance

The outage management performance SpA includes topics that are discussed as part of several LCs, including:

- Management system (LC 1.1);
- Regulatory undertakings (LC 3.3);
- Fitness for service (LC 6.1);
- Radiation protection (LC 7.1);
- Conventional health and safety (LC 8.1);

Integrated Accident Management and Recovery (Severe Accident Management and Recovery and Accident Management and Recovery)

OPG maintains a set of severe accident management guidelines (SAMGs) and Emergency Mitigating Equipment Guidelines (EMEGs). While not listed as in the table of “Licensee Documents that Require Notification of Change”, these documents shall be subject to notification of change and shall be reviewed by CNSC staff to confirm they remain within the licensing basis, in accordance with LC G.1 and G.2.

Commissioning dry storage containers containing minimum 6-year cooled fuel

OPG is authorized to process and store a maximum of 100 dry storage containers containing used fuel at a time that has been cooled in wet storage at the Pickering Nuclear Generating Station for a minimum of 6 years.

OPERATING PERFORMANCE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.3.4	Operations Programs for Reactor Facilities	2025
CSA	N290.11	Requirements for reactor heat removal capability during outage of nuclear power plants	2021
CSA	N290.16	Requirements for Beyond Design Basis Accidents	2016

Procedures

REGDOC-2.5.1 *General Design Consideration: Human Factors* describes the elements of effective human factors verification and validation planning, including a suggested format for documenting these elements.

A verification and validation plan documents the set of activities within a specific project that will be carried out to demonstrate that the human factors considerations of the project conform to accepted human factors principles. This will ensure that the licensee enables personnel to perform their tasks safely and to meet operational goals.

Outage Management Performance

The outage program should have designated criteria that the licensee will follow to confirm that planned and discovery work has been satisfactorily completed during the planned outage, and that all safety-significant structures, systems and components (SSCs) are available to ensure the continued safe operation of the facility.

CNSC staff located at the site offices should be invited to the restart meetings in order to verify that all appropriate reviews for restart of the reactor have occurred.

Outage completion assurance statement should describe the status of all planned work, including activities that were identified in the notification of regulatory undertakings but not completed.

Integrated Accident Management and Recovery (Severe Accident Management and Recovery and Accident Management and Recovery)

Lessons learned from drills, exercises and OPEX, including insights from deterministic and probabilistic analyses, should be incorporated into severe accident analysis and SAMGs updates.

OPERATING PERFORMANCE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

3.2 Approval to restart after a serious process failure

Licence Condition 3.2:

The licensee shall not restart a reactor after a serious process failure without the prior written approval of the Commission, or the prior written consent of a person authorized by the Commission.

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

A serious process failure and its related definitions are defined, as follows:

- Serious process failure – With respect to CANDU reactor facilities, a failure that leads or that could lead, in the absence of action by any special safety system, to significant fuel damage or a significant release from the CANDU reactor facility.
- Significant fuel damage – An event or situation that brought the fuel (>1%) outside of its fitness for service limits.
- Significant release – A release of radioactive material that results in an effective dose, received by or committed to a typical member of the critical group, in excess of 0.5 millisievert.

The definition of serious process failure can also be found in CNSC regulatory document REGDOC-3.6, *Glossary of CNSC Terminology*.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROG-MP-0014	Reactor Safety Program	TI	PNGS
N-STD-OP-0017	Response to Transients	TI	PNGS

Serious process failures are reportable in accordance with REGDOC-3.1.1, See LC 3.3. When an event is found to be a serious process failure or where the determination as to the cause and/or extent of condition has proved inconclusive (i.e. a serious process failure cannot be ruled out), a request for restart of the reactor shall be submitted in writing and approval to restart the reactor must be obtained from the CNSC.

If there is sufficient assurance that the cause of the serious process failure has been resolved and it is now safe to return the facility to service, a CNSC authorized person has the authority to give the consent to the licensee to proceed with the restart of the reactor. Refer to section G.1 of this LCH for details on delegation of authority.

The written request for restart of the reactor shall include the following information:

- Description of the event;

OPERATING PERFORMANCE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

- Causes of the event;
- Consequences and safety significance of the event;
- Recovery plan including corrective actions, and fitness for service assessment on the systems/components impacted from the failure if applicable, which shall be completed prior to reactor restart;
- A statement regarding plant readiness to resume safe operation, which shall include any conditions that the licensee proposes to impose upon reactor restart and/or subsequent reactor operation to ensure safe operation of the reactor facility; and
- Extent of completion of the conditions mentioned in the statement regarding plant readiness to resume safe operation.

Guidance:

In addition to the requirements listed above, the written request to restart a reactor after a serious process failure should also include the following information:

- A statement specifying that an assessment of the extent of condition which led or contributed to a serious process failure has been completed;
- Documentation and communication to licensee staff addressing the root cause analysis, corrective actions and plant readiness to resume operation (including additional training, if necessary); and,
- Applicable historical Operating Experience (OPEX) for review for comparable events (OPEX is further described in LC 1.1).

3.3 Reporting Requirements

Licence Condition 3.3:

The licensee shall notify and report for the reactor facility in accordance with CNSC regulatory document REGDOC 3.1.1, *Reporting Requirements for Nuclear Power Plants* and for the waste management facility in accordance with REGDOC 3.1.2, *Reporting Requirements, Volume 1: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*.

Preamble:

CNSC regulatory documents REGDOC-3.1.1 and REGDOC 3.1.2 have comprehensive reporting requirements (scheduled and unscheduled) for operation of nuclear power plants and waste management facilities. They describe information that the CNSC needs to evaluate the performance of the facilities it regulates. These documents are complementary to the reporting requirements in the *Nuclear Safety and Control Act* and the associated regulations, as well as to the additional reporting that may be required by specific projects and activities.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROC-RA-0005	Written Reporting to Regulatory Agencies	TI	PNGS & PWMF
N-PROC-RA-0020	Preliminary Event Notification	TI	PNGS & PWMF
N-PROG-RA-0003	Performance Improvement	TI	PNGS & PWMF
N-PROG-RA-0002	Conduct of Regulatory Affairs	TI	PNGS & PWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-3.1.1	Reporting Requirements for Nuclear Power Plants, Version 3	2024	Implemented at PNGS
CNSC	REGDOC 3.1.2	Reporting Requirements, Volume 1: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills, Version 1.1	2022	Implemented at PWMF

Reporting Requirements for the Pickering Waste Management Facility

The licensee shall submit an annual compliance report by March 31 of each year, covering the operation for the 12-month period from January 1 to December 31 of the previous year that meets the requirements of REGDOC-3.1.2, *Reporting Requirements, Volume 1: Non-Power Reactor Class I Nuclear*

OPERATING PERFORMANCE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Facilities and Uranium Mines and Mills. The report shall include all of the information listed in Appendix B of REGDOC-3.1.2 for the SCAs that are applicable to the waste management facility.

Guidance:

None.

OPERATING PERFORMANCE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

3.4 Periodic Safety Review

Licence Condition 3.4:

The licensee shall conduct, and submit results of, a periodic safety review at least every 10 years and implement the associated integrated implementation plan.

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

In accordance with subsection 8.01(1) of the *Class I Nuclear Facilities Regulations*, every licensee who is licensed to operate a nuclear power plant must conduct a periodic safety review (PSR) of the nuclear power plant at an interval specified in the licence (10 years). The PSR process requires OPG to submit a PSR basis document, safety factor reports, a global assessment report, and an Integrated Implementation Plan (IIP). An IIP is an output of the PSR that contains commitments and timeframes for implementation.

Compliance Verification Criteria:

The licensee shall conduct a PSR at least every 10 years in accordance with CNSC regulatory document REGDOC-2.3.3, Periodic Safety Reviews, and implement the associated IIP.

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROC-MA-0109	Periodic Safety Review (PSR)	TI	PNGS

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.3.3	Periodic Safety Reviews	2015	Implemented at PNGS

OPG is currently conducting PSR3, results of which will be documented in an associated global assessment report (GAR) and IIP. OPG has committed to submit the IIP to CNSC staff for acceptance by August 31, 2027.

For each calendar year where an IIP is implemented, the licensee shall submit an annual report on the status of all Pickering IIP commitments, in the first quarter of the following year.

Guidance:

When conducting a PSR, the licensee should refer to CSA standard N290.18, *Periodic safety review for nuclear power plants (2017)*, and IAEA, *Specific Safety Guide No. SSG-25 - Periodic Safety Review for Nuclear Power Plants (2013)* for further guidance.

OPERATING PERFORMANCE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

OPG and CNSC staff have bilaterally issued a Periodic Safety Review (PSR3) protocol which provides an administrative agreement that details interactions between the CNSC staff and OPG for the production and review of information by both parties to support the PSR3.

OPERATING PERFORMANCE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

4 SCA – SAFETY ANALYSIS

The safety analysis SCA includes the following SpAs:

- Deterministic safety analysis
- Hazard analysis
- Probabilistic safety analysis (PSA)
- Criticality safety
- Severe accident analysis
- Management of safety issues (including R&D)

4.1 Safety Analysis Program

Licence Condition 4.1:

The licensee shall implement and maintain a safety analysis program.

Preamble:

The implementation and maintenance of a safety analysis program includes a process to identify and assess hazards and risks on an ongoing basis. This includes identifying and evaluating new or unforeseen risks that were not considered at the planning and design stages and updating previous risk assessments by replacing important assumptions with performance data. The results of this process will be used to set objectives and targets and to develop preventative and protective measures.

The safety analysis program covers both the nuclear power plant and waste management facility. It includes deterministic and probabilistic safety analyses for the nuclear power plant and deterministic safety analysis for the waste management facility.

A deterministic safety analysis evaluates a nuclear power plant's or the waste management facility's responses to events by using appropriate rules, models and assumptions. Deterministic safety analysis allows predicting extent of potential loads, such as temperatures and pressures, on reactor system and structures in assumed accident scenarios.

A probabilistic safety assessment (PSA) is a comprehensive and integrated assessment of the safety of the nuclear power plant that, by considering the initial plant state and the probability, progression, and consequences of equipment failures and operator response, derives numerical estimates of a consistent measure of the safety of the plant. Such assessments are most useful in assessing the relative level of safety.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROC-MP-0086	Safety Analysis Basis and Safety Report	TI	PNGS

SAFETY ANALYSIS

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

N-PROG-MP-0006	Software	TI	PNGS & PWMF
N-PROG-MP-0014	Reactor Safety Program	TI	PNGS & PWMF
N-PROG-RA-0016	Risk and Reliability Program	TI	PNGS
N-STD-MP-0019	Beyond Design Basis Accident Management	PI	PNGS
N-STD-RA-0034	Preparation, Maintenance and Application of Probabilistic Risk Assessment	TI	PNGS
NA44-SR-01320-00001	Pickering A Safety Report (Part 1 and 2)	TI	PNGS
NA44-SR-01320-00002	Pickering Nuclear 1-4 Safety Report: Part 3 – Accident Analysis	TI	PNGS
NK30-SR-01320-00001	Pickering B Safety Report - Part 1	TI	PNGS
NK30-SR-01320-00002	Pickering B Safety Report - Part 2	TI	PNGS
NK30-SR-01320-00003	Pickering Nuclear 5-8 Safety Report: Part 3 - Accident Analysis	TI	PNGS
92896-REP-01320-00019	Pickering Component Storage Structure Safety Assessment ¹	PI	PWMF
92896-REP-01320-00024	Safety Assessment for PWMF Storage Building 5 with 1410 Dry Storage Containers ¹	PI	PWMF
92896-REP-01320-00023	Safety Assessment for PWMF Storage Building 5 with 1200 Dry Storage Containers ¹	PI	PWMF
92896-SR-01320-10002	Pickering Waste Management Facility – Safety Report	PI	PWMF
92896-SR-01320-10002-ADD01	Pickering Waste Management Facility – Safety Report Addendum for Minimum Six-Year Cooled Fuel	PI	PWMF

¹ These documents will remain noted in the LCH until fully incorporated into the PWMF Safety Report.

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.4.1	Deterministic Safety Analysis	2014	Implemented at PNGS
CNSC	REGDOC-2.4.2	Probabilistic Safety Assessment (PSA) for Nuclear Power Plants	2014	Implemented at PNGS
CNSC	REGDOC-2.4.2	Probabilistic Safety Assessment (PSA) for Nuclear Power Plants	2022	2032-12-31 ¹ at PNGS
CNSC	REGDOC-2.4.4	Safety Analysis for Class 1B Nuclear Facilities	2022	2028-12-31 ² at PWMF

SAFETY ANALYSIS

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

CNSC	REGDOC-2.4.5	Nuclear Fuel Safety and Qualification	2024	Implemented at PNGS
CSA	N286.7	Quality assurance of analytical, scientific and design computer programs	2016	Implemented at PNGS & PWMF

¹ Future PSA activities will be conducted in accordance with this version and full compliance will be achieved by the end of 2032 following update of PNGS PSAs.

² OPG's next PWMF safety analysis report must be submitted to CNSC in 2028, which is expected to meet the requirements of REGDOC-2.4.4.

Safety Analysis for the Pickering Nuclear Generating Station

Deterministic Safety Analysis

The licensee shall conduct and maintain a deterministic safety analysis in accordance with applicable requirements and reflecting the actual plant design and conditions. The deterministic safety analysis must demonstrate that the radiological consequences of the postulated initiating events involving a single process failure and events involving a single process failure in conjunction with failure of one of the special safety systems do not exceed the accident-dependent reference public dose limits in the table below.

	Individual Dose Limit		Population Dose Limit	
	Thyroid Dose (mSv)	Whole Body Dose (mSv)	Thyroid Dose (Person mSv)	Whole Body Dose (Person mSv)
Single Failure	30	5	10 ⁵	10 ⁵
Dual Failure	2500	250	10 ⁷	10 ⁷

OPG, along with industry partners, has developed a set of derived acceptance criteria (DAC) for slow events, as documented in COG-13-9035-R00, *Derived Acceptance Criteria for Deterministic Safety Analysis*. These DAC were reviewed and accepted by CNSC staff (e-Doc 4981431) and shall be used by OPG when conducting deterministic safety analysis.

Implementation Strategy for REGDOC-2.4.1

The Pickering reactors are designed to standards and regulatory requirements that pre-date the issuing of REGDOC-2.4.1. Where compliance with the requirements (e.g., the single failure criterion (SFC)) cannot be demonstrated by the existing design, the REGDOC-2.4.1 requirements should be applied commensurate with risk, such as permitted in Canadian Standards Association CSA N286-12, recognizing the existing design basis.

These include:

- When demonstrating Level 3 DiD for Design Basis Accidents (DBAs)
 - Apply the SFC by selecting the SFC from the active components that are required to change state for each acceptance criterion.
 - For system availability, sensitivity cases instead of the SFC applying the minimum allowable performance, which accounts for the withdrawal from service of components for limited

SAFETY ANALYSIS

periods for maintenance, testing, inspection, or repair (MTIR) by selecting components unavailable as assessed in the operational limits and conditions.

- For Anticipated Operating Occurrences (AOOs)
 - Assess operating experience to establish whether the facility had a consequential radioactive release and remains operable.
 - Assess Level 2 system actions, if necessary, using realistic operating conditions.
- For each hazard Postulated Initiating Event, classify credible external events into the AOO, DBA and Design Extension Condition classes using event-specific standards and guidelines that are consistent with the existing design basis of the plant.

OPG provides annual updates on their progress to fully implement REGDOC 2.4.1. OPG updated its implementation plan in 2024 to account for its life extension project of Units 5-8 and the shutdown/ of Pickering Units 1-4 (N-CORR-00531-24266, e-Doc 7427475).

The existing OPG Safety Report Update process *N-PROC-MP-0086* shall be followed to comply with the regulatory requirement of updating Safety Reports NA44-SR-01320-00002 and NK30-SR-01320-00003. If significant design or operational changes are to be made to the plant, the licensee shall update the deterministic safety analysis, while following requirements of REGDOC-2.4.1.

Additional Requirements

During the 2024 revision to REGDOC-3.1.1 (version 3), the frequency for revisions to the safety analysis report was removed anticipating a revision to REGDOC-2.4.1 where this information was intended to be documented. This rationale, to avoid duplicating reporting requirements between REGDOC-3.1.1 and topic-specific technical regulatory documents, was presented to the Commission in CMD 24-M4 (e-Doc 7215205). CNSC staff continue to plan to incorporate this information in the next revision of REGDOC-2.4.1, as the following requirement was never intended to be removed and is still applicable to the Pickering NGS.

“The licensee shall file an updated facility description and final safety analysis report for the site within five years of the date of the previous submission or when requested to do so by the CNSC.”

Probabilistic Safety Assessment (PSA)

As per REGDOC 2.4.2, the licensee shall update the PSA models every 5 years or sooner if the facility undergoes major design or operational changes. CNSC staff have accepted (e-Doc # 7606088) OPG’s proposed schedule for submission of Pickering NGS-B PSA updates during the planned refurbishment of units 5-8:

- **By end of 2027** – Update to the Hazard Screening Analysis and Non-Reactor Source PSA.
- **By end of 2029** – Interim update to support the restart of unit 5, 6, and 7 post-refurbishment.
- **By end of 2032** – Complete PSA update reflecting post-refurbishment end-state of all units.

Severe Accident Analysis

Severe accidents represent the set of accidents under beyond design basis accidents (BDBA) that involve significant fuel degradation, either in-core or in fuel storage. Severe accident analysis is performed to identify and characterize these types of accidents to ensure the design is balanced such that no particular

SAFETY ANALYSIS

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

design feature or event makes a dominant contribution to the frequency of severe accidents. The analysis can identify challenges to the plant presented by such events and identify equipment that can be included in the severe accident management guidelines.

The following can be considered as analysis of BDBA:

- Analysis of low-probability ($<10^{-5}$) dual-failure events included in the current Safety Reports;
- Recent assessments that consider the conditions beyond the plant original design basis (e.g., sensitivity cases recently performed for low-probability CME);
- MAAP-CANDU severe accident analyses as part of Level 1 and Level 2 PSA;
- MAAP-CANDU severe accident analyses to support the severe accident management technical basis; and
- BDBA/severe accident assessments (e.g., for in-vessel retention, hydrogen control and mitigation, containment performance, etc.) to address post-Fukushima questions and demonstrate the effectiveness of the design complementary features, including post-Fukushima enhancements for severe accident prevention, mitigation, and management.

Management of Safety Issues (including R&D Programs)

OPG is expected to continue R&D activities related to the performance of Passive Autocatalytic Recombiners (PARs) in H₂ and D₂ environments, steel oxidation and hydrogen/deuterium production, MAAP-CANDU modeling improvements, in-vessel retention, hydrogen source term estimation, and long-term monitoring capability for SAM. Completion of these R&D activities will strengthen capability of the nuclear power plant to withstand severe accident conditions. CNSC staff will track progress on the ongoing R&D topics through either site-specific action items or annual reporting under REGDOC-3.1.1.

Safety Analysis for the Pickering Waste Management Facility

The licensee shall carry out safety analysis for the waste management facility to demonstrate that all events and event sequences which can occur in the facility are analyzed to ensure safe operation.

The licensee holds the responsibility for ensuring that the safety analysis is accurate and meets the regulatory requirements, and shall maintain adequate capability to perform or procure safety analysis.

Every five years, OPG shall review and revise, if necessary, the safety analysis report for the facility, to confirm that the document accurately captures the condition of the facility, and that it remains valid and continues to meet safety goals, safety objectives and acceptance criteria. The revised safety analysis report shall be submitted to CNSC staff for review.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.4.3	Nuclear Criticality Safety, Version 1.1	2020
CSA	N290.17	Probabilistic Safety Assessment for Nuclear Power Plants	2023

SAFETY ANALYSIS

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

ASME	ASME/ANS RA-Sa-2013	Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications, Addenda ASME/ANS RA-Sb-2013	2013
COG	06-9012	Guidelines for Application of the Best Estimate Analysis and Uncertainty (BEAU) Methodology to Licensing Analysis	R01
COG	08-2078	Principles and Guidelines for NOP/ROP Trip Setpoint Analysis for CANDU Reactors	R00
COG	09-9030	Principles & Guidelines For Deterministic Safety Analysis	R03
COG	11-9023	Guidelines for Application of the LOE/ROE Methodology to Deterministic Safety Analysis	R01
IAEA	SSG-3 (Rev. 1)	Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants	2024
IAEA	SSG-4	Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants	2010

Deterministic Safety Analysis

The licensee should use the detailed methodologies and derived acceptance criteria for the conduct of deterministic safety analysis described in the COG documents included as guidance publications.

Updates to deterministic safety analysis should contain a revision summary sheet highlighting the key differences between the existing analyses and updated analysis. The revision summary should include:

- Summary of changes (key differences):
 - In acceptance criteria;
 - In event characterization;
 - In safety analysis assumptions;
 - In methodology, or in elements of a methodology;
 - In plant models;
 - In use of computer codes and embedded models;
 - In trip coverage.
- Reasons for updating the analysis and for updating models, assumptions, initial conditions or boundary conditions;
- Significance of changes, and their justification;
- Significant changes in results that may affect the conclusions of the analysis for the design; operational or emergency safety requirements for a particular situation or event; and
- Impact on operating and safety margins.

The licensee should maintain a Safety Report Basis consisting of Analysis of Record Items and supporting documents. The licensee should continue to provide CNSC staff with regular updates of the Analysis of Record indicating the submissions to be included in the next Safety Report update (Part 3).

SAFETY ANALYSIS

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

When the deterministic safety analysis methodology is modified as a result of improved knowledge, or to address emerging issues, the licensee should assess the impact of such a modification on the operating limits, as well as procedural and administrative rules.

The licensee should not credit results obtained with a modified safety analysis methodology to relax operating conditions and/or change safety margins until the modification of the methodology has been reviewed by CNSC staff. If CNSC staff indicates that the modified methodology is appropriate, the licensee must still fulfill any other requirements or criteria associated with the changes to the operating conditions or safety margins. General criteria that CNSC will consider when reviewing such methodologies are provided in LC G.2.

In addition to industry standards, CNSC staff will refer to the applicable industry verification and validation process practices related to computer codes and software used to support the safe plant operation.

Severe Accident Analysis

Documentation of severe accident (also referred to as beyond design basis accident) analyses and assessments is currently not consolidated and centralized. REGDOC-2.4.1 section 4.5 provides the requirements for safety analysis documentation; however, the licensee should consider consolidating the existing and new analyses to improve the integration, maintenance, control and further updates to facilitate the regulatory review and verification.

5 SCA – PHYSICAL DESIGN

The physical design SCA includes the following SpAs:

- Design governance
- Site characterization
- Facility design
- Structure design
- System design
- Component design (addressed under System design)

5.1 Design Program

Licence Condition 5.1:

The licensee shall implement and maintain a design program.

Preamble:

A design program ensures that the nuclear power plant and waste management facility design is managed using a well-defined systematic approach.

Implementing and maintaining a design program confirms that safety-related SSCs and any modifications to them continue to meet their design bases given new information arising over time and taking changes in the external environment into account. It also confirms that SSCs continue to be able to perform their safety functions under all plant states. An important cross-cutting element of a design program is design basis management.

A design program should be composed of elements that consider topics including but not limited to: pressure boundary design, civil structure design, seismic design, mechanical design, fuel design, core nuclear design, core thermal-hydraulic design, safety system design, fire protection design, electrical power system design, instrumentation and control system design, as well as equipment and structure qualification.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROG-MA-0016	Fuel	TI	PNGS
N-PROG-MP-0001	Engineering Change Control	TI	PNGS & PWMF
N-PROG-MP-0006	Software	TI	PNGS & PWMF
N-PROG-MP-0009	Design Management	TI	PNGS & PWMF
N-STD-MP-0027	Configuration Management	TI	PNGS & PWMF
N-STD-MP-0028	Conduct of Engineering	TI	PNGS & PWMF

PHYSICAL DESIGN

W-STD-WM-0006	Planning for Decommissioning	TI	PNGS & PWMF
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Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CSA	N290.12	Human factors in design for nuclear power plants	2023	Implemented at PNGS
CSA	N290.14	Qualification of Digital Hardware and Software for Use in Instrumentation and Control Applications for Nuclear Power Plants	2015	Implemented at PNGS
CSA	N291	Requirements for safety-related structures for CANDU nuclear power plants	2008	Implemented at PNGS
CSA	N291	Requirements for nuclear safety-related structures	2019	2027-01-01 at PNGS

Design Governance

OPG shall continue providing the CNSC with the code-over-code reviews conducted for any subsequent editions, addendums and/or updates of the codes and standards that were agreed upon, with OPG's assessment of the changes and their significance upon completion of the review and assessment of significance. OPG is required to submit such assessments on an annual basis. N-LIST-00590-00001, *List of Significant Technical Changes from Code-Over-Code Review*, identifies which requirements shall apply to design modifications.

The licensee shall ensure that facility design and changes to plant design are accurately reflected in the safety analysis. Furthermore, the licensee shall ensure that plant status changes (design modifications) are controlled such that the plant is maintained and modified within the limits prescribed by the design and licensing basis.

Aspects of design are considered safety and control measures if changes to them would:

- Invalidate the limits documented in the operating policies and principles or safe operating envelope referred to in LC 3.1,
- Introduce hazards different in nature or greater in probability or consequence than those considered by the safety analyses and probabilistic safety assessment and/or,
- Adversely impact other important safety and control measures, such as those related to operations, radiation protection, emergency preparedness, etc.

The licensee shall ensure that any changes to those aspects remain within the limits established by the licensing basis. Changes affecting the licensing basis (including those that would invalidate limits or introduce different hazards) require prior written approval by the Commission. The design program should minimize the potential for human error and promote safe and reliable system performance through the consideration of human factors in the design of facilities, systems, and equipment.

PHYSICAL DESIGN

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

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For proposed modifications, modern requirements that are consistent with the current licensing basis of the plant shall be applied to the extent practicable.

Facility Design

The licensee document that contains the facility description and the final safety analysis report is cited under LCs G.3 and 4.1, respectively.

System Design

Special Safety Systems (SSS)

Modification of the special safety systems (Shutdown System 1, Shutdown System 2, Emergency Core Cooling System and Containment System) or significant changes to systems connected to the special safety systems would require prior notification and engagement of CNSC. Changes of the licensing basis in a potentially unsafe direction would require prior written notification. Prior notification is not required for changes to items that serve the same functional characteristics of the originally designed item and does not result in a change to operating procedures or safety system testing.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.5.1	General Design Considerations: Human Factors	2019
CNSC	REGDOC-2.5.2	Design of Reactor Facilities: Nuclear Power Plants, Version 2.1	2023
CSA	N290.0	General Requirements for Safety Systems of Nuclear Power Plants	2017
CSA	N290.1	Requirements for the shutdown systems of nuclear power plants	2013
CSA	N290.2	Requirements for emergency core cooling systems for nuclear plants	2017
CSA	N290.3	Requirements for the containment system of nuclear power plants	2022
CSA	N290.4	Requirements for reactor control systems of nuclear power plants	2019
CSA	N290.5	Requirements for electrical power and instrument air systems of CANDU nuclear power plants	2016
CSA	N290.6	Requirements for monitoring and display of nuclear power plant safety functions in the event of an accident	2016

Design Governance

The design program should include, but is not limited to the following:

PHYSICAL DESIGN

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

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- Safety objectives, which include general nuclear safety objectives, radiation protection objectives, technical safety objectives and environmental protection objectives;
- Safety goals, which include qualitative and quantitative safety goals, core damage frequency, and small and large release frequencies;
- The identification of the design authority for the overall design (see also SpA for Organization under LC 1.1.). The design authority should have the authority to review, verify, approve (or reject), document the design changes and maintain design configuration control;
- The design approach for defence-in-depth including the approach adopted to include multiple and (to the extent practicable) independent levels and barriers for defence for all operational states including accidents;
- A systematic process throughout the design phase to show that the design meets all relevant safety requirements, and that the plant design process has followed proven engineering practices;
- Fundamental safety functions incorporated into the design including SSCs used to perform necessary safety functions; and
- Considerations for robustness against malevolent acts.

5.2 Pressure Boundary Program

Licence Condition 5.2:

The licensee shall implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency.

Preamble:

Pressure boundary is defined as a boundary of any pressure-retaining vessel, system or component of a nuclear or non-nuclear system, where the vessel, system or component is registered or eligible for registration.

A pressure boundary program is comprised of the many programs, processes and procedures and associated controls that are required to ensure compliance with all the requirements of CSA N285.0.

This LC also ensures that the Authorized Inspection Agency (AIA) will be subcontracted directly by the licensee. An AIA is an organization recognized by the CNSC as authorized to register designs and procedures, perform inspections, and other functions and activities as defined by the CSA N285.0 and its applicable referenced publications (e.g. CSA B51, ASME Boiler & Pressure Vessel Code, National Board Inspection Code). The AIA is accredited by the American Society of Mechanical Engineers (ASME) as stipulated by NCA-5121 of the ASME Boiler & Pressure Vessel Code. In order for the licensee to fulfill its obligations under this licence condition, it must obtain the services of an AIA to perform activities as defined by the relevant standards.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-CORR-00531-20012	Authorized Inspection Agency for Pressure Boundary Inspection and Registration Services	PI	PWMF
N-CORR-00531-22359	Authorized Inspection Agency Service Agreement	PI	PNGS
N-CORR-00531-24236	Amendment – Authorized Inspection Agency for Pressure Boundary Inspection and Registration Services	TI	PNGS
N-LIST-00531-10003	Index to OPG Pressure Boundary Program Elements	TI	PNGS & PWMF
N-MAN-01913.11-10000	Pressure Boundary Program Manual	TI	PNGS & PWMF
N-PROC-MP-0040	System and Item Classification	PI	PNGS & PWMF
N-PROC-MP-0082	Design Registration	PI	PNGS & PWMF

PHYSICAL DESIGN

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N-PROG-MP-0004	Pressure Boundary	PI	PNGS & PWMF
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Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CSA	N285.0 / N285.6	General requirements for pressure-retaining systems and components in CANDU nuclear power plants / Materials Standards for reactor components for CANDU nuclear power plants - Annex G and J are accepted to be used as "Normative" Annexes.	2023	2027-01-01 at PNGS & PWMF
CSA	B51	Boiler, pressure vessel, and pressure piping code	2019	2027-01-01 at PNGS & PWMF
ASME	BPVC	ASME Boiler and Pressure Vessel Code with Addenda	2021	2027-01-01 at PNGS & PWMF
ASME	B31.1	Power Piping	2022	2027-01-01 at PNGS & PWMF
ASME	B31.3	Process Piping	2022	2027-01-01 at PNGS & PWMF
ASME	B31.5	Refrigeration Piping and Heat Transfer Components	2022	2027-01-01 at PNGS & PWMF

OPG Code effective dates for Unit 5-8 Refurbishment activities have been agreed to by CNSC staff (e-doc# 7409790, P-CORR-00531-23856).

For pressure boundary activities not associated with unit 5-8 refurbishment engineering planning activities, OPG shall comply with the following transitional provisions apply to CSA N285.0:23/CSA N285.6 Series:23 (and Annexes G and J as "normative") starting January 1, 2027 (e-Doc 7643527):

1. Installations that were in progress by January 1, 2027, may continue to be installed in accordance with CSA N285.0-08 and Update No. 2 (including Update No.1) and ASME BPVC 2010 Edition with 2011 Addenda, ASME B31.1-2010, B31.3-2010, and B31.5-2010.
2. Work packages compliant with CSA N285.0-08 and Update No.2 (including Update No. 1), being produced or underway prior to January 1, 2027, will remain valid for implementation until June 30, 2030.
3. Design modifications classified (approved by CNSC or using the OPG Classification procedure) after January 1, 2021, and before January 1, 2027, will be designed and installed to the CSA N285.0 and ASME edition or version specified in the System Classification List, when installed no later than June 30, 2030.
4. Purchase Orders compliant with CSA N285.0-08 and Update No. 2 (including Update No. 1) issued prior to January 1, 2027, will remain valid for installation.
5. Other PB activities, such as procurement, initiated by January 1, 2027, may continue to be in accordance with CSA N285.0-08 and Update No. 2 (including Update No.1).

PHYSICAL DESIGN

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Engineering planning activities for the Pickering Refurbishment Project follow CSA N285.0:23/CSA N285.6 Series:23 (and Annexes G and J as “normative”); CSA B51-19; ASME BPVC 2021 ED; ASME B31.1-2022; ASME B31.3-2022; and ASME B31.5-2022,

Personnel conducting non-destructive examinations shall be certified in accordance with the edition of CAN/CGSB 48.9712/ISO 9712 currently adopted for use by the National Certification Body (NCB) of Natural Resources Canada for the appropriate examination method. If the NCB does not offer certification for a specific inspection method, the relevant alternate requirements of Clause 11.3 of CSA N285.0 shall apply to ensure that personnel are appropriately trained and qualified.

Classification, Registration and Reconciliation Procedures

Licensee procedures describing the classification, registration and reconciliation processes and the associated controls shall form part of the pressure boundary program. The licensee shall provide prior notification of any changes to the procedures describing the classification, registration and reconciliation processes.

Overpressure Protection Reports

The licensee shall provide written notification to CNSC staff, of new or revised overpressure protection reports, after the final registration of the system.

Classification and Registration of Fire Protection Systems

Fire protection systems and associated fittings and components are to be classified at least as Code Class 6, designed to the ASME B31.1 and registered, unless the exemption criteria noted below are met.

The following fittings and components may be exempt from requiring a Canadian Registration Number (CRN) provided they meet the following exemption criteria:

- a) Fittings and components that are cUL or ULC (Underwriters Laboratory of Canada) listed and suitable for the expected environmental conditions and maximum pressure; or
- b) pressurized cylinders and tubes, such as extinguishers, inert gas and foam tanks, that bear Transport Canada approvals and suitable for the expected environmental conditions and maximum pressures; or
- c) buried fire protection piping that is in compliance with NFPA-24.

Buried fire protection piping designed to the ASME piping code may be exempt from the ASME pressure testing requirements if the pressure testing is performed to NFPA-24 *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

The requirements of CSA N285.0 apply for components higher than Code Class 6.

Formal Agreement with an Authorized Inspection Agency (AIA)

The licensee shall always have in place a formal agreement with an AIA to provide services for the pressure boundaries of the reactor facility and waste management facility as defined by CSA N285.0 and

its applicable referenced publications. The AIA must be accredited by the ASME as stipulated by NCA-5121 of the ASME Boiler and Pressure Vessel Code.

Design registration services for pressure boundaries shall be provided by an AIA legally entitled under the Provincial Boilers and Pressure Vessels Acts and Regulations to register designs. Registration of piping systems shall be done by the Technical Standards and Safety Authority (TSSA), who is legally entitled to register designs in Ontario.

A copy of the signed agreement shall be provided to the CNSC. During the licence period, the licensee shall notify the CNSC in writing of any change to the terms and conditions of the agreement, including termination of the agreement.

The licensee shall arrange for the AIA inspectors to have access to all areas of the facility and records, and to the facilities and records of the licensee's pressure boundary contractors and material organizations, as necessary for the purposes of performing inspections and other activities required by the standards. Inspectors of the AIA shall be provided with information, reasonably in advance with notice and time necessary to plan and perform inspections and other activities required by the standards.

For a variance or deviation from the requirements of the CSA N285.0 standard, except as noted below, the licensee must first submit the proposed resolution to the AIA for evaluation, and then to the CNSC for consent. The licensee must demonstrate that meeting the code requirement is impracticable and the proposed resolution will provide adequate safety. Per the agreement with the AIA, the evaluated resolution shall not be implemented without the prior written consent of CNSC staff. A variance or deviation related to Code Edition, Code Classification, and Legacy Registration issues may be submitted directly to the CNSC without prior AIA evaluation. General criteria for obtaining prior written consent/approval for a proposed resolution from the CNSC can be found in LC G.2.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
OPG	N-REF-01913.11-00001	Temporary Leak Maintenance by Leak Mitigation Process (Enclosure 1 to N-CORR-00531-19502, e-Doc 5823652)	2018

PHYSICAL DESIGN

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

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5.3 Equipment and Structure Qualification Program

Licence Condition 5.3:

The licensee shall implement and maintain an equipment and structure qualification program.

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

Environmental qualification (EQ) ensures that all required equipment in a nuclear facility are qualified to perform their safety functions if exposed to harsh environmental conditions resulting from Design Basis Accidents (DBA) and that this capability is preserved for the life of the plant.

Seismic qualification (SQ) ensures that all seismically credited safety-related SSCs in a NPP are designed, installed and maintained to perform their safety function during and/or after (as needed and pre-defined) earthquakes.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROG-RA-0006	Environmental Qualification	TI	PNGS

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CSA	N289.1	General requirements for seismic design and qualification of CANDU nuclear power plants	2023 ¹	2027-01-01 at PNGS
CSA	N289.2	Ground motion determination for seismic qualification of nuclear power plants	2021	2027-01-01 at PNGS
CSA	N289.3	Design procedures for seismic qualification of nuclear power plants	2020	2027-01-01 at PNGS
CSA	N289.4	Testing procedures for seismic qualification of nuclear power plant structures, systems, and components	2022 ²	2027-01-01 at PNGS
CSA	N289.5	Seismic instrumentation requirements for nuclear power plants and nuclear facilities	2012 and Update No. 1	2027-01-01 at PNGS
CSA	N290.13	Environmental qualification of equipment for nuclear power plants	2018	2026-09-30 at PNGS

PHYSICAL DESIGN

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

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¹ With the exception of clauses 5.3.1.2 (e), 5.3.6, and Annex D. Prior to use of these clauses, annex, or similar information, the licensee shall submit a request to CNSC staff for approval.

² With the exception of Annex D and Annex F. Prior to use of these annexes or similar information, the licensee shall submit a request to CNSC staff for approval.

Environmental Qualification:

N290.13 outlines the requirements for an EQ program. Any design or analysis changes that impact the basis for EQ of the plant, or the qualified equipment would require prior notification of the CNSC. Equipment required in a nuclear facility shall be qualified to perform its safety functions during and following a DBA, taking into consideration stressors associated with all service conditions.

Seismic Qualification:

Seismically credited safety-related SSCs in a nuclear facility shall be designed, installed and maintained to perform their safety function against earthquakes. Any changes to seismic qualification that impact the licensing basis would require prior notification of the CNSC.

Guidance:

The processes and procedures related to the SQ program should:

- Identify the methods for establishing SQ, including code effective dates;
- Identify the SSCs for which evaluation of their capacity beyond the Design Basis Earthquake has been done;
- Identify the methods used for Beyond Design Basis Earthquake evaluation;
- Include procedural controls to address aging-related degradation (aging management) to ensure SQ of existing SSCs for the life of the plant (See also LC 6.1 and the requirements for REGDOC-2.6.3, *Aging Management*);
- Identify the seismic monitoring system and its design and maintenance requirements; and
- Include procedural controls for establishing SQ for new and replacement items.

6 SCA – FITNESS FOR SERVICE

The fitness for service SCA includes the following SpAs:

- Equipment fitness for service/equipment performance (Reliability)
- Maintenance
- Structural integrity
- Aging management
- Chemistry control
- Periodic inspection and testing

6.1 Fitness for Service Program

Licence Condition 6.1:

The licensee shall implement and maintain a fitness for service program.

Preamble:

The SCA Fitness for Service covers activities that impact the physical condition of SSCs to ensure that they remain effective over time. Fitness for service includes programs that ensure equipment is available to perform its intended design function when called upon to do so.

The following program elements ensure fitness for service of SSCs:

- Maintenance program defining the policies, processes and procedures that provide direction for maintaining SSCs of the plant;
- Effective control of plant chemistry to ensure critical plant equipment performs safely and reliably;
- Aging management processes and activities to ensure the reliability and availability of required safety functions of SSCs;
- Periodic and in-service inspection programs to ensure that pressure-boundary components; containment structures and components, continue to meet their design requirements;
- In-service inspection of balance of plant to ensure safety significant pressure retaining systems, components and safety-related structures are monitored for degradation and continue to meet their safety functions; and
- Proper reliability program and implementation to ensure that Systems Important to Safety continue to meet their performance requirements.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
COG-JP-4107-V06	Fitness-for-Service Guidelines for Feeders in CANDU Reactors	PI	PNGS

FITNESS FOR SERVICE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
COG Report 07-4089	Fitness-For-Service Guidelines for Steam Generator and Preheater Tubes	PI	PNGS
I-STD-AS-0003	Non-Destructive Examination	TI	PNGS
N-PLAN-01060-10001	Feeders Life Cycle Management Plan	PI	PNGS
N-PLAN-01060-10002	Fuel Channels Life Cycle Management Plan	PI	PNGS
N-PLAN-01060-10003	Reactor Components and Structures Life Cycle Management Plan	PI	PNGS
N-PLAN-01060-10004	Aging Management Plan for Containment Structures	PI	PNGS
N-PLAN-01060-10007	Feeders Life Cycle Management Plan: Technical Basis Document	TI	PNGS
N-PLAN-33110-10009	Steam Generators Life Cycle Management Plan	PI	PNGS
N-PROG-MA-0026	Equipment Reliability	TI	PNGS & PWMF
N-PROC-MA-0044	Fuel Channel Life Cycle Management	TI	PNGS
N-PROC-MA-0052	Flaw Dispositioning	TI	PNGS
N-PROC-MA-0066	Administrative Requirements for In-Service Examination and Testing for Concrete Containment Structures	PI	PNGS
N-PROG-MA-0004	Conduct of Maintenance	TI	PNGS
N-PROG-MA-0017	Component and Equipment Surveillance	PI	PNGS
N-PROG-MA-0025	Major Components	TI	PNGS
N-PROG-MP-0008	Integrated Aging Management	TI	PNGS & PWMF
N-PROG-MP-0009	Design Management	TI	PNGS & PWMF
N-PROG-OP-0004	Chemistry	TI	PNGS
N-PROG-RA-0016	Risk and Reliability Program	TI	PNGS & PWMF
N-REP-31100-10041	Acceptance Criteria and Evaluation Procedures for Material Surveillance Pressure Tube	PI	PNGS
N-REP-31100-10061	Compliance Plan for Long-Term Use of CSA N285.8 For In-Service Evaluation of Zirconium Alloy Pressure Tubes	PI	PNGS
N-STD-MP-0028	Conduct of Engineering	TI	PNGS & PWMF
N-STD-RA-0033	Reliability and Monitoring of Systems Important to Safety	TI	PNGS

FITNESS FOR SERVICE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
NA44-PIP-03642.2-00001	Pickering Nuclear Generating Station A Periodic Inspection Program For Containment Components	PI	PNGS
NA44-PIP-03643.2-00001	Pickering Nuclear GSA – Reactor Building Periodic Inspection Program	PI	PNGS
NA44-PIP-03643.2-00002	Pickering Nuclear GS – PRD & VB Periodic Inspection Program	PI	PNGS
NA44-PIP-03643.2-00003	Pickering Nuclear GS – Vacuum Building Post Tensioning Rods Periodic Inspection Program	PI	PNGS
NA44-PLAN-34220-00002	Life Cycle and Aging Management Program Plan for Fiberglass-Reinforced Plastic Components in the Pickering NGS Vacuum Building	PI	PNGS
NA44-REP-34200-00017	Pickering NGS “A” Reactor Building and Pressure Relief Duct In-service Integrated Leakage Rate Test Requirements in accordance with CSA N287.7-17	PI	PNGS
NK30-PIP-03641.2-00001	Pickering B Periodic Inspection Program Unit 5	PI	PNGS
NK30-PIP-03641.2-00002	Pickering B Periodic Inspection Program Unit 6	PI	PNGS
NK30-PIP-03641.2-00003	Pickering B Periodic Inspection Program Unit 7	PI	PNGS
NK30-PIP-03641.2-00004	Pickering B Periodic Inspection Program Unit 8	PI	PNGS
NK30-PIP-03642.2-00001	Pickering Nuclear Generating Station “B” Periodic Inspection Program For Containment Components	PI	PNGS
NK30-PIP-03643.2-00001	Pickering Nuclear GSB – Reactor Building Periodic Inspection Program	PI	PNGS
NK30-PIP-31100-00005	Pickering Nuclear 5-8 Fuel Channel Pressure Tubes Periodic Inspection Program Plan	PI	PNGS
NK30-PIP-33126-00001	Pickering Nuclear Units 5-8 Fuel Channel Feeder Pipes Periodic Inspection Program Plan	PI	PNGS

FITNESS FOR SERVICE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
NK30-PLAN-33110-10008	Pickering Units 5-8 Steam Generator Life Cycle Management Plan (excluding Sheet Sections 001 to 007)	TI	PNGS
NK30-PLAN-33110-10008 Sheet Section 006	Pickering Units 5-8 In-Service Inspection Plan	PI	PNGS
NK30-REP-34200-00014	Pickering NGS B Reactor Building In-service Leakage Rate Test Requirements In Accordance With CSA N287.7-17	PI	PNGS
NA44-REP-25100-00009	Pickering NGS Vacuum Building In-service Integrated Leakage Rate Test Requirements in Accordance with CSA N287.7-17	PI	PNGS
P-LIST-06937-00001	Pickering A and B List of Safety Related Systems	PI	PNGS
P-PIP-03642.2-00001	Pickering Nuclear Generating Station A Periodic Inspection Program For Unit 0 Containment Components	PI	PNGS
P-PIP-03645.2-00001	Pickering NGS Non-Containment Safety Related Structures Periodic Inspection Program	PI	PNGS
P-REP-03611-00012	PNGS Systems and Components Important to Safety	PI	PNGS
00104-PLAN-79171-00002	Ontario Power Generation Dry Storage Container – Base (Underside) Inspection Plan	PI	PWMF
00104-PLAN-79171-00001	Used Fuel Dry Storage Container Aging Management Plan	PI	PWMF
92896-PLAN-01060-00001	Pickering Re-Tube Components Storage Facility: Dry Storage Modules (DSM) Aging Management Plan	PI	PWMF

Reminder: Aging Management and Periodic Inspection Program related documents require CNSC staff acceptance prior to implementation.

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.6.1	Reliability Programs for Nuclear Power Plants	2017	Implemented at PNGS
CNSC	REGDOC-2.6.2	Maintenance Programs for	2017	Implemented at PNGS

FITNESS FOR SERVICE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

		Nuclear Power Plants		
CNSC	REGDOC 2.6.3	Aging Management	2014	Implemented at PNGS & PWMF
CSA	N285.4	Periodic Inspection of CANDU Nuclear Power Plant Components	2005 ¹ 2019	Implemented at PNGS
CSA	N285.4	Periodic Inspection of CANDU Nuclear Power Plant Components	2019	2027-12-07 at PNGS
CSA	N285.5	Periodic Inspection of CANDU Nuclear Power Plant Containment Components	2008 and Update No. 1 (January 2011) ² (2018)	Implemented at PNGS
CSA	N285.5	Periodic Inspection of CANDU Nuclear Power Plant Containment Components	2022	2027-06-02 at PNGS
CSA	N285.8	Technical Requirements for In-Service Inspection Evaluation of Zirconium Alloy in Pressure Tubes in CANDU Reactors	2023	Implemented at PNGS
CSA	N287.1	General requirements for concrete containment structures for nuclear power plants	2014	Implemented at PNGS
CSA	N287.2	Material requirements for concrete containment structures for nuclear power plants	2017	2027-01-01 at PNGS
CSA	N287.7	In-service Examination and Testing Requirements for Concrete Containment Structures for Nuclear Power Plants	2017	Implemented at PNGS
CSA	N287.8	Aging Management for Concrete Containment Structures for Nuclear Power Plants	2015	2027-01-01 at PNGS
CSA	N291	Requirements for nuclear safety-related structures	2019	2027-01-01 at PNGS

¹ Only until full implementation of the 2019 edition. Compliance with the 2019 edition is only for the clauses specified under “CVC Related to CSA N285.4” in this LCH.

² Only until full implementation of the 2022 edition. Compliance with the 2018 edition is only for the clauses specified under “CVC Related to CSA N285.5” in this LCH.

Equipment Fitness for Service/Equipment Performance (Reliability)

Reliability Program

FITNESS FOR SERVICE

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

The licensee shall establish a reliability program in accordance with REGDOC-2.6.1 that includes setting reliability targets, performing reliability assessments, testing and monitoring, and reporting for plant systems whose failure affect the risk of a release of radioactive or hazardous material.

Aging Management

Continued use of Fracture Toughness Model(s)

Licensee shall submit an impact assessment for CSA N285.8-23 Clause 7 evaluations whenever a fracture toughness test result challenges the model's lower prediction bound, and where the model is applied in the Clause 7 evaluation(s).

CNSC staff accepted the use of the Revision 2 Engineering Fracture Toughness model for Probabilistic Core Assessments (PCAs) for flaws, Leak-Before-Break and Fracture Protection evaluations, provided OPG meets the conditions in CNSC staff's correspondence (e-doc 6795279).

The licensee shall, on an annual basis submit the following until all the activities under the R&D test plan have been completed:

- the latest fracture toughness test results from the executed R&D test plan pertaining to the Cohesive Zone-based fracture toughness Model;
- an assessment of the fracture toughness test results against the applicable model predictions; and
- any updates to the test plan and schedule.

The licensee shall report any test results that challenge the validity of the Revision 2 model upon discovery of the result, per the requirements under Clause 8.3 of CSA N285.8:23.

Chemistry Control

Chemistry Control and Monitoring Program

The licensee shall implement and maintain a chemistry control program. The chemistry control program shall establish processes and overall requirements to ensure critical plant equipment performs safely and reliably over the life of the stations.

The chemistry control program shall specify processes, specifications, overall requirements, parameter monitoring, data trending and evaluation to ensure effective control of plant chemistry during operational and lay-up conditions.

The licensee shall also maintain a set of technical basis documents for chemistry control and monitoring.

Periodic Inspection and Testing

Personnel conducting non-destructive examinations shall be certified in accordance with the edition of CAN/CGSB 48.9712/ISO 9712 currently adopted for use by the National Certification Body (NCB) of Natural Resources Canada for the appropriate examination method. If the NCB does not offer certification for a specific inspection method, the relevant alternate requirements of Clause 5 of CSA N285.4 or Clause 6 of N285.5 shall apply to ensure that personnel are appropriately trained and qualified.

OPG shall prepare, update and revise, as necessary, PIP documents in accordance with the requirements of the applicable CSA Standards listed in the licence condition. The currently accepted PIP documents are listed in the written notification table for this section. Revisions to OPG's PIP documents require CNSC acceptance prior to implementation.

OPG shall carry out periodic inspections in accordance with CNSC accepted PIP documents. If a deviation from the accepted PIP program is anticipated during inspection planning activities, OPG shall obtain CNSC acceptance prior to conducting the affected inspection. However, for any findings, discoveries or deviations from the accepted PIP that are identified during an inspection, OPG shall inform the CNSC and provide justification in the corresponding inspection report submission.

Selection Criteria for Pressure Tube Inspection

In reference to inspected pressure tubes, and to resolve probabilistic core assessment flaw removal assumptions, OPG is to provide evidence that a sample of the pressure tubes with the highest cumulative probability of developing through-wall cracking determined from probabilistic core assessments is included in their pressure tube volumetric inspection program (see CNSC letter 6415008, N-CORR-00531-22440). To validate probabilistic core assessment predictions, OPG is to include consideration for higher risk tubes from the probabilistic core assessments in the selection criteria for fuel channel inspection campaigns.

CVC Related to CSA N285.4 Until Full Implementation of 2019 Version

Permanent exemptions to the requirements of the standard that receive regulatory acceptance shall be incorporated, including supporting technical basis, into the PIP documents, listed in the "Written Notification" table for this section.

OPG shall comply with the 2005 edition of N285.4 including Update No. 1, June 2007, with the exception of clauses (including sub-clauses) 6.1.4.2, 8.2.2, 8.2.5, 8.3.1, 8.3.2, 8.3.3, 9.4 and Table 5, for which OPG shall comply with the 2019 edition of this standard (CNSC letter, e-Doc 6118024).

If it is determined that deterioration related to erosion-corrosion or environmentally assisted cracking is credible on systems covered by the current PIPs at the Pickering units, OPG shall evaluate the need to adopt the requirements of Clauses 7.4.7 or 7.4.8 of CSA N285.4-14 Update No. 1 into their existing PIP and submit the evaluation for CNSC staff review and acceptance.

Fitness for Service Program for Fuel Channels in Extended Operation

[Requirements based on the previous licence condition 6.2 will be included here, pending results of the March 2026 Commission meeting.]

For operation of fuel channels beyond 210,000 effective full power hours (EFPH), OPG shall establish an enhanced Heq monitoring program for in-service Heq scrape sampling and ex-service surveillance tube Heq sampling that is sufficient to characterize the Heq in axial, circumferential and radial extents of inlet and outlet rolled joint regions Heq that may exceed the predicted concentrations due to circumferential and/or localized temperature gradients. The scope of the program shall be submitted to CNSC staff prior to operation beyond 210,000 EFPH.

FITNESS FOR SERVICE

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Evaluation of results and dispositions for Pickering NGS pressure tubes

With respect to N285.4:19 clause 12.2.5.1.3, OPG submitted a revised compliance plan N-REP-31100-10061 R006 (N-CORR-00531-23853, e-Doc 7176834), for the use of CSA N285.8:23 “In-Service Evaluation of Zirconium Alloy Pressure Tubes”, as the evaluation method used for the fitness-for-service assessment of the Fuel Channels in Pickering Units 5 to 8. The revised compliance plan was accepted by CNSC staff (e-Doc 7251842).

Probabilistic Fracture Protection Assessments (CSA N285.8)

Probabilistic Fracture Protection (PFP) evaluations completed for pressure tubes in accordance with CSA N285.8:23 Clause 4.3.2.2 shall use the acceptance criteria and evaluation process documented in the August 21, 2023, correspondence from OPG (e-Doc 7110527, CD# N-CORR-00531-23737).

Fuel Channel Feeder Pipes (N285.4 Clause 13):

With respect to N285.4-05 clause 13.2.5.1.3, CNSC staff have accepted OPG's request to use the updated feeder fitness-for-service guidelines: COG-JP-4107-V06 Revision 3, “Fitness-for-Service Guidelines (FFSG) for Feeders in CANDU Reactors” (e-Doc 3922168 and e-Doc 4001054).

Steam Generator Tubes (N285.4 Clause 14):

CNSC staff have accepted the revised “*performance based disposition process*” (e-Doc 6344283) for steam generator inspections and dispositions, which allows the restart of the NGS without a formal CNSC approval of the disposition before restart, subject to an agreed upon set of conditions.

With respect to N285.4-05 clause 14.2.5.1.3, CNSC staff have accepted OPG's request to use COG Report 07-4089 R2 “Fitness-for-Service Guidelines for Steam Generator and Preheater Tubes”, with specific exceptions (see CNSC letter e-Doc 5503070).

CVC Related to CSA N285.5 Until Full Implementation of 2022 Version

CNSC staff have accepted the Pickering NGS units 5-8 and unit 0 PIP Programs meeting the requirements of N285.5-08 Update No. 1 (e-Doc 4038995). CNSC have accepted alternative requirements for specific clauses of N285.5-08 Update 1 (e-Doc 5785001). CNSC staff have accepted the use of the aging facility data at the Kinectrics Inc. laboratory and the related testing and inspections of the aged samples as an acceptable alternative to in-situ visual inspections of Fiberglass Reinforced Plastic required under N285.5-08 (Update No. 1) (CNSC letter 6657479).

In-service Examination and Testing for Concrete Containment Structures (CSA N287.7-17)

CNSC staff have accepted the Pickering NGS-A and B PIP and Leakage Rate Test Requirements documents, which were updated for the purpose of transitioning from N287.7-08 to N287.7-17 (e-Doc 6653986). In CNSC letter e-Doc 6752746, CNSC staff conditionally accepted the updated PIP document NA44-PIP-03643.2-00002 “Pickering Nuclear GS - PRD and VB Periodic Inspection Program” (see CNSC letter for terms of conditions).

In CNSC letter e-Doc 5839771, CNSC staff provided its consent for OPG to increase the inspection and testing interval for the vacuum building, the dousing system and pressure relief duct at Pickering NGS from 10 years to 12 years.

FITNESS FOR SERVICE

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OPG shall perform a test to measure the leakage rate, at full design pressure, of the operating reactor buildings and inspect the reactor building concrete structures and components of all units at least once every six years.

PWMF Specific CVC

For nuclear-related SSCs identified in accordance with OPG document N-STD-MP-0028, Conduct of Engineering, OPG shall establish inspection, testing and maintenance programs required to ensure continued safe operation of the facility.

Every year, the licensee shall include and submit to CNSC staff the inspection results and their evaluations, resulting from the in-service inspections and aging management of Dry Storage Containers (DSCs) in accordance with OPG document 00104-PLAN-79171-00001, Used Fuel Dry Storage Container Aging Management Plan and OPG document 00104-PLAN-79171-00002, Ontario Power Generation Dry Storage Container – Base (Underside) Inspection Plan, as part of the annual report.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CSA	N285.4	Periodic Inspection of CANDU Nuclear Power Plant Components	2023
CSA	N285.7	Periodic Inspection of CANDU Nuclear Power Plants Balance of Plant Systems and Components	2021
CSA	N287.3	Design requirements for concrete containment structures for nuclear power plants	2025
CSA	N287.4	Construction, fabrication, and installation requirements for concrete containment structures for CANDU nuclear power plants	2019
CSA	N287.5	Examination and testing requirements for concrete containment structures for nuclear power plants	2020
CSA	N290.9	Reliability and maintenance programs for nuclear power plants	2019
CSA	N290.20	Aging Management Requirements for Nuclear Power Plant	2021

Periodic Inspection and Testing

Periodic Inspection Programs

OPG should review the compliance matrices for periodic inspection programs on an annual basis to confirm the programs reflect current practices.

7 SCA – RADIATION PROTECTION

The radiation protection SCA includes the following SpAs:

- Application of ALARA
- Worker dose control
- Radiation protection program performance
- Radiological hazard control.

7.1 Radiation Protection Program

Licence Condition 7.1:

The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

Preamble:

The [Radiation Protection Regulations](#) require that the licensee implement a radiation protection program and also ascertain and record doses for each person who perform any duties in connection with any activity that is authorized by the NSCA or is present at a place where that activity is carried on. The program must ensure that contamination levels and radiation doses received by individuals are monitored, controlled and maintained As Low As Reasonably Achievable (ALARA).

The regulatory dose limits are explicitly provided in the *Radiation Protection Regulations*.

Action Levels (ALs) are designed to alert licensees that a loss of control of some part of the associated radiation protection program may have occurred. If an AL referred to in a licence is reached, specific action is required, as defined in the *Radiation Protection Regulations* and the licence. ALs are not intended to be static and are to reflect operating conditions in the station.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-INS-09071-10009	Requirements for the Calibration and Maintenance of Radiation Protection Instruments	TI	PNGS & PWF
N-MAN-03416-10000	Radiation Dosimetry Program – General Requirements	TI	PNGS & PWF
N-MAN-03416.1-10000	Radiation Dosimetry Program – External Dosimetry	TI	PNGS & PWF
N-MAN-03416.2-10000	Radiation Dosimetry Program – Internal Dosimetry	TI	PNGS & PWF

RADIATION PROTECTION

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROC-RA-0010	Facility Access and Working Rights (Radiological)	TI	PNGS & PWF
N-PROC-RA-0012	Dosimetry and Dose Reporting	TI	PNGS & PWF
N-PROC-RA-0015	Contamination Control While Performing Work	TI	PNGS & PWF
N-PROC-RA-0019	Dose Limits and Exposure Control	PI	PNGS & PWF
N-PROC-RA-0024	Hazard Surveys, Postings, and Labelling	TI	PNGS & PWF
N-PROC-RA-0025	Selection of Radiation Personal Protective Equipment	TI	PNGS & PWF
N-PROC-RA-0027	Radioactive Work Planning, Execution and Close Out	TI	PNGS & PWF
N-PROC-RA-0124	Transfer of Materials from Radiological Zones to Zone1/Public Domain	TI	PNGS & PWF
N-PROC-RA-0013	Radiation Protection	PI	PNGS & PWF
N-STD-RA-0018	Controlling Exposure As Low As Reasonably Achievable	TI	PNGS & PWF
N-STD-RA-0044	Occupational Radiation Protection Action Levels for Power Reactor Operating Licences	PI	PNGS & PWF
N-STD-RA-0045	Occupational Radiation Protection Action Levels for Nuclear Waste Management Facilities	PI	PNGS & PWF
OPG-PROC-0132	Respiratory Protection	TI	PNGS & PWF

Action Levels

The licensee shall conduct a documented review and, if necessary, revise the ALs at the Pickering NGS and Pickering WMF at least once every five years in order to validate their effectiveness. The results of such reviews should be provided to CNSC staff.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.7.1	Radiation Protection, Version 1.1	2025
CNSC	REGDOC-2.7.2	Dosimetry, Volume I: Ascertaining Occupational Dose	2021

RADIATION PROTECTION

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8 SCA – CONVENTIONAL HEALTH AND SAFETY

The conventional health and safety SCA includes the following SpAs:

- Performance
- Practices
- Awareness

8.1 Conventional Health and Safety Program

Licence Condition 8.1:

The licensee shall implement and maintain a conventional health and safety program.

Preamble:

As of April 1, 1998, nuclear facilities owned and operated by Ontario Hydro were exempted from application of Part I, Part II and Part III of the *Canada Labour Code*. This was established as per the following Consolidated Regulations: *SOR/98-179*, *SOR/98-180* and *SOR/98-181*. Pickering NGS is now regulated by the *Occupational Health and Safety Act of Ontario* and the *Labour Relations Act*. Related legislation includes the *Ontario Workplace Safety and Insurance Act (WSIA)* and the *Ontario Human Rights Code*.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROG-MA-0015	Work Protection	TI	PNGS & PWMF
OPG-POL-0001	Employee Health and Safety Policy	TI	PNGS & PWMF
OPG-PROC-0132	Respiratory Protection	TI	PNGS & PWMF
OPG-PROG-0005	Environment Health and Safety Managed Systems	TI	PNGS & PWMF

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.8.1	Conventional Health and Safety	2019

CONVENTIONAL HEALTH AND SAFETY

9 SCA – ENVIRONMENTAL PROTECTION

The environmental protection SCA includes the following SpAs:

- Effluent and emissions control (releases)
- Environmental management system (EMS)
- Protection of people
- Assessment and monitoring
- Environmental Risk Assessment

9.1 Environmental Protection Program

Licence Condition 9.1:

The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within seven days.

Preamble:

The [*General Nuclear Safety and Control Regulations*](#) require every licensee to take all reasonable precautions to protect the environment and to control the release of radioactive nuclear substances or hazardous substances within the site of the licensed activity and into the environment as a result of the licensed activity.

The release of hazardous substances is regulated by the CNSC, as well as both the Ontario Ministry of Environment, Conservation and Parks (MECP) and Environment and Climate Change Canada (ECCC), through various acts and regulations.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROC-OP-0025	Management of the Environmental Monitoring Programs	TI	PNGS & PWF
N-PROC-OP-0037	Environmental Approvals	TI	PNGS & PWF
N-PROC-OP-0038	Abnormal Waterborne Tritium Emission Response	TI	PNGS & PWF
N-PROC-OP-0044	Contaminated Lands Management	TI	PNGS & PWF
N-STD-OP-0031	Monitoring of Nuclear and Hazardous Substances in Effluents	TI	PNGS & PWF
N-STD-OP-0046	Groundwater Protection and Monitoring Program	PI	PNGS & PWF

ENVIRONMENTAL PROTECTION

OPG-POL-0021	Environmental Policy	TI	PNGS & PWMF
OPG-PROC-0126	Hazardous Material Management	TI	PNGS & PWMF
OPG-PROG-0005	Environment Health and Safety Managed Systems	TI	PNGS & PWMF
P-MAN-03443-00002	Pickering Environmental Monitoring Program	TI	PNGS & PWMF
P-REP-03482-00001	Derived Release Limits and Environmental Action Levels for Pickering Nuclear Sewage Effluent	PI	PNGS & PWMF
P-REP-03482-00006	Derived Release Limits for Pickering Nuclear	PI	PNGS & PWMF
P-REP-03482-00007	Action levels for Environmental Releases	PI	PNGS & PWMF
P-REP-07701-00002	Predictive Effects Assessment for Pickering Nuclear Safe Storage	TI	PNGS & PWMF
P-REP-07701-00006	Predictive Effects Assessment for Pickering Nuclear Safe Storage – 2022 Addendum Report	TI	PNGS & PWMF
P-REP-07701-00007	Environmental Risk Assessment Report for Pickering Nuclear	PI	PNGS & PWMF
P-REP-07701-00014	Predictive Environmental Risk Assessment for Pickering Refurbishment, Decommissioning, and Continued Operations	TI	PNGS & PWMF
92896-REP-07701-00019	Predictive Environmental Risk Assessment for Pickering Component Storage Structure	TI	PWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.9.1	Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2	2020	Implemented at PNGS & PWMF
CNSC	REGDOC-2.9.2	Environmental Protection: Controlling Releases to the Environment	2024	2030-01-01 at PNGS & PWMF
CSA	N288.0	Environmental management of nuclear facilities: Common requirements of the CSA N288 series of Standards	2022	Implemented at PNGS & PWMF

ENVIRONMENTAL PROTECTION

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CSA	N288.1	Guidelines for modelling radionuclide environmental transport, fate, and exposure associated with the normal operation of nuclear facilities	2020	Implemented at PNGS & PWMF
CSA	N288.3.4	Performance Testing of Nuclear Air-Cleaning Systems at Nuclear Facilities	2013	Implemented at PNGS & PWMF
CSA	N288.4	Environmental monitoring programs at nuclear facilities and uranium mines and mills	2019	Implemented at PNGS & PWMF
CSA	N288.5	Effluent and emissions monitoring programs at nuclear facilities	2022	Implemented at PNGS & PWMF
CSA	N288.6	Environmental risk assessments at nuclear facilities and uranium mines and mills	2022	2027-04-27 ¹ at PNGS & PWMF
CSA	N288.6	Environmental risk assessments at nuclear facilities and uranium mines and mills	2012	Implemented at PNGS & PWMF
CSA	N288.7	Groundwater protection and monitoring programs for nuclear facilities and uranium mines and mills	2023	Implemented at PNGS & PWMF
CSA	N288.8	Establishing and implementing action levels for releases to the environment from nuclear facilities	2017	Implemented at PNGS & PWMF

¹ OPG will fully comply with CSA N288.6:22 upon CNSC staff acceptance of the 2027 ERA.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.7.1	Radiation Protection, Version 1.1	2025
CSA	N288.2	Guidelines for calculating the radiological consequences to the public of a release of airborne radioactive material for nuclear reactor accidents	2019
CSA	N288.9	Guidance for design of fish impingement and entrainment programs at nuclear facilities	2024

ENVIRONMENTAL PROTECTION

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ID # PENDING (PDF)

10 SCA – EMERGENCY MANAGEMENT AND FIRE PROTECTION

The emergency management and fire protection SCA includes the following SpAs:

- Conventional emergency preparedness and response
- Nuclear emergency preparedness and response
- Fire emergency preparedness and response

10.1 Emergency Preparedness Program

Licence Condition 10.1:

The licensee shall implement and maintain an emergency preparedness program.

Preamble:

The goal of an emergency preparedness program is to ensure that an adequate capability is in place for an effective response in a nuclear emergency. This capability includes but is not limited to authority and responsibilities; organization and staffing; coordination; plans and procedures; tools, equipment, and facilities; and training, drills, and exercises.

Related to the emergency preparedness program, the licensee also maintains:

- A public information program (LC G.6).
- Processes to ensure business continuity in the event of an emergency (LC 1.1).
- The minimum shift complement for emergency response team (LC 2.2).
- A set of emergency operating procedures and abnormal plant operating procedures (LC 3.1).
- A liquid release response plan (LC 9.1).
- A security program (LC 12.1)
- Radioactive materials transportation emergency response plan (LC 14.1)

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROC-RA-0045	Nuclear Emergency Response Organization Drills and Exercises	TI	PNGS & PWMF
N-PROG-RA-0001	Consolidated Nuclear Emergency Plan	PI	PNGS & PWMF
N-STD-RA-0036	Radioactive Materials Transportation Emergency Response Plan	TI	PNGS & PWMF

EMERGENCY MANAGEMENT AND FIRE PROTECTION

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.10.1	Nuclear Emergency Preparedness and Response, Version 2	2016	Implemented

The licensee's *Consolidated Nuclear Emergency Plan* (CNEP) deals with emergency situations that could endanger the safety of on-site staff, the environment and the public. It is predominantly conceived to deal with releases of radioactive materials from fixed facilities and to outline interfaces with the *Provincial Nuclear Emergency Response Plan* (PNERP). The licensee shall maintain equipment, procedures and staff to support off-site response activities for an accidental release. Infrastructures defined within the PNERP may be used in planning and response to virtually all emergencies. The licensee's CNEP also represents a basis for controlling changes and modifications to the licensee's nuclear emergency preparedness program.

The response agreement and assurance of fire response shall be maintained as per the agreement. OPG shall notify the CNSC of any changes to the agreement with the City of Pickering.

Guidance:

None.

10.2 Fire Protection Program

Licence Condition 10.2:

The licensee shall implement and maintain a fire protection program.

Preamble:

A Fire Protection Program (FPP) ensures the licensed activities do not result in unreasonable risk to the health and safety of persons and to the environment due to fire and to ensure that the licensee is able to efficiently and effectively respond to emergency fire situations.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROG-RA-0012	Fire Protection	PI	PNGS & PWMF
P-LIST-71400-00001	Application of CSA N293 to structures, systems, and components for Pickering Nuclear	TI	PNGS

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CSA	N293	Fire protection for nuclear power plants	2012 and Update No. 1 (2017)	Implemented at PNGS
CSA	N293	Fire protection for nuclear power plants	2023	2028-12-31 at PNGS ¹
CSA	N393	Fire protection for facilities that process, handle, or store nuclear substances	2022	Implemented at PWMF

¹ This date represents full compliance with CSA N293-23, the code effective date applicable for new modifications is 2027-01-01, as per N-CORR-00531-24302.

OPG has an agreement with the City of Pickering for fire protection and community emergency management, which describes mutual aid arrangements for on-site and off-site emergencies (P-CORR-00531-24281, e-Doc #####). The agreement describes how resources are combined to help safeguard the community in the event of a major incident.

Guidance:

EMERGENCY MANAGEMENT AND FIRE PROTECTION

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Guidance Publications			
Org	Document #	Title	Version
NEI	NEI 00-01	Guidance for Post Fire Safe Shutdown Circuit Analysis	Revision 2

Where CSA N293 does not address a fire protection topic or issue in whole, or where additional guidance is beneficial, the standards and recommended practices set out by the National Fire Protection Association are used as guidance by CNSC staff in determining the adequacy of a fire protection measure. The Nuclear Energy Institute guidance in NEI 00-01, *Guidance for Post Fire Safe Shutdown Circuit Analysis*, is used by CNSC staff to help determine the adequacy of safe shutdown electrical circuit analysis.

The results of the Third Party Audit report will typically consist of a report which compares the requirements of the applicable codes and standards against the implementation of the FPP or the Fire Response exercised (based on the scope of the audit). The report should identify any non-compliance and formulate a conclusion if the licensee's FPP or Industrial Fire Brigade meets the requirements of CSA N293.

11 SCA – WASTE MANAGEMENT

The waste management SCA includes the following SpAs:

- Waste characterization
- Waste minimization
- Waste management practices
- Decommissioning plans

11.1 Waste Management Program

Licence Condition 11.1:

The licensee shall implement and maintain a waste management program.

Preamble:

CNSC Regulatory Document REGDOC-2.11 *Framework for Radioactive Waste Management and Decommissioning in Canada*, defines radioactive waste as any material (liquid, gaseous or solid) that contains a radioactive “nuclear substance,” as defined in section 2 of the *NSCA* and which the owner has declared to be waste. In addition to containing nuclear substances, radioactive waste may also contain non-radioactive “hazardous substances,” as defined in section 1 of the *General Nuclear Safety and Control Regulations*.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
OPG-PROG-0005	Environment Health and Safety Managed Systems	TI	PNGS & PWMF
OPG-STD-0156	Management of Waste and Other Environmentally Regulated Materials	TI	PNGS & PWMF
N-PROC-RA-0017	Segregation and Handling of Radioactive Wastes	TI	PNGS & PWMF
W-PROG-WM-0001	Nuclear Waste Management	PI	PNGS & PWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.11.1	Waste Management, Volume I: Management of Radioactive Waste	2021	Implemented at PNGS & PWMF

WASTE MANAGEMENT

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CSA	N292.0	General principles for the management of radioactive waste and irradiated fuel	2019	Implemented at PWMF
CSA	N292.0	Radioactive waste management: Common requirements of the CSA N292 series of Standards	2024	Implemented at PNGS 2028-12-311 at PWMF
CSA	N292.3	Management of Low and Intermediate-Level Radioactive Waste	2014	Implemented ¹ at PWMF
CSA	N292.4	Storage of radioactive waste and irradiated fuel	2023	Implemented at PNGS & PWMF
CSA	N292.8	Characterization of radioactive waste and irradiated fuel	2021	Implemented at PNGS & PWMF

¹ CSA N292.3 is superseded by CSA N292.0:24 and will no longer be applicable upon OPG's full implementation of CSA N292.0:24 at the PWMF.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.11	Framework for Radioactive Waste Management and Decommissioning in Canada, Version 2	2021
CSA	N292.5	Guideline for the exemption of clearance from regulatory control of materials that contain, or potentially contain, nuclear substances	2025

With respect to the storage and management of spent nuclear fuel, the waste management program should reflect the fundamental safety principles as applied to nuclear waste. Namely, the systems that are designed and operated should assure subcriticality, control radiation exposure, assure heat removal, assure containment and allow retrievability.

WASTE MANAGEMENT

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11.2 Decommissioning Plan

Licence Condition 11.2:

The licensee shall implement and maintain a decommissioning plan.

Preamble:

This licence condition requires that the licensee implement and maintain a preliminary decommissioning plan (PDP) for operating facilities and a detailed decommissioning plan (DDP) prior to the execution of decommissioning of any facilities.

A PDP provides an overview of the proposed decommissioning approach that is sufficiently detailed to assure that the proposed approach is, in the light of existing knowledge, technically and financially feasible, and appropriate in the interests of health, safety, security and the protection of the environment. The PDP defines areas to be decommissioned and the general structure and sequence of the principle work packages. The PDP forms the basis for developing credible cost estimates for decommissioning and establishing and maintaining an adequate financial guarantee (LC G.5).

A DDP evolves from an existing PDP and sets out the detailed work program, safety and environmental protection procedures, and management systems that will be followed in the decommissioning of a licensed facility. The DDP also further defines the basis for developing credible cost estimates and maintaining financial guarantee arrangements. For deferred decommissioning strategies, a storage with surveillance plan must also be implemented that may be incorporated into the DDP.

For licensed sites with multiple facilities at different stages of operation and decommissioning for which the licensee is responsible, an overarching site PDP or DDP is necessary to ensure that interdependencies between the individual PDPs and DDPs are taken into account.

It is expected that the PDP and DDP be revised as the conditions at the facility change.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
NA44-PLAN-00960-00001	PNGS-A Storage with Surveillance Plan	PI	PNGS
NA44-PLAN-00960-00004	PNGS-A Detailed Decommissioning Plan Volume 0 - Program Overview	PI	PNGS
NA44-PLAN-00960-00005	PNGS-A Detailed Decommissioning Plan Volume 1 - Outbuildings Removal	PI	PNGS
NA44-PLAN-00960-00006	PNGS-A Detailed Decommissioning Plan Volume 2 - Non-Nuclear Component Removal	PI	PNGS

WASTE MANAGEMENT

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

NK30-PLAN-00960-00001	Pickering Nuclear Generating Station B Preliminary Decommissioning Plan	PI	PNGS
P-PLAN-00960-00008	Pickering Nuclear Site Overarching Preliminary Decommissioning Plan	PI	PNGS & PWMF
W-PROG-WM-0003	Decommissioning	PI	PNGS & PWMF
W-STD-WM-0006	Planning for Decommissioning	TI	PNGS & PWMF
W-STD-WM-0005	Conduct of Decommissioning	TI	PNGS & PWMF
92896-PLAN-00960-00001	Preliminary Decommissioning Plan Pickering Waste Management Facility	PI	PWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.11.2	Decommissioning	2021	Implemented at PNGS & PWMF ¹
CSA	N294	Decommissioning of facilities containing nuclear substances	2019	Implemented at PNGS & PWMF

¹ The licensee has implemented the requirements of REGDOC-2.11.2, Decommissioning into its governance documents. The licensee will revise the PDP during the next scheduled revision cycle which is due to the CNSC in 2027.

Stabilization Activities

With the end of commercial operations of Pickering NGS units 1 and 4 in 2024 and the planned refurbishment of units 5-8, OPG is no longer required to submit a permanent shutdown plan (previously called a sustainable operations plan) to the CNSC.

OPG is required to establish and implement a stabilization activity plan (SAP) to manage the transition period until the units are placed in a storage with surveillance (SwS) state. Annual updates to the SAP shall be submitted by December 15 of each year until units 1 and 4 fully transition to a state of SwS and include a report on the progress and effectiveness of the measures committed to.

Decommissioning Activities

The scope of decommissioning activities authorized as part of the licensing basis are those described in the accepted DDP Volumes 0, 1 and 2, as well as those associated with the accepted SwS plan. This corresponds to activities pertaining to the decommissioning of SSCs within planning envelopes (PE) A and B, as well as the maintenance of units 1-4 in a state of SwS during the licence period. As noted in CNSC staff's DDP acceptance letter (e-Doc# 7528989), OPG is required to notify CNSC staff at least one week in advance of initiating any work associated with the accepted DDP.

Execution of decommissioning with respect to any SSCs within PE-C and beyond requires the prior authorization of the Commission.

WASTE MANAGEMENT

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

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Guidance:

Subsequent or revised volumes of the DDP, pertaining to the decommissioning of further or expanded planning envelopes, should typically be submitted to the CNSC 2 to 5 years prior to the planned execution of the described work for CNSC staff acceptance and/or Commission authorization.

12 SCA – SECURITY

The security SCA includes the following SpAs:

- Facilities and Equipment
- Response arrangements
- Security practices
- Drills and exercises
- Cyber Security

12.1 Security Program

Licence Condition 12.1:

The licensee shall implement and maintain a security program.

Preamble:

Nuclear security, like nuclear safety, aims to protect people, property, society and the environment from harmful effects of ionizing radiation. Nuclear security aims to prevent, or detect and respond, to intentional malicious acts involving radioactive substances or directed against facilities or activities where such substances are used.

The security programs implement security requirements stipulated in the *General Nuclear Safety and Control Regulations* and the *Nuclear Security Regulations*.

The security program includes both nuclear security and cyber security.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-INS-08161-10011	Cyber Security Controls for Cyber Essential Assets	TI	PNGS & PWMF
N-PROC-RA-0135	Cyber Security	TI	PNGS & PWMF
N-PROG-RA-0011	Nuclear Security	PI	PNGS & PWMF
N-STI-08161-10017	Cyber Essential Asset Identification and Classification	TI	PNGS & PWMF
NA44-REP-08160.3-00001	Pickering Nuclear Generating Station and Nuclear Sustainability Services– Pickering Harmonized Threat, Vulnerability and Risk Assessment	TI	PNGS & PWMF
OPG-PROG-0042	Cyber Security	TI	PNGS & PWMF
8690-REP-61400-10003	Pickering NGS Security Report	PI	PNGS

SECURITY

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

8690-PLAN-61400-10006	Pickering – Nuclear Security Tactical Plan	PI	PNGS & PWMF
92896-REP-08160-00001	Pickering Waste Management Facility Phase II Security Report	TI	PWMF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.12.1	High-Security Facilities, Volume I: Nuclear Response Force, Version 2	2018	Implemented at PNGS
CNSC	REGDOC-2.12.1	High Security Facilities, Volume II: Criteria for Nuclear Security Systems and Devices	2018	Implemented at PNGS & PWMF
CNSC	REGDOC-2.12.2	Site Access Security Clearance	2013	Implemented at PNGS & PWMF
CNSC	REGDOC-2.12.3	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1	2020	Implemented at PNGS
CSA	N290.7	Cyber security for nuclear power plants and small reactor facilities	2014	Implemented at PNGS
CSA	N290.7	Cyber security for nuclear facilities	2021	2027-03-31 at PNGS

Facilities and Equipment/Response Arrangements/Security Practices/Drills and Exercises

Nuclear Security Program

The licensee shall ensure the identified vital areas within the reactor facility and waste management facility are protected against design basis threats and any other credible threat identified in their Threat and Risk Assessment documentation. The prime functions that must be maintained to prevent unacceptable radiological consequences are those of control, cool, and contain.

The licensee shall maintain the operation, design and analysis provisions credited in the above assessments to ensure adequate engineered safety barriers for the protection against malevolent acts. The provisions for the protection against malevolent acts shall be documented as part of a managed sub-program or process within the management system. The licensee shall summarize changes in design, analysis or operational procedures that are credited for the protection against malevolent acts in the annual threat and risk assessment and submit a copy to the CNSC in accordance with the *Nuclear Security Regulations*.

All detection devices shall be installed, operated and maintained in accordance with manufacturers' specifications and meet the criteria in REGDOC 2.12.1 Volume II.

SECURITY

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

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The licensee shall implement measures for the purpose of preventing and detecting unauthorized entry into a protected area or inner area at a high-security site, including:

- Vehicle barriers and vehicle access control points
- Perimeter intrusion detection systems and devices
- Closed-circuit video systems/ devices for applications in a protected area or inner area
- Security monitoring rooms
- Security monitoring room systems and devices

Cyber Security

The licensee's cyber-security program shall be designed, implemented and maintained to protect the cyber-essential assets (CEA) that perform or impact nuclear safety, nuclear security, emergency preparedness or safeguards functions from cyber-attacks.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
IAEA	Nuclear Security Series No. 4 Technical Guidance	Engineering Safety Aspects of the Protection of Nuclear Power Plants Against Sabotage	2007
IAEA	Nuclear Security Series No. 13 Recommendations	Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities	Revision 5
IAEA	Nuclear Security Series No. 17-T (Revision 1) Technical Guidance	Computer Security Techniques at Nuclear Facilities	2021
IAEA	Nuclear Security Series No. 23-G	Security of Nuclear Information	2015
IAEA	Nuclear Security Series No. 33-T Technical Guidance	Computer Security of Instrumentation and Control Systems at Nuclear Facilities	2018
IAEA	Nuclear Security Series No. 42-G	Computer Security for Nuclear Security	2021
IAEA	TDL-005	Computer Security Incident Response Planning at Nuclear Facilities	2016
IAEA	TDL-006	Conducting Computer Security Assessments at Nuclear Facilities	2016
IAEA	TDL-011	Computer Security Approaches to Reduce Cyber Risks in the Nuclear Supply Chain	2022

SECURITY

13 SCA – SAFEGUARDS AND NON-PROLIFERATION

The safeguards and non-proliferation SCA includes the following SpAs:

- Nuclear material accountancy and control
- Access and assistance to the IAEA
- Operational and design information
- Safeguards equipment, containment and surveillance
- Import and Export

13.1 Safeguards Program

Licence Condition 13.1:

The licensee shall implement and maintain a safeguards program.

Preamble:

Safeguards is a system of inspection and other verification activities undertaken by the IAEA in order to evaluate a Member State's compliance with its obligations pursuant to its safeguards agreements with the IAEA.

Canada has entered into a Safeguards Agreement and an Additional Protocol (hereafter referred to as "safeguards agreements") with the IAEA pursuant to its obligations under the *Treaty on the Non-Proliferation of Nuclear Weapons* (INFCIRC/140). The objective of the Canada-IAEA safeguards agreements is for the IAEA to provide assurance on an annual basis to Canada and to the international community that all declared nuclear materials are in peaceful, non-explosive uses and that there is no indication of undeclared nuclear materials or activities. This conclusion confirms that Canada is in compliance with its obligations under the following Canada-IAEA safeguards agreements:

- *Agreement Between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*
- *Protocol Additional to the Agreement Between Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*

These are reproduced in information circulars INFCIRC/164, and INFCIRC/164/Add. 1.

The scope of non-proliferation activities carried out under this licence is limited to tracking and reporting of foreign obligations and origins of nuclear material, which includes the enriched uranium for Shutdown System Enhancement fission chambers. Additionally, the import and export of controlled nuclear substances, equipment and information identified in the *Nuclear Non-proliferation Import and Export Control Regulations* require a separate licence from the CNSC, consistent with section 3. (2) of the *General Nuclear Safety and Control Regulations*.

Compliance Verification Criteria:

SAFEGUARDS

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-PROC-RA-0136	OPG Safeguards and Nuclear Material Accountancy Requirements	TI	PNGS & PWF
N-PROC-RA-0015	Safeguards and Nuclear Material Accountancy	PI	PNGS & PWF
N-STD-RA-0024	Safeguards and Nuclear Material Accountancy Implementation	PI	PNGS & PWF

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.13.1	Safeguards and Nuclear Material Accountancy	2018	Implemented at PNGS & PWF

To avoid a potential non-compliance with REGDOC-2.13.1, section 8.1.1, when the Nuclear Material Accountancy Reporting (NMAR) e-business system is not available, OPG is to contact the CNSC International Safeguards Division (safeguardsofficial-garantiesofficiel@cnsccsn.gc.ca) to inform them of the issue and to seek guidance on how to fulfill reporting requirements. When OPG inventory change documents and physical-key measurement point inventory summaries are submitted using an alternative method, OPG will still be required to re-submit using the NMAR e-business system once the NMAR system becomes available. For additional information see CNSC letter e-Doc 6039874.

Safeguards measures that are included in operation, equipment or procedures are considered to be part of the licensing basis. With respect to the implementation of safeguards measures, changes made by the licensee to operation, equipment or procedures as of the result of agreement between the licensee, the CNSC and the IAEA are considered routine.

If a requested change would adversely impact Canada's compliance with its safeguards agreements, CNSC staff do not have the authority to give approval, as this would violate the obligations arising from the Canada-IAEA safeguards agreement.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.13.2	Import and Export	2018

SAFEGUARDS

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

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14 SCA – PACKAGING AND TRANSPORT

The packaging and transport SCA includes the following SpAs:

- Package design and maintenance
- Packaging and transport
- Registration for use

14.1 Packaging and Transport Program

Licence Condition 14.1:

The licensee shall implement and maintain a program for packaging and transport of nuclear substances.

Preamble:

Every person who transports radioactive material, or requires it to be transported, shall act in accordance with the requirements of the *Transportation of Dangerous Goods Regulations (TDGR)* and the *Packaging and Transport of Nuclear Substances Regulations, 2015 (PTNSR 2015)*.

The *PTNSR 2015* and the *TDGR* provide specific requirements for the design of transport packages, the packaging, marking and labeling of packages and the handling and transport of nuclear substances.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
N-STD-RA-0036	Radioactive Materials Transportation Emergency Response Plan	TI	PNGS & PWMF
W-PROG-WM-0002	Radioactive Material Transportation	TI	PNGS & PWMF

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC 2.14.1	Volume 1, Information Incorporated by Reference in Canada's Packaging and Transport of Nuclear Substance Regulations, 2015, Volume I, Version 2	2021

PACKAGING AND TRANSPORT

15 REACTOR FACILITY-SPECIFIC

15.1 Refurbishment – Return to Service

Licence Condition 15.1:

The licensee shall implement a return to service plan for refurbishment of Units 5 to 8.

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

Reactor units will be removed from service for replacement of internal reactor components and other activities that can only be accomplished in a “refurbishment” outage. Refurbishment outages differ from planned maintenance outages in that the duration is longer, work activities are more complex, and the configuration of the unit is significantly altered to allow work to proceed.

Return to service (RTS) involves returning the reactor and associated nuclear and non-nuclear systems to commercial operation. The licensee must demonstrate that all regulatory requirements have been met and that the associated work has been done to the satisfaction of the CNSC.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
NK30-PLAN-00120-00022	Pickering Refurbishment Program Management Plan - Return to Service	TI	PNGS

Licensing Basis Publications				
Org	Document #	Title	Version	Effective Date
CNSC	REGDOC-2.3.1	Conduct of Licensed Activities: Construction and Commissioning Program	2016	Implemented at PNGS ¹

¹ Implemented to the extent practicable for the return to service of SSCs.

The licensee’s *Return to Service Program Management Plan*, NK30-PLAN-00120-00022, describes the processes, procedures, and organization that will be used during the Pickering Refurbishment Project to manage the modification and restart activities.

This plan identifies OPG internal restart control verification points (RCVPs) that will be the focus of the run-up activities leading up to full power and unit availability for commercial operation. For each RCVP, the licensee will produce a Completion Assurance Document (CAD) which provides confirmation that all pre-requisites, modification commissioning, testing, system restart activities and commitments have

REACTOR FACILITY-SPECIFIC

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

been addressed to the allow OPG's release of the specific hold point. The CAD will include references to the following reports with detail applicable to the specific activities associated with the RCHP:

- Construction Completion Declarations:
 - Confirm that construction and installation activities are sufficiently complete and that it is safe to proceed with modification commissioning and re-start testing on the affected SSCs.
- Modification Commissioning Reports:
 - Confirm that new or modified SSCs meets the design specifications and performance criteria.
- System Available for Service Packages:
 - Confirm that individual systems, or a group of systems, can be credited to safety and reliability perform their design functions.
- Re-start Testing:
 - Confirm that functional tests and system-level tests have been completed to confirm that non-modified SSCs are ready to return to normal operation after the refurbishment outage.
- Unit Readiness for Service Packages:
 - Confirm that each unit is returned to service in a manner which demonstrates that new and existing plant SSCs conform to the defined physical, function, performance, safety and control requirements.

Guidance:

None.

15.2 Regulatory hold points for the return to service of units 5-8

Licence Condition 15.2:

The licensee shall obtain the approval of the Commission, or consent of a person authorized by the Commission, prior to the removal of established regulatory hold points.

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

CNSC staff selected four (4) regulatory hold points for which CNSC approval will be sought prior to proceeding to the subsequent commissioning phase. These hold points require regulatory verification to confirm operational readiness of the plant safety systems to satisfy regulatory requirements for staged progress through the commissioning phases up to full power operation. These regulatory hold points are consistent with the regulatory approach described in CNSC regulatory document REGDOC-2.3.1, *Conduct of Licensed Activities: Construction and Commissioning Programs*.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
NK30-PLAN-00120-00030	Pickering B Refurbishment Unit Readiness for Service	PI	PNGS

The licensee shall seek approval of the Commission or consent of a person authorized by the Commission prior to the removal of the following regulatory hold points for the return to service of each unit. The regulatory hold points that mark the completion of the commissioning phases are as follows:

1. Prior to **Fuel Load - Phase A**
2. Prior to removal of **Guaranteed Shutdown State - Phase B**
3. Prior to exceeding **1% Full Power - Phase C**
4. Prior to exceeding **65% Full Power - Phase D**

For each of the regulatory hold points, the licensee shall submit Completion Assurance Documents (CAD). In addition, the licensee shall submit CADs following sustained operation at 100% full power that will specify activities that were completed between 65% and 100% full power. Each CAD shall present evidence that all pre-established conditions for removal have been met.

Prior to Guaranteed Shutdown State (GSS) removal, all plant personnel who work on the refurbished reactor shall have completed update training appropriate to the knowledge and skill requirements of the applicable position covering the changes to facility systems, equipment and procedures made during refurbishment. For each ANO, CRSS and SM this includes, at a minimum:

- Principles of reactor operation with new fuel;

REACTOR FACILITY-SPECIFIC

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

- Principles of nuclear safety relevant to the operation of the reactor unit with new fuel;
- Operating constraints and limits associated with the operation of the reactor unit with new fuel;
- The initial approach to criticality and power increase until control by the reactor regulating system is established, including the systems and equipment required and their operation; and
- Changes in fuel composition and core reactivity until reaching equilibrium fuel conditions.

This training shall include formal knowledge and performance evaluations that confirm and document that, at the time of GSS removal, the person has the required knowledge and skills to perform the duties of the applicable position.

Low power testing (Phase C) shall be carried out at the lowest possible power level, with a maximum of 1% of full power.

Pre-requisites for Removal of Hold Points:

Pre-requisites for Fuel Load

1. All IIP commitments required prior to fuel load are complete;
2. All SSCs required for safe operation beyond fuel load are available for service;
3. Staffing levels to safely operate the unit are adequate;
4. Specified operating procedures for fuel load have been formally validated;
5. Specified training for fuel load is complete and staff qualified;
6. Specified SSCs meet the quality and completion requirements of CSA standard N286, *Management system requirements for nuclear facilities*;
7. All non-conformances and open items identified leading up to the fuel load are addressed; and
8. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to fuel load have been successfully completed.

With respect to pre-requisite #3: Staffing levels refers to a sufficient number of qualified workers present at all times to ensure the safe operation of the nuclear facility and to ensure adequate emergency response capability. The licensee should have adequate staff available such that absences due to vacation, sick leave and training do not cause violations of the minimum shift complement levels

Pre-requisites for GSS Removal

1. All IIP commitments required prior to GSS removal are complete;
2. All SSCs required for safe operation beyond GSS removal are available for service;
3. Specified operating procedures for GSS removal have been formally validated;
4. Specified training for GSS removal is complete and staff qualified;
5. All non-conformances and open items identified leading up to GSS removal are addressed;
6. Specified SSCs meet the quality and completion requirements of CSA N286; and
7. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to GSS removal have been successfully completed.

Pre-requisites for Reactor Power Increases Prior to exceeding 1% Full Power

REACTOR FACILITY-SPECIFIC

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

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1. All IIP commitments required prior to increasing reactor power are complete;
2. All SSCs required for safe operation are available for service;
3. Specified operating procedures have been formally validated;
4. Specified training is complete and staff qualified;
5. All non-conformances and open items identified leading up to reactor power increases are addressed;
6. Specified SSCs meet the quality and completion requirements of CSA N286; and
7. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to increasing reactor power have been successfully completed.

Pre-requisites for Reactor Power Increases Prior to exceeding 65 % Full Power

1. All IIP commitments required prior to normal operation are complete;
2. All SSCs required for safe operation are available for service;
3. Specified operating procedures have been formally validated;
4. Specified training is complete and staff qualified;
5. All non-conformances and open items identified leading up to reactor power increases are addressed;
6. Specified SSCs meet the quality and completion requirements of CSA N286; and
7. Verification by CNSC staff that all construction, commissioning, re-start, and available for service activities required prior to increasing reactor power have been successfully completed.

The licensee's criteria for the removal of hold points are contained in NK30-PLAN-00120-00030, *Pickering B Refurbishment Unit Readiness for Service*.

Delegation of authority:

Delegation of authority by the Commission to act as a "person authorized by the Commission" for the purpose of this licence condition is only applied to the Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch. [Future Reference and Pending Commission Delegation]

Guidance:

Objective evidence should be provided to support the confirmation that SSCs meet the quality and completion requirements of CSA N286, including Design, Engineering, Procurement, Construction, Installation and Implementation activities are complete, their results deemed safe for the intended use and their respective critical characteristics and requirements have been met.

REACTOR FACILITY-SPECIFIC

15.3 Cobalt-60 Program

Licence Condition 15.3:

The licensee shall implement and maintain a Cobalt-60 program for activities described under Part IV of this licence.

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

This LC provides basis for regulatory oversight related to the licensed activity associated with Cobalt-60. OPG is authorized to produce Cobalt-60 as a commercial by-product at Pickering NGS Units 5 to 8. Cobalt-60 rods are packaged and shipped off-site. OPG is under contractual obligation to take back the spent Cobalt-60 that has reached the end of its service life (the spent Cobalt-60 arrives to the site in form of sealed sources).

The CNSC has strengthened its regulatory controls on sealed sources, principally through establishment of a sealed source tracking system within an upgraded national sealed source registry and enhanced export and import controls for high-risk sealed sources. These measures provide for safe and secure management and protection of such sources in Canada and are consistent with strengthened international norms in these areas, particularly with respect to the IAEA *Code of Conduct on the Safety and Security of Radioactive Sources*.

OPG is exempted from the requirement for leak testing in accordance with Section 18(2)(d) of the *Nuclear Substances and Radiation Devices Regulations*, based on the Summary Record of Proceedings and Decision (e-Doc 3609970), which detailed that the sealed sources are stored underwater and that OPG's equipment is capable of detecting waterborne contamination of 200 Bq or less of a nuclear substance.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
P-OM-018-31985-01	Cobalt Processing - Table of Contents/Revision History	TI	PNGS
P-OM-018-31985-04.04.12	Cobalt Processing – Cobalt Handling	TI	PNGS
P-OP-31985-0001	Cobalt Processing Procedure	TI	PNGS

When managing Cobalt-60 produced at Pickering NGS Units 5 to 8 OPG shall follow the Operating Manual "Cobalt Processing" and the relevant associated procedures.

REACTOR FACILITY-SPECIFIC

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

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Applicable requirements set out in the Transport Canada *Transportation of Dangerous Goods Regulations* and in the CNSC *Packaging and Transport of Nuclear Substances Regulations* shall be met before transferring Cobalt-60 and shipping it off-site.

When managing and storing Cobalt-60 sealed sources, OPG shall follow the Operating Manual section 4.4.12 "Cobalt Handling" and the relevant associated procedures.

Cobalt-60 sealed sources are recorded in the CNSC database (the Sealed Source Tracking System) that tracks the location of each significantly hazardous radioactive source (IAEA Category 1 and 2 sources) in Canada.

The licensee shall submit a report in writing within 48 hours of any receipt of a Cobalt-60 sealed source with an activity equal to, or greater than, 0.3 TBq in accordance with the requirements of REGDOC-3.1.1 (LC 3.3). The report shall be submitted to the CNSC in accordance with standard communication protocols. The report shall include:

- (i) The date of receipt of a transfer,
- (ii) The name of the shipper and licence number,
- (iii) The address of the shipper's authorized location,
- (iv) The nuclear substance,
- (v) Activity (radioactivity) (Bq) per source on the reference date,
- (vi) The reference date,
- (vii) The number of sealed source(s), and
- (viii) The aggregate activity (Bq).

Guidance:

None.

15.4 Import and Export of Nuclear Substances

Licence Condition 15.4:

The licensee shall limit the activities of import and export of nuclear substances to those occurring as contaminants in laundry, packaging, shielding or equipment.

NOTE: This licence condition applies only to Pickering Nuclear Generating Station (PNGS).

Preamble:

OPG is authorized to import and export nuclear substances occurring as contaminants in laundry originating from the Pickering NGS site and the Western Waste Management Facility (WWMF). Under this licence condition, Pickering NGS is allowed to accept contaminated laundry from WWMF to combine with the Pickering laundry prior to export to the United States for laundering. In addition to contaminated laundry, the licence condition allows for import and export of packaging, shielding or equipment with low levels of contamination similar to laundry. This licence condition does not authorize OPG to import and export controlled nuclear substances as defined under the *Nuclear Non-Proliferation Import and Export Control Regulations*.

This licensed activity was previously authorized under NSRD licence 12861-15-19.1. The original licensing basis for this activity is described in OPG's November 25, 2011, licence application for the renewal of the NSRD licence 12861-15-12.0 (N-CORR-00531-05496, e doc 3846889).

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change			
Document #	Title	Notification	Facility
W-PROG-WM-0002	Radioactive Material Transportation	TI	PNGS ¹

¹ For the purposes of this licence condition only

The licensee shall limit the import and export of nuclear substances to the nuclear substances and quantities listed in Table 1 as follows:

Table 1: Nuclear Substances and Quantity Limits for Import and Export (per shipment)

Nuclear Substance	Maximum Total Quantity
Americium 241	10 MBq
Antimony 122	10 GBq
Antimony 124	50 GBq
Antimony 125	20 GBq
Carbon 14	10 GBq
Cerium 141	1 GBq

REACTOR FACILITY-SPECIFIC

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Nuclear Substance	Maximum Total Quantity
Cerium 144	1 GBq
Cesium 134	1 GBq
Cesium 137	5 GBq
Chromium 51	50 GBq
Cobalt 57	10 MBq
Cobalt 58	100 MBq
Cobalt 60	50 GBq
Curium 242	1 MBq
Curium 244	100 kBq
Deuterium	350 mg
Europium 154	50 MBq
Europium 155	50 MBq
Gadolinium 153	100 MBq
Gadolinium 159	500 MBq
Hafnium 181	10 MBq
Hydrogen 3 (Tritium)	10 GBq
Iodine 129	200 kBq
Iodine 131	2 MBq
Iodine 133	2 MBq
Iron 55	10 GBq
Iron 59	50 GBq
Lanthanum 140	1 MBq
Manganese 54	5 GBq
Manganese 56	5 GBq
Molybdenum 99	1 MBq
Neptunium 237	1 kBq
Neptunium 239	500 kBq
Nickel 59	200 MBq
Nickel 63	500 MBq
Niobium 94	10 MBq
Niobium 95	5 GBq
Plutonium 238	1 MBq
Plutonium 239	50 MBq

REACTOR FACILITY-SPECIFIC

ID # [O4M5N6FSBVFS-972809725-142](#) (Word)

ID # PENDING (PDF)

Nuclear Substance	Maximum Total Quantity
Plutonium 240	1 MBq
Plutonium 241	58 MBq
Promethium 147	50 MBq
Ruthenium 103	1 GBq
Ruthenium 106	1 GBq
Scandium 46	50 MBq
Silver 108m	100 kBq
Silver 110m	10 MBq
Strontium 89	5 MBq
Strontium 90	10 MBq
Tantalum 182	50 kBq
Tin 113	50 MBq
Tungsten 187	1 MBq
Uranium 234	1 kBq
Uranium 235	1 kBq
Uranium 238	10 kBq
Zinc 65	5 MBq
Zirconium 93	100 GBq
Zirconium 95	100 GBq

The licensee is not authorized, subject to any restrictions or exemptions under the regulation, to import or export the items described in Parts A and B of the Schedule to the *Nuclear Non-Proliferation Import and Export Control Regulations*, such as:

- (1) Special fissionable material, as described in paragraph A.1.1:
 - (i) Plutonium;
 - (ii) Uranium 233;
 - (iii) Uranium enriched in Uranium 233 or Uranium 235.
- (2) Source material, as described in paragraph A.1.2:
 - (i) Uranium, containing the mixture of isotopes that occurs in nature;
 - (ii) Uranium, depleted in the isotope Uranium 235; and
 - (iii) Thorium.
- (3) Deuterium and heavy water, as described in paragraph A.1.3.
- (4) Tritium, as described in paragraph A.1.5.
- (5) Alpha-emitting nuclear substances, as described in paragraph B.1.1.1, including but not limited to:
 - (i) Actinium 225, 227;
 - (ii) Californium 248, 250, 252, 253, 254;

REACTOR FACILITY-SPECIFIC

- (iii) Curium 240, 241, 242, 243, 244;
- (iv) Einsteinium 252, 253, 254, 255;
- (v) Fermium 257;
- (vi) Gadolinium 148;
- (vii) Mendelevium 258, 260;
- (viii) Neptunium 235;
- (ix) Polonium 208, 209, 210;
- (x) Radium 223; and

(6) Radium-226, as described in paragraph B.1.1.16.

Guidance:

Guidance Publications			
Org	Document #	Title	Version
CNSC	REGDOC-2.13.2	Import and Export	2018

16 WASTE MANAGEMENT FACILITY-SPECIFIC

16.1 Security Arrangements and Measures

Licence Condition 16.1:

The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (vi) of Part IV of this licence without the submission of the proposed security arrangements and measures for the new building, or any potential modifications to the protected area that may be associated with this new building, and without prior written acceptance of the Commission or prior written consent of a person authorized by the Commission.

NOTE: This licence condition applies only to Pickering Waste Management Facility (PWMF).

Compliance Verification Criteria:

The operating licence authorizes the construction and operation of additional buildings at the PWMF. This LC requires that OPG submit the proposed security arrangements and measures for the new buildings, or any potential modifications to the protected area that may be associated with the new buildings prior to receiving CNSC authorization to operate these buildings.

The Commission, or a person authorized by the Commission, will confirm that acceptable security arrangements have been submitted prior to authorizing OPG to begin operations at the new buildings.

Delegation of Authority

Refer to section G.1 of this LCH for details on delegation of authority.

16.2 Construction Plans

Licence Condition 16.2:

The licensee shall not carry out the activities referred to in paragraph (vi) of Part IV of this licence without the submission of an environmental management plan, a construction verification plan, and the project design requirements, and without prior written acceptance from the Commission or prior written consent of a person authorized by the Commission.

NOTE: This licence condition applies only to Pickering Waste Management Facility (PWMF).

Compliance Verification Criteria:

The CNSC will confirm that both an environmental management plan and a construction verification plan are in effect prior to the commencement of construction activities as authorized in paragraph (vi) of Part IV of this licence.

The CNSC will confirm that appropriate design requirements have been developed and submitted to the CNSC prior to the onset of construction activities. CNSC staff will confirm that the project design requirements comply with the NRC National Fire Code of Canada, NRC National Building Code of Canada, CSA Group standard N393, Fire Protection for Facilities That Process, Handle, or Store Nuclear Substances and REGDOC-2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures.

Furthermore, the licensee must demonstrate that any design changes remain within the Commission approved licensing basis.

Delegation of Authority

Refer to section G.1 of this LCH for details on delegation of authority.

16.3 Commissioning Report

Licence Condition 16.3: Commissioning Report

The licensee shall not carry out the activities referred to in paragraph (ii) of Part IV of this licence that relate to completed construction activities in paragraph (vi) of Part IV of this licence without the submission of a commissioning report, and without prior written acceptance of the Commission or prior written consent of a person authorized by the Commission.

NOTE: This licence condition applies only to Pickering Waste Management Facility (PWMF).

Compliance Verification Criteria:

The Commission, or a person authorized by the Commission, will confirm that an acceptable commissioning report has been submitted prior to authorizing OPG to begin operations at any new buildings. Upon review and acceptance of the commissioning report, the Commission or a person authorized by the Commission, will provide formal notification that OPG is authorized to begin operations at the new building.

Delegation of Authority

Refer to section G.1 of this LCH for details on delegation of authority.

APPENDIX A – Acronyms

The following is the list of acronyms used in the LCH:

ACU	Air Conditioning Units
Act (the)	<i>Nuclear Safety and Control Act</i>
ADL	Administrative Dose limits
AECB	Atomic Energy Control Board
AIA	Authorized Inspection Agency
AIM	Abnormal Incident Manual
AL	Action Levels
ALARA	As Low As Reasonably Achievable
ASME	American Society of Mechanical Engineers
BDBA	Beyond Design Based Accident
CANDU	CANadian Deuterium Uranium
CEA	Cyber Essential Assets
CMD	Commission Member Document
CME	Common Mode Events
CNEP	Consolidated Nuclear Emergency Plan
CNSC	Canadian Nuclear Safety Commission
COG	CANDU Owners Group (now CONEXUS)
CRSS	Control Room Shift Supervisor
CSA	Canadian Standards Association
CT	Calandria Tube
cUL/ULC	Underwriters Laboratory of Canada
CVC	Compliance Verification Criteria
DBA	Design Basis Accident
DDP	Detailed Decommissioning Plan
DRL	Derived Release Limits
EAL	Environmental Action Levels
ECO	End of Commercial Operations
EFPH	Effective Full Power Hour / Equivalent Full Power Hour
EMEG	Emergency Mitigating Equipment Guidelines
EMS	Environmental Management System
E-NOP	Enhanced Neutron Overpower Protection
EOP	Emergency Operating Procedures
EQ	Environmental Qualification
FADS	Filtered Air Discharge System
FC	Fuel Channel
FPP	Fire Protection Program
GAR	Global Assessment Report
Gd	Gadolinium
GSS	Guaranteed Shutdown State
Heq	Hydrogen Equivalent Concentration
HTS	Heat Transport System
IAEA	International Atomic Energy Agency

APPENDIX A– ACRONYMS

IFB	Industrial Fire Brigade
IIP	Integrated Implementation Plan
INFO	CNSC INFOrmation documents
ISI	In-service Inspection
IUC	Instrument Uncertainty Calculations
LBB	Leak Before Break
LBLOCA	Large Break LOCA
LC	Licence Condition
LCH	Licence Conditions Handbook
LCMP	Life Cycle Management Plans
LOCA	Loss of Coolant Accident
LORPR	Loss of Reactor Power Regulation
MCCP	Minimum Complement Coordination Program
MSC	Minimum Shift Complement
NDE	Non-destructive Examination
NEW	Nuclear Energy Worker
NFPA	National Fire Protection Association
NGS	Nuclear Generating Station
NOP	Neutron Overpower Protection
NoRU	Notification of Regulatory Undertakings
NPP	Nuclear Power Plant
NSCA	<i>Nuclear Safety and Control Act</i>
OMIS	Obligated Materials Information Summary
OPG	Ontario Power Generation Inc.
OP&P	Operating Policies and Principles
OPEX	Operating Experience
OSR	Operational Safety Requirements
OCAS	Outage Completion Assurance Statement
PARs	Passive Autocatalytic Combiners
PDP	Preliminary Decommissioning Plan
PIDP	Public Information and Disclosure Program
PIP	Periodic Inspection Program
PLBB	Probabilistic Leak Before Break
PNERP	Provincial Nuclear Emergency Response Plan
PPE	Personal Protective Equipment
ppm	Parts Per Million
PR	Power Reactor
PRA	Probabilistic Risk Assessment
PRD	Pressurized Relief Duct
PROL	Power Reactor Operating Licence
PRPD	Pickering Regulatory Program Division
PSA	Probabilistic Safety Assessment
PSR	Periodic Safety Review
PT	Pressure Tube
PT-CT	Pressure Tube-Calandria Tube
PWMF	Pickering Waste Management Facility

APPENDIX A– ACRONYMS

R	Revision
RD	Regulatory Document
R&D	Research and Development
RBGSS	Rod Based Guaranteed Shutdown State
RBGSS-DM	Rod Based Guaranteed Shutdown State with a Drained Moderator
REGDOC	Regulatory Document
RP	Radiation Protection
SAMG	Severe Accident Management Guidelines
SAP	Stabilization Activity Plan
SCA	Safety and Control Area
SM	Shift Manager
SOE	Safe Operating Envelope
SOP	Sustainable Operations Plan
SpA	Specific Area
SRS	Systems Related Safety
SSCs	Structures, systems and components
SSS	Special Safety Systems
SQ	Seismic Qualification
TDGR	<i>Transportation of Dangerous Goods Regulations</i>
ULC/cUL	Underwriters Laboratory of Canada
VB	Vacuum Building
wk	Week
WN	Written Notification
WSIA	<i>Workplace Safety and Insurance Act</i>
WWMF	Western Waste Management Facility

APPENDIX A– ACRONYMS

APPENDIX B – Glossary of Terms - Definitions

For definitions of terms used in this document, see REGDOC-3.6, *Glossary of CNSC Terminology*, which includes terms and definitions used in the *NSCA* and the regulations made under it, and in CNSC regulatory documents and other publications.

The following definitions, which have not been formally defined in REGDOC-3.6, are also applicable to this document.

Accept/ed/able/ance

Meet regulatory requirements, which mean it is in compliance with regulatory documents or technical standards referenced in the licence.

Approval

Commission's permission to proceed, for situations or changes where the licensee would be:

- Not compliant with regulatory requirements set out in applicable laws and regulations, or
- Not compliant with a licence condition, or
- Not in the **safe direction** but the objective of the licensing basis is met.

Consent

Written permission to proceed, given by CNSC delegated authority, for situations or changes where the licensee would:

- Comply with regulatory requirements set out in applicable laws and regulations;
- Comply with a licence condition; and
- Not adversely impact the licensing basis.

Effective Date

The date that a given document becomes effective within the licensing period. The effective date is either set to the licence issue date or to a future date when the given document becomes effective.

Extent of condition

Means an evaluation to determine if an issue has potential or actual applicability to other activities, processes, equipment, programs, facilities, operations or organizations.

Important to safety

Items important to safety include, but are not limited to:

- Structures, Systems or Components (SSC) whose malfunction or failure could lead to undue radiation exposure of the facility/site personnel, or members of the public.
- SSCs that prevent anticipated operational occurrences from leading to accident conditions.
- Those features that are provided to mitigate the consequences of malfunctions or failures of SSCs.

APPENDIX B– GLOSSARY OF TERMS - DEFINITIONS

- Tasks, duties, activities, aging mechanisms, findings, or any work that improperly performed could lead to radiation exposure of the facility/site personnel, or members of the public.

Program(s)

A documented group of planned activities, procedures, processes, standards and instructions coordinated to meet a specific purpose.

Published Document(s)

A document issued or published for public knowledge, which are typically CNSC regulatory documents and CSA standards.

Qualified Staff

Trained licensee staff deemed competent and qualified to carry out tasks associated to their respective positions.

Recommendations and Guidance

Non-mandatory suggestions on how to comply with the licence condition. Recommendations and guidance may include regulatory advice and/or recommended industry best practices to guide the licensee towards a higher level of safety and/or fully satisfactory performance/implementation of its programs.

Regulatory undertakings

Refers to high level commitments that ensure safety, not component work orders or regulatory predefined maintenance tasks. The licensee's deferral and Station Condition Record process focus on these lower-level commitments.

Restart of the reactor

Means removal of the Guaranteed Shutdown State (GSS).

Safe direction

Means changes in plant safety levels which would not result in:

- A reduction in safety margins,
- A breakdown of barrier,
- An increase (in certain parameters) above accepted limits,
- An increase in risk,
- Impairment(s) of special safety systems,
- An increase in the risk of radioactive releases or spills of hazardous substances,
- Injuries to workers or members of the public,
- Introduction of a new hazard,
- Reduction of the defense-in-depth provisions,

APPENDIX B– GLOSSARY OF TERMS - DEFINITIONS

- Reducing the capability to control, cool and contain the reactor while retaining the adequacy thereof, and
- Causing hazards or risks different in nature or greater in probability or magnitude than those stated in the safety analysis of the nuclear facility.

Safety and control measures

Measures or provisions that demonstrate that the applicant:

- (i) is qualified to carry on the licensed activities, and
- (ii) has made adequate provision for the protection of the environment, the health and safety of persons, the maintenance of national security and any measures required to implement international obligations to which Canada has agreed.

Written notification

A physical or electronic communication between a CNSC delegated authority and a person authorized to act on behalf of the licensee.

Written notification prior to implementation

CNSC must receive the written notification for the proposed changes within a reasonable time (based on the extent of the proposed changes and the potential impact on safe operation of the facility) prior to the implementation. This will allow sufficient time for CNSC staff to review the submission and determine the acceptability.

APPENDIX D:

Consultation and Engagement Report



Indigenous Consultation Report:

Ontario Power Generation Application to Refurbish Pickering Units 5-8 and Renew the Operating Licences of the Pickering Nuclear Generating Station and Pickering Waste Management Facility

May 2026



TABLE OF CONTENTS

TABLE OF CONTENTS	2
EXECUTIVE SUMMARY	4
1 INTRODUCTION	5
1.1 Duty to Consult and, where Appropriate, Accommodate	6
1.2 United Nations Declaration on the Rights of Indigenous Peoples	7
1.3 Role of Proponent.....	9
1.4 CNSC’s Commitment to Reconciliation	9
1.5 Identification of Indigenous Nations and Communities	10
1.6 CNSC Staff’s Consultation Approach for OPG’s Application	11
2 ASSERTED OR ESTABLISHED ABORIGINAL AND/OR TREATY RIGHTS IN OPG’S APPLICATION AREA	13
3 CNSC STAFF’S CONSULTATION AND ENGAGEMENT ACTIVITIES	14
3.1 Consultation Activities with the Mississaugas of Scugog Island First Nation	20
3.1.1 Background on Mississaugas of Scugog Island First Nation and Relationship with the CNSC	20
3.1.2 Key Issues and Concerns Raised by the Mississaugas of Scugog Island First Nation	22
3.1.3 CNSC Staff’s Response.....	23
3.1.4 CNSC Staff’s Commitments	24
3.2 Consultation Activities with Curve Lake First Nation	25
3.2.1 Background on Curve Lake First Nation and Relationship with the CNSC ..	25
3.2.2 Key Issues and Concerns Raised by Curve Lake First Nation	27
3.2.3 CNSC Staff’s Response.....	28
3.2.4 CNSC Staff’s Commitments	29
3.3 Consultation Activities with Hiawatha First Nation.....	29
3.3.1 Background on Hiawatha First Nation and Relationship with CNSC.....	29
3.3.2 Key Issues and Concerns Raised by Hiawatha First Nation.....	31

3.3.3	CNSC Staff's Response.....	32
3.3.4	CNSC Staff's Commitments	33
3.4	Consultation Activities with Alderville First Nation	33
3.4.1	Background on Alderville First Nation and Relationship with the CNSC	33
3.4.2	Key Issues and Concerns Raised by Alderville First Nation	35
3.4.3	CNSC Staff's Response.....	35
3.4.4	CNSC Staff's Commitments	37
3.5	Consultation activities with other Williams Treaties First Nations	37
3.5.1	The Chippewas of Georgina Island First Nation	37
3.5.2	The Chippewas of Rama First Nation (Mnjikaning).....	38
3.5.3	Beausoleil First Nation	39
3.5.4	CNSC Staff's Commitments	40
3.6	Engagement Activities with Six Nations of the Grand River.....	40
3.6.1	Background on Six Nations of the Grand River and Relationship with the CNSC 40	
3.6.2	Key Issues and Concerns Raised by Six Nations of the Grand River and CNSC Staff's Response.....	41
3.6.3	CNSC Staff's Commitments	41
3.7	Engagement Activities with Other Identified Nations.....	41
4	NEXT STEPS AND COMMITMENTS	42
	REFERENCES.....	45
	APPENDIX A. CORRESPONDENCE	
	APPENDIX B. OPG COMMITMENTS	

EXECUTIVE SUMMARY

The Canadian Nuclear Safety Commission (CNSC) Staff would like to acknowledge that the OPG Pickering Nuclear Site is situated within the traditional lands and waters of the Michi Saagiig Anishinaabeg, the Gunshot Treaty (1787-88), the Williams Treaties (1923), and the Williams Treaties Settlement Agreement (2018). The following Williams Treaty signatory First Nations have been consulted and engaged on OPG's Application:

- Curve Lake First Nation (CLFN)
- Alderville First Nation (AFN)
- Hiawatha First Nation (HFN)
- Mississaugas of Scugog Island First Nation (MSIFN)
- Chippewas of Georgina Island First Nation
- Chippewas of Rama First Nation (Mnjikaning)
- Chippewas of Beausoleil First Nation

In addition, given the Pickering Nuclear Site's proximity to or expressed interest, the following Indigenous Nations and communities have been engaged by the CNSC on OPG's Application:

- Mohawks of the Bay of Quinte
- Mississaugas of the Credit First Nation
- Six Nations of the Grand River
- Métis Nation of Ontario (Region 8)
- Saugeen Ojibway Nation

In support of Commission Member Document 26-H7 – *relative to this Application* CNSC staff have developed this Indigenous Consultation Report (the Consultation Report) to detail consultation and engagement activities for OPG's Application. It provides key information obtained to date and next steps identified for CNSC staff-led Indigenous consultation and engagement activities. The Consultation Report also provides information on OPG's engagement activities to date, as per the requirements and guidance set out in [REGDOC-3.2.2, Indigenous Engagement](#), Version 1.2 (REGDOC-3.2.2).

In July 2025, CNSC staff provided early notification to Indigenous Nations and communities that in June 2025 OPG had submitted a project application with the intent to Refurbish Pickering Units 5-8 and Renew the Operating Licences of the Pickering Nuclear Generating Station and Pickering Waste Management Facility

Since receiving the application, CNSC staff have aimed to conduct a thorough, transparent, flexible and collaborative consultation and regulatory process for OPG's Application.

CNSC staff are committed to working with each Indigenous Nation and community, as well as with OPG, to achieve consensus and resolution on any outstanding issues or concerns relating to OPG's Application in advance of the Part-2 Commission hearing scheduled for the week of October 5th, 2026.

An update on consultation efforts with all identified Indigenous Nations and communities, including updated issues tracking tables, consultation and engagement activities, Rights Impact Assessments (RIAs), and CNSC staff's recommendations with respect to the adequacy of consultation and engagement, will be submitted to the Commission as part of CNSC staff's supplemental submission prior to the Part-2 hearing. Understanding that Indigenous Nations and communities will have an opportunity to make oral submissions at the Part-2 hearing, CNSC staff's supplement submission will include CNSC staff's conclusions and recommendations, consultation and impacts to Aboriginal and/or Treaty rights. It will also include details on the outcomes of CNSC staff's efforts, specifically whether those efforts were successful in achieving consensus and securing the Free, Prior and Informed Consent (FPIC) of potentially impacted Indigenous Nations and communities OPG's Application.

1 INTRODUCTION

This Consultation Report was created to supplement and support CNSC staff's CMD. The Consultation Report provides key information with respect to CNSC staff-led Indigenous consultation and engagement activities for OPG's Application, conducted to date. The Consultation Report also provides information on OPG's engagement activities to date, as per the requirements of REGDOC-3.2.2, The Duty to Consult and Accommodate, the [*United Nations Declaration on the Rights of Indigenous Peoples Act*](#) (UNDA) and the CNSC's commitment to reconciliation guide the CNSC's approach to consultation and engagement with Indigenous Nations and communities. This approach is outlined in section 1.6, below.

CNSC staff remain committed to working with the identified Indigenous Nations and communities on OPG's Application to identify potential additional commitments and mitigations to address Application-related concerns and potential impacts, as appropriate. CNSC staff aim to work towards achieving consensus and resolution for any outstanding issues or concerns related to OPG's Application.

CNSC staff note that there will be a two-part Commission hearing for OPG's Application and that Part 2 of the hearing will focus on the interventions received from Indigenous Nations and communities and the public. To provide additional time for collaboration and consultation with Indigenous Nations and communities, CNSC staff will submit a supplemental report to the Commission in advance of the Part-2 hearing with staff's recommendations with respect to the adequacy of consultation and engagement conducted for OPG's Application.

That supplemental submission will include an update on CNSC staff's consultation activities, including the completion of RIAs with AFN, CLFN HFN and MSIFN, should they be interested, as well as updated issues tracking tables, an updated correspondence log, OPG's engagement activities and conclusions and recommendations regarding the Duty to Consult and, where appropriate, accommodate. The submission will also include details on the outcomes of CNSC staff's and OPG's efforts to achieve consensus and seek the FPIC of potentially impacted Indigenous Nations and communities on OPG's Application.

CNSC staff note that requirements and conditions relating to specific commitments made throughout the regulatory review process may be included in an updated Licence Conditions Handbook (LCH). Any updates to the LCH will be based on the outcomes of OPG's and CNSC

staff's consultation and engagement activities with identified Indigenous Nations and communities.

1.1 Duty to Consult and, where Appropriate, Accommodate

The common-law Duty to Consult and Accommodate (DTCA) applies when the Crown contemplates actions that may adversely affect potential and/or established Aboriginal and/or Treaty Rights. The Commission, as an agent of the Crown, must ensure that all licencing decisions under the [*Nuclear Safety and Control Act*](#) (NSCA) [1] and other applicable legislation uphold the honour of the Crown and uphold Indigenous peoples' potential or established Aboriginal and/or Treaty Rights, pursuant to section 35 of the [*Constitution Act, 1982*](#) [2]. CNSC staff work in collaboration and consultation with potentially impacted Indigenous Nations and communities to assess potential impacts to rights and propose mitigation and/or accommodation measures to address the identified impacts.

At the outset of an application, CNSC staff conduct an initial assessment of whether there is a common law DTCA obligation raised for the CNSC as a result of the application. CNSC staff evaluate if a Duty to Consult obligation is triggered, then CNSC staff assess the preliminary depth of the DTCA.

The CNSC staff's approach to assessing, preliminarily, the depth of the Duty to Consult is in line with the process and policies outlined in the [*Aboriginal Consultation and Accommodation - Updated Guidelines for Federal Officials to Fulfill the Duty to Consult*](#) [3]. In order to assess the potential depth of consultation, the CNSC staff uses resources such as Crown-Indigenous Relations and Northern Affairs Canada's [*Aboriginal and Treaty Rights Information System*](#) (ATRIS) [4], information regarding Aboriginal and/or Treaty rights shared by Indigenous Nations and communities, information shared through interventions or submissions to the Commission, as well as information that proponents or licensees gather and submit to the CNSC, as outlined in REGDOC-3.2.2 [5]. As the Commission is not a rights-determining body, staff do not conduct a formal strength-of-claim analysis. The Commission does not have the authority to confirm, establish or deny the existence of Aboriginal and/or Treaty rights as claimed or asserted by Indigenous Nations and communities. Rather, using the aforementioned sources of information, the CNSC staff assesses for recommendation to the Commission potential severity of a proposed project's potential impacts to determine the depth of consultation required to adequately discharge the Duty to Consult and, where appropriate, accommodate.

CNSC staff evaluate and update their assessment of the depth of the Duty to consult and, where appropriate, accommodate continuously, as information becomes available regarding the exercise of rights that could be impacted by the proposed project. This information may include details that Indigenous Nations and communities provide regarding the nature and extent of impacted rights, as well as information stemming from CNSC staff's technical assessment of a project's potential impacts on the public, the environment and Indigenous Nations and communities. CNSC staff take an approach to consultation that is commensurate with the assessed depth of consultation and that is flexible based on the requests and preferences of each Indigenous Nation and community, as appropriate.

The CNSC sets out requirements and guidance for licensees and applicants whose proposed projects may trigger the Crown’s Duty to consult in REGDOC-3.2.2. While the CNSC cannot delegate its Duty to Consult and accommodate obligations, proponents can carry out procedural aspects of the consultation process to support the CNSC in meeting its consultation obligations, where appropriate. For this matter, the CNSC and Commission will consider OPG’s engagement with Indigenous Nations and communities and its proposed mitigations or accommodations, to assess whether the Duty to Consult and, where appropriate, accommodate has been met.

1.2 United Nations Declaration on the Rights of Indigenous Peoples

The [*United Nations Declaration on the Rights of Indigenous Peoples*](#) (UN Declaration) [6] is an international human rights instrument that recognizes the human rights of Indigenous peoples around the world. Canada passed legislation known as the *United Nations Declaration Act* (UNDA) and the bill received Royal Assent on June 21, 2021. The Act provides a framework for the Government of Canada to work with Indigenous peoples to implement the UN Declaration at the federal level.

The CNSC is committed to supporting the Government of Canada’s whole-of-government implementation of UNDA through the [*2023-2028 UNDA Action Plan*](#) [7] (UNDA Action Plan), where it intersects with the CNSC’s mandate. The FPIC principle is integral to UNDA and is reflected in the UNDA Action Plan [7].

Measure #32 in the Shared Priorities chapter of the UNDA Action Plan commits to “the development of guidance for engaging with Indigenous Peoples on natural resources projects in order to obtain free, prior and informed consent, consistent with Articles 18, 19, 20, 27, 28, 29, and 32 of the United Nations Declaration on the Rights of Indigenous Peoples”. Natural Resources Canada (NRCan) is leading this work with the support of other federal departments and agencies.

The CNSC relies on the following sources for guidance on FPIC currently:

- [*Principles Respecting the Government of Canada’s Relationship with Indigenous Peoples*](#) [8], principle #6:
“The Government of Canada recognizes that meaningful engagement with Indigenous peoples aims to secure their free, prior, and informed consent when Canada proposes to take actions which impact them and their rights, including their lands, territories and resources.”
- [*Backgrounder: United Nations Declaration on the Rights of Indigenous Peoples Act*](#) [9] FPIC section:
“More specifically, FPIC describes processes that are free from manipulation or coercion, informed by adequate and timely information, and occur sufficiently prior to a decision so that Indigenous Rights and interests can be incorporated or addressed effectively as part of the decision-making process - all as part of meaningfully aiming to secure the consent of affected Indigenous peoples.

FPIC is about working together in partnership and respect. In many ways, it reflects the ideals behind the relationship with Indigenous peoples, by striving to achieve consensus as parties work together in good faith on decisions that impact Indigenous Rights and interests. Despite what some have suggested, it is not about having a veto over government decision making.”

- [*Kebaowek First Nation v. Canadian Nuclear Laboratories, 2025 FC 319 \(CanLII\)*](#) [10]

The Federal Court decision, *Kebaowek First Nation v. Canadian Nuclear Laboratories* 2025 FC 319, provided important guidance on the application of the United Nations Declaration on the Rights of Indigenous Peoples (UN Declaration) when the duty to consult applies. It notes “...The [UN Declaration] does not create new law or statutory obligations; rather, it is an interpretive lens to be applied to determine if the Crown has fulfilled its obligations prescribed at law.” (para 76). The decision further notes that “While the FPIC standard is not a veto, it requires significant robust processes tailored to consider the impacted Indigenous Nations laws, knowledge, and practices and employs processes that are directed toward finding mutual agreement.” (para 183)

The CNSC’s approach to consultation and engagement with Indigenous peoples is mindful of and incorporates the principles articulated in UNDA. The CNSC aims to achieve consensus and seek the FPIC of potentially impacted Indigenous Nations and communities on proposed projects through collaborative consultation approaches that allow for open dialogue and provide opportunities to understand, document and address the concerns of Indigenous Nations and communities, including measures to avoid or minimize potential impacts to their rights and interests to the greatest extent. Concerns that Indigenous Nations and communities raise, including those relating to consent for a project, are considered as part of the consultation process, including public hearings and the Commission’s decision-making process.

The CNSC provides funding through the Participant Funding Program (PFP) and the Indigenous and Stakeholder Capacity Fund (ISCF) to support the meaningful participation of Indigenous Nations and communities in Commission proceedings, as well as ongoing regulatory work. The CNSC also seeks to understand and follow an impacted Nations’ approaches in order to achieve consensus and FPIC for proposed projects and looks to adapt its processes and procedures based on Nations’ processes, laws, customs and requests, whenever possible. The CNSC’s goal is to ensure a robust consultation process that is clear, transparent and collaborative, enabling potentially impacted Nations and supporting them in communicating their processes and positions, regarding consent, to the Commission to inform its decision-making.

The CNSC remains committed to evolving its approaches, in alignment with Indigenous Nations and communities’ FPIC processes, best practices and guidance emerging from court decisions and the whole-of-government implementation of UNDA [6], and the UNDA Action Plan [7]. This commitment means initiating formal consultations on proposed updates and amendments to the CNSC’s REGDOC-3.2.2 [5] to provide nuclear proponents and licensees with guidance on engaging and partnering with Indigenous Nations under UNDA.

As part of the CNSC staff’s supplemental submission to the Commission for the Part-2 hearing, CNSC staff will outline the process and position of each potentially impacted Nation on their

FPIC in relation to OPG's Application, if shared with CNSC staff. Additionally, potentially impacted Indigenous Nations or communities wishing to express their FPIC position and process to the Commission directly, are encouraged to submit written and/or oral interventions to the Commission, to help inform the Commission's decision-making on OPG's Application.

1.3 Role of Proponent

The CNSC encourages all nuclear proponents and licensees to work with all Indigenous Nations and communities potentially impacted by their projects and licence applications proactively to establish mutually agreeable processes to securing their FPIC for proposed projects. This includes communicating details and outcomes of FPIC processes to the CNSC to inform CNSC staff's recommendations to the Commission.

CNSC staff acknowledge that, in the case of OPG's Application, some Indigenous Nations and communities have raised concerns about FPIC and have requested that OPG aim to secure their consent. CNSC staff have discussed those concerns with OPG and have encouraged OPG to work collaboratively with potentially impacted Indigenous Nations and communities to address FPIC-related concerns.

1.4 CNSC's Commitment to Reconciliation

The CNSC's approach to reconciliation focuses on establishing ongoing collaborative relationships through consistent and meaningful engagement and consultation. CNSC's approach aims to build capacity and seeks to improve opportunities for Indigenous participation in decision-making processes and regulatory oversight activities throughout the full lifecycle of nuclear facilities and for projects located in the territories of Indigenous Nations and communities.

The CNSC is committed to active listening, establishing regular dialogue and understanding the perspectives and values of Indigenous Nations and communities. Indigenous Nations and communities' feedback and priorities will continue to guide the CNSC in identifying key focus areas for taking action and implementing change.

Some of the CNSC's key focus areas include:

- Formalizing Terms of Reference (TOR) for long-term engagement with Indigenous Nations and communities.
- Incorporating Indigenous Knowledge (IK) and ceremony into the CNSC's regulatory processes and assessments.
- Reducing financial and capacity barriers to participation in the full lifecycle of CNSC regulatory activities.
- Updating regulatory documents and expectations to better reflect Indigenous Nations and communities' perspectives and UNDA principles.
- Increasing CNSC staff's Indigenous cultural competency and awareness.

- Collaborating with Indigenous Nations on monitoring, oversight and follow-up activities relating to nuclear facilities and activities in their territories to ensure that their communities are safe and that their territories, rights and interests are protected.

For more information on the CNSC's reconciliation initiatives, please visit the CNSC website at: [Reconciliation \(cnsccsn.gc.ca\)](https://www.cnsccsn.gc.ca/Reconciliation).

1.5 Identification of Indigenous Nations and Communities

CNSC staff have identified Indigenous Nations and communities with potential or established Aboriginal and/or Treaty Rights that may be adversely affected by OPG's Pickering NGS licence application. CNSC staff have identified these Indigenous Nations and communities by conducting analyses using Crown Indigenous Relations and Northern Affairs Canada's (CIRNAC) ATRIS and other mapping and database tools, as well as CNSC records and publicly available records, such as Indigenous Nations and communities' previous interventions and submissions to the CNSC related to the Pickering NGS and other nuclear projects in the vicinity.

CNSC staff have identified the following Indigenous Nations and communities as having Aboriginal and/or Treaty rights in OPG's Application area (referred to as "potentially impacted Indigenous Nations and communities"):

- Alderville First Nation (AFN)
- Curve Lake First Nation (CLFN)
- Hiawatha First Nation (HFN)
- Mississaugas of Scugog Island First Nation (MSIFN)
- Chippewas of Georgina Island First Nation
- Chippewas of Rama First Nation (Mnjikaning)
- Chippewas of Beausoleil First Nation

Additionally, based on information received and reviewed to date, the following Indigenous Nations and communities were identified as potentially having an interest in OPG's Application (referred to as "interested Indigenous Nations and communities"):

- Mohawks of the Bay of Quinte
- Mississaugas of the Credit First Nation
- Six Nations of the Grand River
- Métis Nation of Ontario (Region 8)
- Saugeen Ojibway Nation

CNSC will continue to share updates and remain available to discuss this application or questions with any interested Indigenous Nation or Community ahead of the Part 2 hearing or throughout OPG's project should it proceed.

- The potentially impacted Indigenous Nations and communities and the interested Indigenous Nations and communities are referred to collectively as the "identified Indigenous Nations and communities" throughout the Consultation Report.

1.6 CNSC Staff's Consultation Approach for OPG's Application

CNSC staff have consulted and engaged with potentially impacted or interested Indigenous Nations and communities on OPG's Application since 2023, consultation efforts included but were not limited to letters, emails, telephone calls, regular meetings, meetings with leadership, funding support, technical discussions and collaboration on reports and assessments. These efforts are elaborated upon below, as well as in section 3 and Appendix A of this Consultation Report. At key intervals, CNSC staff invited Indigenous Nations and communities to review and comment on the process and encouraged them to apply for funding through the CNSC's PFP and ISCF.

CNSC's consultation and engagement practices for OPG's Application reflect the evolution of best practices, including as emanating from court decisions. This includes UNDA, the CNSC's commitment to reconciliation and the introduction of the [*Principles Respecting the Government of Canada's Relationship with Indigenous Peoples*](#). CNSC staff also acknowledge that if OPG's Application proceeds, the CNSC retains an obligation to hear and understand perspectives and concerns of Indigenous Nations and communities and therefore will continue to consult and engage with Indigenous Nations and communities over OPG's Pickering Nuclear Site lifecycle. In reviewing OPG's current application, CNSC staff evaluate and recommend to the Commission that the Application raise the CNSC's DTCA,

CNSC staff sought information from potentially impacted Indigenous Nations and communities about the nature of their Aboriginal and/or Treaty rights protected under Section 35 of the *Constitution Act, 1982*, including how they might be impacted by OPG's Application and potential measures, commitments and/or conditions to meaningfully address potential impacts and concerns that Nations identify. As part of this process, CNSC staff considered information that Indigenous Nations and communities and OPG provided about OPG's Application's potential impacts. This was done in view of understanding the FPIC processes and positions of potentially impacted Nations, the nature, scope and extent of any adverse impacts on Nations' rights and interests, as well as identifying potential measures to address those impacts and concerns.

To ensure potentially impacted Indigenous Nations and communities are able to present their views on OPG's Application's potential impacts on their rights and interests in a collaborative and meaningful way, CNSC staff have followed best practices and current approaches to consultation in seeking the input of potentially impacted Nations on Nation-specific RIAs. CNSC staff are conducting these RIAs and analyse to ensure that potential impacts are thoroughly considered, assessed and addressed in the consultation process and resulting recommendations to the Commission by CNSC staff. The RIAs and CNSC staff's recommendations will be submitted to the Commission for the Part-2 Commission hearing.

Given the Government of Canada's and the CNSC's commitments to reconciliation and the principles of UNDA, CNSC staff have conducted consultation with the goal of achieving consensus and seeking the FPIC of potentially impacted Indigenous Nations and communities. As such, CNSC staff undertook the following approach:

- Providing early notification about OPG's Application, in July 2025, via notification letters. These letters included information on OPG's Application, as well as next steps in the regulatory process. They also outlined opportunities for early consultation and engagement with identified Indigenous Nations and communities.
- Offering to discuss preferred consultation approaches with each Indigenous Nation and community in order to develop a meaningful and mutually agreeable approach.
- Responding to and working with potentially impacted Indigenous Nations and communities and OPG to address issues and concerns, while striving to achieve consensus on all identified issues and concerns.
- Monitoring and providing feedback on OPG's engagement activities, based on *REGDOC* 3.2.2 requirements and guidance.
- Ensuring that OPG responded to and addressed all comments and concerns that Indigenous Nations and communities raised about OPG's Application.
- Collaborating on the issues tracking tables, which will be submitted for the Part-2 hearing. CNSC staff created an issues tracking table for each identified Indigenous Nation or community that raised concerns about OPG's Application. These tables will provide a summary of issues and concerns, responses and their resolution status.
- Providing funding and capacity support through the CNSC's PFP and ISCF funding programs, throughout the consultation and engagement process.
- Providing information and consulting on CNSC staff's technical review and assessment of OPG's Application and related programs, documents and reports.
- Seeking to understand and confirm each impacted Nation's position with regards to its FPIC for OPG's Application and their community-specific FPIC process, where appropriate.
- Collaborating on drafting CNSC staff's Consultation Report with each identified Indigenous Nation and community that has raised concerns about OPG's Application. The Consultation Report provides an overview of consultation and engagement activities and ensures Indigenous Nations and communities' concerns are clearly communicated to the Commission, including areas of disagreement. The Consultation Report also includes CNSC staff and OPG's proposed measures and commitments to address those issues and concerns raised to date, all of which is elaborated in a Nation-specific approach below.
- Completing RIAs in response to concerns about impacts to rights and interests. This includes discussions on mitigations, commitments and potential accommodations to address potential impacts to rights, with input from potentially impacted Indigenous Nations and communities.
- Supporting and encouraging Indigenous participation in the regulatory review process, including the Commission hearing, through interventions.

CNSC staff have committed to providing Indigenous Nations and communities with opportunities to participate in the regulatory process throughout OPG's project lifecycle, should OPG's Application proceed. This includes committing to working with identified Indigenous Nations and communities throughout OPG's project lifecycle to address issues and concerns as they arise.

CNSC staff will continue consulting and engaging with identified Indigenous Nations and communities on both the CNSC and OPG's commitments related to OPG's Application. Based

on the outcomes of CNSC staff's consultation activities and OPG's engagement activities, CNSC staff note that:

- Further commitments will be included as conditions or compliance verification criteria in the licence condition handbook ; and
- Any CNSC staff commitments made will be captured in a final commitment list for each potentially impacted Indigenous Nation and community in the supplemental submission for the Commission in advance of the Part-2 hearing.

For more information on CNSC staff's consultation activities, please see Section 3 of this Consultation Report.

CNSC staff acknowledge that, at the time of this Consultation Report's publication, some Indigenous Nations and communities have outstanding concerns about OPG's Application. CNSC staff are committed to working with each Indigenous Nation and OPG to achieve consensus and seek FPIC on OPG's Application, particularly for outstanding issues and concerns, in advance of the Part-2 hearing.

CNSC staff will provide a supplemental submission to the Commission in advance of the Part-2 hearing. This supplemental submission will include an update on the status of CNSC's staff's consultation efforts, OPG's engagement, the outcomes of efforts to secure consensus on OPG's Application, outstanding concerns, and any key measures and commitments to address any potential impacts.

2 ASSERTED OR ESTABLISHED ABORIGINAL AND/OR TREATY RIGHTS IN OPG'S APPLICATION AREA

The Pickering Nuclear Generating Station (PNGS) and Pickering Waste Management Facility (PWMF) are located on the north shore of Lake Ontario, in Pickering Ontario. The site is located on Michi Saagiig Anishinaabeg lands, waters and the Williams Treaties First Nations (WTFN) territory. There are seven WTFN, including HFN, AFN, CLFN, BFN, MSIFN, Chippewas of Georgina Island First Nation and Chippewas of Rama First Nation.

In 2018, a settlement agreement was reached between the WTFN and Governments of Canada and Ontario (Settlement Agreement). The Settlement Agreement formally recognizes the pre-existing Treaty harvesting Rights of the Williams Treaties Signatories members to hunt, trap, fish and gather for food, social and ceremonial purposes within the portions of their traditional territories covered by Treaties No. 5, 16, 18, 20, and 27-271/4 that lie outside of Clauses 1 and 2 of the Williams Treaties. The Settlement Agreement also included a [*Statement of Apology for the Impacts of the 1923 Williams Treaties*](#) [14] from the Government of Canada for the negative impacts of the 1923 Williams Treaties on the WTFN.

The lands of the PNGS and PWMF are covered by the Johnson-Butler Purchase, also referred to as the "Gunshot Treaty" (1787-88), the Williams Treaties (1923), and the lands that were subject to the Settlement Agreement. Figure 1 below shows a map of the Williams Treaties territory.

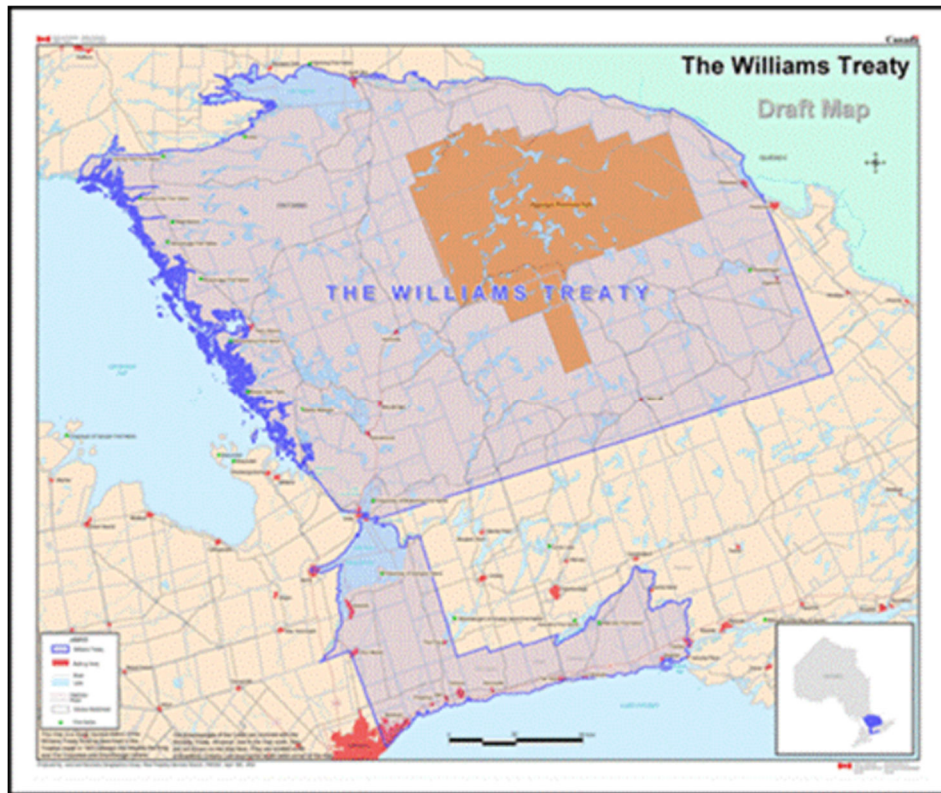


Figure 1: Map of the Williams Treaties

3 CNSC STAFF’S CONSULTATION AND ENGAGEMENT ACTIVITIES

To fulfill the Commission’s consultation obligations for its decision under the NSCA on the licence application, CNSC staff provided early notifications of the licence application in July 2025, to Indigenous Nations and communities. Since then, CNSC staff have provided Indigenous Nations and communities with multiple opportunities for consultation, dialogue and collaboration regarding their concerns and interests relating to OPG’s Application. CNSC staff provided opportunities for dialogue through multiple phone calls, correspondence, and meetings with leadership and community representatives, as well as through funding provisions and capacity support. CNSC staff have also encouraged identified Indigenous Nations and communities to participate in the Commission’s public hearing process; to advise the Commission of any concerns they may have and propose resolutions to those concerns. Additional information about the specific consultation and engagement activities with each identified Indigenous Nation and community is provided in subsections below.

CNSC staff provided regular updates to each identified Indigenous Nation and community as part of its consultation process, keeping them informed of key developments, potential impacts

to Aboriginal and/or Treaty rights, updates to the regulatory review and consultation processes and soliciting Nations' feedback and perspectives. CNSC staff offered Indigenous Nations and communities with opportunities for collaboration when reviewing and commenting on relevant sections of this Consultation Report, including the issues tracking tables which will be submitted for Part-2. Additionally, CNSC staff continue to work with interested Indigenous Nation to solicit feedback on Nation-specific RIAs for OPG's Application, including discussions on concerns about potential impacts to rights and interests and how those might be addressed.

In order to ensure a coordinated approach to Federal Crown consultation with respect to OPG's Application, CNSC staff worked closely with Fisheries and Oceans Canada (DFO) to coordinate and collaborate on consultation and engagement activities, where possible. This collaboration included DFO participation in pre-established meetings and ongoing availability to provide input on application components related to the deep-water intake, in-water works, required DFO approvals and the Fisheries Act, and the applicable licensing and regulatory processes. CNSC staff also coordinated with DFO on Crown responses in the Issues and Concerns table for accessibility and comprehensiveness of related Crown decisions. CNSC and DFO staff will continue to collaborate throughout the licensing and consultation processes where possible and appropriate. Further, CNSC staff have continued to consult and engage with identified Indigenous Nations and communities on nuclear projects and related activities in the area. The CNSC has signed TORs for long-term engagement with CLFN, HFN and MSIFN. CNSC and AFN are currently working to finalize a TOR. These TORs provide a forum for collaboration and a structure for regular meetings and dialogue to address areas of interest or concern regarding CNSC-regulated facilities and activities located within Indigenous Nations' traditional territories, including the Pickering Nuclear Site.

During these reoccurring meetings, CNSC staff provided updates specific to OPG's Application and had consultations and discussions regarding interests, concerns and potential impacts to Aboriginal and/or Treaty rights. CNSC staff have offered and have held multiple Application-specific meetings to discuss issues of concern and collaborate proactively on an approach to consultation and engagement.

Table 1, below, contains a summary of key correspondence and opportunities to participate in the consultation and regulatory process for OPG's Application since formal notification was provided in July 2025.

Appendix A includes copies of the key correspondence associated with the consultation activities listed in Tables 1 to 9. CNSC staff have included general correspondence with all identified Indigenous Nations and communities, such as examples of notifications at key project milestones, notices about funding opportunities and outreach events. This includes offers to meet and consult on OPG's Application, opportunities to review and collaborate on CNSC documents and issues, concerns, comments or questions received and CNSC staff responses.

Table 1: Summary of correspondence and opportunities to participate in engagement and consultation and regulatory processes for the OPG's Application

YYYY-MM-DD	Indigenous Nation or Community	Correspondence/Activity
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2023-2024	All Nations	Throughout OPG's 2024 PNGS request for continued operations regulatory review process, CNSC staff had early discussions in relation to OPG's planned refurbishment of the PNGS.
2023-08-11	Curve Lake First Nation, Hiawatha First Nation	Available project details and general site updates provided by CNSC at monthly meeting.
2024-03-12	Mississaugas of Scugog Island First Nation	Available project details and general site updates provided by CNSC at monthly meeting. Further updates were provided in monthly meetings as outlined in agendas provided in Appendix A
2025-07-04	All Nations	Notice sent to Nations to inform them of the application OPG submitted to CNSC.
2025-07-17	Curve Lake First Nation	Project specific and general site updates provided by CNSC at monthly meeting. Further updates were provided in monthly meetings as outlined in agendas provided in Appendix A
2025-07-17	Hiawatha First Nation	Project specific and general site updates provided by CNSC at monthly meeting. Further updates were provided in monthly meetings as outlined in agendas provided in Appendix A

2025-07-23	All Nations	Notice of Hearing and Participant Funding shared directly with Nations.
2025-11-18	Michi Saagiig First Nations (HFN, AFN, MSIFN, CLFN)	CNSC staff Responded to letter dated October 24, 2025 sent by Michi Saagiig First Nations expressing concerns over DNGS decision and CNSC staff's analysis with respect to consultation obligations for the PNGS
2025-11-18	Michi Saagiig First Nations	Nations were notified of PFP funding awarded.
2025-11-28	Michi Saagiig First Nations	CNSC staff responded to a letter sent by the Michi Saagiig First Nations dated November 28, 2025 expressing concerns regarding the amount of funding received to date in relation to the PNGS licence application.
2025-12-10	CNSC staff letter to Registry	Throughout early conversations with Indigenous Nations and communities discussing OPG's Application, concerns were raised by Nations surrounding the timelines and the ability to meaningfully consult in the time before the hearing. In effort to remain flexible and ensure meaningful consultation, CNSC staff wrote to CNSC Registry to request delay of the hearing Part 1 and 2 by three months. The Michi Saagiig First Nations were

		notified of the letter sent by CNSC staff to the registry and staff's efforts to address their concerns and requests with respect to the process and proceeding timelines.
2025-12-10	Alderville First Nation	Project specific and general site updates provided by CNSC at monthly meeting. Further updates were provided in monthly meetings as outlined in agendas provided in Appendix A
2025-12-24	Michi Saagiig First Nations	CNSC staff sent a letter to the Michi Saagiig First Nations outlining the consultation process and the roles and responsibilities of licensees and the CNSC with respect to consultation and engagement.
2025-12-24	Michi Saagiig First Nations	Draft workplan sent to Michi Saagiig First Nations to establish an agreed upon approach to Consultation for the PNGS & PWMF regulatory review process that best suits the needs of each Nation.
2026-02-04	Michi Saagiig First Nations	CNSC staff sent a letter to the Michi Saagiig First Nations to address concerns regarding OPG's Application to propose a leadership meeting to discuss their specific concerns and a path forward on OPG's Application. This letter set out that it was CNSC Staff's to recommend to the Commission that the DTCA was triggered and detailed CNSC's Staff's reasoning.

2026-03-10	Michi Saagiig First Nations	<p>A leadership meeting was held between CNSC staff and Michi Saagiig First Nations leadership to discuss PNGS & PWMF. It was raised by the Nations that before discussing OPG's Application there was a preference to discuss procedural and relationship matters of concern with respect to the CNSC's consultation, engagement and Commission proceeding processes.</p> <p>In response to a need to discuss these specific topics CNSC staff and the Michi Saagiig First Nations are collaborating to develop a framework and approach to ensure these conversations are prioritized and addressed in an appropriate manner.</p> <p>CNSC staff committed to and offered to meet with each Nation to continue consultation and engagement and seeking their Free, Prior and Informed Consent (FPIC) on the Application.</p>
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3.1 Consultation Activities with the Mississaugas of Scugog Island First Nation

3.1.1 Background on Mississaugas of Scugog Island First Nation and Relationship with the CNSC

. The Mississaugas of Scugog Island First Nation is a Mississauga Nation and is located approximately 50 km north of Oshawa, Ontario. The Mississaugas of Scugog Island First Nation has Aboriginal and Treaty rights; MSIFN is a signatory to the Gunshot Treaty (1877-88), Williams Treaties (1923) and the Settlement Agreement. The Mississaugas of Scugog Island First Nation is actively engaged on all nuclear projects in their territory, including the Pickering Nuclear Site. The Mississaugas of Scugog Island First Nation's community is located within the 50 km Emergency Planning Zone for the Pickering Nuclear Site.

CNSC staff and the Mississaugas of Scugog Island First Nation signed a ToR for long-term engagement in March 2022. Since receiving OPG's Application in July 2025, regularly scheduled meetings between CNSC staff and MSIFN under the ToR have often been utilized to discuss and consult on the PNGS and PWMF licence application. Additionally, CNSC staff offered to have PNGS and PWMF specific consultation meetings in addition to the regularly scheduled monthly meetings. CNSC staff have continued ongoing discussions with the Mississaugas of Scugog Island First Nation to better understand their project specific concerns and potential impacts to their Aboriginal and/or Treaty rights. Additional information about this will be included in the Mississaugas of Scugog Island First Nation specific issues tracking table submitted for the Part-2 hearing.. Key correspondence related to the consultation activities below is included in Appendix A.

The Mississaugas of Scugog Island First Nation was included on all the key correspondence and opportunities for consultation and participation in the regulatory processes listed in Table 1 above. Table 2 sets out a summary of other key consultation activities with the MSIFN.

Table 2: Summary of the key consultation & engagement activities with the Mississaugas of Scugog Island First Nation

Date	Consultation & Engagement Activities
March 12, 2024	On March 12, 2024, CNSC staff and the Mississaugas of Scugog Island First Nation (MSIFN) had a meeting to provide an update on the Pickering site. CNSC staff shared details available to them at the time. CNSC staff shared that OPG would be pursuing

	refurbishment of the PNGS prior to decommissioning and that OPG would likely apply for a license amendment by the end of 2025. CNSC staff identified they were expecting a public Commission hearing for the license amendment and renewal. MSIFN confirmed OPG had shared high level plans with them with respect to the planned Pickering Refurbishment.
April 09, 2024 - Current	At monthly meetings between CNSC and the MSIFN, OPG's Application was discussed. CNSC staff provided project specific updates, and also listened to and responded to questions and concerns raised.
December 20, 2024	In a monthly meeting CNSC staff raised OPG's plans to apply for renewal of the PNGS PROL to undertake refurbishment and combine this licence with their Pickering WFOL. CNSC staff raised that OPG had submitted a Detailed Decommissioning Plan (DDP) for the PNGS and confirmed that MSIFN had also received the DDP. MSIFN expressed interest in having further meetings after work planning to discuss OPG's planned proposal and application for the PNGS.
July 04, 2025	On July 04, 2025 the MSIFN received formal notification of OPG's Application and the requested licensing activities
July 27, 2025	On July 27 2025, CNSC staff shared the Notice of Hearing and Participant Funding directly with the MSIFN.
November 18, 2025	On November 18, 2025, MSFIN received Participant Funding for their participation in the regulatory review process for OPG's Application.
November 18, 2025	On November 18, 2025, MSIFN attended a Joint Consultation Framework Meeting between the four Michi Saagiig First Nations and the CNSC. Pickering was not the subject of this meeting; however, OPG's Application and preferences on the approach to consultation for this process were discussed.
November 20, 2025	On November 20, 2025, CNSC staff sent an email to MSIFN to follow up on the issues and concerns heard regarding OPG's Application in the Joint Consultation Framework Meeting. CNSC staff also asked how the Nations would like to proceed working together to consult on this project. MSIFN responded sharing their preferred approach to consultation.
December 24, 2025	A draft project specific consultation workplan was shared with MSIFN to work towards a mutually agreed upon approach to consultation and engagement on OPG's Application.

March 26, 2026	On March 26, 2026 CNSC staff forwarded the MSIFN an invitation to a public webinar being held to discuss on the PNGS & PWMF site and OPG's current application.
April 8, 2026	DFO attended a CNSC and MSIFN monthly meeting to address questions and concerns about the proposed Deep Water Intake (DWI) for the PNGS Refurbishment, including the requirements and regulatory process under the Fisheries Act.

3.1.2 Key Issues and Concerns Raised by the Mississaugas of Scugog Island First Nation

A summary of key issues and concerns raised by the Mississaugas of Scugog Island First Nation specific to OPG's Application, as understood by CNSC staff is summarized below. The detailed issues tracking table for the Mississaugas of Scugog Island First Nation will be submitted for the Part-2 hearing.

1. Regulatory Framework and Policy Applicability:
 - a. MSIFN expressed concern that combining the PROL and WFOL may obscure the relationship between the WFOL and NRCan's Radioactive Waste Policy, creating uncertainty about whether the policy would continue to apply under a single, combined licence.
2. Aboriginal Rights, and Unceded Territory:
 - a. MSIFN noted that Pickering A and much of Pickering B are constructed on infill over former lakebed, which the Nation regards as unceded territory, raising fundamental rights and title concerns that have not been resolved.
3. Information Sharing, Transparency, and Notice:
 - a. MSIFN highlighted the large scope of the application, including many different licensing activities, which each present a need for review.
4. Capacity and Regulatory Timelines:
 - a. MSIFN emphasized that regulatory timelines are very short from their perspective. Given the scope and complexity of the Pickering file, alongside other obligations, MSIFN presented concerns about the ability to adequately review materials and address all required components within scheduled timelines.
5. Environmental and Fisheries Impacts:
 - a. MSIFN identified potential deficiencies in provided information related to fish impingement and entrainment, including data gaps and a lack of modelling to substantiate claims of reduced fish impacts.
 - b. The absence of robust fisheries data was highlighted as a barrier to assessing impacts on rights and to meaningful consultation.
6. Spoils and Materials Management:

- a. MSIFN highlighted the requirement for a clear baseline characterization of sediments and materials to determine appropriate disposal pathways.
 - b. Decisions on spoils management are required on short timelines due to OPG's project schedule, raising concerns about informed decision-making.
7. Decommissioning Assumptions and Long-Term Planning:
- a. MSIFN flagged that key assumptions underpinning OPG's proposed decommissioning approach have not been brought forward for consultation, including:
 - i. The assumed end state and future land use of the site
 - ii. The assumption of a long, multi-decade, decommissioning timeline
 - iii. MSIFN expressed concern that accepting these assumptions now could lock in decisions and limit future flexibility, including the potential for a shorter decommissioning timeline and earlier repurposing of lands.

3.1.3 CNSC Staff's Response

CNSC staff acknowledge the issues and concerns that the Mississaugas of Scugog Island First Nation has raised to date related to OPG's Application. CNSC staff have worked to understand, assess and address the concerns to the greatest extent possible by having focused discussions and consultation, providing detailed responses, reflecting the Mississaugas of Scugog Island First Nation's views in CNSC's documentation (including the consultation report, and issues tracking table) and communicating the Mississaugas of Scugog Island First Nation's concerns to OPG to consider and address as appropriate.

CNSC staff have made initial commitments (listed below) to address some of the concerns raised to date. In response to concerns expressed regarding the Commission hearing timeline, CNSC staff proactively submitted a letter to the Commission Registry recommending a delay to the Commission hearing schedule in order to allow for more time for consultation and engagement. This approach was taken in order to maintain flexibility in the CNSC staff's consultation approach and regulatory process and to demonstrate responsiveness to the concerns raised by Indigenous Nations and communities.

As part of the consultation and engagement process with Mississaugas of Scugog Island First Nation, CNSC staff have asked and sought information with respect to MSIFN's FPIC seeking process and how they would like to collaborate on seeking their consent for OPG's Application. CNSC staff are committed to working with the Mississaugas of Scugog Island First Nation through an approach to assess potential impacts on their rights and interests as it relates to OPG's Application and further consultation on OPG's Application to identify additional commitments, mitigations and accommodations which address the concerns related to OPG's Application, as appropriate. CNSC staff will strive to achieve a consensus and resolution on issues related to OPG's Application in advance of the Part-2 Commission hearing. The outcomes of this work and

a final list of commitments made by the CNSC staff and OPG will be included in the CNSC's supplemental submission to the Commission in advance of the Part-2 Commission hearing.

Information regarding specific responses to each of the Mississaugas of Scugog Island First Nation's concerns will be included in the issues tracking tables submitted for the Part-2 hearing.

In summary, CNSC staff are committed to:

1. Continuing to discuss any requests for mitigations and accommodations, as appropriate, that MSIFN may raise, including with OPG as appropriate.
2. Collaborating with the Mississaugas of Scugog Island First Nation and interested WTFNs and OPG on supporting studies, monitoring, follow-up activities and other commitments agreed to.
3. Ongoing engagement and consultation with the Mississaugas of Scugog Island First Nation for this project including discussions through the ToR for long-term engagement between the CNSC and the Mississaugas of Scugog Island First Nation, as well as ongoing involvement of the Mississaugas of Scugog Island First Nation in the CNSC's Independent Environmental Monitoring Program (IEMP) and collaboration on ongoing oversight of commitments and protection of the environment and their rights and interests for the broader Pickering NGS Site.
4. Collaboration on oversight and reporting on OPG's engagement and implementation of commitments to MSIFN through the proposed Indigenous Engagement Licence Condition.

CNSC staff are aware that OPG has been engaging with the Mississaugas of Scugog Island First Nation to better understand their concerns and work on collaborative ways to address or mitigate the concerns. CNSC staff are aware that OPG has committed to continuing to discuss with MSIFN. Commitments and accommodations OPG has committed to undertake with the Michi Saagiig First Nations are listed below in Appendix B.

CNSC staff encourages OPG to continue engagement and collaboration with the Mississaugas of Scugog Island First Nation to address their concerns regarding waste management, cumulative and legacy effects, including collaboration on the scoping of a potential cumulative effects study as it relates to OPG nuclear operations in WTFN's territory, including the Pickering Nuclear Site. CNSC staff anticipate receiving an update from OPG on their engagement efforts, in an Indigenous Engagement Report to be filed on the record with the Commission.

3.1.4 CNSC Staff's Commitments

CNSC staff are committed to continuing to work collaboratively with the Mississaugas of Scugog Island First Nation and OPG in advance of the Part-2 Commission hearing to address the concerns and requests related to OPG's Application they have raised to date. This includes

aiming to collaborate on an approach to assessing the potential impacts of OPG’s Application on MSIFN’s rights and interests, such as through a collaborative Rights Impact Assessment (RIA). CNSC staff are also committed to continuing to provide oversight of OPG efforts to follow through and implement commitments made to date to address the Mississaugas of Scugog Island First Nation specific requests and concerns. Updated information about the potential impacts of OPG’s Application on the Mississaugas of Scugog Island First Nation’s Indigenous and/ or Treaty rights and mitigation and/ or accommodation measures to address any identified impacts will be included in the supplemental submission, to be provided to the Commission prior to the Part-2 hearing.

3.2 Consultation Activities with Curve Lake First Nation

3.2.1 Background on Curve Lake First Nation and Relationship with the CNSC

Curve Lake First Nation people are the Michi Saagiig or Mississaugas of the great Anishinaabe Nation. Curve Lake First Nation is located approximately 25 km north of Peterborough Ontario. Curve Lake First Nation has Aboriginal and Treaty rights under section 35 of the *Constitution Act, 1982* and is a signatory to the Gunshot Treaty (1877-88), Williams Treaties (1923) and the Williams Treaties Settlement Agreement (2018). Curve Lake First Nation is actively engaged on all nuclear projects in their territory, including the PNGS and PWMF.

CNSC staff and Curve Lake First Nation signed a ToR for long-term engagement in February 2021 and have monthly meetings where CNSC staff and representatives from Curve Lake First Nation discuss key projects and activities of interest including the PNGS & PWMF. Since receiving OPG’s Application in June 2025, regularly scheduled meetings under the ToR have frequently been used to share information, engage and consult on OPG’s Application. Additionally, CNSC staff offered to have Pickering specific and consultation meetings in addition to the regularly scheduled meetings with Curve Lake First Nation. CNSC staff continue to have ongoing discussions with Curve Lake First Nation to better understand their project specific concerns and potential impacts to their Aboriginal and/or Treaty rights. Key correspondence related to the consultation activities below is included in Appendix A.

Curve Lake First Nation was included on all key correspondence, communications and opportunities for consultation and participation in the regulatory processes as listed in Table 1 above.

Table 3: Summary of the key consultation & engagement activities with Curve Lake First Nation

Date	Consultation & Engagement Activities
July 04, 2025	On July 04, 2025 Curve Lake First Nation (CLFN) received formal notification of OPG's Application and the requested licensing activities.
July 17, 2025 - Current	At monthly meetings between CNSC and CLFN, OPG's Application was discussed. CNSC staff provided project specific updates and also listened to and responded to questions and concerns raised.
July 27, 2025	On July 27 2025, CNSC staff shared the Notice of Hearing and Participant Funding directly with CLFN.
November 18, 2025	On November 18, 2025, CLFN received Participant Funding for their participation in the regulatory review process for OPG's Application.
November 18, 2025	On November 18, 2025, CLFN attended the Joint Consultation Framework Meeting between the four Michi Saagiig First Nations and the CNSC. The Pickering Nuclear Site was not the scheduled subject of this meeting; however, OPG's Application and preferences on the approach to consultation for OPG's Application were discussed.
November 19, 2025	On November 19, 2025, CNSC sent an email to CLFN to follow up on the issues and concerns heard regarding OPG's Application in the Joint Consultation Framework Meeting. CNSC staff also asked how the Nations would like to proceed working together for consultation and engagement on OPG's Application.
December 16, 2025	DFO attended a CNSC, CLFN and HFN monthly meeting to address questions and concerns about the proposed Deep-Water Intake (DWI) for the PNGS Refurbishment, including the requirements and regulatory process under the Fisheries Act.
December 24, 2025	A draft project specific consultation workplan was shared with CLFN to work towards a mutually agreed upon approach to consultation and engagement on OPG's Application.
March 26, 2026	On March 26, 2026 CNSC staff forwarded the CLFN an invitation to a public webinar being held to discuss the PNGS & PWMF site and OPG's current application.

3.2.2 Key Issues and Concerns Raised by Curve Lake First Nation

A summary of key issues and concerns raised by Curve Lake First Nation specific to OPG's Application as understood by CNSC staff are summarized below. The detailed issues tracking table for Curve Lake First Nation will be submitted for the Part-2 hearing.

1. Consultation, Timelines & Funding:
 - a. CLFN expressed concern that combining the Pickering PROL and WFOL could proceed without adequate consultation, and could limit transparency, constrain meaningful review of waste-related issues.
 - b. CLFN stressed that considering the large number of ongoing projects in CLFN territory and breadth of request activities included in the application, the current timelines remain insufficient to support:
 - i. Internal community consultation
 - ii. Technical review of materials
 - iii. Meaningful preparation for the hearing
 - c. CLFN requested:
 - i. Exploration of additional participant funding
 - ii. Clearer hearing participation options
 - d. CLFN identified inadequate funding and compressed timelines were identified as key barriers to full and effective participation from Indigenous Nations and communities.
2. Legacy Issues and Impact Assessment Gaps:
 - a. CLFN emphasized a disconnect between legacy issues and current impact assessment triggers.
 - b. CLFN highlighted that refurbishment would give PNGS a new operational lifespan, yet facilities and impacts that were never originally consulted on remain unassessed and addressed.
 - c. CLFN noted that a 10-year licence renewal followed by a 30-year operational period effectively restarts PNGS operations without addressing unresolved legacy concerns.
3. Waste Management and Decommissioning:
 - a. CLFN raised concerns about decommissioning, particularly:
 - i. Movement of radioactive materials through their territory and the associated risks.
 - ii. Clarity on what waste would remain on site versus what would be transported offsite.
4. DWI & Intake Pipe impacts:
 - a. CLFN raised significant concerns about the DWI including:
 - i. Lakebed disturbance and dredging
 - ii. Fish impingement and entrainment, and thermal plume effects

- iii. Concerns were raised about alignment with NRCan's radioactive waste policy, particularly the requirement for consent in waste management decisions, something that may be complicated by a combined licence.

3.2.3 CNSC Staff's Response

CNSC staff acknowledge the issues and concerns that Curve Lake First Nation has raised to date related to OPG's Application. CNSC staff have worked to understand, assess and address the concerns to the greatest extent possible by having focused discussions and consultation, providing detailed responses, reflecting Curve Lake First Nation's views in CNSC's documentation (including the consultation report, and issues tracking table) and communicating Curve Lake First Nation's concerns to OPG to consider and address as appropriate.

CNSC staff have made initial commitments (listed below) to address the concerns raised to date. In response to concerns expressed regarding the Commission hearing timeline, CNSC staff proactively submitted a letter to the Commission Registry recommending a delay to the Commission hearing schedule in order to allow for more time for consultation and engagement. This approach was taken in order to maintain flexibility in the CNSC's consultation approach and regulatory process and to demonstrate responsiveness to the concerns raised by Indigenous Nations and communities.

As part of the consultation and engagement process with Curve Lake First Nation, CNSC staff have asked and sought information with respect to CLFN's FPIC seeking process and how they would like to collaborate on seeking their consent for OPG's Application. CNSC staff are committed to working with Curve Lake First Nation through an approach to assess potential impacts on their rights and interests as it relates to OPG's Application and further consultation on OPG's Application to identify additional commitments, mitigations and accommodations which address the concerns related to OPG's Application, as appropriate. CNSC staff will strive to achieve a consensus and resolution on issues related to OPG's Application in advance of the Part-2 Commission hearing. The outcomes of this work and a final list of commitments made by the CNSC staff and OPG will be included in the CNSC's supplemental submission to the Commission in advance of the Part-2 Commission hearing.

Information regarding specific responses to each of Curve Lake First Nation's concerns will be included in the issues tracking table submitted for the Part-2 hearing.

In summary, CNSC staff are committed to:

1. Continuing to discuss any requests for mitigations and accommodations, as appropriate, that Curve Lake First Nation may raise, including with OPG as appropriate.
2. Collaborating with the Curve Lake First Nation and interested WTFNs and OPG on supporting studies, monitoring, follow-up activities and other commitments agreed to.

3. Ongoing engagement and consultation with Curve Lake First Nation for this project including discussions through the ToR for long-term engagement between the CNSC and Curve Lake First Nation, as well as ongoing involvement of Curve Lake First Nation in the CNSC's Independent Environmental Monitoring Program (IEMP) and collaboration on ongoing oversight of commitments and protection of the environment and their rights and interests for the broader Pickering Nuclear Site.
4. Collaboration on oversight and reporting on OPG's engagement and implementation of commitments to Curve Lake First Nation through the proposed Indigenous Engagement Licence Condition.

CNSC staff are aware that OPG has been engaging with Curve Lake First Nation to better understand their concerns and work on collaborative ways to address or mitigate the concerns. CNSC staff are aware that OPG has committed to continuing to discuss with Curve Lake First Nation. Commitments and accommodations OPG has committed to undertake with the Michi Saagiig First Nations are listed below in Appendix B.

CNSC staff encourages OPG to continue engagement and collaboration with Curve Lake First Nation to address their concerns regarding waste management, cumulative and legacy effects, including collaboration on the scoping of a potential cumulative effects study as it relates to OPG nuclear operations in WTFN's territory, including the Pickering Nuclear Site. CNSC staff anticipate receiving an update from OPG on their engagement efforts, in an Indigenous Engagement Report to be filed on the record with the Commission.

3.2.4 CNSC Staff's Commitments

CNSC staff are committed to continuing to engage, consult and work collaboratively with Curve Lake First Nation and OPG in advance of the Part-2 hearing to address the concerns and requests related to OPG's Application they have raised to date. This includes collaborative work on an RIA and to address their issues and concerns raised to date. CNSC staff are also committed to providing oversight of OPG efforts to follow through and implement the commitments made to address Curve Lake First Nation's specific requests and concerns. Updated information about the potential impacts of OPG's Application on Curve Lake First Nation's Aboriginal and/ or Treaty rights and mitigation and/ or accommodation measures to address any identified impacts will be included in the supplemental submission, to be submitted to the Commission prior to the Part-2 hearing.

3.3 Consultation Activities with Hiawatha First Nation

3.3.1 Background on Hiawatha First Nation and Relationship with CNSC

Hiawatha First Nation is a Mississauga Nation and is located approximately 30 km south of Peterborough, Ontario. Hiawatha First Nation has Aboriginal and Treaty rights and Hiawatha

First Nation is a signatory to the Gunshot Treaty (1877-88), Williams Treaties (1923) and the Settlement Agreement.

Hiawatha First Nation is actively engaged on all nuclear projects in their territory, including the PNGS & PWMF. CNSC staff and Hiawatha First Nation signed a ToR for long-term engagement in May 2023. Since then, regularly scheduled meetings under the ToR have frequently been used to discuss and consult on OPG's Application. Additionally, CNSC staff offered to have PNGS & PWMF specific consultation meetings and/ or activities in addition to the regularly scheduled meetings. CNSC staff have been having ongoing discussions with Hiawatha First Nation to better understand their project specific concerns and potential impacts to their Aboriginal and/or Treaty rights. Key correspondence related to the consultation activities listed below is included in Appendix A.

Hiawatha First Nation was included on all the key correspondence and opportunities for consultation and participation in the regulatory processes listed in Table 1 above.

Table 4: Summary of the key consultation & engagement activities with Hiawatha First Nation

Date	Consultation & Engagement Activities
July 04, 2025	On July 04, 2025 Hiawatha First Nation (HFN) received formal notification of OPG's Application and the requested licensing activities.
July 17, 2025 - Ongoing	At monthly meetings between CNSC and the HFN, OPG's Application was discussed CNSC staff provided updates and responded to questions and concerns raised.
July 27, 2025	On July 27 2025, CNSC staff shared the Notice of Hearing and Participant Funding directly with HFN.
November 18, 2025	On November 18, 2025, HFN received Participant Funding for their participation in the regulatory review process for OPG's Application.
November 18, 2025	On November 18, 2025, HFN attended the joint Consultation Framework meeting between the four Michi Saagiig First Nations and the CNSC. The Pickering Nuclear Site was not the scheduled subject of this meeting; however, OPG's Application and preferences on the approach to consultation for this process were discussed.

November 19, 2025	On November 19, 2025, CNSC staff sent an email to Hiawatha First Nation to follow up on the issues and concerns heard regarding OPG's Application in the Joint Consultation Framework Meeting. CNSC staff also asked how the Nations would like to proceed working together to consult on this project. Hiawatha First Nation responded sharing their preferred approach to consultation.
December 16, 2025	DFO attended a CNSC, HFN and CLFN monthly meeting to address questions and concerns about the proposed DWI and requirements under the Fisheries Act.
December 24, 2025	A draft project specific consultation workplan was shared with HFN to work towards a mutually agreed upon approach to consultation and engagement on OPG's Application.
March 26, 2026	On March 26, 2026 CNSC staff forwarded HFN an invitation to a public webinar being held to discuss on the PNGS & PWMF site and OPG's current application.
April 8, 2025	DFO attended a CNSC and Hiawatha First Nation monthly meeting to address questions and concerns about the proposed Deep Water Intake (DWI) for the PNGS Refurbishment, including the requirements and regulatory process under the Fisheries Act.

3.3.2 Key Issues and Concerns Raised by Hiawatha First Nation

A summary of key issues and concerns raised by Hiawatha First Nation specific to OPG's Application, as understood by CNSC staff, are summarized below. The detailed issues tracking table for Hiawatha First Nation will be submitted for the Part-2 hearing.

1. Legacy issues and licensing approach:
 - a. HFN does not view the proposed licence consolidation as administrative. HFN expressed it is rooted in unaltered legacy issues.
 - b. PNGS was originally built without HFN's consent or consultation.
 - c. HFN raised concern that they view NRCan's updated radioactive waste policy as requiring Indigenous consent yet the current application treats waste-related decisions as administrative through licence consolidation.
2. Timelines and Impact Assessment:
 - a. HFN stated the planned timelines were too narrow to address the scale, complexity and legacy nature of the activities proposed on OPG's Pickering application.
3. Funding:
 - a. HFN identified the PFP funding as inadequate given the complexity of the OPG's Application.
4. Potential impact of the proposed DWI:

- a. HFN identified concerns about the impacts of the DWI construction, particularly regarding fish impingement and entrainment, and thermal plume effects.

3.3.3 CNSC Staff's Response

CNSC staff acknowledge the issues and concerns that Hiawatha First Nation has raised to date related to OPG's Application. CNSC staff have worked to understand, assess and address the concerns to the greatest extent possible by having focused discussions and consultation, providing detailed responses, reflecting Hiawatha First Nation's views in CNSC's documentation (including the consultation report, and issues tracking table) and communicating Hiawatha First Nation's concerns to OPG to consider and address as appropriate.

CNSC staff have made initial commitments (listed below) to address the concerns raised to date. In response to concerns expressed regarding the Commission hearing timeline, CNSC staff proactively submitted a letter to the Commission Registry recommending a delay to the Commission hearing schedule in order to allow for more time for consultation and engagement. This approach was taken in order to maintain flexibility in the CNSC's consultation approach and regulatory process and to demonstrate responsiveness to the concerns raised by Indigenous Nations and communities.

As part of the consultation and engagement process with Hiawatha First Nation, CNSC staff have asked and sought information with respect to HFN's FPIC seeking process and how they would like to collaborate on seeking their consent for OPG's Application. CNSC staff are committed to working with the Hiawatha First Nation through an approach to assess potential impacts on their rights and interests as it relates to OPG's Application and further consultation on OPG's Application to identify additional commitments, mitigations and accommodations which address the concerns related to OPG's Application, as appropriate. CNSC staff will strive to achieve a consensus and resolution on issues related to OPG's Application in advance of the Part-2 Commission hearing. The outcomes of this work and a final list of commitments made by the CNSC staff and OPG will be included in the CNSC's supplemental submission to the Commission in advance of the Part-2 Commission hearing.

Information regarding specific responses to each of Hiawatha First Nation's concerns will be included in the issues tracking table submitted for the Part-2 hearing.

In summary, CNSC staff are committed to:

1. Continuing to discuss any requests for mitigations and accommodations, as appropriate, that Hiawatha First Nation may raise, including with OPG as appropriate.
2. Collaborating with Hiawatha First Nation and interested WTFNs and OPG on supporting studies, monitoring, follow-up activities and other commitments agreed to.

3. Ongoing engagement and consultation with Hiawatha First Nation for this project including discussions through the ToR for long-term engagement between the CNSC and Hiawatha First Nation, as well as ongoing involvement of Hiawatha First Nation in the CNSC's Independent Environmental Monitoring Program (IEMP) and collaboration on ongoing oversight of commitments and protection of the environment and their rights and interests for the broader Pickering Nuclear Site.
4. Collaboration on oversight and reporting on OPG's engagement and implementation of commitments to Hiawatha First Nation through the proposed Indigenous Engagement Licence Condition.

CNSC staff are aware that OPG has been engaging with Hiawatha First Nation to better understand their concerns and work on collaborative ways to address or mitigate the concerns. CNSC staff are aware that OPG has committed to continuing discussions and engagement with Hiawatha First Nation. Commitments and accommodations OPG has committed to undertake with the Michi Saagiig First Nations are listed below in Appendix B.

CNSC staff encourages OPG to continue engagement and collaboration with Hiawatha First Nation to address their concerns regarding waste management, cumulative and legacy effects, including collaboration on the scoping of a potential cumulative effects study as it relates to OPG nuclear operations in WTFN's territory, including the Pickering Nuclear site. CNSC staff anticipate receiving an update from OPG on their engagement efforts, in an Indigenous Engagement Report to be filed on the record with the Commission.

3.3.4 CNSC Staff's Commitments

CNSC staff are committed to continuing to consult and work collaboratively with Hiawatha First Nation and OPG in advance of the Part-2 hearing to address the concerns and requests related to OPG's Application they have raised to date. This includes collaborative work on an RIA. CNSC staff are also committed to providing oversight of OPG efforts to follow through and implement commitments made to address Hiawatha First Nation's specific requests and concerns. Updated information about the potential impacts of OPG's Application on Hiawatha First Nation's Aboriginal and/ or Treaty rights and mitigation and/ or accommodation measures to address any identified impacts will be included in the supplemental information, to be submitted to the Commission prior to the Part-2 hearing.

3.4 Consultation Activities with Alderville First Nation

3.4.1 Background on Alderville First Nation and Relationship with the CNSC

Alderville First Nation is a Mississauga Nation and is located approximately 50 km south of Peterborough, Ontario. Alderville First Nation has Aboriginal and Treaty rights; Alderville First

Nation is a signatory to the Gunshot Treaty (1877-88), Williams Treaties (1923) and the Settlement Agreement.

Alderville First Nation is actively engaged on all nuclear projects in their territory, including the PNGS & PWF. CNSC staff and Alderville First Nation are currently developing a ToR for long-term engagement and associated work plan. CNSC and Alderville First Nation have established regularly scheduled meetings, which have included consultation and discussions with regards to OPG's Application. Additionally, CNSC staff offered to have PNGS & PWF specific consultation meetings and/ or activities in addition to the regularly scheduled meetings. CNSC staff have been having ongoing discussions with Alderville First Nation to better understand their project specific concerns and potential impacts to their Aboriginal and/or Treaty rights. Key correspondence related to the consultation activities listed below is included in Appendix A.

Alderville First Nation was provided with all of the notices and opportunities discussed in Table 1.

Table 5: Summary of the key consultation & engagement activities with Alderville First Nation

Date	Consultation & Engagement Activities
July 04, 2025	On July 04, 2025 Alderville First Nation (AFN) received formal notification of OPG's Application and the requested licensing activities.
July 27, 2025	On July 27 2025, CNSC staff shared the Notice of Hearing and Participant Funding directly with AFN.
November 18, 2025	On November 18, 2025, AFN received Participant Funding to for their participation in the regulatory review process for OPG's Application.
November 18, 2025	On November 18, 2025, AFN attended the joint Consultation Framework meeting between the four Michi Saagiig First Nations and the CNSC. The Pickering Nuclear Site was not the scheduled subject of this meeting; however, OPG's Application and preferences on the approach to consultation for this process were discussed.
November 20, 2025	On November 20, 2025, CNSC staff sent an email to Alderville First Nation to follow up on the issues and concerns heard regarding OPG's Application in the Joint Framework Meeting. CNSC staff also asked how the Nations would like to proceed

	working together to consult on this project. Alderville First Nation responded sharing their preferred approach to consultation.
December 12, 2025 - Current	At monthly meetings between CNSC and the AFN, OPG's Application was discussed. CNSC staff provided updates addressed questions and concerns.
December 24, 2025	A draft workplan was shared with AFN in effort to ensure a mutually agreed upon plan forward, ensure they received adequate funding and that sufficient opportunity for consultation was conducted in a meaningful way.
March 26, 2026	On March 26, 2026 CNSC staff forwarded AFN an invitation to a public webinar being held to discuss on the PNGS & PWF site and OPG's current application.
April 8, 2025	DFO attended a CNSC and AFN monthly meeting to address questions and concerns about the proposed DWI and requirements under the Fisheries Act.

3.4.2 Key Issues and Concerns Raised by Alderville First Nation

A summary of key issues and concerns raised by Alderville First Nation specific to OPG's Application, as understood by CNSC staff, are summarized below. The detailed issues tracking table for Alderville First Nation will be submitted for the Part-2 hearing.

1. Impacts of Potential impact of the proposed DWI:
 - a. AFN identified concerns about the impacts of the DWI construction and infilling on claimed unceded lakebed.
 - b. AFN expressed that the proposed DWI poses clear risks to constitutionally protected rights associated with waste, fishing and the broader aquatic ecosystem.
 - c. AFN emphasized that both the existing facility and proposed new works sit on infill place over an claimed unceded lakebed and this engages considerations of FPIC noting AFN feels this did not happen in relation to historical development.
2. UNDRIP and FPIC:
 - a. AFN identified the activities included in OPG's Pickering application as a major undertaking (refurbishment/decommissioning) involving radioactive waste.
 - b. AFN emphasized the requirement for CNSC to consider UNDRIP and FPIC, and the impacts of waste storage on Indigenous territories and that the facility is located on "unceded lakebed" since it was built partially on infill.

3.4.3 CNSC Staff's Response

CNSC staff acknowledge the issues and concerns that Alderville First Nation has raised to date related to OPG's Application. CNSC staff have worked to understand, assess and address the

concerns to the greatest extent possible by having focused discussions and consultation, providing detailed responses, reflecting the Alderville First Nation's views in CNSC's documentation (including the consultation report, and issues tracking table) and communicating Alderville First Nation's concerns to OPG to consider and address as appropriate.

CNSC staff have made initial commitments (listed below) to address the concerns raised to date. In response to concerns expressed regarding the Commission hearing timeline, CNSC staff proactively submitted a letter to the Commission Registry recommending a delay to the Commission hearing schedule in order to allow for more time for consultation and engagement. This approach was taken in order to maintain flexibility in the CNSC's consultation approach and regulatory process and to demonstrate responsiveness to the concerns raised by Indigenous Nations and communities.

As part of the consultation and engagement process with Alderville First Nation, CNSC staff have asked and sought information with respect to Alderville First Nation's FPIC seeking process and how they would like to collaborate on seeking their consent for OPG's Application. CNSC staff are committed to working with Alderville First Nation through an approach to assess potential impacts on their rights and interests as it relates to OPG's Application and further consultation on OPG's Application to identify additional commitments, mitigations and accommodations which address the concerns, as appropriate. CNSC staff will strive to achieve a consensus and resolution on issues related to OPG's Application in advance of the Part-2 Commission hearing. The outcomes of this work and a final list of commitments made by the CNSC staff and OPG will be included in the CNSC's supplemental submission to the Commission in advance of the Part-2 Commission hearing.

Information regarding specific responses to each of Alderville First Nation's concerns will be included in the issues tracking table submitted for the Part-2 hearing.

In summary, CNSC staff are committed to:

1. Continuing to discuss any requests for mitigations and accommodations, as appropriate, that Alderville First Nation may raise, including with OPG as appropriate.
2. Collaborating with Alderville First Nation and interested WTFNs and OPG on supporting studies, monitoring, follow-up activities and other commitments agreed to.
3. Ongoing engagement and consultation with Alderville First Nation for this project including discussions through a proposed ToR for long-term engagement between the CNSC and Alderville First Nation, as well as ongoing involvement of Alderville First Nation in the CNSC's Independent Environmental Monitoring Program (IEMP) and collaboration on ongoing oversight of commitments and protection of the environment and their rights and interests for the broader Pickering Nuclear Site.

4. Collaboration on oversight and reporting on OPG's engagement and implementation of commitments to Alderville First Nation through the proposed Indigenous Engagement Licence Condition.

CNSC staff are aware that OPG has been engaging with Alderville First Nation to better understand their concerns and work on collaborative ways to address or mitigate the concerns. CNSC staff are aware that OPG has committed to continuing to engagement and discussions with AFN. Commitments and accommodations OPG has committed to undertake with the Michi Saagiig First Nations are listed below in Appendix B.

CNSC staff encourages OPG to continue engagement and collaboration with Alderville First Nation to address their concerns regarding waste management, cumulative and legacy effects, including collaboration on the scoping of a potential cumulative effects study as it relates to OPG nuclear operations in WTFN's territory, including the Pickering Nuclear site. CNSC staff anticipate receiving an update from OPG on their engagement efforts, in an Indigenous Engagement Report to be filed on the record with the Commission.

3.4.4 CNSC Staff's Commitments

CNSC staff are committed to continuing to consult and work collaboratively with Alderville First Nation and OPG in advance of the Part-2 hearing to address the concerns and requests related to OPG's Application they have raised to date. This includes collaborative work on an RIA. CNSC staff are also committed to providing oversight of OPG efforts to follow through and implement commitments made to address Alderville First Nation's specific requests and concerns. Updated information about the potential impacts of OPG's application on Alderville First Nation's Aboriginal and/ or Treaty rights and mitigation and/ or accommodation measures to address any identified impacts will be included in the supplemental information, to be submitted to the Commission prior to the Part-2 hearing.

3.5 Consultation activities with other Williams Treaties First Nations

3.5.1 The Chippewas of Georgina Island First Nation

The Chippewas of Georgina Island First Nation are located on the southern shores of Lake Simcoe, approximately 80 km north of Oshawa, Ontario. The Chippewas of Georgina Island First Nation has Aboriginal and Treaty rights; and the Chippewas of Georgina Island First Nation is a signatory to the Gunshot Treaty (1877-88), Williams Treaties (1923) and the Settlement Agreement. To date, the Chippewas of Georgina Island First Nation have not raised any specific concerns or issues regarding OPG's licence application.

CNSC notified the Chippewas of Georgina Island First Nation upon CNSC's receipt of OPG's Application in July 2025 and has continued to reach out to provide updates on process, seek input and provide the opportunity to discuss OPG's Application.

Table 6: Summary of the key consultation activities with Chippewas of Georgina Island First Nation

Date	Consultation & Engagement Activities
July 04, 2025	On July 04, 2025 the CNSC notified the Chippewas of Georgina Island First Nation of OPG's Application and the requested licensing activities.
July 27, 2025	On July 27 2025, CNSC staff shared the Notice of Hearing and Participant Funding directly with the Chippewas of Georgina Island First Nation.
March 26, 2026	On March 26, 2026 CNSC invited the Chippewas of Georgina Island First Nation to a public webinar being held to discuss the PNGS & PWMF site and OPG's current application.
May 05, 2026	On May 05, 2026 CNSC reached out to the Chippewas of Georgina Island First Nation to share the CNSC revised hearing notice and offer an opportunity to meet to discuss OPG's Application

3.5.2 The Chippewas of Rama First Nation (Mnjikaning)

The Chippewas of Rama First Nation are located on the northern shores of Lake Simcoe, approximately 10 km north of Orillia, Ontario. The Chippewas of Rama First Nation has Aboriginal and Treaty rights ; The Chippewas of Rama First Nation is a signatory to the Gunshot Treaty (1877-88), and the Settlement Agreement. To date, the Chippewas of Rama First Nation have not raised any specific concerns or issues regarding OPG's Application.

The CNSC notified the Chippewas of Rama First Nation upon CNSC's receipt of OPG's Application and has continued to reach out to provide updates on process, seek input and provide the opportunity to discuss OPG's Application.

Table 7: Summary of the key consultation activities with Chippewas of Rama First Nation

Date	Consultation & Engagement Activities
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July 04, 2025	On July 04, 2025 the CNSC notified the Chippewas of Rama First Nation of OPG's Application and the requested licensing activities.
July 27, 2025	On July 27 2025, CNSC staff shared the Notice of Hearing and Participant Funding directly with the Chippewas of Rama First Nation.
September 19, 2026	On September 19, 2025 CNSC staff called the Chippewas of Rama First Nation to provide a reminder of the Participant Funding application deadline.
March 26, 2026	On March 26, 2026 CNSC staff invited the Chippewas of Rama First Nation to a public webinar being held to discuss the PNGS & PWMF site and OPG's current application.
May 05, 2026	On May 05, 2026 CNSC reached out to the Chippewas of Rama First Nation to share the CNSC revised hearing notice and offer an opportunity to meet to OPG's Application.

3.5.3 Beausoleil First Nation

Beausoleil First Nation is a Chippewa Nation, located on the southern edge of Georgian Bay, Ontario. Beausoleil First Nation has Aboriginal and Treaty rights ; Beausoleil First Nation is a signatory to the Gunshot Treaty (1877-88), Williams Treaties (1923) and the Settlement Agreement . To date, Beausoleil First Nation have not raised any specific concerns or issues regarding OPG's Application.

Beausoleil First Nation was notified upon CNSC's receipt of OPG's Application. CNSC has continued to reach out to provide updates on process, seek input and provide the opportunity to discuss OPG's Application.

Table 8: Summary of the key consultation activities with Beausoleil First Nation

Date	Consultation & Engagement Activities
July 04, 2025	On July 04, 2025 the CNSC notified the Chippewas of Beausoleil First Nation (BFN) of OPG's Application and the requested licensing activities.
July 27, 2025	On July 27 2025, CNSC staff shared the Notice of Hearing and Participant Funding directly with the BFN.

September 19, 2025	On September 19, 2025 CNSC staff called BFN to provide a reminder of the Participant Funding application deadline.
March 26, 2026	On March 26, 2026 CNSC staff invited the BFN to a public webinar being held to discuss the PNGS & PWMF site and OPG's current application.
May 05, 2026	On May 05, 2026 CNSC reached out to BFN to share the CNSC revised hearing notice and offer an opportunity to meet to discuss OPG's Application.

3.5.4 CNSC Staff's Commitments

To date Beausoleil First Nation, Chippewas of Georgina Island First Nation and Chippewas of Rama First Nation have not raised any concerns specific to OPG's Application or any concerns around the potential impacts from OPG's Application on their Aboriginal and/or Treaty rights.

CNSC staff note that these First Nations have not expressed interest directly to CNSC staff requesting more in-depth consultation regarding the Licence application. CNSC staff remain committed to continuing to provide opportunities for consultation and engagement related to OPG's Application and project updates and relevant information, should it proceed.

3.6 Engagement Activities with Six Nations of the Grand River

3.6.1 Background on Six Nations of the Grand River and Relationship with the CNSC

Six Nations of the Grand River (SNGR) represents six Haudenosaunee Nations and is located approximately 20 km south of Brantford, Ontario. CNSC staff have been engaging with Six Nations of the Grand River through frequent meetings on topics and facilities of interest. Six Nations of the Grand River have expressed interest in the Darlington and Pickering sites and related nuclear projects, including OPG's Application for the PNGS.

Six Nations of the Grand River was included on all of the key correspondence and opportunities for engagement and participation in the regulatory processes listed in Table 1 above.

Table 9: Summary of the key engagement activities with Six Nations of the Grand River

Date	Engagement Activities
July 04, 2025	On July 04, 2025 CNSC staff notified Six Nations of the Grand River (SNGR) of OPG's Application and the requested licensing activities.
July 27, 2025	On July 27 2025, CNSC staff shared the Notice of Hearing and Participant Funding directly with SNGR.
September 19, 2025	On September 19, 2025 CNSC staff called SNGR to provide a reminder of the Participant Funding application deadline.
March 1, 2025	On March 1, 2025, CNSC staff met with SNGR to provide information about the PNGS & PWMF application.
March 26,2026	On March 26, 2026 CNSC staff invited SNGR to a public webinar being held to discuss the PNGS & PWMF site and OPG's current application.

3.6.2 Key Issues and Concerns Raised by Six Nations of the Grand River and CNSC Staff's Response

In a March 2025 a meeting was held between CNSC staff and Six Nations of the Grand River (SNGR), SNGR asked for clarification on CNSC's inclusion of SNGR under "interest-based Nations" for this application review process. SNGR raised concerns surrounding OPG's approach to engagement, sharing that OPG has shared that they focus engagement on Indigenous Nations identified as "rights based Nations". CNSC staff responded that based on the information available to CNSC staff with respect to SNGR's territory, rights and interests that there is no potential for any direct impacts to SNGR's rights and interests in relation to OPG's Application, however, CNSC staff remain open to receiving any new information from SNGR with regards to their territory, rights and interests and how they relate to the PNGS.

3.6.3 CNSC Staff's Commitments

CNSC staff are of the view that the questions and concerns raised by Six Nations of the Grand River have been adequately addressed, responded to and discussed to date. CNSC staff remain committed to engaging and sharing information with Six Nations of the Grand River regarding Pickering Nuclear Site moving forward.

3.7 Engagement Activities with Other Identified Nations

CNSC staff also reached out to provide opportunities for engagement on OPG's Application but did not receive a response from other Indigenous Nations and communities who have previously

expressed an interest and/or a concern with respect to the Pickering NGS including the Saugeen Ojibway Nation (SON) Mohawks of the Bay of Quinte (MBQ), Mississaugas of the Credit First Nation (MCFN) and the Métis Nation of Ontario (MNO). CNSC staff will continue to provide updates and opportunities to discuss with all interested Indigenous Nations and communities ahead of Part 2 of the Hearing, and throughout OPG's project lifecycle should it proceed.

Table 10: Summary of the key engagement activities with Other Identified Nations

Date	Engagement Activity
July 04, 2025	On July 04, 2025 CNSC staff notified the SON, MBQ, Mississaugas of the Credit First Nation MNO of OPG's Application and the requested licensing activities.
July 27, 2025	On July 27 2025, CNSC staff shared the Notice of Hearing and Participant Funding directly with SON, MBQ, Mississaugas of the Credit First Nation MNO.
September 19, 2025	On September 19, 2025 CNSC staff called MCFN & MBQ to provide a reminder of the Participant Funding application deadline.
September 19, 2025	On September 19, 2025 CNSC staff provided MCFN requested information about the Commission Hearing Process, OPG's Application and the CNSC Participant Funding Program by email
March, 2026	In March 2026, CNSC staff invited the other identified Nations to a public webinar being held to discuss on the PNGS & PWMF site and OPG's current application.

4 NEXT STEPS AND COMMITMENTS

CNSC staff have aimed to conduct a thorough, transparent, flexible and collaborative consultation and regulatory process for OPG's PNGS and PWMF application. All identified Indigenous Nations and communities were provided with multiple opportunities to participate in the regulatory review and consultation and engagement process. CNSC staff offered funding to support the participation of Indigenous Nations and communities, in addition CNSC staff made CNSC subject matter experts available to respond to and address any questions or concerns raised. Indigenous Nations and communities who have raised issues and concerns in relation to OPG's Application were offered opportunities to develop issues tracking tables collaboratively and work collaboratively on identifying potential measures and options to address the concerns and requests raised.

CNSC staff will continue to monitor and assess OPG's engagement activities throughout the regulatory review process, as per REGDOC 3.2.2. CNSC staff's conclusions and assessment related to OPG's engagement on OPG's Application will be included in CNSC staff's supplemental submission prior to the Part 2 hearing.

Additionally, CNSC staff will continue efforts to work collaboratively to draft Nation-specific RIAs with each interested Michi Saagiig First Nations for OPG's Application. The completed assessments will include the views of CNSC staff and each Michi Saagiig First Nation with respect to the potential for impacts on their Aboriginal and/or Treaty rights and mitigation and/or accommodation measures to address any identified impacts. CNSC staff will continue to seek to understand and confirm each impacted Nation's position with regards to its FPIC for OPG's Application and their community-specific FPIC process, where appropriate.

The RIAs, issues tracking tables, and additional consultation activities will help inform CNSC staff's recommendations to the Commission regarding the adequacy of consultation and engagement for OPG's Application. This information will be provided as part of the supplemental submission prior to the Part-2 hearing.

In addition, CNSC staff continue to work, consult, and engage with all identified Indigenous Nations and communities to understand, assess, and address all outstanding concerns regarding OPG's Application and regulatory process to date. CNSC staff will provide further updates on CNSC staff's ongoing consultation and engagement efforts in a supplemental report to the Commission as part of the Part-2 hearing process. CNSC staff's final assessment, conclusions, and recommendations regarding the adequacy of consultation will be summarized in the supplemental report and include any feedback and perspectives shared by Indigenous Nations in their submissions to the Commission, as well as any additional information shared with CNSC staff.

Commitments made to the Michi Saagiig First Nations by CNSC staff through the consultation process to date are outlined below in Table 11. The CNSC will continue to work with the Michi Saagiig First Nations to fulfill these commitments in advance of Part-2 of the hearing, and to continue discussions on further commitments and potential accommodation measures. Commitments made by OPG to Indigenous Nations and communities, to date, are included in Appendix B.

Table 11: CNSC commitments made to the Michi Saagiig First Nations

Commitments	Status
Collaboratively Draft or seek input on Nation specific Rights Impact	CNSC staff are seeking input from the Michi Saagiig First Nations on their preferred approach to drafting a Rights Impact

Assessments ahead of Part 2 of the Hearing.	Assessment related to the potential impacts of OPG's Application on their Aboriginal and/or Treaty rights.
Continue Tracking Issues and Concerns Through Collaboratively Drafted Issues Table.	These tables will be updated collaboratively and shared in a supplemental submission ahead of Part-2 of the Hearing.
Continue to seek to understand and confirm each impacted Michi Saagiig First Nation's position with regards to their FPIC for OPG's Application and their community-specific FPIC process, where appropriate.	The CNSC has asked and sought insight from the Michi Saagiig First Nations through letters and regular meetings to understand and confirm each impacted Nation's position with regards to their FPIC and FPIC seeking process in relation to OPG's Application. CNSC staff will continue to provide opportunities to work with each Nation to seek reach consensus on key issues, concerns and impacts as part of CNSC staff's efforts to seek to obtain their FPIC.
Continue to work collaboratively with the Michi Saagiig First Nations and OPG in advance of the Part-2 Commission hearing to address identified concerns and requests related to OPG's Application they have raised to date.	The CNSC will continue to work collaboratively with the Michi Saagiig First Nations and OPG to address the concerns and requests related to OPG's Application through responses, the tracking of issues and concerns in the Issues Tables, RIAs, regular meeting discussions and will continue be open to other preferred consultation activities (ie: community information sessions, leadership meetings, presentations).
Continue to Collaborate with DFO to ensure a coordinated approach to Federal Crown consultation with respect to the project.	The CNSC will continue to coordinate consultation and engagement with DFO throughout the process with respect to the proposed Deep Water Intake for the PNGS, ahead of the Part 2 of the Hearing.

REFERENCES

- [1] Statues of Canada, Nuclear Safety and Control Act, S.C. 1997 c.9, last amended on 01 January 2017.
- [2] Statues of Canada, The Constitution Act, 1987, Current to January 1, 2021.
- [3] Minister of the Department of Aboriginal Affairs and Northern Development Canada, Aboriginal Consultation and Accommodation - Updated Guidelines for Federal Officials to Fulfill the Duty to Consult, March 2011.
- [4] Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), "Aboriginal and Treaty Rights Information System (ATRIS)," [Online]. Available: <https://www.rcaanc-cirnac.gc.ca/eng/1100100014686/1706128627473>.
- [5] Canadian Nuclear Safety Commission, "REGDOC-3.2.2 – Indigenous Engagement, Version 1.2," Published February 2022.
- [6] The United Nations, "United Nations Declaration on the Rights of Indigenous Peoples," September 2007.
- [7] United Nations Declaration on the Rights of Indigenous Peoples Act Implementation Secretariat, "The United Nations Declaration on the Rights of Indigenous Peoples Act Action Plan," Department of Justice Canada, 2023.
- [8] Government of Canada, "Principles respecting the Government of Canada's relationship with Indigenous peoples," 2018.
- [9] Government of Canada, "Backgrounder: United Nations Declaration on the Rights of Indigenous Peoples Act," [Online]. Available: <https://www.justice.gc.ca/eng/declaration/about-apropos.html>.
- [10] Kebaowek First Nation v. Canadian Nuclear Laboratories, 2025 FC 319 (CanLII)

APPENDIX A. CORRESPONDENCE

April 1st, 2022 Monthly Meeting between Curve Lake First Nation and CNSC Staff

Attendees:

Curve Lake First Nation (CLFN)	Canadian Nuclear Safety Commission (CNSC)
<ul style="list-style-type: none">- Francis Chua- Chief Emily Whetung	<ul style="list-style-type: none">- Clare Cattrysse- Adam Levine- Laura DeCoste- Jessica Wray- Blair Carter- Veronica Mossop- Marina Martin

Agenda

1. CNL'S Near Surface Disposal Facility (NSDF) & Nuclear Power Demonstration (NPD) updates
2. Global First Power (GFP)'s Micro Modular Reactor (MMR) updates
3. Cameco Fuel Manufacturing (CFM)'s Renewal
4. CNL's Port Hope Renewal & Amendment
5. Ontario Power Generation (OPG)'s Pickering NGS Renewal/licence extension
6. OPG's Darlington Waste Management Facility (DWMF) Renewal
7. Feedback from Curve Lake First Nation's submissions to the Commission in 2021

August 24 2023, Monthly Meeting between Curve Lake First Nation, Hiawatha
First Nation and CNSC staff

Attendees:

CNSC Staff	CLFN and HFN
Dan McDonald	Kayla Wright
Laura DeCoste	Cassandre Roy-Drainville
Nicholas Bourne	Francis Chua
Taline Kalindjian	

Agenda:

1. Welcome and Introduction
2. OPG's application to authorization Pickering operation until 2026
3. In person events (IEMP, Harvesters Symposium, leadership meetings)
4. Updates from CLFN, HFN and CNSC staff

March 12, 2024, Monthly Meeting between MSIFN and CNSC staff

Virtual Meeting through Teams

Agenda:

1. Welcome and agenda review (5 mins)
2. KI Pill team discussion (5 mins)
3. IEMP team presentation (10 mins)
4. DNNP: Rights Impact assessment touch base (10 mins)
5. RegDoc 1.2.3 Discussion (5 mins)
6. Communication discussion (10 mins)

Attendees:

CNSC Staff	MSIFN
Kristi Randhawa	Rob Lukacs
Ana Martin	Don Richardson
Keely McCavitt	
Emily Chang	
Adam Levine	
Katelyn Peters	

April 9th, 2024, Monthly Meeting between MSIFN First and CNSC staff

Via Microsoft Teams

Agenda:

- Greetings and introductions
- DNNP Updates
- PNGS request to operate to the end of 2026
- Licensing process
- Timelines
- DFO: update
- PNGS refurbishment information
- Licensing process
- Timelines
- PWMF license amendments
- License amendment: fuel storage
 - Licensing process
 - Timelines
- OPG's letter of intent

Attendees:

CNSC Staff	MSIFN
Nicole Frigault	Rob Lukacs
Paul MacDonald	Samantha Shrubsole
Keely McCavitt	Don Richardson
Ana Martin	Kayla Ponce de Leon
Mark McLaughlin	
Daniel MacDonald	
Aimee Rupert	
Taline Kalindjian	
Laura DeCoste	

Curve Lake First Nation and CNSC staff monthly meeting – with the Department of Fisheries and Oceans Canada

December 19, 2024

Virtual

CNSC Attendees	DFO Attendees	CLFN Attendees
Laura DeCoste Emily Janzen	Emily Morton Elyjah Schimmens Janna Chegahno	Lois Taylor Francis Chua Kayla Wright Paige Williams

Agenda:

1. Welcome and introductions
2. Discussion with the Department of Fisheries and Oceans Canada (DFO) on the Darlington New Nuclear Project (DNNP) Fisheries Act Authorization (FAA)
3. Discussion on comments and questions raised through CLFN's review of CNSC's supplemental report for the DNNP – Licence Condition 15.4 and the request for a gap analysis
4. Updates from CLFN and CNSC staff
5. Closing

Mississauga's of Scugog First Nation & CNSC 2025 Work Planning Meeting

December 20, 2024
(virtual MS Teams)

<u>CNSC Attendees</u>	<u>MSIFN Attendees</u>
Jamie Bogden Emily Janzen Marina Martin	Sam Shrubsole Don Richardson

Agenda

1. Introduction and opening remarks
2. Check-in on projects:
 - a. OPG's engagement on Predictive ERA (PERA) for Refurbishment of PNGS-B and Decommissioning (Marina Martin)
 - b. Darlington Nuclear Generating Station New Isotopes Project
 - c. Darlington Nuclear Generating Station Re-licensing Project
3. Discussion on MSIFN priorities related to CNSC's regulatory activities and overview of CNSC-MSIFN 2024 long-term engagement work plan activities
4. Next steps

MSIFN and CNSC February Monthly Meeting

February 5, 2025
(virtual MS Teams)

<u>CNSC Attendees</u>	<u>MSIFN Attendees</u>
Emily Janzen, Senior Policy Officer, Indigenous Consultation and Engagement Division (ICED) Ana Martin, Policy Officer, RPPPD Jamie Bogden, Policy Officer, ICED Mark McLaughlin, Project Officer, Waste and Decommissioning Division (WDD) Taline Kalindjian, Project Officer, WDD	Sam Shrubsole, Impact Assessment Team Lead, Minogi Corp Don Richardson, President and CEO, Minogi Corp

Agenda

- Introductions and opening remarks
- Project update: OPG's Application Requesting Licence Amendment to Construct and Operate the Pickering Component Storage Structure (PCSS)
- 2024 activity closeout and final financial report; 2025 workplan activity funding application
- Upcoming meetings, including meetings with leadership this year

Meeting with Michi Saagiig Nations/CNSC to Discuss Pickering and Darlington Projects

April 11, 2025

Virtual

CNSC Attendees	MSFN Attendees
Emily Janzen, Indigenous Consultation and Engagement Division (ICED) Laura DeCoste, ICED Jamie Bogden, ICED Marina Martin, ICED Erin Cotnam-Bent, ICED Martin Hitchon, Darlington Regulatory Program Division (DRPD) Andrew Mathai, DRPD Ross Richardson, Pickering Regulatory Program Division (PRPD) Daniel MacDonald (PRPD) Jocelyn Truong, Major Projects and Strategic Support Division Nancy Greencorn, Wastes and Decommissioning Division (WDD) Taline Kalindjian, WDD Pierre-Daniel Bourgeau, Legal Services	Alderville First Nation Julie Kapyrka Stephanie Zilinski Curve Lake First Nation Paige Williams Mindy Knott Chief Keith Knott Lily Boggs Jaimi O'Hara Francis Chua Lois Taylor Kayla Wright Hiawatha First Nation Mike Howard Mississauga of Scugog Island First Nation Sam Shrubsole Don Richardson Arcadis Gerd Wiatzka Helen Manolopoulos

Agenda:

1. Welcome and introductions (1:30 PM)
2. Pickering Decommissioning Plan & CNSC Review (30 mins)
 - Overview of the Pickering site
 - Summary of the Decommissioning Plan and CNSC staff's review
 - Key CNSC comments and feedback
 - Open discussion
3. OPG's Licence Amendment Request – Pickering Component Storage Structure (30 mins)
 - Project overview
 - Key milestones and timelines
 - Discussion of issues, concerns, and next steps
4. Discussion on OPG's Darlington Nuclear Generating Station renewal application: CNSC staff's proposed Licence Condition & draft compliance verification criteria (1 hr)

LC G.7 which can be found on page 297/1249 of the pdf here: <https://api.cnsccsn.gc.ca/dms/digital-medias/CMD25-H2.pdf/object>

- Review of feedback received from Nations so far on the draft compliance verification criteria language
- Open discussion to gather additional feedback and explore potential ways to address concerns

5. Closing

MSIFN and CNSC March Monthly Meeting

June 3, 2025

(Virtual, MS Teams)

<u>CNSC Attendees</u>	<u>MSIFN Attendees</u>
Emily Janzen, Indigenous Consultation and Engagement Division (ICED) Erin Cotnam-Bent (ICED)	Sam Shrubsole, Minogi Corp

Agenda

- CNSC Updates
- MSIFN Updates

Hiawatha First Nation and CNSC staff monthly meeting

September 3, 2025

(Virtual, MS Teams)

<u>CNSC Attendees</u>	<u>HFN Attendees</u>
Laura DeCoste, ICED Erin Cotnam-Bent, ICED Marina Martin, ICED Jane MacDonald, ICED Daniel MacDonald, Pickering Regulatory Program Division	Sean Davison Tom Cowie Mike Howard Francis Chua Kayla Wright

Agenda

1. Welcome and introductions
2. Presentation and consultation discussion on CNSC staff overview of OPG's Renewal and Refurbishment Application for the Pickering Nuclear Generating Station and Pickering Waste Management Facility (presentation attached)
 - a. Discussion on proposed consultation activities and HFN's priorities, interests and concerns related to the application
3. Updates from HFN and CNSC staff
4. Closing and confirmation of next meeting

Melanson, Jamie (CNSC/CCSN)

From: Janzen, Emily (CNSC/CCSN)
Sent: April 14, 2026 4:48 PM
To: Don Richardson; klarocca@scugogfirstnation.com; tsimpson@alderville.ca; Chief Laurie Carr; LaurieH@curvelake.ca; Francis M. Chua; cathy.richards; Kayla Wright; paigew; lilyb; Julie Kapyrka; Sam Shrubsole; Ceara Das; Matthew Olsen; Sean Davison; Tom Cowie; Rob Lukacs; Kayla Ponce de Leon; Finn Komai; Consultation; Tamara Whitby; TiffanyTA@curvelake.ca; Mike Howard; kelly.larocca; 'energylead'; ConsultationLead
Cc: Bourgeau, Pierre-Daniel (CNSC/CCSN); Anderson, Emma (she, her | elle, la); Marriott, Andrew; Yuen, Pui Wai; Tran, Nhan (CNSC/CCSN); Gerrish, Meghan (CNSC/CCSN); Zenobi, Adam (CNSC/CCSN); Hitchon, Martin (CNSC/CCSN); Hazelton, Kimberly (CNSC/CCSN); Wylie, Doug (CNSC/CCSN); MacDonald, Daniel (CNSC/CCSN); Bédard, Stéphanie (CNSC/CCSN); Richardson, Ross (CNSC/CCSN); Moses, Colin (CNSC/CCSN); Levine, Adam (CNSC/CCSN); Salmon, Candace (CNSC/CCSN); Bogden, Jamie (CNSC/CCSN); MacDonald, Jane (CNSC/CCSN); Janzen, Emily (CNSC/CCSN)
Subject: CNSC Response to MSIFN E-mail from 2026-03-13
Attachments: CNSC Response to MSIFN E-mail from 2026-03-13.pdf

Hello Don and everyone,

Please see attached CNSC staff's response to Don's e-mail below from March 13th, 2026.

Thank you again for raising these concerns so clearly. We welcome continued discussion and would appreciate the opportunity to keep working through these issues together.

Emily Janzen (*she/her/elle*)

Senior Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission
emily.janzen@cnsccsn.gc.ca | Cell: 343-548-0590

Agente principale en politiques, Division de la consultation et de la mobilisation des Autochtones
Commission canadienne de sûreté nucléaire
emily.janzen@cnsccsn.gc.ca | Tél. Cell.: 343-548-0590

From: Janzen, Emily (CNSC/CCSN)
Sent: March 13, 2026 2:05 PM
To: 'Don Richardson' <drichardson@scugogfirstnation.ca>; klarocca@scugogfirstnation.com; tsimpson@alderville.ca; Chief Laurie Carr <chiefcarr@hiawathafn.ca>; LaurieH@curvelake.ca; Francis M. Chua <francis@francischua.com>; cathy.richards <cathy.richards@msifn.ca>; Kayla Wright <kayla@francischua.com>; paigew <paigew@curvelake.ca>; lilyb <lilyb@curvelake.ca>; Julie Kapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>; Sam Shrubsole <sshubsole@scugogfirstnation.ca>; Ceara Das <cdas@alderville.ca>; Matthew Olsen <molsen@alderville.ca>; Sean Davison <sdavison@hiawathafn.ca>; Tom Cowie <tcowie@hiawathafn.ca>; Rob Lukacs <rlukacs@scugogfirstnation.ca>; Kayla Ponce de Leon <kponcedeleon@scugogfirstnation.ca>; Finn Komai <fkamai@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>; Tamara Whitby <tamara.whitby@hiawathafn.ca>; TiffanyTA@curvelake.ca; Mike Howard <dcdc@hiawathafn.ca>; kelly.larocca <kelly.larocca@msifn.ca>
Cc: Wylie, Doug (CNSC/CCSN) <doug.wylie@cnsccsn.gc.ca>; MacDonald, Daniel (CNSC/CCSN) <daniel.macdonald@cnsccsn.gc.ca>; Bédard, Stéphanie (CNSC/CCSN) <stephanie.bedard@cnsccsn.gc.ca>;

Richardson, Ross (CNSC/CCSN) <ross.richardson@cnscccsn.gc.ca>; Moses, Colin (CNSC/CCSN) <colin.moses@cnscccsn.gc.ca>; Levine, Adam (CNSC/CCSN) <adam.levine@cnscccsn.gc.ca>; Salmon, Candace (CNSC/CCSN) <candace.salmon@cnscccsn.gc.ca>; Bogden, Jamie (CNSC/CCSN) <jamie.bogden@cnscccsn.gc.ca>
Subject: RE: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Hello Don and everyone,

Thanks so much for your email and for sharing your thoughts and comments on CNSC processes. I'm acknowledging receipt. We'll take this back, discuss internally, and get back to you as soon as we can.

Thank you again, and I hope you all have a great weekend.
Emily

From: Don Richardson <drichardson@scugogfirstnation.ca>
Sent: March 13, 2026 12:59 PM
To: Janzen, Emily (CNSC/CCSN) <emily.janzen@cnscccsn.gc.ca>; klarocca@scugogfirstnation.com; tsimpson@alderville.ca; Chief Laurie Carr <chiefcarr@hiawathafn.ca>; LaurieH@curvelake.ca; Francis M. Chua <francis@francischua.com>; cathy.richards <cathy.richards@msifn.ca>; Kayla Wright <kayla@francischua.com>; paigew <paigew@curvelake.ca>; lilyb <lilyb@curvelake.ca>; Julie Kapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>; Sam Shrubsole <sshrubsole@scugogfirstnation.ca>; Ceara Das <cdas@alderville.ca>; Matthew Olsen <molsen@alderville.ca>; Sean Davison <sdavison@hiawathafn.ca>; Tom Cowie <tcowie@hiawathafn.ca>; Rob Lukacs <rlukacs@scugogfirstnation.ca>; Kayla Ponce de Leon <kponcedeleon@scugogfirstnation.ca>; Finn Komai <fkamai@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>; Tamara Whitby <tamara.whitby@hiawathafn.ca>; TiffanyTA@curvelake.ca; Mike Howard <dcdc@hiawathafn.ca>; kelly.larocca@msifn.ca
Cc: Wylie, Doug (CNSC/CCSN) <doug.wylie@cnscccsn.gc.ca>; MacDonald, Daniel (CNSC/CCSN) <daniel.macdonald@cnscccsn.gc.ca>; Bédard, Stéphanie (CNSC/CCSN) <stephanie.bedard@cnscccsn.gc.ca>; Richardson, Ross (CNSC/CCSN) <Ross.Richardson@cnscccsn.gc.ca>; Moses, Colin (CNSC/CCSN) <Colin.Moses@cnscccsn.gc.ca>; Levine, Adam (CNSC/CCSN) <Adam.Levine@cnscccsn.gc.ca>; Salmon, Candace (CNSC/CCSN) <candace.salmon@cnscccsn.gc.ca>; Bogden, Jamie (CNSC/CCSN) <jamie.bogden@cnscccsn.gc.ca>
Subject: Re: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Emily,

Thank you for sharing the summary of how the CNSC is implementing Priority 3 of [Canada's Policy for Radioactive Waste Management and Decommissioning](#).

NRCAN's Policy Priority 3 expresses that Canada is "**committed to meaningful engagement with Indigenous peoples in Canada in the planning, development, and operation of radioactive waste management and decommissioning projects**". I appreciate the clarity in the CNSC summary and provide some initial comments here.

Dovetailing with our conversation this week regarding the recent Darlington Nuclear Generating Station (DNLS) relicensing proceeding, and based on that relicensing experience, the CNSC's very recent

approach to DNGS relicensing does not seem to align with what will be required for forthcoming/future applications:

- June 21, 2021 - UNDA legislation passed.
- March 27, 2023 - The NRCAN Radioactive Waste and Decommissioning Policy is published, including its references to nuclear waste/decommissioning, UNDRIP/FPIC, and NRCAN Policy's Priority 3 commitment.
- March 26, 2025, and June 24–26, 2025 - Two years after the NRCAN Policy was published, the CNSC scheduled a two-part public hearing for the proposed licence renewal for the Darlington Nuclear Generating Station (DNGS) - the CNSC determined the Duty to Consult was not triggered for the DNGS relicensing proceeding.

Concerns with the Current Framework Based on the DNGS Relicensing Experience

1. FPIC and UNDRIP are presented as aspirational rather than operational.

Your document states that the CNSC will “seek to obtain FPIC *where appropriate*” and will “support governance processes for coming to an *FPIC position*.” For major Commission decisions on facilities that will operate for decades, generate new waste streams, and create new cumulative impacts (like the very recent Darlington relicensing, as we discussed this week), FPIC cannot be treated as a general principle. It must be embedded in the structure, timing, and scope of the regulatory process. This did not happen for the Darlington relicensing. DNGS relicensing includes decades of new used nuclear fuel and other nuclear wastes, new considerations for future decommissioning of the facility, the continuance of thermal water pollution in the unceded Lake Ontario intermingled with a new thermal water pollution source from DNNP, the cumulative effects of additional used nuclear fuel storage from the adjacent DNNP, and other cumulative impacts across OPG nuclear operations - it is difficult to conclude that these are not "novel impacts" or require the application of FPIC.

2. The CNSC's approach risks treating refurbishment as a continuation of the status quo.

Darlington relicensing was a new decision with new impacts, new long-term waste streams, on-site nuclear waste storage, new risks, and new long-term consequences for the Nations. The duty to consult is therefore at the high end of the spectrum for Darlington relicensing, and the CNSC's processes must reflect that. Darlington relicensing is our most recent reference case for the three-year-old NRCAN policy, and our most recent experience with the CNSC's application of that policy to the new waste streams at DNGS and DNNP, as well as the related decommissioning considerations for those comingled facilities.

3. Responsibilities for consultation and engagement cannot be shifted to OPG.

While proponents have obligations, the CNSC - as a statutory decision-maker - holds the Crown's duty to ensure consultation is adequate before issuing a licence. The Darlington relicensing process illustrates that the current framing leaves too much discretion to OPG and does not establish a clear Crown-led structure for Nation-to-Nation engagement. Procedural loop-holes can be used to find an *FPIC position* that side-steps triggering the Duty to Consult, and to make what the CNSC might unilaterally decide are *appropriate* decisions to obtain FPIC. This seems to be what happened for the DNGS re-licensing.

4. Historical waste issues cannot be excluded from the scope.

Your document acknowledges that radioactive waste has historically been created and stored in

Indigenous territories without consultation. That is the case with DNGS - a clear example of historic nuclear waste being created and stored without meaningful consultation. The CNSC did not transparently address these historical impacts as part of the relicensing process or by the CNSC in determining an **FPIC position**.

5. Current engagement mechanisms are insufficient for the scale and significance of the decision.

The Darlington relicensing approach of participant funding, written submissions, and ad hoc meetings did not meet the standard of “building long-term relationships,” “collaborating on reports,” or “**supporting governance processes for FPIC**,” as described in your document. These commitments require structured, ongoing, Nation-to-Nation mechanisms - many of which we discussed this week.

Suggested Improvements and a More Appropriate Approach

To align the CNSC’s stated commitments with the requirements for future radioactive waste and decommissioning decisions as per the NRCAN policy, please consider my thoughts on some initial suggestions:

1. Clarify how FPIC will be operationalized.

Provide a clear explanation of how the CNSC intends to support Nations in transparently reaching an FPIC position, together with the Nations, and clearly outline how the CNSC will assess FPIC, and how the CNSC will respond if FPIC is not achieved.

2. Provide project-specific capacity funding.

Your document commits to “reducing financial and capacity barriers.” For projects involving radioactive waste and decommissioning, per the NRCAN policy, dedicated, adequate, and timely capacity funding is required to support technical review, legal analysis, community engagement, **and** FPIC decision-making and governance processes.

3. Integrate historical waste issues into the licensing analysis.

This is consistent with NRCAN Policy clause 3.6 and with the CNSC’s own acknowledgment of past harms. The Darlington proceeding did not consider historical waste issues. How will the CNSC operationalize this, and when?

The CNSC says it is committed to reconciliation, the implementation of UNDRIP, and the honour of the Crown. Based on the very recent Darlington relicensing experience, this commitment still seems to be very much in process. It creates significant uncertainty about how it will be applied to forthcoming and future CNSC regulatory processes.

The improvements outlined above are my initial take on what may be necessary to ensure the process is consistent with the NRCAN Policy and the CNSC’s stated principles.

I welcome your comments on the above.

Don

From: Janzen, Emily (CNSC/CCSN) <emily.janzen@cnscccsn.gc.ca>

Sent: March 10, 2026 3:09 PM

To: klarocca@scugogfirstnation.com <klarocca@scugogfirstnation.com>; tsimpson@alderville.ca <tsimpson@alderville.ca>; Chief Laurie Carr <chiefcarr@hiawathafn.ca>; LaurieH@curvelake.ca

<laurieh@curvelake.ca>; Francis M. Chua <francis@francischua.com>; cathy.richards <cathy.richards@msifn.ca>; Kayla Wright <kayla@francischua.com>; paigew <paigew@curvelake.ca>; lilyb <lilyb@curvelake.ca>; Julie Kapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>; Sam Shrubsole <sshubsole@scugogfirstnation.ca>; Ceara Das <cdas@alderville.ca>; Matthew Olsen <molsen@alderville.ca>; Sean Davison <sdavison@hiawathafn.ca>; Tom Cowie <tcowie@hiawathafn.ca>; Don Richardson <drichardson@scugogfirstnation.ca>; Rob Lukacs <rlukacs@scugogfirstnation.ca>; Kayla Ponce de Leon <kponcedeleon@scugogfirstnation.ca>; Finn Komai <fkamai@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>; Tamara Whitby <tamara.whitby@hiawathafn.ca>; TiffanyTA@curvelake.ca <tiffanyta@curvelake.ca>; Mike Howard <dcdc@hiawathafn.ca>; kelly.larocca <kelly.larocca@msifn.ca>
Cc: Wylie, Doug (CNSC/CCSN) <doug.wylie@cnscccsn.gc.ca>; MacDonald, Daniel (CNSC/CCSN) <daniel.macdonald@cnscccsn.gc.ca>; Bédard, Stéphanie (CNSC/CCSN) <stephanie.bedard@cnscccsn.gc.ca>; Richardson, Ross (CNSC/CCSN) <Ross.Richardson@cnscccsn.gc.ca>; Moses, Colin (CNSC/CCSN) <Colin.Moses@cnscccsn.gc.ca>; Levine, Adam (CNSC/CCSN) <Adam.Levine@cnscccsn.gc.ca>; Salmon, Candace (CNSC/CCSN) <candace.salmon@cnscccsn.gc.ca>; Bogden, Jamie (CNSC/CCSN) <jamie.bogden@cnscccsn.gc.ca>

Subject: FW: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Hi all,

As discussed, sharing the CNSC's response to MSIFN's questions regarding NRCAN's waste policy, as requested in our meeting just now.

Thank you,
Emily

From: Janzen, Emily

Sent: October 1, 2025 2:45 PM

To: Don Richardson <drichardson@scugogfirstnation.ca>; Sam Shrubsole <sshubsole@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>; Rob Lukacs <rlukacs@scugogfirstnation.ca>

Cc: Cotnam-Bent, Erin <erin.cotnam-bent@cnscccsn.gc.ca>; MacDonald, Paul <paul.macdonald@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>; Martin, Marina <marina.martin@cnscccsn.gc.ca>; Bédard, Stéphanie <stephanie.bedard@cnscccsn.gc.ca>

Subject: RE: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Hi Don, Sam and Rob!

I am re-sharing our response to MSIFN's questions regarding NRCAN's waste policy, as requested at our meeting September 24. This was prepared in collaboration with our Policy division and NRCAN.

Please let me know if you have any questions.

Thanks,
Emily

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent: July 31, 2025 2:39 PM

To: Don Richardson <drichardson@scugogfirstnation.ca>; Sam Shrubsole <sshubsole@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>

Cc: Janzen, Emily <emily.janzen@cnscccsn.gc.ca>; Cotnam-Bent, Erin <erin.cotnam-bent@cnscccsn.gc.ca>; MacDonald, Paul <Paul.MacDonald@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>

Subject: RE: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Hi Don,

In addition to the text below from July 8th, I wanted to clarify that it is OPG's decision to apply for the combination of their WFOL and PROL under a single licence, and that they would be best positioned to talk about their rationale for this approach. I also want to clarify that this approach to licensing would not reduce the robustness of the CNSC's licensing and compliance requirements and activities for the facilities.

As for the status of the Detailed Decommissioning Plan, I would like to wait to provide you with a detailed update until my Regulatory Program Officer has returned from leave. CNSC staff have asked OPG to provide additional clarification on this topic.

Finally, please find attached a document entitled [CNSC Implementation of Priority 3 of NRCan's *Canada's Policy for Radioactive Waste Management and Decommissioning*](#) which outlines how the CNSC's regulatory framework ties into NRCan's Policy for Radioactive Waste Management and Decommissioning. This was prepared in collaboration with our Policy division and NRCan.

I propose that we meet sometime in August with our Regulatory Program Officer to continue discussing your questions about OPG's application for a renewal with amendments, as well as the DDP. Please let me know if you have any availability August 12th at 2pm, August 13th at 11am or 2pm, or August 14th at 10am, 11am, 2pm, or 3pm.

Thanks very much,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina

Sent: July 18, 2025 3:51 PM

To: Don Richardson <drichardson@scugogfirstnation.ca>; Sam Shrubsole <sshrubsole@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>

Cc: Janzen, Emily <emily.janzen@cnscccsn.gc.ca>; Cotnam-Bent, Erin <erin.cotnam-bent@cnscccsn.gc.ca>

Subject: RE: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Don and team,

I wanted to check-in with you before the weekend to note that the Participant Funding Program opportunity for OPG's application for a renewal and amendments to their Pickering Nuclear Generating Station (NGS) licence is expected to open on Monday. We will follow-up with the link once that's been posted.

We are also planning to follow-up with you next week on some of the items raised in the last MSIFN-CNSC staff monthly meeting about the Pickering NGS, including:

- The status of the Detailed Decommissioning Plan for the Pickering NGS
- Further information about how the CNSC assesses applications to combine licences such as Power Reactor Operating Licence and Waste Facility Operating Licence

- Information about how the CNSC's regulatory framework ties into NRC's Policy for Radioactive Waste Management and Decommissioning

I also note that we plan to have further conversations regarding the details of the proposed water intake system in OPG's application and associated potential impacts to rights.

Thank you and please let me know if you have any questions at this time,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnsccsn.gc.ca

From: Martin, Marina

Sent: July 8, 2025 10:36 AM

To: Don Richardson <drichardson@scugogfirstnation.ca>; Sam Shrubsole <sshrubsole@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>

Cc: Janzen, Emily <emily.janzen@cnsccsn.gc.ca>; Cotnam-Bent, Erin <erin.cotnam-bent@cnsccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnsccsn.gc.ca>; Levine, Adam <adam.levine@cnsccsn.gc.ca>

Subject: RE: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Hi Don,

Thank you for reaching out. We look forward to working with you and MSIFN to discuss the approach for a UNDRIP informed consultation and engagement for the Pickering NGS licence renewal application, including how the CNSC can support the Michi Saagiig Nations in reaching and communicating an FPIC position to the Commission on the proposed project. I will be available to discuss further at the CNSC-MSIFN monthly meeting this afternoon and plan to propose a meeting with all Michi Saagiig Nations, should that be the preferred path forward.

With regards to OPG's proposal to consolidate their PROL and WFOL, the CNSC does not have requirements stipulating that certain activities need to fall on separate licences, only that a licence is required to conduct certain activities noted in the Nuclear Safety and Control Act.

Previously, OPG has elected to apply for separate licences for its power reactor and waste management facilities on the Pickering site, which include several licenced activities at both facilities. Whether the licenced activities are included on two separate licences or a single combined licence is an administrative matter that does not impact the CNSC's assessment of the application or compliance verification of the licensees conduct.

It is up to the applicant to apply for a particular licence that includes the relevant licenced activities, and for this renewal, OPG has elected to apply for a single combined licence for the entire Pickering site. However, if this is of concern to MSIFN we are happy to have a discussion on this with yourselves and OPG if that would be helpful.

Note that NB Power has a similar combined licence that includes both a power reactor and a waste management facility for the Point Lepreau nuclear generating station.

Please let us know if you want to discuss this aspect of OPG's application further.

Thanks,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Don Richardson <drichardson@scugogfirstnation.ca>
Sent: July 4, 2025 7:41 PM
To: Martin, Marina <marina.martin@cnscccsn.gc.ca>; Sam Shrubsole <sshrubsole@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>
Cc: Janzen, Emily <emily.janzen@cnscccsn.gc.ca>; Cotnam-Bent, Erin <erin.cotnam-bent@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>
Subject: Re: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Marina,

MSIFN and the other Michi Saagiig Nations will expect a robust consultation process inclusive of the CNSC's recent direction with the CNL NSDF - we expect a process inclusive of UNDRIP and FPIC as with the CNL direction based on current case law and this CNSC decision.

Can you also please provide us with the regulatory basis for why OPG can now expect the CNSC to consolidate the existing Waste Facility Operating Licence (WFOL) for the Pickering Waste Management Facility (WMF) into the renewed PROL, and why this was not previously the case.

Thanks,

Don Richardson

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>
Sent: Friday, July 4, 2025 1:31:52 PM
To: Sam Shrubsole <sshrubsole@scugogfirstnation.ca>; Don Richardson <drichardson@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>
Cc: Janzen, Emily <emily.janzen@cnscccsn.gc.ca>; Cotnam-Bent, Erin <erin.cotnam-bent@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>
Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Sam and Don,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

- A renewed 10-year PROL beginning January 1, 2027,
- The consolidation of the existing Waste Facility Operating Licence (WFOL) for the Pickering Waste Management Facility (WMF) into the renewed PROL,
- Authorization to refurbish Pickering NGS units 5-8 for continued commercial operation,
- Authorization to conduct further non-nuclear decommissioning related work on units 1-4 and inclusion of the "decommissioning" activity in the licence,
- Various other administrative licence amendments.

CNSC staff are currently conducting a completeness check of OPG's application, which will be followed by a technical review, if the application contains enough information to do so. CNSC staff will send you a letter with further information if the application moves into a technical review. CNSC staff are seeking to understand your preferred consultation approach for this Commission proceeding. CNSC staff will also share further information about the anticipated Commission hearing process and the availability of participant funding to support your participation in the Commission hearing process.

If you have any questions about this process or want to share how you would like to be consulted for this process, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial concerns about the project or how it may impact your Aboriginal and/or Treaty rights, and to further discuss with you how potential impacts might be mitigated. CNSC staff will be available to discuss in our regular meeting series, should you want to add this topic to a future agenda.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>
Sent on: Friday, July 4, 2025 5:31:31 PM
To: jkapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>
CC: Janzen, Emily <emily.janzen@cnscccsn.gc.ca>; Cotnam-Bent, Erin <erin.cotnam-bent@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>
Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Julie and Stephanie,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

- A renewed 10-year PROL beginning January 1, 2027,
- The consolidation of the existing Waste Facility Operating Licence (WFOL) for the Pickering Waste Management Facility (WMF) into the renewed PROL,
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- Various other administrative licence amendments.

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If you have any questions about this process or want to share how you would like to be consulted for this process, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial concerns about the project or how it may impact your Aboriginal and/or Treaty rights, and to further discuss with you how potential impacts might be mitigated.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Friday, July 4, 2025 5:32:13 PM

To: danamonague@chimnissing.ca; bfnconsultation@chimnissing.ca

CC: DeCoste, Laura <laura.decoste@cnscccsn.gc.ca>; MacDonald, Jane <jane.macdonald@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Dana,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

- A renewed 10-year PROL beginning January 1, 2027,
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- Various other administrative licence amendments.

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If you have any questions about this process or want to share how you would like to be consulted for this process, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial concerns about the project or how it may impact your Aboriginal and/or Treaty rights, and to further discuss with you how potential impacts might be mitigated.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Friday, July 4, 2025 5:31:58 PM

To: jl.porte@georginaisland.com; Natasha Charles <natasha.charles@georginaisland.com>

CC: DeCoste, Laura <laura.decoste@cnscccsn.gc.ca>; MacDonald, Jane <jane.macdonald@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon JL and Natasha,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

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If you have any questions about this process or want to share how you would like to be consulted for this process, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial concerns about the project or how it may impact your Aboriginal and/or Treaty rights, and to further discuss with you how potential impacts might be mitigated.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Friday, July 4, 2025 5:31:37 PM

To: Paige Williams <paigew@curvelake.ca>; Consultation Energy Lead <energylead@curvelake.ca>; Consultation Lead <consultationlead@curvelake.ca>; Francis M. Chua <francis@francischua.com>; Kayla Wright <kayla@francischua.com>

CC: DeCoste, Laura <laura.decoste@cnscccsn.gc.ca>; Cotnam-Bent, Erin <erin.cotnam-bent@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

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If you have any questions about this process or want to share how you would like to be consulted for this process, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial concerns about the project or how it may impact your Aboriginal and/or Treaty rights, and to further discuss with you how potential impacts might be mitigated. CNSC staff will be available to discuss in our regular meeting series, should you want to add this topic to a future agenda.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>
Sent on: Friday, July 4, 2025 5:32:19 PM
To: dbickell@ramafirstnation.ca; consultation@ramafirstnation.ca
CC: DeCoste, Laura <laura.decoste@cnscccsn.gc.ca>; MacDonald, Jane <jane.macdonald@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>
Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Dillon,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

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If you have any questions about this process or want to share how you would like to be consulted for this process, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial concerns about the project or how it may impact your Aboriginal and/or Treaty rights, and to further discuss with you how potential impacts might be mitigated.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Friday, July 4, 2025 5:32:05 PM

To: Mike Howard <dcdc@hiawathafn.ca>; Tom Cowie <tcowie@hiawathafn.ca>; Sean Davison <sdavison@hiawathafn.ca>

CC: DeCoste, Laura <laura.decoste@cnscccsn.gc.ca>; Cotnam-Bent, Erin <erin.cotnam-bent@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Mike, Tom, and Sean,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

- A renewed 10-year PROL beginning January 1, 2027,
- The consolidation of the existing Waste Facility Operating Licence (WFOL) for the Pickering Waste Management Facility (WMF) into the renewed PROL,
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Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>
Sent on: Friday, July 4, 2025 5:32:43 PM
To: environment@mbq-tmt.org; nicoles@mbq-tmt.org; Charlotte Gurnsey <consultation@mbq-tmt.org>
CC: DeCoste, Laura <laura.decoste@cnscccsn.gc.ca>; MacDonald, Jane <jane.macdonald@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>
Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Megan, Nicole, and Cassie,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

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If you have any questions about this process or want to share your views, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial questions or concerns about the project.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Friday, July 4, 2025 5:32:35 PM

To: Mark.Laforme@mncfn.ca; Abby.LaForme@mncfn.ca; Megan.DeVries@mncfn.ca; Lindsay.Wong@mncfn.ca

CC: DeCoste, Laura <laura.decoste@cnscccsn.gc.ca>; MacDonald, Jane <jane.macdonald@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon,

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If you have any questions about this process or want to share your views, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial questions or concerns about the project.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnsccsn.gc.ca>

Sent on: Friday, July 4, 2025 5:33:01 PM

To: Mary MacDougall <marym@metisnation.org>; Jennifer Christoff <jenniferc@metisnation.org>

CC: Dormer, Natalie <natalie.dormer@cnsccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnsccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Mary and Jennifer,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

- A renewed 10-year PROL beginning January 1, 2027,
- The consolidation of the existing Waste Facility Operating Licence (WFOL) for the Pickering Waste Management Facility (WMF) into the renewed PROL,
- Authorization to refurbish Pickering NGS units 5-8 for continued commercial operation,
- Authorization to conduct further non-nuclear decommissioning related work on units 1-4 and inclusion of the "decommissioning" activity in the licence,
- Various other administrative licence amendments.

CNSC staff are currently conducting a completeness check of OPG's application, which will be followed by a technical review, if the application contains enough information to do so. CNSC staff will send you a letter with further information if the application moves into a technical review. CNSC staff are seeking to understand your preferred engagement approach for this Commission proceeding. CNSC staff will also share further information about the anticipated Commission hearing process and the availability of participant funding to support your participation in the Commission hearing process.

If you have any questions about this process or want to share your views, please reach out to me at marina.martin@cnsccsn.gc.ca. CNSC staff want to hear if you have any initial questions or concerns about the project. CNSC staff will be available to discuss in our regular meeting series, should you want to add this topic to a future agenda.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnsccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>
Sent on: Friday, July 4, 2025 5:31:52 PM
To: Sam Shrubsole <sshshrubsole@scugogfirstnation.ca>; Don Richardson <drichardson@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>
CC: Janzen, Emily <emily.janzen@cnscccsn.gc.ca>; Cotnam-Bent, Erin <erin.cotnam-bent@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>
Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Sam and Don,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

- A renewed 10-year PROL beginning January 1, 2027,
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If you have any questions about this process or want to share how you would like to be consulted for this process, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial concerns about the project or how it may impact your Aboriginal and/or Treaty rights, and to further discuss with you how potential impacts might be mitigated. CNSC staff will be available to discuss in our regular meeting series, should you want to add this topic to a future agenda.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Friday, July 4, 2025 5:33:10 PM

To: Owen Tanner <manager.energy@saugeenobwaynation.ca>; Bob Nickel <bnickel.energy@saugeenobwaynation.ca>

CC: Sellers, Kirsten <kirsten.sellers@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Owen and Bob,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

- A renewed 10-year PROL beginning January 1, 2027,
- The consolidation of the existing Waste Facility Operating Licence (WFOL) for the Pickering Waste Management Facility (WMF) into the renewed PROL,
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If you have any questions about this process or want to share your views, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial questions or concerns about the project. CNSC staff will be available to discuss in our regular meeting series, should you want to add this topic to a future agenda.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Friday, July 4, 2025 5:31:31 PM

To: jkapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>

CC: Janzen, Emily <emily.janzen@cnscccsn.gc.ca>; Cotnam-Bent, Erin <erin.cotnam-bent@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon Julie and Stephanie,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

OPG's application considers several different items. OPG has requested:

- A renewed 10-year PROL beginning January 1, 2027,
- The consolidation of the existing Waste Facility Operating Licence (WFOL) for the Pickering Waste Management Facility (WMF) into the renewed PROL,
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- Various other administrative licence amendments.

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If you have any questions about this process or want to share how you would like to be consulted for this process, please reach out to me at marina.martin@cnscccsn.gc.ca. CNSC staff want to hear if you have any initial concerns about the project or how it may impact your Aboriginal and/or Treaty rights, and to further discuss with you how potential impacts might be mitigated.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

Bédard, Stéphanie (CNSC/CCSN)

From: Megan DeVries <Megan.DeVries@mncfn.ca>
Sent: Thursday, October 2, 2025 8:47 AM
To: Martin, Marina
Cc: MacDonald, Jane; Bédard, Stéphanie; Lindsay Wong; Participant Funding Program - Programme de financière des participants (CNSC/CCSN)
Subject: Re: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Follow Up Flag: Follow up
Flag Status: Completed

Categories: To File

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Hi Marina,

Thank you for following up on this item. At this time, MCFN will not be reviewing the materials associated with the hearing nor applying for the participation funding. We ask to continue to be circulated on updates for our own record keeping, but we will defer to the Williams Treaties First Nations, with whom I assume you are extensively consulting.

Thank you,
Megan.

Megan DeVries (she/her)
Manager of Consultations
Department of Consultation and Accommodation



Mississaugas of the Credit First Nation

Mailing: 2789 Mississauga Road, Hagersville ON, N0A 1H0

Physical: 4065 Highway 6 North, Hagersville ON, N0A 1H0

Web: www.mncfn.ca

Cell: 226-934-8640

Disclaimer

The Mississaugas of the Credit First Nation (MCFN) asserts the right to maintain stewardship on our ancestral homelands which includes the right to protect the lands and waters that sustain and support the life and health of all. Historically, and without our consent, MCFN homelands have been industrialized to the point where cumulative effects have already surpassed the point of a questionable future for coming generations. In this era of reconciliation, building a renewed relationship with First Nation peoples based on recognition of rights, respect and partnership, MCFN fully expect legal

obligations with the body of the politic to adhere to National interests and engage MCFN in all future development taking place within our ancestral lands.

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you are not the intended recipient you are notified that disclosing, copying, distributing or taking any action in reliance on the contents of this information is strictly prohibited. Please note that any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the Mississaugas of the Credit First Nation.

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent: Friday, September 19, 2025 3:19 PM

To: Megan DeVries <Megan.DeVries@mncfn.ca>

Cc: MacDonald, Jane <jane.macdonald@cnscccsn.gc.ca>; Bédard, Stéphanie <stephanie.bedard@cnscccsn.gc.ca>; Lindsay Wong <Lindsay.Wong@mncfn.ca>; Participant Funding Program - Programme de financière des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>

Subject: RE: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Hi Megan,

Thanks for speaking to me on the phone yesterday. Please find here some additional information about the Commission Hearing Process, OPG's application, and our PFP program to help you decide whether to intervene in this Commission hearing and whether to apply for the associated funding.

The Canadian Nuclear Safety Commission (CNSC) will hold a 2-part public hearing on April 1, 2026, and the week of June 22, 2026, to consider an application from Ontario Power Generation (OPG) to authorize the refurbishment of the [Pickering Nuclear Generating Station](#) (PNGS), and to renew the power reactor operating licence for the PNGS and the waste facility operating licence for the Pickering Waste Management Facility. Both facilities are located at the Pickering nuclear site, in Pickering, Ontario, on the traditional lands and waters of the Michi Saagiig Anishinaabeg, the Gunshot Treaty (1877–88), the Williams Treaties (1923), and the Williams Treaties Settlement Agreement (2018). The CNSC is offering participant funding to assist Indigenous Nations and communities, members of the public and interested parties in reviewing OPG's application and associated documents, and in participating in the Commission hearing process.

Up to **\$250,000** in participant funding will be disbursed among all successful applicants for the provision of new, distinctive and valuable information through informed and topic-specific interventions to the Commission. Funding will be awarded for the review of documentation, including CNSC staff's documents and OPG's Commission member documents, and for participation in the public Commission hearing.

If you want to participate in this Commission hearing, there is a lot of flexibility in how you can conduct your review of hearing materials (ex. hiring a consultant, doing an in-house review) and what information you want to present to the Commission in an informed and topic-specific intervention. You can highlight concerns, potential issues with the project, and potential impacts the project may have on your community.

PFP can support consultant fees to help with the review of documentation, meetings with CNSC staff, community meetings for engagement related to the application, and travel to the hearing to participate orally, to name a couple of examples.

Please let me know as soon as possible if you think you would be interested in applying for PFP for this Commission hearing.

Additionally, if you have any concerns about the project, CNSC staff would like to hear about those and discuss them with you to ensure that we are all properly informed. CNSC staff have the following availability:

- Sept 23rd at 10:30am or 11:30am
- Sept 29th at 11:30am
- Oct 1st at 2:30pm
- Oct 2nd at 1pm or 3pm
- Oct 3rd at 9:30am, 10:30am, or 1pm

If none of those times work for you, we can look at additional dates further into the future.

Thanks very much,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina
Sent: July 14, 2025 11:38 AM
To: Megan DeVries <Megan.DeVries@mncfn.ca>
Cc: DeCoste, Laura <laura.decoste@cnscccsn.gc.ca>; MacDonald, Jane <jane.macdonald@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>; Lindsay Wong <Lindsay.Wong@mncfn.ca>
Subject: RE: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Hi Megan,

Thank you very much for reaching out.

We will continue to provide you with updates throughout the process and notify you when our Participant Funding Program opportunity opens.

Please do not hesitate to reach out if you have any questions or concerns.

Thanks again,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Megan DeVries <Megan.DeVries@mncfn.ca>
Sent: July 14, 2025 9:42 AM
To: Martin, Marina <marina.martin@cnscccsn.gc.ca>
Cc: DeCoste, Laura <laura.decoste@cnscccsn.gc.ca>; MacDonald, Jane <jane.macdonald@cnscccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnscccsn.gc.ca>; Lindsay Wong <Lindsay.Wong@mncfn.ca>

Subject: Re: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Hello Marina,

Thank you for contacting the Mississaugas of the Credit First Nation.

We received notification from OPG on June 17 that they intend to apply for early renewal and consolidation at the plant. The following was our response:

MCFN continues to maintain an interest in this file. We would like you to continue to circulate us on project notices and updates and, if and when there are technical reports available to support your renewal and consolidation application, we would like to review those documents. Please let me know if you have any questions or require any clarification.

We hope that OPG will work with MCFN to satisfy our interests and requests for engagement, but ask that CNSC continues to check in with us throughout the application process. We anticipate that OPG will provide sufficient capacity funding to support our time and reviews, but would expect CNSC to do so should OPG decline.

Thank you,
Megan.

Megan DeVries (she/her)
Manager of Consultations
Department of Consultation and Accommodation



Mississaugas of the Credit First Nation

Mailing: 2789 Mississauga Road, Hagersville ON, N0A 1H0

Physical: 4065 Highway 6 North, Hagersville ON, N0A 1H0

Web: www.mncfn.ca

Cell: 226-934-8640

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This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you are not the intended recipient you are notified that disclosing, copying, distributing or taking any action in reliance on the contents of this information is strictly prohibited. Please note that any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the Mississaugas of the Credit First Nation.

From: Martin, Marina <marina.martin@cnsc-ccsn.gc.ca>

Sent: Friday, July 4, 2025 1:32 PM

To: Mark LaForme <Mark.LaForme@mncfn.ca>; Abby Lee <Abby.LaForme@mncfn.ca>; Megan DeVries <Megan.DeVries@mncfn.ca>; Lindsay Wong <Lindsay.Wong@mncfn.ca>

Cc: DeCoste, Laura <laura.decoste@cnsc-ccsn.gc.ca>; MacDonald, Jane <jane.macdonald@cnsc-ccsn.gc.ca>; MacDonald, Daniel <daniel.macdonald@cnsc-ccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station

Good afternoon,

I'm reaching out to inform you that on June 27, 2025, Ontario Power Generation (OPG) submitted an application for a renewed Power Reactor Operating Licence (PROL) for the Pickering Nuclear Generating Station (NGS).

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- Authorization to conduct further non-nuclear decommissioning related work on units 1-4 and inclusion of the "decommissioning" activity in the licence,
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If you have any questions about this process or want to share your views, please reach out to me at marina.martin@cnsc-ccsn.gc.ca. CNSC staff want to hear if you have any initial questions or concerns about the project.

Thank you and please do not hesitate to reach out,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnsc-ccsn.gc.ca

Hiawatha First Nation and CNSC staff monthly meeting

July 17, 2025

Virtual

CNSC Attendees	Hiawatha Attendees
Laura DeCoste Erin Cotnam-Bent Marina Martin Adam Zenobi	Mike Howard Sean Davison Francis Chua Kayla Wright

Agenda:

- Welcome and introductions
- Notice of OPG's application for the Pickering Nuclear Generating Station and Pickering Waste Management Facility - request for renewal and refurbishment
- Debrief from the Darlington Nuclear Generating Station renewal hearing
- Updates from HFN and CNSC
- Closing and confirmation of next meeting (August 21)

Curve Lake First Nation and CNSC staff monthly meeting

July 17, 2025

Virtual

CNSC Attendees	Curve Lake Attendees
Laura DeCoste, ICED Erin Cotnam-Bent, ICED Marina Martin, ICED Jerry Kallada, Funding Programs Adam Zenobi, Funding Programs Arielle Jean, Funding Programs	Paige Williams Lily Boggs Francis Chua

Agenda:

- Welcome and introductions
- Discussion on Curve Lake's TOR/ Workplan application and request for funding for external legal counsel support
- Notice of OPG's application for the Pickering Nuclear Generating Station and Pickering Waste Management Facility - request for renewal and refurbishment
- Debrief from the Darlington Nuclear Generating Station renewal hearing
- Updates from Curve Lake and CNSC
- Closing and confirmation of next meeting (August 21)

Bédard, Stéphanie (CNSC/CCSN)

Subject: Draft agenda added: Hiawatha First Nation and CNSC staff monthly meeting
Location: Microsoft Teams Meeting

Start: Thu 7/17/2025 2:00 PM
End: Thu 7/17/2025 3:00 PM

Recurrence: Monthly
Recurrence Pattern: the third Thursday of every 1 month(s) from 2:00 PM to 3:00 PM

Meeting Status: Accepted

Organizer: DeCoste, Laura
Required Attendees: sdavison@hiawathafn.ca; Tom Cowie; Martin, Marina
Optional Attendees: Chief Laurie Carr; Mike Howard; Cotnam-Bent, Erin

Hello everyone!

Please find the draft agenda below and let me know if you have any comments / edits.

Draft agenda:

1. Welcome and introductions
2. Notice of OPG's application for the Pickering Nuclear Generating Station - request for renewal and refurbishment
3. Debrief from the Darlington Nuclear Generating Station renewal hearing
4. Updates from HFN and CNSC
5. Closing and confirmation of next meeting (August 21)

Laura

Microsoft Teams meeting

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 279 212 274 627

Passcode: qghdaw

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Or call in (audio only)

[+1 647-749-9265,,278517886#](#) Canada, Toronto

[\(844\) 632-5179,,278517886#](#) Canada (Toll-free)

Phone Conference ID: 278 517 886#

[Find a local number](#) | [Reset PIN](#)

Curve Lake First Nation and CNSC staff monthly meeting

September 18, 2025

Virtual

CNSC Attendees	Curve Lake Attendees
Laura DeCoste, ICED Erin Cotnam-Bent, ICED Marina Martin, ICED Daniel MacDonald, Senior Regulatory Program Officer, Pickering Regulatory Program Division	Kayla Wright Lily Boggs Francis Chua Paola Cueva

Agenda:

- Welcome and introductions
- Consultation discussion/ working planning: approach to consultation on OPG Pickering Nuclear Generating Station and Waste Management Facility application. Guiding questions for consideration:
 - What are your initial concerns about the project?
 - What aspects of the project do you want or need to learn more about?
 - Do you see any impacts on Curve Lake's rights or interests? Does Curve Lake have a preferred approach to assessing impacts and discussing potential mitigation or accommodations measures?
 - Are there specific consultation activities or approaches you would like to take? How would Curve Lake like to incorporate your Indigenous Knowledge, Laws, Culture and Free, Prior and Informed Consent process into the assessment and Commission proceedings?
- Updates from Curve Lake and CNSC staff
- Closing and confirmation of next meeting (Oct 16)

Hiawatha First Nation and CNSC staff monthly meeting

September 18, 2025
(Virtual, MS Teams)

<u>CNSC Attendees</u>	<u>HFN Attendees</u>
Laura DeCoste, ICED Erin Cotnam-Bent, ICED Marina Martin, ICED Ian Lindsay, ICED Daniel MacDonald, Pickering Regulatory Program Division	Sean Davison Mike Howard

Agenda

1. Welcome and introductions
2. Consultation discussion: work planning and approach to consultation OPG PNGS and PWMF application. Guiding questions for consideration:
 - a. What are your initial concerns about the project?
 - b. What aspects of the project do you want or need to learn more about?
 - c. HFN has raised concerns about legacy impacts, are there any specific mitigations measures or approaches to addressing this concern that HFN would like to explore further?
 - d. Do you see any impacts on HFN's rights or interests? Does HFN have a preferred approach to assessing impacts and discussing potential mitigation or accommodations measures?
 - e. Are there specific consultation activities or approaches you would like to take? How would HFN like to incorporate your Indigenous Knowledge, Laws, Culture and Free, Prior and Informed Consent process into the assessment and Commission proceedings?
3. Updates from HFN and CNSC staff
4. Closing and confirmation of next meeting (Oct 16)

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Wednesday, July 23, 2025 5:01:11 PM

To: lonnybomberry@sixnations.ca; lrcs@sixnations.ca

CC: Participant Funding Program - Programme de financement des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

Good afternoon,

I'm reaching out today to let you know that the [Notice of Hearing](#) and [Participant Funding Program opportunity](#) for the Canadian Nuclear Safety Commission (CNSC) Hearing on Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station are posted on the CNSC's website.

The deadline to apply for the Participant Funding Program opportunity is September 15th, 2025.

Thank you and please reach out if you have any questions,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Wednesday, July 23, 2025 4:52:30 PM

To: jkapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>

CC: Participant Funding Program - Programme de financière des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

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Thank you and please reach out if you have any questions,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Wednesday, July 23, 2025 4:57:34 PM

To: danamonague@chimissing.ca; bfnconsultation@chimissing.ca

CC: Participant Funding Program - Programme de financement des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

Good afternoon,

I'm reaching out today to let you know that the [Notice of Hearing](#) and [Participant Funding Program opportunity](#) for the Canadian Nuclear Safety Commission (CNSC) Hearing on Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station are posted on the CNSC's website.

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Thank you and please reach out if you have any questions,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Wednesday, July 23, 2025 4:55:58 PM

To: j.l.porte@georginaisland.com; Natasha Charles <natasha.charles@georginaisland.com>

CC: Participant Funding Program - Programme de financement des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

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Thank you and please reach out if you have any questions,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Wednesday, July 23, 2025 4:53:20 PM

To: Paige Williams <paigew@curvelake.ca>; Consultation Energy Lead <energylead@curvelake.ca>; Consultation Lead <consultationlead@curvelake.ca>; Francis M. Chua <francis@francischua.com>; Kayla Wright <kayla@francischua.com>

CC: Participant Funding Program - Programme de financière des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

Good afternoon,

I'm reaching out today to let you know that the [Notice of Hearing](#) and [Participant Funding Program opportunity](#) for the Canadian Nuclear Safety Commission (CNSC) Hearing on Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station are posted on the CNSC's website.

The deadline to apply for the Participant Funding Program opportunity is September 15th, 2025.

Thank you and please reach out if you have any questions about these items.

We'll be in touch!

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>
Sent on: Wednesday, July 23, 2025 4:58:27 PM
To: dbickell@ramafirstnation.ca; consultation@ramafirstnation.ca
CC: Participant Funding Program - Programme de financement des participants (CNSC/CCSN) <ppf@cnscccsn.gc.ca>
Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

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The deadline to apply for the Participant Funding Program opportunity is September 15th, 2025.

Thank you and please reach out if you have any questions,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Wednesday, July 23, 2025 4:56:34 PM

To: Mike Howard <dcdc@hiawathafn.ca>; Tom Cowie <tcowie@hiawathafn.ca>; Sean Davison <sdavison@hiawathafn.ca>

CC: Participant Funding Program - Programme de financement des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>; DeCoste, Laura <laura.decoste@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

Good afternoon,

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Thank you and please reach out if you have any questions on these items.

We'll be in touch!

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Wednesday, July 23, 2025 5:01:02 PM

To: environment@mbq-tmt.org; nicoles@mbq-tmt.org; Charlotte Gurnsey <consultation@mbq-tmt.org>

CC: Participant Funding Program - Programme de financement des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

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The deadline to apply for the Participant Funding Program opportunity is September 15th, 2025.

Thank you and please reach out if you have any questions,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Wednesday, July 23, 2025 4:59:37 PM

To: Mark Laforme@mncfn.ca; Abby LaForme@mncfn.ca; Megan DeVries <megan.devries@mncfn.ca>; Lindsay Wong <lindsay.wong@mncfn.ca>

CC: Participant Funding Program - Programme de financement des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

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The deadline to apply for the Participant Funding Program opportunity is September 15th, 2025.

Thank you and please reach out if you have any questions,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Wednesday, July 23, 2025 4:54:03 PM

To: Consultation <consultation@scugogfirstnation.com>; Don Richardson <d Richardson@scugogfirstnation.ca>; Sam Shrubsole <sshubsole@scugogfirstnation.ca>

CC: Participant Funding Program - Programme de financement des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>; Janzen, Emily <emily.janzen@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

Good afternoon,

I'm reaching out today to let you know that the [Notice of Hearing](#) and [Participant Funding Program opportunity](#) for the Canadian Nuclear Safety Commission (CNSC) Hearing on Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station are posted on the CNSC's website.

The deadline to apply for the Participant Funding Program opportunity is September 15th, 2025. Please note that a two-part hearing is planned.

Thank you and please reach out if you have any questions on these items.

I'll be in touch again soon,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina <marina.martin@cnscccsn.gc.ca>

Sent on: Wednesday, July 23, 2025 5:02:08 PM

To: Owen Tanner <manager.energy@saugeenobwaynation.ca>; Bob Nickel <bnickel.energy@saugeenobwaynation.ca>

CC: Participant Funding Program - Programme de financement des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>; Sellers, Kirsten <kirsten.sellers@cnscccsn.gc.ca>

Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

Good afternoon Owen and Bob,

I'm reaching out today to let you know that the [Notice of Hearing](#) and [Participant Funding Program opportunity](#) for the Canadian Nuclear Safety Commission (CNSC) Hearing on Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station are posted on the CNSC's website.

The deadline to apply for the Participant Funding Program opportunity is September 15th, 2025.

Happy to chat about this at one of our regular meetings!

Thank you and please reach out if you have any questions,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: [Terra - Consultation Liason \(BFN\)](#)
To: [Martin, Marina](#)
Cc: [Jane Copegog](#)
Subject: Re: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station
Sent: 2025-07-28 11:26:26 AM

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Good afternoon Marina,

Thank you for sending this important update regarding the Canadian Nuclear Safety Commission (CNSC) Hearing on Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station. We acknowledge receipt of this email and the attached Notice of Hearing and Participant Funding Program opportunity.

We will review the information provided, including the deadline for the Participant Funding Program application on September 15th, 2025, and will be in contact should we have any questions or require further information.

Thanks,
Terra

On Wed, Jul 23, 2025 at 12:57 PM Martin, Marina <marina.martin@cnsccsn.gc.ca> wrote:

Good afternoon,

I'm reaching out today to let you know that the [Notice of Hearing](#) and [Participant Funding Program opportunity](#) for the Canadian Nuclear Safety Commission (CNSC) Hearing on Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station are posted on the CNSC's website.

The deadline to apply for the Participant Funding Program opportunity is September 15th, 2025.

Thank you and please reach out if you have any questions,

Marina Martin

she/her

Policy Officer, Indigenous Consultation and Engagement Division

Canadian Nuclear Safety Commission – Government of Canada

Marina.Martin@cnsccsn.gc.ca

Please consider the environment before printing this email.

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Curve Lake First Nation and CNSC staff monthly meeting

August 19, 2025

Virtual

CNSC Attendees	Curve Lake Attendees
Laura DeCoste, ICED Erin Cotnam-Bent, ICED Marina Martin, ICED Daniel MacDonald, Senior Regulatory Program Officer, Pickering Regulatory Program Division Adam Zenobi, Team Lead, Funding Programs	Kayla Wright Lily Boggs Francis Chua

Agenda:

- Welcome and introductions
- Overview of Overview of OPG's Renewal and Refurbishment Application for PNGS and PWMF
- Darlington Nuclear Generating Station Renewal PFP Funding
- Other

From: [Jean, Arielle](#)
To: [Stephanie Zilinski](#)
Cc: [Julie Kapyrka](#); [Martin, Marina](#); [Participant Funding Program - Programme de financière des participants \(CNSC/CCSN\)](#);
Subject: RE: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station
Sent: 2025-09-15 1:25:22 PM

Hello Stephanie,

Just confirming that the Funding Programs team has received your application. We will review and let you know if we have any questions.

Thank you!
Arielle

From: Stephanie Zilinski <szilinski@alderville.ca>
Sent: September 15, 2025 10:50 AM
To: Martin, Marina <marina.martin@cnsccsn.gc.ca>; Julie Kapyrka <jkapyrka@alderville.ca>; Participant Funding Program - Programme de financière des participants (CNSC/CCSN) <pfp@cnsccsn.gc.ca>
Subject: RE: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Aaniin Marina

Enclosed is Alderville First Nation's application.

Please direct all questions to myself.

Chi Megwetch

Stephanie Zilinski
Special Projects Consultant



11696 Second Line
Roseneath, ON K0K 2X0
szilinski@alderville.ca

From: Martin, Marina <marina.martin@cnsccsn.gc.ca>
Sent: July 23, 2025 12:53 PM
To: Julie Kapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>
Cc: Participant Funding Program - Programme de financière des participants (CNSC/CCSN) <pfp@cnsccsn.gc.ca>
Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

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The deadline to apply for the Participant Funding Program opportunity is September 15th, 2025.

Thank you and please reach out if you have any questions,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada

From: [Martin, Marina](#)
To: jamieb@mbq-tmt.org
Cc: [Participant Funding Program - Programme de financière des participants \(CNSC/CCSN\); MacDonald, Jane; Bédard, Stéphanie; environment@mbq-tmt.org; Charlotte Gurnsey;](#)
Subject: RE: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station
Attachments: [Canadian Nuclear Safety Commission's Notice of Ontario Power Generation's application for a Licence Renewal for the Pickering Nuclear Generating Station](#)
Sent: 2025-09-18 11:59:00 AM

Good afternoon Jamie,

I spoke to Cassie on the phone earlier, who passed along your contact information.

We are reaching out to see if the Mohawks of the Bay of Quinte are interested in learning more about or participating in the CNSC Commission Hearing for OPG's application to renew their licence for the Pickering Nuclear Generating Station with amendments.

Should you be interested and require funding to support your participation, please let us know and provide us with a filled-in [application](#) by September 26th, if possible.

We are available to meet with you to discuss OPG's application and the regulatory process – Please just let us know.

Thanks for your time,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

From: Martin, Marina
Sent: July 23, 2025 1:01 PM
To: environment@mbq-tmt.org; nicoles@mbq-tmt.org; [Charlotte Gurnsey <consultation@mbq-tmt.org>](mailto:Charlotte.Gurnsey@mbq-tmt.org)
Cc: Participant Funding Program - Programme de financière des participants (CNSC/CCSN) <pfp@cnscccsn.gc.ca>
Subject: Canadian Nuclear Safety Commission's Notice of Public Hearing and Participant Funding for Ontario Power Generation's application for a Licence Renewal with Amendments for the Pickering Nuclear Generating Station

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Thank you and please reach out if you have any questions,

Marina Martin
she/her

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

MCFN	<p>10:50am called Megan Devries at MCFN to follow-up on PFP</p> <p>Megan shared that she didn't feel they had enough information to know what their review was going to be like, and therefore wouldn't know what to apply for PFP. I offered to have a meeting with her next Monday. Megan is very busy and not available for the next couple of weeks.</p> <p>I committed to following-up with some additional information and proposed meeting dates & times.</p> <p>(Complete)</p>
MBQ	<p>11:20 called MBQ</p> <p>Cassie gave me a new contact to reach out to: Jamie Brant MBQ Community Energie Cham JamieB@MBQ-TMT.org</p> <p>(Complete)</p>
6Nations	<p>11:33 Called Lonnie, left a voicemail</p> <p>Noting that PFP deadline has passed but that we are available to support and can discuss the project, concerns, & any support they may want</p>
Rama	<p>11:38 Called Dillon, left a message noting that PFP deadline has passed but that we are available to support and can discuss the project, concerns, & any support they may want</p>
Beausoleil	<p>11:44 Called Jane C at Beausoleil – Left a message for Dana, who will follow-up via email. Beausoleil in the process of hiring consultation staff, asked us to keep Jane C included in correspondence.</p>

Marina Martin
 she/her

Policy Officer, Indigenous Consultation and Engagement Division
 Canadian Nuclear Safety Commission – Government of Canada
Marina.Martin@cnscccsn.gc.ca

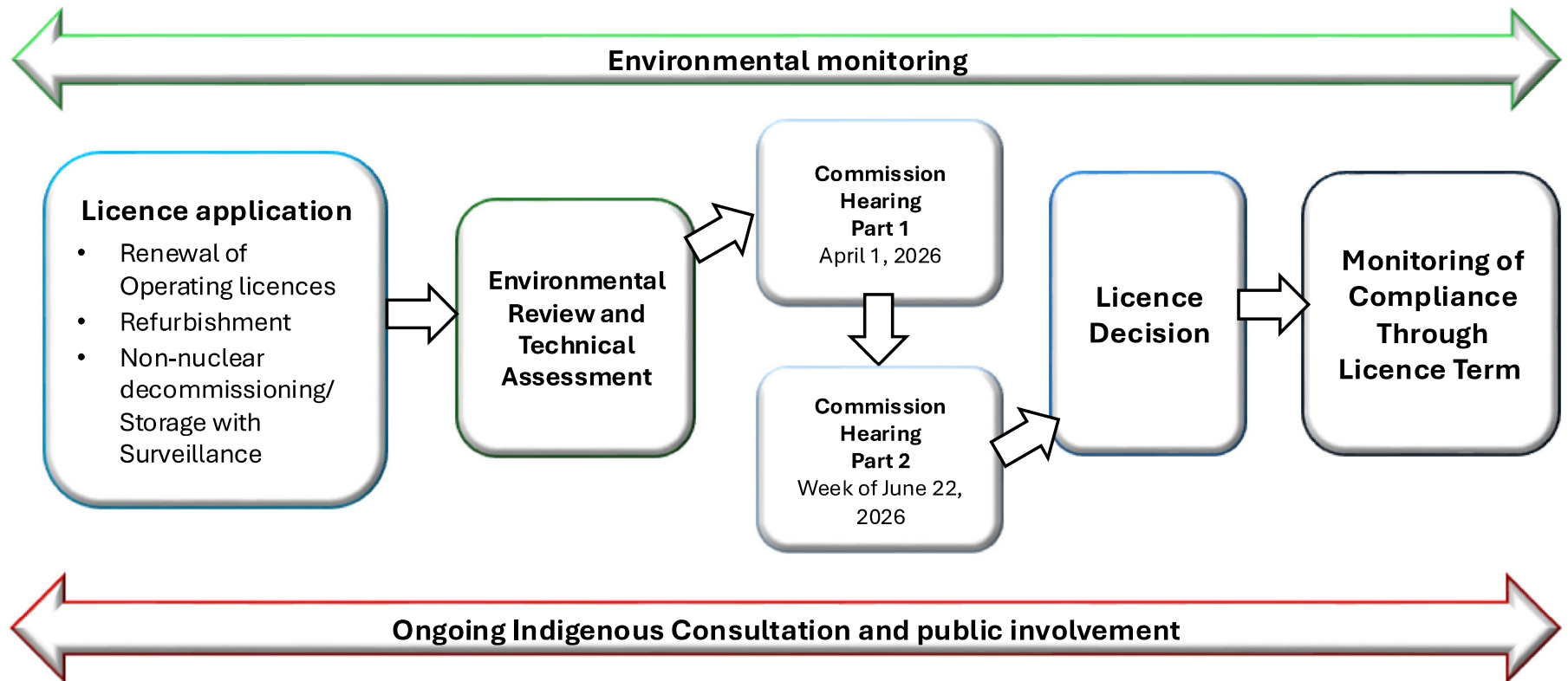
CNSC staff overview of OPG's Renewal and Refurbishment Application for PNGS

Details and regulatory context of Ontario Power Generation's application to the Canadian Nuclear Safety Commission to renew and amend their Power Reactor Operating Licence for the Pickering Nuclear Generating Station

2025-09-23 Update on CNSC Licensing and Oversight Activities Involving OPG

Location	Darlington			Pickering	Wesleyville
Licence/Facility	DNGS OPG holds a licence to operate the Darlington Nuclear Generating Station (10 year licence, expires 30-Nov-2025)	DWMF OPG holds a licence to operate the Darlington Waste Management Facility, (10 year licence, expires in 2033)	DNNP OPG holds a licence to construct one BWRX-300 reactor	PNGS & PWMF OPG holds a licence to operate for the Pickering Nuclear Generating Station, which expires in 31-Aug-2028. OPG also currently holds a separate licence to operate a waste facility for the Pickering Waste Management Facility.	N/A - Integrated Impact Assessment OPG is <u>not</u> licenced to conduct any site preparation, construction, or operations at this time.
Oversight of Licenced activities <i>How we monitor, assess, and correct OPG against their licenses.</i>	Licensed activities include: <ul style="list-style-type: none"> • Operating DNGS • Producing isotopes 	Licensed activities include: <ul style="list-style-type: none"> • Operating DWMF 	Licensed activities include: <ul style="list-style-type: none"> - Construction of one BWRX-300 reactor CNSC staff provide ongoing oversight, including LC 15.4 and CVC related to Indigenous Engagement	Licensed activities include: <p>Reactor Operating Licence:</p> <ul style="list-style-type: none"> • Operating PNGS <p>Waste Facility Operating Licence:</p> <ul style="list-style-type: none"> • Construction of a structure to store 'components' - future decommissioning and potential refurbishment waste (PCSS) • Operating WMF 	N/A – No licence
Ongoing or Expected Commission Licensing	Renewal - In May 2024, OPG submitted an application for a licence renewal, asking for a 30-year licence. Hearings on the application were held in March and June 2025, and we are now awaiting the Commission's decision. CNSC staff are finalizing the Licence Condition Handbook for this licence, including Compliance Verification Criteria related to Indigenous Engagement Program	OPG's licence is valid until 2033; no applications expected.	OPG is expected to eventually submit an application for: <ul style="list-style-type: none"> - Licence to Operate the one BWRX-300 reactor - Amendment to the Licence To Construct to construct a waste storage facility 	Renewal & Refurbishment - OPG has applied to the CNSC for a licence renewal with amendments, requesting permission to refurbish units 5-8; combine their PROL and WFOL under one licence; and carry out early non-nuclear decommissioning. Detailed Decommissioning Plan and Future Decommissioning - OPG has submitted 3 of 6 volumes of their "Detailed Decommissioning Plan" for CNSC staff review and approval. Before OPG could begin true decommissioning, they would need to apply for appropriate Commission Licensing	OPG is expected to initiate an Integrated Impact Assessment process for a potential New Nuclear Build. CNSC and IAAC staff are collaborating on consultation for this process.

Overview of CNSC Licensing Process



Location	Darlington			Pickering	Wesleyville
Licence/Facility	DNGS OPG holds a licence to operate the Darlington Nuclear Generating Station (10 year licence, expires 30-Nov-2025)	DWMF OPG holds a licence to operate the Darlington Waste Management Facility, (10 year licence, expires in 2033)	DNNP OPG holds a licence to construct one BWRX-300 reactor	PNGS & PWMF OPG holds a licence to operate for the Pickering Nuclear Generating Station, which expires in 31-Aug-2028. OPG also currently holds a separate licence to operate a waste facility for the Pickering Waste Management Facility.	N/A - Integrated Impact Assessment OPG is <u>not</u> licenced to conduct any site preparation, construction, or operations at this time.
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OPG's Application to Renew and Amend their PNGS Licence to Operate

OPG has applied:

- For a 10-year renewal for their Power Reactor Operating Licence and Waste Facility Operating Licence
- For some administrative changes to remove outdated or irrelevant licence conditions
- To refurbish reactor units #5-8 and extend their operating lifespan
- To do storage with surveillance and some non-nuclear decommissioning activities for units #1-4
- To consolidate the individual licences for the Pickering Nuclear Generating Station and the Pickering Waste Management Facility

Part of Application: Administrative updates

- Removal of Licence conditions that are no longer relevant
 - OPG has completed the environmental assessment follow-up plan for PWMF (licence condition 9.2 of the waste operating licence)
 - After 2026, current pressure tubes will be removed from service and no longer in 'extended operation', so associated requirements will not be necessary.

Part of Application: Request to refurbish reactor units #5-8 and extend their operating lifespan

- Refurbishment includes:
 - Re-designed Deep Water Intake construction activities
 - Removing and replacing systems, structures, and components
 - Feeder pipes, fuel channels, steam generators, turbine and generator systems, etc.
 - Upgrades to support facilities and equipment
 - Plans to resume power generation by 2036 (within requested licensing period)
 - Reworking any systems on-site that depended on units 1-4
 - E.g., Service water, electrical systems, etc.

Part of Application: OPG's Request for Storage With Surveillance and some non-nuclear decommissioning activities

- OPG has requested authorization to place units 1 & 4 into Storage with Surveillance (SWS) once they have completed stabilization activities
- Units 2 & 3 are already authorized to be in a SWS state, so OPG is requesting that SWS for units 1 & 4 also be reflected in their licence

Stabilization = Defueling, draining, isolating the reactors

Storage with Surveillance (SWS) = Care, maintenance, and monitoring

- SWS also includes risk reduction activities, such as removal of non-nuclear buildings (e.g., Administration) and systems that are no longer needed.

Part of Application: Combining OPG's Reactor and Waste Facility Operating Licences

- OPG currently holds one Power Reactor Operating Licence (PROL) for the PNGS and one Waste Facility Operating Licence (WFOL) for the PWMF
 - OPG is looking to combine these activities under the same licence
- CNSC staff view this request as administrative since all requirements for the PROL and WFOL will still need to be met – There are no reduced requirements or oversight
- The Point Lepreau NGS also has a combined PROL & WFOL

Key Consultation Activities

- Work with CNSC staff to identify concerns, potential impacts to rights or interests, and possible mitigation measures
- Work with CNSC staff to inform your Nation about the licence application and solicit your input on it
- Work with CNSC staff to incorporate Indigenous Knowledge, Laws and Culture into the assessment and Commission Proceedings
- Determine, through your respective process, your Nation's position on Consent and communicate that to the Commission to inform their decision-making
- Collaborate with CNSC staff on the draft Licence Condition Handbook
- Collaborate with CNSC staff to report to the Commission
- Intervene orally and in writing at the Commission Hearing

Questions for consideration

- What are your initial concerns about the project? Do you see any potential impacts to rights or interests?
 - Which rights or interests may be impacted?
 - Is there information available that you would like to share about how your Nation exercises their rights (currently and historically) in the project area and existing constraints on the exercise of rights?
 - How could the project impact those rights and interest?
 - What mitigation or accommodation measures could address the potential impacts?
- What aspects of the project do you want or need to learn more about?
- Are there specific consultation activities or approaches you would like to take?

MSIFN and CNSC September Monthly Meeting

September 24, 2025

(Virtual, MS Teams)

<u>CNSC Attendees</u>	<u>MSIFN Attendees</u>	<u>IAAC</u>
Emily Janzen, Indigenous Consultation and Engagement Division (ICED) Erin Cotnam-Bent (ICED) Marina Martin (ICED) Stéphanie Bédard (ICED) Daniel MacDonald, Pickering Regulatory Program Division	Sam Shrubsole, Minogi Corp Don Richardson, Minogi Corp Rob Lukas, Minogi Corp	Kimberley-Anne Noble, IAAC Genevieve Gaudette, IAAC

Agenda

- **Bruce C Project**
 - Update on the Impact Statement Phase
 - Check-in on path forward
- **OPG's application for a Renewal and Refurbishment of the Pickering NGS**
 - Update and overview of application
 - Seeking MSIFN's questions and concerns about the application
 - Seeking potential impacts to rights or interests that MSIFN identifies
 - Does MSIFN have a preferred approach to assessing impacts to rights and discussing potential mitigation or accommodations?
 - Would MSIFN be open to meeting with CNSC staff and OPG together to discuss mitigation?
 - Path forward and Next Steps
 - Issues and concerns tables
 - Are there specific consultation activities or approaches you would like to take? How would MSIFN like to incorporate your Indigenous Knowledge, Laws, Culture and Free, Prior and Informed Consent process into the assessment and Commission proceedings?
- **If time permits, touch base on:**
 - ISCF Stream 3 funding application for 2025 engagement activities
 - End of year leadership meeting and planning for 2026 (Nov 26?)
 - Consultation framework meeting with all the Michi Saagiig Nations

Melanson, Jamie (CNSC/CCSN)

From: Bogden, Jamie (CNSC/CCSN)
Sent: October 22, 2025 11:37 AM
To: Don Richardson; Babony, Kate; Sam Shrubsole
Cc: Janzen, Emily (CNSC/CCSN); Martin, Marina (CNSC/CCSN); D'Onofrio, Rebecca (CNSC/CCSN); Rupert, Aimee (CNSC/CCSN); MacDonald, Daniel (CNSC/CCSN)
Subject: RE: Pickering - seeking 2009 EIS Report documents
Attachments: E-DOCS-#3297610-v1-CMD_for_EA_Screening_Report_-_Pickering_B_Nuclear_Generating_Station_for_Refurbishment_and_Continued_Operations.pdf; E-DOCS-#3330500-v2-Record_of_Proceedings_-_Ontario_Power_Generation_Inc_-_Screening_Environmental_Assessment_of_the_Pickering_Nuclear_Generating_Station_B_Refurbishment.pdf; E-DOCS-#3229629-v1-(P-1)Refurbishment_and_Continued_Operation_of_Pickering_B_Nuclear_Generating_Station_Environmental_Assessment_(Study_Report)_December_20.pdf

Hi Don,

I hope this message finds you well. It's a pleasure to meet you. I will be acting as the lead for the CNSC's Indigenous and Consultation team throughout the course of this license application review process. I look forward to working with you.

Attached to this email, you'll find three documents that contain the information you requested. Please note due to the size of the EA report I have had to break that into 4 PDFs in 3 separate emails I will send in response to this one. I am so sorry about that, my attempts at other methods of sharing the document did not want to cooperate! To help guide your review, I've included a table that outlines which documents should best provide each item of requested information. Please note some information can be found in more than one document shared but I have indicated the primary sources I thought would be most helpful.

Please don't hesitate to reach out if you have any questions or need further clarification. I'm happy to assist.

Request	Please refer to the document listed
The OPG Pickering B Refurbishment EIS (that started in 2006):	E-DOCS 3229629
All Aboriginal consultation documentation, including submissions, and the assessment of impacts on Aboriginal rights and interests	EDOCS 3229629 EDOCS 3297610 EDOCS 3330500
Documentation on the decision to subject the project to a screening vs. a full EA / Review Panel	E-DOCS 3297610

Warm regards,

Jamie Bogden (*she/her/elle*)

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission
Jamie.bogden@cnsccsn.gc.ca

Agente en politiques, Division de la consultation et de la mobilisation des Autochtones
Commission canadienne de sûreté nucléaire
Jamie.bogden@cnsccsn.gc.ca

Jamie Bogden
Policy Officer, Canadian Nuclear Safety Commission

From: Don Richardson <>
Sent: October 5, 2025 9:55 AM
To: Janzen, Emily <emily.janzen@cnsccsn.gc.ca>
Cc: Sam Shrubsole < Babony, Kate
Subject: Pickering - seeking 2009 EIS Report documents

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Emily,

We have been looking for the full set of documentation for the OPG Pickering Refurbishment EIS that started in 2006 with a CNSC decision January 26, 2009.

In particular, we are looking to obtain the information noted here <https://www.cnsccsn.gc.ca/eng/resources/environmental-protection/environmental-assessments/ea-06-01-21226/>

Along with the EIS Report, we would like to obtain all of the Aboriginal consultation documentation, including all the submissions, and the assessment of impacts on Aboriginal rights and interests. We would also like to see the documentation on the decision to subject the project to a screening vs. a full EA / Review Panel, and the cumulative effects assessment scope and documentation.

Please let us know if you can provide us with this documentation.

Thanks,

Don

MSIFN and CNSC October Monthly Meeting

October 22, 2025
(Virtual, MS Teams)

<u>CNSC Attendees</u>	<u>MSIFN Attendees</u>
Emily Janzen, Indigenous Consultation and Engagement Division (ICED) Marina Martin (ICED) Stéphanie Bédard (ICED) Daniel MacDonald, Pickering Regulatory Program Division Jamie Bodgen (ICED)	Sam Shrubsole, Minogi Corp Finn Komai, Minogi Corp

Agenda

- Pickering NGS:
 - o Discussion on questions from last meeting
 - o Check-in on OPG's engagement
- Touch base on DNNP including upcoming 2026 applications and approach to consultation
- If time permits, touch base on:
 - o End of year TOR meeting: Nov 26
 - o Consultation framework meeting with all the Michi Saagiig Nations – confirmed hybrid on Nov 18



Fogler, Rubinoff LLP

Lawyers

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Our File No. 254458

October 24, 2025

WITHOUT PREJUDICE

Adam Levine
Director of Indigenous Consultation and Engagement
Canadian Nuclear Safety Commission

Dear Adam:

**Re: Darlington Nuclear Generating Station Power Reactor Operating Licence Renewal
Decision: Michi Saagiig Response**

Dear Adam,

We hope this letter finds you well. We are writing regarding the DNGS renewal application process and decision. We wish to acknowledge the CNSC's work with the Nations and the resulting positive gains, to state our position on the Record of Decision ("RoD") and make recommendations for continued process improvements.

Introduction

Canada has a dishonourable history with Treaty First Nations, though there have been recent gradual efforts to reconcile past failures. While the duty to consult has existed since treaty-making, it was formally recognized in common law by the Supreme Court in 2004. This marked a key step in protecting Section 35 Rights. In addition to the duty to consult, Canada has adopted minimum standards for the treatment of Indigenous Peoples through its passing of the *United Nations Declaration on the Rights of Indigenous Peoples Act* ("UNDA") and faces additional obligations under the Truth and Reconciliation Commission and its fiduciary duties.

We will continue working with you to ensure the CNSC's consultation process upholds treaty obligations to put Rights-holding First Nations on an equal playing field. It is our goal to create a true government-to-government consultation process in line with similar regulatory agencies, industry standards and legal obligations. Not only will it improve the relationship between the parties, but it will also assist the CNSC through stream-lined decision-making, efficient use of resources, and provide more predictable licence decision processes.

Darlington NGS

The Michi Saagiig Nations were relieved that the Commissioners decision agreed with their concerns over a 30-year licence renewal and ordered a more reasonable 20-year licence. We acknowledge paragraph 379 of the RoD which expressly recognized the Michi Saagiig position as being influential in coming to its decision. We believe this marks a potential turning point, and that our voices are starting to be heard.

Licence Condition G. 7 and integration of cultural practices into the hearing were other positive outcomes of the licence renewal application. Our hope is that these features become commonplace in all CNSC hearings and decisions which impact First Nations.

Despite the positive outcomes in the RoD, we are compelled to raise a number of concerns with both the process and decision. These concerns are:

- 1) Process
 - Positionality of the Nations as Intervenors and not Parties;
 - CNSC funding model;
- 2) Decision
 - Determination that the Duty to Consult and Accommodate ("DtCA") was not triggered; and
 - Statement that UNDRIP is a interpretive aid for fulfilling the DtCA.

Process Issues**Positionality as Intervenors not Parties not Reflective of Rights**

The Michi Saagiig Nations agreed to share the land and resources in their territory with the newcomers. They did not agree to give up territory Rights nor did they relinquish decision-making over activities and development in our lands. The 2018 Williams Treaties First Nations ("WTFN") Settlement among the WTFNs, Canada and Ontario, was the culmination of their fight to protect these Rights. It solidified the Nations as regulators and this needs to be reflected in their position as a Party to CNSC hearings, not Intervenors.

Besides the political insult of treating them as a regular stakeholder, not being party to the hearing leaves their participation to the discretion of the CNSC. Even if they are granted Intervenor status, it does not afford them the same rights as being a Party. They must continually apply for Intervenor status in each proceeding, they are not entitled to partake in part one of two-part hearings, they are not entitled to the same disclosure, and they must seek leave to appeal orders if they are not directly addressed to them.

Furthermore, the CNSC has continued to deny their position as regulators during the G. 7 Licence Condition negotiations. The Commission ordered the licence condition to give the Nations a direct voice regarding OPG's Indigenous engagement, yet the CNSC continually positions them as subservient to OPG.

Funding Model – Request for Core Funding

The Michi Saagiig Nations are located in what is arguably the most active development region in Canada. They are inundated with requests from proponents and the Crown to consult. Each development threatens their Rights and places significant burdens on their consultation teams; in terms of time; deep understanding of diverse technologies and impacts; and legal and moral responsibility to the community. If they do not

have the resources to properly participate, they risk further erosions of their Rights. The current CNSC funding model contributes to this risk.

In matters dealing with OPG only, the Michi Saagiig Nations are simultaneously dealing with the CNSC's regulatory process on Darlington NGS, Pickering NGS, Darlington New Nuclear Project, and the Port Hope site. All projects are in various life-cycle stages and consultation regarding these projects is continuous and will continue for decades. What is not continuous is CNSC's financial support. OPG and the CNSC are devoting many tens of thousands of hours to the projects while the Nations are expected to keep up without guaranteed funding.

Many proponents and Crown agencies provide First Nations core funding to support the necessary participation in the Crown's fulfillment of their request for consultation. However, some financial models create further barriers by creating administrative hurdles and gaps to effective consultation. We need the CNSC's funding model to evolve in order to properly support participation and consultation via guaranteed core funding.

The current CNSC funding model tied to hearing decisions has very specific timelines for when applications open and when the funding closes. This rigid timeline leaves the Nations disadvantaged.

- 1) They are precluded from starting consultation until the funding is approved. This may be months after a licence application has been submitted and within only weeks of when their responses and submissions are required. It is not enough time to properly analyze studies, to engage with their leadership and community, or to hire advisors to assist with technical knowledge. While the law has confirmed the DtCA includes providing adequate time for meaningful consultation, there has been no adjustment to the CNSC's funding model to ensure meaningful consultation can be realized.

While the Nations are waiting to begin their due diligence, the CNSC and OPG are working away with a full compliment of technical staff, advisors and consultation teams. The Nations are not on an even playing field, continually putting their Rights at risk

- 2) The current funding model also prevents the Nations from conducting the required follow up work once a hearing has closed. This includes continuing negotiations on licence conditions, review of the Commissioner's decisions, and consultation with leadership and community. Continuity is impossible as they need to halt their advisors work, internal review processes, and community consultation.

Instead of the current process, we are asking for essentially two funding models. The first is continuous core funding which is not tied to a specific licence application for the Michi Saagiig Nations to properly consult on the four Nuclear sites. This will cover the gap described above. The second financial stream will remain what is currently in use, more robust financial support for the specific applications and hearings.

Decision Issues

The Determination the Duty to Consult was not Triggered

The Commissioner's determination that the DtCA was not triggered ignored a number of our arguments to the contrary including that the decision constituted a strategic-higher level decision, a new Title claim was asserted, that land is not to be encumbered for multiple generations, and the requirement to consider cumulative impacts which raises the level of required consultation. These factors are DtCA triggers, yet the Commissioners did not address them in their reasons.

It is our contention; the Commissioners also made an error in law at para 328.

328. The Commission acknowledges the Michi Saagiig Nation's asserted claims over the lake and lakebed, as well as the Williams Treaties Settlement Agreement of 2018. The Commission does not have the authority to confirm, establish or deny the existence of Aboriginal and/or treaty rights as claimed or asserted by Indigenous Nations and communities. The Commission expects OPG to continue to work with the William Treaties First Nations to engage on the issue of the jurisdiction of the Lake Ontario lakebed and the potential issuance of a land use easement. Moreover, the renewal of OPG's licence does not involve any new activities that would introduce new environmental impacts or change the licensed activities at the Darlington NGS. As such, the Commission finds that there are no new or novel adverse impacts to potential or established Aboriginal claims or rights.

The Commission does not need to confirm, establish or deny any claims in their DtCA analysis. The entire premise of the DtCA is to protect Rights in the face of uncertainty. The first step in the *Haida* test is that the Crown has knowledge of a *potential* Right. The test is clear that it does not require the Right to be established before the duty arises. The duty is triggered at a low threshold by the *potential* of an adverse impact on a *potential* Right. This was the entire premise of the *Haida* case which gave rise to the common law DtCA.

Secondly, the Michi Saagiig Nations have asserted title over Lake Ontario waters and lakebed. Aboriginal Title is a property right, not a jurisdictional issue as the Commission incorrectly stated. We know the DNGS involves the use of the lake and lakebed; it is incorrect that the renewal licence does not have the potential to adversely impact the Rights of the Nations. The DtCA was most certainly triggered.

Further, the implication from the CNSC's words is that another part of the Crown is responsible for determining the existence of any DtCA. This represents an unlawful fettering of the CNSC's discretion, contrary to principles of administrative law and logic. If the statement in para. 328 is accepted, there was no need for any legal analysis by the CNSC as to the existence of the DtCA as any decision regarding its existence was not a matter within the CNSC's jurisdiction.

We strongly disagree with the Commissioners determination and believe they made an error in law.

The CNSC's process was also flawed. We are still unaware of how the CNSC staff determined the DtCA wasn't triggered. There was no initial scoping, no consideration of which Rights the DNGS currently infringed to know if there would be new impacts. More insultingly it was only through reading the CNSC's hearing submission that we learned the CNSC staff's position that the DtCA wasn't triggered. The Nations were never told of this position despite multiple meetings with the CNSC.

Lastly, we know the DNGS infringes the Michi Saagiig's Aboriginal and Treaty Rights. This is only legally possible if the infringement is justified through the *Sparrow* framework as these Rights are protected by the constitution. One of the elements of the *Sparrow* framework is that the First Nations were consulted. If there was no consultation previously nor for the current hearing, infringing Rights was not justified. The Commissioners ignored this consultation requirement.

UNDRIP is More than an “Interpretive Aid”

The DtCA is a harms-based analysis whereas UNDRIP is a Rights based instrument to protect a minimum standard for the survival, dignity and well being of Indigenous Peoples. UNDRIP's application is not dependent upon the existence of the DtCA despite it being an effective interpretative aid. The current CNSC's determination that their actions and decisions were inline with UNDRIP ignores the requirement for the free, prior and informed consent of the Nations regarding the storage of hazardous waste which is specifically required under Article 29(2).

While we are leaving the door open to address the faults in the DNGS PROL RoD, our attention must now turn to the Pickering NGS refurbishment and renewal and waste facility operating licence application. PNGS's application in its entirety represents Canada's largest nuclear project to date. We wish to avoid the pitfalls of the DNGS renewal application and ensure each party clearly sets out their consultation position early on in the process.

To be clear, the PNGS refurbishment, renewal, and waste facility operating licence application triggers the DtCA and requires UNDRIP's application. We need to ensure CNSC's position is in line with ours to move forward. We expect the CNSC to confirm its position in writing in this regard at its earliest opportunity.

Yours truly,

FOGLER, RUBINOFF LLP



Kate Babony

KB/wl

cc: Emily Whetung-MacInnes
OPG

Curve Lake First Nation and CNSC staff monthly meeting

October 29, 2025

Virtual

CNSC Attendees	Curve Lake Attendees
Ian Lindsay, ICED Stéphanie Bédard, ICED Jamie Bogden, ICED Rebecca D'Onofrio, ICED Daniel MacDonald, Senior Regulatory Program Officer, Pickering Regulatory Program Division	Paige Williams, Consultation Manager Lily Boggs, Consultation Energy Lead Francis Chua, Francis Chua Consulting Kayla Wright, Francis Chua Consulting

Agenda:

- Welcome and introductions (Jamie and Stephanie)
- OPG PNGS and PWMF Application: Continued Consultation Discussion / Working Planning:
 - Approach to Consultation
 - What are your initial concerns about the project?
 - What aspects of the project do you want or need to learn more about?
 - Any specific mitigations measures or approaches to addressing this concern that Curve Lake First Nation would like to explore further?
 - Any impacts on Curve Lake First Nation's rights or interests? Does Curve Lake First Nation have a preferred approach to assessing impacts and discussing potential mitigation or accommodations measures?
 - Are there specific consultation activities or approaches you would like to take?
 - How might Curve Lake First Nation like to incorporate your Indigenous Knowledge, Laws, Culture, and Free, Prior and Informed Consent process into the assessment and Commission proceedings?
- Darlington New Nuclear Project
 - OPG anticipates submitting two (2) applications in late-Q1 (Spring) 2026
 - Amendment of License to Construct, construct an intermediate and low-level waste facility
 - License to Operate the BWRX reactor
 - How to best consult with Curve Lake First Nation (Joint discussions for both applications? Discuss with Curve Lake First Nation alone, or jointly with other Michi Saagiig Nations?)
- CNSC Consultation Framework Discussion – November 18th

- Proposed agenda and examples of discussion questions attached to meeting invite
- Indigenous Knowledge Study
 - Any update on this item?
- Reminder: Submit ISCF ToR and Workplan application for 2026
- Further updates from Curve Lake First Nation and CNSC staff
- Any further updates and confirmation of next meeting (November 20)
 - Interest in year-end meeting in November? December?



Fogler, Rubinoff LLP

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Our File No. 254458

October 31, 2025

WITHOUT PREJUDICE

Adam Levine
Director of Indigenous Consultation and Engagement
Canadian Nuclear Safety Commission

Dear Adam:

**Re: Pickering Nuclear Generating Station Power Reactor Operating Licence and
Pickering Waste Facility Operating Licence Renewal Application: Michi Saagiig
Nations Consultation Process**

Dear Adam,

Thank you for your quick acknowledgement of the DNGS Closure Letter. We are writing as follow up to our request for the CNSC's position on the Crown's duty to consult and accommodate ("DtCA") the Michi Saagiig Nations in relation to OPG's Pickering Nuclear Generating Station ("PNGS") refurbishment and renewal and waste facility operating licence application ("Application"). PNGS's application in its entirety represents Canada's largest nuclear project to date and has important implications on the Aboriginal and Treaty Rights of the Michi Saagiig communities. We wish to avoid the pitfalls of the DNGS renewal application consultation process by establishing each party's position as soon as possible.

As you are aware the Crown's duty to consult the First Nations arises as soon as the Crown is contemplating action or a decision which has the potential to adversely impact established or potential Aboriginal and/or Treaty Rights. The Crown also has a positive obligation to apply UNDRIP to this Application, especially Article 29(2), as the Application considers hazardous waste which requires the Nations' consent.

OPG submitted their Application on 27 June 2025 and the Crown has had knowledge of the impending Application for much longer. The CNSC is aware of the Michi Saagiig Nations' asserted Aboriginal Title claim to Lake Ontario's waters and lakebed. As of the time of writing, the Michi Saagiig Nations are unclear on the CNSC's position regarding the DtCA and none of the Nations have been consulted regarding a DtCA scoping analysis.

We are requesting the CNSC provide its written position on the DtCA and UNDRIP at the earliest opportunity.

Yours truly,

FOGLER, RUBINOFF LLP



Kate Babony

KB/wl

cc: Emily Whetung-MacInnes
OPG



18 November, 2025

Kate Babony
Fogler, Rubinoff LLP
Toronto, ON
M5H 3Y2

Dear Kate:

Thank you for your letters dated October 24 and 31, 2025, regarding the Ontario Power Generation (OPG) Darlington Nuclear Generating Station (DNGS) Power Operator Licence Renewal and the Pickering Nuclear Generating Station (PNGS) application for a refurbishment, renewal, and waste facility operating licence. The Canadian Nuclear Safety Commission (CNSC) staff are writing to respond to the concerns and positions as outlined in your letters.

CNSC staff acknowledge and appreciate the concerns you've raised on behalf of Alderville First Nation, Curve Lake First Nation, Hiawatha First Nation and the Mississaugas of Scugog Island First Nation, and we value the opportunity to continue this dialogue as we work continuously to improve the organization's consultation, engagement and Commission hearing processes.

Positionality as Intervenors not Parties not Reflective of Rights

CNSC staff thank you for providing feedback on the hearing process and your experience during the Darlington Nuclear Generating Station (DNGS) renewal Commission hearing. We have shared your feedback with CNSC's Commission Registry for consideration. The Registry will provide an independent response to these concerns directly. We encourage you to continue engaging with the Commission Registry on future proceedings and advise starting discussions as early as possible about your involvement and role in the hearing process for the PNGS application.

For further clarity on the DNGS renewal hearing and the Commission's decision in this matter, please refer directly to the Commission's detailed Record of Decision, which outlines the rationale and decision reached in relation to the licence renewal application.

CNSC staff are not at liberty to interpret, justify or attempt to expand upon decision-making of the Commission, as that decision-making reflects the independent judgment of the Commission itself.



Participant Funding

CNSC staff acknowledge the challenges faced by the Michi Saagiig Nations as outlined in the two letters given the competing consultation timelines for various licensing activities, including the pressures that CNSC's current funding model may place. The CNSC awarded funding to the Michi Saagiig Nations who applied under the Darlington licence renewal participant funding opportunity in September 2024. Further, CNSC staff were responsive to the funding requests from the Michi Saagiig Nations in March 2025 to help cover additional activities in relation to the DNGS renewal Commission hearing and awarded additional funding to the Nations in April 2025. For reference, the Participant Funding Program decision for the DNGS renewal hearing can be found [here](#).

The Pickering Nuclear Generating Station (PNGS) Participant Funding Program (PFP) opportunity is now closed. The Funding Review Committee has completed its review of the funding applications received from all Michi Saagiig First Nations and the awarded funding will be communicated to the funding applicants in the coming weeks.

Indigenous and Stakeholder Capacity Fund

The CNSC's Indigenous and Stakeholder Capacity Fund (ISCF) was developed to help Indigenous Nations and communities, as well as interested parties, gain the capacity to engage in the CNSC's regulatory processes prior to and throughout the lifecycle of nuclear facilities and activities in Canada in a variety of ways, including internal resource support to assist Nations in engaging with the CNSC. This funding has been offered to all and awarded to a number of the Michi Saagiig Nations, through multiple streams, including resource support funding to hire an internal resource for Nations to help manage the work and relationship with the CNSC. The ISCF remains a potential solution to ease some of the challenges faced by the Nations in relation to capacity and funding needs. The ISCF also provides flexibility as it does not depend on project timelines and enables CNSC staff to collaborate with Nations in the determination of priority initiatives and activities that are funded on an annual basis. CNSC staff are available to assist and engage in discussions on how this funding can be further utilized to align with the priorities and funding needs of the Michi Saagiig First Nations. For detailed information on the process, please consult the ISCF application guide, available [here](#).

Next Steps – Pickering Nuclear Generating Station (PNGS) application: Duty to Consult and the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)

OPG's application for the PNGS includes proposed amendments to the site and licensed activities that go beyond the scope of OPG's current PNGS operating licence. Based on a preliminary analysis of OPG's application and requested activities it is CNSC staff's assessment that there is likely a Duty to Consult and Accommodate, where appropriate, obligation with the Michi Saagiig Nations. Please note that it is ultimately up to the Commission to decide based on



all information and evidence brought before it as part of the Commission hearing to determine whether the Duty to Consult and Accommodate was raised by the application and if so, if it was adequately discharged.

CNSC staff also agree with the need to consider UNDRIP, including seeking the free, prior and informed consent (FPIC) from the Michi Saagiig Nations, as per the the *UN Declaration on the Rights of Indigenous Peoples Act, 2021*.

In July 2025, a notification was sent to the Michi Saagiig Nations by email providing details outlining OPG's requested activities within the application for PNGS renewal and refurbishment project and CNSC's licensing review and consultation process. A subsequent notice of hearing including hearing and funding details was also published in July 2025 and provided to the Nations directly by CNSC staff.

CNSC staff will continue to work with the Michi Saagiig Nations to collaboratively develop a consultation plan related to OPG's PNGS application, including understanding their free, prior, and informed (FPIC) process. We remain committed to frequent and meaningful meetings and dialogue to ensure open lines of communication and to work together to constructively and meaningfully address the issues, concerns, and priorities of the Michi Saagiig Nations in relation to OPG's PNGS application and other nuclear facilities and activities in the Michi Saagiig Nations' traditional and treaty territories.

We look forward to continuing our discussions and working together to strengthen our shared efforts. Through ongoing dialogue and collaboration, we remain committed to identifying opportunities for improvement and supporting meaningful consultation. We would like to set up a meeting with the Michi Saagiig Nations as soon as practicable to discuss OPG's PNGS licence application and work together on establishing a mutually agreeable path forward on the regulatory review, consultation and FPIC seeking processes. Please let us know at your earliest convenience on when such a meeting could occur.

Yours sincerely,

X Adam Levine

Signed by: Levine, Adam

Adam Levine
Director, Indigenous Engagement and Consultation Division
Canadian Nuclear Safety Commission
Ottawa, ON
K1P 1C2

Melanson, Jamie (CNSC/CCSN)

From: Bogden, Jamie (CNSC/CCSN)
Sent: November 19, 2025 7:20 PM
To: Kayla Wright; Francis M. Chua; Paige Williams; Lily Boggs
Cc: Bédard, Stéphanie (CNSC/CCSN); Lindsay, Ian (CNSC/CCSN)
Subject: Following Up Post Consultation Framework Meeting

Hello,

I wanted to reach out to first thank you for meeting with us yesterday and sharing your perspectives in our consultation framework meeting. Secondly, I wanted to reintroduce myself as the point of contact for the Pickering Nuclear Generating Station project.

I want to acknowledge the PNGS-specific concerns and issues raised in yesterday's meeting. Thank you for sharing them with us, and I look forward to our continued discussions on the matter.

Moving forward, please do not hesitate to continue raising questions and concerns with me. I would be happy to address them to the best of my ability and engage in a discussion.

I think yesterday provided great insight into essential conversations around the project, and I would like to meet to continue that dialogue. If you are willing, I would like to coordinate a meeting.

I also have a few questions about how you envision the consultation process around PNGS moving forward:

1. Would you prefer we approach discussions on PNGS jointly with all Michi Saagiig First Nations, or individually, with separate meetings and potential workplans?
2. Would you like to continue discussions about the PNGS application during regularly scheduled monthly meetings, or would it be beneficial for me to coordinate separate, recurring meetings?

Please let us know your thoughts, and I will coordinate next steps based on your feedback.

I look forward to the opportunity to collaborate.

Best regards,

Jamie Bogden (*she/her/elle*)

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission
Jamie.bogden@cnscccsn.gc.ca

Agente en politiques, Division de la consultation et de la mobilisation des Autochtones
Commission canadienne de sûreté nucléaire
Jamie.bogden@cnscccsn.gc.ca

Melanson, Jamie (CNSC/CCSN)

From: Bogden, Jamie (CNSC/CCSN)
Sent: November 19, 2025 7:22 PM
To: Sean Davison; Mike Howard; Tom Cowie; Tamara Whitby; Francis M. Chua; Kayla Wright
Cc: Bédard, Stéphanie (CNSC/CCSN); Lindsay, Ian (CNSC/CCSN)
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Jamie Bogden (*she/her/elle*)

Policy Officer, Indigenous Consultation and Engagement Division
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Commission canadienne de sûreté nucléaire
Jamie.bogden@cnscccsn.gc.ca

Melanson, Jamie (CNSC/CCSN)

From: Bogden, Jamie (CNSC/CCSN)
Sent: November 20, 2025 10:09 AM
To: Julie Kapyrka; Stephanie Zilinski; Ceara Das
Cc: MacDonald, Daniel (CNSC/CCSN); Janzen, Emily (CNSC/CCSN); Bédard, Stéphanie (CNSC/CCSN)
Subject: Following Up Post Consultation Framework Meeting

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Another question for you is how you envision the Consultation process around PNGS moving forward,

1. Would you prefer we approach discussions on PNGS jointly with all Michi Saagiig First Nations, or individually, with separate meetings and potential workplans?
2. Would you like to continue discussions about the PNGS application during a set of recurring meetings or would you like to meet as needed?

Please let us know your thoughts, and I will coordinate next steps based on your feedback.

I look forward to the opportunity to collaborate.

Thank you,

Jamie Bogden (*she/her/elle*)

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission
Jamie.bogden@cnscccsn.gc.ca

Agente en politiques, Division de la consultation et de la mobilisation des Autochtones
Commission canadienne de sûreté nucléaire
Jamie.bogden@cnscccsn.gc.ca

Melanson, Jamie (CNSC/CCSN)

From: Bogden, Jamie (CNSC/CCSN)
Sent: November 20, 2025 9:00 AM
To: Peter Graham
Cc: MacDonald, Jane (CNSC/CCSN); D'Onofrio, Rebecca (CNSC/CCSN); Janzen, Emily (CNSC/CCSN)
Subject: RE: OPG Pickering Nuclear Generating Station Relicensing

Hi Peter,

Thank you for sharing your perspectives regarding engagement throughout the Darlington licence renewal process. We value the time and effort Six Nations of the Grand River (SNGR) dedicated to those discussions.

At this time, following our preliminary assessment, CNSC staff agree with the inclusion of SNGR as an interested Indigenous Nation for the upcoming Pickering licence application. This preliminary analysis is based on the information provided by SNGR to the CNSC to date which doesn't clearly demonstrate a direct connection between the project location and related activities and potential impacts on rights. CNSC staff have also previously reached out to Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) for clarification on CIRNAC's position regarding SNGR's assertions of rights and the connection to the Darlington/Pickering area.

While CNSC is not a rights-determining body, we remain open to continuing conversations about potential impacts and concerns you may have related to this licence application and receiving any new information about specific rights practices, current or historical, in relation to the project. CNSC staff will continue to ensure you receive relevant information and opportunities to participate in the regulatory process.

In addition, CNSC staff will continue to encourage Ontario Power Generation (OPG) to pursue ongoing dialogue and engagement with SNGR throughout the licensing process. We will reinforce the importance of maintaining meaningful communication and providing timely updates.

Please let us know if you would like to schedule a meeting to discuss this further or identify specific areas of interest regarding the Pickering application and if there is anything else we can do to support SNGR in your discussions and engagement with OPG.

Thank you,
Jamie Bogden

From: Janzen, Emily (CNSC/CCSN) <emily.janzen@cnscccsn.gc.ca>
Sent: November 3, 2025 2:55 PM
To: Peter Graham <LRCS@sixnations.ca>
Cc: Bogden, Jamie (CNSC/CCSN) <jamie.bogden@cnscccsn.gc.ca>; MacDonald, Jane (CNSC/CCSN) <jane.macdonald@cnscccsn.gc.ca>; D'Onofrio, Rebecca (CNSC/CCSN) <rebecca.donofrio@cnscccsn.gc.ca>
Subject: RE: OPG Pickering Nuclear Generating Station Relicensing

Hi Peter,

Great to hear from you! I hope you had a fun Halloween.

I've looped in Jamie and Jane on this thread as they are leading work on the Pickering file and will follow up with you directly.

Thanks,

Emily Janzen (*she/her/elle*)

Senior Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission
emily.janzen@cnsccsn.gc.ca | Cell: 343-548-0590

Agente principale en politiques, Division de la consultation et de la mobilisation des Autochtones
Commission canadienne de sûreté nucléaire
emily.janzen@cnsccsn.gc.ca | Tél. Cell.: 343-548-0590

From: Peter Graham <L RCS@sixnations.ca>
Sent: November 3, 2025 1:59 PM
To: Janzen, Emily (CNSC/CCSN) <emily.janzen@cnsccsn.gc.ca>
Subject: FW: OPG Pickering Nuclear Generating Station Relicensing

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Hi Emily,

As OPG will likely defer to CNSC, I would like an answer from CNSC's perspective.

Thank you, Peter

From: Peter Graham
Sent: November 3, 2025 9:17 AM
To: Jared Canfield <jared.canfield@opg.com>
Cc: Ian Jacobsen <ian.jacobsen@opg.com>; Meghan Buckham <meghan.buckham@opg.com>; Amasha Gamage <amasha.gamage@opg.com>; Katie Haddlesey <katie.haddlesey@opg.com>; Mark Nussli <mark.nussli@opg.com>; Elizabeth Lecky <elizabeth.lecky@opg.com>
Subject: RE: OPG Pickering Nuclear Generating Station Relicensing

Good morning Jared,

I see SNGR has been slotted under "Indigenous Communities identified in Table 9 do not claim Aboriginal or treaty rights". I would like a detailed explanation as to why OPG/CNSC believes SNGR does not have Aboriginal rights or asserted Aboriginal rights at the Pickering site.

Thank you, Peter

From: Jared Canfield <jared.canfield@opg.com>

Sent: November 3, 2025 8:25 AM

To: Peter Graham <L RCS@sixnations.ca>

Cc: Ian Jacobsen <ian.jacobsen@opg.com>; Meghan Buckham <meghan.buckham@opg.com>; Amasha Gamage <amasha.gamage@opg.com>; Katie Haddlesey <katie.haddlesey@opg.com>; Mark Nussli <mark.nussli@opg.com>; Elizabeth Lecky <elizabeth.lecky@opg.com>

Subject: [External] OPG Pickering Nuclear Generating Station Relicensing

Good morning Peter,

I hope you are doing well and had a great weekend. I am reaching out to share with you an update regarding Ontario Power Generation's (OPG) submission to the Canadian Nuclear Safety Commission (CNSC) requesting renewal of the Pickering Nuclear Generating Station's Power Reactor Operating Licence (PROL) and the Pickering Waste Management Facility's Operating Licence (WFOL) for a 10-year term from January 1, 2027 to December 31, 2036. During the 10-year term, OPG plans to refurbish Units 5 to 8 to support continued operations for 30+ years and progress the decommissioning of Units 1 to 4 as per the CNSC approved Detailed Decommissioning Plan.

OPG submitted the application to the CNSC on June 30, 2025. The application is attached to this email and can alternatively be found on our website using the following link: [Nuclear power | Operating licences – OPG](#), under "Our licences", "Pickering Nuclear Generating Station", then "application". Please note the key milestones for the Pickering PROL/WFOL licence renewal process below:

- February 27, 2026: OPG plans to submit a Commission Member Document (CMD), updating various sections of the application, such as the Indigenous Engagement section. There is an opportunity for comments and perspectives on the application to be considered, as appropriate, in this CMD.
- April 1, 2026: Part I Public Hearing for the Pickering PROL/WFOL licence renewal application.
- May 2026: Interventions due to the CNSC for the Pickering PROL/WFOL licence renewal application. More information, such as participant funding can be found using the following link: [Notice of Hearing](#).
- June 22-26, 2026: Part II Public Hearing for the Pickering PROL/WFOL licence Renewal application.

OPG wants to understand the perspectives of Indigenous Nations and communities and would be happy to further discuss the Pickering PROL/WFOL with you. If you would like to have your perspectives on the application reflected in the CMD planned for February 2026, we respectfully request your comments by December 19, 2025. Engagement opportunities will continue into 2026 based on your interest and capacity.

If you have any questions, comments and/or would like to meet and discuss any aspect of the application in more detail, please respond to this email.

Best,
Jared



Jared Canfield (He/Him)



Associate Advisor, Indigenous Relations
Indigenous Relations Nuclear

289-671-8569

THIS MESSAGE IS ONLY INTENDED FOR THE USE OF THE INTENDED RECIPIENT(S) AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED, PROPRIETARY AND/OR CONFIDENTIAL. If you are not the intended recipient, you are hereby notified that any review, retransmission, dissemination, distribution, copying, conversion to hard copy or other use of this communication is strictly prohibited. If you are not the intended recipient and have received this message in error, please notify me by return e-mail and delete this message from your system. Ontario Power Generation Inc.

Melanson, Jamie (CNSC/CCSN)

From: Bogden, Jamie (CNSC/CCSN)
Sent: November 20, 2025 9:33 AM
To: Sam Shrubsole; Don Richardson; Rob Lukacs; Kayla Ponce de Leon; Consultation
Cc: Bédard, Stéphanie (CNSC/CCSN); Janzen, Emily (CNSC/CCSN)
Subject: Following Up Post Consultation Framework Meeting

Hello,

I wanted to reach out to first thank you for meeting with us Tuesday and sharing your perspectives in our consultation framework meeting. Secondly, I wanted to reintroduce myself as the point of contact for the Pickering Nuclear Generating Station project.

I want to acknowledge the PNGS-specific concerns and issues raised in Tuesday's meeting. Thank you for sharing them with us, and I look forward to our continued discussions on the matter.

Moving forward, please do not hesitate to continue raising questions and concerns with me. I would be happy to address them to the best of my ability and engage in a discussion.

I think Tuesday provided great insight into essential conversations around the project, and I would like to meet to continue that dialogue. If you are willing, I would like to coordinate a meeting.

I also have a few questions about how you envision the Consultation process around PNGS moving forward:

1. Would you prefer we approach discussions on PNGS jointly with all Michi Saagiig First Nations, or individually, with separate meetings and potential workplans?
2. Would you like to continue discussions about the PNGS application during existing regularly scheduled meetings, or would it be beneficial for me to coordinate separate, recurring meetings?

Please let us know your thoughts, and I will coordinate next steps based on your feedback. I look forward to the opportunity to collaborate.

Best regards,

Jamie Bogden (*she/her/elle*)

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission
Jamie.bogden@cnscccsn.gc.ca

Agente en politiques, Division de la consultation et de la mobilisation des Autochtones
Commission canadienne de sûreté nucléaire
Jamie.bogden@cnscccsn.gc.ca



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Lawyer: Kate Babony
Direct Dial: 416.864.7609
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Legal Assistant: Wendy Lanning
Direct Dial: 416.849.4150
E-mail: wlanning@foglers.com

Our File No. 252545

November 28, 2025

VIA EMAIL

CONFIDENTIAL

Arielle Jean
Reconciliation Policy and Public Programs Division
Canadian National Safety Commission

Dear Ms. Jean:

Re: Pickering Nuclear Generating Station Applications ("PNGS") Participant Funding

We are writing to you regarding the approved PNGS participant funding for Alderville First Nation, Curve Lake First Nation, Hiawatha First Nation, and the Mississaugas of Scugog Island First Nation; the Michi Saagiig of the Williams Treaties First Nations (the "**Michi Saagiig**"). The Nations' submitted budgets were lean, carefully created based on previous hearings' realized costs and without significant increases despite the complexity of the PNGS. We appreciate the CNSC's thoughtful consideration of the funding applications and the approved amounts, however some of those amounts reduced the requested funding by over 25%. This jeopardizes the Nations' ability to protect their rights and the Crown's ability to uphold its honour. We are respectfully requesting reconsideration of the approved amounts.

Background

The Michi Saagiig Nations are the Treaty and host Nations to PNGS, Darlington Nuclear Generating Station ("DNGS"), Darlington New Nuclear Project ("DNNP"), and the new Port Hope site, among other projects overseen by the CNSC. The recent nuclear activity in the Michi Saagiig's traditional territory has been immense and unrelenting and will continue for many years to come.

Each of the Michi Saagiig Nations operate within varying levels of capacity. As they have shared interest in the protection of their section 35 Constitutional rights, the Nations have a dual consultation function – first to represent the interests of their own Nations and second, to work

collaboratively to protect their shared interests. This is tireless work to ensure both communities are protected and that the relationship among the Nations, with the CNSC and OPG are paramount.

This dual consultation role benefits the CNSC as the Nations undertake more work internally to present a unified Michi Saagiig voice where appropriate during nuclear hearings and consultation. The goal is to ensure efficiency by working with the CNSC once instead of four times, providing one hearing submission and jointly participating at the hearing. To do this successfully requires a more robust internal framework, planning and execution.

Working within a shared governance framework is part of reconciliation. The Nations have taken it upon themselves to rebuild relationships and advance the resurgence of their shared cultures and values where the Crown tried to divide and conquer.

The Nations agreed to work with the same legal team to make this approach feasible. It was a success during the DNNP and DNGS hearings. Pooling resources assists all parties, including the CNSC. The requested budgets were thoughtfully drafted, taking in many factors including the dual consultation roles and precedent from the last two hearings, among other things, and at all times were for reasonable costs.

The requested legal budget was based off the realized costs of the DNGS hearing. As you are aware, the provided funding for the DNGS was not sufficient and required a (denied) request for more funding. The eventual shortfall was covered by the Nations own frugality and at no further cost to the CNSC.

We are working to provide the same high-quality, meaningful consultation to both the Nations' communities and the shared Michi Saagiig community, while ensuring the legal team's ability for adequate CNSC preparation—without requesting additional capacity funding. However, the upcoming PNGS hearing is significantly more complex than the DNGS hearing, and the requested legal funding was drastically cut more than 25% from what was requested. This forces the Nations to, once again, choose between securing proper legal representation or cutting essential internal processes. Placing this burden on the Michi Saagiig is neither reconciliation, nor it is not honourable.

Providing adequate funding is assessed as part of the Crown's fulfillment of its duty to consult, which has been triggered. We respectfully ask that the Michi Saagiig's approved funding amounts be re-assessed and increased to align with the requested amount to ensure sufficient capacity.

Yours truly,

FOGLER, RUBINOFF LLP



Kate Babony
KB/wl

Curve Lake First Nation and CNSC staff monthly meeting

November 28, 2025

Virtual

CNSC Attendees	Curve Lake Attendees
Ian Lindsay, ICED Stéphanie Bédard, ICED Jamie Bogden, ICED Rebecca D'Onofrio, ICED Daniel MacDonald, Senior Regulatory Program Officer, Pickering Regulatory Program Division	Francis Chua, Francis Chua Consulting Kayla Wright, Francis Chua Consulting Paige Williams, Consultation Manager Lily Boggs, Consultation Energy Lead

Agenda:

- OPG PNGS & PWMF Application: Continued Consultation Discussion / Working Planning:
 - Approach to Consultation
 - Concerns about the project / any aspects of the project you wish to learn more about
 - Any specific mitigations measures or approaches to addressing concerns that you would like to explore further
 - Any impacts on rights or interests? Any preferred approach(es) to assessing impacts and discussing potential mitigation or accommodations measures
 - Any specific consultation activities or approaches you would like to take
 - How might Curve Lake First Nation like to incorporate Indigenous Knowledge, Laws, Culture, and Free, Prior and Informed Consent process into the assessment and Commission proceedings
- Turtle Island Indigenous Science Conference (University of Waterloo) – May 24-26, 2026: [Turtle Island Indigenous Science Conference 2026 | University of Waterloo](#)
 - CNSC's Laboratory Services seeking to collaborate and present with Curve Lake First Nation on past manoomin (wild rice) sampling
 - Abstract due January 18
- CNSC Participant Funding available: BWXT NEC mid-term update on Peterborough and Toronto facilities (May 2026)
[Participant funding for the BWXT Nuclear Energy Canada Inc. mid-term update](#)
 - Applications due January 23
- Reminder: ISCF ToR and Workplan application for 2026
 - IEMP 2026 schedule to be shared very soon
- Combining Curve Lake First Nation and Hiawatha First Nation meetings
 - End-of-year meeting in December?

<energylead@curvelake.ca>

Cc: Tara McKenzie <tara.mckenzie@opg.com>; Andrea Goold <andrea.goold@opg.com>; Mark Nussli <mark.nussli@opg.com>; Elizabeth Lecky <elizabeth.lecky@opg.com>; Diana Benjamin <diana.benjamin@opg.com>; Kenn Ross <kenn.ross@opg.com>; Ali Esmaeily <ali.esmaeily@opg.com>; Aditi Bhardwaj <aditi.bhardwaj@opg.com>; Jared Canfield <jared.canfield@opg.com>; Joy Davis <joy.davis@opg.com>; Gillian Irwin <gillian.irwin@opg.com>; Chris Horne <chris.horne@opg.com>; Shauna Morsillo <shauna.morsillo@opg.com>; Frank Scarcelli <frank.scarcelli@opg.com>; Gabriel Rodrigues Borges <gabriel.borges@opg.com>; Nduka Egbochuku <nduka.egbochuku@opg.com>; Vanessa Tang Hon Yue <vanessa.tanghonyue@opg.com>; Soo Chae <soo.chae@opg.com>; INDIGENOUS RELATIONS <indigenous.relations@opg.com>; Navin Bindra <navin.bindra@opg.com>; Brad Ellsworth <brad.ellsworth@opg.com>; Martin, Marina (CNSC/CCSN) <marina.martin@cnscccsn.gc.ca>; Oue, Shirley (CNSC/CCSN) <shirley.oue@cnscccsn.gc.ca>; D'Onofrio, Rebecca (CNSC/CCSN) <rebecca.donofrio@cnscccsn.gc.ca>

Subject: NOV Waste Table Meeting Minutes and Actions Follow Up (Terms of Reference and DNNP Fuel Response)

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Hello,

I hope you enjoyed your weekends! Please see the attached meeting minutes/actions and follow up items from our last Waste Table meeting.

Please note that in addition to the meeting minutes, I have also included the Terms of Reference with your comments dispositioned (attached) and a response to the question around DNNP fuel/enriched uranium below:

In November 2023, Ontario Power Generation (OPG) announced that it was partnering with companies from Canada, the U.S., and France to ensure a fuel supply for its Small Modular Reactors (SMRs) at the Darlington New Nuclear Project (DNNP). The four contracts involve:

- Canadian company, Cameco, which has uranium mines in Saskatchewan and a Uranium Hexafluoride (UF6) conversion facility in Port Hope, will supply natural UF6.
- US-based, Urenco USA (UUSA) will provide uranium enrichment services from their operations in Eunice, New Mexico.
- France's Orano will provide additional Enriched Uranium Product (EUP) from their operations in France.
- And US-based, Global Nuclear Fuel-Americas LLC, a GE-led joint venture, will provide fuel fabrication and related technical services and fuel assemblies.

The SMRs will use the GE Hitachi BWRX-300, a boiling water reactor (BWR) that will use the Global Nuclear Fuel (GNF)-2 fuel. This is the same fuel as many BWRs around the world. The fuel material is low-enriched (3% to 5%) uranium dioxide in zirconium alloy metal cladding. It contains 240 fuel assemblies per core (Darlington CANDU core is ~6,200 bundles). The re-fueling cycle is every 12-24 months.

Transportation of the low enriched uranium (BWRX-300 fuel) is not new and has been done for years by other licensees in Canada. The management of the fuel that will be used in the BWRX-300 is fundamentally the same as the management of the fuel used in the existing operating fleet in Canada. As part of LTO, multiple regulatory agencies will be involved with reviewing and approving the movement of BWRX-300 new fuel to ensure the transportation is performed safely including CNSC and Transportation Canada. Additionally, OPG's fuel assembly partner, Global Nuclear Fuels (GNF), has significant experience with safely shipping low enriched fuel internationally.

If you have any questions or concerns, please do not hesitate to reach out.

Miigwech,



10 December 2025

Candace Salmon
Legal and Commission Affairs Branch
Canadian Nuclear Safety Commission

Dear Commission Registrar:

Canadian Nuclear Safety Commission (CNSC) staff are writing regarding Ontario Power Generation's (OPG) Pickering Nuclear Generating Station (PNGS) licence renewal and refurbishment application two-part Commission Hearing, currently scheduled for April 2026 (Part-1) and June 2026 (Part-2).

CNSC staff began engaging with potentially impacted and interested Indigenous Nations and communities regarding OPG's application in September 2023. Discussions on OPG's application were incorporated into monthly meetings and reflected in workplans for the 2024 calendar year. Following receipt of the application from OPG in June 2025, the CNSC followed up with all identified Indigenous Nations to provide the Notice of Hearing and Participant Funding announcement in July 2025. The application deadline for Participant Funding was September 15th, 2025, and funding contribution agreements were shared with funding recipients on November 18th, 2025.

Based on consultation and engagement conducted with Indigenous Nations and communities on OPG's licence application to date, CNSC staff have heard from the Michi Saagiig Nations of the Williams Treaties¹, that due to the complexity of the application, which includes requested authorizations for a power reactor licence renewal, licence consolidation with the Pickering Waste Management Facility licence, refurbishment of the nuclear generating station, proposed decommissioning activities, and other administrative requests, that the current hearing schedule poses a challenge to them and CNSC staff's ability to conduct meaningful consultation in the current timeframe.

¹ This concern was first raised in a meeting with Curve Lake First Nation and later reiterated during a joint Michi Saagiig First Nation meeting that included Curve Lake First Nation, Hiawatha First Nation, Alderville First Nation, and the Mississaugas of Scugog Island First Nation.

CNSC staff take the requests and concerns raised by the Michi Saagiig Nations seriously and are seeking to accommodate these concerns by recommending that the Commission hearing dates be delayed by three months to allow for more time for consultation between CNSC staff and the Michi Saagiig Nations and for engagement between OPG and the Michi Saagiig Nations on the Pickering licence application. This additional time would allow for the Crown to meet its obligations, for CNSC staff to work collaboratively with the Michi Saagiig Nations to continue to collaboratively work on their issues and concerns regarding OPG's application, with an aim to come to a consensus on key issues and a path forward related to OPG's licence application.

This adjustment would move Part 1 of the hearing to June, 2026 and Part 2 to October, 2026. Further, it is CNSC staff's understanding that the Michi Saagiig Nations will be providing their own separate letter to the Commission Registry outlining their concerns and preferred timeframe for the hearing schedule and their preferred approach to participation in the process.

Thank you for considering this request. Please do not hesitate to contact us should you require additional information or clarification.

Sincerely,

Levine
, Adam

A digital signature block for Adam Levine. It includes a large, stylized 'L' and 'A' in a light purple color. To the right of the signature, there is a small, rectangular box containing the following text: "Digitally signed by Levine, Adam", "DN: C=CA, O=GC, OU=CNSC-", "CCSN, CN='Levine, Adam'", "Reason: I am the author of this", "document", "Location:", "Date: 2025.12.10", "16:22:27", "-05'00'", and "Foxit PDF Editor Version: 13.0.1".

Digitally signed by Levine, Adam
DN: C=CA, O=GC, OU=CNSC-
CCSN, CN='Levine, Adam'
Reason: I am the author of this
document
Location:
Date: 2025.12.10
16:22:27
-05'00'
Foxit PDF Editor Version: 13.0.1

Adam Levine,
Director
Indigenous Engagement and Consultation Division
Canadian Nuclear Safety Commission

2025 CNSC–AFN Terms of Reference & Year-End Review Meeting

December 10th 9-10 a.m.

Virtual via MS teams

CNSC Attendees	Alderville First Nation Attendees
Emily Janzen Adam Zenobi	Julie Kapyrka Stephanie Zilinski Ceara Das Matthew Olsen

Agenda

- Opening remarks from AFN and CNSC representatives
- Overview of CNSC’s mandate and regulated facilities within AFN territory (CNSC)
- AFN to share priorities related to CNSC’s regulatory activities (AFN)
- 2026 Long-Term Engagement Work Plan
 - Review of 2025 activities
 - Discussion of AFN priorities for 2026
 - Next steps on AFN’s ISCF Stream 3 funding application for 2026
- Strengthening the CNSC-AFN Relationship
- Open discussion on collaboration and feedback from AFN
- Next Steps and Action Items

Melanson, Jamie (CNSC/CCSN)

From: Jean, Arielle (CNSC/CCSN)
Sent: December 11, 2025 1:24 PM
To: Babony, Kate
Cc: kayla@francischua.com; Francis M. Chua; jkapyrka@alderville.ca; szilinski@alderville.ca; Mike Howard; sshrubsole@scugogfirstnation.ca; drichardson@scugogfirstnation.ca; Janzen, Emily (CNSC/CCSN); Lindsay, Ian (CNSC/CCSN); Bogden, Jamie (CNSC/CCSN); D'Onofrio, Rebecca (CNSC/CCSN); Levine, Adam (CNSC/CCSN); Zenobi, Adam (CNSC/CCSN); Tran, Nhan (CNSC/CCSN)
Subject: RE: Michi Saagiig Nations' Participant Funding for Pickering NGS's Applications

Hello Kate,

Thank you for sharing the feedback and concerns of the Michi Saagiig Nations on the recent Participant Funding Program (PFP) decision related to Ontario Power Generation's application to refurbish the Pickering Nuclear Generating Station and renew its Pickering Nuclear Generating Station and Waste Management Facility licences.

As you are aware, the Canadian Nuclear Safety Commission (CNSC) considers recommendations from an external Funding Review Committee (FRC) when awarding participant funding. The FRC considers many factors in its recommendations, including the total amount of funding available, the level of interest in the project, potential impacts of the project, and applicants' proposals. The CNSC announced an initial budget of \$250,000 to award for this participant funding opportunity. Given the level of interest in the project, the CNSC approved nearly \$100,000 more in participant funding than was initially planned, with over \$250,000 awarded to the four Michi Saagiig Nations to help ensure they could meaningfully participate in the hearing.

Due to the limited amount of funding available, the FRC had to recommend reducing the amount of funding awarded to all applicants for this funding opportunity. As you noted, the FRC reduced the requested legal fees by 25% for each Nation to due to the high amount requested relative to other expenses and considering that the Nations would be pooling their resources for collective support. Unfortunately, the CNSC does not have the financial resources to increase the funding awarded to the Michi Saagiig Nations for the Pickering hearing at this time. However, as engagement on Pickering continues, the CNSC remains open to funding additional consultation activities not covered under the current contribution agreements should additional activities beyond the scope of the current funding award be identified and depending on the PFP's funding budget.

We acknowledge and appreciate the feedback provided by the Michi Saagiig Nations on our funding programs to date and are actively looking at ways the programs can better help support the Nations' consultation and engagement with the CNSC, keeping mind each program's current scope and budget. To that end, we are working on an approach to provide funding for early consultation and engagement activities for upcoming major projects to ensure the Michi Saagiig Nations have the support they need to meaningfully participate in activities with the CNSC and will be presenting this approach to the Nations in upcoming correspondence and meetings.

Please let me know if you have any questions or would like to discuss.

Thank you,

Arielle Jean
(she/her/elle)

Senior Policy Officer

Reconciliation Policy and Public Programs Division
Canadian Nuclear Safety Commission/Government of Canada
arielle.jean@cnscccsn.gc.ca/Tel: 416-529-4696

Agente principale en politiques

Division de la politique sur la réconciliation et des programmes
Commission canadienne de sûreté nucléaire/Gouvernement du Canada
arielle.jean@cnscccsn.gc.ca/Tél: 416-529-4696

From: Babony, Kate <kababony@foglers.com>

Sent: December 1, 2025 2:13 PM

To: Jean, Arielle (CNSC/CCSN) <arielle.jean@cnscccsn.gc.ca>

Cc: Janzen, Emily (CNSC/CCSN) <emily.janzen@cnscccsn.gc.ca>; Bogden, Jamie (CNSC/CCSN) <jami.bogden@cnscccsn.gc.ca>; kayla@francischnua.com; Francis M. Chua <francis@francischnua.com>; jkapyrka@alderville.ca; szilinski@alderville.ca; Mike Howard <dcdc@hiawathafn.ca>; sshrubsole@scugogfirstnation.ca; drichardson@scugogfirstnation.ca; Zenobi, Adam (CNSC/CCSN) <adam.zenobi@cnscccsn.gc.ca>; Tran, Nhan (CNSC/CCSN) <Nhan.Tran@cnscccsn.gc.ca>

Subject: RE: Michi Saagiig Nations' Participant Funding for Pickering NGS's Applications

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Thank you, Arielle,
Kate

From: Jean, Arielle (CNSC/CCSN) <arielle.jean@cnscccsn.gc.ca>

Sent: Monday, December 1, 2025 2:07 PM

To: Babony, Kate <kababony@foglers.com>

Cc: Janzen, Emily (CNSC/CCSN) <emily.janzen@cnscccsn.gc.ca>; Bogden, Jamie (CNSC/CCSN) <jami.bogden@cnscccsn.gc.ca>; kayla@francischnua.com; Francis M. Chua <francis@francischnua.com>; jkapyrka@alderville.ca; szilinski@alderville.ca; Mike Howard <dcdc@hiawathafn.ca>; sshrubsole@scugogfirstnation.ca; drichardson@scugogfirstnation.ca; Zenobi, Adam (CNSC/CCSN) <adam.zenobi@cnscccsn.gc.ca>; Tran, Nhan (CNSC/CCSN) <Nhan.Tran@cnscccsn.gc.ca>

Subject: RE: Michi Saagiig Nations' Participant Funding for Pickering NGS's Applications

Hello Kate,

Thank you for sharing this with me. I will review this request with my team and get back to you.

Arielle

From: Babony, Kate <kababony@foglers.com>

Sent: December 1, 2025 9:19 AM

To: Jean, Arielle (CNSC/CCSN) <arielle.jean@cnscccsn.gc.ca>

Cc: Janzen, Emily (CNSC/CCSN) <emily.janzen@cnscccsn.gc.ca>; Bogden, Jamie (CNSC/CCSN) <jami.bogden@cnscccsn.gc.ca>; kayla@francischnua.com; Francis M. Chua <francis@francischnua.com>; jkapyrka@alderville.ca; szilinski@alderville.ca; Mike Howard <dcdc@hiawathafn.ca>; sshrubsole@scugogfirstnation.ca; drichardson@scugogfirstnation.ca

Subject: Michi Saagiig Nations' Participant Funding for Pickering NGS's Applications

Good morning, Arielle,

I hope you are well. Please see the attached letter and request sent on behalf of Alderville First Nation, Curve Lake First Nation, Hiawatha First Nation and the Mississaugas of Scugog Island First Nation.

We appreciate your timely attention to this.

Kind regards,
Kate



Kate Babony She/Her
Fogler, Rubinoff LLP
Lawyers
Scotia Plaza
40 King Street West, Suite 2400
P.O. Box #215
Toronto, ON M5H 3Y2
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VIA EMAIL

December 11, 2025

Dear Kate Babony,

**Re: OPG Pickering Nuclear Generating Station licence renewal and
refurbishment application**

I write further to the December 10, 2025, letter from CNSC staff, attached in enclosure to this letter.


CNSC staff have heard from the Michi Saagiig Nations of the Williams Treaties that the current hearing schedule does not provide sufficient time for meaningful consultation.

CNSC staff, seeking to accommodate this concern, have recommended to the Commission to reschedule the hearing, to delay by three months to allow for further consultation and engagement.

We write to seek your position on the CNSC staff request. Please reply by **Thursday, December 18, 2025**. We recognize the short timeframe, but require this information as soon as possible for the Commission to make a determination and the Commission Registry to manage logistics and venue bookings should the dates change.

Please note that the CNSC staff letter, this correspondence, and your reply will be posted online as part of the record for this proceeding. Additionally, do not hesitate to contact us should you have any questions about the above or attached.

Sincerely,



Candace Salmon

Commission Registrar
Legal and Commission Affairs Branch

Canadian Nuclear Safety Commission

candace.salmon@cnscccsn.gc.ca / cell: (343) 630-3471

Registraire de la Commission

Direction générale des affaires juridiques et de la Commission

Commission canadienne de sûreté nucléaire

candace.salmon@cnscccsn.gc.ca / Tél. (343) 630-3471

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Rob Lukacs – rlukacs@scugogfirstnation.ca
Kayla Ponce de Leon – kponcedeleon@scugogfirstnation.ca
Consultation – consultation@scugogfirstnation.com



10 December 2025

Candace Salmon
Legal and Commission Affairs Branch
Canadian Nuclear Safety Commission

Dear Commission Registrar:

Canadian Nuclear Safety Commission (CNSC) staff are writing regarding Ontario Power Generation's (OPG) Pickering Nuclear Generating Station (PNGS) licence renewal and refurbishment application two-part Commission Hearing, currently scheduled for April 2026 (Part-1) and June 2026 (Part-2).

CNSC staff began engaging with potentially impacted and interested Indigenous Nations and communities regarding OPG's application in September 2023. Discussions on OPG's application were incorporated into monthly meetings and reflected in workplans for the 2024 calendar year. Following receipt of the application from OPG in June 2025, the CNSC followed up with all identified Indigenous Nations to provide the Notice of Hearing and Participant Funding announcement in July 2025. The application deadline for Participant Funding was September 15th, 2025, and funding contribution agreements were shared with funding recipients on November 18th, 2025.

Based on consultation and engagement conducted with Indigenous Nations and communities on OPG's licence application to date, CNSC staff have heard from the Michi Saagiig Nations of the Williams Treaties¹, that due to the complexity of the application, which includes requested authorizations for a power reactor licence renewal, licence consolidation with the Pickering Waste Management Facility licence, refurbishment of the nuclear generating station, proposed decommissioning activities, and other administrative requests, that the current hearing schedule poses a challenge to them and CNSC staff's ability to conduct meaningful consultation in the current timeframe.

¹ This concern was first raised in a meeting with Curve Lake First Nation and later reiterated during a joint Michi Saagiig First Nation meeting that included Curve Lake First Nation, Hiawatha First Nation, Alderville First Nation, and the Mississaugas of Scugog Island First Nation.

CNSC staff take the requests and concerns raised by the Michi Saagiig Nations seriously and are seeking to accommodate these concerns by recommending that the Commission hearing dates be delayed by three months to allow for more time for consultation between CNSC staff and the Michi Saagiig Nations and for engagement between OPG and the Michi Saagiig Nations on the Pickering licence application. This additional time would allow for the Crown to meet its obligations, for CNSC staff to work collaboratively with the Michi Saagiig Nations to continue to collaboratively work on their issues and concerns regarding OPG's application, with an aim to come to a consensus on key issues and a path forward related to OPG's licence application.

This adjustment would move Part 1 of the hearing to June, 2026 and Part 2 to October, 2026. Further, it is CNSC staff's understanding that the Michi Saagiig Nations will be providing their own separate letter to the Commission Registry outlining their concerns and preferred timeframe for the hearing schedule and their preferred approach to participation in the process.

Thank you for considering this request. Please do not hesitate to contact us should you require additional information or clarification.

Sincerely,

Adam Levine,
Director
Indigenous Engagement and Consultation Division
Canadian Nuclear Safety Commission



Fogler, Rubinoff LLP

Lawyers

Scotia Plaza

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Direct Dial: 416.864.7609
E-mail: kbabony@foglers.com

Our File No. 255245

18 December 2025

Candace Salmon
Commission Registrar
Legal and Commission Affairs Branch
Canadian Nuclear Safety Commission

Dear Candace:

Re: Response to 11 December 2025 Letter regarding OPG Pickering Nuclear Generating Station licence renewal and refurbishment application

Thank you for your letter and for providing Adam Levine's 10 December 2025 letter regarding delaying the above licencing hearing. Please find below the response from the Michi Saagiig Nations of the Williams Treaties First Nations - Alderville First Nation, Curve Lake First Nation, Hiawatha First Nation and the Mississaugas of Scugog Island First Nation (MS-WTFNs).

Consultation Record

As indicated in Adam Levine's letter, OPG's Pickering Nuclear Generating Station licence application (PNGS Application) is complex, now involving power reactor licence renewal (PROL), licence consolidation with the Pickering Waste Management Facility licence, refurbishment of the nuclear generating station, and decommissioning of four reactors. We would like to take this opportunity to provide some additional context to the letter and seek clarification of a few items.

CNSC staff wrote that engagement with the MS-WTFNs began September 2023 and that consultation was incorporated into monthly meetings and the 2024 Annual Workplan. While it is accurate that an application regarding PNGS was introduced at the end of 2023, it is important to note that the application was not the PNGS Application in its current form. MS-WTFNs were told that only the PROL would be in the application with a 2026 Q4 decision timeline.

The MS-WTFNs were originally told the Waste Facility Operating Licence renewal application would happen around 2027¹ and the decommissioning application timeline was between 2027-2028. The 2024 Workplan was also not comprehensive of the PNGS Application. It is not accurate that the MS-WTFNs have been engaged on the PNGS Application since September 2023. Can CNSC confirm when OPG and

¹ Draft OPG Pickering Indigenous Engagement Plan January 2023

CNSC first discussed the current application format and what communications had occurred with MS-WTFNs prior to the decision being made?

Just recently, the MS-WTFNs were informed by OPG that it had been delegated the procedural aspects of consultation by the Province. The MS-WTFNs were not included nor consulted in this delegation and such information creates issues regarding the Duty to Consult and Accommodate (DTCA). The Crown has had knowledge of this multifaceted application, in its various forms for more than two years, yet the MS-WTFNs were never told if the DTCA had been triggered and if so, at what level, nor were the MS-WTFNs part of a scoping analysis. Can the Crown provide the scoping analysis to the MS-WTFNs?

The MS-WTFNs wrote to the CNSC on 24 and 31 October 2025 requesting clarity on the Crown's DTCA position to prevent a repeat of the Darlington Nuclear Generation Station's PROL application process, where the Crown stated their position that the DTCA had not been triggered in their hearing submission yet never relayed that to the Nations in person. Adam Levine provided a response on 18 November 2025 stating that "*there is likely a Duty to Consult and Accommodate obligation to the Michi Saagiig Nations*".

Adam also stated there is a requirement to consider the United Declaration on the Rights of Indigenous People, including seeking the free, prior and informed consent (FPIC) of the MS-WTFNs. Given the information we received about the delegation of certain procedural aspects of the DTCA to OPG referenced above, the MS-WTFNs are concerned about inconsistencies in the Crown's interpretation of its duties to MS-WTFNs.

We thank Adam for his response though we are left with continued uncertainty. We are not clear what "likely triggered" means, what level of consultation is required, how the DTCA was scoped or how the CNSC intends to seek the MS-WTFN's FPIC. We would like to understand how CNSC sees its duties in this regard and how it anticipates discharging such duties – both in form and substance.

Three-month Delay Position

We have shared our consultation concerns with CNSC staff, but we need to clarify the CNSC's positioning around the three-month delay. Any postponement of OPG's PNGS Application hearing is a benefit to the Crown to remedy its deficient consultation and uphold its Honour. It is not an accommodation to the MS-WTFNs.

We also understand that both the CNSC and OPG require the extra time to ensure they are prepared for the hearings. We reject any inference that the Nations are causing any delay. The MS-WTFNs continue to be open and willing partners, and it is the Nations who are seeking consultation clarity to ensure the hearings proceed with certainty.

Yours truly,

FOGLER, RUBINOFF LLP



Kate Babony
KB

Curve Lake First Nation and Hiawatha First Nation- CNSC staff monthly meeting

December 18, 2025

Virtual

CNSC Attendees	First Nation Attendees
Ian Lindsay, ICED Stéphanie Bédard, ICED Jamie Bogden, ICED Rebecca D'Onofrio, ICED Daniel MacDonald, Senior Regulatory Program Officer, Pickering Regulatory Program Division	Curve Lake First Nation Paige Williams, Consultation Manager Lily Boggs, Consultation Energy Lead Hiawatha First Nation Tamara Whitby, Energy Lead Tom Cowie, Consultation / Lands and Resources Mike Howard, Consultation / Lands and Resources Francis Chua, Francis Chua Consulting Kayla Wright, Francis Chua Consulting

Agenda:

- Recent invites to CNSC Information Sessions in January: Regulatory Oversight Reports (RORs):
 - Wednesday January 7: Uranium and Nuclear Substance Processing Facilities ROR (2024): [Report here](#)
 - Tuesday January 13: Nuclear Power Generating Sites ROR (2024): [Report here](#)
 - Monday January 19: Canadian Nuclear Laboratories (CNL) ROR (2024): [Report here](#)
 - Commission meeting – week of March 23, 2026 to discuss the RORs
- Email: Independent Environmental Monitoring Program (IEMP) Campaign for 2026:
 - *BWXT Peterborough; Darlington Nuclear Generating Station; Port Hope Conversion Facility and Cameco Fuel Manufacturing; Port Hope Area Initiative*
 - Interest in the IEMP Team attending to discuss further at January 2026 meeting?
- BWXT Mid-Term Update – Commission hearing: week of May 25, 2026
 - Reminder: Participant Funding application due January 23
 - Interest in Project Officer attending to discuss further at a future meeting?
- Year-end recap of Workplan, carrying over of key items to 2026
 - Pickering
 - Port Hope
 - IEMP
 - Others

Melanson, Jamie (CNSC/CCSN)

From: Levine, Adam (CNSC/CCSN)
Sent: December 24, 2025 12:00 PM
To: tsimpson@alderville.ca
Cc: Babony, Kate; Emily Whetung-MacInnes <emily.whetung-macinnnes@opg.com>; Sara Irvine; Soo Chae; Geoffrey Mens; D'Onofrio, Rebecca (CNSC/CCSN); Bogden, Jamie (CNSC/CCSN); Registry / Greffe (CNSC/CCSN); Samson, Jude (CNSC/CCSN); Salmon, Candace (CNSC/CCSN); MacDonald, Daniel (CNSC/CCSN); Richardson, Ross (CNSC/CCSN); Julie Kapyrka; Stephanie Zilinski; Ceara Das; molsen@alderville.ca
Subject: Pickering Nuclear Generating Station – CNSC staff response to Michi Saagiig First Nations concerns
Attachments: Dec 24 2025 - CNSC Staff Letter to Alderville First Nation PNGS Project.pdf; Draft CNSC-Alderville First Nation PNGS Consultation Plan.docx; Letter to Registry- Pickering Hearing Dates.pdf

Hello Chief Simpson, hope that you are well!

We are writing to provide an update on OPG's Pickering Nuclear Generating Station (PNGS) application and clarification on several questions that emerged during our recent discussions with the Michi Saagiig Nations related to the application. We appreciate the constructive dialogue to date and value the continued collaboration on this file and others.

Attached you will also find our recent correspondence with the Commission Registry to recommend a 3-month delay to the Commission hearing dates for the PNGS application in order to allow more time for consultation and engagement with your Nation and the other Michi Saagiig Nations, as well as a draft consultation and engagement plan for your Nation's feedback and input.

We look forward to resuming consultation in the new year and to furthering our discussions at that time.

Kind regards and happy holidays!

Adam



24 December 2025

Chief Taynar Simpson
Alderville First Nation
Roseneath, ON
K0K 2X0

Dear Chief Taynar Simpson,

I hope this message finds you well. Canadian Nuclear Safety Commission (CNSC) staff are writing regarding concerns we have heard from the Michi Saagiig First Nations¹ (MSFNs) related to Ontario Power Generation's (OPG) Pickering Nuclear Generating Station (PNGS) licence application. OPG's application includes requested authorizations for a power reactor licence renewal, licence consolidation with the Pickering Waste Management Facility licence, refurbishment of the nuclear generating station, proposed decommissioning activities, and other administrative requests.

CNSC staff acknowledge the concerns and questions raised in the Michi Saagiig First Nations' December 18, 2025 letter addressed to the CNSC Registry concerning OPG's PNGS application. CNSC staff greatly appreciate your feedback and will address those in a separate correspondence to be sent shortly.

Scheduled Hearing Dates for OPG's Pickering Licence Application

During regular meetings with Curve Lake First Nation, and during the joint Michi Saagiig and CNSC Consultation Framework meeting held in person in the Mississaugas of Scugog Island First Nation community on November 18, 2025, CNSC staff heard concerns from the Michi Saagiig First Nations regarding the

¹ The Michi Saagiig Nations mentioned throughout the following document include Curve Lake First Nation, Hiawatha First Nation, Alderville First Nation, and the Mississaugas of Scugog Island First Nation.

current timelines for the PNGS public Commission hearing which is currently scheduled for April 2026 (Part 1) and June 2026 (Part 2).

The CNSC acknowledges the Michi Saagiig First Nations' concerns that these timelines present challenges for meaningful consultation with your Nation. CNSC staff understand that these challenges arise from the complex nature of OPG's licence application for the PNGS, as well as your involvement in other ongoing projects and consultation processes in your territory.

On December 10, 2025, in response to Michi Saagiig First Nations' concerns, CNSC staff formally recommended to the Commission Registry that the Commission consider delaying the PNGS Commission hearing by three months, providing more time for meaningful engagement and consultation with the Michi Saagiig First Nations in relation to OPG's licence application. This communication was provided to you by the CNSC's Commission Registrar on December 11, 2025.

PNGS Project Consultation Workplan

Building off of the engagement we have conducted to date on OPG's PNGS licence application, which began in 2023, we propose to co-develop a consultation workplan in partnership with the Michi Saagiig First Nations. This workplan would outline expectations, planned activities and timing, and preferred consultation methods tailored to each of the Michi Saagiig First Nations in relation to this project.

Please find enclosed a draft consultation workplan, which includes proposed activities for review and input. Please note that the timelines included in the workplan are subject to change based on the Commission's decision with respect to the timing of the hearing dates.

Defining Roles and Responsibilities for Consultation and Engagement During Licensing and CNSC Regulatory Review Processes

CNSC staff have also heard feedback regarding the need to clarify the roles and responsibilities of proponents/licensees and the CNSC with respect to consultation, engagement and accommodations. Below is a summary of roles and responsibilities surrounding consultation and engagement on a nuclear

project, as outlined in [CNSC REGDOC 3.2.2: Indigenous Engagement](#), and guided by CNSC's approach to [consultation and engagement](#) and the [principles of the United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#):

Proponents and Licensees:

- Identify and engage Indigenous Nations and communities, early and meaningfully, in relation to their project/licence application
- Provide clear and accessible information, including documents and reports, specific to the activities described in the licence application
- Identify activities and topics of interest, and support engagement opportunities where interests are identified
- Identify issues and concerns, and mitigate, offset, or accommodate potential impacts to Indigenous and or treaty rights or interests
- Provide information and reports to the CNSC on the Indigenous engagement activities undertaken, including elements of agreements with Indigenous Nations and communities, as they relate to mitigation measures and other forms of accommodations to address potential impacts to potential or established Indigenous and/or treaty rights and related interests in relation to their project/licence application
- Offer and hold discussions with Indigenous Nations and communities regarding technical aspects of the project, and respond to and address their concerns and document requests
- Seeking to secure the Free, Prior and Informed Consent (FPIC) of Indigenous Nations whose rights may be impacted by their project/licence application
- The engagement activities, including potential commitments, mitigations and accommodations measures proposed by the licensee, to address potential impacts on the rights of interests of Indigenous Nations and communities can be relied upon to support the CNSC in fulfilling its consultation obligations.

CNSC Staff:

- Identify and initiate consultation and engagement activities with Indigenous Nations and communities who are potentially impacted by a proposed project/licence application
- Collaborate with other federal, provincial and territorial departments and agencies in a whole-of-government approach to consultation and engagement as appropriate
- Provide information to Nations and communities regarding CNSC's regulatory process and how to participate and collaborate on developing a mutually agreeable approach to consultation and engagement, and work to appropriately mitigate, offset or accommodate impacted Nations, where appropriate
- Support Indigenous Nations and communities in leading their own FPIC process. Working with proponents/licensees in seeking the FPIC of Indigenous Nations whose rights may be impacted by the project/licence application
- Provide funding through the CNSC's funding programs to support Indigenous Nations in building capacity and meaningfully participating in CNSC regulatory processes
- Submit information and recommendations to the Commission with regards to consultation and engagement efforts to help inform their decision making with respect to the adequacy of consultation and upholding the honour of the Crown
- Engage and collaborate with Indigenous Nations throughout the lifecycle of facilities to build relationships, foster mutual understanding, and provide oversight of licence conditions and commitments.

CNSC Commission:

- Decision-maker under the [*Nuclear Safety and Control Act \(1997\)*](#). The CNSC Commission (the Commission) reviews evidence, submissions, and recommendations before making licensing decisions
- Conducts public hearings and considers all relevant information, including consultation outcomes and interventions from Indigenous Nations and communities, to ensure decisions are fair, transparent, and consistent with legal obligations

- As an agent of the Crown, based on all information submitted on the record as part of a Commission hearing process, the Commission determines the adequacy of consultation and engagement completed to date and whether those activities and outcomes satisfies the obligation of consultation and, where appropriate, accommodation of potentially impacted Indigenous Nations and communities.

Consultation and Engagement Activities Completed to Date for the PNGS Licence Application

CNSC Staff consultation and engagement:

CNSC Staff initiated early discussions, sharing available, preliminary information provided by OPG, in relation to OPG's PNGS licence application with the Michi Saagiig Nations in 2023 and 2024 during regular meetings to prepare for the anticipated licence application. Throughout the previous [Pickering licence extension](#) process in 2023 and 2024, staff provided ongoing updates on OPG's plans and addressed questions related to potential refurbishment of the PNGS. CNSC staff received a letter of intent from OPG about the upcoming PNGS licence application, in October 2024. Once this letter was received, CNSC staff shared information on the PNGS license application in monthly meetings with the Michi Saagiig First Nations. In April 2025, CNSC staff hosted an online joint meeting with the Michi Saagiig First Nations to share information on Pickering and the upcoming PNGS licence application.

Following CNSC's receipt of OPG's current application for the PNGS in June 2025, notifications were sent by CNSC staff in July 2025 to the Michi Saagiig First Nations, which included information on the Participant Funding opportunity to support participation in the regulatory review process including the Commission hearing.

A subsequent notice containing details on the hearing and participant funding opportunities was shared with the Nations on July 23, 2025. CNSC staff engaged and discussed directly with Alderville First Nation with regards to OPG's PNGS licence application during a meeting on December 10, 2025.

On November 18, 2025, CNSC staff attended the joint Michi Saagiig First Nations consultation framework meeting and had the opportunity to discuss the PNGS project and hear issues and concerns with regards to the licence application directly. The Michi Saagiig First Nations also received confirmation of their Participant Funding awards on November 18, 2025.

CNSC staff are committed to continuing to consult, engage and collaborate with the Michi Saagiig First Nations with regards to the PNGS licence application in order to work towards consensus on the project and address any concerns and potential impacts that the Nations have identified in relation to the Project. Please see the enclosed proposed consultation workplan for your Nation's feedback and input.

OPG Engagement:

In the licence renewal application for the PNGS and Pickering Waste Management Facility (PWMF), OPG reports ongoing engagement since 2023 with Indigenous Nations and communities, particularly with the Michi Saagiig First Nations. OPG reports having considered input by the Michi Saagiig First Nations to inform the development of a site-wide Indigenous Engagement Plan for the PNGS. Engagement activities outlined in OPG's application and related documentation include sharing draft licence materials, environmental and decommissioning plans, and conducting technical reviews, meetings, and workshops with the Michi Saagiig First Nations.

OPG acknowledges potential novel impacts from specific activities in the application, such as the deep-water intake construction, and reports they are

actively discussing commitments and accommodations with the Michi Saagiig First Nations to address concerns and potential impacts. OPG states they have provided capacity funding and collaborative forums to the Michi Saagiig First Nations in order to support their participation in project specific engagement.

In addition, OPG has outlined in their submissions to CNSC staff a number of commitments and accommodations to address the concerns and requests that the Michi Saagiig First Nations have identified to date in relation to the PNGS as well as the broader relationship with OPG. From CNSC staff's understanding, these include commitments and measures regarding collaboration on monitoring activities, updates to OPG's Environmental Risk Assessment for the PNGS, additional studies, collaboration on the identification of appropriate off-set measures in relation to the PNGS and other OPG facilities and projects in the Michi Saagiig First Nation's territories.

Perspectives of the Michi Saagiig First Nations:

CNSC staff invite your Nation and the other Michi Saagiig First Nations to share your perspectives on OPG's engagement to date and confirm whether you and your Nation are satisfied with OPG's commitments made to address = concerns raised to date. We also invite feedback on whether these commitments adequately respond to your Nation's interests or if additional measures and commitments from both OPG and the CNSC are needed to ensure your Nation's concerns are fully addressed with respect to the PNGS licence application.

Next steps:

As a next step, I would like to propose a leadership-level meeting between the Michi Saagiig First Nations and the CNSC in late January 2026, or as soon as possible. The CNSC is also open to including OPG leadership as part of the meeting should that be of interest to your Nation. This meeting would provide

an opportunity to align on priorities, clarify expectations, and strengthen collaboration on this licence application and other nuclear projects in your territory moving forward.

Some of the key topics we would appreciate your Nation's perspective on include:

- Identifying any outstanding information needs in relation to OPG's PNGS licence application
- Identifying any outstanding concerns your Nation may have in relation to the licence application
- Your Nation's thoughts, input and feedback with respect to the proposed consultation activities and steps outlined in the enclosed consultation workplan
- Your Nation's satisfaction or position with respect to OPG's commitments and engagement to date with respect to the PNGS facility and current licence application
- Identify if there are other additional specific mitigations, commitments or accommodations that would address any outstanding concerns and potential impacts in relation to the PNGS licence application
- Information and guidance with respect to your Nation's, and the Michi Saagiig First Nations' FPIC seeking process or protocols.

These points, and others can form part of the discussion with leadership, and we can work together on advancing the regulatory review and consultation process in a timely and meaningful way. The relationship with your Nation and all of the Michi Saagiig First Nations is a priority for the CNSC and we look forward to our ongoing work together on the PNGS licence application and other nuclear projects in your territory.

Sincerely,

X

Adam Levine
Director-Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission

Melanson, Jamie (CNSC/CCSN)

From: Levine, Adam (CNSC/CCSN)
Sent: December 24, 2025 11:48 AM
To: LaurieH@curvelake.ca
Cc: Francis M. Chua; kayla@francischua.com; Babony, Kate; Emily Whetung-MacInnes <emily.whetung-macInnes@opg.com>; Sara Irvine; Soo Chae; Geoffrey Mens; D'Onofrio, Rebecca (CNSC/CCSN); Bogden, Jamie (CNSC/CCSN); Registry / Greffe (CNSC/CCSN); Samson, Jude (CNSC/CCSN); Salmon, Candace (CNSC/CCSN); MacDonald, Daniel (CNSC/CCSN); Richardson, Ross (CNSC/CCSN); Paige Williams; lilyb@curvelake.ca
Subject: Pickering Nuclear Generating Station – CNSC staff response to Michi Saagiig First Nations concerns
Attachments: Dec 24 2025 - CNSC letter to Curve Lake First Nation PNGS Project.pdf; Draft CNSC - Curve Lake First Nation PNGS Consultation Plan.docx; Letter to Registry- Pickering Hearing Dates.pdf

Hello Chief Hockaday, hope that you are well!

We are writing to provide an update on OPG's Pickering Nuclear Generating Station (PNGS) application and clarification on several questions that emerged during our recent discussions with the Michi Saagiig Nations related to the application. We appreciate the constructive dialogue to date and value the continued collaboration on this file and others.

Attached you will also find our recent correspondence with the Commission Registry to recommend a 3-month delay to the Commission hearing dates for the PNGS application in order to allow more time for consultation and engagement with your Nation and the other Michi Saagiig Nations, as well as a draft consultation and engagement plan for your Nation's feedback and input.

We look forward to resuming consultation in the new year and to furthering our discussions at that time.

Kind regards and happy holidays!

Adam



24 December 2025

Chief Laurie Hockaday
Curve Lake First Nation
Curve Lake, ON
K0L1R0

Dear Chief Laurie Hockaday,

I hope this message finds you well. Canadian Nuclear Safety Commission (CNSC) staff are writing regarding concerns we have heard from the Michi Saagiig First Nations¹ (MSFNs) related to Ontario Power Generation's (OPG) Pickering Nuclear Generating Station (PNGS) licence application. OPG's application includes requested authorizations for a power reactor licence renewal, licence consolidation with the Pickering Waste Management Facility licence, refurbishment of the nuclear generating station, proposed decommissioning activities, and other administrative requests.

CNSC staff acknowledge the concerns and questions raised in the Michi Saagiig First Nations' December 18, 2025 letter addressed to the CNSC Registry concerning OPG's PNGS application. CNSC staff greatly appreciate your feedback and will address those in a separate correspondence to be sent shortly.

Scheduled Hearing Dates for OPG's Pickering Licence Application

During regular meetings with Curve Lake First Nation, and during the joint Michi Saagiig and CNSC Consultation Framework meeting held in person in the Mississaugas of Scugog Island First Nation community on November 18, 2025, CNSC staff heard concerns from the Michi Saagiig First Nations regarding the

¹ The Michi Saagiig Nations mentioned throughout the following document include Curve Lake First Nation, Hiawatha First Nation, Alderville First Nation, and the Mississaugas of Scugog Island First Nation.

current timelines for the PNGS public Commission hearing which is currently scheduled for April 2026 (Part 1) and June 2026 (Part 2).

The CNSC acknowledges the Michi Saagiig First Nations' concerns that these timelines present challenges for meaningful consultation with your Nation. CNSC staff understand that these challenges arise from the complex nature of OPG's licence application for the PNGS, as well as your involvement in other ongoing projects and consultation processes in your territory.

On December 10, 2025, in response to Michi Saagiig First Nations' concerns, CNSC staff formally recommended to the Commission Registry that the Commission consider delaying the PNGS Commission hearing by three months, providing more time for meaningful engagement and consultation with the Michi Saagiig First Nations in relation to OPG's licence application. This communication was provided to you by the CNSC's Commission Registrar on December 11, 2025.

PNGS Project Consultation Workplan

Building off of the engagement we have conducted to date on OPG's PNGS licence application, which began in 2023, we propose to co-develop a consultation workplan in partnership with the Michi Saagiig First Nations. This workplan would outline expectations, planned activities and timing, and preferred consultation methods tailored to each of the Michi Saagiig First Nations in relation to this project.

Please find enclosed a draft consultation workplan, which includes proposed activities for review and input. Please note that the timelines included in the workplan are subject to change based on the Commission's decision with respect to the timing of the hearing dates.

Defining Roles and Responsibilities for Consultation and Engagement During Licensing and CNSC Regulatory Review Processes

CNSC staff have also heard feedback regarding the need to clarify the roles and responsibilities of proponents/licensees and the CNSC with respect to consultation, engagement and accommodations. Below is a summary of roles and responsibilities surrounding consultation and engagement on a nuclear

project, as outlined in [CNSC REGDOC 3.2.2: Indigenous Engagement](#), and guided by CNSC's approach to [consultation and engagement](#) and the [principles of the United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#):

Proponents and Licensees:

- Identify and engage Indigenous Nations and communities, early and meaningfully, in relation to their project/licence application
- Provide clear and accessible information, including documents and reports, specific to the activities described in the licence application
- Identify activities and topics of interest, and support engagement opportunities where interests are identified
- Identify issues and concerns, and mitigate, offset, or accommodate potential impacts to Indigenous and or treaty rights or interests
- Provide information and reports to the CNSC on the Indigenous engagement activities undertaken, including elements of agreements with Indigenous Nations and communities, as they relate to mitigation measures and other forms of accommodations to address potential impacts to potential or established Indigenous and/or treaty rights and related interests in relation to their project/licence application
- Offer and hold discussions with Indigenous Nations and communities regarding technical aspects of the project, and respond to and address their concerns and document requests
- Seeking to secure the Free, Prior and Informed Consent (FPIC) of Indigenous Nations whose rights may be impacted by their project/licence application
- The engagement activities, including potential commitments, mitigations and accommodations measures proposed by the licensee, to address potential impacts on the rights of interests of Indigenous Nations and communities can be relied upon to support the CNSC in fulfilling its consultation obligations.

CNSC Staff:

- Identify and initiate consultation and engagement activities with Indigenous Nations and communities who are potentially impacted by a proposed project/licence application
- Collaborate with other federal, provincial and territorial departments and agencies in a whole-of-government approach to consultation and engagement as appropriate
- Provide information to Nations and communities regarding CNSC's regulatory process and how to participate and collaborate on developing a mutually agreeable approach to consultation and engagement, and work to appropriately mitigate, offset or accommodate impacted Nations, where appropriate
- Support Indigenous Nations and communities in leading their own FPIC process. Working with proponents/licensees in seeking the FPIC of Indigenous Nations whose rights may be impacted by the project/licence application
- Provide funding through the CNSC's funding programs to support Indigenous Nations in building capacity and meaningfully participating in CNSC regulatory processes
- Submit information and recommendations to the Commission with regards to consultation and engagement efforts to help inform their decision making with respect to the adequacy of consultation and upholding the honour of the Crown
- Engage and collaborate with Indigenous Nations throughout the lifecycle of facilities to build relationships, foster mutual understanding, and provide oversight of licence conditions and commitments.

CNSC Commission:

- Decision-maker under the [*Nuclear Safety and Control Act \(1997\)*](#). The CNSC Commission (the Commission) reviews evidence, submissions, and recommendations before making licensing decisions
- Conducts public hearings and considers all relevant information, including consultation outcomes and interventions from Indigenous Nations and communities, to ensure decisions are fair, transparent, and consistent with legal obligations

- As an agent of the Crown, based on all information submitted on the record as part of a Commission hearing process, the Commission determines the adequacy of consultation and engagement completed to date and whether those activities and outcomes satisfies the obligation of consultation and, where appropriate, accommodation of potentially impacted Indigenous Nations and communities.

Consultation and Engagement Activities Completed to Date for the PNGS Licence Application

CNSC Staff consultation and engagement:

CNSC Staff initiated early discussions, sharing available, preliminary information provided by OPG, in relation to OPG's PNGS licence application with the Michi Saagiig Nations in 2023 and 2024 during regular meetings to prepare for the anticipated licence application. Throughout the previous [Pickering licence extension](#) process in 2023 and 2024, staff provided ongoing updates on OPG's plans and addressed questions related to potential refurbishment of the PNGS. CNSC staff received a letter of intent from OPG about the upcoming PNGS licence application, in October 2024. Once this letter was received, CNSC staff shared information on the PNGS license application in monthly meetings with the Michi Saagiig First Nations. In April 2025, CNSC staff hosted an online joint meeting with the Michi Saagiig First Nations to share information on Pickering and the upcoming PNGS licence application.

Following CNSC's receipt of OPG's current application for the PNGS in June 2025, notifications were sent by CNSC staff in July 2025 to the Michi Saagiig First Nations, which included information on the Participant Funding opportunity to support participation in the regulatory review process including the Commission hearing.

A subsequent notice containing details on the hearing and participant funding opportunities was shared with the Nations on July 23, 2025. CNSC staff engaged and discussed directly with Curve Lake First Nation with regards to OPG's PNGS licence application during meetings on October 29, 2025, November 28, 2025 and December 18, 2025.

On November 18, 2025, CNSC staff attended the joint Michi Saagiig First Nations consultation framework meeting and had the opportunity to discuss the PNGS project and hear issues and concerns with regards to the licence application directly. The Michi Saagiig First Nations also received confirmation of their Participant Funding awards on November 18, 2025.

CNSC staff are committed to continuing to consult, engage and collaborate with the Michi Saagiig First Nations with regards to the PNGS licence application in order to work towards consensus on the project and address any concerns and potential impacts that the Nations have identified in relation to the Project. Please see the enclosed proposed consultation workplan for your Nation's feedback and input.

OPG Engagement:

In the licence renewal application for the PNGS and Pickering Waste Management Facility (PWMF), OPG reports ongoing engagement since 2023 with Indigenous Nations and communities, particularly with the Michi Saagiig First Nations. OPG reports having considered input by the Michi Saagiig First Nations to inform the development of a site-wide Indigenous Engagement Plan for the PNGS. Engagement activities outlined in OPG's application and related documentation include sharing draft licence materials, environmental and decommissioning plans, and conducting technical reviews, meetings, and workshops with the Michi Saagiig First Nations.

OPG acknowledges potential novel impacts from specific activities in the application, such as the deep-water intake construction, and reports they are actively discussing commitments and accommodations with the Michi Saagiig First Nations to address concerns and potential impacts. OPG states they have provided capacity funding and collaborative forums to the Michi Saagiig First Nations in order to support their participation in project specific engagement.

In addition, OPG has outlined in their submissions to CNSC staff a number of commitments and accommodations to address the concerns and requests that the Michi Saagiig First Nations have identified to date in relation to the PNGS as well as the broader relationship with OPG. From CNSC staff's understanding, these include commitments and measures regarding collaboration on monitoring activities, updates to OPG's Environmental Risk Assessment for the PNGS, additional studies, collaboration on the identification of appropriate off-set measures in relation to the PNGS and other OPG facilities and projects in the Michi Saagiig First Nation's territories.

Perspectives of the Michi Saagiig First Nations:

CNSC staff invite your Nation and the other Michi Saagiig First Nations to share your perspectives on OPG's engagement to date and confirm whether you and your Nation are satisfied with OPG's commitments made to address = concerns raised to date. We also invite feedback on whether these commitments adequately respond to your Nation's interests or if additional measures and commitments from both OPG and the CNSC are needed to ensure your Nation's concerns are fully addressed with respect to the PNGS licence application.

Next steps:

As a next step, I would like to propose a leadership-level meeting between the Michi Saagiig First Nations and the CNSC in late January 2026, or as soon as

possible. The CNSC is also open to including OPG leadership as part of the meeting should that be of interest to your Nation. This meeting would provide an opportunity to align on priorities, clarify expectations, and strengthen collaboration on this licence application and other nuclear projects in your territory moving forward.

Some of the key topics we would appreciate your Nation's perspective on include:

- Identifying any outstanding information needs in relation to OPG's PNGS licence application
- Identifying any outstanding concerns your Nation may have in relation to the licence application
- Your Nation's thoughts, input and feedback with respect to the proposed consultation activities and steps outlined in the enclosed consultation workplan
- Your Nation's satisfaction or position with respect to OPG's commitments and engagement to date with respect to the PNGS facility and current licence application
- Identify if there are other additional specific mitigations, commitments or accommodations that would address any outstanding concerns and potential impacts in relation to the PNGS licence application
- Information and guidance with respect to your Nation's, and the Michi Saagiig First Nations' FPIC seeking process or protocols.

These points, and others can form part of the discussion with leadership and we can work together on advancing the regulatory review and consultation process in a timely and meaningful way. The relationship with your Nation and all of the Michi Saagiig First Nations is a priority for the CNSC and we look forward to our ongoing work together on the PNGS licence application and other nuclear projects in your territory.

Sincerely,

X

Adam Levine

Director-Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission

Melanson, Jamie (CNSC/CCSN)

From: Levine, Adam (CNSC/CCSN)
Sent: December 24, 2025 11:37 AM
To: chiefcarr@hiawathafn.ca
Cc: sdavison; Tom Cowie; Francis M. Chua; kayla@francischua.com; Babony, Kate; Emily Whetung-MacInnes <emily.whetung-macinnnes@opg.com>; Sara Irvine; Soo Chae; Geoffrey Mens; D'Onofrio, Rebecca (CNSC/CCSN); Bogden, Jamie (CNSC/CCSN); Registry / Greffe (CNSC/CCSN); Samson, Jude (CNSC/CCSN); Salmon, Candace (CNSC/CCSN); MacDonald, Daniel (CNSC/CCSN); Richardson, Ross (CNSC/CCSN)
Subject: Pickering Nuclear Generating Station – CNSC staff response to Michi Saagiig First Nations concerns
Attachments: Letter to Registry- Pickering Hearing Dates.pdf; Draft CNSC-Hiawatha FN PNGS Consultation Plan.docx; Dec 24 2025 - CNSC staff letter to Hiawatha First Nation PNGS Project.pdf

Hello Chief Carr, hope that you are well!

We are writing to provide an update on OPG's Pickering Nuclear Generating Station (PNGS) application and clarification on several questions that emerged during our recent discussions with the Michi Saagiig Nations related to the application. We appreciate the constructive dialogue to date and value the continued collaboration on this file and others.

Attached you will also find our recent correspondence with the Commission Registry to recommend a 3-month delay to the Commission hearing dates for the PNGS application in order to allow more time for consultation and engagement with your Nation and the other Michi Saagiig Nations, as well as a draft consultation and engagement plan for your Nation's feedback and input.

We look forward to resuming consultation in the new year and to furthering our discussions at that time.

Kind regards and happy holidays!

Adam



24 December 2025

Chief Laurie Carr
Hiawatha First Nation
Hiawatha, ON
K9J 0E6

Dear Chief Laurie Carr,

I hope this message finds you well. Canadian Nuclear Safety Commission (CNSC) staff are writing regarding concerns we have heard from the Michi Saagiig First Nations¹ (MSFNs) related to Ontario Power Generation's (OPG) Pickering Nuclear Generating Station (PNGS) licence application. OPG's application includes requested authorizations for a power reactor licence renewal, licence consolidation with the Pickering Waste Management Facility licence, refurbishment of the nuclear generating station, proposed decommissioning activities, and other administrative requests.

CNSC staff acknowledge the concerns and questions raised in the Michi Saagiig First Nations' December 18, 2025 letter addressed to the CNSC Registry concerning OPG's PNGS application. CNSC staff greatly appreciate your feedback and will address those in a separate correspondence to be sent shortly.

Scheduled Hearing Dates for OPG's Pickering Licence Application

During regular meetings with Curve Lake First Nation, and during the joint Michi Saagiig and CNSC Consultation Framework meeting held in person in the Mississauga of Scugog Island First Nation community on November 18, 2025, CNSC staff heard concerns from the Michi Saagiig First Nations regarding the

¹ The Michi Saagiig Nations mentioned throughout the following document include Curve Lake First Nation, Hiawatha First Nation, Alderville First Nation, and the Mississauga of Scugog Island First Nation.

current timelines for the PNGS public Commission hearing which is currently scheduled for April 2026 (Part 1) and June 2026 (Part 2).

The CNSC acknowledges the Michi Saagiig First Nations' concerns that these timelines present challenges for meaningful consultation with your Nation. CNSC staff understand that these challenges arise from the complex nature of OPG's licence application for the PNGS, as well as your involvement in other ongoing projects and consultation processes in your territory.

On December 10, 2025, in response to Michi Saagiig First Nations' concerns, CNSC staff formally recommended to the Commission Registry that the Commission consider delaying the PNGS Commission hearing by three months, providing more time for meaningful engagement and consultation with the Michi Saagiig First Nations in relation to OPG's licence application. This communication was provided to you by the CNSC's Commission Registrar on December 11, 2025.

PNGS Project Consultation Workplan

Building off of the engagement we have conducted to date on OPG's PNGS licence application, which began in 2023, we propose to co-develop a consultation workplan in partnership with the Michi Saagiig First Nations. This workplan would outline expectations, planned activities and timing, and preferred consultation methods tailored to each of the Michi Saagiig First Nations in relation to this project.

Please find enclosed a draft consultation workplan, which includes proposed activities for review and input. Please note that the timelines included in the workplan are subject to change based on the Commission's decision with respect to the timing of the hearing dates.

Defining Roles and Responsibilities for Consultation and Engagement During Licensing and CNSC Regulatory Review Processes

CNSC staff have also heard feedback regarding the need to clarify the roles and responsibilities of proponents/licensees and the CNSC with respect to consultation, engagement and accommodations. Below is a summary of roles and responsibilities surrounding consultation and engagement on a nuclear

project, as outlined in [CNSC REGDOC 3.2.2: Indigenous Engagement](#), and guided by CNSC's approach to [consultation and engagement](#) and the [principles of the United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#):

Proponents and Licensees:

- Identify and engage Indigenous Nations and communities, early and meaningfully, in relation to their project/licence application
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- Identify activities and topics of interest, and support engagement opportunities where interests are identified
- Identify issues and concerns, and mitigate, offset, or accommodate potential impacts to Indigenous and or treaty rights or interests
- Provide information and reports to the CNSC on the Indigenous engagement activities undertaken, including elements of agreements with Indigenous Nations and communities, as they relate to mitigation measures and other forms of accommodations to address potential impacts to potential or established Indigenous and/or treaty rights and related interests in relation to their project/licence application
- Offer and hold discussions with Indigenous Nations and communities regarding technical aspects of the project, and respond to and address their concerns and document requests
- Seeking to secure the Free, Prior and Informed Consent (FPIC) of Indigenous Nations whose rights may be impacted by their project/licence application
- The engagement activities, including potential commitments, mitigations and accommodations measures proposed by the licensee, to address potential impacts on the rights of interests of Indigenous Nations and communities can be relied upon to support the CNSC in fulfilling its consultation obligations.

CNSC Staff:

- Identify and initiate consultation and engagement activities with Indigenous Nations and communities who are potentially impacted by a proposed project/licence application
- Collaborate with other federal, provincial and territorial departments and agencies in a whole-of-government approach to consultation and engagement as appropriate
- Provide information to Nations and communities regarding CNSC's regulatory process and how to participate and collaborate on developing a mutually agreeable approach to consultation and engagement, and work to appropriately mitigate, offset or accommodate impacted Nations, where appropriate
- Support Indigenous Nations and communities in leading their own FPIC process. Working with proponents/licensees in seeking the FPIC of Indigenous Nations whose rights may be impacted by the project/licence application
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Consultation and Engagement Activities Completed to Date for the PNGS Licence Application

CNSC Staff consultation and engagement:

CNSC Staff initiated early discussions, sharing available, preliminary information provided by OPG, in relation to OPG's PNGS licence application with the Michi Saagiig Nations in 2023 and 2024 during regular meetings to prepare for the anticipated licence application. Throughout the previous [Pickering licence extension](#) process in 2023 and 2024, staff provided ongoing updates on OPG's plans and addressed questions related to potential refurbishment of the PNGS. CNSC staff received a letter of intent from OPG about the upcoming PNGS licence application, in October 2024. Once this letter was received, CNSC staff shared information on the PNGS license application in monthly meetings with the Michi Saagiig First Nations. In April 2025, CNSC staff hosted an online joint meeting with the Michi Saagiig First Nations to share information on Pickering and the upcoming PNGS licence application.

Following CNSC's receipt of OPG's current application for the PNGS in June 2025, notifications were sent by CNSC staff in July 2025 to the Michi Saagiig First Nations, which included information on the Participant Funding opportunity to support participation in the regulatory review process including the Commission hearing.

A subsequent notice containing details on the hearing and participant funding opportunities was shared with the Nations on July 23, 2025. CNSC staff engaged and discussed directly with Hiawatha First Nation with regards to OPG's PNGS licence application during meetings on July 17, 2025, September 3 and 18, 2025, October 31, 2025 and December 18, 2025.

On November 18, 2025, CNSC staff attended the joint Michi Saagiig First Nations consultation framework meeting and had the opportunity to discuss the PNGS project and hear issues and concerns with regards to the licence application directly. The Michi Saagiig First Nations also received confirmation of their Participant Funding awards on November 18, 2025.

CNSC staff are committed to continuing to consult, engage and collaborate with the Michi Saagiig First Nations with regards to the PNGS licence application in order to work towards consensus on the project and address any concerns and potential impacts that the Nations have identified in relation to the Project. Please see the enclosed proposed consultation workplan for your Nation's feedback and input.

OPG Engagement:

In the licence renewal application for the PNGS and Pickering Waste Management Facility (PWMF), OPG reports ongoing engagement since 2023 with Indigenous Nations and communities, particularly with the Michi Saagiig First Nations. OPG reports having considered input by the Michi Saagiig First Nations to inform the development of a site-wide Indigenous Engagement Plan for the PNGS. Engagement activities outlined in OPG's application and related documentation include sharing draft licence materials, environmental and decommissioning plans, and conducting technical reviews, meetings, and workshops with the Michi Saagiig First Nations.

OPG acknowledges potential novel impacts from specific activities in the application, such as the deep-water intake construction, and reports they are actively discussing commitments and accommodations with the Michi Saagiig First Nations to address concerns and potential impacts. OPG states they have provided capacity funding and collaborative forums to the Michi Saagiig First Nations in order to support their participation in project specific engagement.

In addition, OPG has outlined in their submissions to CNSC staff a number of commitments and accommodations to address the concerns and requests that the Michi Saagiig First Nations have identified to date in relation to the PNGS as well as the broader relationship with OPG. From CNSC staff's understanding, these include commitments and measures regarding collaboration on monitoring activities, updates to OPG's Environmental Risk Assessment for the PNGS, additional studies, collaboration on the identification of appropriate off-set measures in relation to the PNGS and other OPG facilities and projects in the Michi Saagiig First Nation's territories.

Perspectives of the Michi Saagiig First Nations:

CNSC staff invite your Nation and the other Michi Saagiig First Nations to share your perspectives on OPG's engagement to date and confirm whether you and your Nation are satisfied with OPG's commitments made to address concerns raised to date. We also invite feedback on whether these commitments adequately respond to your Nation's interests or if additional measures and commitments from both OPG and the CNSC are needed to ensure your Nation's concerns are fully addressed with respect to the PNGS licence application.

Next steps:

As a next step, I would like to propose a leadership-level meeting between the Michi Saagiig First Nations and the CNSC in late January 2026, or as soon as

possible. The CNSC is also open to including OPG leadership as part of the meeting should that be of interest to your Nation. This meeting would provide an opportunity to align on priorities, clarify expectations, and strengthen collaboration on this licence application and other nuclear projects in your territory moving forward.

Some of the key topics we would appreciate your Nation's perspective on include:

- Identifying any outstanding information needs in relation to OPG's PNGS licence application
- Identifying any outstanding concerns your Nation may have in relation to the licence application
- Your Nation's thoughts, input and feedback with respect to the proposed consultation activities and steps outlined in the enclosed consultation workplan
- Your Nation's satisfaction or position with respect to OPG's commitments and engagement to date with respect to the PNGS facility and current licence application
- Identify if there are other additional specific mitigations, commitments or accommodations that would address any outstanding concerns and potential impacts in relation to the PNGS licence application
- Information and guidance with respect to your Nation's, and the Michi Saagiig First Nations' FPIC seeking process or protocols.

These points, and others can form part of the discussion with leadership and we can work together on advancing the regulatory review and consultation process in a timely and meaningful way. The relationship with your Nation and all of the Michi Saagiig First Nations is a priority for the CNSC and we look forward to our ongoing work together on the PNGS licence application and other nuclear projects in your territory.

Sincerely,

X

Adam Levine
Director-Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission

Melanson, Jamie (CNSC/CCSN)

From: Levine, Adam (CNSC/CCSN)
Sent: December 24, 2025 12:16 PM
To: klarocca@scugogfirstnation.com
Cc: Babony, Kate; Emily Whetung-MacInnes <emily.whetung-macinnnes@opg.com>; Sara Irvine; Soo Chae; Geoffrey Mens; D'Onofrio, Rebecca (CNSC/CCSN); Bogden, Jamie (CNSC/CCSN); Registry / Greffe (CNSC/CCSN); Samson, Jude (CNSC/CCSN); Salmon, Candace (CNSC/CCSN); MacDonald, Daniel (CNSC/CCSN); Richardson, Ross (CNSC/CCSN); Sam Shrubsole; Don Richardson; Rob Lukacs; Kayla Ponce de Leon; Finn Komai; Consultation
Subject: Pickering Nuclear Generating Station – CNSC staff response to Michi Saagiig First Nations concerns
Attachments: Dec 24 2025 CNSC Staff Letter to Mississaugas of Scugog Island First Nation PNGS Project.pdf; Draft CNSC-MSIFN PNGS Workplan.docx; Letter to Registry- Pickering Hearing Dates.pdf

Hello Chief LaRocca, hope that you are well!

We are writing to provide an update on OPG's Pickering Nuclear Generating Station (PNGS) application and clarification on several questions that emerged during our recent discussions with the Michi Saagiig Nations related to the application. We appreciate the constructive dialogue to date and value the continued collaboration on this file and others.

Attached you will also find our recent correspondence with the Commission Registry to recommend a 3-month delay to the Commission hearing dates for the PNGS application in order to allow more time for consultation and engagement with your Nation and the other Michi Saagiig Nations, as well as a draft consultation and engagement plan for your Nation's feedback and input.

We look forward to resuming consultation in the new year and to furthering our discussions at that time.

Kind regards and happy holidays!

Adam



24 December 2025

Chief Kelly LaRocca
Mississaugas of Scugog Island First Nation
Port Perry, ON
L9L 1A7

Dear Chief Kelly LaRocca,

I hope this message finds you well. Canadian Nuclear Safety Commission (CNSC) staff are writing regarding concerns we have heard from the Michi Saagiig First Nations¹ (MSFNs) related to Ontario Power Generation's (OPG) Pickering Nuclear Generating Station (PNGS) licence application. OPG's application includes requested authorizations for a power reactor licence renewal, licence consolidation with the Pickering Waste Management Facility licence, refurbishment of the nuclear generating station, proposed decommissioning activities, and other administrative requests.

CNSC staff acknowledge the concerns and questions raised in the Michi Saagiig First Nations' December 18, 2025 letter addressed to the CNSC Registry concerning OPG's PNGS application. CNSC staff greatly appreciate your feedback and will address those in a separate correspondence to be sent shortly.

Scheduled Hearing Dates for OPG's Pickering Licence Application

During regular meetings with Curve Lake First Nation, and during the joint Michi Saagiig and CNSC Consultation Framework meeting held in person in the Mississaugas of Scugog Island First Nation community on November 18, 2025, CNSC staff heard concerns from the Michi Saagiig First Nations regarding the

¹ The Michi Saagiig Nations mentioned throughout the following document include Curve Lake First Nation, Hiawatha First Nation, Alderville First Nation, and the Mississaugas of Scugog Island First Nation.

current timelines for the PNGS public Commission hearing which is currently scheduled for April 2026 (Part 1) and June 2026 (Part 2).

The CNSC acknowledges the Michi Saagiig First Nations' concerns that these timelines present challenges for meaningful consultation with your Nation. CNSC staff understand that these challenges arise from the complex nature of OPG's licence application for the PNGS, as well as your involvement in other ongoing projects and consultation processes in your territory.

On December 10, 2025, in response to Michi Saagiig First Nations' concerns, CNSC staff formally recommended to the Commission Registry that the Commission consider delaying the PNGS Commission hearing by three months, providing more time for meaningful engagement and consultation with the Michi Saagiig First Nations in relation to OPG's licence application. This communication was provided to you by the CNSC's Commission Registrar on December 11, 2025.

PNGS Project Consultation Workplan

Building off of the engagement we have conducted to date on OPG's PNGS licence application, which began in 2023, we propose to co-develop a consultation workplan in partnership with the Michi Saagiig First Nations. This workplan would outline expectations, planned activities and timing, and preferred consultation methods tailored to each of the Michi Saagiig First Nations in relation to this project.

Please find enclosed a draft consultation workplan, which includes proposed activities for review and input. Please note that the timelines included in the workplan are subject to change based on the Commission's decision with respect to the timing of the hearing dates.

Defining Roles and Responsibilities for Consultation and Engagement During Licensing and CNSC Regulatory Review Processes

CNSC staff have also heard feedback regarding the need to clarify the roles and responsibilities of proponents/licensees and the CNSC with respect to consultation, engagement and accommodations. Below is a summary of roles and responsibilities surrounding consultation and engagement on a nuclear

project, as outlined in [CNSC REGDOC 3.2.2: Indigenous Engagement](#), and guided by CNSC's approach to [consultation and engagement](#) and the [principles of the United Nations Declaration on the Rights of Indigenous Peoples \(UNDRIP\)](#):

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- Identify and engage Indigenous Nations and communities, early and meaningfully, in relation to their project/licence application
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CNSC Staff:

- Identify and initiate consultation and engagement activities with Indigenous Nations and communities who are potentially impacted by a proposed project/licence application
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Consultation and Engagement Activities Completed to Date for the PNGS Licence Application

CNSC Staff consultation and engagement:

CNSC Staff initiated early discussions, sharing available, preliminary information provided by OPG, in relation to OPG's PNGS licence application with the Michi Saagiig Nations in 2023 and 2024 during regular meetings to prepare for the anticipated licence application. Throughout the previous [Pickering licence extension](#) process in 2023 and 2024, staff provided ongoing updates on OPG's plans and addressed questions related to potential refurbishment of the PNGS. CNSC staff received a letter of intent from OPG about the upcoming PNGS licence application, in October 2024. Once this letter was received, CNSC staff shared information on the PNGS license application in monthly meetings with the Michi Saagiig First Nations. In April 2025, CNSC staff hosted an online joint meeting with the Michi Saagiig First Nations to share information on Pickering and the upcoming PNGS licence application.

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A subsequent notice containing details on the hearing and participant funding opportunities was shared with the Nations on July 23, 2025. CNSC staff engaged and discussed directly with Mississaugas of Scugog Island First Nation with regards to OPG's PNGS license application during meetings on July 8, 2025, September 24 2025, November 26, 2025.

On November 18, 2025, CNSC staff attended the joint Michi Saagiig First Nations consultation framework meeting and had the opportunity to discuss the PNGS project and hear issues and concerns with regards to the licence application directly. The Michi Saagiig First Nations also received confirmation of their Participant Funding awards on November 18, 2025.

CNSC staff are committed to continuing to consult, engage and collaborate with the Michi Saagiig First Nations with regards to the PNGS licence application in order to work towards consensus on the project and address any concerns and potential impacts that the Nations have identified in relation to the Project. Please see the enclosed proposed consultation workplan for your Nation's feedback and input.

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In the licence renewal application for the PNGS and Pickering Waste Management Facility (PWMF), OPG reports ongoing engagement since 2023 with Indigenous Nations and communities, particularly with the Michi Saagiig First Nations. OPG reports having considered input by the Michi Saagiig First Nations to inform the development of a site-wide Indigenous Engagement Plan for the PNGS. Engagement activities outlined in OPG's application and related documentation include sharing draft licence materials, environmental and decommissioning plans, and conducting technical reviews, meetings, and workshops with the Michi Saagiig First Nations.

OPG acknowledges potential novel impacts from specific activities in the application, such as the deep-water intake construction, and reports they are actively discussing commitments and accommodations with the Michi Saagiig First Nations to address concerns and potential impacts. OPG states they have provided capacity funding and collaborative forums to the Michi Saagiig First Nations in order to support their participation in project specific engagement.

In addition, OPG has outlined in their submissions to CNSC staff a number of commitments and accommodations to address the concerns and requests that the Michi Saagiig First Nations have identified to date in relation to the PNGS as well as the broader relationship with OPG. From CNSC staff's understanding, these include commitments and measures regarding collaboration on monitoring activities, updates to OPG's Environmental Risk Assessment for the PNGS, additional studies, collaboration on the identification of appropriate off-set measures in relation to the PNGS and other OPG facilities and projects in the Michi Saagiig First Nation's territories.

Perspectives of the Michi Saagiig First Nations:

CNSC staff invite your Nation and the other Michi Saagiig First Nations to share your perspectives on OPG's engagement to date and confirm whether you and your Nation are satisfied with OPG's commitments made to address = concerns raised to date. We also invite feedback on whether these commitments adequately respond to your Nation's interests or if additional measures and commitments from both OPG and the CNSC are needed to ensure your Nation's concerns are fully addressed with respect to the PNGS licence application.

Next steps:

As a next step, I would like to propose a leadership-level meeting between the Michi Saagiig First Nations and the CNSC in late January 2026, or as soon as

possible. The CNSC is also open to including OPG leadership as part of the meeting should that be of interest to your Nation. This meeting would provide an opportunity to align on priorities, clarify expectations, and strengthen collaboration on this licence application and other nuclear projects in your territory moving forward.

Some of the key topics we would appreciate your Nation's perspective on include:

- Identifying any outstanding information needs in relation to OPG's PNGS licence application
- Identifying any outstanding concerns your Nation may have in relation to the licence application
- Your Nation's thoughts, input and feedback with respect to the proposed consultation activities and steps outlined in the enclosed consultation workplan
- Your Nation's satisfaction or position with respect to OPG's commitments and engagement to date with respect to the PNGS facility and current licence application
- Identify if there are other additional specific mitigations, commitments or accommodations that would address any outstanding concerns and potential impacts in relation to the PNGS licence application
- Information and guidance with respect to your Nation's, and the Michi Saagiig First Nations' FPIC seeking process or protocols.

These points, and others can form part of the discussion with leadership and we can work together on advancing the regulatory review and consultation process in a timely and meaningful way. The relationship with your Nation and all of the Michi Saagiig First Nations is a priority for the CNSC and we look forward to our ongoing work together on the PNGS licence application and other nuclear projects in your territory.

Sincerely,

X

Adam Levine

Director-Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission

Curve Lake First Nation and Hiawatha First Nation – CNSC staff monthly meeting

January 15, 2026

Virtual

CNSC Attendees	First Nation Attendees
Jamie Bogden, ICED Stéphanie Bédard, ICED Rebecca D’Onofrio, ICED Daniel MacDonald, Senior Regulatory Program Officer, Pickering Regulatory Program Division David Szonyi, IEMP	Curve Lake First Nation Paige Williams, Consultation Manager Lily Boggs, Consultation Energy Lead Hiawatha First Nation Tamara Whitby, Energy Lead Tom Cowie, Consultation / Lands and Resources Mike Howard, Consultation / Lands and Resources Francis Chua, Francis Chua Consulting Kayla Wright, Francis Chua Consulting

Agenda:

- Presentation and discussion of CNSC’s Independent Environmental Program (IEMP) and the upcoming IEMP Sampling Campaign, and
- Continue our discussions on OPG’s PNGS and PWMF application.

AFN and CNSC Meeting

January 27, 2026

(Virtual, MS Teams)

<u>CNSC Attendees</u>	<u>AFN Attendees</u>
Keely McCavitt, Indigenous Consultation and Engagement Division (ICED) Stéphanie Bédard, ICED Rebecca D’Onofrio, ICED Jamie Bogden, ICED David Szonyi, IEMP Anne Laplante, Senior Policy Officer, Indigenous Stakeholder Capacity Fund Program Administrator	Julie Kapyrka, Consultation manager Stephanie Zilinski, Special Projects Consultant Matthew Olsen, Consultation Project Engagement Coordinator

Agenda

- 2026 Independent Environmental Monitoring Program – David Szonyi
- Pickering: Application for Authorization to Refurbish the Pickering Nuclear Generating Station and Renew its Pickering Nuclear Generating Station and Waste Management Facility licences – Jamie Bogden
- DNNP and applications anticipated for Feb/March 2026 – Keely McCavitt
- Next Steps



February 4, 2026

Kate Babony
Fogler, Rubinoff LLP
Toronto, ON
M5H 3Y2

Dear Kate Babony,

Thank you for your letter, received by the Canadian Nuclear Safety Commission Registrar on December 18, 2025. The Registry has shared your letter with CNSC staff to respond to some of the questions and concerns you identified.

As indicated in our letter sent to the Michi Saagiig First Nations on December 24, 2025, CNSC staff would appreciate the opportunity for a leadership meeting with the Michi Saagiig First Nations to further discuss concerns that have been raised in relation to the Pickering Nuclear Generating Station (PNGS) licence application and would be pleased to do so in late February 2026, should this be convenient for leadership.

A discussion between our leadership would ensure that we have adequately understood and answered all questions on the regulatory review process as outlined in your letter¹ and worked together to advance the consultation and engagement process in order to address any outstanding concerns with respect to OPG's licence application for the PNGS.

¹ October 24, 2025: Darlington Nuclear Generating Station Power Reactor Operating Licence Renewal Decision: Michi Saagiig Response

- October 31, 2025: Pickering Nuclear Generating Station Power Reactor Operating Licence and Pickering Waste Facility Operating Licence Renewal Application: Michi Saagiig Nations Consultation Process

- December 18, 2025: Response to 11 December 2025 Letter regarding OPG Pickering Nuclear Generating Station licence renewal and refurbishment application

Ontario Power Generation PNGS Application and Engagement Timeline

CNSC staff have been engaging and consulting with the Michi Saagiig First Nations for many years regarding the Pickering facility's ongoing operations and licensing activities.

In 2023, OPG submitted a feasibility study to the province and underwent the CNSC licensing process to extend operations of PNGS Units 5-8 to 2026. Throughout 2023 and 2024, CNSC staff provided updates to the Michi Saagiig First Nations in relation to activities and regulatory processes pertaining to the Pickering site, the operations extension, and the potential upcoming licensing application for the proposed refurbishment of the PNGS. Updates and early discussions on the proposed refurbishment were conducted as information was made available to CNSC staff by OPG throughout 2023 and 2024. In the June 2024 PNGS extension Commission hearing, OPG made note that they would, in the future, seek approvals for refurbishment of PNGS units 5-8 for continued operations.

Engagement and information sharing with the Michi Saagiig First Nations on the current PNGS application began once OPG submitted their letter of intent in October 2024, at which point CNSC staff became aware of the full extent of the activities that OPG was requesting.

OPG subsequently submitted their application to the CNSC on June 27, 2025, and a notification advising the Michi Saagiig First Nations of the receipt of the application was sent on July 4, 2025.

Duty to Consult Determination

As outlined in the CNSC letter sent to you and the Michi Saagiig First Nations on November 18, 2025, CNSC staff began its technical assessment after receiving OPG's application. As part of the assessment, staff review the application and, ultimately, draft a Commission Member Document (CMD). The CMD will include CNSC staff's assessment of the application and recommendations to help inform the Commission in making its licensing decision.

As part of the CNSC's standard procedures and practices, once the application was received, CNSC staff completed a preliminary analysis of whether the CNSC's

Duty to Consult and Accommodate obligations may be raised by the Commission decision on the licence application. CNSC staff's preliminary analysis for OPG's PNGS licence application concludes that the Duty to Consult and, where appropriate, Accommodate is raised for this licensing decision. The Williams Treaties First Nations, including the Michi Saagiig First Nations, are identified as rights-holding Nations and communities with established or asserted rights in the project area. CNSC staff found that activities included in OPG's application, including the proposed modification and operation of a deepwater intake system, have the potential to affect the exercise of rights related to fishing and harvesting around the lakebed.

CNSC staff's preliminary analysis on the Duty to Consult and Accommodate is reassessed as new information and perspectives are shared with the CNSC by Indigenous Nations and communities throughout the consultation and engagement process. These inputs help inform the CNSC's ongoing work to uphold the Honour of the Crown in every Commission decision and action. The preliminary analysis on the Duty to Consult informs CNSC staff's engagement and consultation activities with Indigenous Nations and communities, as well as their findings and recommendations provided to the Commission in the CMD. As part of the hearing, CNSC staff must demonstrate, to the Commission's satisfaction, that the Crown's duties have been fulfilled.

CNSC staff are proceeding with consultation activities with the Michi Saagiig First Nations and have provided the Michi Saagiig First Nations with a proposed consultation plan for input and feedback. The CNSC is committed to continuing to work with the Michi Saagiig First Nations to understand, address, and come to consensus on key specific issues and any identified impacts on the rights and interests of the Nations as they relate to the PNGS licence application.

Delegation of the Duty to Consult

As agent of the Crown, it is ultimately the CNSC that must uphold the Honour of the Crown. While the CNSC cannot delegate its Duty to Consult obligations, it can delegate procedural aspects of the consultation process to licensees and require that licensees complete certain engagement activities and uphold their engagement requirements for their licence applications and projects. This was outlined in the letters sent to you and the Michi Saagiig First Nations on December 24th, 2025 and as outlined in [REGDOC 3.2.2 - Indigenous Engagement](#).

The Commission can consider engagement activities undertaken by the proponent in their decision on adequacy of consultation.

To clarify, the Provincial Crown and the CNSC's consultation obligations and processes are distinct, and each operates under its own legislative framework, policies, and established processes. Should you need further clarification or information on the Province's Duty to Consult process and policies in general, and specifically in relation to the PNGS project, please contact David.Woodard@ontario.ca and Hilary.Ferguson@ontario.ca.

New Dates for Commission Hearing

CNSC staff acknowledge that the Michi Saagiig First Nations have not directly asked the Registry to postpone the PNGS hearing dates. This was requested proactively by CNSC staff to accommodate concerns CNSC staff heard in meetings and discussions with the Michi Saagiig First Nations that the current timelines would not provide an adequate opportunity for consultation by CNSC staff and engagement by OPG.

CNSC staff note that Indigenous Nations and communities were informed promptly of OPG's application, and Notices of Hearing and funding opportunities were issued within the mandated timeframes. All steps were completed within reasonable timelines that meet the CNSC's service standards and processes. The change of hearing dates was sought to ensure that the CNSC remains flexible and rigorous in our approach to consultation, and to ensure that feedback from Indigenous Nations and communities was meaningfully considered in the regulatory review and consultation process.


The Commission has accepted CNSC staff's recommendation to shift the hearing dates. A revised [Notice of Public Hearing](#) has been published, and any further updates regarding the proceeding will be posted on the CNSC's website. An update will also be shared directly with the Michi Saagiig First Nations.

CNSC staff hope this information answers some of the concerns and questions that were outlined in your letter of December 18, 2025 to the Commission Registrar. We look forward to hearing back regarding the proposed leadership meeting with the Michi Saagiig First Nations in late February. We're hopeful this meeting will offer an important opportunity to ensure that CNSC staff have

adequately addressed any outstanding questions or concerns that the Nations may have with respect to the PNGS licence application and regulatory review process and help advance our continued work together.

Yours sincerely,

x Levine,
Adam

 Digitally signed by Levine, Adam
DN: C=CA, O=GC, OU=CNSC-CCSN,
CN="Levine, Adam"
Reason: I am the author of this document
Location:
Date: 2026.02.04 10:33:36-05'00'
Foxit PDF Editor Version: 13.0.1

Adam Levine

Director - Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission
Ottawa, ON
K1P 1C2

CNSC–MSIFN Monthly Meeting

February 4, 2026 at 2pm

Virtual via MS teams

CNSC Attendees	MSIFN
<ul style="list-style-type: none">• Emily Janzen, Senior Policy Officer, Indigenous Consultation and Engagement Division (ICED)• Stephanie Bédard, Policy Officer, ICED• Jamie Bogden, Policy Officer, ICED• Doug Wylie, Team Lead, ICED (first 30 minutes)• David Szonyi, IEMP• Pete Peters, IEMP• Melissa Fabian Mendoza, ERAD• Daniel MacDonald, PRPD	<ul style="list-style-type: none">• Don Richardson, President and CEO, Minogi• Sam Shrubsole, Impact Assessment Team Lead, Minogi• Finn Komai, Ecology Project Coordinator, Minogi

Agenda

- Introducing our New Team lead, Doug Wylie, replacing Rebecca D’Onofrio who’s on Maternity leave
- 2026 Independent Environmental Monitoring Program
- Pickering
- DNNP and applications anticipated for Feb/March 2026
- Funding past March 2026
- Need to reschedule the February 25 meeting

Melanson, Jamie (CNSC/CCSN)

From: Bogden, Jamie (CNSC/CCSN)
Sent: February 17, 2026 12:11 PM
To: 'Julie Kapyrka'
Cc: Ceara Das; Stephanie Zilinski; Matthew Olsen
Subject: RE: Leadership Meeting to Discuss PNGS

Hi all,

Thank you so much for getting back to me about the March 10th date. I am just waiting to hear back from others to confirm the date and set a place.

I have gone ahead and secured that day in my VP's calendar; he is very much looking forward to joining. We will, as mentioned in our last meeting share this invitation with the Registrar as well. 😊

As soon as I hear back from the others I will send around a draft agenda so we can collaborate on it.

Looking forward to it!

Jamie Bogden (*she/her/elle*)

Policy Officer, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission
Jamie.bogden@cnscccsn.gc.ca

Agente en politiques, Division de la consultation et de la mobilisation des Autochtones
Commission canadienne de sûreté nucléaire
Jamie.bogden@cnscccsn.gc.ca

From: Julie Kapyrka <jkapyrka@alderville.ca>
Sent: February 5, 2026 1:32 PM
To: Bogden, Jamie (CNSC/CCSN) <jamie.bogden@cnscccsn.gc.ca>; Francis M. Chua <francis@francischua.com>; Kayla Wright <kayla@francischua.com>; Paige Williams <paigew@curvelake.ca>; Lily Boggs <lilyb@curvelake.ca>; Stephanie Zilinski <szilinski@alderville.ca>; Ceara Das <cdas@alderville.ca>; Matthew Olsen <molsen@alderville.ca>; Sean Davison <sdavison@hiawathafn.ca>; Don Richardson <drichardson@scugogfirstnation.ca>; Rob Lukacs <rlukacs@scugogfirstnation.ca>; Kayla Ponce de Leon <kponcedeleon@scugogfirstnation.ca>; Finn Komai <fkamai@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>
Cc: Bédard, Stéphanie (CNSC/CCSN) <stephanie.bedard@cnscccsn.gc.ca>; Janzen, Emily (CNSC/CCSN) <emily.janzen@cnscccsn.gc.ca>
Subject: RE: Leadership Meeting to Discuss PNGS

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Aaniin Jamie,

Chief Simpson is available that date and time.

Miigwech,

From: Bogden, Jamie (CNSC/CCSN) <jamie.bogden@cnscccsn.gc.ca>

Sent: Thursday, February 5, 2026 1:05 PM

To: Francis M. Chua <francis@francischua.com>; Kayla Wright <kayla@francischua.com>; Paige Williams <paigew@curvelake.ca>; Lily Boggs <lilyb@curvelake.ca>; Julie Kapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>; Ceara Das <cdas@alderville.ca>; Matthew Olsen <molsen@alderville.ca>; Sean Davison <sdavison@hiawathafn.ca>; Don Richardson <drichardson@scugogfirstnation.ca>; Rob Lukacs <rlukacs@scugogfirstnation.ca>; Kayla Ponce de Leon <kponcedeleon@scugogfirstnation.ca>; Finn Komai <fkamai@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>

Cc: Bédard, Stéphanie (CNSC/CCSN) <stephanie.bedard@cnscccsn.gc.ca>; Janzen, Emily (CNSC/CCSN) <emily.janzen@cnscccsn.gc.ca>

Subject: Leadership Meeting to Discuss PNGS

Hi all,

I hope you are all having a wonderful week so far!

It's been so great connecting with you and having the opportunity to discuss OPG's PNGS application. Through our correspondence and more recently through our monthly meetings, we've raised our request for a leadership-level meeting. I believe we are all aligned that this would be a valuable opportunity to ensure a shared understanding and alignment on the path forward for the PNGS licence application and next steps. It would also help clear up any miscommunications and provide a forum to address outstanding questions.

To that end, we would like to propose March 10 from 1:00–3:00 PM for this meeting. We have looked into this date and it shouldn't fall during March Break.

Please let us know if anyone would be willing to host the meeting. Once a date and format are confirmed, I would be happy to coordinate collaboration on an agenda. Our VP of Regulatory Affairs Branch and Chief Communications Officer for Canadian Nuclear Safety Commission, Colin Moses, is eager to participate in these discussions.

As there was some mention of holding a working-level discussion in advance, we would be happy to simultaneously coordinate a virtual meeting ahead of time to further discuss PNGS.

We look forward to your thoughts and to continuing these productive discussions.

Thank you,

Jamie Bogden

Curve Lake First Nation and Hiawatha First Nation – CNSC staff monthly meeting

February 19, 2026

Virtual

CNSC Attendees	First Nation Attendees	DFO
Jamie Bogden, Indigenous Consultation Engagement Division (ICED) Stéphanie Bédard, Indigenous Consultation Engagement Division (ICED) Daniel MacDonald, Senior Regulatory Program Officer, Pickering Regulatory Program Division	Curve Lake First Nation Paige Williams, Consultation Manager Lily Boggs, Consultation Energy Lead Hiawatha First Nation Tamara Whitby, Energy Lead Francis Chua, Francis Chua Consulting Kayla Wright, Francis Chua Consulting	Elyjah Schimmens

Agenda:

- Consultation Discussion on OPG's PNGS & PWMF application and DFO review process for the DWI
- TOR Workplan Activities for 2026
- Leadership meeting planning
- PHCF – Check interest for our Project Lead (Erin Cotnam-Bent) and Project Officer (Mike Jones) to join at the next meeting

AFN and CNSC Meeting

February 24, 2026

(Virtual, MS Teams)

<u>CNSC Attendees</u>	<u>AFN Attendees</u>
Emily Janzen, Indigenous Consultation and Engagement Division (ICED) Stéphanie Bédard, ICED Michael Coy, Funding Anne Laplante, Funding Daniel MacDonald, Erin Cotnam-Bent, ICED Mike Jones, Senior Project Officer, Nuclear Processing Facilities Division (NPFDD)	Julie Kapyrka, Consultation manager Stephanie Zilinski, Special Projects Consultant Matthew Olsen, Consultation Project Engagement Coordinator

Agenda

- Pickering Nuclear Generating Station: Renewal, Refurbishment and Decommissioning – review the PNGS consultation plan (attached) sent over by Adam Levine on December 24th, 2025
- Port Hope Conversion Facility (PHCF) licence renewal application
- DNNP and applications anticipated
 - Request for in-person hearing for DNNP LTC amendment
- If needed: touch base on funding

CNSC–MSIFN Monthly Meeting

March 3, 2026 at 11 am

Virtual via MS teams

CNSC Attendees	MSIFN
Emily Janzen, Indigenous Consultation and Engagement Division (ICED) Jamie Bogden, ICED Daniel MacDonald, Pickering Regulatory Program Division Erin Cotnam-Bent, ICED Mike Jones, Nuclear Processing Facilities Division (NPF) Valerie Weisflock, NPF	Don Richardson, President and CEO, Minogi Sam Shrubsole, Impact Assessment Team Lead, Minogi Finn Komai, Ecology Project Coordinator, Minogi

Agenda

- Pickering Nuclear Generating Station: Renewal, Refurbishment and Decommissioning – Jamie/Dan
 - Touch base on the PNGS consultation plan sent over by Adam Levine on December 24th, 2025
- Port Hope Conversion Facility (PHCF) project – Erin/Mike/Valerie
 - Notification letter sent to MSIFN on February 13 (attached to the meeting invite)
- DNNP and applications anticipated
- Touch base on funding and 2026 Stream 3 application, if needed
- Next meeting: March 25 – looking to reschedule as it's during the ROR Commission Meetings

Melanson, Jamie (CNSC/CCSN)

From: Bogden, Jamie (CNSC/CCSN)
Sent: March 9, 2026 5:58 PM
To: 'Julie Kapyrka'; Sam Shrubsole; klarocca@scugogfirstnation.com; Taynar Simpson; Chief Laurie Carr; LaurieH@curvelake.ca; Francis M. Chua; cathy.richards; Kayla Wright; paigew; lilyb; Stephanie Zilinski; Ceara Das; Matthew Olsen; Sean Davison; Tom Cowie; Don Richardson; Rob Lukacs; Kayla Ponce de Leon; Finn Komai; Consultation; Tamara Whitby; TiffanyTA@curvelake.ca; Mike Howard; Wylie, Doug (CNSC/CCSN); MacDonald, Daniel (CNSC/CCSN); Richardson, Ross (CNSC/CCSN); Bédard, Stéphanie (CNSC/CCSN); Levine, Adam (CNSC/CCSN); Moses, Colin (CNSC/CCSN)
Cc: Salmon, Candace (CNSC/CCSN); Janzen, Emily (CNSC/CCSN)
Subject: RE: Virtual Michi Saagiig First Nations/CNSC Leadership Meeting

Hi,

Thank you so much for clarifying Sam, and for informing us of Alderville's preference Julie.

I completely understand. We had made a few edits to the agenda in efforts to simplify and streamline it, given the limited time we have together tomorrow. The intention was not to remove or deprioritize any topics, and we fully expected and intend to speak to all items that were originally identified.

The ordering we proposed was simply meant to help ground the discussion: starting with a shared understanding of the application in front of the Commission, the current status and next steps from the CNSC's regulatory oversight perspective. We had thought this might be helpful to participants before moving into the discussion of concerns and issues from MSFN. We recognize that this is the heart of the conversation, and the agenda was adjusted only to ensure we begin with helpful context to support our dialogue.

That said, we are of course happy to keep the agenda as you have both outlined, and I will be sure to update it accordingly in our invitation.

Have a great evening,
Jamie

From: Julie Kapyrka <jkapyrka@alderville.ca>
Sent: March 9, 2026 3:38 PM
To: Sam Shrubsole <sshubsole@scugogfirstnation.ca>; Bogden, Jamie (CNSC/CCSN) <jamie.bogden@cnscccsn.gc.ca>; klarocca@scugogfirstnation.com; Taynar Simpson <tsimpson@alderville.ca>; Chief Laurie Carr <chiefcarr@hiawathafn.ca>; LaurieH@curvelake.ca; Francis M. Chua <francis@francischua.com>; cathy.richards <cathy.richards@msifn.ca>; Kayla Wright <kayla@francischua.com>; paigew <paigew@curvelake.ca>; lilyb <lilyb@curvelake.ca>; Stephanie Zilinski <szilinski@alderville.ca>; Ceara Das <cdas@alderville.ca>; Matthew Olsen <molsen@alderville.ca>; Sean Davison <sdavison@hiawathafn.ca>; Tom Cowie <tcowie@hiawathafn.ca>; Don Richardson <drichardson@scugogfirstnation.ca>; Rob Lukacs <rlukacs@scugogfirstnation.ca>; Kayla Ponce de Leon <kponcedeleon@scugogfirstnation.ca>; Finn Komai <fkamai@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>; Tamara Whitby <tamara.whitby@hiawathafn.ca>; TiffanyTA@curvelake.ca; Mike Howard <dcdc@hiawathafn.ca>; Wylie, Doug (CNSC/CCSN) <doug.wylie@cnscccsn.gc.ca>; MacDonald, Daniel (CNSC/CCSN) <daniel.macdonald@cnscccsn.gc.ca>; Richardson, Ross (CNSC/CCSN) <Ross.Richardson@cnscccsn.gc.ca>;

Bédard, Stéphanie (CNSC/CCSN) <stephanie.bedard@cnscccsn.gc.ca>; Levine, Adam (CNSC/CCSN) <Adam.Levine@cnscccsn.gc.ca>; Moses, Colin (CNSC/CCSN) <Colin.Moses@cnscccsn.gc.ca>

Cc: Salmon, Candace (CNSC/CCSN) <candace.salmon@cnscccsn.gc.ca>; Janzen, Emily (CNSC/CCSN) <emily.janzen@cnscccsn.gc.ca>

Subject: RE: Virtual Michi Saagiig First Nations/CNSC Leadership Meeting

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Aaniin Jamie,

We support the agenda as follows:

1. Welcome and introductions
2. Confirm meeting purpose and agenda
3. Discussion of concerns and issues
4. Progress update on process improvements
5. What we heard: Listening tour outcomes
6. CNSC overview of the PNGS licence application, regulatory process, and revised hearing timeline
 - a. Letters that have been shared recently
 - b. Funding
7. Key actions before the hearing
8. Upcoming licence renewals 2026
9. Review of action items and next steps leading up to the hearing
10. Closing remarks

It is important to Alderville First Nation to bring our concerns and issues to the top of the agenda, so that we have time to work through them.

We are equally perplexed that this part of the agenda: “CNSC overview of the PNGS licence application, regulatory process, and revised hearing timeline” has been changed to “Perspectives and questions from the Michi Saagiig First Nations on the PNGS application.” We concur with MSIFN that this was not included in the original agenda and does not provide enough time to prepare for such a discussion.

Please honour the agenda that is provided above.

Miigwehn

Dr. Julie Kapyrka
Consultation Manager



Alderville First Nation
11696 Second Line Rd.
Roseneath, ON K0K 2X0

From: Sam Shrubsole <sshrubsole@scugogfirstnation.ca>

Sent: Monday, March 9, 2026 3:10 PM

To: Bogden, Jamie (CNSC/CCSN) <jamie.bogden@cnsccsn.gc.ca>; klarocca@scugogfirstnation.com; Taynar Simpson <tsimpson@alderville.ca>; Chief Laurie Carr <chiefcarr@hiawathafn.ca>; LaurieH@curvelake.ca; Francis M. Chua <francis@francischua.com>; cathy.richards <cathy.richards@msifn.ca>; Kayla Wright <kayla@francischua.com>; paigew <paigew@curvelake.ca>; lilyb <lilyb@curvelake.ca>; Julie Kapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>; Ceara Das <cdas@alderville.ca>; Matthew Olsen <molsen@alderville.ca>; Sean Davison <sdavison@hiawathafn.ca>; Tom Cowie <tcowie@hiawathafn.ca>; Don Richardson <drichardson@scugogfirstnation.ca>; Rob Lukacs <rlukacs@scugogfirstnation.ca>; Kayla Ponce de Leon <kponcedeleon@scugogfirstnation.ca>; Finn Komai <fkomai@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>; Tamara Whitby <tamara.whitby@hiawathafn.ca>; TiffanyTA@curvelake.ca; Mike Howard <dcdc@hiawathafn.ca>; Wylie, Doug (CNSC/CCSN) <doug.wylie@cnsccsn.gc.ca>; MacDonald, Daniel (CNSC/CCSN) <daniel.macdonald@cnsccsn.gc.ca>; Richardson, Ross (CNSC/CCSN) <Ross.Richardson@cnsccsn.gc.ca>; Bédard, Stéphanie (CNSC/CCSN) <stephanie.bedard@cnsccsn.gc.ca>; Levine, Adam (CNSC/CCSN) <Adam.Levine@cnsccsn.gc.ca>; Moses, Colin (CNSC/CCSN) <Colin.Moses@cnsccsn.gc.ca>

Cc: Salmon, Candace (CNSC/CCSN) <candace.salmon@cnsccsn.gc.ca>; Janzen, Emily (CNSC/CCSN) <emily.janzen@cnsccsn.gc.ca>

Subject: Re: Virtual Michi Saagiig First Nations/CNSC Leadership Meeting

Hi Jamie,

The agenda you proposed unfortunately ignores the request from the communities to centre agenda item #3 - "Discussion of concerns and issues". Our request to move this to the top of the agenda is because this is what is driving both the CNSC and Michi Saagiig leadership to attend the meeting, and the concepts discussed here would be woven throughout the meeting.

The rest of the agenda I suggested was unchanged from the most recent agenda proposed by CNSC (with the exception of removing the RIA discussion). Knowing the meeting is tomorrow, I am unclear on the rationale for moving things around and further changing topics. For example, "CNSC overview of the PNGS licence application, regulatory process, and revised hearing timeline" has been changed to "Perspectives and questions from the Michi Saagiig First Nations on the PNGS application." This was not included in the original agenda and does not provide enough time to prepare for such a discussion.

From MSIFN's perspective, it is important that we proceed with the proposed agenda below. Otherwise, we will not be able to move forward with the meeting at this time.

1. Welcome and introductions
2. Confirm meeting purpose and agenda
3. Discussion of concerns and issues
4. Progress update on process improvements
5. What we heard: Listening tour outcomes
6. CNSC overview of the PNGS licence application, regulatory process, and revised hearing timeline
 - a. Letters that have been shared recently
 - b. Funding
7. Key actions before the hearing
8. Upcoming licence renewals 2026

9. Review of action items and next steps leading up to the hearing
10. Closing remarks

Thank you,
Sam

Samantha Shrubsole

Impact Assessment Team Lead

sshrubsole@scugogfirstnation.ca

samantha.shrubsole@minogi.ca

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Minogi Corp.

Mississaugas of Scugog Island First Nation



MINOGI

GROW WELL

From: Bogden, Jamie (CNSC/CCSN) <jamie.bogden@cnscccsn.gc.ca>

Sent: Monday, March 9, 2026 2:28 PM

To: Sam Shrubsole <sshrubsole@scugogfirstnation.ca>; klarocca@scugogfirstnation.com <klarocca@scugogfirstnation.com>; tsimpson@alderville.ca <tsimpson@alderville.ca>; Chief Laurie Carr <chiefcarr@hiawathafn.ca>; LaurieH@curvelake.ca <laurieh@curvelake.ca>; Francis M. Chua <francis@francischua.com>; cathy.richards <cathy.richards@msifn.ca>; Kayla Wright <kayla@francischua.com>; paigew <paigew@curvelake.ca>; lilyb <lilyb@curvelake.ca>; Julie Kapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>; Ceara Das <cdas@alderville.ca>; Matthew Olsen <molsen@alderville.ca>; Sean Davison <sdavison@hiawathafn.ca>; Tom Cowie <tcowie@hiawathafn.ca>; Don Richardson <drichardson@scugogfirstnation.ca>; Rob Lukacs <rlukacs@scugogfirstnation.ca>; Kayla Ponce de Leon <kponcedeleon@scugogfirstnation.ca>; Finn Komai <fkamai@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>; Tamara Whitby <tamara.whitby@hiawathafn.ca>; TiffanyTA@curvelake.ca <tiffanyta@curvelake.ca>; Mike Howard <dcdc@hiawathafn.ca>; Wylie, Doug (CNSC/CCSN) <doug.wylie@cnscccsn.gc.ca>; MacDonald, Daniel (CNSC/CCSN) <daniel.macdonald@cnscccsn.gc.ca>; Richardson, Ross (CNSC/CCSN) <Ross.Richardson@cnscccsn.gc.ca>; Bédard, Stéphanie (CNSC/CCSN) <stephanie.bedard@cnscccsn.gc.ca>; Levine, Adam (CNSC/CCSN) <Adam.Levine@cnscccsn.gc.ca>; Moses, Colin (CNSC/CCSN) <Colin.Moses@cnscccsn.gc.ca>
Cc: Salmon, Candace (CNSC/CCSN) <candace.salmon@cnscccsn.gc.ca>; Janzen, Emily (CNSC/CCSN)

[<emily.janzen@cnscccsn.gc.ca>](mailto:emily.janzen@cnscccsn.gc.ca)

Subject: RE: Virtual Michi Saagiig First Nations/CNSC Leadership Meeting

Hi Sam,

Perfect timing! I was just working on the agenda as well and have proposed this revised version, which I believe addresses your feedback.

Please let me know if this approach works for you!

1. Welcome and introductions
2. Overview of Ontario Power Generation's (OPG) Pickering Nuclear Generating Station (PNGS) licence application, current status and next steps
3. Perspectives and questions from the Michi Saagiig First Nations on the PNGS application
4. Next steps and actions on the PNGS licence application
5. Other items requested by the Michi Saagiig First Nations
 1. CNSC update on progress and actions taken by the CNSC based on feedback and requests from the Michi Saagiig First Nations
 2. What we heard: CNSC Listening tour updates and next steps
 3. Upcoming licence renewals 2026
6. Closing

Thank you for your help with this,

We're looking forward to the meeting and our discussion tomorrow.

From: Sam Shrubsole <sshrubsole@scugogfirstnation.ca>

Sent: March 9, 2026 2:04 PM

To: Bogden, Jamie (CNSC/CCSN) <jamie.bogden@cnscccsn.gc.ca>; klarocca@scugogfirstnation.com; tsimpson@alderville.ca; Chief Laurie Carr <chiefcarr@hiawathafn.ca>; LaurieH@curvelake.ca; Francis M. Chua <francis@francischua.com>; cathy.richards <cathy.richards@msifn.ca>; Kayla Wright <kayla@francischua.com>; paigew <paigew@curvelake.ca>; lilyb <lilyb@curvelake.ca>; Julie Kapyrka <jkapyrka@alderville.ca>; Stephanie Zilinski <szilinski@alderville.ca>; Ceara Das <cdas@alderville.ca>; Matthew Olsen <molsen@alderville.ca>; Sean Davison <sdavison@hiawathafn.ca>; Tom Cowie <tcowie@hiawathafn.ca>; Don Richardson <drichardson@scugogfirstnation.ca>; Rob Lukacs <rlukacs@scugogfirstnation.ca>; Kayla Ponce de Leon <kponcedeleon@scugogfirstnation.ca>; Finn Komai <fkamai@scugogfirstnation.ca>; Consultation <consultation@scugogfirstnation.com>; Tamara Whitby <tamara.whitby@hiawathafn.ca>; TiffanyTA@curvelake.ca; Mike Howard <dcdc@hiawathafn.ca>; Wylie, Doug (CNSC/CCSN) <doug.wylie@cnscccsn.gc.ca>; MacDonald, Daniel (CNSC/CCSN) <daniel.macdonald@cnscccsn.gc.ca>; Richardson, Ross (CNSC/CCSN) <Ross.Richardson@cnscccsn.gc.ca>; Bédard, Stéphanie (CNSC/CCSN) <stephanie.bedard@cnscccsn.gc.ca>; Levine, Adam (CNSC/CCSN) <Adam.Levine@cnscccsn.gc.ca>

ccsn.gc.ca>; Moses, Colin (CNSC/CCSN) <Colin.Moses@cnscccsn.gc.ca>

Cc: Salmon, Candace (CNSC/CCSN) <candace.salmon@cnscccsn.gc.ca>; Janzen, Emily (CNSC/CCSN) <emily.janzen@cnscccsn.gc.ca>

Subject: Re: Virtual Michi Saagiig First Nations/CNSC Leadership Meeting

EXTERNAL EMAIL – USE CAUTION / COURRIEL EXTERNE – FAITES PREUVE DE PRUDENCE

Hi Jamie,

Ahead of tomorrow's meeting, I would like to request two small changes to the agenda:

1. Shift "Discussion of concerns and issues" up to #3 on the agenda rather than #7, and
2. Remove discussion of a "Rights Impact Assessment" with CNSC

The proposed new agenda would be:

1. Welcome and introductions
2. Confirm meeting purpose and agenda
3. Discussion of concerns and issues
4. Progress update on process improvements
5. What we heard: Listening tour outcomes
6. CNSC overview of the PNGS licence application, regulatory process, and revised hearing timeline
 1. Letters that have been shared recently
 2. Funding
7. Key actions before the hearing
8. Upcoming licence renewals 2026
9. Review of action items and next steps leading up to the hearing
10. Closing remarks

These change were confirmed with the other community representatives prior to sharing. Please let me know if you have any questions.

Thank you!

Sam

Samantha Shrubsole

Impact Assessment Team Lead

sshrubsole@scugogfirstnation.ca

samantha.shrubsole@minogi.ca

C: 289-260-9392

Minogi Corp.

Mississaugas of Scugog Island First Nation



From:

Sent: Monday, March 2, 2026 9:25 AM

Subject: Virtual Michi Saagiig First Nations/CNSC Leadership Meeting

Hi all,

Here is our invitation for the upcoming virtual leadership meeting to discuss Ontario Power Generation's current Pickering application and provide an opportunity to discuss at the leadership-level.

The finalized, agenda will be attached as soon as it is confirmed.

Please feel free to reach out if you have any questions in the meantime. I look forward to meeting with you.

Warm regards,
Jamie

Microsoft Teams meeting

Join:

<https://teams.microsoft.com/meet/24879740646470?p=bzpncvOsc2zzWcXUCh>

Meeting ID: 248 797 406 464 70

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.....

Réunion Microsoft Teams

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<https://teams.microsoft.com/meet/24879740646470?p=bzpncvOsc2zzWcXUCh>

Numéro de réunion : 248 797 406 464 70

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Pour les organisateurs : [Options de réunion](#) | [Réinitialiser le code d'appel](#)

Melanson, Jamie (CNSC/CCSN)

From: Bédard, Stéphanie (CNSC/CCSN)
Sent: March 26, 2026 1:42 PM
To: Julie Kapyrka; Ceara Das; Matthew Olsen; Paige Williams; Consultation Lead; Consultation Energy Lead; Francis M. Chua; Kayla Wright; Mike Howard; Sean Davison; Tom Cowie; Tamara Whitby; Don Richardson; Sam Shrubsole; Rob Lukacs; Finn Komai; Kayla Ponce de Leon; consultation@scugogfirstnation.com; bfnconsultation@chimnissing.ca; tori.monague@chimnissing.ca; danamonague@chimnissing.ca; Jane.copegog@chimnissing.ca; jl.porte@georginaisland.com; consultation@ramafirstnation.ca; dbickell@ramafirstnation.ca
Cc: Bogden, Jamie (CNSC/CCSN); Bédard, Stéphanie (CNSC/CCSN)
Subject: Invitation to Register for PNGS and PWMF Webinar/ Invitation à s'inscrire au webinaire de CNP et IGDP

(Le Français suit)

Hi everyone,

We are pleased to invite you to CNSC's public webinar on OPG's Pickering Nuclear Generating Station (PNGS) and Pickering Waste Management Facility (PWMF) application. This session will provide updates and information about the application and offer an opportunity to ask questions.

To participate, **registration is required**. Please use the links below to register for the session in your preferred language.

English Session



Wednesday, April 15, 2026



1:30 p.m. – 3:00 p.m. (ET)



Register here: [Microsoft Virtual Events Powered by Teams](#)

French Session



Thursday, April 16, 2026



10:30 a.m. – 12:00 p.m. (ET)



Register here: [Microsoft Virtual Events Powered by Teams](#)

Please feel free to share this invitation with others who may be interested in attending.

If you have any questions in advance of the sessions, please don't hesitate to reach out.

We look forward to your participation.


Kind regards,


Bonjour,

Nous avons le plaisir de vous inviter au webinaire public de la CCSN concernant la demande d'OPG pour la centrale nucléaire de Pickering (CNP) et l'installation de gestion des déchets de Pickering (IGDP). Cette séance fournira des mises à jour et de l'information sur la demande, et offrira l'occasion de poser des questions.

Pour participer, **l'inscription est obligatoire**. Veuillez utiliser les liens ci-dessous pour vous inscrire à la séance dans la langue de votre choix.

Séance en anglais


 **Mercredi 15 avril 2026**

 **13 h 30 à 15 h (HE)**

 **Inscription :** [*Microsoft Virtual Events Powered by Teams*](#)

Séance en français

 **Jeudi 16 avril 2026**

 **10 h 30 à 12 h (HE)**

 **Inscription :** [*Microsoft Virtual Events Powered by Teams*](#)

N'hésitez pas à partager cette invitation avec toute personne qui pourrait être intéressée.

Si vous avez des questions avant les séances, n'hésitez pas à communiquer avec nous.

Au plaisir de votre participation.

Cordialement,

Stéphanie Bédard (She, Elle, Her)

Agente des politiques / Policy Officer
Indigenous Consultation and Engagement Division /
Division de la consultation et la mobilisation des Autochtones
Strategic Planning Directorate | Direction de la planification stratégique
Canadian Nuclear Safety Commission | Commission Canadienne de sûreté nucléaire
Government of Canada / Gouvernement du Canada



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Please respond to this email in the official language of your choice. | Veuillez répondre à ce courriel dans la langue officielle de votre choix.

Melanson, Jamie (CNSC/CCSN)

From: Bédard, Stéphanie (CNSC/CCSN)
Sent: March 26, 2026 2:22 PM
To: Peter Graham; Lonny Bomberry
Cc: MacDonald, Jane (CNSC/CCSN); Bogden, Jamie (CNSC/CCSN)
Subject: Invitation to Register for PNGS and PWF Webinar/ Invitation à s'inscrire au webinaire de CNP et IGDP

(Le Français suit)

Hi Peter and Lonny,

We are pleased to invite you to CNSC's public webinar on OPG's Pickering Nuclear Generating Station (PNGS) and Pickering Waste Management Facility (PWF) application. This session will provide updates and information about the application and offer an opportunity to ask questions.

To participate, **registration is required**. Please use the links below to register for the session in your preferred language.

English Session



Wednesday, April 15, 2026



1:30 p.m. – 3:00 p.m. (ET)



Register here: [Microsoft Virtual Events Powered by Teams](#)

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We look forward to your participation.

Kind regards,


Bonjour,

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Si vous avez des questions avant les séances, n'hésitez pas à communiquer avec nous.

Au plaisir de votre participation.

Cordialement,

Stéphanie Bédard (She, Elle, Her)

Agente des politiques / Policy Officer

Indigenous Consultation and Engagement Division /

Division de la consultation et la mobilisation des Autochtones

Strategic Planning Directorate | Direction de la planification stratégique

Canadian Nuclear Safety Commission | Commission Canadienne de sûreté nucléaire

Government of Canada / Gouvernement du Canada



**Canadian Nuclear
Safety Commission**

**Commission canadienne
de sûreté nucléaire**

Please respond to this email in the official language of your choice. | Veuillez répondre à ce courriel dans la langue officielle de votre choix.

CNSC–MSIFN Monthly Meeting

April 8, 2026 at 2 pm

Virtual via MS teams

CNSC Attendees	MSIFN	DFO
Emily Janzen, Indigenous Consultation and Engagement Division (ICED) Stéphanie Bédard, ICED Doug Wylie, ICED Jamie Bogden, ICED Erin Cotnam-Bent, ICED Jane MacDonald, ICED Daniel MacDonald, Pickering Regulatory Program Division Aya El-Merhi, Darlington Regulatory Program Division (DRPD) Nina Abonasara, DRPD	Don Richardson, President and CEO, Minogi Sam Shrubsole, Impact Assessment Team Lead, Minogi Finn Komai, Ecology Project Coordinator, Minogi Brian Morrison, Senior ecology coordinator	Elyjah Schimmers, Regulatory Review Biologist

Agenda

- BWXT Mid-Term Review
Darlington Nuclear Generating Station Integrated Implementation Plan (IIP)
- Darlington New Nuclear Project (DNNP)
- Pickering Nuclear Generating Station (PNGS)
 - Department of Fisheries and Oceans (DFO) to attend to discuss Deep Water Intake (DWI)



April 14, 2026

Our file

[MMTJHLOZZ9AL-831168269-2070](#)

Dr. Don Richardson
President and CEO
Minogi Corp. (Representing Mississaugas of Scugog Island First Nation)
Mississaugas of Scugog Island First Nation
Port Perry, Ontario
L9L 1B6

Dear Dr. Richardson,

Thank you for your thoughtful and detailed email sent on March 13, 2026, and for continuing the respectful dialogue we've been having. We appreciate the time you've taken to clearly articulate MSIFN's concerns and suggestions, particularly in light of the recent Darlington Nuclear Generating Station (DNGS) relicensing experience. Your feedback is important to us and will help inform how the CNSC continues to evolve its approach.

I want to begin by acknowledging MSIFN's view that, based on the DNGS relicensing experience, there is a disconnect between the CNSC's commitments under the UN Declaration, UNDA, and Canada's Policy for Radioactive Waste and Decommissioning, and how those commitments are being operationalized in practice for regulatory decisions. We understand that this experience has resulted in dissatisfaction in CNSC regulatory processes, particularly for decisions related to radioactive waste, cumulative effects, and decommissioning.

While CNSC staff cannot revisit or alter previous Commission decisions, we do take seriously the feedback we receive from Nations, and we want to work collaboratively to continue to clarify and improve our approach to consultation, engagement and implementation of the UN Declaration.

Darlington Relicensing and Ongoing Oversight

With respect to DNGS specifically, CNSC staff are focused on ensuring that the Michi Saagiig Nations are meaningfully involved in ongoing operations and regulatory oversight at Darlington, particularly in areas such as waste

management, decommissioning and environmental monitoring. This is reflected in Licence Condition G.7, which requires Ontario Power Generation (OPG) to provide opportunities for two-way dialogue and collaboration in relation to these areas of work at the DNGS. CNSC staff view this as a positive step forward, and we are committed to working with the Michi Saagiig Nations to shape how this involvement occurs in practice moving forward.

Cumulative Effects and Historical / Legacy Concerns

We acknowledge MSIFN's concerns regarding cumulative effects and historical and legacy waste issues and understand how important these concerns are to the Nation. With respect to our regulatory process, cumulative effects are considered at the outset of a proposed project and revisited as new applications are brought forward through the CNSC's licensing and environmental protection framework. Throughout the Darlington New Nuclear Project (DNNP) regulatory and consultation process, CNSC staff have sought feedback from the Michi Saagiig Nations on cumulative effects on rights, and have worked to reflect historical, cumulative, and legacy contexts in submissions to the Commission. We also continue to offer funding and support to the Michi Saagiig Nations to undertake a Cumulative Effects Assessment and/or an Indigenous Knowledge study and remain committed to working with the Michi Saagiig Nations on how the results of these studies, when shared with the CNSC and OPG, should be incorporated into regulatory oversight and future decision-making processes in the territory.

We also acknowledge that addressing legacy issues remains an important matter that requires continued discussion within the CNSC and with relevant partners and authorities. These discussions would involve those who may have the mandate, authorities and powers to identify and commit to mitigations and accommodations to address the concerns identified by the Michi Saagiig Nations related to legacy, historic and cumulative impacts from nuclear development and projects in Michi Saagiig Nation territory.

The CNSC remains committed to a one-window and coordinated approach to finding meaningful ways to acknowledge and address historical and legacy concerns. This includes advancing work with the Nations and helping to identify and coordinate with the appropriate partners and authorities – such as Natural Resources Canada and other federal entities, OPG, the Province of Ontario and

others as appropriate – to seek solutions to address the concerns the Nations are raising.

Recent CNSC Enhancements to Policy, Engagement, and Consultation

The CNSC is committed to making changes and enhancements to its policies, approaches and processes with respect to consultation, engagement and advancing the implementation of the UN Declaration in our work with Indigenous Nations and communities. Current and planned steps in this regard include:

- Working towards revisions and updates to REGDOC-3.2.2: *Indigenous Engagement*, to strengthen expectations for clear, consistent, and meaningful Indigenous engagement and consultation by CNSC licensees, aligned with the principles of the UN Declaration and applied across the nuclear industry.
- Launched policy and listening tour discussions with the Michi Saagiig Nations, and other Nations the CNSC works with, throughout 2025 to improve alignment between CNSC policies, the UNDA, and the expectations of Indigenous Nations and communities. These discussions will inform updates to CNSC practices and result in a publicly available *What We Heard Report* and a set of guiding principles for future engagement.
- Enhancing Commission hearing processes to be more culturally inclusive and respectful, including adjustments to hearing layouts and schedules, and collaboration with Nations to incorporate cultural practices such as opening and closing prayers or smudging ceremonies, where requested.
- Expanding Indigenous involvement in ongoing regulation and oversight, including:
 - establishing licence conditions related to Indigenous engagement and involvement;
 - collaboration with Nations on CNSC oversight and monitoring programs such as the Independent Environmental Monitoring Program (IEMP); and
 - incorporating Indigenous Knowledge, when shared by Nations and they give permission for the CNSC to reflect the information into CNSC oversight and reporting, including Environmental Protection

Review Reports for facilities such as BWXT and the Darlington Nuclear Generating Station.

We remain committed to continuing to work collaboratively with MSIFN and other Indigenous Nations to identify a constructive path forward to making additional improvements and changes to the CNSC processes, policies and procedures.

Responses to Suggested Improvements

1. Clarifying how Free, Prior and Informed Consent (FPIC) will be operationalized

The CNSC's current approach is to support Indigenous Nations in leading and defining their own FPIC processes, while working to ensure that those processes are respected and meaningfully reflected in regulatory engagement. Our website, [UN Declaration on the Rights of Indigenous Peoples and the CNSC](#), provides the following information on how FPIC is put into practice:

The CNSC works directly with Indigenous Nations and communities to:

- *seek FPIC when rights and interests may be affected by nuclear projects*
- *collaborate to understand FPIC processes and ensure positions are communicated*
- *adjust consultation activities to reflect Indigenous perspectives, laws, knowledge and practices*
- *develop and carry out solutions together to address concerns*

The CNSC adjusts its processes and expects licensees to:

- *adapt procedures based on Indigenous protocols, cultures, laws and requests*
- *follow CNSC guidance that is clear and up to date*
- *collaborate with impacted Indigenous Nations and communities to address concerns*
- *build partnerships and work towards agreements that support seeking and obtaining FPIC*

These practices help ensure FPIC is respected in regulatory decisions, and that Indigenous Nations and communities are active partners throughout the process.

The question of how FPIC is weighed in a Commission decision rests with the Commission tribunal itself. CNSC staff cannot predetermine or speak to the Commission's deliberations in any given proceeding, which is a core pillar in maintaining the independence of the Commission and its decision-making authority. CNSC staff outside of the Commission Registry have no knowledge of or role in the deliberation process. The CNSC is committed to continuing dialogue with Nations about how transparency around FPIC-related processes and expectations can be improved.

2. Project-specific capacity funding

CNSC staff acknowledge the challenges faced by MSIFN, and other Michi Saagiig Nations, around capacity, including the pressures that CNSC's current funding model may place on the Nations. The CNSC initially awarded funding to MSIFN under its Participant Funding Program (PFP) for the Darlington licence renewal funding opportunity in September 2024. Further, CNSC staff were responsive to additional funding requests from MSIFN in March 2025 to help cover additional activities in relation to the DNGS Commission hearing and awarded additional PFP funding in April 2025. The CNSC remains dedicated to continuing to provide funding to support MSIFN's meaningful participation in its regulatory processes and are currently reviewing options to improve the CNSC's funding programs based on feedback from MSIFN and the other Michi Saagiig Nations, including options to provide funding earlier for Commission proceedings, where possible.

The CNSC's Capacity Fund was developed to help Indigenous Nations and communities, as well as interested parties, gain the capacity to engage in the CNSC's regulatory processes prior to and throughout the lifecycle of nuclear facilities and activities in Canada in a variety of ways, including internal resource support to assist Nations in engaging with the CNSC. This funding has been offered to MSIFN through multiple streams, including resource support funding to hire an internal resource for Nations to help manage the work and relationship with the CNSC. The Capacity Fund remains a potential solution to ease some of the challenges faced in relation to funding, capacity building, and helps mitigate gaps in project specific funding. The Capacity Fund also provides

flexibility as it does not depend on project timelines and enables CNSC staff to collaborate with Nations in the determination of priority initiatives and activities that are funded on an annual basis. CNSC staff are available to assist and engage in discussions on how this funding can be further utilized to align with the priorities and funding needs of MSIFN.

3. Integrate historical waste issues into the licensing analysis

As noted in our response to MSIFN regarding *Canada's Policy for Radioactive Waste Management and Decommissioning*, the CNSC acknowledges that some radioactive waste in Canada is located within Indigenous traditional and treaty territories, and that this waste may have been created and stored without prior engagement or consultation. We recognize the importance of addressing these impacts collaboratively with Indigenous Nations, Natural Resources Canada (NRCan), provincial authorities, and proponents.

As discussed above, consistent with Commission direction and current jurisprudence, the legal duty to consult is understood to apply to potential impacts flowing from a current proposed decision, rather than to historical impacts alone.


CNSC staff agree that historical and legacy waste issues provide important context for understanding cumulative effects and present-day concerns when a proposed project or licence application may raise the duty to consult and accommodate (i.e., the potential for new adverse impacts on the exercise of rights). The CNSC sees value in continued dialogue with Nations on appropriate mechanisms to acknowledge and address these issues alongside licensing decisions, within the CNSC's mandate, and in collaboration with Federal and other partners that may have a role in identifying and working on solutions to the concerns raised with respect to historic and legacy impacts, such as NRCan and other federal entities, OPG and the Province of Ontario, as appropriate.

In closing, we want to acknowledge that although significant work has been done to reflect, address and incorporate many of the issues you raise, including the UN Declaration, FPIC, cumulative effects, and historical impacts in the CNSC's regulatory and consultation processes, there remains a lot of work that we can do together to further advance these key areas of policy and practice as part of the CNSC regulatory processes and framework. Advancing this work

meaningfully requires collaboration, trust, and ongoing dialogue with MSIFN and other Indigenous Nations. We remain committed to listening, learning, and working with you to improve how our regulatory framework is applied in practice and find practical and meaningful solutions to the concerns and requests that you have raised on behalf of MSIFN. We are also committed to having more regular leadership meetings, as discussed in the March 10, 2026, leadership meeting, so that we may continue to collaborate on and advance practical and sustainable solutions to the concerns and requests raised.

Thank you again for raising these concerns so clearly. We welcome continued discussion and would appreciate the opportunity to keep working through these issues together.

Thank you,

X **Levine,
Adam**  Digitally signed by Levine, Adam
DN: C=CA, O=GC, OU=CNCS-CCSN,
CN="Levine, Adam"
Reason: I am the author of this document
Location:
Date: 2026.04.14 16:30:34-04'00'
Foxit PDF Editor Version: 13.0.1

Adam Levine
Director, Indigenous Consultation and Engagement Division
Canadian Nuclear Safety Commission
adam.levine@cnsc-ccsn.gc.ca | 613-462-5159

c.c.:/c.c.:

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NRCan: Emma Anderson, Andrew Marriott, Pui Wai Yuen

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Finn Komai, fkamai@scugogfirstnation.ca

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Tamara Whitby, tamara.whitby@hiawathafn.ca



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Canada

Pickering Nuclear Generating Station (NGS) & Waste Management Facility (WMF)

OPG's licence application to refurbish Pickering NGS units 5-8
and renew the NGS and WMF operating licences

Pickering Regulatory Program Division (PRPD)

Contents

- The CNSC
- Pickering Nuclear Site Activities
- OPG's Application
- Consultation and Engagement
- CNSC Public Hearing Timeline



The Canadian Nuclear Safety Commission (CNSC)

Canadian Nuclear Safety Commission

Our Mandate



REGULATE

the use of **nuclear energy** and **materials** to **protect health, safety and security**, and the **environment**



IMPLEMENT

Canada's international commitments on the **peaceful use of nuclear energy**



DISSEMINATE

objective scientific, technical, and regulatory information to the public

75 years of regulatory experience

Canadian Nuclear Safety Commission

The Commission Tribunal



**TIMOTHY
BERUBE,
PhD**



**ANDREA
HARDIE**



**JERRY
HOPWOOD**



**MARCEL
LACROIX,
PhD**



**Dr.
Alexander
McEwan**



**VICTORIA H.
REMENDA,
PhD**



**PIERRE
TREMBLAY**

TRANSPARENT, SCIENCE-BASED DECISION MAKING

Quasi-judicial administrative tribunal
Agent of the Crown (Duty to Consult)
Reports to Parliament through Minister
of Natural Resources

Members are independent and part-time
Commission hearings are public and Webcast
Staff presentations are public
Decisions are reviewable by Federal Court

Canadian Nuclear Safety Commission

CNSC Staff

- Implement Commission decisions
- Develop regulatory requirements, recommendations, and guidance for the Commission
- Verify and enforce licensee compliance
- Engage the public and Indigenous Nations and communities



Pickering Nuclear Site

Pickering NGS

- 8 CANDU power reactor units – 516 MW of electricity each
- Units 1-4 are permanently shut down
- Units 5-8 are authorized to operate until the end of 2026
- 10-year operating licence valid until 2028



Pickering WMF

- 2 phases (Phase I and Phase II) located on the Pickering Site
- Stores nuclear waste produced at the Pickering NGS, including:
 - Used nuclear fuel in dry storage (high-level waste)
 - Components from past retube activities (intermediate-level waste)
- Separate 10-year operating licence valid until 2028



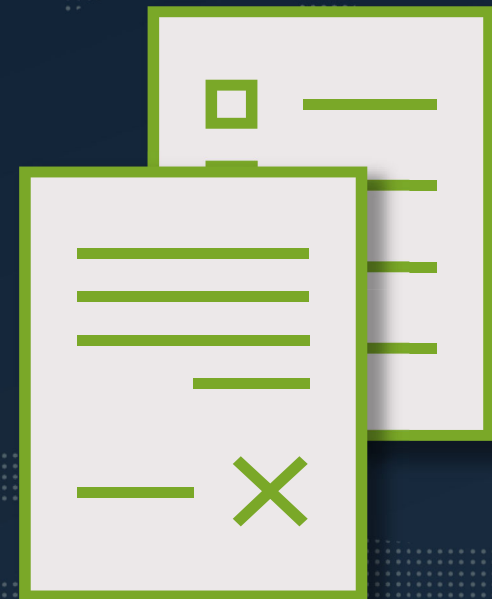
Decommissioning Units 1-4

- Units 2 and 3 have been in safe storage since 2010
- Units 1 & 4 shut down in 2024 and are now defueled and de-watered and are transitioning to safe storage
- In June 2025, CNSC staff accepted, with comments and conditions, OPG's limited scope detailed decommissioning plan (DDP)
 - DDP scope limited to removal of non-nuclear buildings and equipment
 - This work has started and will continue during the next licensing period
 - The DDP is required to be updated every 5 years

OPG's Application

OPG's Application

- On June 27, 2025, OPG applied for:
 - Authorization to refurbish Pickering NGS units 5-8 and continue operations
 - Renewal of the NGS and WMF operating licences for a 10-year licence period
 - Consolidation of the NGS and WMF licences into a single operating licence



Supporting Documentation



- Predictive Environmental Risk Assessment
 - Evaluates the environmental risks associated with the planned activities at the Pickering site, including refurbishment, operations, and decommissioning
- Climate Change Resilience Assessment
 - Identifies climate change-related hazards that may impact the Pickering NGS in the future

Proposed Refurbishment Project (1/3)

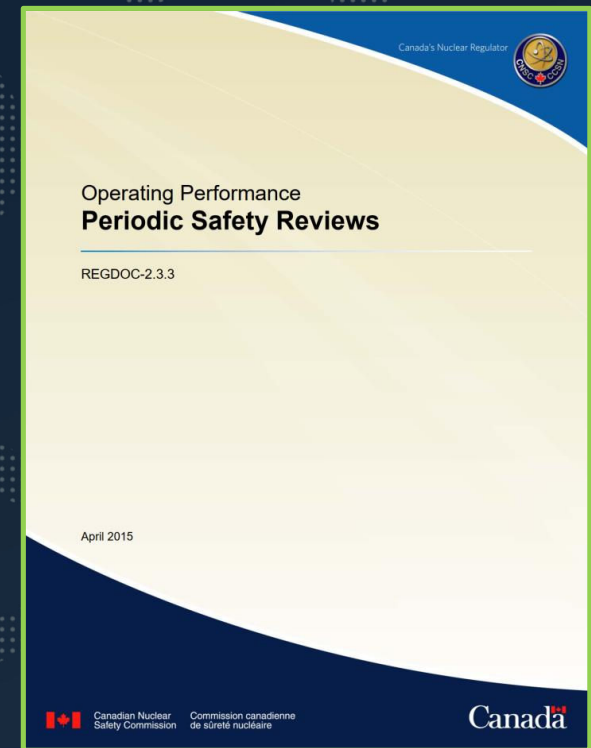
- Refurbishment planned between 2027 and 2034
- All units will be shut down before the end of 2026
 - Staggered return to service following refurbishment
- The major refurbishment scope includes:
 - **Retube** – Replace fuel channels and calandria tubes
 - **Feeders** – Replace feeder piping and other primary heat transport system repairs and updates
 - **Steam generators** – Replace all steam generators, which will be removed through an opening created in the containment dome
 - **Deep-water intake** – New coolant intake that will draw water from deep in the lake to improve thermal efficiency, decrease impacts to fish, and enhance resilience to climate change

Proposed Refurbishment Project (2/3)

- Further planned refurbishment scope includes:
 - Turbine generator system overhauls and upgrades
 - Digital control computer upgrades
 - Replacement of standby generators
 - Addition of a new containment filtered venting system
 - Installation of a shield tank overpressure protection system
 - Inspections, repairs, and replacement of civil structures and components

Proposed Refurbishment Project (3/3)

- Periodic Safety Review (PSR)
 - A comprehensive review of the plant design, condition, and operational programs against modern codes and standards to identify additional safety enhancements
 - 15 safety factor reports submitted and reviewed by CNSC staff
 - OPG has committed to complete the remaining PSR deliverables in 2027 and to implement the safety enhancements during the proposed licence period



CNSC Staff Regulatory Oversight

- During the proposed refurbishment, CNSC staff would continue to provide regulatory oversight
- On-site CNSC inspectors conduct inspections, surveillance and monitoring activities, and follow-up on events as necessary
- Technical specialists in various disciplines will continue to review regulatory submissions to verify that regulatory requirements continue to be met

CNSC Regulatory Hold Points

- For the return to service of each unit, CNSC staff will recommend that the Commission include 4 regulatory hold points:
 1. Prior to fuel load
 2. Prior to removal of the Guaranteed Shutdown State
 3. Prior to exceeding 1% full power
 4. Prior to exceeding 65% full power
- Each hold point must be released by the Commission or a person authorized by the Commission prior to continuing work

Consultation and Engagement

Indigenous Engagement & Consultation

As an agent of the Crown, CNSC consults with potentially impacted Indigenous peoples to understand and address potential impacts to Indigenous and/or treaty rights from a project

CNSC leads a whole-of-government approach to improve the efficiency/effectiveness of engagement and consultation processes

CNSC requires licensees to engage with potentially affected Indigenous peoples early in the development and throughout the life of their project



Building long-term positive relationships with Indigenous Nations and communities in Canada

Participant Funding Program (PFP)

- The CNSC made funding available through its Participant Funding Program (now closed)
- The PFP assists Indigenous Nations and communities, members of the public, and stakeholders in participating in the regulatory process and providing value-added information to the Commission
- Based on recommendations from an external Funding Review Committee, the CNSC awarded \$343,584.86 to 10 applicants

Status and Next Steps

Current Status

- CNSC staff continue to assess OPG's licence application and, in some cases, have made requests for additional information from OPG
- CNSC staff's Commission Member Document (CMD) will include:
 - Information on OPG's application, including the proposed refurbishment project
 - The results of CNSC staff's assessment of the application, including overall conclusions and recommendations to the Commission
 - A consultation report summarizing consultation efforts to date with Indigenous Nations and communities
 - Other information on matters of regulatory interest
- CNSC staff and Fisheries and Ocean's Canada (DFO) continue to collaborate regarding the proposed Deep Water Intake Project

Next Steps

- **May 15, 2026** – CNSC staff Commission Member Document (CMD) available upon request
- **June 23, 2026** – Public Hearing Part 1 in Gatineau, Qc (one day)
- **August 12, 2026** – Intervention Deadline
- **October 5, 2026** – Public Hearing Part 2 in Ajax, On (multiple days)

How to Participate

- A [Revised Notice of Public Hearing](#) was published on January 22, 2026
- The public hearing will be webcast live and available on the [CNSC website](#)
- Requests to intervene can be made using the [online request form](#) or by email
- For more information, please contact:

Senior Tribunal Officer, Commission Registry

Canadian Nuclear Safety Commission

280 Slater St. | PO Box 1046 Stn B

Ottawa ON | K1P 5S9

Tel.: 343-576-7629 | Fax: 613-995-5086

Email: interventions@cnscccsn.gc.ca

Web: <https://www.cnscccsn.gc.ca/eng/the-commission/participate/hearings/>

Thank you

Stay connected!



nuclearsafety.gc.ca

CNSC–MSIFN Monthly Meeting

April 22, 2026 at 11am

Virtual via MS teams

CNSC Attendees	MSIFN
Emily Janzen, Indigenous Consultation and Engagement Division (ICED) Stéphanie Bédard, ICED Doug Wylie, ICED Jamie Bogden, ICED Jane MacDonald, ICED Daniel MacDonald, Pickering Regulatory Program Division (PRPD) Patrick Collins, Darlington Regulatory Program Division (DRPD)	Sam Shrubsole, Impact Assessment Team Lead, Minogi Finn Komai, Ecology Project Coordinator, Minogi

Agenda

- BWXT Mid Term Review - Jane
- Pickering Nuclear Generating Station (PNGS) Application for Renewal, Refurbishment and Decommissioning - Jamie, Dan
- Darlington New Nuclear Project (DNNP) - Licence to Operate (LTO) Application - Emily, Nina, Patrick
- MSIFN 2026 Annual Powwow (July 18/19) - Funding and CNSC Attendance
- Next Meeting: May 27

On April 11, 2025, CNSC staff met with representatives of the four Michi Saagiig Nations to discuss CNSC staff's review of the initial sections of OPG's Detailed Decommissioning Plan (DDP) for Pickering-A (units 1 to 4). CNSC staff explained that the current scope of the materials OPG has submitted include only the removal of conventional (non-nuclear) components and that CNSC staff do not expect OPG to apply for authorisation to begin nuclear component removal, such that could generate radiological waste, at this time. CNSC staff were asked to provide CNSC staff's view on whether an Impact Assessment (IA) under the *Impact Assessment Act* (IAA) would be triggered by any of the future activities OPG may have planned for the Pickering NGS site. These activities were discussed at this meeting and are: the upcoming licence renewal of the power reactor and waste facility, the refurbishment of Pickering units 5-8, and the future decommissioning of Pickering units 1-4.

With respect to an existing nuclear facility, these activities (licence renewal, refurbishment, or decommissioning), are not "designated physical activities" listed under the [Physical Activities Regulations](#) under the IAA that require an IA.

Upon receipt of any application, CNSC staff complete an environmental review identification form to establish the type of environmental review that is required, based on the information submitted by the applicant and in accordance with the IAA and *Nuclear Safety and Control Act* (NSCA). As per the [Memorandum of Understanding on Integrated Impact Assessments Under the IAA](#), the Impact Assessment Agency of Canada and the CNSC agree to keep each other informed, in a timely manner, of emerging projects that may be subject to both the IAA and NSCA.

Regardless of the type of environmental review legislation that applies, all proposed activities undergo a thorough and rigorous technical regulatory review. A licence for a nuclear facility or activity is not granted unless the CNSC's independent Commission is satisfied that the applicant is qualified to carry out the activity and protect the environment and the health and safety of people throughout the entire lifecycle of the project.

More information on the CNSC's environmental protection review process can be found on the [CNSC website](#), including the [Environmental Protection Review Report: Pickering Nuclear Site](#) and other environmental protection review reports.

Melanson, Jamie (CNSC/CCSN)

From: Jean Charles, Emmanuelle (CNSC/CCSN) on behalf of Moses, Colin (CNSC/CCSN)
Sent: April 28, 2026 3:34 PM
To: chiefcarr@hiawathafn.ca
Cc: sdavison@hiawathafn.ca; dcdc@hiawathafn.ca; tcowie@hiawathafn.ca; tamara.whitby@hiawathafn.ca
Subject: Canadian Nuclear Safety Commission | Michi Saagiig First Nations' Leadership Meeting Summary and Next Steps
Attachments: 2026-03-10- Leadership meeting.docx

Hi Chief Laurie Carr,

I hope you are all enjoying a positive start to the spring season.

I would like to express my sincere appreciation for the constructive and productive meeting held on March 10, 2026. I look forward to continuing the meaningful dialogue we had during our meeting on March 10 and working together to make progress and meaningful change based on your Nations' feedback, requests and priorities. I have included a meeting summary and key actions list from the meeting for your input.

Following your preference and request, we did not touch on the Pickering Nuclear Generating Station project-specific topics in detail, however, we welcomed and valued the opportunity to engage in a broader conversation about our overall relationship and related processes. The perspectives you shared offered meaningful insight, and I am grateful for the openness and clarity you brought to the dialogue.

To facilitate further dialogue, I have listed topics that we have heard from your Nations as priorities for collaboration and discussion to advance specific actions and changes within the CNSC's mandate and framework. I have taken some time to reflect on these items with my team and would like to share work we have undertaken to move these items forward and discuss a potential path forward to continue to monitor progress. I note as well that some of these items will require ongoing monitoring and have proposed a potential approach to maintain our collective awareness of progress in that regard.

1. The Michi Saagiig First Nations' desire to not to be treated as interveners in Commission proceedings but rather to be recognized as "Parties"/rights holders to the proceeding
 - The Commission Registry has committed to providing an overview of the roles of parties and participants in Commission hearing processes, including how these roles are defined under the Commission's Rules of Procedure and applied in practice. I have asked my team and the Commission Registry to work with your engagement teams, to explore ways to support your Nations' participation in the hearing process in a manner that reflects your perspectives on participation.
2. A desire for more stable and ongoing capacity funding to be engaged and a key partner in CNSC regulatory processes
 - I have reviewed the Michi Saagiig First Nations' funding allocations and note that while they are well represented in our Participant Funding Program, given the recent heavy hearing load, there is an opportunity to better balance this with more sustainable funding under the Indigenous and Stakeholder Capacity Fund program. I have therefore asked my team to explore funding opportunities with your engagement teams to meaningfully achieve this.
3. The integration and reflection of UNDRIP and FPIC principles in CNSC regulatory processes and expectations for CNSC licensees
4. The desire for the CNSC to meaningfully consider and address long-standing concerns regarding legacy impacts and cumulative effects from nuclear projects and facilities

5. A desire for the CNSC to develop and establish an Indigenous Advisory Committee to support of ongoing dialogue, advice, and collaboration with Indigenous Nations who engage in the CNSC's regulatory processes
 - We acknowledge items 3-5 are also topics that were raised in the 2025 listening tour discussion and again thank you for your engagement in that discussion as well. In response to the CNSC listening tour, a report summarizing what we learned will soon be shared with you and published on our website. We also intend to develop, in consultation with interested Indigenous Nations and communities, a supporting action plan. We look forward to continued discussions on this matter.
6. The desire for the CNSC to exercise the same authorities to consider, assess, and consult on the full range of factors examined under the Impact Assessment Act (IAA) for all licence applications and nuclear projects, not only those that currently trigger an integrated assessment under the IAA.

I would appreciate any feedback that you and your teams have with respect to this priority list and our immediate actions, and if there are any others from our discussions that you would like to prioritize for our upcoming meetings and discussions. Our intent is to track these so that we can collect any information shared during our meetings.

We recognize these are substantive and longstanding topics, working to address them together is a priority for the CNSC. To that effect, I felt it was important to highlight some immediate actions. To continue to advance, we see merit in establishing regular meetings where we continue to take stock and seek input on nuclear activities in your territory while working to progress systematically on these priorities supported by periodic leadership meetings, in-person if possible.

Recognizing our ongoing work together, we hope to establish a planned approach that advances these overarching matters while still maintaining meetings established under our current Terms of Reference (TOR) for long-term engagement. In that way we hope to advance these priority topics, and continue project specific dialogue and consultation which supports identifying, understanding and addressing project specific concerns and potential impacts on your Nations' rights and interests.

While I am eager to meet again, I value the time and feedback you have already given to the CNSC and want future discussions to be focused on tangible progress on taking action on the requests and feedback you have provided us to discuss. CNSC staff will be in touch to coordinate at the working level to identify and propose an approach for meeting formats that best supports this ongoing collaboration and advancement of progress. Our preliminary thoughts are to hold:

- Leadership meetings, in-person if possible, once to twice per year, which will allow for reflective discussions on the advancement of topics and the implementation of proposed changes based on the requests and feedback you and your Nation have provided us;
- Regular quarterly meetings at the working level between CNSC staff and Michi Saagiig First Nation staff and representatives, as set out in signed Terms of Reference (ToRs) for long-term engagement, to discuss priority topics, make progress on addressing your requests and feedback and to ensure alignment in advance of leadership meetings.

I am greatly encouraged by the opportunity to strengthen our partnership through ongoing engagement and collaboration. My team in the CNSC's Indigenous Consultation and Engagement Division (ICED) will work with your teams to coordinate these discussions and next steps.

Thank you again for your time, candor, and collaboration.

Warm regards,

Colin

Colin Moses

(he/him)

Vice-President Regulatory Affairs and Chief Communications Officer

Canadian Nuclear Safety Commission / Government of Canada

colin.moses@cnsccsn.gc.ca / Tel: 613-222-4533

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Melanson, Jamie (CNSC/CCSN)

From: Jean Charles, Emmanuelle (CNSC/CCSN) on behalf of Moses, Colin (CNSC/CCSN)
Sent: April 28, 2026 3:21 PM
To: klarocca@scugogfirstnation.com
Cc: sshrubsole@scugogfirstnation.ca; drichardson@scugogfirstnation.ca; rlukacs@scugogfirstnation.ca; kponcedeleon@scugogfirstnation.ca; fkomai@scugogfirstnation.ca; consultation@scugogfirstnation.com
Subject: Canadian Nuclear Safety Commission | Michi Saagiig First Nations' Leadership Meeting Summary and Next Steps
Attachments: 2026-03-10- Leadership meeting.docx

Hi Chief Kelly LaRocca,

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From: Jean Charles, Emmanuelle (CNSC/CCSN) on behalf of Moses, Colin (CNSC/CCSN)
Sent: April 28, 2026 3:22 PM
To: tsimpson@alderville.ca
Cc: jkapyrka@alderville.ca; szilinski@alderville.ca; cdas@alderville.ca; molsen@alderville.ca
Subject: Canadian Nuclear Safety Commission | Michi Saagiig First Nations' Leadership Meeting Summary and Next Steps
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Hi Chief Taynar Simpson,

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Melanson, Jamie (CNSC/CCSN)

From: Jean Charles, Emmanuelle (CNSC/CCSN) on behalf of Moses, Colin (CNSC/CCSN)
Sent: April 28, 2026 3:24 PM
To: LaurieH@curvelake.ca
Cc: Wright, Kayla; Chua, Francis; paigew@curvelake.ca; lilyb@curvelake.ca
Subject: Canadian Nuclear Safety Commission | Michi Saagiig First Nations' Leadership Meeting Summary and Next Steps
Attachments: 2026-03-10- Leadership meeting.docx

Hi Chief Laurie Hockaday,

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 - The Commission Registry has committed to providing an overview of the roles of parties and participants in Commission hearing processes, including how these roles are defined under the Commission's Rules of Procedure and applied in practice. I have asked my team and the Commission Registry to work with your engagement teams, to explore ways to support your Nations' participation in the hearing process in a manner that reflects your perspectives on participation.
2. A desire for more stable and ongoing capacity funding to be engaged and a key partner in CNSC regulatory processes
 - I have reviewed the Michi Saagiig First Nations' funding allocations and note that while they are well represented in our Participant Funding Program, given the recent heavy hearing load, there is an opportunity to better balance this with more sustainable funding under the Indigenous and Stakeholder Capacity Fund program. I have therefore asked my team to explore funding opportunities with your engagement teams to meaningfully achieve this.
3. The integration and reflection of UNDRIP and FPIC principles in CNSC regulatory processes and expectations for CNSC licensees
4. The desire for the CNSC to meaningfully consider and address long-standing concerns regarding legacy impacts and cumulative effects from nuclear projects and facilities

5. A desire for the CNSC to develop and establish an Indigenous Advisory Committee to support of ongoing dialogue, advice, and collaboration with Indigenous Nations who engage in the CNSC's regulatory processes
 - We acknowledge items 3-5 are also topics that were raised in the 2025 listening tour discussion and again thank you for your engagement in that discussion as well. In response to the CNSC listening tour, a report summarizing what we learned will soon be shared with you and published on our website. We also intend to develop, in consultation with interested Indigenous Nations and communities, a supporting action plan. We look forward to continued discussions on this matter.
6. The desire for the CNSC to exercise the same authorities to consider, assess, and consult on the full range of factors examined under the Impact Assessment Act (IAA) for all licence applications and nuclear projects, not only those that currently trigger an integrated assessment under the IAA.

I would appreciate any feedback that you and your teams have with respect to this priority list and our immediate actions, and if there are any others from our discussions that you would like to prioritize for our upcoming meetings and discussions. Our intent is to track these so that we can collect any information shared during our meetings.

We recognize these are substantive and longstanding topics, working to address them together is a priority for the CNSC. To that effect, I felt it was important to highlight some immediate actions. To continue to advance, we see merit in establishing regular meetings where we continue to take stock and seek input on nuclear activities in your territory while working to progress systematically on these priorities supported by periodic leadership meetings, in-person if possible.

Recognizing our ongoing work together, we hope to establish a planned approach that advances these overarching matters while still maintaining meetings established under our current Terms of Reference (TOR) for long-term engagement. In that way we hope to advance these priority topics, and continue project specific dialogue and consultation which supports identifying, understanding and addressing project specific concerns and potential impacts on your Nations' rights and interests.

While I am eager to meet again, I value the time and feedback you have already given to the CNSC and want future discussions to be focused on tangible progress on taking action on the requests and feedback you have provided us to discuss. CNSC staff will be in touch to coordinate at the working level to identify and propose an approach for meeting formats that best supports this ongoing collaboration and advancement of progress. Our preliminary thoughts are to hold:

- Leadership meetings, in-person if possible, once to twice per year, which will allow for reflective discussions on the advancement of topics and the implementation of proposed changes based on the requests and feedback you and your Nation have provided us;
- Regular quarterly meetings at the working level between CNSC staff and Michi Saagiig First Nation staff and representatives, as set out in signed Terms of Reference (ToRs) for long-term engagement, to discuss priority topics, make progress on addressing your requests and feedback and to ensure alignment in advance of leadership meetings.

I am greatly encouraged by the opportunity to strengthen our partnership through ongoing engagement and collaboration. My team in the CNSC's Indigenous Consultation and Engagement Division (ICED) will work with your teams to coordinate these discussions and next steps.

Thank you again for your time, candor, and collaboration.

Warm regards,

Colin

Colin Moses

(he/him)

Vice-President Regulatory Affairs and Chief Communications Officer

Canadian Nuclear Safety Commission / Government of Canada

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AFN and CNSC Meeting

April 28, 2026

(Virtual, MS Teams)

<u>CNSC Attendees</u>	<u>AFN Attendees</u>
Emily Janzen, Indigenous Consultation and Engagement Division (ICED) Stéphanie Bédard, ICED Jamie Melancon, ICED Jane MacDonald, ICED Daniel MacDonald, Pickering Regulatory Program Division Patrick Collins, Darlington Regulatory Program Division Julian Amalraj, Nuclear Processing Facilities Division (NPFDD)	Julie Kapyrka, Consultation manager

Agenda

- BWXT Mid Term Review – Jane and Julian
- Consultation discussion: OPG Pickering Nuclear Generating Station (PNGS) and Pickering Waste Management Facility application - Jamie, Daniel
- Darlington New Nuclear Project (DNNP) - Licence to Operate (LTO) Application - Emily, Patrick
- Touch base on Independent Environmental Monitoring Program sampling – sampling for BWXT Peterborough the week of June 22
- Next Meeting: May 26

Six Nations/CNSC- Monthly Meeting

Date: April 29, 2026 at 9 am

Virtual via MS teams

CNSC Attendees	Six Nations
Jane MacDonald, Policy Officer ICED Stéphanie Bédard, Policy Officer ICED Jamie Melancon, Policy Officer ,ICED Emily Janzen, Senior Policy Officer, ICED	Peter Graham, Settler and consultation supervisor Dawn Russell, Consultation Admin Lonny Bomberly, Director Tayler Hill, Assistant Director

Agenda

- CNSC Regular Project updates
 - Darlington New Nuclear Project (DNNP)- Emily
 - OPG Pickering Nuclear Generating Station (PNGS) and Pickering Waste Management Facility (PWMF)- Jamie
 - Wesleyville – Jane (Emily)
- SNGR updates
- Roundtable
 - Next meeting May 13 – Confirm or push, as only 2 weeks in between
 - Are there any projects or topics of interest SNGR would like to know more about?



VIA EMAIL

May 7, 2026

Chief Simpson
Alderville First Nation
11696 Line Rd 2
Roseneath, ON K0K 2X0

Chief Hockaday
Curve Lake First Nation
22 Winookeedaa St.
Curve Lake, ON K0L 1R0

Chief Carr
Hiawatha First Nation
431 Hiawatha Line
Hiawatha, ON K9J 0E6

Chief LaRocca
Mississaugas of Scugog Island First Nation
22521 Island Rd.
Port Perry, ON L9L 1B6

Chief Simpson, Chief Hockaday, Chief Carr and Chief LaRocca,

Re: Action Item: Participant roles at Commission Hearings

Further to the recent leadership meeting between the Michi Saagiig of the Williams Treaties First Nations (Michi Saagiig Nations) and the CNSC, I am writing to follow up on the Commission Registry action item. The Registry was asked to describe the roles of different participants in a Commission hearing and to clarify the procedural rights associated with each role. There appeared to be concern that “parties” have more rights than “intervenorors.”

Parties versus intervenors

Rule 1 of the [Canadian Nuclear Safety Commission Rules of Procedure](#) (CNSC Rules) provides the key definitions. In a licensing matter, the only “**party**” is the person applying for a new licence or for a change to an existing licence (renewal, suspension, amendment, revocation, or replacement). An “**intervenor**” is any person permitted to intervene in a public hearing. The CNSC Rules also define “**participant**” to include both parties and intervenors.

CNSC staff are not parties or intervenors. Rather, rule 2(2) provides that the Commission “may permit or require” CNSC staff to participate in a proceeding in such manner as will enable the Commission to determine the matter in a fair, informal and expeditious manner. CNSC staff support the Commission by providing information, analysis, and recommendations based on its expertise. Other government agencies may also provide information relevant to their regulatory responsibilities.

Although the CNSC Rules impose some different obligations on parties and intervenors (rules 18 and 19), neither the CNSC Rules nor the [Nuclear Safety and Control Act](#) (NSCA) give them different rights to participate. Rather, the Commission controls its own hearings.

The NSCA requires the Commission to conduct its proceedings as informally and expeditiously as fairness allows. The Commission has broad discretion to control its process and to accept evidence in the manner it considers appropriate (NSCA s. 20; CNSC Rules 18–20). These provisions apply equally to all participants.

Licensees or proponents play a significant role in licensing hearings because they are the applicants or licensees. The Commission must decide whether to grant or refuse their application and this gives them legal rights under the common law and rules of procedural fairness. Their prominence is due to their role as applicants.

Both parties and intervenors may request to present at an oral hearing, and the Commission routinely grants such requests. However, as a specialized tribunal using an inquisitorial model, the Commission directs all questioning. No participant may cross-examine or directly question another participant. This approach allows the Commission to efficiently gather and test the information it needs to help inform its decisions.

Other government agencies do not receive dedicated presentation time. They attend hearings to answer questions from the Commission, if asked. This is another example of how the Commission manages its proceedings.

Recourse rights

A person’s status as a party or intervenor in a hearing does not affect their ability to challenge a licensing decision made by the Commission. Anyone **directly affected** by a Commission decision may apply to the Federal Court for judicial review ([Federal Courts Act](#), s. 18.1(1)).

I recognize that my letter of February 23, 2026, may have raised concerns, particularly regarding section 43 of the NSCA. Section 43 addresses appeals to and reconsiderations by the Commission:

- Subsection 43(1) allows a person directly affected by certain designated officer (DO) decisions to **appeal** the decision to the Commission. The Commission cannot hear appeals of its own decisions.
- Subsection 43(2) allows a person to ask the Commission to **redetermine** a matter where the Commission:
 - refused **their** application for a new licence
 - refused **their** application to change to an existing licence
 - changed, suspended, revoked or replaced **their** existing licence
- Subsection 43(3) gives the Commission broad authority to **redetermine** a matter on its own initiative.

Subsection 43(2) of the NSCA gives a licensee or licence applicant recourse options under the NSCA, because they are the **applicant or licensee**. The subsection and its potential internal recourse step applies only where the decision directly and negatively affects the person's licence or their licence application.

Subsection 43(2) of the NSCA also allows a person named in or subject to an "order" to request a redetermination. Orders are distinct from licensing decisions. They are enforcement tools used to compel action in the interest of health, safety, security, the environment, or compliance with international obligations (for example, see NSCA s. 35 and [The CNSC's approach to compliance verification and enforcement](#)). Proceedings following an order are generally not public, and the only participant is the person named in or subject to the order.

The Registry's letter of February 23, 2026, responded to the Michi Saagiig Nations' request for the Commission to redetermine its decision on Ontario Power Generation's application to amend the Pickering Waste Management Facility licence to authorize construction and operation of the Pickering Component Storage Structure. The request relied on various subsections of the NSCA.

The February 23, 2026, letter confirmed that the Commission considered the request under subsection 43(3) of the NSCA, its own-initiative redetermination power. This was the only potentially applicable provision to address the request. Subsection 43(1) could not apply because the matter did not arise from a DO decision. Subsection 43(2) did not apply because this was a licensing matter and the Michi Saagiig Nations were not the applicant.

The Michi Saagiig Nations' ability to participate in the hearing was not limited in any way by their status as intervenors rather than parties. The Commission's redetermination power

can be a useful way for it to revisit a matter in limited circumstances, such as when there is new information that could not have been raised earlier. Please know that the Commission takes a request to act under subsection 43(3) seriously. And again, not having access to an internal NSCA reconsideration process does not in any way affect the right of anyone directly affected by a Commission decision to bring an application for judicial review to the Federal Court.

Conclusion

For all these reasons, a person's status as a "party" or "intervenor" does not affect their right to participate in a Commission proceeding, nor does it limit their ability to challenge a decision in court or to ask the Commission to reconsider a decision.

We remain committed to working with you to further enhance your participation and involvement in Commission hearings. Many changes have been made to Commission hearing processes because of your feedback, including moving discussions about consultation and engagement to Part 2 of two-part proceedings. This better ensures that Nations and communities have the option to attend and participate in discussions that are about them.

Relative to the upcoming Commission proceeding to consider OPG's application for authorization to refurbish the Pickering Nuclear Generating Station and renew its Pickering Nuclear Generating Station and Waste Management Facility licences, we recognize that part 1 of that hearing is for the licensee to explain its application and CNSC staff to explain its assessment of the safety and control measures described in the application. That said, we are open and welcome to ideas on ways that your Nations might participate in that part of the hearing. We would be pleased to meet with you to discuss part 1, as well as participation in part 2 closer to the October 2026 hearing date.

Please do not hesitate to contact the Registry should you have any additional questions.

Sincerely,



Candace Salmon

Commission Registrar
Legal and Commission Affairs Branch
Canadian Nuclear Safety Commission
candace.salmon@cnsccsn.gc.ca / cell: (343) 630-3471

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APPENDIX B. OPG COMMITMENTS

Table 1: Commitment List

Topic	Description of Concern and/or Interest	Measure to Address	Commitment Type
<i>Assessing Risk & Monitoring Potential Impacts on Indigenous People</i> Predictive Environmental Risk Assessment (PERA) and Environmental Risk Assessment (ERA) Harvester Receptor	Through ongoing engagement on PERAs and ERAs, MS-WTFN's expressed an interest in the inclusion of a Harvester receptor to conservatively account for Indigenous people who may live, work and/or practice rights near OPG's facilities. Concerns were expressed that the receptor groups used previously may not capture how Michi Saagiig members who may live and/or work and/or harvest and consume wildlife, fish and/or plant resources close to the site.	For the PNGS Refurbishment PERA and PCSS PERA (and upcoming PNGS ERA), OPG has included the Harvester Receptor to assess the radiological dose for Indigenous populations who may live and/or work and/or harvest and consume wildlife, fish and/or plant resources close to the site. OPG has also presented the MS-WTFNs with a list of questions/discussion topics that will help understand areas of concern or importance, harvesting practices, and how they would like information received, to guide refinements in future PERA and ERAs. OPG is committed to continued engagement on the design and outcome of environmental risk assessments.	Accommodation Measure – measure supports ongoing monitoring and management of potential impacts in collaboration with Nations.
<i>Site Survey Inclusive of Indigenous People</i> Site Specific Survey	MS-WTFN's expressed an interest in reviewing and providing input on OPG's draft site specific survey to ensure Indigenous peoples living proximate to Darlington and Pickering stations are appropriately captured for OPG to better understand potential impacts to rights.	As a result of this feedback OPG adapted the Site Specific Survey to make the survey inclusive of Indigenous peoples living and working near OPG's facilities with questions worded based on feedback provided by the MS-WTFNs.	Accommodation Measure - measure supports ongoing monitoring and management of potential impacts in collaboration with Nations.
<i>Consideration of Archaeological and Cultural Heritage Values</i> Terrestrial & Marine Archaeology Program	MS-WTFN's raised concerns regarding impacts of refurbishment and decommissioning activities on archaeological and cultural heritage resources.	OPG and MS-WTFNs worked collaboratively to develop and execute a site wide archaeological assessment program that goes above and beyond legal requirements. The terrestrial program to date has included conducting a Stage 1 assessment across the entire Pickering site. Based on the outcomes of this assessment, OPG and the MS-WTFN's have proceeded with Stage 2 assessments in	Accommodation Measure – measure supports avoidance and mitigation of potential impacts to archaeological and cultural heritage values in collaboration with the Nations.

Topic	Description of Concern and/or Interest	Measure to Address	Commitment Type
		<p>recommended areas where ground disturbance work is being contemplated. The marine program includes desktop studies, sub bottom profiling, ROV video capture, archaeological monitoring and sediment screening. The archaeology program will continue to evolve and inform engagement at site to ensure archaeological and cultural heritage values are identified and impacts are avoided and/or mitigated.</p> <p>OPG will inform the Michi Saagiig Nations and commit to further archaeology assessment if any planned ground disturbance activities are proposed in areas recommended for further archaeology assessment.</p>	
<p><i>Monitoring of aquatic species at site</i></p> <p>Aquatic environmental surveys</p>	<p>MS-WTFN expressed an interest in attending aquatic monitoring activities, particularly those related to species at risk and culturally significant, such as Lake Sturgeon. MS-WTFN also raised concerns that only one spot was available (due to boat size) for participants wishing to attend these sampling activities.</p>	<p>For sampling activities taking place in the summer and early fall, OPG worked with our vendor to ensure that an additional spot (total of two spots) on the boat would be reserved for any interested First Nations participants while continuing to ensure that boat safety requirements are maintained. For sampling activities conducted during harsh weather conditions in late fall, and in consideration for safety, OPG offered to record videos of the sampling activities and provide shift reports, along with data tables summarizing the species caught. Additionally, OPG worked with our vendor to coordinate with another vendor in Frenchman's Bay to secure access to a boat with 10 additional spots, should there be increased interest from participants wishing to attend the sampling activities. ROV videos were captured</p>	<p>Deepening Engagement – measures help to facilitate deeper level of engagement and involvement on studies of importance on site.</p>

Topic	Description of Concern and/or Interest	Measure to Address	Commitment Type
		<p>and shared with the Nations to improve our collective understanding of aquatic habitats in areas of interest and to inform project activities.</p> <p>OPG targets to share the monitoring schedule approximately two weeks in advance of planned activities, to assist the Michi Saagiig Nations in coordinating potential monitoring participation.</p>	
<p><i>Monitoring of culturally significant aquatic species at site</i></p> <p>Lake Sturgeon targeted monitoring</p>	<p>MS-WTFN expressed concern regarding the temperature of the lake during the Lake Sturgeon sampling activity conducted from 29-Sep-25 to 2-Oct-25. Specifically, MS-WTFN highlighted the temperature was higher than the preferred temperature range for Lake Sturgeon.</p>	<p>OPG worked with our vendor to conduct an additional round of Lake Sturgeon sampling from 14-Nov-25 to 15-Nov-25, during which the lake water temperatures were within the preferred habitat range for Lake Sturgeon.</p>	<p>Accommodation Measure – measure supports additional data collection that will further inform assessment and further avoidance and/or mitigation measures, as appropriate, in collaboration with the Nations,</p>
<p><i>Monitoring Fish Entrainment</i></p> <p>Increase sampling due to climate change</p>	<p>OPG engaged the Michi Saagiig Nations on the design for a fish entrainment study at Pickering in 2024. The study is currently in progress and is a requirement of OPG's existing Fisheries Act Authorization. Through engagement, we heard that as climate change continues to impact spawning times and windows, there was an interest in increasing sampling frequency during those time periods.</p>	<p>Based on these comments, OPG increased the monitoring schedule from every other week to weekly during October, November, February and March.</p>	<p>Accommodation Measure - measure supports ongoing monitoring and management of potential impacts in collaboration with Nations.</p>
<p><i>MS-WTFN offsetting considerations</i></p> <p>Selection of an aquatic offsetting</p>	<p>MS-WTFN has expressed an interest in being engaged on the selection of an offsetting location/concept early and throughout the process to consider MS-WTFN's worldview. MS-WTFN has also provided feedback from</p>	<p>OPG has been engaging with the MS-WTFN at the MS-WTFN/OPG Pickering Table meetings, where OPG has presented potential offsetting concepts and will be sharing the proposed offsetting opportunities for early input. OPG has also invited MS-WTFN to</p>	<p>Deepening Engagement – measures help to facilitate deeper level of engagement and involvement on studies of importance on site.</p>

Topic	Description of Concern and/or Interest	Measure to Address	Commitment Type
location/concept in support of the Fisheries Act Authorization Application for construction of a deepwater intake	past projects to consider contacting local municipalities for potential offsetting location opportunities.	participate in field visits of potential offsetting locations on Sep 23, 2025. Additionally, OPG has contacted local municipalities as per MS-WTFN's feedback to seek out potential offsetting location opportunities.	
<i>MS-WTFN offsetting considerations</i> Identification of potential offsetting locations/concepts for future projects/operations permitting	MS-WTFN has expressed an interest in being engaged on a holistic approach to planning for offsetting for future permits.	OPG has been engaging with the MS-WTFN at the MSN/OPG Environment Table meetings, where OPG is working collaboratively with the MS-WTFN to develop a scope of work for vendor support to develop a list of potential offsetting locations/concepts that consider both MS-WTFN and future OPG permit needs. OPG shared a draft scope of work document with the MS-WTFN for review and input, prior to finalizing.	Deepening engagement – approach helps to facilitate holistic and coordinated approach to offsetting across various sites and/or projects. Outcomes intended to result in effective avoidance and mitigation measures to potential impacts to rights, as appropriate.
<i>Project updates</i> Notifications	MS-WTFN has expressed an interest that OPG provides project event notifications that are regularly shared with regulators and/or Crown authorities to support meaningful, transparent engagement.	OPG has committed to MS-WTFN to provide project event notifications such as environmental reportable events and notable wildlife observations/events.	Deepening Engagement – measure is responsive to an interest from the Nations to understand reportable and notable events to deepen engagement discussions.

Table 2: Acronyms

ERA	Environmental Risk Assessment
MS-WTFN	Michi Saagiig of the Williams Treaties First Nations
OPG	Ontario Power Generation
PERA	Predictive Environmental Risk Assessment
EMP	Environmental Monitoring Program
DGR	Deep Geological Repository

October 10, 2025

CD# P-CORR-00531-24089 P

MR. R. RICHARDSON

Director
Pickering Regulatory Program Division
Canadian Nuclear Safety Commission
280 Slater Street
Ottawa, Ontario, K1P 5S9

Dear Mr. Richardson:

**Additional Information Supporting the Licence Renewal Application for
Pickering Nuclear Generating Station and Pickering Waste Facility**

The purpose of this letter is to provide CNSC staff additional information as requested in Reference 1 regarding OPG's application to renew the operating licences for the Pickering Nuclear Generating Station (NGS) and the Pickering Waste Management Facility (PWMF) (Reference 2). OPG's responses to the security related comments have been separately provided in Reference 3.

OPG's responses to the CNSC staff sufficiency review comments are provided in Attachment 1. Supporting information is provided in Attachments 2, 3 and 4 as referenced in the responses.

As requested in Reference 1, the following enclosures are provided to support the licence renewal application:

- Enclosure 1 provides OPG-PROC-0036 R008, "Environmental Aspects Identification and Significance Rating".
- Enclosure 2 provides P-PLAN-03480-00001 R013, "Pickering Nuclear Radioactive and Hazardous Emissions Monitoring Plan".
- Enclosure 3 provides OPG-STD-0119 R002, "Biodiversity Conservation Standard".
- Enclosure 4 provides 92896-REP-15200-00001 R000, "Pickering Waste Management Facility SB4 Erosion Hazard Assessment".

Mr. Richardson

CD# P-CORR-00531-24089 P

- Enclosure 5 provides 92896-REP-15200-00005 R000, "Pickering Waste Management Facility SB5&6 Erosion Hazard Assessment".

Should you have any questions, please contact Soo Chae, Senior Manager, Regulatory Affairs Strategic Projects, at soo.chae@opg.com.

Sincerely,



Paul Seguin
Senior Vice President
Pickering Nuclear
Ontario Power Generation
Inc.



Kapil Aggarwal
Vice President
Nuclear Sustainability
Services
Ontario Power Generation
Inc.



Luca Ceccato
Senior Vice President
Pickering Projects
Ontario Power Generation
Inc.

Attach. Encl.

cc: CNSC Site Supervisor
forms-formulaires@cnscccsn.gc.ca

References:

1. CNSC Letter, R. Richardson to P. Seguin, K. Aggarwal and L. Ceccato, "CNSC Staff Request for Additional Information - Renewal Application for Pickering Nuclear Generating Station Power Reactor Operating Licence and Pickering Waste Facility Operating Licence", September 5, 2025, e-Doc 7560134, CD# P-CORR-00531-24104.
2. OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to C. Salmon, "Renewal Application for Pickering Nuclear Generating Station Power Reactor Operating Licence and Pickering Waste Facility Operating Licence", June 27, 2025, e-Doc 7542953, CD# P-CORR-00531-23980.
3. OPG Letter, Z. Khansaheb to R. Richardson, "Additional Security Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility", September 26, 2025, CD# 8690-CORR-00531-22732.

ATTACHMENT 1

OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, "Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility".

CD# P-CORR-00531-24089 P

OPG's Responses to CNSC Staff's Sufficiency Review on the Renewal Application for the Pickering NGS and PWMF Licenses

Prepared By: Muzammel Hussain
Checked By: Barbara Stavropoulos

ATTACHMENT 1

OPG's Responses to CNSC Staff's Sufficiency Review on the Renewal Application for the Pickering NGS and PWMF Licences

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
1.	General Application Whole Document	<p>CNSC staff note that specific requests to the Commission are not summarized or consolidated in one place. Instead, requests are spread throughout OPG's application. CNSC staff have identified the following requests:</p> <ul style="list-style-type: none"> • Renewal of the PROL and WFOL for a 10-year period starting January 1, 2027. • Consolidation of the PROL and WFOL into a renewed PROL • Authorization to refurbish units 5-8 for continued commercial operation. • Inclusion of a licenced activity pertaining to decommissioning units 1-4, as noted in appendix C. • Removal of WFOL LC 9.2 in the renewed licence. 	OPG is requested to confirm the accuracy of the noted requests to the Commission.	<p>OPG is requesting the following of the Commission:</p> <ol style="list-style-type: none"> 1. Renewal of the Pickering NGS PROL and PWMF WFOL, authorizing OPG to carry out the activities listed in Appendix C [Reference A1] for a 10-year term from January 1, 2027 to December 31, 2036; 2. Consolidation of the PROL and WFOL into a single operating licence; 3. Authorization to operate Units 5 to 8 following refurbishment; 4. Inclusion of a licensed activity pertaining to Units 1 to 4 decommissioning (in accordance with the CNSC staff approved Detailed Decommissioning Plan); 5. Removal of WFOL Licence Condition 9.2; and 6. Authorization to expand the capacity of PWMF Storage Building 5 to 1,410 Dry Storage Containers. <p>This consolidated list of requests will be included in OPG's CMD submission.</p>
2.	General Application Section 1.0	<p>In its application, OPG states "OPG also requests renewal of the licensed activities authorized under the Pickering WMF Waste Facility Operating Licence (WFOL) WFOL-W4-350.00/2028 and consolidation of the WFOL with the Pickering NGS PROL. This request is administrative in nature and OPG will uphold the safety standards of both facilities." CNSC staff interpret this statement as indicating that all existing safety and control measures at the Pickering NGS and Pickering WMF will remain in place after the proposed consolidation of the PROL and WFOL, such as:</p> <ul style="list-style-type: none"> • Action levels • Management systems and programs 	OPG is requested to confirm that all existing safety and control measures for the Pickering NGS and Pickering WMF will remain in place following the proposed consolidation of the PROL and WFOL.	OPG confirms that, following the proposed consolidation of the Pickering NGS PROL and the PWMF WFOL, all existing safety and control measures for both the Pickering NGS and the PWMF will remain in place, including those listed. OPG is committed to upholding the safety standards and regulatory requirements applicable to both facilities. The proposed consolidation does not entail any changes to the safety and control measures currently in effect at either the Pickering NGS or the PWMF.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		<ul style="list-style-type: none"> • Governance documents • Safety analysis and assessments • Implemented REGDOCs and CSA standards • Drill and exercise programs 		
3.	General Licensing Section 1.1	<p>In its application, OPG provides information on the 4 current and 1 future dry storage container (DSC) storage buildings. In section 2.14.6 OPG also states that 1339 DSCs are currently stored in these buildings. CNSC staff note that, based on section 1.1, the total current capacity is for up to 1758 DSCs. OPG has explained that DSC storage building 5 will have initial capacity of 1200 DSCs and that it will be increased in the future to up to 1410 DSCs. CNSC staff note that an increase of 210 DSCs has not yet been assessed by CNSC staff. Additionally, CNSC staff note that Appendix C indicates storage building 5 can store up to 1410 DSCs, whereas the currently authorized number is 1200 DSCs. OPG does not indicate when an amendment to increase the capacity of storage building 5 would be sought nor provide details on its rationale. If OPG's intent is to request authorization from the Commission to store up to 1410 DSCs in building 5 as part of this application, more information is required.</p> <p>Further, OPG does not include any information or timeline on a hypothetical DSC storage building 6. CNSC staff note that as part of the hearing to consider the renewed 2018 licence for the Pickering WMF, OPG indicated its plan to build two DSC storage buildings amalgamated as a single structure referred to as storage building 5/6. In more recent submissions, OPG refers to this building as only building 5. CNSC staff note that the current WFOL limits OPG to 6 DSC storage buildings. This limit was introduced as part of the renewed 2018 WFOL and was put in place because OPG had intended to construct building 4, 5, and 6 during the current licence period. At the time of the Commission authorizing the</p>	<p>OPG is requested to provide further information on the following:</p> <ul style="list-style-type: none"> • When and by what means the capacity of DSC storage building 5 will be increased to 1410 DSCs. • When OPG anticipates exhausting the capacity of DSC storage building 5. • The estimated total DSC storage capacity needed for an additional 30 years of unit 5-8 operation. • When construction of a hypothetical DSC storage building 6 would be necessary. • The details, such as capacity and location, of a hypothetical DSC storage building 6. • When or if OPG intends to construct a replacement DSC processing building 	<p>Storage Building 5 (SB5) currently has an operational limit of 1,200 DSCs. Through the detailed design process an optimized footprint of the building was developed that allows to safely store 1,410 DSCs. The nuclear safety assessment, demonstrating that this design/operational limit of 1,410 DSCs is within regulatory requirements, is planned to be submitted to CNSC staff in Q4 2025. OPG is requesting authorization from the Commission to store up to 1,410 DSCs in SB5 as part of this application (upon acceptance of the safety analysis). SB5 is being built to store DSCs that were originally planned within the footprint of two storage buildings (SB5 and Storage Building 6 (SB6)). To optimize the footprint of the area, one building is planned to be constructed instead of two. As such, OPG does not have plans for SB6 based on current long term disposal strategies with Nuclear Waste Management Organization (NWMO).</p> <p>At this time, OPG does not have any plans to replace the DSC processing building; however, OPG requires the operational flexibility already approved in the 2018 WFOL to remain available should current planning assumptions change.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		<p>construction of 6 DSC storage buildings, OPG provided information that building 5 and 6 would be an amalgamated structure with a capacity of up to 1200 DSCs. Therefore, construction of a 6th DSC storage building beyond the currently planned double sized building 5 (previously building 5 and 6), may fall outside of the existing licensing basis and require Commission authorization.</p> <p>OPG also states that it is authorized to construct a new DSC processing building to replace the existing building. As part of the hearing to consider the renewed 2018 WFOL, OPG noted that it planned to construct the replacement in 2019. In its application, OPG does not provide information or estimated timeline for the construction of this replacement DSC processing building. While future construction of a replacement DSC processing facility is currently authorized under the existing licensing basis, it is unclear when or if OPG intends to construct such a facility.</p>	during the proposed licensing period.	
4.	General Refurbishment Section 1.2.1.2	<p>OPG refers to the Program Management Plans (PgMPs) and Project Management Plans (PMPs) as containing more information on refurbishment.</p> <p>CNSC staff note that information on the scope of refurbishment – such as a high-level summary of methodologies, a complete list of impacted structures systems and components (SSCs) that will be repaired or replaced, and a more detailed execution schedule – is not included in the application. For example, the application does not indicate the method of removing the boilers from the reactor building. Additionally, improvements to the irradiated fuel bay (IFB-B), Reactor Building vault temperatures, and fuel handling system reliability are also not discussed with respect to refurbishment scope.</p> <p>Regarding refurbishment waste, information on the use of the planned Pickering component storage structure (PCSS) is included in the application, including the storage of some low-</p>	OPG is requested to respond to the comment and to ensure that a summary of the refurbishment project is provided on the record.	<p>As indicated in the licence renewal application, OPG is committed to ensuring safe and reliable operation of Pickering NGS as it undergoes refurbishment activities and beyond.</p> <p>Significant safety improvements are being undertaken as physical plant modifications to improve long term plant reliability and to increase safety and operational margins of the Pickering NGS Units 5 to 8. Scope during the next licence period includes, but is not limited to:</p> <ul style="list-style-type: none"> • Replacement of all Pressure Tubes, Calandria Tubes and Feeders • Replacement of all 48 Boilers • Replacement of all 6 Standby Generators • Replacement of Digital Control Computers • Fuel Handling Equipment improvements

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		<p>level waste (LLW), retube waste, and steam generators. However, specifics – such as the relative volumes of LLW to be stored at the western waste management facility (WWMF) and the Pickering WMF, and the long-term plan for retube waste and steam generators – are lacking. CNSC staff suggest that a separate summary document or table be prepared and provided to CNSC staff on the record that includes:</p> <ul style="list-style-type: none">• A list of the SSCs that will be modified, repaired, or replaced during refurbishment• A high-level summary of refurbishment methodologies (e.g., how steam generators will be removed through the RB roof and how they will be stored)• Information regarding on and off-site waste storage locations and intended long term plans if applicable		<ul style="list-style-type: none">• Fire Protection Equipment improvements• Deep Water Intake <p>As indicated in Appendix B of the renewal application [Reference A1], additional systems, structures and components (SSCs) that may undergo replacements or upgrades are identified. OPG is currently undergoing the project definition phase where other SSCs are being assessed for replacement or upgrades and this project phase is expected to be completed in 2026. The planned major scope of work and select methodologies that will be undertaken during the licensing period are outlined in Attachment 2 of this submission. To effectively manage scope throughout this period, OPG will utilize established processes for scope changes and oversight. This includes but is not limited to forums such as the Engineering Review Board (ERB), AMOC (Asset Management Oversight Committee), and Refurbishment Change Control Board (RCCB). During this project phase, OPG staff will continue to have regular communication with CNSC staff regarding modification activities, and information on the scope development is planned to be reflected in the Commission Member Document.</p> <p>OPG is also currently undertaking detailed design work on Safety Improvement Opportunities related to Core Cooling, Containment Enhancement, and External Hazard Protection as detailed in Attachment 2.</p> <p>Furthermore, to support extending the Pickering NGS Units 5 to 8 operating life for an additional 30+ years, OPG is committed to implementing the resulting Integrated Implementation Plan (IIP) for Pickering NGS. The PSR3 IIP</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>to be submitted in August 2027 will define the improvements to be implemented and timelines for their implementation.</p> <p>Taken together, these sets of modifications demonstrate a strong commitment to Nuclear Safety and continued safe operation over the next operating life cycle for the Pickering NGS Units 5-8.</p> <p>Regarding refurbishment waste, where potential LLW may be shipped or transferred to will be a business decision with consideration of Rightsholder and stakeholder input, waste management efficiencies, consistent with any transportation restrictions for waste shipments, and any identified opportunities for optimization, incorporating lessons learned and risk mitigation with respect to waste management from Darlington NGS and Bruce Power NGS refurbishment projects. For example, similar to Darlington NGS feeders and in alignment with OPG's target for waste diversion, feeder pipes are suitable for metal processing at a third-party licensed facility which minimizes the volume of radioactive waste requiring storage/disposal.</p> <p>The on-site transfer of LLW to the PCSS will follow OPG's Radiation Protection program. Off-site shipments of LLW, will follow OPG's Radioactive Materials Transportation program which ensures the dose rates are acceptable for transport in certified transportation packages. Radioactive shipments are characterized, classified, packed, shipped, and received in a manner that is compliant with the Transportation of Dangerous Goods Regulations and the Packaging and Transport of Nuclear Substances Regulations, 2015 to ensure the safety of workers, the public, and the environment.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				As per the Federal Government's Integrated Strategy for Radioactive Waste (ISRW), after interim storage, major components and waste containers will be transported to a licensed long-term disposal facility. ILW is planned to be disposed of in the NWMO ILW Deep Geological Repository (DGR) and LLW in a near surface disposal facility (NSDF).
5.	General Refurbishment Section 1.2.1.3	OPG states that "station improvements, enhancements, and maintenance will continue beyond the refurbishment window during planned unit maintenance outages and during normal operation" It is not clear under what mechanism such improvements will be tracked or if such improvements will be entirely under the scope of the PSR3 integrated implementation plan (IIP).	OPG is requested to provide further information on planned improvements that will extend beyond the refurbishment outages and confirm if all such activity will be captured under the PSR3 IIP.	<p>PSR3 is currently underway to support refurbishment of Pickering NGS Units 5 to 8 for 30+ years of commercial operation. In compliance with REGDOC-2.3.3, the PSR3 timeframe of review is 10 years, and this is defined as the 'Period of Validity' in Section 2.4 of the PSR3 Basis Document.</p> <p>For Pickering NGS, the next licence period consists of refurbishment and post-refurbishment operation of Pickering NGS Units 5 to 8; therefore, the PSR3 takes into account these phases (i.e. refurbishment, normal operation, and maintenance outages) of the station.</p> <p>Based on the 10-year Period of Validity and the Assessment Basis, and the fact that not all station improvements, enhancements, and maintenance will be driven by PSR3, the PSR3 IIP will include only items identified, assessed, and developed through the PSR3 process. For items not captured within the scope of PSR3, OPG will continue to ensure that the condition of critical nuclear facility equipment is understood and that required activities are in place to ensure the health of these components and systems through the Integrated Aging Management and the Equipment Reliability Programs. Furthermore, OPG will continue to follow the established Regulatory Action Management governance for communication with CNSC staff to track these improvements for the Pickering NGS.</p>

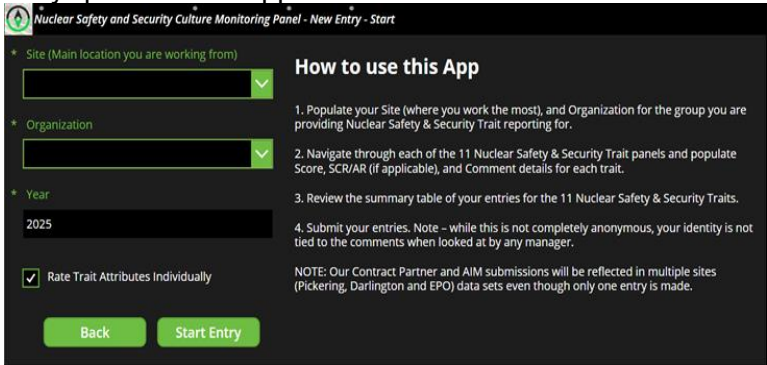
Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
6.	General Refurbishment Section 1.2.1.4	<p>OPG provides information on the return to service of refurbished units, as detailed in Pickering Refurbishment Program Management Plan – Return to Service, NK30-PLAN-00120-00022. In its application, OPG describes a 4-phase approach to return to service. OPG has also previously indicated to the CNSC that it is immediately compliant with REGDOC 2.3.1.</p> <p>CNSC staff note that the return to service of the lead Pickering NGS unit (unit 5) will be substantially different in scope than the return to service of subsequent units. At the time of return to service of unit 5, all necessary shared SSCs across Pickering A and B will also need to be returned to service. Additionally, the station will be powered from the grid at this time.</p> <p>OPG's application does not make special reference to the unique circumstances of returning unit 5 to service.</p>	OPG is requested to provide further information regarding any special considerations for the return to service of the lead unit, expected to be unit 5.	<p>In May 2025, OPG confirmed compliance with REGDOC 2.3.1.</p> <p>As part of Return to Service (RTS) activities, an overall station review was performed which included all station systems. RTS milestones were assigned to each system required to restart a unit. For Unit 5 start-up, all required common systems (Negative Pressure Containment, 056 Standby Generators, Emergency Coolant Injection, etc.) were included in the review and assigned appropriate milestones which are tied to Unit 5 Restart Control Verification Points milestones (as defined in the Pickering Refurbishment Program Management Plan – Return to Service, NK30-PLAN-00120-00022). Furthermore, specific modifications have been identified to progress Unit 5 as a single unit start-up, and an overall review is being carried out to ensure all nuclear safety requirements will be met for Unit 5 RTS.</p>
7.	General Refurbishment Section 2.3.8.4	<p>OPG states that the refurbishment configurations and activities will continue to meet the safe operating envelope (SOE). OPG also states that the SOE will be revised during the refurbishment outages by way of revisions to the operating policies and procedures (OP&Ps).</p> <p>OPG does not note whether any changes to the SOE or OP&Ps resulting from improvements made during repair and replacement of SSCs are planned, following the refurbishment of units 5-8.</p>	OPG is requested to provide information on planned modifications to the SOE or OP&Ps that may result from plant improvements during refurbishment.	Planned modifications, including Safety Improvement Opportunities described in Section 2.4.8.2 of the licence application [Reference A1] and the scope described in response to CNSC Question #4, are expected to result in changes to SOE documentation, such as Operational Safety Requirements (OSRs). The details of such changes will be communicated to CNSC staff in accordance with existing licence conditions, such as prior written notification for OP&Ps revisions or modifications to special safety systems.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
8.	General Refurbishment Section 2.6.7.3	OPG highlights the importance of layup states in managing outage work and that a normal operational state will be used as a preferred layup state. Earlier in the application, OPG also states that units will be placed in a dewatered and defueled layup state prior to refurbishment. CNSC staff note that with the staggered refurbishment approach, unit 8 may remain in a layup state for several years. It is unclear which systems will be maintained in an operational state or how OPG intends to maintain the various systems of the units that are in a layup state.	OPG is requested to provide further information on how it will maintain SSCs of units kept in a prolonged layup state.	System operation and layup plans have been prepared for each system to preserve the asset and ensure high reliability on unit return to service. System configurations include dry or wet states, with and without equipment operating. The plans include but are not limited to preventive maintenance, chemistry control and operator surveillance to ensure System Structures and Components (SSC) technical requirements are satisfied. The staggered refurbishment approach and outage durations are captured in the plans. The plans will be updated, as required, to include OPEX and reflect any changes in the project that may occur. Each plan has been reviewed by OPG engineering and operations staff.
9.	General Storage with Surveillance Section 1.2	OPG states that reliance on Pickering A systems will continue beyond refurbishment. The application does not provide further information on, specifically, which Pickering A systems will be needed to support operation of Pickering B and when such reliance will be removed. While references are not indicated with respect to such interdependencies, CNSC staff also note that OPG has provided a Storage with Surveillance Plan (SwS) with its DDP submission and provides annual updates to the Stabilization Activities Plan (SAP) for CNSC staff review. CNSC staff confirm that these submissions do discuss reliance between Pickering A and B systems.	OPG is requested to provide information indicating which Pickering A systems will continue to be maintained to support the continued operation of Pickering B and to confirm that all such systems are described in the SwS and SAP. OPG is also requested to provide information on what modifications are being considered to reduce such interdependencies.	Pickering NGS-A (Units 1 to 4) Storage with Surveillance Plan, R00, Section 4.1.2 includes a listing of the station systems required to remain in-service and interconnected at the beginning of SWS to support Pickering NGS-B (Units 5 to 8) continued operation. To ensure independent operation of Pickering NGS-B post refurbishment and to support Pickering NGS-A decommissioning, the common systems critical for the operation of Pickering NGS-B need to be reconfigured to ensure that they are not supplied from Pickering NGS-A. Modifications are therefore planned to reduce dependencies of Pickering NGS-B on Pickering NGS-A, related to Air, Water, Electrical, and Vacuum Building systems. Systems requiring modifications to reduce dependencies of Pickering NGS-B on Pickering NGS-A are listed below: <ol style="list-style-type: none"> 1. Instrument Air 2. Service Water 3. CLII and CLIV Electrical Supplies 4. Vacuum Building and Support Auxiliaries

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>5. Security Systems Loads</p> <p>These modifications are planned to be conducted before the Pickering NGS-A fuel bays are emptied. It is expected that OPG will provide updates in the SAP regarding the above information.</p>
10.	General Storage with Surveillance Section 1.2.2.1	<p>OPG indicates that damaged and defective fuel will be cleaned from the IFB. However, the application does not provide further details, particularly regarding storage.</p> <p>Additionally, OPG states “Support for Defective Fuel Storage: As a part of the project to store defective fuel, a safety analysis will be completed for the transfer, processing and storage of DSCs containing canned defective fuel at the Pickering WMF.”</p> <p>CNSC staff note that such an assessment has not yet been provided to CNSC staff and a determination on its acceptability has not yet been made.</p>	<p>OPG is requested to provide further details regarding the cleanup and storage of damaged or defective fuel, including the amount currently stored in the IFBs and the status of the safety analysis.</p>	<p>The Decommissioning Plan (DDP) recently submitted to CNSC staff outlines that OPG has started a project to empty the fuel bays of fuel. For damaged/defective fuel, OPG is planning to follow the similar process approved by CNSC for Hydro Quebec (HQ) which was successfully implemented and removed damaged and defective fuel at Gentilly 2 by December 2020.</p> <p>With 4 running units over a longer period of time, OPG has more fuel than HQ, thus the canning system design is being improved for this volume. A similar canning system from the same vendor was just delivered to Korea Nuclear Power. OPG uses different on-site storage containers than HQ; thus, the analysis will be developed based on the OPG Dry Storage Containers (DSC). The can design is almost the same as the HQ canning system, with minor changes for compatibility with an improved canning system.</p> <p>The IFB-A has an estimated 87,175 bundles in baskets and 1,981 bundles in scrap baskets. The AIFB has an estimated 138,036 bundles in modules and 1,408 in scrap modules. The scrap baskets/module hold the mandated 20 bundles/year/unit of inspected fuel as well as damaged/defective bundles and pencils. The defective volume is estimated as less than 2% of the full bundle inventory currently being safely managed. The inventory is in NuFlash software established in the 2000s and the tracking prior was estimated as per documented communications between OPG Safeguards and the CNSC staff. The IAEA is</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>aware of this project and there are active discussions on the management of inventory.</p> <p>The modification to design and build the canning system is currently in the detailed design phase, while the modification to modify fuel modules for dry storage of canned damaged/defective fuel (referred to as Damaged or Defective Fuel (DDF) Module) is currently in preliminary engineering phase.</p> <p>Using OPEX from the HQ project, OPG plans to encase an individual defective fuel bundle in a welded container thereafter known as canned fuel. Similar to HQ, OPG is anticipating that each individual canned fuel bundle will have dimensions larger than the intact fuel bundles, so modules will need to be modified to fit canned fuel. The canned fuel will be placed into modified modules and 4 modified modules will be put into a DSC. DSCs containing canned damaged/defective fuel will store less fuel than DSCs containing intact fuel bundles due to the additional dimensions of the can. As a result, it is expected that these DSCs will exhibit lower dose rates and generate less heat compared to DSCs loaded with 384 intact fuel bundles. The impact on direct and indirect interfacing systems will be assessed during the module detailed design phase. OPG plans to follow a similar process as HQ, presenting the safety assessment, supporting analyses, and engineering details to CNSC staff during and/or following the detailed design phase.</p> <p>OPG has informed NWMO of the canning project, and plans on involving them throughout the design phase, to ensure canned fuel can be accepted by the NWMO at the Deep Geological Repository.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
11.	Management System Section 2.1	OPG's application notes recently conducted Nuclear Oversight audits and self-assessments. However, CNSC staff note that OPG does not indicate what audits, self-assessments, and annual management reviews for Pickering operations, refurbishment, decommissioning, and waste management facilities will be conducted during the proposed licence period.	OPG is requested to provide additional information on planned Nuclear Oversight audits, self-assessments, and annual management reviews.	<p>Pickering Nuclear will continue to be audited by Nuclear Oversight according to the Nuclear Operations Assurance Map 5-year coverage plan, N-PLAN-01070-00001. All programs under the OPG Nuclear Management System (NMS) are covered by this plan, including the Nuclear Operations program (N-PROG-OP-0001), the Decommissioning program (W-PROG-WM-0003) and the Nuclear Waste Management program (W-PROG-WM-0001).</p> <p>The requirement to produce a 5-year plan is in accordance with N-PROC-RA-0048 R026, Conducting Audits and Performance Assessments, Section 1.2. The plan currently shows all planned audits until 2028. Before the end of 2028, a new 5-year plan will be published for the 2029 – 2033 cycle and so on.</p> <p>For the Pickering Refurbishment Project, OPG will continue to conduct annual self-assessment planning, which is approved by the senior leadership team via the Corrective Action Review Board (CARB) at the end of each year for its following year. This approach aligns with the overall strategy to achieve maximum topic coverage in conjunction with ongoing oversight activities conducted by Nuclear Oversight (NO), CNSC, Refurbishment Review Board (RRB), etc.</p> <p>The topics, focus areas, and depth of these self-assessments will vary as the project progresses — for example, from readiness at the start of a major window to return to service at the end of a unit's refurbishment.</p> <p>Annual management reviews for Pickering operations, decommissioning and waste management facilities will continue to be conducted in accordance with N-PROC-RA-0023, Fleetview Program Health and Performance</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				Reporting. Programs relevant to Pickering refurbishment are expected to include specific performance indicators within their respective Fleetview Reports. These reports will be reviewed at minimum annually by the Nuclear Executive Committee.
12.	Management System Section 2.1.6	In section 2.1.6, OPG notes the Nuclear Safety and Security Culture Monitoring Plan (NSSCMP) Power App and the Nuclear Safety and Security Culture Trait of the Week and accompanying App. However, CNSC staff note that OPG does not indicate the procedures and related training for using these apps, if applicable.	OPG is requested to provide information on the noted power app training and procedures.	<p>OPG procedure, N-PROC-AS-0083, Nuclear Safety and Security Culture Monitoring Panels, section 1.3.2, describes how the NSSCMP App is used by nuclear staff to rate each of the 44 attributes of a healthy nuclear safety and security culture. When the ratings have been submitted into the NSSCMP App, the NSSCMP Coordinator will send out the consolidated information to the NSSCMP Trait Owners to assist select panel members in assessing and communicating the health of a particular trait across the site. Instructions for using this app are provided in the “New Entry” panel of the app as shown below:</p>  <p>The Trait of the Week App is simply an app that is used to ensure site alignment with which trait is the focus of any particular week. It provides the poster of that trait as well as the schedule. The app is meant to accompany the NSSC website where the Trait of the Week schedule is posted. No training is required for this app.</p> <p>Please refer to the image above for more details.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
13.	Management System Section 2.1.10	OPG's application states "All facility modifications, including the process to place SSCs into inactive/abandoned status and managing active SSCs during SWS will follow OPG's existing Nuclear Management System." However, it is unclear whether OPG intends to modify the management system used for decommissioning during the proposed licensing period.	OPG is requested to provide additional information regarding its decommissioning management system.	All decommissioning work undertaken at Pickering NGS during the proposed licensing period will comply with the processes and procedures of the existing NMS as defined in the N-CHAR-AS-0002 "Nuclear Management System". The risk reduction and removal activities (Planning Envelopes A and B) utilize the existing established governance (OPG-PROG-0039) on project management, contract management and construction management to complete the proposed scope .
14.	Management System Section 2.1.10	OPG's application notes that the execution of work during decommissioning will follow OPG-PROG-0046, Construction Management. However, the intent of this program is to construct and not to decommission SSCs. It is unclear whether this program will require modification to be applied to decommissioning work.	OPG is requested to clarify the applicability of the noted program.	OPG has recently reintegrated its construction management requirements into OPG-PROG-0039, Project Management, and is retiring OPG-PROG-0046. OPG will follow OPG-PROG-0039 for the planning and execution of all Risk Reduction activities approved through the DDP and included in the licensing period, and does not expect any modifications at this time. If OPG requires modifications to OPG-PROG-0039 to accommodate certain Risk Reduction activities, existing processes to update OPG programs will be followed, as per N-CHAR-AS-0002.
15.	Management System Section 2.1.11	In the Licence application, OPG states that the "Refurbishment Program complies with the Project and Construction Management Programs, OPG-PROG-0039 and OPG-PROG-0046 respectively." However, in N-CHAR-AS-0002 R024, Nuclear Management System, OPG-PROG-0046 was removed and OPG-PROG-0039 was reintegrated.	OPG is requested to clarify the information provided in section 2.1.11, particularly the use of programs that are no longer under N-CHAR-AS-0002 R024.	In August 2025, after submission of the licence application [Reference A1], N-CHAR-AS-0002 R024, Nuclear Management System, and OPG-PROG-0039 R007, Project Management, were issued. The construction requirements of CSA N286-12 (Clauses 7.7, 7.11.2, 9.6 and 9.8) are met through the implementing document OPG-STD-0183, Construction Management. As OPG-PROG-0046 is no longer a required program, it is being retired and replaced with OPG-PROG-0039 following the change management process.
16.	Human Performance	Clause 6(m) of the CINFR requires the application to include the proposed responsibilities of and qualification requirements and training program for workers, including the	OPG is requested to provide the noted information regarding:	N-PROG-TR-0005, outlines and identifies the major Nuclear Training Programs. The listing of Training and Qualification Description (TQD) documents associated with Nuclear

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	Management Section 2.2	<p>procedures for the requalification of workers.</p> <p>CNSC staff note that section 2.2.2 does not include the proposed responsibilities and qualification requirements of workers, nor state the procedure to be used to requalify workers.</p> <p>Further, section 2.2.8 does not include the proposed responsibilities and qualification requirements of vendor supplied personnel.</p> <p>The application indicates that vendor supplied personnel will not be trained using the OPG program or procedures but does not describe the training program that will be used.</p> <p>Clause 6(n) of the CINFR requires the application to include the results that have been achieved in implementing the program for recruiting, training, and qualifying workers in respect of the operation and maintenance of the nuclear facility.</p> <p>CNSC staff note that section 2.2 does not include adequate information regarding results achieved in implementing the training program.</p> <p>Clause 7(j) of the CINFR requires the application to include the proposed qualification requirements and training program for workers.</p> <p>CNSC staff note that section 2.2.7 does not specify the proposed qualification requirements for decommissioning workers. The DDP states that decommissioning labourers will be used who are not typically employed to support other OPG activities.</p>	<ul style="list-style-type: none"> the responsibilities, qualification, and training of workers, including those supplied by vendors the results achieved in implementing the training program the proposed qualification requirements for decommissioning workers 	<p>Training Programs are provided in N-LIST-08920-10001, Nuclear Training Programs. The specific TQDs outline the responsibilities of the workgroups within the operating organization. These TQDs outline both the initial training and the continuing training / requalification training requirements for staff.</p> <p>A new TQD for Pickering Refurbishment will be developed describing the specific incremental training and qualification requirements for any individual, including OPG staff and Vendor Partners, who perform nuclear refurbishment work for refurbishment specific activities, similar to N-TQD-901-00001, Nuclear Refurbishment Training and Qualification Description, which was created for the Darlington Refurbishment Project.</p> <p>The training related to the decommissioning activities will be managed using N-PROG-TR-0005, Training. OPG will follow the same processes used for operations to ensure external contractors meet the training requirements of REGDOC-2.2.2, <i>Personnel Training</i>.</p> <p>Vendor Training is managed using N-TQD-510-00001, Supplemental, BTU, and Direct Hire Training and Qualification Description, which specifies training requirements for this target population, including any identified for decommissioning activities.</p> <p>New decommissioning activities will be analyzed per N-PROC-TR-0008, Systematic Approach to Training.</p> <p>REGDOC-2.2.2, sets out requirements and guidance for the analysis, design, development, implementation, evaluation, documentation and management of training at nuclear</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>facilities within Canada, including the essential principles and elements of an effective training system.</p> <p>The Health of Training (HoT) Report is an industry-accepted approach to evaluating and providing a measure of how effective the training system is achieving performance improvement through training. The HoT reports include a number of categories where each category has defined criteria for measuring level of compliance with Systematic Approach To Training principles and the success of meeting performance expectations.</p> <p>These reports are rolled into the Training Index, which is the Nuclear Training Key Performance Indicator and is an aggregate score of the overall health (or success) of the Training Program in improving station performance. Pickering's overall Training Index has been rated excellent in the last three quarters. Additional information on training effectiveness was provided in section 2.2.2 of the licence application [Reference A1].</p> <p>In addition, REGDOC-3.1.1, <i>Reporting Requirements for Nuclear Power Plants</i>, includes quantitative annual reporting requirements, e.g., number of initial certification examinations and recertification tests taken in the year and the pass rate. This data is highly specific to the certification training program.</p>
17.	Human Performance Management Section 2.2	<p>With respect to REGDOC 1.1.3, Licence Application Guide – Licence to Operate A Nuclear Power Plant, Section 4.2.3 Personnel Training states:</p> <p>“The application shall include the applicant’s overall training policy and all governance documents (or a description) related to the training system, including a list of the</p>	<p>OPG is requested to provide the noted information regarding:</p> <ul style="list-style-type: none">the list of occupations and descriptions	<p>On a quarterly basis, OPG reports on the performance of Nuclear Power Plant personnel to the CNSC as per REGDOC-3.1.1, <i>Reporting Requirements for Nuclear Power Plants</i>, Version 3. The final report of the calendar year includes:</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		<p>occupations or positions. The application shall include descriptions of the initial and continuing training programs for all workers engaged in licensed activities, including workers employed as trainers and instructional staff.”</p> <p>CNSC staff note that:</p> <ul style="list-style-type: none"> The list of occupations and descriptions is not provided in sections 2.2.2, 2.2.7, 2.2.8, or 2.2.9. Initial and continuing training programs for all workers engaged in licensed activities has not been provided in sections 2.2.2, 2.2.7, 2.2.8, or 2.2.9. It is not clear if the refurbishment project will use N-PROG-TR-0005, Training for contractors brought in for refurbishment. This program only applies to personnel on the list of nuclear training programs. Section 2.2.8 indicates that contractors hired for refurbishment will use their own training system but does not describe that system. 	<ul style="list-style-type: none"> the initial and continuing training programs the training program applicable to refurbishment contractors 	<ol style="list-style-type: none"> a summary of the organizational changes, reflecting the organizational structure for the calendar year being reported, a complete and accurate organizational arrangement identifying the names and descriptions of each functional unit with accountability under the licence, including staffing numbers and staff job titles; and if contractors are used, the reporting relationships and licence accountabilities under which contractors are managed. <p>The initial and continuing training programs for established workgroups, including those supporting the refurbishment and decommissioning projects will be maintained using N-PROG-TR-0005, Training. In addition, a new TQD for Pickering Refurbishment will be developed describing the specific incremental training and qualification requirements for any individual, including OPG staff and Vendor Partners, who perform nuclear refurbishment work for refurbishment specific activities. This new TQD will be similar to N-TQD-901-00001, Nuclear Refurbishment Training and Qualification Description, which was created for the Darlington NGS Refurbishment Project.</p> <p>In addition, N-TQD-510-00001 Supplemental BTU, and Direct Hire Training and Qualification Description specifies training requirements for this target population including for the Nuclear Refurbishment Project. This TQD includes a section related to Nuclear refurbishment training and the requirements in accordance with OPG and Vendor Partners training system and programs. This TQD will be updated per its review cycle.</p>
18.	Human Performance	OPG states “Pickering NGS Units 5 to 8 minimum complement changes are expected to be requested following defuel of	OPG is requested to provide information on its planned	OPG does not intend to modify Emergency Response Team or Security Minimum Shift Complement (MSC) levels during

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
	Management Section 2.2.8	units". However, OPG has not provided a plan or timelines for these noted Pickering NGS units 5-8 minimum shift complement (MSC) changes.	changes to the Pickering B MSC with respect to refurbishment activities.	<p>the refurbishment period. Off-site response arrangements, Emergency Response Organization Roles, and municipal agreements are expected to remain unchanged.</p> <p>MSC changes to Control Room Staffing will be implemented in the following phases: Phase 1: Units in extended shutdown - Gradual reduction to MSC requirements for Authorized Nuclear Operators Phase 2: All units defueled - Control room staffing requirement reduced to Supervisor Phase 3: Prior to Unit 5 fuel load Phase 4: Subsequent Unit fuel loads</p> <p>OPG will utilize a similar approach to that used for Pickering NGS Units 1 and 4 MSC changes to address the first two phases. Submissions for Phase 1 are expected by the end of Q1 2026, and for Phase 2 by the end of Q2 2026. All submissions will be prepared in accordance with REGDOC-2.2.5, <i>Minimum Staff Complement</i>. The timing for Phase 3 and Phase 4 submissions will be determined at a later date.</p>
19.	Human Performance Management Section 2.2.3 & 2.2.4	Licence Condition 2.3 of OPG's PROL for the Pickering NGS requires OPG to maintain certification programs in accordance with REGDOC 2.2.3 Vol III, Version 2. However, OPG's application does not indicate how it plans to meet these requirements and maintain the certification of certified personnel during refurbishment.	OPG is requested to provide information detailing its certification strategy during refurbishment.	<p>A staffing report is currently being drafted and is expected to be submitted to the CNSC by year-end. Below are the salient points regarding treatment of certified staff during the refurbishment period:</p> <ul style="list-style-type: none"> • Certified staff will continue to perform in role until the units are defueled. • Certified staff will be assigned to inactive status shortly after the Phase 2 (all units defueled) MSC changes, consistent with REGDOC-2.2.3, <i>Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2</i> requirements.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<ul style="list-style-type: none"> Staff will remain certified and inactive up until just prior to Phase 3 (Unit 5 new fuel load), when minimum shift complement will be re-established. Certified staff training (update training, refresher training and simulator training) will continue throughout the refurbishment period consistent with REGDOC-2.2.3, <i>Volume III, Version 2</i> requirements. Certified staff will receive specialized training as appropriate to the unique aspects of the Unit 5 start-up. OPG will select a core group of certified staff for the Unit 5 start-up. The core group will be reassigned to "Active" status when assigned to MSC duties (just prior to new fuel load). The core group performance will be reviewed during the period from new fuel load to OPGSS surrender. OPG will ensure the core group of certified staff can perform all duties competently and safely prior to OPGSS surrender. The process outlined above is consistent with REGDOC-2.2.3, <i>Volume III, Version 2</i> requirements, in particular section 20.5.4, work under supervision.
20.	Operating Performance Section 2.3.8.1	OPG states "Changes to status of plant SSC are approved, documented, performed and verified by qualified personnel (unless the SSC is isolated and de-energized)." CNSC staff note that it is unclear what qualification requirements will be in place for staff performing work on isolated and de-energized SSCs.	OPG is requested to clarify how work is managed and performed with respect to isolated and de-energized SSCs	Work will be managed and performed on isolated and de-energized SSCs by staff as defined in their respective TQDs. Prior to declaring a system back in service, scope and quality of work, will be confirmed via comprehensive construction completion documents and system return to service testing.
21.	Safety Analysis Section 2.4.3	OPG states that it "plans to review and assess the impacts of various pending changes related to the Pickering NGS Units 1 to 4 transition to decommissioning and Pickering NGS Units 5 to 8 refurbishment activities on the existing Pickering NGS	OPG is requested to provide further information regarding an updated Pickering PSA	OPG is developing the plan for PSA update (which will include Severe Accident Analysis as part of the Level 2 assessments) covering the refurbishment period from 2025 to 2032. A meeting with CNSC staff was held on September

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		<p>Units 5 to 8 probabilistic safety assessments (PSAs)". CNSC staff requests additional information on the scope and the timeline for this work.</p> <p>To support the evaluation of life-extension, refurbishment and safety improvements, CNSC staff expect that OPG conduct PSA studies using the current PSA models to assess the impact of planned refurbishment activities (including safety improvements) on Pickering NGS Unit 5 to 8, and to provide CNSC staff the safety benefits from a PSA perspective (in terms of core damage frequency and large release frequency reduction, from the current PSA results).</p> <p>CNSC staff expect that the results and insights of these PSA studies on planned refurbishment activities, such as those listed in Section 2.4.8.2 and other potential safety improvement opportunities, should be used in OPG's application for the purpose of demonstrating that:</p> <ul style="list-style-type: none"> • Sufficient safety improvements have been considered/planned, to the extent practically/reasonably achievable, to reduce the severe accident risk. • The large release risk (from both the magnitude of release and frequency of release) is significantly reduced (compared with the pre-refurbished plant). <p>In addition, CNSC staff expect that the PSA results are also used in the PSR process to support the demonstration that the gap between existing plant and "modern codes and standards" requirements/expectations on "practical elimination of significant radioactive releases" is adequately addressed and reduced to the extent practical/achievable. CNSC staff note that OPG's PSR3 is currently underway.</p> <p>OPG also states that "OPG plans to update the Pickering NGS Units 5 to 8 severe accident analysis (SAA) in support of the Pickering NGS Units 5 to 8 refurbishment PSA update". In support of the restart of Pickering NGS Units 5 to 8 following</p>	and SAA, including strategy, scope, timeline, and results.	<p>17, 2025, where OPG presented the proposed PSA update strategy and timeline; formal correspondence will follow and is planned to be submitted to CNSC staff in Q4 2025.</p> <p>The scope of PSA activities will be phased and will include the applicable impacts of Pickering NGS Units 1 to 4 separation modifications and transition to decommissioning, impact of refurbishment construction activities, and the impact of Safety Improvement Opportunities (SIOs) on the PSA goals as documented in the Risk and Reliability Program (N-PROG-RA-0016). Transition periods from the first unit return-to-service to post-refurbishment operation will be included. A Level 1 timeline will be provided indicating PSA activities and the proposed submissions until 2032.</p> <p>The current SIOs being considered for Pickering NGS Units 5-8 refurbishment were created using insights from the 2022 Pickering B Risk Assessment (PBRA), system reliability models, previous ISR/PSRs, system Component Condition Assessments and Darlington NGS OPEX. The SIOs are primarily driven by their positive nuclear safety impact in deterministic, probabilistic and/or hazard analysis space. The development of the SIOs is also driven by the intent to meet the safety goals outlined in the Risk and Reliability Program (N-PROG-RA-0016).</p> <p>SIOs that have been screened through the feasibility and definition phases of refurbishment are currently progressing through the early stages of conceptual and detailed design. Through an iterative process, PSA studies are assisting with detailed design decisions to ensure the proposed solutions result in practical PSA risk benefits. The individual and aggregate benefits of SIOs in terms of Severe Core Damage Frequency (SCDF) and Large Release Frequency (LRF)</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		planned refurbishment, CNSC staff request OPG to provide a PSA and SAA update strategy. CNSC staff acknowledge OPG's plan to update the SAA for Pickering Units 5-8, however clarity is requested on the timeline and scope for this update.		<p>results will not be fully quantified until the detailed design is completed.</p> <p>OPG agrees that the PSA insights are used in the PSR process. In the PSR3 Safety Factor 6 (SF6): PSA, the existing PSA was reviewed to determine to what extent the results remain valid as a representative model of the plant when the following aspects have been considered: changes in the design and operation of the plant; new technical information, current methods; and new operational data. OPG received comments from CNSC staff on PSR3 SF6; OPG has recently submitted dispositions to the comments on PSR3 SF6 related to PSA [Reference A3]. OPG will continue to progress the SF6 gaps through the PSR3 process, developing resolution plans in the Global Assessment Report and potentially developing into actions in the Integrated Implementation Plan. In general, the PSR3 uses the PSA and its results, where appropriate, to support the PSR3 assessment. For example, in the PSR3 Global Assessment Report, the Defense in Depth assessment reviews the most recent PSA results and their impact on each of the 5 levels of defense in depth.</p>
22.	Safety Analysis Section 2.4.9 & 2.5.7	<p>OPG states "Support for MKIII (V-Groove) DSCs: It will be confirmed, prior to storage, that storing used fuel in MKIII DSCs in the storage buildings is an acceptable practice. The MKIII DSC design will follow the OPG ECC process and is described in more detail in Section 2.5.7."</p> <p>Furthermore, OPG has notes that a preliminary dose rate assessment was conducted for MKIII DSC, which indicated an insignificant change to the dose rates that is within the available margin at the site boundaries.</p> <p>CNSC staff request OPG to:</p> <ul style="list-style-type: none"> Confirm whether a safety assessment has been conducted to support the use of the MKIII DSC. 	OPG is requested to provide the noted information regarding the MKIII DSC.	<p>Written notification to CNSC staff will be provided for licensing basis document changes prior to implementation of the DSC design change as per the LCH. Currently OPG is planning to submit design details and supporting information to CNSC staff for the MKIII DSC in Q4 2025.</p> <p>Some information regarding the MKIII DSC:</p> <ul style="list-style-type: none"> A dose rate assessment has been completed for MKIII DSC, which indicated an insignificant change to the dose rates at the front and side faces of the DSC, and the skyshine effect is within the available margin at the site boundaries.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		<ul style="list-style-type: none">Describe the key design differences between the MKII and MKIII DSCs.Indicate whether the change will impact any existing programmatic or procedural documents.Provide the anticipated start date and key milestones for the MKIII DSC implementation at Pickering WMF boundaries.		<p>Various analyses have been completed for assessing MKIII DSC structural integrity and safety. These analyses include on-site processing and storage design basis accident scenarios, off-site transportation (DSC-TP) design basis accident scenarios, thermal impact, and container/site dose rates. The analyses have demonstrated there are sufficient design margins for the DSC MKIII modification.</p> <ul style="list-style-type: none">The key design differences between the DSC MKIII and MKII are:<ol style="list-style-type: none">Modification in the DSC lid-to-base closure weld groove from single bevel to V-groove configuration. The V-groove configuration will allow easy access to the weld root and improve weld quality.Reduction in the weld height from 1-1/4" to 3/4", and consequently a reduction in weld passes and the thickness of DSC lid/base flange thickness.Removal of the lid and base reinforcing rings, and extension of the DSC lid and base outer liners to join the lid and base flanges.The majority of the existing programmatic or procedural documents for MKII DSC will still be applicable to processing the MKIII DSC. The modification will require updates to and/or creation of new operations and maintenance procedures. For example, there will be revisions to the lid-to-base welding procedure, inspection procedures, and IAEA safeguard LMCV scanning procedure. Revisions to these documents will follow the change management process.

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				<ul style="list-style-type: none"> Currently the planned implementation schedule for MKIII DSC at PWMF is: <ol style="list-style-type: none"> Commissioning between November 2026 and January 2027 Available for Service in February 2027
23.	Safety Analysis Section 2.4.9	OPG states "Shielding analysis is performed to determine dose rates from DSCs, both inside and outside the storage buildings and structures." CNSC staff note that the Pickering WMF includes only storage "buildings" for DSCs and not storage "structures".	OPG is requested to provide the noted information regarding the MKIII DSC.	DSCs will be stored with other DSCs only, in used fuel dry storage buildings at the PWMF. Holistic dose rates at the PWMF outside of DSC storage buildings and refurbishment waste structures (i.e. Dry Storage Modules and the Pickering Component Storage Structure) are calculated to ensure acceptance criteria will be met.
24.	Physical Design Section 1.2	OPG notes the future separation of the Pickering site via the "AB Gate". It is unclear how the containment system will be configured once this separation is established.	OPG is requested to provide further information regarding the future configuration of containment following separation of Pickering A and B, including timing.	<p>With regards to containment on Pickering NGS Units 1 to 4, OPG is pursuing erecting bulkheads on Unit 1 (similar to that of Units 2 and 3), as well as a wall within the Pressure Relief Duct between the Vacuum Building and Unit 2 that will remove Unit 4 from containment. Preliminary engineering is complete, and detailed design is in progress, with execution planned for 2027 - 2028. These modifications are to remove Units 1 and 4 from containment.</p> <p>After the bulkheads are installed, remaining SSCs of containment that are not already supplied by PNGS-B will be switched over to PNGS-B supply, as detailed in OPG's response to CNSC comment 9.</p>
25.	Physical Design Section 1.2.1.3	OPG's application notes various planned improvements but does not provide information on improvements of Bulkheads/perimeter seals between Pickering reactor buildings (RBs) and the PRD. It is unclear whether such improvements will be conducted as part of proposed refurbishment project or captured under the Safety Improvement Opportunities (SIOs). Additionally, there is no information on possible improvements to associated leak rate measurement methodologies.	OPG is requested to provide further information regarding improvements to seals between the RBs and PRD, including testing methodologies.	<p>The PRD/RB bulkhead perimeter seals will be replaced. The Post-Maintenance Testing consists of the Pre-Operational Proof Testing and the Integrated Leakage Rate Testing, as applicable.</p> <p>The blow-in and blow-out panel seals will also be replaced. Note that there is no previous history or OPEX of significant leakage from these components.</p> <p>The test methodology will adhere to the requirements of CSA N287.6 and/or N287.7, as applicable.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
26.	Physical Design Section 1.2.1.3 and Appendix B	OPG's application notes changes to instrument air systems in appendix B but does not provide details. It is unclear whether OPG intends, as part of the proposed refurbishment project, to improve leakage rates to improve the negative pressure containment system response time.	OPG is requested to provide further information regarding improvements to instrument air systems.	Scope is planned to replace the design of diaphragm-type isolating valves on the instrument air supply circuits inside containment. OPEX has shown that these diaphragms develop leaks at the bonnet flange as a result of aging, changing the design will eliminate this failure mode.
27.	Physical Design Section 2.5.1 & 2.5.5	OPG notes N-PROC-MP-0082, Design Registration and N-PROC-MP-0040, System and Item Classification in its application. It is unclear if these procedures also cover pressure boundary decommissioning activities (e.g., systems declassification, de-registration). In section 2.5.5, OPG further states "This section provides additional information regarding the Physical Design SCA with respect to Units 1 to 4 decommissioning. It is intended to supplement the information provided in the general SCA discussion above and therefore only addresses those specific areas where additional decommissioning-related details are needed." However, CNSC staff note that OPG's application does not include information on strategy and methodology for pressure boundary decommissioning for Units 1&4.	OPG is requested to provide additional information regarding pressure boundary decommissioning. OPG is also requested to clarify whether the noted procedures cover pressure boundary decommissioning activities.	OPG has not yet finalized the plans related to the AB Gate and pressure boundary decommissioning. Pressure boundary decommissioning will be captured in future DDP Volumes, and in accordance with CNSC REGDOC-2.11.2, Decommissioning, OPG will review and update the DDP at 5-year intervals to capture any updated/new decommissioning plans and submit to CNSC staff for approval. N-PROC-MP-0040 and N-PROC-MP-0082 govern system classification and design registration, including provisions for systems not required to be classified and systems no longer requiring to be registered. OPG plans to revise these procedures to further clarify the requirements for declassification and deregistration of the existing classified and registered systems that will no longer required be in service (abandoned). These procedures will be updated by January 1, 2027, along with the update for the Pressure Boundary Transition project for new Code Effective Dates.
28.	Physical Design Section 2.5.4.1	OPG's application discusses the refurbishment of Units 5-8, decommissioning of Units 1-4, and the renewal of the NGS and WMF operating licences. In section 2.5.4.1, OPG notes two documents: N-PROG-MP-0004, Pressure Boundary and N-Man-01913.11-10000, Pressure Boundary Program Manual. CNSC staff note that these documents are for pressure boundary activities to support safe operation. It is unclear if OPG's intends for these documents to also	OPG is requested to provide further information to demonstrate that the noted documents adequately cover all pressure boundary activities intended for the proposed licensing period, including refurbishment and decommissioning.	N-PROG-MP-0004, Pressure Boundary and N-MAN-01913.11-10000, Pressure Boundary Program Manual govern all pressure boundary activities at OPG nuclear facilities, including the refurbishment of Units 5 to 8 and decommissioning of Units 1 to 4. These documents are planned to be updated by January 2027 to capture required changes. CNSC staff will be provided written notification on revisions to these documents as required per the LCH.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		support pressure boundary activities for the Units 5-8 refurbishment and Units 1-4 decommissioning.		
29.	Physical Design Section 2.5.4.1	<p>OPG states "Based on the agreement reached with the CNSC, all PB activities at Pickering NGS are compliant with CSA N285.0-08 and update no. 2. until the end of the Pickering NGS Refurbishment Project".</p> <p>CNSC staff previously accepted OPG's submission [A2] that requested concurrence for freezing the design code and standard effective dates for Pickering 5-8 refurbishment, which indicated compliance with CSA N285.0:23. CNSC staff also note that this submission and acceptance are not formally referenced in OPG's application.</p> <p>More recently, OPG requested CNSC staff acceptance of the pressure boundary transitional provisions for compliance with CSA N285.0:23/ CSA N285.6 Series:23 (and Annexes G and J as "normative") [A3]. In its request, OPG indicated that these transitional provisions do not apply to the Pickering refurbishment project engineering planning activities or pressure boundary activities initiated after January 1, 2027.</p> <p>With respect to Pickering, it is CNSC staff's understanding that the transitional provisions are intended to accommodate only current station operations.</p> <p>It is CNSC staff's interpretation that all Pickering B Refurbishment activities should be compliant with N285.0-23.</p>	OPG is requested to respond to CNSC staff's comment and clarify the implementation of CSA N285.0:23.	<p>OPG confirms that the pressure boundary transitional provisions are intended to accommodate only current station operations. The new design-related codes and standards' effective dates accepted by CNSC staff [References A4 and A5] will apply starting January 1, 2027 for the entire nuclear fleet. In Reference A6, OPG requested CNSC staff acceptance of transitional provisions for pressure boundary activities initiated prior to, and in progress on January 1, 2027. These activities continue to follow CSA N285.0-08 and Update No. 2 in accordance with an approved Pressure Boundary Program Manual. The transitional provisions for current station operations, if accepted, will allow OPG to manage scope changes and avoid extensive rework and code edition reconciliations after January 1, 2027. To clarify, the statement in Section 2.5.4.1 of the licence application [Reference A1] should be "Based on the agreement reached with the CNSC, all PB activities at Pickering NGS are compliant with CSA N285.0-08 and update no. 2 until the end of the Darlington Refurbishment Project in 2026".</p> <p>OPG confirms that all Pickering NGS Units 5 to 8 refurbishment activities should be compliant with N285.0-23. The new design-related codes and standards' effective dates were accepted by CNSC staff [Reference A7 and A8] to be effective immediately for the Pickering Units 5-8 Refurbishment Engineering Planning activities as requested in Reference A9. There are no Pickering NGS Unit 5 to 8 Refurbishment pressure boundary activities initiated using CSA N285.0-08 and Update No. 2. The proposed pressure boundary transitional provisions are therefore not applicable to the Pickering NGS Units 5-8 Refurbishment Engineering Planning activities.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>The Pickering NGS Units 5-8 Refurbishment pressure boundary implementation activities will be initiated in accordance with the approved Pressure Boundary Program Manual, upon incorporation of the new Code Effective Dates, following completion of the Pressure Boundary Transition project, after January 1, 2027.</p> <p>The transitional provisions are therefore not applicable to Pickering Refurbishment pressure boundary implementation activities.</p>
30.	Physical Design Section 2.5.6.2	In section 2.5.6.2, OPG discusses its strategy for pressure boundary activities during Pickering units 5-8 refurbishment. However, CNSC staff note that OPG does not reference a refurbishment pressure boundary program.	OPG is requested to clarify the applicable pressure boundary program	There is one pressure boundary program (N-PROG-MP-0004) that is applicable for all pressure boundary activities at the NGS, WMF and including the refurbishment projects. OPG has initiated a project to transition the OPG governance (PB program and PB Program Manual) to full compliance with CSA N285.0-23 and the reference Standards by January 1, 2027.
31.	Physical Design Section 2.5.7.2	CNSC understand that since the Pickering WMF follows the OPG Nuclear governance for pressure boundaries, the Pickering WMF also follows code effective dates for Pickering WMF pressure boundary activities that are aligned with those of the Pickering NGS.	OPG is requested to clarify whether the Pickering NGS and Pickering WMF will respect the same code effective dates.	PWMF will respect the same code effective dates as PNGS as per Reference A10, Design Codes and Standard Effective Dates for the OPG Nuclear Fleet, and accepted by CNSC staff in Reference A11.
32.	Fitness for Service Section 2.6.	In table 29, CNSC staff note that the periodic inspection plan (PIP) for N291 SSCs (Non-Containment Safety Related Structures Periodic Inspection Program, P-PIP-03643.2-00001) is not included.	OPG is requested to confirm whether the noted PIP should be included in table 29.	OPG confirms that the periodic inspection plan (PIP) for N291 SSCs (Non-Containment Safety Related Structures Periodic Inspection Program, P-PIP-03643.2-00001) should be included in Table 29.
33.	Fitness for Service Section 2.6.1	Section 2.6.1 of the application provides information regarding the list of Pickering A and Pickering B Systems Important to Safety, as well as the implementation of the reliability program following the Pickering A shutdown and decommissioning. However, the implementation plan for the period following Pickering B shutdown and defuel is not discussed. CNSC staff request additional information on the implementation of the reliability program activities for SSCs important to the safety of	OPG is requested to provide information pertaining to the implementation of the reliability program during the period where all units are defueled.	OPG will continue to adhere to REGDOC-2.6.1, REGDOC-3.1.1 and N-STD-RA-0033. OPG will monitor and report on all current Systems Important to Safety and Components Important to Safety listed in Revision 005 of P-REP-03611-00012 for Pickering NGS Units 5–8 (inclusive of Pickering NGS Units 1-4 NPC as it is shared) until they are no longer required during the planned refurbishment of Pickering NGS Units 5-8.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		Pickering A and Pickering B IFBs for the period where all Pickering units are defueled.		<p>Following the defueling of Pickering NGS Units 1-4, OPG updated the list of Systems and Components Important to Safety considering all available PSA studies, deterministic analyses and available station data. An Expert Panel meeting was held where the nuclear safety impacts, both probabilistic and deterministic, from the IFBs were reviewed and assessed as part of OPG's update to its SIS/CIS List. The components supporting the IFBs were screened out based on both deterministic and probabilistic considerations as previously communicated in Reference A12. The importance of IFB and AIFB remains unchanged following shutdown of Pickering NGS Units 1-4 and 5-8 as compared to normal operation, with routine monitoring of these systems remaining unchanged. This approach of screening out systems is consistent and aligned with internal governance, N-STD-RA-0033, and regulatory documents, REGDOC-2.6.1. The approach for the Pickering IFB-B following the defueling of Pickering NGS units 5 to 8 will align with the approach for Pickering NGS Units 1 to 4 IFBs.</p> <p>Both the Pickering IFB-A and IFB-B will continue to be maintained as a Safe Operating Envelope (SOE) system. Further, OPG will maintain its graded approach to managing equipment reliability of the Pickering IFB-A and IFB-B. System Performance Monitoring, which is performed by Station Engineering in accordance with N-PROC-MA-0024, will continue and monitoring of System Health of the Pickering IFB-A and IFB-B is required until all fuel is removed. All routine monitoring and reporting activities are unchanged following shutdown of Pickering NGS Units 5 to 8 and is consistent with those requirements of N-PROC-MA-0024.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				OPG understands that CNSC Staff are requesting a “pilot project” to introduce additional reporting of the AIFB and IFB-A beyond the scope of the existing Pickering SIS/CIS List using a “graded approach”. As communicated and agreed to during the OPG-CNSC discussion in August 2025, the 2025 Pickering Annual Risk & Reliability Report (ARRR) will report on Revision 004 of P-REP-03611-00012, which includes Pickering NGS Units 1 to 4 systems and components beyond just NPC, up until the point they were no longer required to be available (e.g. defuel). CNSC staff’s request for a pilot project for reporting of the AIFB and IFB-A will be considered for the 2026 Pickering ARRR. The same approach may be considered for Pickering NGS Units 5 to 8 after the defueling of those units.
34.	Fitness for Service Section 2.6.2	OPG states that “Upon completion of maintenance activities, Post-Maintenance Tests (PMTs) are conducted as per N-STD-MA-0008, Station Material Condition and Housekeeping which establishes the PMT process and specifies the requirements.” CNSC staff note that N-STD-MA-0008 appears to pertain only to housekeeping practices and not PMTs.	OPG is requested to provide additional information on the conduct of the noted PMTs.	Section 2.6.2 [Reference A1] contains a reference error. The Post Maintenance Testing document reference should be N-STD-MA-0004.
35.	Fitness for Service Section 2.6.3.1	OPG notes that pressure tubes are periodically removed from operating reactors for material surveillance. OPG does not indicate details on planned activities following refurbishment of the units.	OPG is requested to provide additional information pertaining to its strategy for the removal of PTs for material surveillance.	As noted in Section 2.6.3.1[Reference A1], OPG will continue to comply with CSA N285.4 and all applicable standards for material surveillance of pressure tubes following refurbishment. OPG ensures compliance through the preparation of Fuel Channel Life Cycle Management Plans (LCMP) which will continue to be updated and maintained through refurbishment and the post-refurbishment operating life of the station. The LCMP and corresponding Pickering Fuel Channel Periodic Inspection Program (PIP) Plan (to be reviewed and accepted by the CNSC staff) will map out future pressure tube removals for the purpose of material surveillance in accordance with the requirements defined in Clause 12.4 of CSA N285.4.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
36.	Fitness for Service Section 2.6.7	OPG's application notes several SSCs that are within the scope of the potential refurbishment project. However, OPG's application does not provide information on how OPG plans to use the results of the reliability program to identify systems and components for inclusion in the refurbishment scope. For example, how will negative performance trends be used to identify potential aging impacts on system reliability to inform the scope of the refurbishment activities.	OPG is requested to clarify whether and how results from the reliability program were used to identify SSCs for inclusion in the scope of refurbishment activities.	<p>System Condition Assessments (SCAs) form the foundation of the refurbishment scope by integrating aging management strategies with equipment reliability plans. SCAs utilize a variety of information sources, including Component Condition Assessments (CCAs), system and component health reports (SHR/CHR), system health action plans, equipment surveillance data, maintenance records, analyses of degradation and failure trends, and cyclical maintenance activities such as backlog and preventative maintenance. The identification of major refurbishment outage scope is accomplished through a cross-functional review process involving Engineering, Operations, Maintenance, Nuclear Safety, and other key disciplines, ensuring that critical safety and equipment reliability work are prioritized using a risk-based approach.</p> <p>To effectively manage refurbishment scope and monitor systems throughout the refurbishment period, OPG will utilize established processes for scoping, health reporting, and oversight. Examples of these processes and forums include the Refurb Change Control Board (RCCB), Executive Scope Review Board (ESRB), Asset Management Oversight Committee (AMOC), Project Management Oversight Committee (PMOC), Preventative Maintenance Review Board (PMRB), Plant Health, and Scope Review Board (SRB). These existing processes will remain in place during refurbishment to ensure that equipment reliability actions are consistently reviewed and managed in accordance with established protocols.</p>
37.	Fitness for Service Section 2.6.7	The steam generator replacement project will create significant modifications to the reactor building concrete structures. These modifications may have an impact on their aging behaviour. CNSC staff were unable to identify in OPG's submission any consideration given to the potential	OPG is requested to provide information and results pertaining to the evaluation of the noted impacts regarding steam generator	The removal of the Original Steam Generators (OSGs) and installation of Replacement Steam Generators (RSGs) is proposed through two openings in the reactor building dome with one opening centered above Boiler 6 (west bank of the calandria) and one opening centered above Boiler 7 (east

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		increase or modification in aging behaviour of the concrete structures due to the modifications required by the steam generator replacement project.	replacement, including information on planned mitigations.	bank of the calandria). It is understood that the activities associated with the removal of the two openings in the reactor building dome and dome restoration will have an impact on the aging management plan. During detailed design, stress redistribution and discontinuity, cracking and leakage (including microcracks, shrinkage cracks, and construction joint permeability), as well as exposure-related deterioration of concrete and reinforcement will be considered. During the early design engineering phase, OPG performed extensive visual inspection and non-destructive tests (NDT) of the Pickering NGS reactor building dome surface on Units 5 to 8. All inspections and examinations were carried out to assess the existing condition of the concrete containment structures and their parts as a baseline prior to concrete dome cutting activities. Additional inspection activities are planned to be performed on the reactor building dome during the construction and commissioning phases of the reactor building. Planned post-construction verification will include NDT and leak-tightness testing of restored areas, along with pre-/post-condition comparisons to support long-term monitoring within the scope of the Aging Management Program (AMP). Furthermore, the risk associated with stress redistribution and discontinuity was evaluated through nonlinear 3-D finite element analysis. Based on the preliminary study, it was concluded that the dome slab with openings during the construction stage and after dome restoration are adequate to resist the loads applied. Fully understanding and evaluating the potential risks and challenges to the long-term aging behavior of the reactor building dome, due to the modifications, helps to minimize impacts on its aging behaviour and structural integrity.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>Proper engineered construction techniques and material specifications will be considered during the creation and restoration of openings in the reactor building dome. These methods include:</p> <ul style="list-style-type: none">• Hydro-demolition: This technique may be used to remove concrete around opening perimeters, preventing the formation of microcracks in adjacent concrete and preserving the integrity of the existing structure.• Staged removal sequencing: Concrete removal may be carried out in controlled stages to minimize sudden load redistribution, reducing the risk of overstressing the remaining dome sections.• Shrinkage crack control reinforcement: Reinforcement may be detailed in reinstated sections to control shrinkage strains, minimizing the risk of cracking in the restored areas.• Construction joint preparation: New construction joints may be roughened and fitted with new waterstops to ensure durable bonding and leak-tightness.• Protection of exposed reinforcement: During steam generator replacement activities, exposed rebars may be fitted with protective caps and enclosures to prevent corrosion. <p>The benefits of these methods include:</p> <ul style="list-style-type: none">• Maintaining the dome's global and local structural integrity and original stress distribution throughout all construction phases. Preventing the development of new microcracks, thereby preserving the long-term durability and aging performance of the dome concrete.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<ul style="list-style-type: none"> Ensuring the compatibility and durability of new materials with the existing concrete, limiting potential aging-related degradation. Minimizing exposure-related deterioration of reinforcement and surrounding concrete during the construction period. <p>Based on OPEX, a number of NPP concrete structures, including concrete containment buildings, have experienced degradation, requiring remedial action. Some initial problem areas that were identified were primarily related to material, construction, or design errors.</p> <p>As described above, all potential risks associated with the modifications have been identified and are fully controlled through the planned evaluation and mitigation measures.</p>
38.	Fitness for Service Section 2.6.7.6	<p>OPG states that new and improved pressure tubes will reset aging limits and that new materials will mitigate life limiting mechanisms.</p> <p>OPG has not provided information describing which life limiting mechanisms would be improved.</p> <p>For example, elongation of pressure tubes is a life limiting mechanism. Will the new fuel channel assemblies involve design changes to limit elongation or accommodate additional elongation through redesigned bearings?</p>	OPG is requested to respond to the comment and provide further information on the life limiting mechanisms improved by new fuel channels.	<p>Through a combination of design changes and modern manufacturing and installation practices, margins against the following life limiting mechanisms are expected to improve with the installation of new pressure tubes:</p> <p>Pressure Tube Deformation</p> <ul style="list-style-type: none"> The new pressure tubes have a higher specified wall thickness than pre-refurbishment pressure tubes. This increase in wall thickness will reduce diametral strain and operating stresses. To better accommodate axial elongation, the outboard bearing sleeves and inboard journal rings are being redesigned (increased lengths) to maximize the amount of available bearing travel. <p>Pressure Tube to Calandria Tube (PT-CT) Contact</p> <ul style="list-style-type: none"> The new fuel channels will use tight-fitting Zr-2.5Nb-0.5Cu spacers currently being installed in the refurbished Darlington NGS units. The use of tight-fitting spacers is expected to mitigate the spacer movement/relocation issues

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>inherent with the current loose-fitting spacer design, ultimately reducing the risk of PT-CT contact.</p> <p>Pressure Tube Flaws</p> <ul style="list-style-type: none">- Using current Zr-2.5Nb manufacturing and inspection processes will minimize the introduction of laminar flaws during forming of the new pressure tubes. These changes will further reduce the already low occurrence of laminar flaws.- Current Foreign Material Exclusion (FME) practices will be followed to minimize the amount of foreign material entrained in the Primary Heat Transport System during construction/maintenance activities. Minimizing the introduction of foreign material will reduce the rate of debris fretting flaw formation post-refurbishment.- Increased pressure tube wall thickness and material property improvements (described below) will improve margins and increase overall flaw tolerance post-refurbishment. <p>Pressure Tube Deuterium Ingress</p> <ul style="list-style-type: none">- Manufacturing processes have been modified to reduce the initial concentration of hydrogen in pressure tubes. Quadruple melting of the pressure tube ingots, control of furnace vacuums, and modified machining at intermediate stages of manufacturing have contributed to reduced hydrogen concentrations in pressure tubes. With lower initial hydrogen, hydrogen equivalent concentration is expected to be at lower levels for the same operating time than in the pressure tubes currently installed in Pickering NGS Units 5 to 8. <p>Pressure Tube Material Properties</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>- The most important manufacturing-related contributor to low fracture toughness is chlorine concentration. With quadruple melting, the new pressure tubes will have the same limit on chlorine concentration as those manufactured for recent retube projects, which is an improvement on the currently installed pressure tubes.</p> <p>- As described above, reduced initial hydrogen concentrations are also expected to improve overall fracture toughness.</p>
39.	Fitness for Service Section 2.6 & 2.11.6	<p>CNSC staff have been unable to identify in OPG's application any consideration of the physical condition and aging management of the IFBs.</p> <p>OPG notes that the IFBs for Pickering units 1-4 are required to remain in service to support the Pickering A Safe Storage Project, however the IFB-A was not included in the scope of PSR-3, and so no assessment of condition and aging management has been provided.</p> <p>The IFB for Pickering B must remain in operation for refurbishment. The PSR3 Gap SF2-3 identified that "a plan to address the leakage from the Pickering B IFB into the interspace sumps during the extended operation needs to be developed".</p> <p>The licence application Section 2.11.6 states "Prior to the start of refurbishment, OPG is implementing actions to ensure that the IFBs will be ready from a heat removal and space standpoint prior to receiving a unit's full core discharge of fuel, in accordance with CNSC REGDOC-2.5.2" however no other information is provided.</p>	OPG is requested to provide additional information on the assessments and plans to ensure fitness for service of the Pickering A and B IFBs to support the activities planned during the proposed licence period.	<p>The aging management plan for the IFBs includes several measures to ensure the reliability and fitness-for-service of the bays throughout their service life at Pickering NGS.</p> <p>Until the AIFB and the IFB-A are emptied by 2040, the following aging management activities are planned:</p> <ul style="list-style-type: none"> • AIFB Module Loader Overhaul: The overhaul of AIFB module loader was recently completed. This work ensures that the module loader can operate safely and reliably for the required operations in the AIFB. • AIFB Leakage to Interspace: Risk mitigation strategies are in place to ensure that the AIFB water level is maintained within acceptable ranges until leak repairs can be completed. Two (2) temporary sump pumps have been installed and are used intermittently when required to pump water back to the bay and maintain bay level. <p>Monthly leak rate tests are completed. The results from the test are reviewed by engineering to calculate and trend the leak rate. Recent data shows that leak rates are stable and are within seasonal fluctuations in the AIFB.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>An analysis was completed by engineering in Q1 2025 to determine the pumping capacity of the temporary sump pumps in relation to the leak rate trends. It was demonstrated that the pumping capacity of the temporary sump pumps is more than 10x that of the trending leak rates, demonstrating sufficient capabilities to mitigate the current risk of leakage to interspace in the AIFB.</p> <p>Data from Pickering NGS groundwater monitoring shows that there is no evidence of leakage to the environment. The data from sampling wells and groundwater tubes indicate that the leakage is confined to the interspace.</p> <ul style="list-style-type: none">• AIFB Supertool Reliability: To ensure operability of the supertool, the replenishment strategy for critical maintenance parts for the supertool has been revised to ensure that adequate stock is on hand at all times to allow for timely repairs.• AIFB Underwater Gantry Light Replacement: The underwater gantry lights will undergo upgrades to LED lights to ensure reliable underwater visibility. All three of the underwater gantry lights are planned for replacement, with similar work to follow in the IFB-A and IFB-B.• IFB-A Cooling Pump Replacements: To ensure the reliability of the IFB-A cooling loop, replacements are planned for both cooling pumps 0-34410-P4 and P5 with new models. To support these replacements, a backup cooling pump has been installed, 0-34410-P8, which will provide further redundancy to the cooling reliability in the interim.• Safe-store for AIFB / IFB-A: A safe-store project is in preliminary stages for emptying the AIFB/IFB-A, with a focus on scrap baskets and damaged/defective

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>fuel. Plans are in progress for the safe canning of this fuel.</p> <p>The aging management activities planned for IFB-B to ensure operation for an additional 30 years are:</p> <ul style="list-style-type: none">• IFB-B Leakage to Interspace: A risk mitigation strategy is in place to ensure that the IFB-B water level is maintained within acceptable ranges until leak repairs can be completed. Three(3) temporary sump pumps have been installed and are used intermittently when required to pump water back to the bay and maintain bay level. Monthly leak rate tests are completed, and the results reviewed by engineering to calculate and trend the leak rate. Recent data shows that leak rates are stagnating for the IFB-B. The analysis completed by engineering in Q1 2025 demonstrated that, similar to the AIFB, the temporary sump pump pumping capacity is much greater than the trending leak rates, indicating sufficient margin for this risk mitigation strategy.• IFB-B Leak Repair: The PSR3 Gap SF2-3 identified that “a plan to address the leakage from the Pickering NGS Units 5-8 IFB into the interspace sumps during the extended operation needs to be developed”. This is being addressed through leak searches and liner repairs for the IFB-B. There are discussions as to when this activity should occur and the current plan is to perform liner repairs post-refurbishment when the bay is more accessible from defueling activities.• IFB-B LPSW Pipe Inspections: Preliminary inspections have been completed on the LPSW

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>piping in the IFB-B cooling loop to determine the condition of the pipes. These inspections have revealed degradation of the pipes. Further inspections via non-destructive examination (NDE) testing are planned. Necessary repairs and extent of condition inspections on the IFB-A and AIFB will be scheduled based on the findings.</p> <ul style="list-style-type: none"> • IFB-B Purification Filters: A plan is in progress for swapping the model currently used for our IFB-B purification filters to a longer lasting, more reliable filter model. The new model is planned to undergo testing first to ensure the efficiency of the filter swap strategy. If successful in the IFB-B, the scope may be expanded to include a change in model to the AIFB / IFB-A filters as well. • IFB-B Supertool Reliability: Since the AIFB and IFB-B supertool are the same, a similar strategy has been taken to ensure operability of the IFB-B supertool. The replenishment strategy for critical maintenance parts for the supertool has been revised to ensure that adequate stock is on hand at all times to allow for timely repairs.
40.	Radiation Protection Section 2.5.7.2	<p>OPG notes that a design change for the DSCs used at the Pickering WMF will be pursued during the licence period associated with the requested consolidated licence. OPG's application states that the new DSC design will be referred to as the MKIII and that a preliminary dose rate assessment has been completed, which indicated an "insignificant change to the dose rates and within the available margin at the site boundaries".</p> <p>However, OPG's application does not comment on the anticipated impact of the proposed MKIII design on worker doses.</p>	OPG is requested to provide information pertaining to impacts of the MKIII DSC design on worker dose.	<p>Furthermore to the safety analyses response on MKIII DSC to CNSC Question #22 above, the minor change to the weld groove area/lid seating surface was analyzed and the potential increase in dose rates was determined to not present any anticipated impact on worker safety. The location of this change on the DSC design is not within the routine working distance and location of staff, as it is on the top of the DSC and not at ground level.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
41.	Radiation Protection Section 2.7	<p>Section 2.4 of REGDOC-1.1.3 requires the applicant to provide a statement of performance assessment that includes significant findings and lessons-learned over the previous licence period.</p> <p>However, OPG's application does not include any discussion on the work series that drove the CRE values for any given year, which work series in general are the most dose significant based on experiences, and what measures are effective/ineffective in managing worker exposures during those work series.</p>	OPG is requested to provide the noted information regarding RP/ALARA past performance, significant lessons-learned, and results of major self-assessments that transpired over the current licensing period at the NGS and WMF.	Responses to this comment are provided in Attachment 3 of this submission.
42.	Radiation Protection Section 2.7	<p>Section 4.7.3 of REGDOC-1.1.3 requires the applicant to expand upon RP equipment and instrumentation with respect to the applicant's RP program.</p> <p>OPG's application provides a high-level discussion on the use of radiation detection instrumentation for the purpose of achieving radiological hazard control. OPG's application also includes the identification of some OPG governance documents related to RP equipment and instrumentation. However, OPG's application lacks sufficient description that demonstrates OPG has control over how these instruments and equipment are selected, calibrated, maintained, or monitored for end-of-life.</p>	OPG is requested to provide the noted information, including any applicable governance documents, regarding radiation protection equipment and instrumentation.	Responses to this comment are provided in Attachment 3 of this submission.
43.	Radiation Protection Section 2.7	<p>Section 4.7.3 of REGDOC-1.1.3 requires the applicant to expand upon the RP provisions associated with planning for unusual situations.</p> <p>OPG's application discusses unusual situations (i.e. Anticipated Operations Occurrences, Design Basis Accidents, Beyond Design Basis Accidents) and includes content on associated safety analyses and emergency management. However, OPG's application lacks sufficient discussion on the provisions for RP during unusual situations.</p>	OPG is requested to provide the noted information regarding the provisions for radiation protection during unusual situations at the NGS and WMF.	Responses to this comment are provided in Attachment 3 of this submission.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response																						
44.	Radiation Protection Section 2.7.7	Regarding Pickering WMF perimeter dose monitoring, OPG states “Data is reported to the CNSC in the Pickering WMF Quarterly Operations report.” In May 2024, CNSC staff notified OPG that quarterly reporting, under the WFOL, to the CNSC was no longer required and that annual reporting would be required instead. This resulted in the discontinuation of the Pickering WMF Quarterly Operations reports.	OPG is requested to clarify the reporting method of perimeter dose monitoring of the Pickering WMF facilities.	OPG will continue to deploy WMF perimeter environmental gamma monitoring TLDs on a quarterly basis, and will continue to report all data to the CNSC on an annual basis.																						
45.	Radiation Protection Appendix C	GNSCR 3(1)(c) requires that the application include “the name, maximum quantity, and form of any nuclear substance to be encompassed by the licence”. GNSCR 3(1)(j) requires the application to provide “the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activity to be licensed, including waste that may be stored, managed, processed or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste”. To address the above, OPG’s application contains Appendix C, which provides a high-level summary and identifies natural uranium, irradiated uranium, depleted uranium, Co-60, heavy water, enriched uranium, intermediate-level waste, and low-level waste. CNSC staff note that OPG’s RP and Dosimetry programs contain provisions to monitor for various radionuclides, including mixed fission and activation products (MFAP); the radionuclides include, but are not limited to H-3, Sr/Y-90, Zr/Nb-95, Co-60, Am-241, Pu-239, Pu-239/240 Cm-242, Cm-243/244 and other hard to detect nuclides like Fe-55. With the exception of Co-60, OPG’s submission has not provided a list of radiological hazards that need to be monitored for. Additionally, from a Safety Assessment perspective, OPG has established that key radionuclides to consider are Cs-137, Sr/Y-90, and radioiodine.	OPG is requested to provide a comprehensive listing, in accordance with GNSCR 3(1)(c) and GNSCR 3(1)(j), of the anticipated radiological hazards associated with the activities encompassed by the requested licence.	<p>In addition to the detailed requirements for workplace monitoring which form the basis of OPG's Licensed Dosimetry Program, workplace survey requirements are captured in N-PROC-RA-0024, <i>Hazard Surveys, Posting, and Labeling</i>. Specifically, Table 4: Workplace Radiation Monitoring Programs.</p> <p style="text-align: center;">Table 4: Workplace Radiation Monitoring Programs</p> <table><tr><th>Radiological Hazard</th><th>Site</th><th>Frequency or other criteria</th><th>Instruction to Perform Monitoring</th></tr><tr><td rowspan="2">Particulate Carbon-14</td><td>PNGS Units 1-4 (A)</td><td>Twice annually or major work on Annulus gas system.</td><td rowspan="2">N-INS-03425.4-10000, Particulate Carbon-14 Workplace Monitoring</td></tr><tr><td>PNGS Units 5-8 (B), DNGS</td><td>When working on horizontal or vertical flux detectors.</td></tr><tr><td>Neutron</td><td>PNGSA, PNGSB, DNGS</td><td>Annually</td><td>N-INS-03425.4-10001, Neutron Dosimetry Methods Dose Rate Validation Surveys</td></tr><tr><td>Alpha</td><td>PNGSA, PNGSB, DNGS, NWMD</td><td>As specified in N-INS-09071-10013 or on receipt of notification of potential fuel defects.*</td><td>N-INS-09071-10013, Workplace Alpha Contamination Monitoring and Control</td></tr><tr><td>Hard to Detect Nuclides</td><td>PNGSA, PNGSB, DNGS</td><td>Every five years or commencement of major system work.</td><td>N-INS-09071-10019, Radionuclide Characterization at Nuclear Facilities</td></tr></table> <p><small>* Notifications received in accordance with N-PROC-MP-0106, Fuel Integrity and Defect Management. Alpha characterization only required to be performed on affected unit unless circumstances suggest other areas may be affected.</small></p> <p>Pickering NGS specific examples of the documents generated in accordance with N-PROC-RA-0024, Table 4 include:</p> <ul style="list-style-type: none">• NA44-REP-09071-00005, <i>Alpha Characterization Report – Pickering 014 2024</i>	Radiological Hazard	Site	Frequency or other criteria	Instruction to Perform Monitoring	Particulate Carbon-14	PNGS Units 1-4 (A)	Twice annually or major work on Annulus gas system.	N-INS-03425.4-10000, Particulate Carbon-14 Workplace Monitoring	PNGS Units 5-8 (B), DNGS	When working on horizontal or vertical flux detectors.	Neutron	PNGSA, PNGSB, DNGS	Annually	N-INS-03425.4-10001, Neutron Dosimetry Methods Dose Rate Validation Surveys	Alpha	PNGSA, PNGSB, DNGS, NWMD	As specified in N-INS-09071-10013 or on receipt of notification of potential fuel defects.*	N-INS-09071-10013, Workplace Alpha Contamination Monitoring and Control	Hard to Detect Nuclides	PNGSA, PNGSB, DNGS	Every five years or commencement of major system work.	N-INS-09071-10019, Radionuclide Characterization at Nuclear Facilities
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Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		<p>CNSC staff note that GNSCR 3(1)(c) and GNSCR 3(1)(j) lists specific information that is required. CNSC staff presume that the qualification and quantification of the radiological hazards associated with the Pickering NGS and Pickering WMF may be described in various OPG documents (e.g. source term characterizations). If this is the case, it would be acceptable for OPG to provide these documents to fulfil the requirements of GNSCR 3(1)(c) and GNSCR 3(1)(j).</p> <p>OPG's application should consider the radiological hazards that are to be encompassed by the requested consolidated licence. This would include OPG's Safe Storage and decommissioning activities of Pickering NGS Units 1-4, the radiological substances associated with the refurbishment of Pickering NGS Units 5-8, and the operation of the Pickering WMF.</p>		<ul style="list-style-type: none"> NK30-REP-09071-00005, <i>Alpha Characterization Report – Pickering 058 2024</i> P-REP-03420-00007, <i>Source Term Characterization at PNGS (2024)</i>
46.	Conventional Health and Safety Section 2.8.	The refurbishment of Units 5-8 is expected to result in changing hazards as work progresses and a possible increased risk of injury that workers must be made aware of.	OPG is requested to provide additional information regarding how workers (including contractors) will be made aware of changing hazards on the site associated with OPG's planned activities.	Recognizing that the refurbishment of Units 5–8 will introduce evolving hazards, the Nuclear Refurbishment team has developed a Health and Safety Integration Plan to ensure all workers, including contractors, are aware of the increased risk of injury. The plan identifies key risks—such as congested work areas, material handling and movement, falling objects, and the presence of multiple work groups—and underscores the importance of effective controls. To address these hazards, the team will incorporate relevant learnings from the recent Darlington Nuclear Refurbishment Project, as well as external sources, and leverage well-established tools and processes. Additionally, a mock-up facility is available for practicing high-risk tasks, senior leadership oversight forums will facilitate early detection of safety concerns, and a strong field presence will be maintained by both the Health & Safety team and line leadership.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
47.	Environmental Protection Section 2.9	<p>OPG's application notes several documents that do not require CNSC notification of change that are used to support OPG's application conclusions. Therefore, CNSC staff have either not reviewed these documents or are unsure if newer revisions exist.</p> <p>The following documents have previously been submitted to the CNSC:</p> <ul style="list-style-type: none"> • OPG-STD-0152, Spill Management Rev 001 • OPG-PROC-0036, Environmental Aspects Identification and Significance Rating R007 • OPG-PROC-0041, Environmental Event Identification, Classification, and Reporting R008 • P-PLAN-03480-00001, Pickering Nuclear Radioactive and Hazardous Emissions Monitoring Plan R012 <p>The following document has not previously been submitted to the CNSC:</p> <ul style="list-style-type: none"> • OPG-STD-0119, Biodiversity Conservation Standard 	OPG is requested to provide the latest revisions of the noted documents, where necessary.	<p>Enclosure 1 provides OPG-PROC-0036 R008, <i>Environmental Aspects Identification and Significance Rating</i>.</p> <p>Enclosure 2 provides P-PLAN-03480-00001 R013, <i>Pickering Nuclear Radioactive and Hazardous Emissions Monitoring Plan</i>.</p> <p>Enclosure 3 provides OPG-STD-0119 R002, <i>Biodiversity Conservation Standard</i>.</p> <p>The other noted documents in CNSC staff's comment are confirmed to be the latest revision.</p>
48.	Environmental Protection Section 2.9.2.1	<p>OPG states that "The PERA concluded that there are no potential adverse effects predicted to human health or the environment as a result of the project activities". CNSC staff note that these conclusions seem to be focused on "adverse effects" and have no mentioning of any risks.</p> <p>CNSC staff expect OPG's PERA conclusions presented in the Application to use risk assessment terminology in order to reflect the objectives of the assessment (i.e. predict and assess the risks to representative human and ecological receptors posed by proposed activities).</p>	OPG is requested to ensure that PERA conclusions are presented using risk assessment terminology in future submissions on this matter.	<p>OPG has presented the terminology within the PERA to reflect the concepts in CSA N288.6 (Environmental risk assessments at nuclear facilities and uranium mines and mills), as well as REGDOC-2.9.1 (Environmental Protection: Environmental Principles, Assessments and Protection Measures).</p> <p>Specifically, the PERA is aligned with the following definitions of "Predictive ERA" and "risk", included in Section 3.1 of CSA N288.6:</p> <ul style="list-style-type: none"> • Predictive ERA — an ERA (generally applicable to a new facility or process) that attempts to estimate the

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				<p>effects of a contaminant or stressor on an existing environment prior to its release into the environment.</p> <ul style="list-style-type: none"> • Risk — a representation of the potential for occurrence of effects due to exposure to a contaminant or stressor. The term is sometimes used in the strict sense of a probability of occurrence of an effect... <p>The PERA aims to quantify and characterize the risk to representative human and ecological receptors posed by proposed activities, and conclusions are drawn on the potential effects. This is consistent with REGDOC-2.9.1, which states in Section 4.1 that the ERA “assesses the likelihood and significance of these interactions and the resulting potential effects on the environment and the public”.</p> <p>In the next iteration of the PERA, additional language will be added to the Conclusions section to make a clearer connection between risks and effects, based on the concepts described above. Similar changes will be incorporated into applicable future submissions to the CNSC in support of the licence renewal application. This will ensure that the conclusions are more reflective of the objectives of the PERA.</p>
49.	Environmental Protection Section 2.9.3.1	OPG’s enclosed storage with surveillance plan states “As plant conditions evolve through SWS, portions of the active drainage system... could be isolated from Radioactive Liquid Waste Management System (RLWMS), end-stated, and abandoned.” CNSC staff note that at the Pickering NGS site, similar to other NGS sites in Canada, part of the groundwater protection functions benefit from the active drainage system, such as foundation drains, where the groundwater level is actively	OPG is requested to provide additional information regarding the noted possible interaction between planned end-stating activities and the continued groundwater monitoring and protection program.	OPG has a robust groundwater monitoring protection program. The groundwater monitoring protection program will continue to comply with CSA N288.7 standard (Groundwater protection and monitoring programs for nuclear facilities and uranium mines and mills) during the entire life cycle of the facility including Storage with Surveillance and Decommissioning phases. Therefore, any changes to the groundwater condition as a result of site

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		managed. This results in a drainage sink causing groundwater to flow inward to the protected areas. It is unclear if the planned end-stating of portions of the Pickering A active drainage system during the proposed licence period may affect the status and efficiency of the groundwater protection program.		activities is expected to be detected and addressed in a timely manner. Currently there are no plans to end state foundation drains, or associated drain paths during the SwS phase, therefore the groundwater condition is not expected to change significantly during this period. OPG will continue to provide CNSC staff with the groundwater monitoring protection program report to CNSC staff.
50.	Environmental Protection Section 2.9.6 & 2.9.7	OPG states that “The valid FAA period extends from the date of issue (January 2018) through December 31, 2028” CNSC staff note that while the first version of OPG’s FAA was issued in 2018, the most recent amended FAA was issued on August 25, 2022. OPG’s application does not indicate whether OPG has sought an amendment or renewal of its current FAA at this time. OPG further states that “ECCC accepted that no further monitoring for potential chronic effects on Round Whitefish will be needed for operations up to December 31, 2026. The need for, and scope of, future thermal monitoring of the Pickering NGS discharge will be proposed by OPG in consultation with DFO, ECCC and First Nations Rightsholders.” CNSC staff note that OPG has not indicated whether it has conducted the noted consultations and whether future thermal monitoring is planned to support operations beyond December 31, 2026.	OPG is requested to provide additional information regarding any planned amendment or renewal of its FAA for continued operation of the Pickering NGS. OPG is also requested to provide additional information regarding possible future thermal plume monitoring.	OPG is currently in discussions with DFO regarding the metrics that will be used (replacing Age-1 equivalency) to measure and quantify impingement and entrainment (I&E) impacts. Once these metrics have been finalized in consultation with DFO and First Nations Rightsholders, OPG will seek a technical amendment of its current FAA for continued operation of the Pickering NGS. As CNSC staff are aware, the surface water intake at Pickering NGS is planned to be replaced with a deep-water intake (DWI) system which is expected to lead to a reduction in thermal discharge temperatures. OPG will assess the need for and scope of future thermal monitoring of the Pickering NGS discharge and conduct the noted consultations (with DFO, ECCC and First Nations Rightsholders) once changes to the intake system and design of the proposed DWI are clearly defined and more information is available on potential impacts to the thermal discharge.
51.	Environmental Protection Section 2.9.10	OPG states “Due to the proximity of the Pickering WMF Phase II Area to the shoreline and the bluff, an erosion hazard assessment was completed to determine the appropriate setback of the buildings from the shoreline and the bluff per Ontario Regulation 166/06 under the Conservation Authority Act.” CNSC staff note that OPG has not provided the erosion hazard assessment report for CNSC staff review.	OPG is requested to provide the noted erosion hazard assessment report.	The erosion hazard assessments for the PWMF Phase II area are documented in Enclosure 4 and Enclosure 5.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
52.	Environmental Protection Section 2.9.10.5	<p>In its application, OPG provides information on visual screening of buildings from the shoreline and shoreline stability. CNSC note that:</p> <ul style="list-style-type: none"> Since the Pickering Component Storage Structure (PCSS) is outside the area considered when the locations of the visual screens were determined, it is unclear whether the visual screens reduce visibility of the PCSS. What program and reporting mechanism to the CNSC will be used for future slope stability studies. 	<p>OPG is requested to:</p> <ul style="list-style-type: none"> Confirm whether the placement of the visual screening is sufficient to reduce visibility of the PCSS. Clarify the program that is in place to continue monitoring slope stability and report such information to the CNSC. 	<p>The purpose of the visual screening was to benefit the trail users on the waterfront trail east of the PNGS property. As part of the follow-up monitoring plan associated with the development of SB3 and SB4, a follow-up assessment of the established visual screening was completed in 2020. The assessment found there could be improvements and additional trees were planted and measures to promote growth of existing trees were completed. No additional visual screening work is planned. The established trees and existing topography will also provide visual screening of the PCSS from the waterfront trail.</p> <p>The shoreline stability monitoring was required as part of the PWMF Phase II Environmental Assessment Follow-up Plan (92896-REP-07701.8-00001) for SB4, and has been completed. SB4 and the planned SB5 buildings are located inland of the 100-year erosion limit (the PCSS is located further inland). As recommended in the SB4 shoreline hazard assessment, erosion monitoring of the bluff continues to be completed periodically by a coastal engineer to confirm annual recession rates and to identify any changes to features along the bluff (i.e. roads, fences, stormwater outfalls). OPG plans to continue to include information on shoreline monitoring in the PWMF Annual Compliance Report (ACR).</p>
53.	Emergency Management and Fire Protection Section 1.2	<p>OPG's application notes that the fire response needs analysis (FRNA) is updated in accordance with CSA N393 for the Pickering WMF but does not discuss this analysis with respect to the Pickering NGS.</p> <p>CNSC staff note that it is unclear if OPG intends to update the FRNA for the Pickering WMF and the Pickering NGS to reflect proposed changes to the Pickering site, such as the construction of the AB Gate and other decommissioning and refurbishment activities, to ensure emergency response team</p>	<p>OPG is requested to provide information on planned updates to the FRNA for the Pickering NGS and Pickering WMF.</p>	<p>The license change to Pickering WMF does not change the licensing basis publications, or the fire response strategy. Hence, per CSA N393-22, Clause 11.2.2, the Pickering WMF FRNA will be reviewed and updated as necessary to reflect major changes to facility configuration, hazards, and systems, i.e. adding any new structure.</p> <p>Similarly, as part of the AB Gate, and other decommissioning and refurbishment modification project(s), through the ECC</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		(ERT) staffing and equipment are appropriate and ensure training is updated accordingly.		process, a Fire Protection Impact Evaluation (FPIE) form will be completed. The modification process will assess for any potential impedance to emergency response and define appropriate measures to either ensure compliance with the existing FRNA or revise the FRNA as required. This may reflect major changes to facility configuration, hazard and systems in accordance with CSA N293 to ensure emergency response team (ERT) staffing, equipment and training are appropriate.
54.	Emergency Management and Fire Protection Section 2.10.3	<p>OPG's application notes that the Pickering NGS's Fire Protection Assessment (FPA), which consist of the Fire Hazard Assessment and Fire Safety Shutdown Assessment, was re-affirmed in 2022 and submitted to the CNSC. CNSC staff note that its review of the 2022 FPA was done in view of Pickering ceasing commercial operation as determined at the time and did not capture plans for refurbishment.</p> <p>OPG's application does not include information on plans to update these documents to reflect anticipated changes to fire hazards and fire protection systems.</p> <p>CNSC staff expect the FPA to capture anticipated plant modification and changes to fire protection systems. The FPA also needs to clearly identify all anticipated modifications or changes to current fire hazard and fire protection systems. The impact of anticipated modifications or changes should be assessed in the FPA.</p>	OPG is requested to provide further information regarding the status of an updated FPA for the Pickering NGS.	<p>For Pickering NGS Units 1 to 4, the FPA (including both the Fire Hazard Assessment (FHA) and Fire Safety Shutdown Analysis (FSSA)) is being completed as part of the ongoing project, in compliance with CSA N293 frequency requirements. This work will ensure that all anticipated modifications and changes to fire hazards and fire protection systems are appropriately captured and assessed.</p> <p>For Pickering NGS Units 5 to 8, the FPA (including FHA and FSSA) is planned to be reaffirmed in accordance with the CSA N293 frequency requirements. In addition, OPG will revise the FPA to incorporate all refurbishment-related modifications and changes to fire protection systems as part of the refurbishment project planning cycle. This approach will ensure that the FPA continues to meet regulatory expectations and accurately reflects the plant configuration throughout the refurbishment process.</p> <p>OPG will ensure that the FPA for both Pickering NGS Units 1 to 4 and Units 5 to 8 comprehensively addresses any anticipated modifications or changes to fire hazards and fire protection systems.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
55.	Waste Management Section 1.2.2.1	OPG states “The decommissioning of the IFBs will follow a phased approach... As fuel is removed, empty baskets and associated frames will be removed from the IFBs and disposed of using existing waste routes.” It is not clear to CNSC staff what the existing waste routes will be at the time of decommissioning and the disposition pathway for this type of waste.	OPG is requested to provide further information pertaining to the noted waste routes and disposition pathways during decommissioning.	For work anticipated during the licence period, waste routes and disposition pathways for L/ILW and HLW from the fuel bay will be managed per OPG's Nuclear Waste Management Program, W-PROG-WM-0001. For specific planning envelopes, this is detailed in Section 2.6.2.1 of NA44-PLAN-00960-00004, PNGS-A (Units 1-4) Detailed Decommissioning Plan, Volume 0 – Program Overview. Waste management practices are reviewed and updated as needed for subsequent revisions of the DDP.
56.	Waste Management Section 2.11.6	OPG states “Once ready, these LLW containers will be transferred or shipped from the Pickering NGS to the planned PCSS, Western Waste Management Facility (WWMF) or an equivalent licensed facility that can accept LLW.” OPG's application does not specify what will determine where these LLW containers will be shipped or transferred to.	OPG is requested to provide further information regarding the transfer of the noted LLW containers.	Where potential LLW may be shipped or transferred to will be a business decision with consideration of waste management efficiencies, consistent with any transportation restrictions for waste shipments, and any identified opportunities for optimization, incorporating lessons learned and risk mitigation with respect to waste management from Darlington NGS and Bruce Power NGS refurbishment projects. For example, similar to Darlington NGS feeders and in alignment with OPG's target for waste diversion, feeder pipes are suitable for metal processing at a third-party licensed facility which minimizes the volume of radioactive waste requiring storage/disposal. The on-site transfer of LLW to the PCSS will follow OPG's Radiation Protection program. Off-site shipments of LLW will follow OPG's Radioactive Materials Transportation program which ensures the dose rates are acceptable for transport in certified transportation packages. Radioactive shipments are characterized, classified, packed, shipped, and received in a manner that is compliant with the Transportation of Dangerous Goods Regulations and the Packaging and Transport of Nuclear Substances Regulations, 2015 to ensure the safety of workers, the public, and the environment.

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
57.	Transportation Section 2.14.1	OPG's application provides information on its packaging and transport program. However, OPG does not include information on how it ensures that third party carriers are compliant with the applicable transportation regulations.	OPG is requested to provide further information on how it ensures third party carriers are compliant with applicable regulations.	OPG ensures that all third-party carriers used for the transportation of regulated materials are compliant with applicable federal, provincial, and municipal regulations through a comprehensive process. This includes a rigorous pre-qualification and selection process where carriers must demonstrate compliance with laws such as the Transportation of Dangerous Goods (TDG) Act and CNSC requirements by providing relevant documentation and certifications. As part of this process, carriers are required to complete and submit OPG-FORM-0210, which documents the carrier's compliance status and provides detailed information on their regulatory qualifications, and OPG-FORM-0214, which records the training and competency of carrier personnel involved in the transportation of regulated materials. OPG's contracts with carriers require ongoing regulatory compliance and the maintenance of all necessary permits. Additionally, OPG verifies that carrier personnel have completed required regulatory training and competency assessments as documented in OPG-FORM-0214. Compliance is further ensured through periodic audits, which may involve document reviews and site visits, as well as mandatory incident reporting and investigation protocols. OPG regularly reviews carrier performance, provides feedback for continuous improvement, and takes corrective actions if necessary, including the possibility of contract termination for non-compliance. Through these measures, including the use of OPG-FORM-0210 and OPG-FORM-0214, OPG maintains a high standard of regulatory compliance and safety in its transportation activities.
58.	Indigenous Engagement Section 1.6.1.6	Tables 10, 11, and 12 contain a summary of OPG's engagement with Indigenous Nations and communities. Some of the bullet points in those tables contain dates, attendees, and topics discussed, but that information is not provided for each activity listed. For each of the activities in each of the	OPG is requested to provide the noted information pertaining to details of OPG's engagement activities, including the	OPG has updated Tables 10, 11 and 12 of the application with the information specified by CNSC staff (Attachment 4 of this submission).

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		<p>bullets of Tables 10, 11, and 12, please specify the date(s) of the activity, the participating Indigenous Nations or communities, and the particular topics discussed.</p> <p>Additionally, OPG provides a summary of issues raised by Indigenous Nations or communities in Table 13 but does not identify which Indigenous Nation or community raised which concern, nor how OPG worked to address those concerns.</p> <p>OPG is also requested to identify the concerns raised by each Indigenous Nation or community, demonstrate how OPG has worked with Indigenous Nations or communities to address those concerns, and confirm that information is reflected appropriately with the relevant Indigenous Nation or community, where possible.</p>	concerns of Indigenous Nations and communities.	<p>OPG's engagement with Indigenous Nations and communities is ongoing, iterative and dynamic. OPG also recognizes the importance of understanding and addressing issues, interests, and/or concerns raised by Indigenous Nations and communities. Table 13 represents a general summary of issues and concerns raised by Indigenous Nations and communities from early engagement activities on the Pickering licence renewal. OPG chose not to attribute specific concerns raised to individual Indigenous Nations, or demonstrate how OPG has worked to address concerns, as engagement discussions are ongoing.</p> <p>OPG is expected to provide this level of detail in the Commission Member Document (CMD), when engagement discussions have progressed further.</p> <p>OPG has also enhanced current engagement log software to allow for more effective issues and concern tracking.</p>
59.	Indigenous Engagement Section 1.6.1.6	<p>OPG provides a preliminary assessment of potential impacts to Aboriginal and/or Treaty rights.</p> <p>It is unclear whether any of the potential impacts identified were included from input from Indigenous Nations or communities or to what extent OPG has engaged with Indigenous Nations and communities on potential impacts to their Aboriginal and/or Treaty rights.</p>	OPG is requested to provide further information regarding its engagement with Indigenous Nations and communities on potential impacts to their Aboriginal and/or Treaty rights, including any concerns raised.	<p>As referenced in the application, OPG's preliminary assessment of impacts was from OPG's perspective and may evolve as engagements unfold to inform OPG's understanding of how the activities in the application may impact established or asserted Aboriginal and/or treaty rights. Indigenous Nations and communities have been engaged on the application and OPG welcomes all feedback from Indigenous Nations and communities on how activities in the application may impact established or asserted Aboriginal and/or treaty rights, to support OPG in addressing those impacts through avoidance, mitigation, and accommodation measures, as appropriate. OPG shared an early draft of the application with the Michi Saagiig and did not receive comments on the initial assessment prior to submission.</p> <p>OPG will incorporate feedback from Indigenous Nations and communities on how the activities in the application may impact Aboriginal and/or treaty rights in the CMD.</p>

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
60.	Indigenous Engagement Section 1.6.1.6	OPG indicates that the proposed location of the deep-water intake structure, to support the refurbishment of Pickering NGS units 5 to 8, would be in an area of the lakebed that has not been disturbed previously. OPG's application does not provide details on its approach to addressing concerns raised by the Michi Saagiig Nations regarding their asserted rights in relation to Lake Ontario and the lakebed.	OPG is requested to provide further information regarding its approach to address the noted concerns with the deep-water intake structure.	OPG has engaged with the Michi Saagiig Nations regarding the deep-water intake and its potential to impact an area of the lakebed that has not been disturbed previously. OPG leverages its monthly Pickering Table meeting series and ad hoc meetings, as necessary, with the Michi Saagiig Nations to discuss planned deep-water intake activities early and any concerns regarding their asserted rights in relation to Lake Ontario and the lakebed. While engagement is ongoing and dynamic, OPG is actively listening to the Michi Saagiig Nations in an attempt to address potential impacts through avoidance, mitigation, and accommodation measures, as appropriate. In-water archaeological plans were developed with the Michi Saagiig Nations and they were invited to participate in monitoring and to have a presence in the rock shack to screen materials that were removed through the in-water bore hole campaign. Additionally, lessons learned have been gathered from the DNNP to understand which studies and monitoring will need to take place in the water to assist the Michi Saagiig communities in their understanding of any dredging and disposal sites. Given that the Michi Saagiig Nations' assertion of rights in relation to Lake Ontario and the lakebed relates to multiple OPG facilities and operations, OPG will also continue to engage with the Michi Saagiig Nations on this topic through our ongoing long-term relationship discussions.
61.	Indigenous Engagement Section 1.6.1.6	OPG explains that its spill management protocols will serve to minimize and mitigate the impacts of construction and dismantlement activities to surface water quality, fish and fish habitat, and soil and groundwater. Please explain: <ul style="list-style-type: none"> How OPG engaged with Indigenous Nations or communities on these mitigation measures. 	OPG is requested to respond to the comment.	OPG's reference in the application to spill management protocols serving to minimize and mitigate the impacts of construction and dismantlement activities to surface water quality, fish and fish habitat, and soil and groundwater is OPG's view on how OPG is mitigating potential impacts to Aboriginal and/or treaty rights. OPG welcomes input and comments from Indigenous Nations and communities on the

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
		<ul style="list-style-type: none"> How input from Indigenous Nations or communities may have been integrated into these mitigation measures. Whether additional mitigation measures were proposed by Indigenous Nations or communities. Whether Indigenous Nations or communities who have identified potential impacts to their Aboriginal and/or Treaty rights are satisfied that the proposed mitigation, or other forms of accommodation, will address potential adverse impacts. 		initial assessment to advance discussions on potential impacts and appropriate measures to address. Engagements are ongoing and dynamic and OPG will incorporate Indigenous perspectives on potential impacts to rights and proposed avoidance, mitigation and/or accommodation measures, as appropriate, in the CMD.
62.	Indigenous Engagement Section 1.6.1.6	OPG's application submission does not include an updated Indigenous Engagement Plan.	OPG is requested to provide its updated Indigenous Engagement Plan.	OPG's Pickering Indigenous Engagement Plan is a living document that is intended to be revised, as needed, to reflect engagement priorities recognized by Indigenous Nations and communities and OPG. OPG is in the process of revising the Pickering Indigenous Engagement Plan based on feedback received from Indigenous Nations and communities and once finalized, an updated copy will be provided. Reviews of the IEP are planned in Q2 moving forward.
63.	Indigenous Engagement Section 1.6.1.6	OPG is requested to describe whether identified Indigenous Nations have requested additional studies to support the refurbishment, deep-water intake, or decommissioning, and whether OPG has considered conducting or supporting any additional requested studies.	OPG is requested to respond to the comment.	Through ongoing engagement with Indigenous Nations and communities and feedback received to date, OPG has conducted additional studies to support the refurbishment, deep-water intake, and decommissioning activities at Pickering. Through engagements with the Michi Saagiig Nations, OPG has and plans to conduct additional terrestrial and marine archaeology studies at the Pickering site to support these activities. For example, the marine archaeology scope has been expanded to include all of OPG's water lots, and also includes eastern shoreline mitigation. The aquatic sampling program has additionally been expanded to include the eastern shoreline mitigation. Additionally, through engagements with the Michi Saagiig Nations, OPG has supported an independent third party Used Fuel Benchmarking Report on OPG's practices and procedures

Item	SCA / Section [Reference A1]	CNSC Staff Comment [Reference A2]	Expectation to Address Comment	OPG Response
				related to the management of used/spent fuel, as well as a third-party review of the Detailed Decommissioning Plan. OPG also included relevant feedback from previous engagements with the Michi Saagiig Nations from other OPG nuclear projects. For example, considered during the development of the 2025 aquatic sampling program for the Pickering site, were the presence of species at risk and cold water species which OPG understands to be of particular interest to Indigenous communities. OPG appreciates the feedback and input received from Indigenous Nations and communities to conduct additional studies, as appropriate.

References:

A1. OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to C. Salmon, "Renewal Application for Pickering Nuclear Generating Station Power Reactor Operating Licence and Pickering Waste Facility Operating Licence", June 27, 2025, e-Doc 7542953, CD# P-CORR-00531-23980.

A2. CNSC Letter, R. Richardson to P. Seguin, K. Aggarwal and L. Ceccato, "CNSC Staff Request for Additional Information - Renewal Application for Pickering Nuclear Generating Station Power Reactor Operating Licence and Pickering Waste Facility Operating Licence", September 5, 2025, e-Doc 7560134, CD# P-CORR-00531-24104.

A3. OPG Letter, L. Ceccato and P. Seguin to R. Richardson, "Pickering NGS – OPG Responses to CNSC Staff’s Comments on the PSR3 Submission of the Safety Factor Reports Batch #2 (SF 4, 5, 6, 7, 8, 10, 14)", September 17, 2025, CD# P-CORR-00531-24052.

A4. CNSC Letter, A. Mathai to M. Knutson, "OPG - Design Codes and Standards Effective Dates for OPG Nuclear Fleet", October 15, 2024, e-Doc 7374720, CD# N-CORR-00531-24267.

A5. CNSC Letter, A. Mathai to M. Knutson, "OPG Response to CNSC Staff’s Comments on Design Codes and Standards Effective Dates for OPG Nuclear Fleet", March 3, 2025, e-Doc 7470936, CD# N-CORR-00531-24464.

A6. OPG Letter, M. R. Knutson to R. Richardson, A. Mathai, and N. Greencorn, "OPG: Request for CNSC Staff’s Acceptance of the Pressure Boundary Transitional Provisions for Compliance with CSA N285.0:23/CSA N285.6 Series:23 (and Annexes G and J as 'normative')", January 23, 2025, CD# N-CORR-00531-24343.

- A7. CNSC Letter, R. Richardson to P. Seguin and L. Ceccato, "Pickering NGS – Request for CNSC Staff's Concurrence for Freezing the Design Code and Standard Effective Dates for Pickering 5-8 Refurbishment", August 15, 2024, e-Doc 7334991, CD# P-CORR-00531-23793.
- A8. CNSC Letter, R. Richardson to P. Seguin and L. Ceccato, " Pickering NGS – OPG Responses to CNSC Staff's Comments on Freezing the Design Code and Standard Effective Dates for Pickering 5-8 Refurbishment", November 20, 2024, CD# P-CORR-23856.
- A9. OPG Letter, J. Blazanin and R. Bakardien to R. Richardson, "Pickering NGS – Request for CNSC Staff's Concurrence for Freezing the Design Code and Standard Effective Dates for Pickering 5-8 Refurbishment", April 29, 2024, CD# P-CORR-00531-23558.
- A10. OPG Letter, M. R. Knutson to R. Richardson, A. Mathai, and N. Petseva, "OPG – Design Codes and Standards Effective Dates for OPG Nuclear Fleet", February 23, 2024, CD# N-CORR-00531-23959.
- A11. CNSC Letter, A. Mathai to M. R. Knutson, "OPG Response to CNSC Staff's Comments on Design Codes and Standards Effective Dates for OPG Nuclear Fleet", March 3, 2025, e-Doc 7470936, CD# N-CORR-00531-24464.
- A12. OPG Email, K. Lynchahon to P. MacDonald, "Pickering NGS – Response to CNSC Staff Requests regarding Changes to P-REP 03611-00012, PNGS Systems and Components Important to Safety", July, 22, 2025, CD# P-CORR-00531-24062.

ATTACHMENT 2

OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, "Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility".

CD# P-CORR-00531-24089 P

Major Scope Activities for Pickering NGS Units 5 to 8

Prepared By: Ed Martin
Checked By: Jenny Leung

ATTACHMENT 2

Major Scope Activities for Pickering NGS Units 5 to 8

Significant physical plant modifications are planned to be undertaken to improve long term plant reliability and to increase safety and operational margins of the Pickering NGS Units 5 to 8. The following table outlines the major scope of work that is planned to be undertaken during the licensing period.

Note: OPG is currently undergoing the project definition phase where other SSCs are being assessed for replacement or upgrades and this project phase is expected to be completed in 2026. To effectively manage scope throughout this period, OPG will utilize established processes for scope changes and oversight.

Scope	Description
Deep Water Intake (DWI)	The DWI will consist of an intake cap, an intake shaft, a tunnel, a forebay up-shaft and a forebay conduit to bring water from deeper in the lake into the forebay for station operations. A bridge will be constructed over the existing outfall to enhance construction logistics. A potential lake infill is being considered to support site preparation and construction needs. A supplemental cutoff wall will be constructed to isolate the surface water intake and optimize the performance of the deep-water intake.
Retube, Feeder, and Boiler Replacement (RFBR)	<p>The RFBR project will involve the removal and replacement of the reactor face, feeder cabinet frames, insulation, fuel channel components, and associated piping and instrumentation. Specialized activities will include replacement of feeder pipes and fuel channel assemblies, with comprehensive inspections performed before and after installation to ensure the integrity of all replaced components.</p> <p>The project will also replace all 48 boilers/steam generators across the affected units. Boiler removal and installation will require the use of cranes positioned on the south side of the plant. The boilers will be lifted through engineered openings in each reactor building which control radioactive contamination and weather ingress. The removed boilers will be transported to the Pickering Component Storage Structure (PCSS).</p>
Emergency Coolant Injection (ECI)	A number of ECI valves will be refurbished or replaced as part of the refurbishment project. Components such as the ECI recovery motors as well as the ECI recovery heat exchangers will also be inspected/refurbished/repared to support continued reliable operation post-refurbishment.
Emergency Water Supply (EWS)	Inspection of EWS buried piping and installation of cathodic protection (as required) will be completed.
Fire Protection System	The scope of work for the fire protection system is currently being defined, with active assessments underway to evaluate system life

Scope	Description
	extension. Preliminary findings indicate that several components—such as valves, sprinkler systems, and fire hydrants may be recommended for replacement or upgrades during the licensing period.
Turbine & Generator and Auxiliaries	<p>The refurbishment of Turbine Generator systems at Pickering NGS Units 5–8 will upgrade and replace critical components to ensure reliable, efficient, and modernized operation. This work will address aging equipment, integrate new digital controls, and enhance monitoring and auxiliary systems throughout the facility.</p> <p>This includes High Pressure/Low Pressure Turbine upgrades, inspection and overhaul of turbine steam valves, refurbishment of turbine auxiliaries, Moisture Separator Reheater upgrades, digital control system installation, and generator refurbishment including rewinding of rotors and core, excitation system upgrades and generator auxiliaries upgrades.</p>
Main Power Output	Transformer replacements will be completed as part of the aging management program.
Main Steam & Boiler Blowdown	The continuous boiler blow down system will be re-designed to improve the chemistry for the replacement steam generators and protect tube integrity.
Moderator & Auxiliaries	Valves will be replaced for improved reliability and to support required future maintenance on moderator components such as heat exchangers and pumps. There is also scope to address existing operational challenges on the moderator cover gas system.
Negative Pressure Containment (NPC), Vacuum Building (VB), and Pressure Relief Duct (PRD)	A number of scope items will be executed to improve the leakage rate performance of our concrete containment structures including but not limited to: replacing construction seals and sealant, refurbishing the sealing surfaces of components, replacing containment boundary and/or intra-containment seals, and repairing and sealing concrete cracks. Select components from the vacuum building dousing system will also be replaced based on condition assessments.
Plant Computers	<p>The Digital Control Computer (DCC) upgrades will include the replacement of systems such as computers, software, peripherals, and process input-output (I/O) equipment as part of the life extension program.</p> <p>The Plant Computers project will also upgrade hardware as required.</p>
Primary Heat Transport & Auxiliaries	To improve the reliability and safety of Primary Heat Transport and Auxiliaries, components such as Motorized Valve gaskets/packing and Shutdown Cooling system blind flange gaskets, bleed cooler, bleed condenser tube bundles, etc. will be inspected/repaired/or replaced.

Scope	Description
Reactor Building Cooling	A condition-based maintenance approach will be undertaken to improve Air Conditioning Unit (ACU) reliability through a modified coil design intended to improve the reliability of the ACU coils and prevent premature failures.
Reactor Regulating System (RRS), Shutdown System 1 (SDS1), Shutdown System 2 (SDS2)	Replacement of subset of In-core Flux Detectors and Ion Chamber Detectors based on condition assessment.
Standby Generators	Replacement of Unit 056 and 078 Standby Generators.
Fuel Handling	<p>Scope items to extend equipment life and improve reliability include but are not limited to:</p> <ul style="list-style-type: none"> • New Closure plug replacements to reduce risk of sticking during fueling activities. • Fueling Machine (FM) and Carriage Refurbishment: Fueling Machine head and carriage to be overhauled including internal shaft support and magazine bearings. • Bridge Ball Screw Replacement. • Inspection and Repair of Elevator and Conveyor.
Civil System	<p>Inspections, repairs, and replacements will be carried out on civil structures and components, including but not limited to:</p> <ul style="list-style-type: none"> • Inspections for concrete cracking and sealant condition. • Application of an elastomeric floor coating to the vacuum building floor slab to address leaks and enhance waterproofing, with repairs to the main floor slab and upper chamber concrete to restore pressure boundary and containment functions. • Fitness for Service (FFS) assessments of the foundation steel H-Piles for the Reactor Buildings (RB), Vacuum Building (VB), and Pressure Relief Duct (PRD) to support continued operation of P058 beyond Refurbishment.
Air Systems	The air system improvements project encompasses upgrades to the Breathing Air, Service Air, and Instrument Air systems. This includes component replacements such as compressors. These activities will also address equipment obsolescence and ensure ongoing reliability.
CLI, II, III Electrical	Class I, II, and III electrical scope mainly consists of component replacement for relays and rectifiers.

Scope	Description
Safety Improvement Opportunities (SIOs)	<ul style="list-style-type: none"> • Diesel Firewater Make-Up Enhancements: An alternate water supply will be established for the Pickering NGS units 5 to 8 Heat Transport System (HTS) and/or Moderator by utilizing the diesel firewater pump system through the existing service water infrastructure. • Enhanced EWS Supply to Boilers, HTS, and Moderator: The emergency water supply (EWS) to the boilers, heat transport system, and moderator will be enhanced for both design basis accidents and beyond design basis accidents. Modifications will allow the moderator to be directly fed by the EWS to provide a long-term heat sink. System reliability will be enhanced through elimination of single points of failure. • Alternate Water Supply to the Moderator: The Emergency Water Storage Tank (EWST) is currently supplied by the Pickering ANGUS units 1 to 4 Service Water system and serves as an interim heat sink for the Pickering NGS units 5 to 8 Moderator during beyond design basis accidents. To maintain a diverse and independent supply post-refurbishment, an alternate water source to the moderator will be provided. • Containment Filtered Venting System (CFVS) modification: A new modification to the CFVS will be implemented to mitigate containment overpressure and reduce airborne contaminant releases during beyond design basis accidents. This will use a controlled pressure venting and filtration system. • Shield Tank Overpressure Protection (STOP): The STOP project will install a large relief capacity on the End Shield/Calandria Vault to improve the margin to shield tank overpressure resulting from rapidly progressing accidents. • External Hazard Protection: Reinforcement of the metal-clad portion of the Unit 7 Control Equipment Room exterior wall with a masonry block wall will be completed to improve windborne missile resistance and reduce core damage risk.

ATTACHMENT 3

OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, "Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility".

CD# P-CORR-00531-24089 P

OPG Response to CNSC Comments #41 to 43

Prepared By: Eugenia Co
Checked By: Heather Rambukkana
and Sanjeev Sharma

ATTACHMENT 3

OPG Response to CNSC Comments #41 to 43

CNSC Staff Sufficiency Review Comment 41

CNSC's Expectation to Address (Comment 41): OPG is requested to provide the noted information regarding Radiation Protection (RP)/ As Low As Reasonably Achievable (ALARA) past performance, significant lessons-learned, and results of major self-assessments that transpired over the current licensing period at the Pickering Nuclear Generating Station (NGS) and Waste Management Facility (WMF).

OPG Response:

The key work programs at the PWMF remain largely unchanged over the licensing period. The principal work program consists of the loading and processing of Dry Storage Containers (DSCs) as well as routine facility maintenance activities. DSC throughput per year have steadily increased over the licensing period, with 2024 having the highest number of DSCs processed at 80. Collective radiation exposure per DSC throughput has remained generally unchanged over this period of time. Both average doses for each respective work group remain quite low, averaging less than the regulatory dose limit for a member of the public. Similarly, the maximum exposed individuals were in line with trends of the past few years and well below OPG's internal exposure control level and administrative limits.

Upon examination of the breakdown of dose distribution over the licensing period, it remains that a small number of staff received a recordable dose, an even smaller number recorded a dose above the CNSC dose limit for members of the Public (1.00 mSv). The highest exposed individual over the current dosimetry period (at 1.43 mSv) is well below the 5 year regulatory limit of 100 mSv and this trend remains. Also, internal dose continues to remain low with only small amounts due to tritium.

The following are the outage work program series summary of the ALARA plans contributing to collective dose:

Year	Outage	Major Work Series
2018	P1841 P1861 P1881	<u>P1841, P1861, P1881</u> <ul style="list-style-type: none"> • Feeder Inspections • Boiler Inspections
2019	P1951 P1971	<u>P1951, P1971</u> <ul style="list-style-type: none"> • Feeder Inspections • Boiler Inspections
2020	P2011 P2041 P2061	<u>P2011</u> <ul style="list-style-type: none"> • Feeder Inspections • Fuel Channel Shift • Boiler Inspections <u>P2041</u> <ul style="list-style-type: none"> • Feeder Inspections • Boiler Inspections <u>P2061</u> <ul style="list-style-type: none"> • Feeder Inspections • Fuel Channel Shift • Boiler Inspections

Year	Outage	Major Work Series
2021	P2181 P2171	<u>P2181</u> <ul style="list-style-type: none"> • Feeder Inspections • Fuel Channel Shift • Single Fuel Channel Replacement • Boiler Inspections <u>P2171</u> <ul style="list-style-type: none"> • Feeder Inspections • Fuel Channel Shift • Boiler Inspections
2022	P2251 P2211 P2291	<u>P2251</u> <ul style="list-style-type: none"> • Feeder Inspections • Fuel Channel Shift • Single Fuel Channel Replacement • Boiler Inspections <u>P2211</u> <ul style="list-style-type: none"> • Feeder Inspections • Fuel Channel Shift • Boiler Inspections <u>P2291</u> <ul style="list-style-type: none"> • Vacuum Building Outage
2023	P2381 P2341 P2361	<u>P2381</u> <ul style="list-style-type: none"> • Boiler Inspections <u>P2341</u> <ul style="list-style-type: none"> • Feeder Inspections • Boiler Inspections <u>P2361</u> <ul style="list-style-type: none"> • Feeder Inspections • Boiler Inspections • Fuel Channel Shift
2024	P2451 P2471	<u>P2451</u> <ul style="list-style-type: none"> • Feeder Inspections • Boiler Inspections <u>P2471</u> <ul style="list-style-type: none"> • Feeder Inspections • Boiler Inspections • Fuel Channel Shift • Single Fuel Channel Replacement

Lessons Learned

The following are some outage work program series summary lessons learned:

Major Work Series	Lessons Learned & OPEX	Dose Reduction Trend (adjusted for source term and scope)
Feeder Inspections	<p>Development of remote tooling used for inspection of graylocs and instrument lines to maximize distance from source.</p> <p>Work control enhanced sequencing and logic of inspection locations to minimize platform movements, scaffold modifications, and feeder panel removals.</p> <p>Use of teledosimetry and rovers to minimize number of personnel on the reactor maintenance program.</p>	Decrease
Single Fuel Channel Replacement	<p>Specific and detailed access restrictions were established, based on extensive beam surveys to prevent unplanned exposures during open beam conditions.</p> <p>Procedural updates to ensure garter spring locations are monitored and controlled during removal to prevent exposure to personnel.</p>	Decrease
Boiler Inspections	<p>Specialized boiler locking tab shielding used to reduce hot spot dose rates.</p> <p>Boiler guidance document implemented (P-GUID-09071-00004) to assist RP with how to respond to various boiler inspection scenarios.</p>	Decrease
Fuel Channel Shift	<p>Software improvements:</p> <ul style="list-style-type: none"> • Use of laser tools to perform tube sheet measurements. Reduces the amount of workers performing hands on reactor face work. • Software for determining channel shifting order which helps reduce amount of cascade channels requiring shifting. • Workers trained on a representative mock-up prior to work execution which ensures the work could progress with 	Decrease

Major Work Series	Lessons Learned & OPEX	Dose Reduction Trend (adjusted for source term and scope)
	<p>minimal questions and interruptions.</p> <p>Tooling improvements and procedure changes help reduce process time on face.</p> <p>Numet platform shielding canopy curtains are effectively used as shielding when possible. Modification to shielding canopy allowed curtains to be closed with tooling installed on face.</p>	
Vacuum Building Outage (VBO)	<p>Plastic suits required for most Pressure Relief Duct (PRD) entries contributed to Collected Internal Radiation Exposure (CIRE) performance better than target. ALARA worked closely with workgroups to identify breathing air header locations and plan ahead for the number of people allowed in the PRD for each work evolution.</p>	N/A – no trend as this is an infrequent work evolution.

Self-Assessments

The following are some ALARA Self-Assessments documenting a summary of recommendations, actions and benefits:

Self-Assessment	Recommendations and Actions	Details/Benefits
2021 – Radiation Protection Industry Gap Review	<p>Develop technical basis for the use of High-Efficiency Particulate Air (HEPA) qualified units in the station (where to use items, when to use items, what constitutes a qualified HEPA unit).</p> <p>Communicate requirement to specify number of boundary personnel in shot plans to qualified staff reviewing and preparing radiography shot plans.</p>	<p>Technical basis helped further align current HEPA/vacuum program at PNGS with industry guidelines.</p> <p>Number of boundary monitors not initially specified in Pickering Radiography shot plans. Radiography Boundary Shot Plan N-FORM-11714 was revised to include number of individuals at shot location to align with industry guidance.</p>
Self Assessment of P2541 PCE Results Proactive Entrance into Prevention SCR No. P-2024-06977	<p>Radiation Protection (RP) department implement outage boiler campaign Personnel Contamination Events (PCE) reduction plan to include all additional high contamination work.</p> <p>Review all Radiation Exposure Permits (REPs) requiring hot particle controls to add expectations for additional surveys for discreet particles. This includes instructions for surveys on areas, people, and equipment once hot particle surveys are completed.</p> <p>Improvements to PCE Dynamic Learning Activity (DLA) – Extent of condition survey techniques for large area wipes updated and rolled out to all RP personnel.</p>	<p>Help reduce number of outage PCE.</p> <p>Expands existing boiler PCE reduction across entire outage.</p> <p>Provides guidance for team to identify potential contamination proactively and implement cleaning prior to reaching elevation levels of contamination.</p>
Tritium Uptake Deep Dive	<p>Revise N-FORM-11072 Tritium Protection Planning Review to shape behaviours towards discussion of tritium hazard during work execution and backout conditions.</p>	<p>New N-FORM-11072 helped workers better understand implications of unplugged time and drives workers to discuss more conservative backout conditions. There have been no unplanned exposures at PNGS since 2023.</p> <p>Other initiatives from this self-assessment which were not as effective include:</p>

Self-Assessment	Recommendations and Actions	Details/Benefits
		<ul style="list-style-type: none">• Flagging Corrective Action Plans (CAPs) related to RP for RP review. This has not been very effective as 1) there have been many CAPs related to RP and 2) when there are CAPs, RP has been engaged with the work group to assist with generating actions and supporting them without the use of the CAP flag. <p>Evaluating the effectiveness of current communication methods and develop communications for radiological risks and knowledge. This action was not very effective as it only identified that staff do review RP's existing communication channels, but reviewing this information does not necessarily drive staff to change behaviours.</p>

CNSC Staff Sufficiency Review Comment 42

CNSC's Expectation to Address (Comment 42): OPG is requested to provide the noted information, including any applicable governance documents, regarding radiation protection equipment and instrumentation.

OPG Response:

The process for ensuring approved RP instruments are used, calibrated, maintained and monitored for end of life is documented in N-PROC-RA-0066, Lifecycle Management of Radiation Protection Instruments as follows:

Selection of RP instrumentation:

- Only approved RP instruments shall be purchased as listed in N-EL-03425.42-10000, *List of Radiation Protection Instrumentation Approved for Purchase in Ontario Power Generation, Nuclear*. Approved RP Instruments for specialized use are listed in N-EL-03425.42-10001, *List of RP Instrumentation for Specialized Use in OPG Nuclear*.
- Requests for the introduction of a new make, model or type of RP instrument require a completed OPG-FORM-0260, *Change Management Plan*, in accordance with OPG-STD-0140, *Managing Change*, that is submitted to the Manager, Health Physics Department for approval. This Standard outlines the Change Management approach to be applied to change planning and implementation to ensure changes achieve their intended results, maximize outcomes through better change adoption, and minimize risk. The Health Physics Department-Radiation Protection Programs and Field Support Section (HPD-RPP&FS) shall prepare an implementation plan that includes development of technical specifications if required and an evaluation and performance testing against specifications and site-specific conditions. The plan will ensure that instruments to be used at site have been acceptance tested.

Calibration of RP instrumentation:

- As per N-INS-09071-10009, Requirements for the Calibration and Maintenance of Radiation Protection Instruments, all RP instruments, fixed or portable, shall be calibrated at least once a year. Calibrations shall be performed in accordance with procedures approved by the Health Physicist Instrumentation at HPD-RP Programs & Field Support (HPI-FS). Calibration of Fixed Area Gamma Monitors (FAGM) and Fixed Area Tritium Monitors (FATM) are performed using approved Control Maintenance Procedures. An instrument record shall be generated each time an instrument is calibrated and a label indicating the calibration date shall be applied to the instrument. Pickering NGS uses a software solution for tracking of maintenance and calibration of RP instruments through N-PROC-MA-0070, Calibration of Field Equipment and N-PROC-MA-0015, Tool Control.

Maintenance of RP Instrumentation:

- For each type of RP instrument, the manufacturer's service manual shall be registered as a controlled document in accordance with OPG-PROC-0178, Controlled Document Management. All maintenance work shall be performed in accordance with the registered service manual. A maintenance record or Work Report shall be generated each time an instrument is reported defective. RP instruments that have deficiencies noted during pre-operational checks will be identified with a defective instrument tag and removed from service pending repairs. Instruments reported defective shall be calibrated before they are returned to service.

Monitoring RP Instrumentation for end-of life:

- Manager Health Physics Department approves the maintenance-related Performance Indicators developed by HPI-FS to monitor the performance of portable RP instrumentation while in service. Performance Indicators are metrics used to track the health of the inventory of RP Instruments in use at OPG for availability and monitoring for end-of-life service. The indicators are divided into two distinct groups: Health Physics and Maintenance:
 1. Health Physics Indicators deal with the instrument's ability to accurately measure the radiation hazard it is designed to measure.
 2. Maintenance Indicators deal with the instrument's availability for use which is influenced by factors such as mean time between failures and includes managing the instrument inventory at sites. Factors such as cost (time and materials) to keep an instrument in service can also be used to determine service life. A description of performance indicators is referenced in N-INS-03425.41-10002, *Performance Indicators for Radiation Instruments*. HPI-FS collects data on performance and availability of portable RP instruments and prepares monthly Performance Indicator Report on Portable Radiation Instruments. Site HPIs prepare quarterly Fixed Instrument reports that capture the results of instrument sensitivity checks, availability, and detector lifetime. For monitors located at Zone 1 or public domain exit boundaries, challenge testing is performed annually using representative station contamination on a smear. Deliberate failure tests are performed every 5-years or whenever modifications to the monitor due to hardware, firmware or software changes are made. Site HPI review Station Condition Records and Work Reports and utilize performance monitoring and self-assessment to identify industry best practices. Copies of Performance Indicator reports are provided to the site Section Manager, ALARA for local trending and to the Manager, RPP&FS, HPD for fleet trending and review to determine if changes to instrument calibration or maintenance are required. Annual reviews are also conducted to identify new instrument purchase requirements and replenishment of spare parts inventory necessary to ensure availability of instruments.
- System Engineers (SEs) are assigned to monitor the performance of fixed RP monitoring systems, such as FAGMs and FATMs. As documented in N-PROC-MA-0024, System Performance Monitoring, SEs conduct system monitoring activities in accordance with System Performance Monitoring Plans and initiate remedial actions in accordance with the Performance Monitoring Equipment List. The SE will create and maintain a System Notebook that is continuously updated as data is collected. The SE will document reviews, assessments, and referenced elements of System Performance Monitoring into the SystemIQ database in accordance with N-INS-01071-10000, System Health Reporting. The SE will assess overall system performance, produce a System Health Report, and develop and implement an Action Plan to improve or restore system performance. The SE will initiate remedial actions to address trends. These actions should be proactive by attempting to correct the problem prior to equipment or component failure.

Improvement opportunities associated with current suite of instruments:

- The neutron meters currently in use at Pickering are challenging to use (heavy and bulky) and are limited in quantity and availability. As part of life cycle management, HPD-RPP&FS

are currently reviewing and assessing new neutron meters that have improved ergonomics and availability.

- A project is currently ongoing to replace the FAGMs and FATMs that have been in service since the station was built. Replacement is conducted due to the aging of equipment and obsolescence of spare parts.

HPD-RPP&FS are assessing models of Electronic Personal Dosimeters that can measure neutron dose.

CNSC Staff Sufficiency Review Comment 43:

CNSC's Expectation to Address (Comment 43): OPG is requested to provide the noted information regarding the provisions for radiation protection during unusual situations at the NGS and WMF.

OPG Response:

As mentioned in the application, the broader document related to emergency planning is N-PROG-RA-0001, *Consolidated Nuclear Emergency Plan*. The following category areas document Radiation Protection provisions for planning for unusual situations, as per N-INS-03491-10023 *Health Physics Manager*:

Category Area	Radiation Protection Provisions
Access Controls	<ul style="list-style-type: none"> • Assembly Areas for personnel accounting to help ensure personnel exposures are minimized from radiological hazards associated with incident area(s). • Number of site support personnel strategically managed through Resource Deployment Manager in Site Management Centre (SMC) to ensure number of potential personnel exposures are minimized. • Site ingress and egress considerations based on weather conditions, radiological conditions, and timing to any planned radiological release.
Habitability Controls	<ul style="list-style-type: none"> • Routine (hourly) radiation surveys conducted to establish habitability. • Eating and drinking provisions under the direction of Health Physics Manager (HPM). • Alarming gamma monitors alert personnel of changing radiological conditions.
Communication Systems	<ul style="list-style-type: none"> • Updates between HPM in the SMC and Health Physics Director in the Corporate Emergency Operations Facility. • Communication available through direct landline, cell phone, third party web platform, fax, or dedicated beyond design basis accident telecommunication system and radio equipment.
Radiation Monitoring Capabilities	<ul style="list-style-type: none"> • Redundancy in exit radiation monitors for personnel. • Live-time transmitting gamma and tritium monitoring; hourly surveys obtained, reviewed, and transmitted. • Routine in-plant surveys for gamma dose rate, airborne tritium, and airborne particulate conducted by in-plant survey team at strategic locations, including corridors, airlocks, and other areas as directed by the Shift Manager.

Category Area	Radiation Protection Provisions
	<ul style="list-style-type: none"> Chemistry lab includes capabilities for analyzing airborne samples for radioiodine. Gaseous Fission Product system includes sensitivity and alarms to key radionuclides associated with fuel defects.
Portable Emergency Response RP Equipment and Instrumentation	<ul style="list-style-type: none"> Dedicated portable gamma instruments poised for use (includes capabilities for high range detection and extension probe for increased distance). Standalone dosimetry devices available for use when the standard services are unavailable or when directed by Shift Manager or HPM. N-PROC-RA-0040, <i>Maintenance and Testing of OPG Nuclear Emergency Response Organization Facilities and Equipment</i> includes additional site instructions to manage RP equipment checks supporting assembly area cabinets, in-plant survey team cabinets, off-site survey team, and Transportation Emergency Response Plan.
Radiation Personal Protection Equipment	<ul style="list-style-type: none"> N-PROC-RA-0025, <i>Selection of Radiation Personal Protection Equipment</i>, is followed to the extent practical. Provisions for radiation personal protective equipment under emergent work documented with use approvals required by Responsible Health Physicist.

ATTACHMENT 4

OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, "Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility".

CD# P-CORR-00531-24089 P

Supplementary Information Addressing CNSC Comment #58

Prepared By: Jared Canfield
Checked By: Katie Haddlesey

ATTACHMENT 4

Supplementary Information Addressing CNSC Comment #58

OPG has updated Tables 10, 11 and 12 of the licence application with the requested information.

Table 10. Williams Treaties First Nations (WTFNs) Rightsholders

Community	Summary
Alderville First Nation	<ul style="list-style-type: none"> • OPG letter sent March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement. • Multiple meetings in 2023 discussing Pickering Nuclear Generating Station (NGS) feasibility assessment and refurbishment activities including decommissioning. • Shared draft Pickering Indigenous Engagement Plan (IEP) for review and comment January 30, 2024. Final working version of IEP shared May 28, 2024. Update shared January 13, 2025. • OPG email sent June 24, 2024, providing opportunities to monitor during Predictive Environmental Risk Assessment (PERA) at the Pickering NGS. • OPG and Michi Saagiig Waste Tables <ul style="list-style-type: none"> ○ August 7, 2024 <ul style="list-style-type: none"> ▪ Tour - Darlington Waste Management Facility (WMF) ▪ Planning - Focus and scope of Waste Table <ul style="list-style-type: none"> • Consent, Nuclear Waste Management Organization (NWMO) & Natural Resources Canada (NRCAN) ○ October 28, 2024 <ul style="list-style-type: none"> ▪ Terms of Reference- regulatory roadmap ▪ Project updates (Pickering & Darlington Waste Management Facilities and Darlington New Nuclear Project (DNNP) spent fuel storage options Pickering Decommissioning) ○ January 29, 2025 <ul style="list-style-type: none"> ▪ NRCAN nuclear waste policy overview ▪ DNNP used fuel onsite storage options ▪ Detailed Decommissioning Plan (DDP) & benchmarking report (spent fuel management) ○ March 20, 2025 <ul style="list-style-type: none"> ▪ NWMO – Planning framework for used fuel (Deep Geologic Repository (DGR)) ○ May 15, 2025 <ul style="list-style-type: none"> ▪ Opportunity to provide a workshop on the DDP • OPG and Michi Saagiig Pickering Engagement Table <ul style="list-style-type: none"> ○ October 15, 2024 <ul style="list-style-type: none"> ▪ Planning – Table conduct & meetings guidance

Community	Summary
	<ul style="list-style-type: none"> ▪ Draft documents – Regulatory roadmap, permits, studies & reports ▪ Pickering updates – Refurbishment, waste & decommissioning, environment ○ November 20, 2024 <ul style="list-style-type: none"> ▪ Terms of Reference ▪ Lake sturgeon & PERA aquatic sampling ▪ Deep water intake and dry storage module relocation ▪ Waste strategy & DDP • Executed Pickering Memorandum of Understanding (MoU) to provide capacity funding November 8, 2024. • Communicated a DDP briefing note October 23, 2024. • Draft DDP shared November 12, 2024 for review and feedback. Comments received April 1, 2025 following Michi Saagiig Nations request to hire a third-party reviewer to support their review. • PERA for Pickering Component Storage Structure (PCSS) shared November 26, 2024. MSIFN comments received April 3, 2025 and OPG responses to MSIFN comments shared May 8, 2025 with all Michi Saagiig Nations. Revised PCSS PERA shared with all WTFN June 10, 2025. • Framework meetings throughout 2024 (June 27, October 24 and November 28) to discuss Pickering NGS PROL and WFOL activities. • OPG and Michi Saagiig Pickering Engagement Table <ul style="list-style-type: none"> ○ February 6, 2025 <ul style="list-style-type: none"> ▪ PROL/WFOL licence application, timelines, reports ▪ Permits update ▪ Deep water intake – spoils management ○ March 6, 2025 <ul style="list-style-type: none"> ▪ Project updates – Oil boom replacement, Pickering Component Storage Structure (PCSS), Storage Building 5 (SB5), DDP ○ April 3, 2025 <ul style="list-style-type: none"> ▪ Project updates – PCSS, SB5, Decommissioning and PCSS pre-construction activities & stormwater. ▪ Deep water intake marine archaeology, geotechnical & permits, spoils management, dry storage module relocation ○ May 1, 2025 <ul style="list-style-type: none"> ▪ Capacity funding ▪ Archaeology (terrestrial) update ▪ PROL/WFOL licence application, timelines, reports OPG to share briefing note & draft application mid-May ▪ Project updates – PCSS, SB5, Decommissioning and PCSS pre-construction activities ▪ Deep water intake field work ○ June 5, 2025 <ul style="list-style-type: none"> ▪ Archaeology (terrestrial) update ▪ PROL/WFOL licence application, timelines, reports

Community	Summary
	<ul style="list-style-type: none"> ▪ Project updates – PCSS, SB5, Decommissioning and PCSS pre-construction activities ▪ Deep water intake – geotechnical, marine archaeology, project status and dry storage module relocation • Representatives attended tour of the Pickering NGS on March 21, 2025. • PERA and Climate Change Vulnerability and Assessment Summary Report for Pickering Nuclear shared April 15, 2025. • Briefing note to support key aspects of the DDP sent April 24, 2025. • Supporting an ongoing stage 1 terrestrial archaeology assessment at the Pickering NGS and site visit April 8, 2025 at request of the Michi Saagiig Nations. • OPG email sent March 19, 2025 suggesting meeting to further discuss engagement on the PROL and WFOL relicensing and related activities. • Engagement approach pathway for PROL and Waste Facility Operating License (WFOL). OPG shared an early draft of the PROL and WFOL licence renewal application and memo that provided a summary of the PROL and WFOL renewal application with Michi Saagiig Nations on May 20, 2025, based on feedback received April 3, 2025 on Nations' priorities. • Meetings on May 12 & 28, 2025 with the Michi Saagiig Nations to discuss Deep Water Intake marine archaeology scope, path forward including methodology, and next steps.
Beausoleil First Nation	<ul style="list-style-type: none"> • OPG letter sent March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement. • Shared draft Pickering IEP for review and comment on January 30, 2024. Comments received on May 30, 2024. Final working version of IEP shared May 21, 2024 prior to receiving comments. Update shared on January 13, 2025. • Attended virtual Pickering Engagement meeting on March 20, 2024 discuss PNGS refurbishment, projects and decommissioning. • PERA for Pickering PCSS shared on December 13, 2024. Revised PCSS PERA shared with all WTFN on June 10, 2025. • Communicated a DDP briefing note and opportunity to review the DDP November 27, 2024. • Engagement via email and phone throughout 2024 attempting to provide opportunity to engage on Pickering NGS PROL and WFOL activities. • OPG email sent on November 22, 2024 informing OPG's intent to apply for a consolidated Pickering PROL and WFOL and offer for further engagement. • OPG email sent on January 13, 2025 informing OPG is working towards submitting the PROL and WFOL application in Q2 2025.

Community	Summary
	<ul style="list-style-type: none"> • OPG email sent on March 18, 2025 sharing Pickering updates re: Electrode Boiler project. • PERA for Pickering Nuclear and Climate Change Vulnerability and Assessment Summary Report shared on May 16, 2025. • OPG email sent on June 9, 2025 sharing a memo that provided a summary of the PROL/WFOL renewal application.
Curve Lake First Nation	<ul style="list-style-type: none"> • OPG letter sent March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement. • Multiple meetings in 2023 discussing Pickering NGS feasibility assessment and refurbishment activities. • Shared draft Pickering IEP for review and comment January 30, 2024. Final working version of IEP shared May 28, 2024. Comments received October 11, 2024. Update shared January 13, 2025. • Attended Pickering Engagement meeting March 20, 2024. • OPG and Michi Saagiig Waste Tables <ul style="list-style-type: none"> ○ August 7, 2024 <ul style="list-style-type: none"> • Tour - Darlington Waste Management Facility • Planning - Focus and scope of Waste Table <ul style="list-style-type: none"> • Consent, NWMO & NRCAN ○ October 28, 2024 <ul style="list-style-type: none"> • Terms of Reference- regulatory roadmap • Project updates (Pickering & Darlington Waste Management Facilities and DNNP spent fuel storage options and Pickering Decommissioning) ○ January 29, 2025 <ul style="list-style-type: none"> • NRCAN nuclear waste policy overview • DNNP used fuel onsite storage options • DDP & benchmarking report (spent fuel management) ○ March 20, 2025 <ul style="list-style-type: none"> • NWMO – Planning framework for used fuel (Deep Geologic Repository (DGR)) ○ May 15, 2025 <ul style="list-style-type: none"> • Opportunity to provide a workshop on the DDP. • OPG and Michi Saagiig Pickering Engagement Table <ul style="list-style-type: none"> ○ October 15, 2024 <ul style="list-style-type: none"> • Planning – Table conduct & meetings guidance • Draft documents – Regulatory roadmap, permits, studies & reports • Pickering updates – Refurbishment, waste & decommissioning, environment ○ November 20, 2024 <ul style="list-style-type: none"> • Terms of Reference • Lake sturgeon & PERA aquatic sampling • Deep water intake and dry storage module relocation

Community	Summary
	<ul style="list-style-type: none"> • Waste strategy & DDP • Executed Pickering MoU to provide capacity funding November 20, 2024. • Communicated a Detailed Decommissioning Plan briefing note October 23, 2024. • Draft Detailed Decommissioning Plan shared November 12, 2024 for review and feedback. Comments received April 1, 2025 following Michi Saagiig Nations request to hire a third-party reviewer to support their review. • PERA for PCSS shared November 26, 2024. CLFN comments received January 15, 2025 (OPG responded January 20, 2025). MSIFN comments received April 3, 2025. OPG responses to MSIFN comments shared May 8, 2025 with all Michi Saagiig Nations. Revised PCSS PERA shared with all WTFN June 10, 2025. • Framework meetings throughout 2024 (June 25, August 27, September 24, and October 22) to discuss Pickering NGS PROL and WFOL activities. • OPG and Michi Saagiig Pickering Engagement Table <ul style="list-style-type: none"> ○ February 6, 2025 <ul style="list-style-type: none"> • PROL/WFOL licence application, timelines, reports • Permits update • Deep water intake – spoils management ○ March 6, 2025 <ul style="list-style-type: none"> • Project updates – Oil boom replacement, PCSS, SB5, DDP ○ April 3, 2025 <ul style="list-style-type: none"> • Project updates – PCSS, SB5, Decommissioning, PCSS pre-construction activities & stormwater. • Deep water intake marine archaeology, geotechnical & permits, spoils management, dry storage module relocation ○ May 1, 2025 <ul style="list-style-type: none"> • Capacity funding • Archaeology (terrestrial) update. • PROL/WFOL licence application, timelines, reports OPG to share briefing note & draft application mid-May • Project updates – PCSS, SB5, Decommissioning PCSS pre-construction activities • Deep water intake field work ○ June 5, 2025 <ul style="list-style-type: none"> • Archaeology (terrestrial) update • PROL/WFOL licence application, timelines, reports • Project updates – PCSS, SB5, Decommissioning and PCSS pre-construction activities. • Deep water intake – geotechnical, marine archaeology, project status and dry storage module relocation • Representatives attended tour of the Pickering NGS on March 21, 2025.

Community	Summary
	<ul style="list-style-type: none"> • PERA and Climate Change Vulnerability and Assessment Summary Report for Pickering Nuclear shared April 15, 2025. • Briefing note to support key aspects of the DDP sent April 24, 2025. • OPG letter sent March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement. • Multiple meetings in 2023 discussing Pickering NGS feasibility assessment and refurbishment activities including decommissioning. • Shared draft Pickering IEP for review and comment January 30, 2024. Final working version of IEP shared May 28, 2024. Update shared January 13, 2025. • OPG email sent June 24, 2024, providing opportunities to monitor during PERA at the Pickering NGS. • OPG and Michi Saagiig Waste Tables <ul style="list-style-type: none"> ○ August 7, 2024 <ul style="list-style-type: none"> • Tour - Darlington Waste Management Facility • Planning - Focus and scope of Waste Table <ul style="list-style-type: none"> • Consent, NWMO & NRCAN ○ October 28, 2024 <ul style="list-style-type: none"> • Terms of Reference- regulatory roadmap • Project updates (Pickering & Darlington Waste Management Facilities, DNNP spent fuel storage options and Pickering Decommissioning) ○ January 29, 2025 <ul style="list-style-type: none"> • NRCAN nuclear waste policy overview. • DNNP used fuel onsite storage options. • DDP & benchmarking report (spent fuel management) ○ March 20, 2025 <ul style="list-style-type: none"> • NWMO – Planning framework for used fuel (DGR) ○ May 15, 2025 <ul style="list-style-type: none"> • Opportunity to provide a workshop on the DDP. • OPG and Michi Saagiig Pickering Engagement Table <ul style="list-style-type: none"> ○ October 15, 2024 <ul style="list-style-type: none"> • Planning – Table conduct & meetings guidance • Draft documents – Regulatory roadmap, permits, studies & reports • Pickering updates – Refurbishment, waste & decommissioning, environment ○ November 20, 2024 <ul style="list-style-type: none"> • Terms of Reference • Lake sturgeon & PERA aquatic sampling • Deep water intake and dry storage module relocation • Waste strategy & DDP • Executed Pickering MoU to provide capacity funding November 8, 2024.

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	<ul style="list-style-type: none"> • Communicated a Detailed Decommissioning Plan briefing note October 23, 2024. • Draft DDP shared November 12, 2024 for review and feedback. Comments received April 1, 2025 following Michi Saagiig Nations request to hire a third-party reviewer to support their review. • PERA for Pickering PCSS shared November 26, 2024. MSIFN comments received April 3, 2025 and OPG responses to MSIFN comments shared May 8, 2025 with all Michi Saagiig Nations. Revised PCSS PERA shared with all WTFN June 10, 2025. • Framework meetings throughout 2024 to discuss Pickering NGS PROL and WFOL activities. • OPG and Michi Saagiig Pickering Engagement Table <ul style="list-style-type: none"> ○ February 6, 2025 <ul style="list-style-type: none"> • PROL/WFOL licence application, timelines, reports • Permits update • Deep water intake – spoils management ○ March 6, 2025 <ul style="list-style-type: none"> • Project updates – Oil boom replacement, Pickering Component Storage Structure (PCSS), SB5, DDP ○ April 3, 2025 <ul style="list-style-type: none"> • Project updates – PCSS, SB5, Decommissioning and PCSS pre-construction activities & stormwater. • Deep water intake marine archaeology, geotechnical & permits, spoils management, dry storage module relocation ○ May 1, 2025 <ul style="list-style-type: none"> • Capacity funding • Archaeology (terrestrial) update • PROL/WFOL licence application, timelines, reports. OPG to share briefing note & draft application mid-May. • Project updates – PCSS, SB5, Decommissioning and PCSS pre-construction activities. • Deep water intake field work ○ June 5, 2025 <ul style="list-style-type: none"> • Archaeology (terrestrial) update • PROL/WFOL licence application, timelines, reports • Project updates – PCSS, SB5, Decommissioning and PCSS pre-construction activities. • Deep water intake – geotechnical, marine archaeology, project status and dry storage module relocation • Representatives attended tour of the Pickering NGS on March 21, 2025. • PERA and Climate Change Vulnerability and Assessment Summary Report for Pickering Nuclear shared April 15, 2025. • Briefing note to support key aspects of the DDP sent April 24, 2025.

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	<ul style="list-style-type: none"> Supporting an ongoing stage 1 terrestrial archaeology assessment at the Pickering NGS and site visit April 8, 2025 at request of the Michi Saagiig Nations. OPG email sent March 19, 2025 suggesting meeting to further discuss engagement on the PROL and WFOL relicensing and related activities. Engagement approach pathway for PROL and WFOL. OPG shared an early draft of the PROL and WFOL licence renewal application and memo that provided a summary of the PROL and WFOL renewal application with Michi Saagiig Nations on May 20, 2025, based on feedback received April 3, 2025 on Nations' priorities. Meetings on May 12 & 28, 2025 with the Michi Saagiig Nations to discuss Deep Water Intake marine archaeology scope, path forward including methodology, and next steps.
Chippewas of Georgina Island First Nation	<ul style="list-style-type: none"> OPG letter sent March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement. Shared draft Pickering IEP for review and comment on January 30, 2024. Comments received on May 30, 2024. Final working version of IEP shared May 21, 2024 prior to receiving comments. Update shared on January 13, 2025. Invited March 1, 2024 to attend virtual Pickering Engagement meeting on March 20, 2024 discuss PNGS refurbishment, projects and decommissioning. PERA for Pickering PCSS shared on December 13, 2024. Revised PCSS PERA shared with all WTFN on June 10, 2025. Communicated a DDP briefing note and opportunity to review DDP on November 27, 2024. Engagement via email and phone throughout 2024 attempting to provide opportunity to engage on Pickering NGS PROL and WFOL activities. OPG email sent on November 22, 2024 informing OPG's intent to apply for a consolidated Pickering PROL and WFOL and offer for further engagement. OPG email sent on January 13, 2025 informing OPG is working towards submitting the PROL and WFOL application in Q2 2025. OPG email sent on March 18, 2025 sharing Pickering updates re: Electrode Boiler project. PERA for Pickering Nuclear and Climate Change Vulnerability and Assessment Summary Report shared on May 16, 2025. OPG email sent on June 9, 2025 sharing a memo that provided a summary of the PROL/WFOL renewal application.
Hiawatha First Nation	<ul style="list-style-type: none"> OPG letter sent March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key

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	<p>milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement.</p> <ul style="list-style-type: none"> • Multiple meetings in 2023 discussing the Pickering NGS feasibility assessment and refurbishment activities. • Shared draft Pickering IEP for review and comment January 30, 2024. Final working version of IEP shared May 28, 2024. Update shared January 13, 2025. • Attended Pickering Engagement meeting March 20, 2024. • OPG and Michi Saagiig Waste Tables <ul style="list-style-type: none"> ○ August 7, 2024 <ul style="list-style-type: none"> • Tour - Darlington Waste Management Facility • Planning - Focus and scope of Waste Table <ul style="list-style-type: none"> • Consent, NWMO & NRCAN ○ October 28, 2024 <ul style="list-style-type: none"> • Terms of Reference regulatory roadmap • Project updates (Pickering & Darlington Waste Management Facilities and DNNP spent fuel storage options, Pickering Decommissioning) ○ January 29, 2025 <ul style="list-style-type: none"> • NRCAN nuclear waste policy overview. • DNNP used fuel onsite storage options • DDP & benchmarking report (spent fuel management) ○ March 20, 2025 <ul style="list-style-type: none"> • NWMO – Planning framework for used fuel (Deep Geologic Repository, DGR) ○ May 15, 2025 <ul style="list-style-type: none"> • Opportunity to provide a workshop on the DDP. • OPG and Michi Saagiig Pickering Engagement Table <ul style="list-style-type: none"> ○ October 15, 2024 <ul style="list-style-type: none"> • Planning – Table conduct & meetings guidance • Draft documents – Regulatory roadmap, permits, studies & reports • Pickering updates – Refurbishment, waste & decommissioning, environment ○ November 20, 2024 <ul style="list-style-type: none"> • Terms of Reference • Lake sturgeon & PERA aquatic sampling • Deep water intake and dry storage module relocation • Waste strategy & DDP • Executed Pickering MoU January 15, 2025 to provide capacity funding. • Communicated a Detailed Decommissioning Plan briefing note October 23, 2024. • Draft DDP shared November 12, 2024 for review and feedback. Comments received April 1, 2025 following Michi Saagiig Nations request to hire a third-party reviewer to support their review.

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Mississaugas of Scugog Island First Nation	<ul style="list-style-type: none"> OPG letter sent March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement. Multiple meetings in 2023 discussing the Pickering NGS feasibility assessment and refurbishment activities. Shared draft Pickering IEP for review and comment January 30, 2024. Comments received February 22, 2024. Final working version of IEP shared May 21, 2024. Update shared January 13, 2025. Attended Pickering Engagement meeting March 20, 2024. OPG email sent June 24, 2024, providing opportunities to monitor during PERA at the Pickering NGS. OPG and Michi Saagiig Waste Tables <ul style="list-style-type: none"> August 7, 2024 <ul style="list-style-type: none"> Tour - Darlington Waste Management Facility Planning - Focus and scope of Waste Table <ul style="list-style-type: none"> Consent, NWMO & NRCAN October 28, 2024 <ul style="list-style-type: none"> Terms of Reference and regulatory roadmap Project updates (Pickering & Darlington Waste Management Facilities and DNNP spent fuel storage options and Pickering Decommissioning) January 29, 2025 <ul style="list-style-type: none"> NRCAN nuclear waste policy overview DNNP used fuel onsite storage options DDP & benchmarking report (spent fuel management) March 20, 2025 <ul style="list-style-type: none"> NWMO – Planning framework for used fuel (DGR) May 15, 2025 <ul style="list-style-type: none"> Opportunity to provide a workshop on the DDP. OPG and Michi Saagiig Pickering Engagement Table <ul style="list-style-type: none"> October 15, 2024 <ul style="list-style-type: none"> Planning – Table conduct & meetings guidance Draft documents – Regulatory roadmap, permits, studies & reports Pickering updates – Refurbishment, waste & decommissioning, environment November 20, 2024 <ul style="list-style-type: none"> Terms of Reference Lake sturgeon & PERA aquatic sampling Deep water intake and dry storage module relocation Waste strategy & DDP

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	<ul style="list-style-type: none"> • OPG letter sent March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement. • Multiple meetings in 2023 discussing Pickering NGS feasibility assessment and refurbishment activities including decommissioning. • Shared draft Pickering IEP for review and comment January 30, 2024. Final working version of IEP shared May 28, 2024. Update shared January 13, 2025. • OPG email sent June 24, 2024, providing opportunities to monitor during PERA at the Pickering NGS. • OPG and Michi Saagiig Waste Tables <ul style="list-style-type: none"> ○ August 7, 2024 <ul style="list-style-type: none"> • Tour - Darlington Waste Management Facility • Planning - Focus and scope of Waste Table <ul style="list-style-type: none"> • Consent, NWMO & NRCAN ○ October 28, 2024 <ul style="list-style-type: none"> • Terms of Reference, regulatory roadmap • Project updates (Pickering & Darlington Waste Management Facilities and DNNP spent fuel storage options; Pickering Decommissioning) ○ January 29, 2025 <ul style="list-style-type: none"> • NRCAN nuclear waste policy overview • DNNP used fuel onsite storage options • DDP & benchmarking report (spent fuel management) ○ March 20, 2025 <ul style="list-style-type: none"> • NWMO – Planning framework for used fuel DGR ○ May 15, 2025 <ul style="list-style-type: none"> • Opportunity to provide a workshop on the DDP. • OPG and Michi Saagiig Pickering Engagement Table <ul style="list-style-type: none"> ○ October 15, 2024 <ul style="list-style-type: none"> • Planning – Table conduct & meetings guidance • Draft documents – Regulatory roadmap, permits, studies & reports • Pickering updates – Refurbishment, waste & decommissioning, environment ○ November 20, 2024 <ul style="list-style-type: none"> • Terms of Reference • Lake sturgeon & PERA aquatic sampling • Deep water intake, dry storage module relocation • Waste strategy & DDP • Executed Pickering MoU to provide capacity funding November 8, 2024. • Communicated a DDP briefing note October 23, 2024.

Community	Summary
	<ul style="list-style-type: none"> • Draft DDP shared November 12, 2024 for review and feedback. Comments received April 1, 2025 following Michi Saagiig Nations request to hire a third-party reviewer to support their review. • PERA for Pickering PCSS shared November 26, 2024. MSIFN comments received April 3, 2025 and OPG responses to MSIFN comments shared May 8, 2025 with all Michi Saagiig Nations. Revised PCSS PERA shared with all WTFN June 10, 2025. • Framework meetings throughout 2024 to discuss Pickering NGS PROL and WFOL activities. • OPG and Michi Saagiig Pickering Engagement Table <ul style="list-style-type: none"> ○ February 6, 2025 <ul style="list-style-type: none"> • PROL/WFOL licence application, timelines, reports • Permits update • Deep water intake – spoils management ○ March 6, 2025 <ul style="list-style-type: none"> • Project updates – Oil boom replacement, PCSS, SB5, DDP ○ April 3, 2025 <ul style="list-style-type: none"> • Project updates – PCSS, SB5, Decommissioning and PCSS pre-construction activities & stormwater • Deep water intake marine archaeology, geotechnical & permits, spoils management, dry storage module relocation ○ May 1, 2025 <ul style="list-style-type: none"> • Capacity funding • Archaeology (terrestrial) update • PROL/WFOL licence application, timelines, reports OPG to share briefing note & draft application mid-May • Project updates – PCSS, SB5, Decommissioning and PCSS pre-construction activities • Deep water intake field work ○ June 5, 2025 <ul style="list-style-type: none"> • Archaeology (terrestrial) update • PROL/WFOL licence application, timelines, reports • Project updates – PCSS, SB5, Decommissioning and PCSS pre-construction activities • Deep water intake – geotechnical, marine archaeology, project status and dry storage module relocation • Representatives attended tour of the Pickering NGS on March 21, 2025. • PERA and Climate Change Vulnerability and Assessment Summary Report for Pickering Nuclear shared April 15, 2025. • Briefing note to support key aspects of the DDP sent April 24, 2025. • Supporting an ongoing stage 1 terrestrial archaeology assessment at the Pickering NGS and site visit April 8, 2025 at request of the Michi Saagiig Nations.

Community	Summary
	<ul style="list-style-type: none"> • OPG email sent March 19, 2025 suggesting meeting to further discuss engagement on the PROL and WFOL relicensing and related activities. • Engagement approach pathway for PROL and WFOL. OPG shared an early draft of the PROL and WFOL licence renewal application and memo that provided a summary of the PROL and WFOL renewal application with Michi Saagiig Nations on May 20, 2025, based on feedback received April 3, 2025 on Nations' priorities. • Meetings on May 12 & 28, 2025 with the Michi Saagiig Nations to discuss Deep Water Intake marine archaeology scope, path forward including methodology, and next steps.
Chippewas of Rama First Nation	<ul style="list-style-type: none"> • OPG letter sent March 28, 2023, with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement. • Shared draft Pickering IEP for review and comment on January 30, 2024. Comments received on May 30, 2024. Final working version of IEP shared May 21, 2024 prior to receiving comments. Update shared on January 13, 2025. • Attended virtual Pickering Engagement meeting on April 17, 2024 to discuss PNGS refurbishment, projects and decommissioning. • In-person meeting with Chief, Council and consultation staff to discuss ongoing and proposed activities at Pickering NGS on July 29, 2024. • Shared Pickering MoU on Aug 09, 2024. No response received. OPG followed up Aug 29, 2024. • PERA for Pickering Component Storage Structure (PCSS) shared on December 13, 2024. Revised PCSS PERA shared with all WTFN on June 10, 2025. • Communicated a Detailed Decommissioning Plan briefing note and opportunity to review the Detailed Decommissioning Plan November 27, 2024. • Engagement via email and phone throughout 2024 attempting to provide opportunity to engage on Pickering NGS PROL and WFOL activities. • OPG email sent on November 22, 2024 informing OPG's intent to apply for a consolidated Pickering PROL and WFOL and offer for further engagement. • OPG email sent on January 13, 2025 informing OPG is working towards submitting the PROL and WFOL application in Q2 2025. • OPG email sent on March 18, 2025 sharing Pickering updates re: Electrode Boiler project. • PERA for Pickering Nuclear and Climate Change Vulnerability and Assessment Summary Report shared on May 16, 2025. • OPG email sent on June 9, 2025 sharing a memo that provided a summary of the PROL/WFOL renewal application.

Table 11. Identified Indigenous Communities with Asserted Aboriginal and/or Treaty Rights

Community	Summary
Kawartha Nishnawbe	<ul style="list-style-type: none">• OPG letter sent March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement.• OPG follow-up letter July 17, 2023 with context about Pickering NGS future, and meeting request to discuss engagement and involvement.• OPG shared email update June 17, 2025 to inform of OPG's intent to apply for a consolidated Pickering PROL and WFOL, shared the IEP, and offer for further engagement.

Table 12. Identified Indigenous Nations and Communities Expressing an Interest

Community	Summary
Huron-Wendat Nation, Quebec	<ul style="list-style-type: none"> • OPG letter sent March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement. • OPG follow-up letter July 17, 2023 with context about Pickering NGS future, meeting request to discuss engagement and involvement. • Final working version of IEP shared June 14, 2024. Update shared January 13, 2025. • OPG email January 13, 2025 informing OPG's intent to apply for a consolidated Pickering PROL and WFOL and offer for further engagement.
Mohawks of the Bay of Quinte First Nation	<ul style="list-style-type: none"> • OPG letter with context about Pickering NGS future, meeting request to discuss engagement and involvement on July 17, 2023. • Email regarding Pickering Emergency Management notification protocols sent on November 3, 2023. • Shared draft Pickering IEP for review and comment January 30, 2024. Final working version of IEP shared on June 14, 2024. Update shared on January 13, 2025. • OPG email on January 13, 2025 informing OPG's intent to apply for a consolidated Pickering PROL and WFOL and offer for further engagement.
Métis Nation of Ontario Region 8	<ul style="list-style-type: none"> • OPG letter with context about Pickering NGS future, meeting request to discuss engagement and involvement on July 17, 2023. • Meeting to discuss Pickering NGS feasibility and refurbishment update on December 15, 2023. • Shared draft Pickering IEP for review and comment on January 30, 2024. Final working version of IEP shared on May 21, 2024. Update shared on January 13, 2025. • Meeting to discuss ongoing and proposed Pickering NGS refurbishment activities on June 10, 2024. • OPG email on January 13, 2025 informing OPG's intent to apply for a consolidated Pickering PROL and WFOL and offer for further engagement.
Saugeen Ojibway Nation	<ul style="list-style-type: none"> • Shared Pickering IEP for review and comment on September 24, 2024. No comments received. • OPG email sent on February 21, 2025 reaffirming OPG's desire to engage on operations and proposed activities at the Pickering site, including an updated IEP.
Six Nations of the Grand River First Nation	<ul style="list-style-type: none"> • OPG letter sent on March 28, 2023 with context about nuclear power, the Pickering station, past technical feasibility assessments for refurbishment, a statement of planned feasibility assessment, key milestones, invitation to tour the Pickering facility, and commitment to ongoing engagement. • Meeting to discuss Pickering NGS overview and refurbishment feasibility assessment on September 26, 2023.

Community	Summary
	<ul style="list-style-type: none"> • Pickering NGS site tour and discussion on November 21, 2023. • Shared draft Pickering IEP for review and comment on January 30, 2024. Final working version of IEP shared May 27, 2024. Update shared January 13, 2025. • Framework meetings throughout 2024 (July 19 and October 18) to discuss Pickering NGS PROL and WFOL activities based on Six Nations of the Grand River interest. • Framework meeting agenda sent July 18, 2024 identifying Pickering NGS IEP • Framework meeting on July 19, 2024 discussed PNGS IEP with an SNGS request for a plain language overview of Pickering activities. • Framework meeting October 18, 2024 discussed PNGS Refurbishment updates and presented a slide deck overview of site activities. • OPG email January 13, 2025 informing OPG's intent to apply for a consolidated Pickering PROL and WFOL and offer for further engagement. • Framework meeting on January 17, 2025 to discuss Pickering NGS PROL and WFOL activities.
Mississaugas of the Credit First Nation	<ul style="list-style-type: none"> • Shared draft Pickering IEP for review and comment on January 13, 2024 for review and feedback. • OPG shared email update on June 17, 2025 to inform of OPG's intent to apply for a consolidated Pickering PROL and WFOL and offer for further engagement.

ENCLOSURE 1

OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, "Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility".

CD# P-CORR-00531-24089 P

Environmental Aspects Identification and Significance Rating

OPG-PROC-0036 R008

(11 total pages)

ENCLOSURE 2

OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, "Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility".

CD# P-CORR-00531-24089 P

Pickering Nuclear Radioactive and Hazardous Emissions Monitoring Plan

P-PLAN-03480-00001 R013

(203 total pages)

ENCLOSURE 3

OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, "Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility".

CD# P-CORR-00531-24089 P

Biodiversity Conservation Standard

OPG-STD-0119 R002

(14 total pages)

ENCLOSURE 4

OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, "Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility".

CD# P-CORR-00531-24089 P

**Pickering Waste Management Facility SB4
Erosion Hazard Assessment**

CD# 92896-REP-15200-00001- Rev 000

(109 total pages)

ENCLOSURE 5

OPG Letter, P. Seguin, K. Aggarwal and L. Ceccato to R. Richardson, "Additional Information Supporting the Licence Renewal Application for Pickering Nuclear Generating Station and Pickering Waste Facility".

CD# P-CORR-00531-24089 P

**Pickering Waste Management Facility SB5&6
Erosion Hazard Assessment**

CD# 92896-REP-15200-00005-Rev 000

(102 total pages)

**Summary of Regulatory Commitments, Regulatory Obligations and Regulatory
Management Actions Made/Concurrence Requested**

CD# P-CORR-00531-24089 P

Submission Title: Additional Information Supporting the Licence Renewal Application for
Pickering Nuclear Generating Station and Pickering Waste Facility

Regulatory Commitments (REGC):

No.	Description	Date to be Completed
	None	

Regulatory Management Action (REGM):

No.	Description	Date to be Completed
	None	

Regulatory Obligation Action (REGO):

No.	Description	Date to be Completed
	None	

**Concurrence
Requested:** None.

Title:

**Predictive Environmental Risk Assessment for Pickering Refurbishment,
Decommissioning, and Continued Operations**

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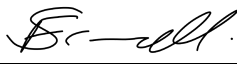
**Predictive Environmental Risk
Assessment for Pickering
Refurbishment, Decommissioning, and
Continued Operations**

P-REP-07701-00014 R000


2025-04-07

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**PREDICTIVE ENVIRONMENTAL RISK
ASSESSMENT FOR PICKERING
REFURBISHMENT, DECOMMISSIONING, AND
CONTINUED OPERATIONS**

P-REP-07701-00014 R000

REPORT PREPARED FOR:

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**PREDICTIVE ENVIRONMENTAL RISK
ASSESSMENT FOR PICKERING
REFURBISHMENT, DECOMMISSIONING, AND
CONTINUED OPERATIONS**

P-REP-07701-00014 R000



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Revision Number	Date	Comments
R000	07 April 2025	Initial Issue of report.

LAND ACKNOWLEDGEMENT

The lands and waters on which the Pickering Nuclear Generating Station (PNGS) is situated are the treaty and traditional territory of the Michi Saagiig and Chippewa Nations, collectively known as the Williams Treaties First Nations.

The PNGS is within the territory of the Johnson-Butler Purchase/Gunshot Treaty (1787-1788) and the Williams Treaties of 1923. These Treaty Rights were reaffirmed in 2018 in a settlement with Canada and the Province of Ontario.

To acknowledge the Treaty and traditional territory, is to recognize the rights of the First Nations. It is to recognize the history of the land, predating the establishment of the earliest European colonies. It is also to acknowledge the significance for the Indigenous peoples who lived and continue to live upon it, to acknowledge the people whose practices and spiritualities are tied to the land and water and continue to develop in relation to the territory and its other inhabitants today.



EXECUTIVE SUMMARY

Ontario Power Generation (OPG) plans to pursue refurbishment and continued operation of Pickering Nuclear Generating Station (PNGS) Units 5 to 8, as well as decommissioning of PNGS Units 1 to 4, herein referred to as the Project. This report presents the Predictive Environmental Risk Assessment (PERA) for the Project. The PERA supports the renewal of the existing licence for PNGS to include refurbishment activities for PNGS Units 5-8, decommissioning of PNGS Units 1-4, as well as the Nuclear Sustainability Services – Pickering Waste Management Facility (NSS-PWMF) waste licence.

Refurbishment and continued operation of PNGS Units 5-8 will help OPG meet its mission to build a sustainable future powered by our electricity, our ideas, and our people. This supports OPG's vision to electrify life in one generation.

The focus of the PERA is on the activities that will potentially occur up to and including the re-licensing period from 2027 to 2037; activities and Project phases that will occur after the end of 2037 are discussed at a more general level of detail. The Project includes the following phases:

PNGS Units 1-4

- **Stabilization Phase:** Initiated in October 2024, a 3-year Stabilization Phase for Unit 1 and Unit 4 includes the arrangements and activities that ensure a safe and efficient transition from the end of commercial operation to the Storage with Surveillance (SWS) state for the transitioning units. PNGS Unit 2 and Unit 3 are not included in the assessment of this phase as the Stabilization Phase of Unit 2 and Unit 3 is complete and the units have been in SWS since 2010.
- **Storage with Surveillance:** Starting in 2028, and projected to end by approximately 2090, a 50-70-year Storage with Surveillance Phase will be initiated (for Unit 1 and Unit 4) to allow for natural decay of radioactivity. Unit 2 and Unit 3 have been in SWS since 2010 and will continue in SWS until approximately 2090 as well. Activities during this phase include the ongoing operation of the Irradiated Fuel Bays (IFBs) and the continued transfer of spent fuel to dry storage containers (DSCs). Consistent with CNSC REGDOC-2.11.2 "Decommissioning" (CNSC, 2021), risk reduction activities will be initiated during this phase to remove and remediate non-nuclear equipment and buildings/facilities.
- **Dismantle and Demolish:** From 2034 to approximately 2100, the Dismantle and Demolish Phase will be initiated for Units 1-4 with details to be provided in subsequent Detailed Decommissioning Plan (DDP) updates.

PNGS Units 5-8

- **Refurbishment:** Starting in 2027 (pending approvals) preparation for refurbishment of PNGS Units 5-8 will be initiated, including defueling and dewatering of reactors, relocation and/or

removal of structures and equipment, construction of buildings and temporary laydown areas. Starting in 2027, the first unit will enter refurbishment which involves replacing reactor components including: fuel channels and calandria tubes, inlet and outlet feeders from end fittings to the reactor inlet/outlet headers, replacement of steam generators, refurbishment of various systems including reactor auxiliary systems and feedwater systems, and normal upgrade and maintenance activities. The unit will then be refuelled and restarted.

- **Continued Operations:** At the end of refurbishment, all units at PNGS Units 5-8 will be returned to service and operation will then continue for approximately 30 years.
- **Decommissioning:** At the end of life for PNGS Units 5-8 the facility will enter a Stabilization Phase, followed by SWS, and Dismantle and Demolish phases. At this stage, decommissioning of PNGS Units 5-8 is only conceptually developed, and is consistent with its preliminary decommissioning plan (PDP) (OPG, 2025).

Objectives

This PERA was conducted to meet the requirements of CSA N288.6:22 “Environmental Risk Assessments at Nuclear Facilities and Uranium Mines and Mills” (CSA, 2022a) and also meets the requirements for an Environmental Risk Assessment (ERA) outlined in Section 4.1 of REGDOC-2.9.1 “Environmental Protection: Environmental Principles, Assessments and Protection Measures” (CNSC, 2020). The objectives of the PERA are to:

- Identify whether any proposed Project activities are likely to result in environmental emissions or other stressors potentially exceeding those in previous assessments;
- Predict and assess the risk of effect to representative human and ecological receptors resulting from exposure to radiological and non-radiological substances and physical stressors expected to be released during refurbishment, decommissioning, and continued operations of PNGS;
- Inform prioritization of monitoring and mitigation measures.

OPG is committed to open and transparent communication on our operations and projects and adheres to the guidance outlined in CNSC REGDOC 3.2.1, Public Information and Disclosure, and CNSC REGDOC 3.2.2, Indigenous Engagement, in accordance with the PNGS Licence Condition Handbook (CNSC, 2018, 2022).

Methodology

The general approach to this PERA included the following key steps:

1. Review and update existing conditions. This is primarily conducted through review of the 2022 Pickering Nuclear ERA and additional data collected to support an update to existing conditions.

2. Identify proposed PNGS Units 1-4 decommissioning activities and PNGS Units 5-8 refurbishment activities.
3. Perform a qualitative assessment to identify future activities that are not bound by existing conditions or assumptions in previous assessments (Tier 1 assessment). For those interactions bound by existing conditions or previous assessments, no further action is required other than documenting the rationale.
4. Conduct quantitative assessment (Tier 2) for those interactions not bound by existing conditions or assumptions in previous assessments. This is primarily a quantitative risk assessment with estimation of dose and hazard quotients (as applicable).
5. Identify mitigation measures and recommendations for monitoring programs.

The evaluation of Project-environment interactions also utilizes the previous assessments referred to above, which include the 2022 PN ERA (Ecometrix, 2023a), the 2017 Safe Storage Predictive Effects Assessment (PEA) and 2022 PEA Addendum (Ecometrix, 2023b; Golder and Ecometrix, 2017), and the Pickering Component Storage Structure (PCSS) PERA (Ecometrix, 2024).

Tier 1 Assessment

PNGS Units 1-4 Decommissioning and PNGS Units 5-8 Refurbishment proposed activities were evaluated for interactions with environmental pathways and receptors in the Tier 1 assessment. In general, interactions associated with project activities during the Stabilization and SWS phases of PNGS Units 1-4 are considered sufficiently bounded by the findings of the 2017 Safe Storage PEA and the 2022 PEA Addendum, or the 2022 PN ERA, and do not warrant further evaluation. Although PNGS Units 1-4 risk reduction and removal activities were not evaluated in previous assessments, these activities are not anticipated to result in significant environmental effects as construction best practices and applicable mitigation plans will be implemented to ensure impacts are minimized. Environmental effects of future dismantle and demolish activities planned to start in 2034 will be detailed in subsequent DDP updates and PERA updates when more detailed work packages are defined.

Refurbishment activities for PNGS Units 5-8 including islanding the unit, refurbishment of reactor auxiliary systems, and other upgrades are determined in the Tier 1 assessment to have negligible interaction with the environment. Some activities, such as the construction of the PCSS, are evaluated as part of a separate PERA. Other activities, such as defueling and dewatering the units, are bounded by the 2017 Safe Storage PEA and the 2022 PEA Addendum, while still others, such as management of tritium emissions, are bounded by the 2022 PN ERA. These activities bounded by other assessments do not warrant further evaluation in the Tier 2 assessment.

One of the major design modifications/activities not previously evaluated is the potential construction of an offshore lake bottom water intake structure for PNGS Units 5-8 that will replace the current shoreline surface water intake. The proposed deep water intake (DWI) will draw deeper

cooler water from Lake Ontario which is expected to significantly reduce fish impingement and entrainment as well as reduce potential biofouling events with attached algae. The construction of the intake structure could also potentially involve shoreline modifications such as a dock, infill, and material disposal. The Tier 1 screening identified that aquatic habitat impacts from the DWI construction and thermal effects, especially as they relate to climate change, require further assessment. As such, these project-environment interactions are comprehensively evaluated in the Tier 2 quantitative assessment to characterize the potential for adverse impacts.

To support this PERA, predictive air quality and noise modelling was completed to assess potential impacts to human and ecological receptors resulting from the planned PNGS Units 1-4 Decommissioning and PNGS Units 5-8 Refurbishment. The modelling was developed as a conservative “worst-case” bounding scenario for the planned Project activities.

No long-term human health effects are expected to occur as a result of the predicted ambient air quality or noise conditions for the bounding scenario. Exceedances of the selected ambient air quality criteria were predicted for total suspended particulates (TSP), inhalable and respirable particulates (PM₁₀ and PM_{2.5}), nitrogen dioxide (NO₂, representative of nitrogen oxides [NO_x]), and benzo(a)pyrene (BaP, representative of polycyclic aromatic hydrocarbons [PAHs]) for at least one of the human receptor locations assessed. No health risks are anticipated for the bounding scenario since air quality criteria exceedances are predicted to occur infrequently (i.e., only a few days to a few weeks in the year), or at receptor locations where people stay for short periods of time (i.e., the Sport Fisher). For noise, predicted exceedances of human health noise guidelines are modelled to only occur at locations where people stay for short periods of time (i.e., the Sport Fisher, Industrial/Commercial Worker), limiting the overall exposure to elevated noise levels.

No long-term ecological health effects are expected to occur as a result of the predicted ambient air quality for the bounding scenario. Some exceedances of the selected ambient air quality criteria were predicted for TSP, PM₁₀, PM_{2.5}, NO₂, and BaP for at least one of the ecological receptor locations assessed. No effects are expected since exceedances are largely localized to the PN site where mitigation measures (e.g., dust suppression measures) will be utilized to further minimize dust and particulate emissions. Project-related exceedances of short-term 24-hr TSP and PM₁₀ criteria off-site at Frenchman’s Bay are predicted to occur relatively infrequently (i.e., exceedances on a few days up to a few weeks in a year). It is expected that Frenchman’s Bay will continue to provide suitable habitat for local terrestrial and riparian biota over the course of the Project.

No noise impacts to receptors at Hydro Marsh and Frenchman’s Bay are expected since predicted noise levels are less than the 10 dB guideline for incremental change above existing conditions. Exceedances of noise guideline are localized to the PN site. It is presumed that wildlife currently inhabiting the PN site are well adjusted to noise levels characteristic of an urban/semi-urban environment and are relatively tolerant of human activity. Increased noise levels above the 10 dB guideline are predicted at the Bank Swallow Fixed Face Earthen Embankment. As such, mitigation measures should be considered to reduce noise levels during the breeding season (approximately April 1st to August 31st). Additionally, the conservative assumptions in the noise model can be re-evaluated once Project planning is further underway to provide more realistic predictions.

While air quality and noise were not assessed further for any human or ecological receptors in the Tier 2 assessment, recommendations are included to protect breeding birds on-site including species at risk from elevated noise levels (see recommendations section below). Barn swallow, bank swallow, and peregrine falcon are known to breed on the PN site.

General feedback from the Williams Treaties First Nations indicates that it would be beneficial to include a Harvester receptor in the PERA, to more specifically reflect Indigenous people who may live and work near the facility and consume traditional foods harvested near the facility. As such, assessment of a Harvester is considered in the Tier 2 quantitative assessment.

Following refurbishment, PNGS Units 5-8 will operate in a manner consistent with existing operations (4 operating units). Consequently, the potential effects of the Continued Operation Phase on most environmental components are bounded by those previously assessed in the 2022 PN ERA for 6 operating units and comparable to current conditions with 4 units (PNGS Units 5-8) operating.

In summary, the following potential effects are evaluated in the Tier 2 assessment:

- Inclusion of a Harvester in the Predictive Human Health Risk Assessment (HHRA) to assess radiation dose from exposure to releases of tritium, carbon-14, and beta/gamma to the atmospheric and surface water environment.
- Evaluation of aquatic habitat loss and potential changes to habitat quality in the Predictive Ecological Risk Assessment (EcoRA) from construction of the proposed DWI and associated lake infill areas and dock.
- Evaluation of changes to thermal effects on indicator fish species in the Predictive EcoRA due to operation of the DWI, with consideration of long-term climate change.

Tier 2 Quantitative Assessment

Predictive HHRA

The Tier 1 assessment concluded that the radiological emissions to air and water assessed in the 2017 Safe Storage PEA remain conservative estimates of radiological emissions for current Project planning for PNGS Units 1-4 Stabilization and SWS, as well as for PNGS Units 5-8 Refurbishment.

Using the conservative estimates for emissions, the predictive HHRA provides the predicted radiation dose for the Harvester, and also provides an updated dose prediction for the other human receptors evaluated in the 2017 Safe Storage PEA based on more recent meteorological data from PN (2017 to 2021).

The incremental radiation dose from the Project to all human receptors evaluated is predicted to be well below the regulatory public dose limit of 1 mSv/a. The predicted dose to the Harvester is 1.24 μ Sv/a which is 0.12% of the regulatory public dose limit (1,000 μ Sv/a). The predicted doses to all human receptors are well below the public dose limit and a small fraction of the natural background

dose of 1,400 $\mu\text{Sv/a}$; therefore, no health effects are anticipated due to exposure of potential critical groups to radiological releases from the PN Site during the Project phases.

Predictive EcoRA

The predictive EcoRA evaluated the potential impacts of the construction and operation of the DWI on aquatic habitat loss and thermal effects.

Based on the habitat assessment results, the construction of the proposed DWI and associated lake infill areas and dock could result in the destruction of approximately 17.5 ha of fish habitat utilized by species for potential spawning, foraging and migration, and 4.8 ha of habitat alteration from dredging and potential bridge over the PNGS Units 5-8 CCW outfall. Additionally, the construction of the intake channel (a bored tunnel running from the intake cap to PNGS) could result in temporary disruption of approximately 2.5 ha of fish habitat.

Although the substrate and depth in the nearshore area meet the spawning requirements of some fish species, high wave energy along the shoreline makes it unsuitable for spawning. Furthermore, the DWI and nearshore aquatic environment lack unique habitat features, as they are typical of other areas found throughout Lake Ontario. Therefore, while construction activities will result in habitat loss, no rare or unique habitats will be lost.

The thermal impact of the PNGS Units 5-8 discharge during operation of the DWI was evaluated. It is anticipated that once the DWI is in operation the discharge temperature will be the same or lower than the existing PNGS Units 5-8 discharge temperatures. Thus, the PNGS Refurbishment activities are not expected to add any additional thermal load to the aquatic environment, and may even result in an improvement relative to current thermal conditions. When considering the additional influence of climate change over time, lake water temperatures are expected to increase over the long-term. However, this increase is not expected to occur uniformly across the water column, with surface waters warming at a faster rate than deeper layers. The effects of lake warming are anticipated to impact all fish in varying degrees. Some fish species may have to shift to different habitats to remain within their optimal temperature range or acclimate as climate change continues to progress. Over the long-term, thermal contributions from PNGS Units 5-8 are expected to be similar or slightly less than current conditions.

Cumulative Effects

The PERA encompasses all existing and known future activities on the PN site including evaluation of: previous PNGS operations (for 6 operating units), PNGS Units 1 and 4 Stabilization, PNGS Units 1-4 SWS and dismantle/demolish activities, PNGS Units 5-8 Refurbishment (including construction and operation of the DWI), PNGS Units 5-8 Continued Operations, the NSS-PWMF including construction of an additional Storage Building #5, the PCSS, and construction of other planned buildings.

The air, noise, and surface water modelling performed to support the PERA conservatively evaluate bounding scenarios where Project activities occur during the same timeframe. As such, cumulative effects on the PN site have been considered in this PERA.

Cumulative effects from other OPG projects near the PN site were considered. Environmental monitoring at PN includes contributions from Darlington Nuclear Generating Station (DNGS), and in the future, Darlington New Nuclear Project (DNNP). Since the PN site is approximately 34 km west of the DN site, the influence from DNGS and DNNP at PN would be small.

Overall Conclusions

Based on the results of the PERA, most activities associated with PNGS Units 1-4 Decommissioning, PNGS Units 5-8 Refurbishment, and Continued Operations are not predicted to result in adverse effects to human and/or ecological receptor groups evaluated. Some aquatic habitat will be disturbed or removed from DWI construction – OPG will meet all Fisheries and Oceans Canada (DFO) authorization requirements including implementation of fish habitat compensation measures to offset the loss of habitat and associated productivity. As such the effect of aquatic habitat loss should be minimal with implementation of mitigation measures. While some individual exceedances of air quality or noise guidelines were identified, monitoring and mitigation measures identified below will be implemented to confirm no adverse effects.

Recommendations for Monitoring and Mitigation

Based on the results of this PERA, recommendations and/or mitigation measures are identified in **Table ES-1** below.

Table ES-1: Recommendations for Monitoring and Mitigation

Environmental Component	Recommendation for Monitoring and Mitigation
Atmospheric Environment	<ul style="list-style-type: none"> • <u>Air Quality</u>: Air monitoring of existing conditions should continue so that at least 6 months of air quality data are available to characterize the existing environment. The additional air monitoring data should be included in the next iteration of the PERA. • <u>Air Quality</u>: Implementation of a dust management plan that could involve mitigative measures such as the application of dust suppressants, stabilization of completed soil surfaces, and suspension of dust-generating activities during periods of inclement weather. This is expected to reduce dust and particulate emissions and deposition on to vegetation surfaces, limiting pollution of local wildlife habitat. • <u>Noise</u>: The development and implementation of a Noise Management Plan will outline best construction practices and available mitigation measures for controlling noise generation.

Environmental Component	Recommendation for Monitoring and Mitigation
	<ul style="list-style-type: none"> • <u>Noise</u>: Mitigation measures should be explored to reduce noise levels to species at risk during the breeding season, including Bank Swallow, Barn Swallow, and Peregrine Falcon (known to nest on the PN site). Mitigation measures may include alternate truck routes, revisiting assumptions in noise model to reduce conservatism.
Surface Water Environment	<ul style="list-style-type: none"> • No additional recommendations beyond continuing to implement surface water quality monitoring through OPG's ongoing environmental monitoring program. • OPG will employ best practices for stormwater management that would meet Ontario Ministry of Environment, Conservation and Parks (MECP) requirements and industrial sewage works rules.
Aquatic Environment	<ul style="list-style-type: none"> • Aquatic monitoring studies were completed to support this PERA based on current Project planning for the DWI at the time of study design. As the design of the DWI evolves, it presents some uncertainty in the study area size and location. As such, further data (fish community, benthic macroinvertebrate community, microzooplankton community) should be collected for the aquatic environment to reflect changes to DWI planning since the Project was initiated. The additional aquatic environment data should be included in the next version of the PERA. • <u>Aquatic Habitat</u>: To mitigate impacts of habitat loss from DWI construction, measures should be taken to limit the spread of aquatic invasive species, such as cleaning, draining, and drying any equipment used in the water, and avoiding the transfer of organisms or water between bodies of water. Additionally, OPG will replace and restore disturbed habitat features, as well as remediate any impacted areas, in accordance with DFO authorization requirements, if applicable. • <u>Aquatic Habitat</u>: An Erosion and Sediment Control Plan should be developed to minimize the mobilization of suspended materials into the water during DWI construction. Mitigation measures may include conducting in-water works in isolation of open or flowing water to reduce sediment introduction into the watercourse, regular inspection and maintenance of erosion controls, monitoring for signs of sedimentation, and ensuring the proper disposal of dredged materials. Similarly, a spill response plan should be implemented to prevent spills of deleterious substances. • <u>Impingement and Entrainment</u>: The reduction of impingement and entrainment once the DWI is operational should be confirmed through monitoring programs.

Environmental Component	Recommendation for Monitoring and Mitigation
	<ul style="list-style-type: none"> • <u>Thermal Effects</u>: The assumption that PNGS Units 5-8 discharge temperatures post-DWI implementation will be the same or slightly lower than previous operational conditions (with 6 operating units) should be confirmed through evaluation of lake water temperatures in terms of hazard quotients to key indicator fish species, as well as evaluation of the influence of climate change over time. This evaluation should be included in routine PN ERA updates. Additionally, monitoring of lake bottom temperatures within the thermal plume, once the DWI is operational is recommended to improve the understanding of habitat conditions.
Geological and Hydrogeological Environment	<ul style="list-style-type: none"> • During construction of the PCSS, Storage Building #5, Retube and Feeder Replacement Service Island Support Annex (RFRISA), and other planned buildings, any dewatering during excavation should be completed with the necessary permissions following MECP regulations intended to be protective against discharge or re-infiltration of collected groundwater. • A geotechnical investigation should be completed to determine if dewatering is required for the RFRISA or any other planned building. A geotechnical investigation has already been completed for the PCSS and is discussed in the PCSS PERA.
Terrestrial Environment	<ul style="list-style-type: none"> • See atmospheric environment row for recommendations on reducing noise levels for species at risk. • As much as its possible to do so, construction activities should be adjusted as needed to minimize impacts, such as modifying work schedules or implementing noise and activity restrictions near nesting sites. To further reduce disturbance, heavy construction activity should be avoided during key breeding periods. Furthermore, work could be planned to occur during daytime hours to minimize disruption of nocturnal wildlife. • OPG will comply with the species and habitat protection provisions of the Endangered Species Act, Species at Risk Act, and Migratory Birds Convention Act during all project activities. • OPG will continue to monitor breeding birds and conduct broader biodiversity monitoring on an annual basis to support conservation efforts and regulatory compliance.
Radiation and Radioactivity (Gamma Radiation)	<ul style="list-style-type: none"> • Future iterations of the PN ERA (based on the time period they encompass) should consider the new NSS-PWMF layout with inclusion of the transferred Dry Storage Modules (DSMs) from the Phase I to the Phase II NSS-PWMF site. Data from thermoluminescent dosimeters surrounding the DSMs as well as

Environmental Component	Recommendation for Monitoring and Mitigation
	quarterly catch basin stormwater monitoring can be used to verify the conclusion that doses remain acceptable.

OPG recognizes that the PERA, while it satisfies assessment of environmental impacts from a Western science perspective, may not fully address the impact of the Project on Aboriginal and Treaty rights as they are understood today. This is particularly true in light of the 2018 settlement agreement between the seven members of the Williams Treaties First Nations (WTFN) with the Governments of Canada and Ontario. The Settlement (Government of Canada, 2018) pertains to the lands of the PN site and reaffirms the rights of WTFN citizens, which has fundamentally shifted how WTFN is engaged and consulted on site development. OPG recognizes the importance of furthering our knowledge and understanding, in ongoing meaningful engagement with the WTFN. OPG endeavors to continue to work with the WTFN to appropriately identify the rights impacted by the Project and to achieve feasible mitigation measures and/or accommodation.

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1.1
1.1	Project Overview and Schedule.....	1.3
1.2	Regulatory Context	1.7
1.3	Objectives.....	1.7
1.4	Scope	1.8
1.4.1	Spatial Boundaries.....	1.8
1.4.2	Temporal Boundaries	1.11
1.5	Summary of Past Assessments	1.11
1.5.1	Environmental Risk Assessment for Pickering Nuclear.....	1.11
1.5.2	Predictive Effects Assessment for Pickering Nuclear Safe Storage.....	1.13
1.5.3	Pickering B Refurbishment Environmental Assessment	1.14
1.6	What OPG has heard through Indigenous Engagement Feedback	1.14
1.7	Quality Assurance and Quality Control.....	1.16
2.0	METHODOLOGY.....	2.1
3.0	PROJECT ACTIVITIES	3.1
3.1	Refurbishment of PNGS Units 5-8.....	3.11
3.1.1	Preparation for Refurbishment.....	3.11
3.1.2	Refurbishment.....	3.16
3.1.3	Refuelling and Restarting	3.19
3.2	Continued Operations of PNGS Units 5-8	3.20
3.3	Decommissioning of PNGS Units 1-4	3.21
3.3.1	Decommissioning Timeline.....	3.21
3.3.2	Separation of PNGS Units 1-4 and PNGS Units 5-8.....	3.22
3.3.3	Stabilization and Storage with Surveillance Activities.....	3.23
3.3.4	Risk Reduction and Removal Activities	3.24
4.0	SUMMARY OF EXISTING CONDITIONS.....	4.1
4.1	Atmospheric Environment	4.4
4.1.1	Air Quality	4.4
4.1.2	Noise	4.13
4.2	Surface Water Environment.....	4.16
4.2.1	Flow and Hydrology.....	4.16
4.2.2	Water and Sediment Quality.....	4.17
4.2.3	Stormwater runoff	4.32
4.3	Aquatic Environment.....	4.33

4.3.1	Fish.....	4.33
4.3.2	Benthic Macroinvertebrates.....	4.56
4.3.3	Plankton Communities	4.61
4.3.4	Aquatic Habitat.....	4.68
4.4	Geological and Hydrogeological Environment	4.77
4.4.1	Surficial Geology and Soil.....	4.77
4.4.2	Groundwater.....	4.81
4.5	Terrestrial Environment	4.84
4.5.1	Vegetation	4.87
4.5.2	Wildlife	4.87
4.6	Radiation and Radioactivity.....	4.90
4.6.1	Human Dose	4.90
4.6.2	Ecological Dose.....	4.92
4.7	Uncertainty in the Existing Conditions	4.95
5.0	TIER 1 QUALITATIVE ASSESSMENT	5.1
5.1	Atmospheric Environment	5.4
5.1.1	Air Quality	5.4
5.1.2	Noise.....	5.29
5.1.3	Summary of Tier 1 Assessment	5.35
5.2	Surface Water Environment.....	5.37
5.2.1	Surface Water Flow	5.37
5.2.2	Surface Water Quality	5.45
5.2.3	Summary of Tier 1 Assessment	5.53
5.3	Aquatic Environment.....	5.56
5.3.1	Fish and Fish Habitat	5.56
5.3.2	Impingement and Entrainment	5.58
5.3.3	Thermal Effects	5.61
5.3.4	Summary of Tier 1 Assessment	5.63
5.4	Geological and Hydrogeological Environment	5.66
5.4.1	Soil	5.66
5.4.2	Groundwater.....	5.70
5.4.3	Summary of Tier 1 Assessment	5.74
5.5	Terrestrial Environment	5.76
5.5.1	Vegetation and Wildlife.....	5.76
5.5.2	Summary of Tier 1 Assessment	5.81
5.6	Radiation and Radioactivity.....	5.83
5.6.1	PNGS Units 1-4 Decommissioning	5.84
5.6.2	PNGS Units 5-8 Refurbishment.....	5.85
5.6.3	PNGS Units 5-8 Continued Operations.....	5.89
5.6.4	Summary of Tier 1 Assessment	5.89
5.7	Climate Change Considerations.....	5.90

5.7.1	PNGS Units 1-4 Decommissioning	5.91
5.7.2	PNGS Units 5-8 Refurbishment	5.92
5.7.3	Continued Operations	5.94
5.8	Uncertainty in the Tier 1 Assessment	5.95
5.9	Summary of Tier 1 Assessment	5.95
6.0	TIER 2 QUANTITATIVE ASSESSMENT	6.1
6.1	Predictive Human Health Risk Assessment (HHRA)	6.1
6.1.1	Problem Formulation	6.1
6.1.2	Exposure Assessment	6.8
6.1.3	Toxicity Assessment	6.20
6.1.4	Risk Characterization	6.21
6.2	Predictive Ecological Risk Assessment (EcoRA)	6.22
6.2.1	Problem Formulation	6.22
6.2.2	Aquatic Habitat Impacts	6.26
6.2.3	Thermal Effects	6.37
7.0	CUMULATIVE EFFECTS CONSIDERATION	7.1
8.0	CONCLUSIONS	8.1
8.1	Tier 1 Assessment Conclusions	8.1
8.2	Tier 2 Assessment Conclusions	8.3
8.2.1	Predictive Human Health Risk Assessment (HHRA)	8.3
8.2.2	Predictive Ecological Risk Assessment (EcoRA)	8.4
8.3	Recommendations for Monitoring and Mitigation	8.5
9.0	REFERENCES	9.1
APPENDIX A	SCREENING TABLES	A.1
A.1	Surface water	A.2
A.2	Sediment	A.14
A.3	Soil	A.18
APPENDIX B	RESULTS OF 2024 AQUATIC STUDIES	B.1
B.1	Deepwater Fish Community Studies Results	B.1
B.2	Nearshore Fish Community Studies Results	B.5
B.3	Fish Tissue	B.8
B.4	Benthic Macroinvertebrate Community Study Results	B.10

B.5	Macrozooplankton Community Study Results.....	B.12
B.6	Aquatic Habitat Characterization.....	B.15
APPENDIX C PREDICTED RADIATION DOSE TO HUMAN RECEPTORS		C.1

LIST OF TABLES

Table 3-1: Summary of Project Assumptions for Pickering Refurbishment and Decommissioning	3.2
Table 4-1: Summary of 2024-2025 Environmental Field Studies conducted in support of the PERA.....	4.2
Table 4-2: Radiological Air Emissions from PN (2021-2023).....	4.6
Table 4-3: Summary of Existing Conditions Air Concentrations Used In AQ Modelling	4.10
Table 4-4: Summary of PN Air Quality Monitoring Data (Jan. 6 to Feb. 18, 2025).....	4.11
Table 4-5: PN Existing Conditions Noise Data Summary (September 2024)	4.15
Table 4-6: Radiological Water Emissions from PN (2021-2023).....	4.26
Table 4-7: Fish Species at Risk Observed in the PN Area	4.34
Table 4-8: Standardized Fish Counts and Species Richness observed during the 2024 Deepwater Fish Community Study.....	4.37
Table 4-9: Fish Caught (count and %) and Species Richness in 2024 Nearshore Fish Community Study in Shoreline Erosion Mitigation Area and West Infill Area	4.42
Table 4-10: Benthic Macroinvertebrate Community Metrics in Samples collected from Deepwater Area, 2024	4.58
Table 4-11: Benthic Macroinvertebrate Community Metrics in Samples Collected from Nearshore study areas, 2024	4.60
Table 4-12: Proportions of Major Macrozooplankton Groups in Samples from 2024 Macrozooplankton Community Study.....	4.63
Table 4-13: Summary Statistics for Calculated Macrozooplankton Metrics, Spring 2024.....	4.64
Table 4-14: Summary Statistics for Calculated Macrozooplankton Metrics, Summer 2024.....	4.65
Table 4-15: Summary Statistics for Calculated Macrozooplankton Metrics, Fall 2024.....	4.66
Table 4-16: Substrate characterization in the proposed DWI area, 2024.....	4.70
Table 4-17: Terrestrial Animal Species at Risk Observed within the PN Study Area	4.89
Table 4-18: Summary of Dose to Potential Critical Groups from 2021-2023.....	4.90
Table 4-19: Summary of Dose to Limiting Critical Group from 2021 to 2023	4.91
Table 4-20: Dose Rate at the NSS-PWMF Exclusion Zone Boundary.....	4.92
Table 4-21: Summary of Radiation Dose Estimates for Biota at the Pickering Site	4.94
Table 5-1: Identification of Project-Environment Interactions.....	5.2
Table 5-2: Ambient Air Quality Screening Criteria.....	5.9
Table 5-3: Summary of Exceedances of Ambient Air Quality Guidelines during PNGS Units 5-8 Refurbishment.....	5.13
Table 5-4: Total Suspended Particulate Matter (TSP) Air Modelling Results.....	5.20
Table 5-5: Inhalable Particulates (PM ₁₀) Air Modelling Results	5.21
Table 5-6: Respirable Particulates (PM _{2.5}) Air Modelling Results	5.22
Table 5-7: Nitrogen Oxides (as NO ₂) Air Modelling Results.....	5.23
Table 5-8: Sulphur Dioxide (SO ₂) Air Modelling Results	5.24
Table 5-9: Carbon Monoxide (CO) Air Modelling Results	5.25
Table 5-10: Benzo(a)pyrene (BaP) Air Modelling Results.....	5.26

Table 5-11: Acrolein Air Modelling Results	5.27
Table 5-12: Human Health and Ecological Noise Modelling Results	5.34
Table 5-13: Summary of Interactions between Project Activities and Atmospheric Environment	5.35
Table 5-14: Summary of Surface Water Assumptions during the Project	5.39
Table 5-15: Summary of Predicted Surface Water Concentration Factors for PNGS Units 5-8 Outfall	5.43
Table 5-16: Predicted Lake Water Concentrations for Radionuclides during SWS	5.47
Table 5-17: Summary of CCW Mixing Calculations for RLWMS and NWTP	5.49
Table 5-18: Predicted Surface Water Concentrations for Radionuclides Released to PNGS Units 5-8 Outfall During Refurbishment	5.52
Table 5-19: Summary of Interactions between Project Activities and Surface Water Environment	5.53
Table 5-20: Summary of Interactions between Project Activities and Aquatic Environment	5.63
Table 5-21: Summary of Interactions between Project Activities and Geological and Hydrogeological Environment	5.74
Table 5-22: Summary of Interactions between Project Activities and Terrestrial Environment	5.81
Table 5-23: Summary of Interactions between Project Activities and Gamma Radiation	5.90
Table 5-24: Project-Environment Interactions Carried Forward into the Tier 2 Assessment	5.97
Table 6-1: Complete Exposure Pathways for Receptors for Exposure to Radiological COPCs	6.4
Table 6-2: Human Exposure Factors for Radiological Dose Calculations	6.9
Table 6-3: Proportioned Consumption Rates for Harvester Modelling	6.12
Table 6-4: Traditional Foods Selected for Harvester Modelling	6.13
Table 6-5: Local Food Intake Fractions for Harvester for IMPACT Model – Adult, Child, and Infant	6.15
Table 6-6: Exposure Point Concentrations for Water Contaminants of Potential Concern Used in Dose Calculations	6.17
Table 6-7: Air Concentrations at Human Receptor Locations	6.18
Table 6-8: Total Dose to Human Receptors for Conservative Estimate	6.18
Table 6-9: Summary of Total Dose to Human Receptors and Comparison to Dose Limit	6.21
Table 6-10: Assessment Endpoints, Measurement Endpoints, and Lines of Evidence	6.23
Table 6-11: Estimated Areal Footprint and Disturbance Type for Construction Activities in the DWI and Nearshore Study Areas	6.29
Table 6-12: Catch and/or Life History Information of Adult Fish Species Near PNGS	6.31
Table 6-13: Habitat Preferences of Fish Species Based on Spawning Requirements	6.32
Table 6-14: Substrate Types and Proportions in the Footprint of the DWI and Nearshore modifications	6.33
Table 8-1: Recommendations for Monitoring and Mitigation	8.6

LIST OF FIGURES

Figure 1-1: PN Site Location and Vicinity.....	1.2
Figure 1-2: Pickering NGS Timeline Overview.....	1.6
Figure 1-3: Area of Assessment for Human Receptors.....	1.9
Figure 1-4: Areas of Assessment for Ecological Receptors	1.10
Figure 2-1: Methodology for the PNGS PERA.....	2.2
Figure 3-1: Pickering Nuclear Site Plan.....	3.1
Figure 3-2: Planned Locations for the PCSS and RFRISA.....	3.13
Figure 3-3: DWI and Associated Site Preparation Modifications.....	3.16
Figure 3-4: PNGS AB Gate.....	3.22
Figure 3-5: Planning Envelope A-1 – Outbuildings in Green.....	3.26
Figure 3-6: Planning Envelope A-2 – Outbuildings in Orange.....	3.26
Figure 3-7: Planning Envelope A-3 – Outbuildings in Blue.....	3.27
Figure 3-8: Planning Envelope B-1 – Turbine Hall.....	3.28
Figure 3-9: Planning Envelope B-2 – Turbine Auxiliary Bay	3.29
Figure 4-1: Monitoring Locations for the 2025 Air Quality and 2024 Noise Monitoring Program	4.12
Figure 4-2: Water Balance at PNGS under Previous Operational Conditions in 2022 PN ERA ...	4.17
Figure 4-3: Lake Ontario Surface Water Sampling Locations, 2024.....	4.19
Figure 4-4: Frenchman’s Bay Surface Water Sampling Locations, 2024	4.20
Figure 4-5: Frenchman’s Bay Sediment Sampling Stations, 2024.....	4.29
Figure 4-6: Nearshore Lake Ontario Sediment and Benthic Macroinvertebrate Community Sampling Stations, 2024.....	4.30
Figure 4-7: Sampling Area for 2024 PNGS Deepwater Fish Community, Benthic Macroinvertebrate Community, and Macrozooplankton Community Studies	4.35
Figure 4-8: Fish Species Composition of fish caught in Monitoring Nets during the Spring, Summer, and Fall sampling events of the 2024 Deepwater Fish Community Study.....	4.38
Figure 4-9: Boxplots and Raw Data (points) of Fish Endpoints Expressed by Season from the 2024 Deepwater Fish Community Study.....	4.39
Figure 4-10: Sampling Area for the PNGS Nearshore Fish Community Study, 2024.....	4.41
Figure 4-11: Fish Species Composition caught in Broad Scale Monitoring (BSM) and Experimental (EXP) Nets in Shoreline Erosion Mitigation Area and West Infill Area during the Spring sampling event of the 2024 Nearshore Fish Community Study	4.44
Figure 4-12: Fish Species Composition caught in Broad Scale Monitoring (BSM) and Experimental (EXP) Nets in the Shoreline Erosion Mitigation Area and West Infill Area during the Summer sampling event of the 2024 Nearshore Fish Community Study.....	4.45
Figure 4-13: Fish Species Composition caught in Broad Scale Monitoring (BSM) and Experimental (EXP) Nets in the Shoreline Erosion Mitigation Area and West Infill Area during the Fall sampling event of the 2024 Nearshore Fish Community Study.....	4.46
Figure 4-14: Water Temperature Profiles across the three Deepwater Fish community sampling events in 2024.....	4.53

Figure 4-15: Water Temperature Profiles across the three Macrozooplankton Community sampling events in 2024.....	4.54
Figure 4-16: Boxplots and Raw Data (points) of Macrozooplankton Endpoints Expressed by Season.....	4.67
Figure 4-17: Proposed DWI Area Substrate Coverage, 2024.....	4.72
Figure 4-18: Underwater Video Data Collection Area in the Nearshore Study Areas for the Aquatic Habitat Assessment Study, 2024	4.74
Figure 4-19: Proposed Shoreline Erosion Mitigation and West Infill Areas Substrate Coverage, 2024.....	4.76
Figure 4-20: Monitoring Locations for the 2024 Soil Monitoring Program.....	4.80
Figure 4-21: Terrestrial Monitoring Study Area (Beacon, 2022).....	4.86
Figure 5-1: Human Health Receptors for Air Quality and Noise Modelling	5.11
Figure 5-2: Ecological Receptor Locations for the Air Quality and Noise Modelling.....	5.12
Figure 5-3: Site Water Balance During PNGS Unit 1 and Unit 4 Stabilization	5.40
Figure 5-4: Water Balance for Bounding Condition during Refurbishment	5.44
Figure 5-5: Water Balance for PNGS Units 5-8 Continued Operations	5.45
Figure 6-1: Conceptual Model for Human Receptors (CSA, 2020).....	6.7
Figure 6-2: Ecological Health CSM for Physical Stressors in the Tier 2 Assessment	6.25
Figure 6-3: Project Footprint of Potential DWI and Nearshore Modifications Associated with the PNGS Refurbishment	6.27
Figure 6-4: Intake and Discharge Temperatures (°C) at PNGS and DNGS from January 2021 to December 2023.....	6.39
Figure 6-5: Thermal Profiles Taken Across Multiple Seasons in 2024 at Both Potential Locations for the PNGS DWI.....	6.40

LIST OF ACRONYMS AND SYMBOLS

Acronyms

AAQC	Ambient Air Quality Criteria
AAWS	Advanced Algae Warning System
ACB	Air Contaminants Benchmarks
AIFB	Auxiliary Irradiated Fuel Bay
ALARA	As Low as Reasonably Achievable
ALW	Active Liquid Waste
AQM	Air Quality Monitoring
ASB	Auxiliary Services Building
BaP	Benzo(a)pyrene
BOD	Biochemical Oxygen Demand
BPUE	Biomass Per Unit Effort
BSM	Broadscale Monitoring
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CAAQS	Canadian Ambient Air Quality Standards
CANDU	CANada Deuterium Uranium
CCME	Canadian Council of Ministers of the Environment
CCW	Condenser Cooling Water
CLFN	Curve Lake First Nation
CNSC	Canadian Nuclear Safety Commission
CO	Carbon monoxide
COD	Chemical Oxygen Demand
COG	CANDU Owners Group
COPC	Contaminant of Potential Concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
CPUE	Catch Per Unit Effort
CSA	Canadian Standards Association
CSB	Common Services Building
CSM	Conceptual Site Model
CTU	Combustion Turbine Unit
CWQG	Canadian Water Quality Guidelines
D ₂ O	Heavy Water (Deuterium oxide)
DDP	Detailed Decommissioning Plan
DFO	Fisheries and Oceans Canada
DGR	Deep Geologic Repository
DNGS	Darlington Nuclear Generating Station
DNNP	Darlington New Nuclear Project

DRL	Derived Release Limit
DSC	Dry Storage Container
DSM	Dry Storage Module
dw	Dry weight
DWI	Deep Water Intake
EA	Environmental Assessment
EC	Environment Canada
ECA	Environmental Compliance Approval
ECCC	Environment and Climate Change Canada
Eco CV	Ecological Component Value
EcoRA	Ecological Risk Assessment
EMP	Environmental Monitoring Program
EPG	Emergency Power Generator
EPRI	Electric Power Research Institute
ERA	Environmental Risk Assessment
ERT	Emergency Response Team
ESA	Endangered Species Act
ESDM	Emissions Summary and Dispersion Modelling
EXP	Experimental
FAA	Fisheries Act Authorization
FCSAP	Federal Contaminated Sites Action Plan
FDS	Fish Diversion System
FEQG	Federal Environmental Quality Guideline
FFEE	Fixed Face Earthen Embankment
FNFNES	First Nations Food, Nutrition and Environment Study
GHG	Greenhouse Gas
GLM	Generalized Linear Model
GTA	Greater Toronto Area
GWMP	Groundwater Monitoring Program
GWPP	Groundwater Protection Program
%HA	Percent Highly Annoyed
HADD	Harmful Alteration, Destruction, and Disruption
HC	Health Canada
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
HTO	Tritium Oxide
HU	Hydrostratigraphic Unit
IA	Impact Assessment
IARC	International Agency for Research on Cancer
IBI	Indices of Biological Integrity
IEP	Indigenous Engagement Plan

IFB	Irradiated Fuel Bay
ILCR	Incremental Lifetime Cancer Risk
ILW	Intermediate Level Waste
ISO	International Organization for Standardization
ISQG	Interim Sediment Quality Guidelines
LAeq	Equivalent sound levels (A-weighted)
L&ILW	Low and Intermediate Level Waste
LEL	Lowest Effect Level
LLW	Low Level Waste
LPL	Lowest Practical Level
MECP	Ministry of Environment, Conservation and Parks
MISA	Municipal Industrial Strategy for Abatement
MNA	Monitored Natural Attenuation
MNRF	Ontario Ministry of Natural Resources and Forestry
MOE	Ontario Ministry of Environment
MOECC	Ontario Ministry of Environment and Climate Change
MOEE	Ontario Ministry of Environment and Energy
MSB	Main Security Building
MSIFN	Mississaugas of Scugog Island First Nation
MWAT	Maximum Weekly Average Temperature
NEW	Nuclear Energy Worker
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen oxides
NPC-300	Environmental Noise Guideline
NSCA	Nuclear Safety and Control Act
NSS-PWMF	Nuclear Sustainability Services – Pickering Waste Management Facility
NSS-WWMF	Nuclear Sustainability Services – Western Waste Management Facility
NWTP	New Water Treatment Plant
OBT	Organically Bound Tritium
OPEX	Operating Experience
OPG	Ontario Power Generation
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSS	Pickering Component Storage Structure
PDP	Preliminary Decommissioning Plan
PE	Planning Envelope
PEA	Predictive Effects Assessment
PERA	Predictive Environmental Risk Assessment
PEL	Probable Effects Level
PHC	Petroleum Hydrocarbons
PM ₁₀	Inhalable particulates

PM _{2.5}	Respirable particulates
PN	Pickering Nuclear
PNGS	Pickering Nuclear Generating Station
PNIC	Pickering Nuclear Information Centre
POI	Point of Impingement
POW	Plane of Window
PSQG	Provincial Sediment Quality Guideline
PWQO	Provincial Water Quality Objective
Q25	First Quartile
Q75	Third Quartile
QA	Quality Assurance
RAB	Reactor Auxiliary Bay
RBSW	Reactor Building Service Water
RCM	Regional Climate Model
RCP	Representative Concentration Pathway
RCS	Retube Component Storage
RCSF	Retube Component Storage Facility
RFRISA	Retube and Feeder Replacement Service Island Support Annex
RLWMS	Radioactive Liquid Waste Management System
RMA10	Hydrodynamic surface water model
SARO	Species at Risk in Ontario
SB	Storage Building
SCS	Site Condition Standards
SDSE	Shutdown System Enhancement
SEL	Severe Effects Level
SG	Standby Gas Generator
SHA	Safe Harbour Stewardship Agreement
SLM	Sound level meters
SO ₂	Sulfur dioxide
SPM	Suspended Particulate Matter
SQG	Soil Quality Guideline
SS	Storage Structure
SSC	Structures, Systems, and Components
STDm	Short Term Daily Maximum
SWS	Storage with Surveillance
TAB	Turbine Auxiliary Bay
TH	Turbine Hall
TKN	Total Kjeldahl Nitrogen
TLD	Thermoluminescent dosimeter
TOC	Total Organic Carbon
TRC	Total Residual Chlorine

TRCA	Toronto and Region Conservation Authority
TRV	Toxicity Reference Value
TSD	Technical Support Document
TSP	Total suspended particulates
U.S. EPA	United States Environmental Protection Agency
UCLM	Upper Confidence Limit of the Mean
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
VBRS	Vacuum Building Ramp Sump
VOC	Volatile Organic Compound
WHO	World Health Organization
WNW	West-North-West
WSP	Water Supply Plant
WTFNs	Williams Treaties First Nations
ww	Wet weight

1.0 Introduction

The Pickering Nuclear (PN) site is located in the City of Pickering on the north shore of Lake Ontario at Moore Point, about 32 km east of downtown Toronto and 21 km west of Oshawa (**Figure 1-1**). The PN site is comprised of the PN Generating Station (PNGS), with four operating CANada Deuterium Uranium (CANDU) pressurized heavy water reactors, and two units in Storage with Surveillance (SWS). The Nuclear Sustainability Services – Pickering Waste Management Facility (NSS-PWMF) is also located on the PN site and is comprised of two sites. The NSS-PWMF Phase I site is located southeast of PNGS Unit 8, adjacent to the east side of the station security fence, and the NSS-PWMF Phase II site is located approximately 500 m north-east of the power generating facilities in the East Complex.

By the late 1700s, the Indigenous peoples in southeastern Ontario were compelled to cede their lands along the northern shore of Lake Ontario to the Crown. Two Treaties and agreements between the Crown and First Nations have historically been related to the lands comprising the PN site: the Johnson/Butler Purchase (1787-1788) (also known as the Gunshot Treaty), and the Williams Treaties (1923). Presently, the PN site remains within the territory of the 1923 Williams Treaties.

Ontario Power Generation (OPG) plans to pursue refurbishment and continued operation of PNGS Units 5-8 (PNGS Units 5-8), as well as decommissioning of PNGS Units 1-4), herein referred to as the Project. Refurbishment and continued operation of PNGS Units 5-8 will help OPG meet its mission to build a sustainable future powered by our electricity, our ideas, and our people. This is in support of OPG's vision to electrify life in one generation.

The existing PNGS licence allows for continued operation of PNGS Units 5-8 until the end of 2026. PNGS Units 1 and 4 were shutdown in 2024 and PNGS Units 2 and 3 have been in SWS since 2010. The existing licence is being renewed early to include refurbishment activities for PNGS Units 5-8, decommissioning of PNGS Units 1 to 4, as well as incorporating the NSS-PWMF waste licence.

To support the licence renewal, this predictive environmental risk assessment (PERA) was prepared. This PERA evaluates the proposed Project activities to ensure there will not be any significant risks to people or the environment, and to determine any areas requiring additional mitigation, monitoring, or study. This PERA complies with Canadian Standards Association (CSA) N288.6:22, Environmental Risk Assessment at Nuclear Facilities and Uranium Mines and Mills (CSA, 2022b) and Canadian Nuclear Safety Commission (CNSC) REGDOC-2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures (CNSC, 2020). OPG is committed to open and transparent communication on our operations and projects and adheres to the guidance outlined in CNSC REGDOC 3.2.1, Public Information and Disclosure, and CNSC REGDOC 3.2.2, Indigenous Engagement, in accordance with the PNGS Licence Condition Handbook (CNSC, 2018, 2022).

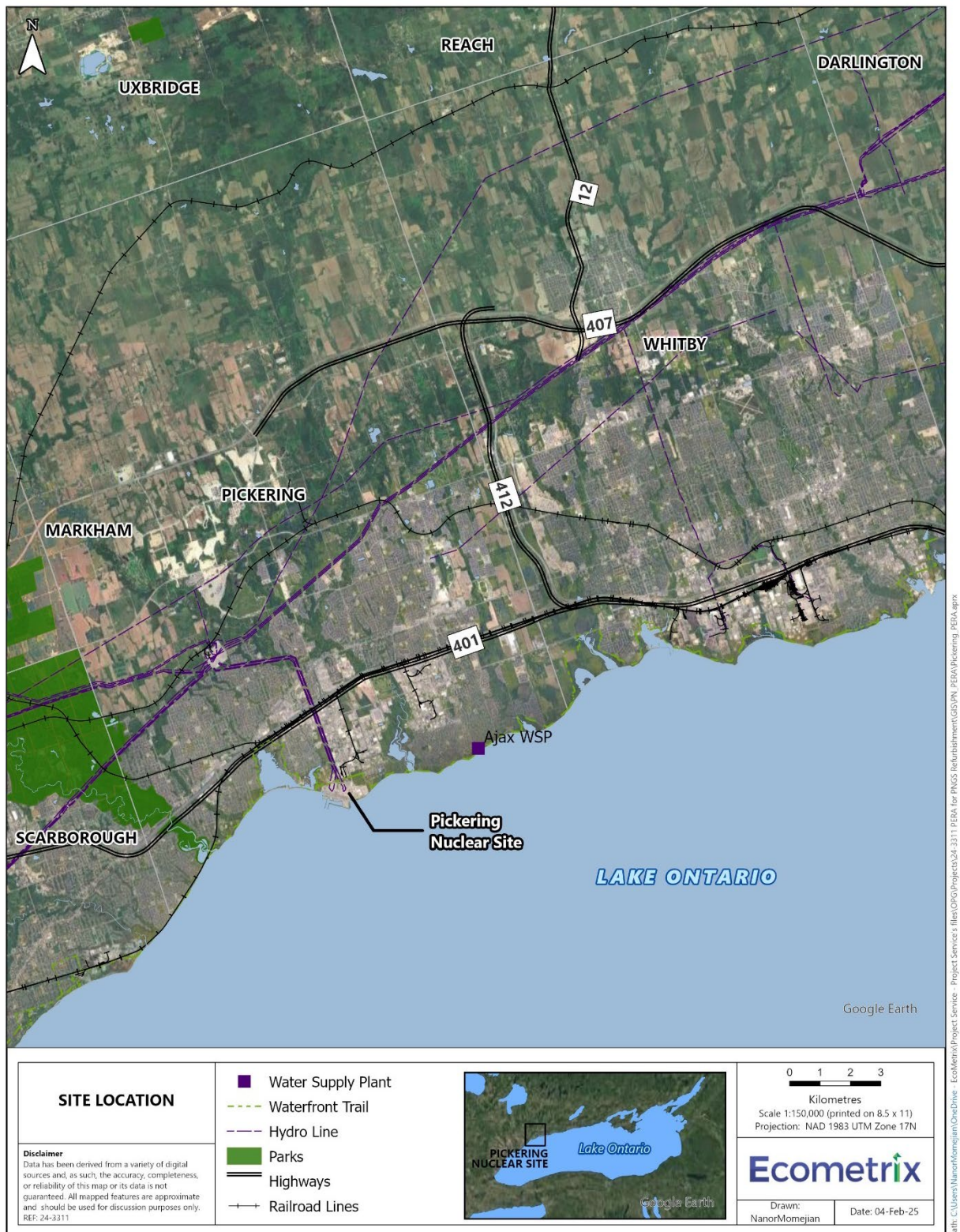


Figure 1-1: PN Site Location and Vicinity

1.1 Project Overview and Schedule

This section provides a brief overview of the Project and associated timelines based on current planning at the time of preparing this PERA. As the Project progresses the timelines may shift; however, conceptual timelines are provided here for planning purposes, and are shown in **Figure 1-2**. The assumptions considered in the PERA are specific to activities which are expected to occur during the Project phases considered and are generally independent of exact timelines unless otherwise noted within the assessment.

The focus of the PERA is on the activities that will occur up to and including the re-licensing period from 2027 to 2037; however, activities and Project phases that will occur after the end of 2037 are discussed at a more general level of detail.

PNGS Unit 1 was permanently shut down on October 1, 2024 and Unit 4 was permanently shut down on December 31, 2024. PNGS Units 2 and 3 were previously shut down in 1997 and were declared to be in SWS in 2010 (Note: for the purposes of this PERA, the term Safe Storage is equivalent to SWS). Stabilization activities were initiated in 2024 for PNGS Unit 1 and in early 2025 for PNGS Unit 4 and are expected to be completed by 2028. SWS Activities (Start of Decommissioning¹) for Unit 1 and Unit 4 will begin in 2028.

- Stabilization Phase:** Initiated in October 2024, a 3-year Stabilization Phase for Units 1 and 4 includes the arrangements and activities that ensure a safe and efficient transition from the end of commercial operation to the SWS state for the transitioning units. Stabilization activities include defueling and dewatering reactor Units 1 and 4. PNGS Units 2 and 3 are not included in assessment of this phase as the Stabilization Phase of Units 2 and 3 is complete and the units have been in a SWS state since 2010. The stabilization activities are captured in the PNGS Stabilization Activity Plan (OPG, 2024a), and were previously assessed from an environmental impact perspective in the 2017 Safe Storage Predictive Effects Assessment (PEA) and 2022 PEA Addendum (Ecometrix, 2023b; Golder and Ecometrix, 2017).
- Storage with Surveillance (SWS):** Starting in 2028 to approximately 2090, a 50- to 70-year SWS Phase for Units 1 and 4 will begin to allow for natural decay of radioactivity. Units 2 and 3 have been in SWS phase since 2010. Activities during this phase include the ongoing operation of the Irradiated Fuel Bays (IFBs) and the continued transfer of spent fuel to dry storage containers (DSCs). Current planning anticipates that used fuel transfer to DSCs will be completed within 10 years of PNGS Units 1 and 4 transitioning to SWS. Monitoring the natural decay of radioactivity within the remaining reactor systems will continue to approximately 2050. Risk reduction and removal activities will be initiated to remove and remediate non-nuclear equipment and buildings/facilities. These

¹ Decommissioning actions are the procedures, processes and work activities (e.g., storage with surveillance, decontamination, dismantling or cleanup) that are taken to retire a facility, location or site from service with due regard for the health and safety of people and the environment.

risk reduction and removal activities are distinct from Dismantle and Demolish activities. Risk reduction and removal activities will only occur for structures, systems, and components (SSCs) that have been end-stated and are no longer required to support SWS activities. This is consistent with CNSC REGDOC-2.11.2 “Decommissioning” (CNSC, 2021). SWS activities were previously assessed from an environmental impact perspective in the 2017 Safe Storage Predictive Effects Assessment (PEA) and 2022 PEA Addendum (Ecometrix, 2023b; Golder and Ecometrix, 2017) – the SWS period was 25 to 30 years in previous assessments; with the focus on the first 10 years as bounding for the rest of the phase. While the duration of SWS is now longer, the bounding assumption for the first 10 years of SWS is still valid. Risk reduction and removal activities were not considered in the 2017 Safe Storage PEA or 2022 PEA Addendum, but are assessed in this PERA.

- **Dismantle and Demolish:** From 2034 to approximately 2100, the Dismantle and Demolish Phase will be initiated for PNGS Units 1-4. The specific Dismantle and Demolish activities, along with their associated work packages, will be detailed in subsequent Detailed Decommissioning Plan (DDP) updates.

For PNGS Units 5-8, refurbishment licensed activities are planned to start in 2027; however, prerequisites will start earlier. The units are planned for shutdown in 2026. The first unit from PNGS Units 5-8 is expected to come back online in 2031 and the last of the four units is expected to come back online by the end of 2034. The PNGS Units 5-8 Project phases are described below, and the conceptual timeline is shown in **Figure 1-2**.

- **Refurbishment:** Starting in 2027 (pending approvals), preparation for refurbishment of PNGS Units 5-8 will be initiated, including defueling and dewatering of reactors, relocation and/or removal of structures and equipment, construction of buildings and temporary laydown areas. Starting in 2027, the first unit will enter refurbishment which includes replacing reactor components including: fuel channels and calandria tubes, inlet and outlet feeders from end fittings to the reactor inlet/outlet headers, replacement of steam generators, refurbishment of various systems including reactor auxiliary systems and feedwater systems, and normal upgrade and maintenance activities. The unit will then be refuelled and restarted. Each unit will undergo refurbishment in a staged manner.
- **Continued Operations:** At the end of Refurbishment all units at PNGS Units 5-8 will be returned to service where operation will then continue for approximately 30 years. Continued Operations of the refurbished reactors will be very similar to current operations for PNGS Units 5-8 and will include ongoing maintenance until end of life of the reactors.
- **Decommissioning:** At the end of life for PNGS Units 5-8 (approximately 2070), the facility will enter a Stabilization Phase, followed by SWS, and Dismantle and Demolish phases. At this stage, decommissioning of PNGS Units 5-8 is only conceptually developed, and is consistent with its preliminary decommissioning plan (PDP) (OPG,

2025). Prior to the transition of PNGS Units 5-8 to SWS, the PDP will be further developed into a DDP to include all details of decommissioning, and the associated environmental effects will be evaluated. It is assumed, based on growing international decommissioning experience and the protection strategies outlined in the PDP, that effective mitigation measures will be available for decommissioning. Additionally, Stabilization and SWS activities for PNGS Units 5-8 were previously assessed from an environmental impact perspective in the 2017 Safe Storage PEA and 2022 PEA Addendum (Ecometrix, 2023b; Golder and Ecometrix, 2017), as these documents assessed both PNGS Units 1-4 and PNGS Units 5-8.

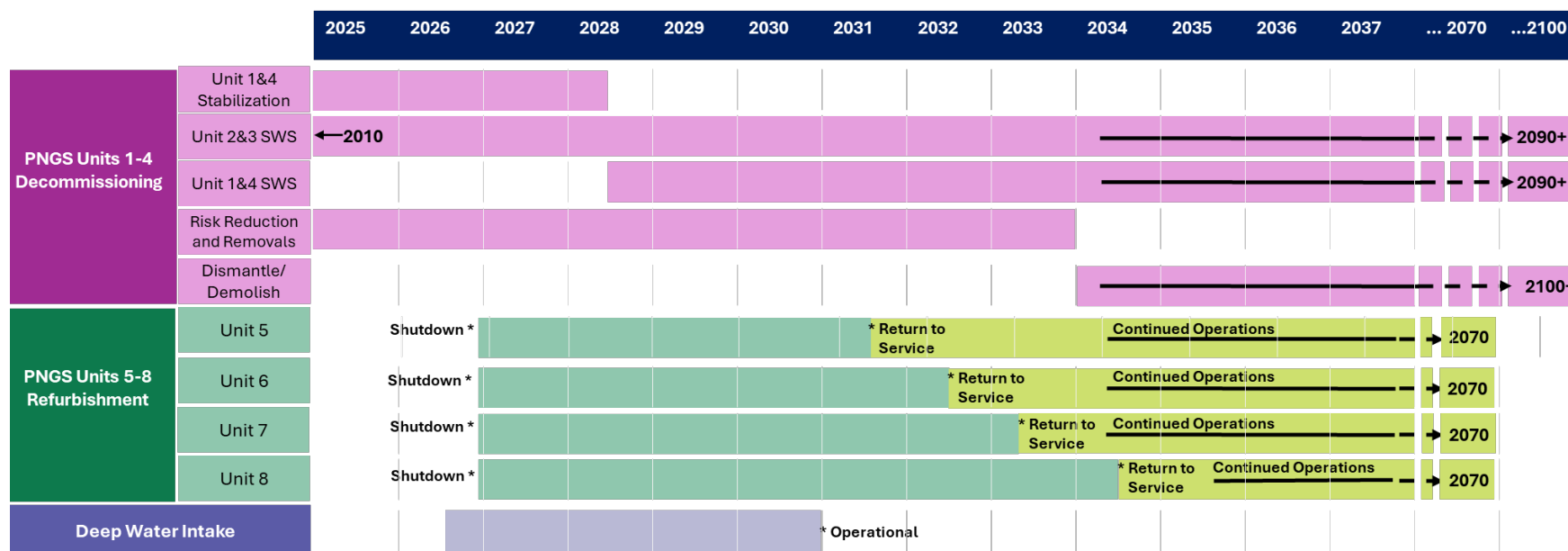


Figure 1-2: Pickering NGS Timeline Overview

1.2 Regulatory Context

The *Nuclear Safety and Control Act* (NSCA) mandates the CNSC to regulate the nuclear industry in a manner that prevents unreasonable risk to the environment and makes adequate provision for environmental protection, in conformity with international obligations. This mandate is reflected in the General Nuclear Safety and Control Regulations under the NSCA, and in the CNSC Regulatory Document REGDOC-2.9.1 “Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2” (CNSC, 2020).

REGDOC-2.9.1 outlines the CNSC’s environmental protection framework, including the environmental protection measures a licensee would take for a given project or licence application. The refurbishment of PNGS Units 5-8 and the decommissioning of PNGS Units 1-4 is not a designated project under the *Impact Assessment Act* (2019). However, the Project does have potential for interactions with the environment, which requires the CNSC to conduct an Environmental Protection Review under the NSCA. This PERA will become part of the supporting technical documentation to be submitted to the CNSC in support of the licence application for these activities, which will help inform the CNSC’s Environmental Protection Review.

This PERA has been prepared following the guidance of CSA N288.6:22 (CSA, 2022b) and CNSC REGDOC-2.9.1 (CNSC, 2020).

OPG is committed to open and transparent communication on our operations and projects and adheres to the guidance outlined in CNSC REGDOC 3.2.1, Public Information and Disclosure, and CNSC REGDOC 3.2.2, Indigenous Engagement, in accordance with the PNGS Licence Condition Handbook (CNSC, 2018, 2022).

1.3 Objectives

The objectives of this PERA are to:

- Identify whether any proposed Project activities are likely to result in environmental emissions or other stressors potentially exceeding those in previous assessments;
- Predict and assess the risk of effect to representative human and ecological receptors resulting from exposure to radiological and non-radiological substances and physical stressors expected to be released during refurbishment, decommissioning, and continued operations of PNGS;
- Inform prioritization of monitoring and mitigation measures.

The most recent ERA for PN was completed in 2022 and focused on the five-year period from 2016 to 2020 (Ecometrix, 2023a). The 2022 PN ERA should be consulted for detailed information on prior operational conditions on the PN Site (for 6 operating units); as well as the systems and structures in operation at PNGS. Additionally, the 2017 Safe Storage PEA and 2022 PEA

Addendum (Ecometrix, 2023b; Golder and Ecometrix, 2017) should be consulted for assessment of the environmental risks from stabilization and SWS activities.

To support this PERA, additional field data were collected on existing conditions in 2024 and 2025. These data supplement the ongoing annual environmental monitoring program (EMP), effluent and emissions monitoring programs, biodiversity monitoring programs, and any supplementary environmental field studies previously conducted. Existing conditions are described at a summary level in Section 4.0.

1.4 Scope

1.4.1 Spatial Boundaries

For the predictive human health risk assessment (HHRA), the spatial scale is consistent with that in the 2022 PN ERA, the 2017 PN PEA, 2022 PN PEA Addendum, and EMP, and includes identified human receptors (including a Harvester receptor not considered in previous assessments, see **Section 6.1.1.2**) within 10 km of the PN site, as shown on **Figure 1-3**. This area includes lands within the city of Pickering, the town of Ajax, and the eastern part of the city of Toronto (Scarborough).

For the predictive ecological risk assessment (EcoRA), the spatial scale is consistent with that in the 2022 PN ERA, the 2017 PN PEA and 2022 PN PEA Addendum and includes those ecological receptors identified on the PN site and within the immediate PNGS boundary, as well as within the 914-m exclusion zone and the near-field receiving waters, including Frenchman's Bay. However, for this assessment the nearshore Lake Ontario has been expanded to include the area of the proposed DWI, as shown on **Figure 1-4**.





Figure 1-4: Areas of Assessment for Ecological Receptors

1.4.2 Temporal Boundaries

The temporal boundaries of the Pickering PERA include the existing licence period which expires at the end of August 2028, as well as the re-licensing period to align with the start of refurbishment activities. This includes PNGS Units 1 and 4 Stabilization (3 years), PNGS Units 1-4 SWS (including risk reduction and removal activities that will occur during this timeframe), as well as PNGS Units 5-8 refurbishment and the start of continued operations (see **Figure 1-2**). This Pickering PERA covers the timeframe of 2025 to 2037.

At this stage, future Dismantle and Demolish activities for PNGS Units 1-4 are in the planning stages. The specific Dismantle and Demolish activities, along with their associated work packages, will be detailed in subsequent DDP updates.

At the end of commercial operation of PNGS Units 5-8, the facility will enter a Stabilization Phase, followed by SWS, and Dismantle and Demolish. At this stage, decommissioning of PNGS Units 5-8 is only conceptually developed, and is consistent with its PDP (OPG, 2025). Prior to the transition of PNGS Units 5-8 to SWS, the PDP will be further developed into a DDP to include all details of decommissioning, and the associated environmental effects will be evaluated. It is assumed, based on growing international decommissioning experience and the protection strategies outlined in the PDP, that effective mitigation measures will be available for decommissioning.

1.5 Summary of Past Assessments

This section provides a summary of past assessments that were relied on to support the assessment of PNGS Units 1-4 decommissioning and PNGS Units 5-8 refurbishment and continued operations in this PERA. The 2022 PN ERA provides the most up to date assessment of previous conditions at the PN site for 6 operating units. It is important to understand these existing and previous conditions in order to assess future conditions during PNGS Units 1-4 decommissioning and PNGS Units 5-8 refurbishment and continued operations. This section also provides a summary of predictive assessments that have been completed including the 2017 Safe Storage PEA and 2022 PEA Addendum (Ecometrix, 2023b; Golder and Ecometrix, 2017), as well as the 2007 environmental assessment (EA) for the refurbishment and continued operations of PNGS Units 5-8.

1.5.1 Environmental Risk Assessment for Pickering Nuclear

The most recent ERA for PN (i.e., the 2022 PN ERA) (Ecometrix, 2023a) was completed in accordance with CSA N288.6-12 (CSA, 2012) and REGDOC-2.9.1. It assesses the conditions at the PN site focused on the five-year period from 2016 to 2020. The scope looked at the potential effects of nuclear and hazardous substances released from the PN site on the human and ecological environment, as well as potential effects from physical stressors.

Potential risks to human receptors were characterized quantitatively in the HHRA, which concluded that there was limited risk to human receptors from inhalation of nitrogen oxides

(NO_x) and ingestion of hydrazine via drinking water. While the Incremental Lifetime Cancer Risk (ILCR) to sport fishers from ingesting fish containing hydrazine exceeded the acceptable risk level, this estimate was based on the highly conservative assumption that 100% of the fish consumed were collected within 500 meters of the Condenser Cooling Water (CCW) discharge. During the 2016 to 2020 period, the annual radiological dose to the critical group (Urban Resident) ranged from 1.2 to 2.1 $\mu\text{Sv/a}$ (0.0012 to 0.0021 mSv/a), which is approximately three orders of magnitude lower than the regulatory public dose limit of 1 mSv/a . Since the critical group is the receptor that receives the highest dose from PN, their protection implies that other receptor groups near PN are also protected.

The ERA suggested that there were minimal effects of the PN site on aquatic or terrestrial ecosystems near the site, in Frenchman's Bay, and surrounding areas. No significant adverse effects are expected from sulfur dioxide (SO₂) emissions to ecological receptors at the PN site. Based on 2015 Emissions Summary and Dispersion Modelling (ESDM), elevated concentrations of SO₂ were predicted to be released in 2016, resulting in an exceedance of the annual ambient air quality criteria (AAQC) that is protective of vegetation; however, from 2017 to 2020 no exceedances were identified. The adjusted annual SO₂ concentration did not exceed the no-effect level from the World Health Organization (WHO, 2000); therefore, no long-term effects to vegetation are expected.

At the outfall, Upper Confidence Limit of the Mean (UCLM) concentrations of morpholine, hydrazine, copper, and total residual chlorine (TRC) were below benchmark levels for aquatic receptors.

At Frenchman's Bay, water concentrations of hydrazine, morpholine, TRC, and sodium did not exceed their respective benchmarks for the ecological receptors evaluated. The maximum and UCLM measured iron concentrations in water at Frenchman's Bay were above the benthic invertebrate benchmark, but the maximum and UCLM measured iron concentrations in sediment at Frenchman's Bay did not exceed the sediment benchmarks for benthic invertebrates; therefore, adverse effects are not expected since benthic invertebrates live in the sediment.

While the Hazard Quotients (HQs) based on the maximum and UCLM concentrations of aluminum and iron exceeded the acceptable level of 1 for certain riparian mammals and birds in Frenchman's Bay, many of these species are unlikely to be impacted at a population-level as they do not reside exclusively in the area. The Least Bittern, a species at risk, is likely not at risk from exposure to iron in Frenchman's Bay, since based on UCLM exposure, the HQ does not exceed the acceptable risk level of 1. Birds are mobile and would be exposed to concentrations closer to UCLM than the maximum.

In general, soils on the PN site that exceeded benchmark concentrations are localized, suggesting the influence of past industrial operations rather than deposition from atmospheric sources. As such, accumulation of contaminants of potential concern (COPC) in soil over time is not expected.

Although localized effects to individual earthworms/plants may occur, the earthworm community and terrestrial plant population on the site as a whole are not expected to be affected. Risks to mammals and birds on the PN site are considered unlikely. Acceptable risk levels were not exceeded for mammals or birds exposed to UCLM concentrations in soil, except for the Red-winged Blackbird for zinc. The terrestrial receptors, except for the Meadow Vole which has a small home range, are highly mobile and are unlikely to be exposed to the maximum concentrations for the entire year. Residency at the PN site has been conservatively assumed to be 1, even though soil is inaccessible at most areas of the site due to the existing infrastructure. Any effects to individual mammals or birds on the PN site are localized, and the populations on the site as a whole are not expected to be affected.

The impacts of physical stressors, such as temperature, entrainment, and impingement, were also assessed for fish at the PN site. It was found that the thermal plume released from PNGS does not adversely affect the development of Round Whitefish embryos. Additionally, biomass lost to impingement in 2016 was reduced by 88% relative to baseline levels (i.e., prior to the installation of the fish diversion system in 2009), surpassing the 80% impingement reduction target set by the CNSC in 2009.

In terms of radiological impacts, there were no exceedances of the radiation dose benchmarks for aquatic, riparian, and terrestrial biota at any locations for the ecological receptors assessed.

1.5.2 Predictive Effects Assessment for Pickering Nuclear Safe Storage

A predictive effects assessment (PEA) for PN Safe Storage was completed in 2017 to identify changes from the years 2011 to 2015 (identified as existing conditions at the time of the assessment) environmental and human health conditions that would result from activities associated with the Stabilization Phase and the SWS Phase of PNGS Units 1-4 and PNGS Units 5-8 (Golder and Ecometrix, 2017). Based on the screening assessment, further quantitative assessment of air quality (radiological and non-radiological), and surface water flow and quality were conducted. The conclusion of the 2017 Safe Storage PEA was that there were no predicted potential adverse effects to humans nor to ecological receptors from the activities proposed to take place during the Stabilization and the SWS Phases.

To support the mid-term operating licence review that occurred in 2023, a PEA Addendum Report was prepared to document and demonstrate that human health and the environment would continue to be protected during PNGS Units 1 and 4, and PNGS Units 5-8 shutdown, based on updated existing environmental conditions and current operational assumptions for the Stabilization and SWS Phases (Ecometrix, 2023b). The 2017 Safe Storage PEA assumed continued operations of PNGS until 2024; whereas in the PEA Addendum Report, continued operations of PNGS Units 5-8 was assumed until 2026. Based on changes to assumptions for Safe Storage (equivalent to SWS) at the time when the PEA Addendum Report was being prepared, the PEA Addendum Report re-assessed predicted effects to future ecological receptors in the PN forebay as well as potential entrainment and impingement effects due to increased flows through the intake, compared to the 2017 Safe Storage PEA. The conclusion of

the 2022 PEA Addendum was consistent with 2017 in that there were no predicted potential adverse effects to humans nor to ecological receptors from the activities proposed to take place during the Stabilization and the SWS Phases. No further mitigation measures were identified.

Based on current planning, the 2017 Safe Storage PEA and 2022 PEA Addendum are still valid for PNGS Units 1-4 for the Stabilization and SWS Phases. Note the SWS period in the 2017 Safe Storage PEA and 2022 PEA Addendum was 25 to 30 years; with the focus on the first 10 years as bounding for the rest of the phase. While the duration of SWS is now longer, the bounding assumption for SWS is still valid. For PNGS Units 5-8, OPG now plans to pursue refurbishment.

1.5.3 Pickering B Refurbishment Environmental Assessment

In 2007 OPG conducted an EA study for the refurbishment of one or more of the PNGS Units 5-8 reactors. The scope of the EA included the construction and operation of additional waste storage structures to accommodate wastes resulting from reactor refurbishment activities, and from continued operation of the reactors.

The EA study report and nine technical supporting documents (TSDs) were submitted to the CNSC in December 2007 (OPG, 2007). After considering the screening report, the mitigation measures, and comments filed from the public, the CNSC accepted that the project would not cause significant adverse effects (CNSC, 2009).

In early 2024, OPG announced that it plans to pursue refurbishment of PNGS Units 5-8 to help meet Ontario's growing electricity demand and reduce emissions by supporting the electrification of the province's overall economy (OPG, 2024b).

1.6 What OPG has heard through Indigenous Engagement Feedback

In early 2024, OPG initiated support for the Michi Saagiig Nations of the WTFN to carry out an Indigenous Knowledge study, including aspects of Rights impact assessment (IA), cumulative effects assessment, and augmented monitoring, as determined by the Nations. This work will be scoped by the Michi Saagiig Nations, and when completed, the Nations will determine if and what portions may be shared with OPG, which can help inform future ERAs.

This section describes engagement activities and meetings with Indigenous Nations and communities related to the PERA, relevant discussion and feedback, and how it has been considered in the PERA.

OPG has a site wide Indigenous Engagement Plan (IEP) for the PN site which covers ongoing and proposed initiatives, including the PERA. The IEP distinguishes between rights holders (WTFNs) and Indigenous Nations and communities that express interest in OPG's PN site.

Currently, OPG is engaging with the Michi Saagiig Nations on a regular basis on various OPG projects, including activities that are planned at the PN site. OPG also continues to share information and provide opportunities for engagement with the Chippewa Nations. With respect

to Indigenous Nations and communities who have expressed interest in Pickering NGS, OPG conducts outreach and engages at the request of the Nations. Engagement on the PERA has primarily focussed on the WTFNs. The list below summarizes feedback received and topics discussed related to the Pickering PERA through various engagements with the Michi Saagiig Nations.

- In 2023, OPG received comments from the Mississaugas of Scugog Island First Nation (MSIFN) on the 2022 PN ERA and 2022 PEA Addendum. A number of issues were raised related to terminology, questions on environmental monitoring data, and explanation of ERA results. OPG has addressed those comments that are also applicable to this PERA.
 - Moved away from using the term “baseline” to describe the current environmental conditions. Have preferred the term “existing conditions”, “current operational conditions”, “existing operational conditions”, or “previous operational conditions” if referring to 6 operating units.
 - Inclusion of text to describe how adaptive management is considered (Section 2.0).
 - Initiated collection of environmental monitoring data in 2024 and 2025 to address concerns that existing conditions at PNGS were relying on old data. Environmental data collected included air quality data, noise levels, surface water and sediment quality, soil quality, fish tissue, and aquatic habitat characterization.
- In May 2024, OPG met with the Nations to present an overview of the PERA, including plans for field studies and opportunities to participate.
- In June 2024, sampling plans were shared with the Nations as well as dates for upcoming monitoring as opportunities for participation.
- In Fall 2024, a Michi Saagiig representative of MSIFN participated in the fish community studies in the deepwater intake study area. On that day a Lake Sturgeon was captured and released back into the lake. Follow up discussions with the Michi Saagiig Nations identified lessons learned regarding communications between OPG and the Michi Saagiig Nations when a notable event occurs.
- In November and December 2024 OPG received comments on the Darlington New Nuclear Project (DNNP) PERA from the Curve Lake First Nation (CLFN) and the MSIFN, respectively. Comments from the CLFN on the DNNP PERA that may be relevant to this PERA are assessment of the thermal plume and its impact on aquatic biota, as well as the accuracy of the Harvester receptor characterized in the DNNP PERA. OPG is making efforts to seek additional information to update the characteristics of the new Harvester receptor over time, and engaging with the Michi Saagiig Nations along the way. While at the time of preparation of this report comments from the MSIFN on the DNNP PERA are

still being addressed, those comments that may be relevant to this PERA include: ensuring direct input from the WTFNs into the PERA, formalizing a plan to incorporate input from the WTFNs into the ERA process and ensuring characteristics are accurately represented in exposure models, prioritizing monitoring and validation of emissions, addressing cumulative effects, consideration of adaptive management, and clarifying waste management, among others.

- In early 2025, OPG received comments from CLFN on the PCSS PERA, requesting a Harvester receptor be added to the assessment. The Harvester has been added to this PERA (see Section 6.0). Subsequently, in April 2025, OPG received comments from MSIFN on the PCSS PERA. OPG is still reviewing these comments and will formally address these comments through the PCSS PERA process. OPG has taken action to address a few comments in this PERA, including:
 - Removing the word “discernable” from “no discernable health effects” and removing the word “adverse” from “no adverse radiological effects to ecological receptors” when presenting the results of the PCSS PERA;
 - Adding reference to CNSC REGDOC 3.2.1, Public Information and Disclosure, and CNSC REGDOC 3.2.2, Indigenous Engagement (CNSC, 2018, 2022).
- In March 2025, OPG met with the Nations to provide an overview of the PERA’s timelines, to understand engagement opportunities leading up to its submission to the CNSC.

OPG will continue to facilitate engagement on this and other PERAs and ERAs, which will broaden OPG’s understanding of surrounding land use and receptor selection. OPG endeavors to continue to work with Indigenous Nations and communities to strengthen ongoing engagement around ERAs and PERAs. OPG plans to share this PERA report as a draft for review and comments by the WTFN. As the PERA is an iterative process, input and feedback will be incorporated into this and future assessments.

OPG has shared this PERA report as a draft for review and comments by the Michi Saagiig Nations. However, it does not at this time include the voices of the Nations. As the PERA is an iterative process, OPG continues to engage and welcomes input and feedback that may be incorporated into this and/or future assessments.

1.7 Quality Assurance and Quality Control

This PERA made use of environmental monitoring data. These data are derived from chemical and radiochemical analyses of samples collected from effluent streams and environmental media around the PN site. The environmental data provided by OPG were collected by qualified staff and analyzed by qualified laboratories under the Environmental Monitoring Program (EMP), such as the station chemistry laboratory and the Whitby Health Physics Laboratory. The EMP has

its own quality assurance (QA) program that encompasses activities such as sample collection, laboratory analysis, laboratory quality control, and external laboratory comparison (OPG, 2019a).

Environmental samples collected in 2024 and 2025 to characterize existing conditions at the PN site, such as water, sediment, soil, fish tissue, air and noise were collected and analyzed in accordance with CSA N288.4:19. Samples collected were analyzed for non-radiological constituents by Bureau Veritas Laboratories and radiological constituents by Kinectrics, which are both accredited by the Standards Council of Canada as conforming to the quality assurance requirements of International Organization for Standardization (ISO) Standard 17025. In order to achieve desired detection limits, hydrazine analysis was performed by Eurofins Lancaster Laboratories Environmental in Lancaster, Pennsylvania, which is accredited to the ISO Standard 17025 as well as the United States National Environmental Laboratory Accreditation Program Standard.

Throughout the planning and preparation of the PERA, all staff worked under an ISO 9001:2015 certified Quality Management System. All work was internally reviewed and verified. Reviews included verification of data and calculations, as well as review of report content and formatting. Comments have been dispositioned and addressed as appropriate by report revisions. The review process has been documented through an electronic paper trail of review comments and dispositions.

2.0 Methodology

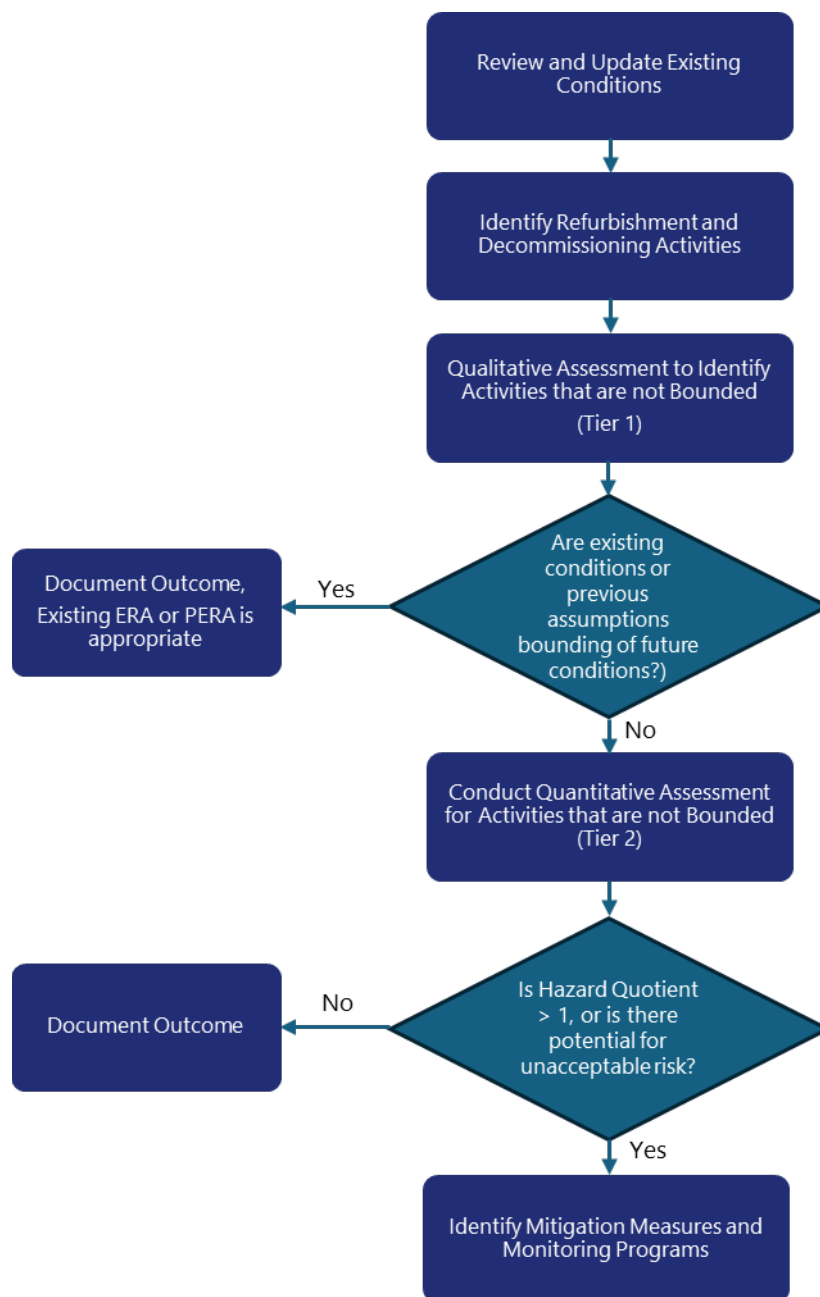
The methodology for the PERA is based on general guidance from CSA N288.6:22 (CSA, 2022b). Specific guidance on predictive ERAs is not provided in the CSA guidance; therefore, ERA guidance was modified from Figure 5.1 in CSA N288.6:22 to apply to this assessment. This methodology is generally consistent with that identified in the 2017 Safe Storage PEA and 2022 PEA Addendum (Ecometrix, 2023b; Golder and Ecometrix, 2017) and is shown on **Figure 2-1**.

The PERA focuses on identifying and assessing decommissioning and refurbishment activities that were not previously considered and found acceptable in other assessments (the 2017 Safe Storage PEA and 2022 PEA Addendum) and are not bounded by previous conditions at the PN site as described in the 2022 PN ERA (for 6 operating units) and updated existing conditions (**Section 4.0**). Those activities that are not bounded by existing or previous conditions are those that may potentially increase environmental emissions or other stressors, and which therefore warrant further assessment of human health or ecological risk.

A qualitative assessment (Tier 1 assessment) is performed to identify which project activities are not bounded by existing conditions and previous assessments. A quantitative assessment (Tier 2 assessment) is performed for those environmental interactions and project activities that are not bounded. The outcome of the quantitative assessment will inform if additional monitoring or mitigation measures are recommended.

OPG integrates adaptive management into its environmental management system. Specifically, adaptive management is fundamental to the EMP to ensure that the monitoring activities remain valid, and to enable OPG to appropriately identify and address any adverse findings or areas of risk. EMP design reviews, self-assessments and audits are regularly conducted to confirm effectiveness of environmental monitoring activities and to practice continual improvement. The ERA process is also a means for adaptive management as it is undertaken every 5 years and considers changes to site activities and environmental conditions to identify any areas where changes in mitigation or monitoring may be needed. Through the existing processes, if a risk to the environment is identified or predicted through the ERA, it can trigger changes to the EMP, supplementary studies and/or mitigation measures, as required.

As the Project is in its planning phase, the PERA has been conducted as a bounding conservative assessment to ensure that potential environmental effects are adequately characterized. As part of adaptive management, an updated PERA may be prepared, if warranted based on CSA N288.6:22 to incorporate future Project changes.



Note: A hazard quotient is a numerical representation of a potential for effects due to exposure to constituents. A hazard quotient greater than 1 indicates that there is potential for adverse effects and there is a need for further, more detailed assessment. In some situations (i.e., physical stressors) a hazard quotient may not be applicable, but the overall tiered approach still applies.

Figure 2-1: Methodology for the PNGS PERA

3.0 Project Activities

This section provides the current understanding (at the time of preparing this PERA) of the overall activities for the Decommissioning of PNGS Units 1-4 and the Refurbishment and Continued Operation of PNGS Units 5-8. As identified in **Section 1.1**, permanent shutdown of PNGS Units 1 and 4 occurred in Q4 2024, Stabilization Activities for Units 1 and 4 were initiated in 2025 and SWS Activities (Start of Decommissioning) for Units 1-4 will start in 2028. PNGS Units 5-8 refurbishment licensed activities will start in 2027; however, other prerequisites will begin earlier. The first unit is expected to come back online from PNGS Units 5-8 in 2031 and the last of the four units in 2034. Operation of PNGS Units 5-8 will then continue for approximately 30 years.

The PN site is shown on **Figure 3-1**, which includes existing and planned buildings, laydown areas, and parking areas. A summary of assumptions for the Project are provided in **Table 3-1** by SSC, with further detailed discussion provided by Project phase below. A background description of each SSC is provided in the 2022 PN ERA (Ecometrix, 2023a).



Note: Red shaded areas represent planned laydown areas, green shaded areas represent parking.

Existing Facilities: MSB = Main Security Building; ERT = Emergency Response Team; ASB = Auxiliary Security Building;
Proposed New Facilities: RFRISA = Retube and Feeder Replacement Service Island Support Annex; CSB = Common
Services Building; PCSS = Pickering Component Storage Structure; SS = Storage Structure

Figure 3-1: Pickering Nuclear Site Plan

Table 3-1: Summary of Project Assumptions for Pickering Refurbishment and Decommissioning

Structure, System or Component	Units 1 & 4 Stabilization Phase (Defueling/Dewatering and End Stating) (2024-2028)	Units 1-4 Storage with Surveillance Phase (Wet and Dry) (2028-2070+)	Units 1-4 Risk Reduction and Removal and Dismantle/Demolish Activities (2025-2037)	Units 5-8 Refurbishment (2026-2034)
Reactor Building Systems	<ul style="list-style-type: none">The Reactor Building systems will cease operation for nuclear fission and heat generation. Fuel will be removed, heavy water systems drained, moderator system flushed, and all other liquids, wastes and potentially hazardous transient materials will be removed.Building ventilation and stack monitoring will remain operational.The Reactor Building active drainage sumps will remain operational.1,500 Mg of the approximately 3,000 Mg heavy water that will be drained from the units will be transferred to the Darlington Heavy Water Management Building – West Annex, following the Darlington Unit 1 refurbishment per D₂O Management Plan for Pickering Safe Storage	<ul style="list-style-type: none">Surveillance will commence to ensure Reactor Building systems are maintained in a safe state.Operation of ventilation will be reduced and run only as required for occupational safety and building integrity.Sumps will be isolated from the active drainage system.Heavy water storage on-site will continue, with periodic transfers off-site as required.	<ul style="list-style-type: none">No risk reduction and removal or dismantle/demolish activities in the 2025 – 2037 timeframe associated with this SSC.	<ul style="list-style-type: none">The Reactor Building systems will cease operation for nuclear fission and heat generation. Fuel will be removed, heavy water systems drained, moderator system flushed, and all other liquids, wastes and potentially hazardous transient materials will be removed.Heavy water (D₂O) transfers from PNGS Units 5-8 dewater to Darlington Heavy Water Management Building West Annex – 150 Mg will be Low Curie, 160 Mg will be High CurieUnits will be drained – 2017 Safe Storage PEA assumptions would be bounding.Removal of Fuel Bundles using existing fuel handling equipmentInitial dewatering may result in some increase in radiological emissions from RLWMS and reactor building ventilation.Heavy water will be drained from moderator and heat transport systems and auxiliaries.Systems will be dried and maybe rinsed to remove remaining heavy water, minimizing tritium emissions later during the outage.Dewatering moderator and heat transport involves removal of ~ 242 m³ and 139 m³ of heavy water, respectively.Heavy water will be reused once refurbishment is complete.
Reactor Auxiliary Bay (RAB), Irradiated Fuel Bays (IFB-A, IFB-B) and Auxiliary Irradiated Fuel Bay (AIFB*)	<ul style="list-style-type: none">The RAB systems will remain in operation to accommodate the shutdown of the reactor units, the defueling, and the removal of other equipment.Systems no longer required will be taken out of service and left in a safe state, with the equipment remaining in place.	<ul style="list-style-type: none">SWS will commence to ensure RAB is maintained in a safe state.IFB-A and AIFB will remain in normal operation until all contents can be transferred to dry storage.Selected monitoring equipment will remain operational.	<ul style="list-style-type: none">In the 2025– 2037 timeframe baskets and associated frames from the IFB-A and AIFB would be removed and transferred to the NSS-PWMF (See Nuclear Sustainability Services - Pickering Waste Management Facility (NSS-PWMF) row for more details)	<ul style="list-style-type: none">Used fuel will be transferred to the IFB-B for wet storage.Used fuel will remain in IFB-B for at least 10 years; however, OPG is authorized to process and store a maximum of 100 DSCs with used fuel that has been cooled in wet storage for a minimum of 6 years. Commissioning tests on DSCs

Structure, System or Component	Units 1 & 4 Stabilization Phase (Defueling/Dewatering and End Stating) (2024-2028)	Units 1-4 Storage with Surveillance Phase (Wet and Dry) (2028-2070+)	Units 1-4 Risk Reduction and Removal and Dismantle/Demolish Activities (2025-2037)	Units 5-8 Refurbishment (2026-2034)
	<ul style="list-style-type: none"> IFB-A and AIFB will remain in normal operation. 	<ul style="list-style-type: none"> Fuel will be transferred to DSCs and transportation to the NSS-PWMF will continue. Once IFB-A is no longer required, for storage or cobalt harvest IFB-A may be drained. 		<p>have been performed and submitted to the CNSC for review. OPG will proceed with processing and storing of minimum 6-year cooled fuel once CNSC staff conclude the results are acceptable.</p>
Turbine Hall and Turbine Auxiliary Bay (TAB)	<ul style="list-style-type: none"> Electricity generating equipment (e.g., turbines and generators) associated with each reactor unit will cease operation as units are shut down. As equipment within the PNGS Units 1-4 TAB is no longer required, it will be taken out of service and left in a safe state with equipment remaining in place (some exceptions may be made for equipment that can be resold). PNGS Units 1-4 TAB basement sump pumps will remain in operation. 	<ul style="list-style-type: none"> Current steam emissions from PNGS Units 1 and 4 will no longer exist during the Surveillance Phase. Surveillance will commence to ensure PNGS Units 1-4 TAB is maintained in a safe state. Heating and ventilation will be provided, to the extent required. Operation of the PNGS Units 1-4 TAB basement sumps will continue to maintain the groundwater level below the basement floor. 	<ul style="list-style-type: none"> Within the 2025-2037 timeframe, select Non-Nuclear Components such as turbine and generator in the Turbine Hall (PE-B-1 in Section 3.3.4.2) will be partially removed, but Turbine Hall structures remain. Removal of electrical supply and controls In the PNGS Units 1-4 TAB (PE-B-2) will occur within the 2025 - 2037 timeline in parallel with Units 1&4 Stabilization activities. PNGS Units 1-4 TAB structure will remain intact. 	<ul style="list-style-type: none"> Planned modifications will be installed. Turbine and generator controls will be upgraded. Turbine and generator will be commissioned.
Service Wing*	<ul style="list-style-type: none"> No Changes to 2017 Safe Storage PEA 	<ul style="list-style-type: none"> No Changes to 2017 Safe Storage PEA 	<ul style="list-style-type: none"> No risk reduction and removal or dismantle/demolish activities in the 2025 – 2037 timeframe associated with this SSC. 	<ul style="list-style-type: none"> No Changes from existing conditions for PNGS Units 5-8
Standby Generators and Emergency Power	<ul style="list-style-type: none"> The generators will continue to be tested and relied on to supply back-up power and water to PN Generating Station systems while fuel remains in the reactor units. 	<ul style="list-style-type: none"> A single back-up power source will be required. 	<ul style="list-style-type: none"> Select Standby Generator (PNGS Units 1-4 in PE-A-2, see Section 3.3.4.1), Standby Generator pumphouse and fire protection system for the fuel oil tanks will be removed completely within the 2025-2037 timeframe. 	<ul style="list-style-type: none"> PNGS Units 5-8 Standby Generators will be upgraded and/or replaced
Building Heating and Ventilation	<ul style="list-style-type: none"> Adequate building heating and ventilation will continue to be supplied. An alternative heating source will be required during the Stabilization Phase. Starting in 2026 the Auxiliary Boiler will not be used – transition to electric boilers 	<ul style="list-style-type: none"> Building heating and ventilation will be supplied to the extent necessary to satisfy occupational safety and maintain system and building integrity. Less heat (i.e., less heating boiler use) will be required than in the Stabilization Phase. The Auxiliary Boiler will be used during peak loads as back-up heating supply during the SWS Phase because there will be a transition to electrical heating sources with the electric boiler being the primary heat source. 	<ul style="list-style-type: none"> No risk reduction and removal or dismantle/demolish activities in the 2025 – 2037 timeframe associated with this SSC. 	<ul style="list-style-type: none"> During Refurbishment, the heating source will transition to electric boilers and the Auxiliary Boiler will be available on standby

Structure, System or Component	Units 1 & 4 Stabilization Phase (Defueling/Dewatering and End Stating) (2024-2028)	Units 1-4 Storage with Surveillance Phase (Wet and Dry) (2028-2070+)	Units 1-4 Risk Reduction and Removal and Dismantle/Demolish Activities (2025-2037)	Units 5-8 Refurbishment (2026-2034)
Condenser Cooling Water (CCW) and Reactor Building Service Water (RBSW) Systems	<ul style="list-style-type: none"> CCW pumps will be taken out of service in stages as reactor units are shut down. A minimum of two CCW pumps will continue to operate following the shutdown of reactor units to facilitate Stabilization activities. 	<ul style="list-style-type: none"> The increased CCW flow between the 2017 Safe Storage PEA and the 2022 Safe Storage PEA Addendum will further reduce the temperature difference between the discharged water temperature from the outfall and the water intake temperature (i.e., ΔT) because of greater dilution of warm water. The increased CCW flow may change predicted sediment deposition patterns. Unit 1 CCW Pumps will be made available as contingency. For PNGS Units 5-8, the expected CCW flow rate through the PNGS-B side is 2,899 L/s (250,500m³/day) during the SWS Phase, higher than the assumed flow rate of 578 L/s (50,000 m³/day) in the 2017 Safe Storage PEA. With regards to water quality, the updated CCW flows are bounded by the conditions assumed for the 2017 Safe Storage PEA, because the higher flow rate will provide greater dilution, resulting in reduced discharge concentrations at the outfall. This was addressed in the 2022 Safe Storage PEA Addendum. 	<ul style="list-style-type: none"> Cooling water lines will be removed from the CCW supply system. CCW lines will be isolated, and segmented. Remove CCW pipework to access points and cap per the interim end state. Cutting and capping the CCW pipework during the 2025-2037 timeframe. 	<ul style="list-style-type: none"> When all units on the PNGS Units 5-8 side are shut down for refurbishment, CCW pumps on the PNGS Units 1-4 side will be operating. RBSW will be released to both the PNGS Units 1-4 and PNGS Units 5-8 discharge channels. When one unit has completed refurbishment and the DWI is operational, water will flow into PNGS Units 5-8 through the DWI. All CCW pumps will be shutdown on PNGS Units 1-4 side. At the end of refurbishment all units on PNGS Units 5-8 will be operational and water balance will return to existing conditions for the PNGS Units 5-8 side.
Electrical Transmission Facilities*	<ul style="list-style-type: none"> Main output transformers and generating system transformers associated with each unit will be taken out of service and placed into a safe state following the shutdown of the reactor units. Select station service transformers and switchyard equipment will remain in operation to supply power to the facility. Any transformers no longer required would be placed in SWS. 	<ul style="list-style-type: none"> Select station service transformers and switchyard equipment will remain in operation to supply power to the facility. 	<ul style="list-style-type: none"> No risk reduction and removal or dismantle/demolish activities in the 2025 – 2037 timeframe associated with this SSC. 	<ul style="list-style-type: none"> Replacement of the Main Power Output Transformers will occur as well as partial upgrade of the standby generators The Auxiliary Power Supply will be used to support DWI construction power.
Oil and Chemical Storage Building*	<ul style="list-style-type: none"> Waste consolidation activities and transportation off-site will increase. 	<ul style="list-style-type: none"> Operations will continue, though waste consolidation and transportation activities will be reduced. 	<ul style="list-style-type: none"> Selected oil tank and gas cylinders to be completely removed or partially removed throughout the 2025– 2037 timeframe. Those activities units include: <ul style="list-style-type: none"> Remove Oil Tank Farm A (PE-A-1, see Section 3.3.4.1): This unit 	<ul style="list-style-type: none"> Waste consolidation activities and transportation off-site will increase.

Structure, System or Component	Units 1 & 4 Stabilization Phase (Defueling/Dewatering and End Stating) (2024-2028)	Units 1-4 Storage with Surveillance Phase (Wet and Dry) (2028-2070+)	Units 1-4 Risk Reduction and Removal and Dismantle/Demolish Activities (2025-2037)	Units 5-8 Refurbishment (2026-2034)
			<p>is already emptied and will be removed off-site along with concrete pad, and associated piping, instrumentation, and electrical connections. Pipework will need to be removed, capped, material and equipment surveyed, hoisted for transportation and off-site disposal.</p> <ul style="list-style-type: none">Complete removal of internal components and structures for Gas Bottle Storage Enclose A (PE-A-2): Gas bottles would be removed before the start of decommissioning activities in 2034. During decommissioning phase, the remaining structure/building will be dismantled and removed.Complete removal of internal components and structures of Standby Generator oil tanks PNGS Units 1-4 (PE-A-2): The standby generator oil tanks will be emptied in the Stabilization phase. During SWS, the remaining structure/building will be dismantled and removed.	
Administration, Engineering Services, Security Buildings and Pickering Nuclear Information Centre (PNIC)*	<ul style="list-style-type: none">The Administration building will be maintained to support the decommissioning project and to house key decommissioning staff.The assumption of the 2017 Safe Storage PEA remains bounding.	<ul style="list-style-type: none">The Administration building will be maintained to support the decommissioning project and to house key decommissioning staff.The 2017 Safe Storage PEA assumption that buildings will be leased to future industrial/commercial workers is bounding, because the future industrial/industrial worker was assessed as the nearest receptor to the plant (refer to Section 4.1.3 of the 2017 Safe Storage PEA). This receptor would be bounding of exposure and dose from any on-site building leased out.	<ul style="list-style-type: none">No risk reduction and removal or dismantle/demolish activities in the 2025 – 2037 timeframe associated with this SSC.	<ul style="list-style-type: none">Construction of Retube and Feeder Replacement Service Island Support Annex (RFRISA), a three-storey business and personal services building.Based on Project planning for refurbishment leasing of buildings is no longer planned; therefore, the on-site future industrial/commercial worker is no longer applicable.

Structure, System or Component	Units 1 & 4 Stabilization Phase (Defueling/Dewatering and End Stating) (2024-2028)	Units 1-4 Storage with Surveillance Phase (Wet and Dry) (2028-2070+)	Units 1-4 Risk Reduction and Removal and Dismantle/Demolish Activities (2025-2037)	Units 5-8 Refurbishment (2026-2034)
		Therefore, no further assessment is required. (Note: based on Project planning for refurbishment leasing of buildings is no longer planned)		
High Pressure Emergency Coolant Injection (HPECI) Facilities*	<ul style="list-style-type: none"> No changes while fuel remains in the reactor units. Once the reactor units are all defueled, the HPECI will be drained, and all associated equipment placed in an inactive safe state. HPECI water will be discharged via an approved pathway. 	<ul style="list-style-type: none"> HPECI facilities will no longer be in operation and will be in an inactive safe state. PNGS-A Pipework will be drained, but PNGS-B will remain in service 	<ul style="list-style-type: none"> No risk reduction and removal or dismantle/demolish activities in the 2025 – 2037 timeframe associated with this SSC. 	<ul style="list-style-type: none"> No changes are planned to the HPECI system.
New Water Treatment Plant (NWTP)*	<ul style="list-style-type: none"> A mobile water treatment system may be used or demineralized water will be brought from off-site, and stored in tanks at the PN site. New pumps and controls will be added to hook up with the existing network to supply active loads during SWS. The 2017 Safe Storage PEA evaluated use of a mobile water treatment system If demineralized water brought from off-site no discharges are anticipated to be associated with water treatment to meet demineralized water requirements, and the 2017 Safe Storage PEA assumptions are bounding. 	<ul style="list-style-type: none"> A mobile water treatment system is no longer planned during the SWS Phase. The 2017 Safe Storage PEA considered non-radiological discharges from a mobile water treatment system during the SWS Phase and found that predicted concentrations of contaminants from water treatment are below screening levels (refer to Section 4.2.3.2.1.1 of the 2017 Safe Storage PEA). Considering that no water treatment is currently planned, the assessment of non-radiological discharges from a mobile water treatment system in the 2017 Safe Storage PEA is bounding for lake water quality. No further assessment is needed. 	<ul style="list-style-type: none"> No risk reduction and removal or dismantle/demolish activities in the 2025 – 2037 timeframe associated with this SSC. 	<ul style="list-style-type: none"> A new water treatment plant will be built and commissioned During refurbishment a mobile water treatment plant may be used for 2.5 years (approximately October 2026 to 2029). A temporary mobile water treatment plant may be used to support DWI construction activities such as tunnel boring and muck management (approximately 2027-2030).
Nuclear Sustainability Services - Pickering Waste Management Facility (NSS-PWMF)*	<ul style="list-style-type: none"> A Licence Amendment for PWMF is being sought from CNSC to load 6- to 10-year fuel to the DSCs (from previous 10-year minimum), to free up bay space for the defueling of PNGS Units 5-8. A dose rate assessment has been completed for OPG considering the higher activity (lower aged) fuel for Storage Building 3 (SB #3). 	<ul style="list-style-type: none"> No changes, the NSS-PWMF will continue in full operation to receive, process and store DSCs until all the fuel has been removed from the IFBs and they have been decommissioned. 	<ul style="list-style-type: none"> Used fuel that has been stored in the IFBs for the required minimum cooling period will continue to be loaded into DSCs and transported to the NSS-PWMF using the existing programs and procedures for the management of used fuel. Work will continue to be executed with existing operational procedures, leveraging established practices from previous fuel handling operations. As fuel is removed, empty baskets and associated frames will be removed from the IFBs and disposed of using existing waste routes. 	<ul style="list-style-type: none"> Used fuel that has been stored in the IFBs for the required minimum cooling period will continue to be loaded into DSCs and transported to the NSS-PWMF using the existing programs and procedures for the management of used fuel. Used fuel will be transferred to NSS-PWMF for storage. No additional storage buildings after SB #5 are planned.

Structure, System or Component	Units 1 & 4 Stabilization Phase (Defueling/Dewatering and End Stating) (2024-2028)	Units 1-4 Storage with Surveillance Phase (Wet and Dry) (2028-2070+)	Units 1-4 Risk Reduction and Removal and Dismantle/Demolish Activities (2025-2037)	Units 5-8 Refurbishment (2026-2034)
Waste Management (radiological and non-radiological)*	<ul style="list-style-type: none">Radioactive and non-radiological solid and liquid wastes will continue to be generated and managed as they are during normal operations.	<ul style="list-style-type: none">There will be a reduction in wastes produced.Waste will continue to be managed in accordance with accepted procedures and licence requirements.	<ul style="list-style-type: none">Waste management will continue to be managed in accordance with accepted procedures and licence requirements.	<ul style="list-style-type: none">Pickering Component Storage Structure (PCSS) will be construction in East Complex for storage of Low and Intermediate Level Waste (L&ILW).Refurbishment waste, including fuel channel assembly waste and steam generator waste, will be stored in PCSS.Refurbishment of fuel channel assemblies, calandria tubes and feeder piping will generate Intermediate Level Waste (ILW) and Low Level (LLW).Volume reductions such as cutting and crushing in the Reactor Building vault will be used for pressure tubes and calandria tubes.Feeder pipes cut into lengths to fit in standardized waste containers, and transported off site as per routine LLW generated at PNGS Units 5-8.Total estimated volume of miscellaneous routine LLW is 4,000 m³ (1,000 m³ per unit).Miscellaneous LLW and feeder pipes will be transported to NSS-WWMF.Relocation of Dry Storage Modules (DSMs)
Site Drainage and Waterborne Emissions	<ul style="list-style-type: none">Drainage systems, including stormwater runoff, sewage, active and inactive drainage systems will remain operational.Draining of systems may result in additional flow to the radioactive liquid waste management system (RLWMS, e.g., upgraders), but it will be discharged as in previous operations (6 operating units).Additional materials may be generated for discharge via the inactive drainage; however, approval will be obtained for the disposal options.The volumes of active and inactive liquid emissions generated will be gradually reduced as operations are terminated.	<ul style="list-style-type: none">All types of waterborne emissions will be reduced.Stormwater volumes will remain the same.All drainage systems, including stormwater runoff, sewer, and active and inactive drainage systems will remain operational to the extent necessary to meet operational and regulatory requirement.Inactive drainage will not be re-routed to RLWMS, RBSW or the PNGS Units 5-8 discharge channel. The revised strategy for inactive drainage in the 2022 Safe Storage PEA Addendum was to discharge to the respective PNGS-A or PNGS-B CCW intake duct. As a result, less active discharges will be diverted to	<ul style="list-style-type: none">All types of waterborne emissions will be reduced.Stormwater volumes will remain the same.All drainage systems, including stormwater runoff, sewer, and active and inactive drainage systems will remain operational to the extent necessary to meet operational and regulatory requirement.	<ul style="list-style-type: none">During refurbishment waterbone emissions will be similar to that assessed in 2017 Safe Storage PEA.A minimum of two CCW pumps will remain in service on PNGS Units 1-4 side while all units on PNGS Units 5-8 side are shutdown for refurbishment. RLWMS will discharge out the PNGS Units 1-4 side.Drainage systems, including stormwater runoff, sewage, active and inactive drainage systems will remain operational.

Structure, System or Component	Units 1 & 4 Stabilization Phase (Defueling/Dewatering and End Stating) (2024-2028)	Units 1-4 Storage with Surveillance Phase (Wet and Dry) (2028-2070+)	Units 1-4 Risk Reduction and Removal and Dismantle/Demolish Activities (2025-2037)	Units 5-8 Refurbishment (2026-2034)
	<ul style="list-style-type: none">A minimum of two CCW pumps will remain in service	<p>the RLWMS, and the 2017 Safe Storage PEA assessment of lake water quality remains bounding.</p> <ul style="list-style-type: none">Inactive drainage discharge to the PNGS-B CCW intake duct will be drawn back into the station along with the cooling water intake. Any potential impacted water will be diluted prior to discharge, as was the case in the 2017 Safe Storage PEA. This change does not affect the 2017 Safe Storage PEA bounding condition and the increased CCW flow between the 2017 PEA (50,000 m³/day) and the 2022 PEA Addendum (250,500 m³/day) will reduce predicted discharge concentrations since there is greater CCW flow available for dilution. Therefore, no further assessment is needed for inactive drainage to the PNGS-B side.Inactive drainage discharge to the PNGS-A CCW intake duct will eventually be a source of tritium to the forebay because there is expected to be no intake flow through the PNGS-A intake duct. This was assessed in the 2022 Safe Storage PEA Addendum.		
Screenhouses, Forebay, Intake Channel, and Intake and Discharge Ducts	<ul style="list-style-type: none">All these SSCs will remain operational and continue to operate as in the current operations.The CCW duct may not be used when the CCW pumps cease operations at the end of the Stabilization Phase.	<ul style="list-style-type: none">The forebay will continue to be an operating intake that is reduced from operational conditions but will be increased from the 2017 Safe Storage PEA assumption as discussed in the CCW and RBSW systems row (i.e. Section 3.7 of the 2017 Safe Storage PEA). Once the deepwater intake is operational the forebay will no longer be an operating intake and a cutoff wall will be constructed that allows for minimal flow to pass into the forebay and direct the operational flows through the Deep Water Intake and into the forebay.The 2017 Safe Storage PEA predicted that the forebay would become a	<ul style="list-style-type: none">No risk reduction and removal or dismantle/demolish activities in the 2025 – 2037 timeframe associated with this SSC.	<ul style="list-style-type: none">DWI to be constructed will draw deeper cooler water from Lake Ontario which is expected to significantly reduce fish impingement and entrainment as well as reduce potential biofouling events with attached algae (see Section 3.1.1.7).Construction of the DWI will also involve shoreline modifications including a potential dock and possible infill, and disposal of construction and dredged material (see Section 3.1.1.7).Once the DWI is in use, a cut-off wall will be installed in the intake channel, as it will no longer be needed to supply water to the station. The cut-off wall will be designed to allow for minimal flow through the wall into the forebay.

Structure, System or Component	Units 1 & 4 Stabilization Phase (Defueling/Dewatering and End Stating) (2024-2028)	Units 1-4 Storage with Surveillance Phase (Wet and Dry) (2028-2070+)	Units 1-4 Risk Reduction and Removal and Dismantle/Demolish Activities (2025-2037)	Units 5-8 Refurbishment (2026-2034)
		<p>sediment depositional area (refer to Section 4.3.2 of the 2017 Safe Storage PEA). Less sedimentation in the forebay is expected to occur due to the higher expected intake flow rate. This change is considered bounded in the assessment in the 2017 PEA. No further assessment is needed.</p> <ul style="list-style-type: none">The inactive drainage system will continue to discharge to the common PNGS Unit 1-4 or PNGS Unit 5-8 line that leads to the old water treatment plant and then directed to the sediment pond and to the common intake channel, discharge to the respective PNGS Unit 1-4 or PNGS Unit 5-8 CCW intake duct after unit shut-down. However, for PNGS Unit 1-4, with no CCW flow, inactive drainage will report eventually to the forebay. See discussion in the previous row. This was assessed in the 2022 Safe Storage PEA Addendum.		<ul style="list-style-type: none">DWI and its associated cutoff wall are pending final design, construction and approvals..
Fish Diversion System (FDS)*	<ul style="list-style-type: none">The FDS will continue to be installed seasonally as necessary while any number of CCW pumps remain in operation.	<ul style="list-style-type: none">The FDS will not be removed without prior approval and discussions between OPG and Fisheries and Oceans Canada (DFO).	<ul style="list-style-type: none">The FDS will not be removed without prior approval and discussions between OPG and DFO.	<ul style="list-style-type: none">The FDS will not be removed without prior approval and discussions between OPG and DFO.
Tempering Water Duct*	<ul style="list-style-type: none">No Changes	<ul style="list-style-type: none">No Changes	<ul style="list-style-type: none">No risk reduction and removal or dismantle/demolish activities in the 2025 – 2037 timeframe associated with this SSC.	<ul style="list-style-type: none">No changes
Auxiliary Boiler (Existing steam boiler, fueled with fuel oil, which provides back-up heating steam supply for the PN site during commercial operations)*	<ul style="list-style-type: none">The existing Auxiliary Boiler will be upgraded and modified to supply steam for building heating and process steam (as a backup to meet peak demand if required) during the Stabilization Phase. The upgrades to the Auxiliary Boiler include installation of a new air dryer, replacement of the feed water pump, and a new oxygen sensor; these upgrades will not increase the air emission rate from the Auxiliary Boiler.Operation of the Auxiliary Boiler during the Stabilization Phase is bounded by the 2017 Safe Storage PEA and previous	<ul style="list-style-type: none">Operation of the Auxiliary Boiler will be limited to during Peak Loads.Transition to electrical heating sources with the electric boiler being the primary heat source	<ul style="list-style-type: none">No risk reduction and removal or dismantle/demolish activities in the 2025 – 2037 timeframe associated with this SSC.	<ul style="list-style-type: none">Heating source will transition to electric boilers and the Auxiliary Boiler will be available on standby

Structure, System or Component	Units 1 & 4 Stabilization Phase (Defueling/Dewatering and End Stating) (2024-2028)	Units 1-4 Storage with Surveillance Phase (Wet and Dry) (2028-2070+)	Units 1-4 Risk Reduction and Removal and Dismantle/Demolish Activities (2025-2037)	Units 5-8 Refurbishment (2026-2034)
	operational conditions assessed for the 2022 PN ERA, both of which consider full-time operation of the Auxiliary Boiler.			
Other Supporting Structures and Services*	<ul style="list-style-type: none">The East and West Annex will be used for PN Site activities and will remain.The East Complex will continue to be used for PN Site activities.Upgraders will continue to be used to upgrade heavy water. Necessary process steam may be supplied by the building heating boilers.	<ul style="list-style-type: none">The East Complex, East and West Annex will be required.The East Complex will be maintained for PN Site activities.Upgraders will be in service as required.	<ul style="list-style-type: none">The Helium Trailers x4 and Hydrogen (H₂) Skids (PE-A-1, see Section 3.3.4.1) will be completely removed, with the removal of internal components and structuresSelect Off Gas System Building will be partially removed in the 2025– 2033 timeframe, while keeping the structures. The Off Gas System includes the Activated Carbon Tank, ducts, instrumentation, pump system, connected piping and electrical systems.Complete removal of internal components of Sulzer-A while keeping the structure (PE-A-1).Selected structures will be completely removed including:<ul style="list-style-type: none">Scaffolding Sheds (PE-A-1): These sheds will be dismantled to be removed, transported and disposed.Shutdown System Enhancement (SDSE) Instrument Rooms (PE-A-2): The outer structure of the instrument rooms will be dismantled, removed and transported for disposal.	<ul style="list-style-type: none">The East and West Annex will be used for PN Site activities and will remain.The East Complex will continue to be used for PN Site activities.Upgraders will continue to be used to upgrade heavy water. Necessary process steam may be supplied by the building heating boilers.

Notes:
* Indicates that the SSC provides a common service to all PNGS units.

3.1 Refurbishment of PNGS Units 5-8

Refurbishment of PNGS Units 5-8 consists of three sub-phases: preparation for refurbishment, refurbishment, and refuelling and restarting. These sub-phases are described in more detail below. Where relevant, general descriptions of refurbishment activities have been obtained from the Refurbishment and Continued Operation of Pickering B Nuclear Generating Station EA (OPG, 2007a). Additional activities such as, construction and operation of DWI are described based on current Project planning.

3.1.1 Preparation for Refurbishment

Starting in 2027, preparation for refurbishment will be initiated including procurement and mobilization of equipment and components, relocation/removal/construction of buildings, structures and equipment and temporary laydown areas, defueling and dewatering of reactors, islanding the unit, management of heavy water, and deep water intake construction.

3.1.1.1 Procurement and Mobilization of Equipment and Components

The major system components to be procured for refurbishment include steam generators, feeder piping, fuel channel assemblies and calandria tubes.

Additionally, a large amount of heavy machinery will be mobilized. This includes diesel-powered transportation equipment, including a large multiwheeled ground transporter, forklifts, tractor trailers, and other construction equipment such as cranes, earthmovers, electrical generators, etc. A large crane will be required for hoisting of the steam generators into and out of the reactor buildings, through specially prepared and approved openings in the reactor building domes. This crane will be situated on the south side of the PNGS Units 5-8 reactor buildings.

3.1.1.2 Relocation/Removal/Construction of Buildings, Structures, and Equipment

To make room for the large crane, some structures and equipment within the PNGS Protected Area will be temporarily relocated or removed. This will include fire hydrants, an equipment storage building, the gas bottle storage enclosure and the chlorine building, since they are located south of the reactor buildings. Other structures and equipment may have to be temporarily relocated or removed to facilitate the movement of refurbishment equipment, components and wastes through the station.

The majority of the temporary construction facilities and laydown areas will be located in the East Complex (**Figure 3-1**). Construction-related facilities, such as change rooms, shop facilities, construction offices, and laydown areas for equipment and machinery will be required. These land uses are similar to the existing land use in the East Complex area. Depending on the exact timing, some existing buildings and structures within the East Complex will be converted to these uses or replaced as required.

Some additional service buildings or structures may be required within the PNGS Protected Area Boundary. There may be a need for service buildings to accommodate additional personnel or additional equipment storage, which may include the Retube and Feeder Replacement Service Island Support Annex (RFRISA), Sally Port, and the Common Services Building (CSB) (**Figure 3-1**).

The RFRISA will be constructed within the PNGS Protected Area during the same timeframe as the PCSS (**Figure 3-2**). The RFRISA is expected to have an area of approximately 48,000 to 50,000 ft², and will be a three-story business and personal services building with offices and conference rooms. Underground services will be connected to existing site services. It is expected that construction of the RFRISA will be complete by mid to late 2026.

Any new buildings will be designed and constructed following OPG's engineering change control process.

3.1.1.3 Construction of Pickering Component Storage Structure (PCSS) and Storage Building #5

The Pickering Component Storage Structure (PCSS) will be constructed adjacent to the northern boundary of the NSS-PWMF Phase II site within the Pickering Site East Complex (**Figure 3-2**). The PCSS will be used for the storage of low and intermediate level waste, including PNGS Units 1-4 and PNGS Units 5-8 components such as steam generators, pressure and calandria tubes, calandria tube inserts, and end fittings, and concrete LLW. Based on the expected waste streams that will be produced, the PCSS is expected to have an area of approximately 41,000 ft². The structure will be shielded with concrete walls and enclosed with a roof. It is expected that construction of the PCSS will be complete by mid-2027. Evaluation of the environmental effects of the PCSS was part of a separate PERA (Ecometrix, 2024) as the PCSS will be incorporated into the existing NSS-PWMF operating policies and procedures and operate under an amended Waste Facility Operating Licence.

The Pickering B Refurbishment EA included the construction and operation of two additional DSC Storage Buildings (SB #5 and #6) in the PWMF Phase II Site, east of SB #4 (SENEC, 2007). At this time, only SB #5 is planned, as an amalgamation of both buildings, with an in-service date of Q3 2027 (see **Figure 3-1**). SB #5 will be designed to accommodate up to 1040 loaded DSCs.

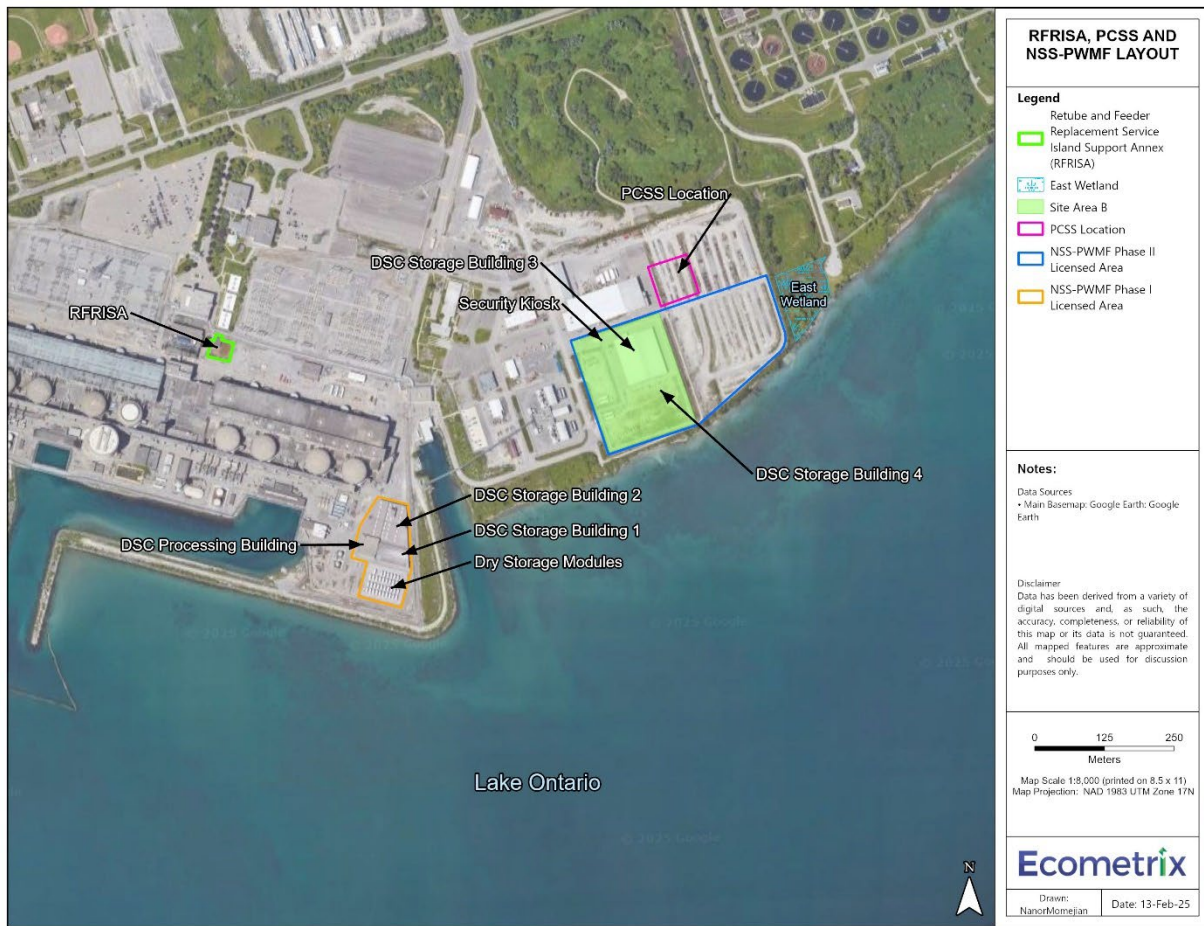


Figure 3-2: Planned Locations for the PCSS and RFRISA

3.1.1.4 Defuel and Dewater

The Reactor Building systems for Units 5-8 will cease operation for nuclear fission and heat generation. Used fuel will be removed from the fuel channels of those reactors, using fuelling machines and transferred using the existing irradiated fuel transfer and conveyor systems, to the Unit 5-8 irradiated fuel bay (IFB) for wet storage. Currently, the used fuel will remain in the IFB-B for at least ten years prior to transfer to dry storage at the NSS-PWMF. OPG is authorized to process and store a maximum of 100 DSCs with used fuel that has been cooled in wet storage for a minimum of 6 years. OPG has performed commissioning tests on DSCs and submitted dose results to the CNSC for review and can proceed with processing of minimum 6-year cooled fuel once CNSC staff conclude the results are acceptable.

Heavy water will be drained from the moderator and heat transport systems and auxiliaries. Initial dewatering may result in some increase in radiological emissions from Radioactive Liquid Waste Management System (RLWMS) and reactor building ventilation exhaust. The units (Units

5-8) will be drained. The moderator and heat transport systems will be dried and may be rinsed to remove the remaining heavy water to minimize tritium emissions later in the refurbishment process.

3.1.1.5 Islanding the Unit

The unit undergoing refurbishment will be isolated from the other operating units, to facilitate the refurbishment work and create a safe working environment for reactor activities. This is referred to as “islanding the unit”, and involves physical separation of the unit to be refurbished from the common negative pressure containment system by sealing the transition duct between the boiler room and the containment pressure relief duct. It will also involve isolation of the unit’s portion of some shared systems and potentially involve equipment logic or operational changes to support the needs of the remainder of the station. Operationally, the islanded unit will be supported separately from the remainder of the station and in a manner that benefits safe and efficient access for construction staff.

3.1.1.6 Management of Heavy Water

Heavy water (D₂O) removed will be collected, upgraded and stored in accordance with existing plans. Heavy water will be stored on-site, with some transferred to the Darlington Heavy Water Management Building – West Annex. Heavy water will be reused once refurbishment is complete.

If the heavy water is to be detritiated prior to reuse, it will be shipped to the Darlington Tritium Removal Facility in specially designed containers called Tritiated Heavy Water Transportation Packages, as per current practice. OPG has heavy water storage facilities on the PN site, and storage of heavy water is within PNGS Units 5-8’s current operating licence (PROL 48.03/2028).

Heavy water is reusable and interchangeable between units. However, heavy water used for moderator and heat transport systems is kept separated as the isotopic composition and chemical characteristics of the heavy water in the two systems are slightly different.

3.1.1.7 Construction of Deep Water Intake

One of the major design modifications/activities related to the Project is the construction of an offshore lake bottom water intake structure for PNGS Units 5-8 that will replace the current shoreline surface water intake. The proposed deep water intake (DWI) will draw deeper cooler water from Lake Ontario which is expected to significantly reduce fish impingement and entrainment as well as reduce potential biofouling events with attached algae. The construction of the intake structure will also involve shoreline modifications including a potential dock, bridge, and possible West Infill, shoreline erosion mitigation area east of the PNGS Unit 5-8 outfall, and disposal of construction and dredged material.

The site modifications to support the DWI tunneling encompass several key activities being considered. Infrastructure enhancements may include constructing a bridge over the outfall and road widening on Dike Road. Preparatory activities include clearing/grubbing and

leveling/laydown area preparation. The infill design has not been finalized. However, a potential infill is being considered, with input from Indigenous Nations and communities and regulators, adjacent to the existing forebay groyne structure, as well as a dock and associated harbor along the Eastern quadrant of the infill.

The new intake cap will be located approximately 1.5 km offshore out from the east end of the existing forebay (**Figure 3-3**). Construction of the DWI will begin in mid-2026 and will include tunnel boring. The DWI will be operational by 2030.

During tunneling activities, a large volume of spoils will be excavated. OPG is currently evaluating spoil management options, including: lake infill, open aquatic disposal location, onsite landfill or offsite disposal facility. Based on preliminary planning it is anticipated that much of the rock could potentially be disposed of in a lake infill, near surface materials will be sent for inland disposal and overburden materials may be sent for open aquatic disposal. OPG is working with the Indigenous Nations and communities to seek input, feedback, identify the best option and identify mitigation measures. A comprehensive spoil management plan will be developed in accordance with regulatory requirements during the site preparation phase for the DWI once the DWI constructor has been selected.

Once the DWI is in use, a cut-off wall will be installed in the intake channel, as it will no longer be needed to supply water to the station. The cutoff wall is expected to be constructed using a combination of concrete, steel reinforcement, and various fill types. This structure will serve two primary functions: to separate the lake from the forebay and to provide an emergency service water supply to the station. The cut-off wall will have small holes to allow for minimal flow through the wall into the forebay. The specific flow through the structure, such as a pipe or sluice gate will be determined based on safety case and environmental requirements. The cutoff wall will be designed with environmental considerations such as minimizing risk of fish impingement/entrainment and biofouling.

The total estimated project footprint and associated impacts on aquatic habitat are outlined in **Section 6.2.2.1**. Briefly, the completed intake cap is projected to cover up to 1 ha, based on current design specifications of a 100 m x 100 m intake cap. However, to accommodate the temporary disruption caused by dredging and construction activities associated with the intake cap, a boundary of 150 m x 150 m (~2.5 ha) has been considered for total intake cap area. As the intake tunnel spanning from PNGS to the Intake cap is expected to be a bored tunnel that is several metres below the lake bed, it is not expected to result in a measurable footprint on the aquatic environment. Lake infilling will primarily be conducted in three areas: the West Infill area (11.5 ha), the Shoreline Erosion Mitigation Area (4.0 ha), and in the forebay dredge (0.2 ha). Navigational channel dredging as a part of the dock will result in a footprint of 4.5 ha. A bridge allowance of 0.6 ha is also being considered for a potential bridge over the PNGS Units 5-8 CCW outfall. Finally, the cut-off wall, which is planned to be constructed in the forebay once the DWI is operational, is expected to span up to 0.5 ha.

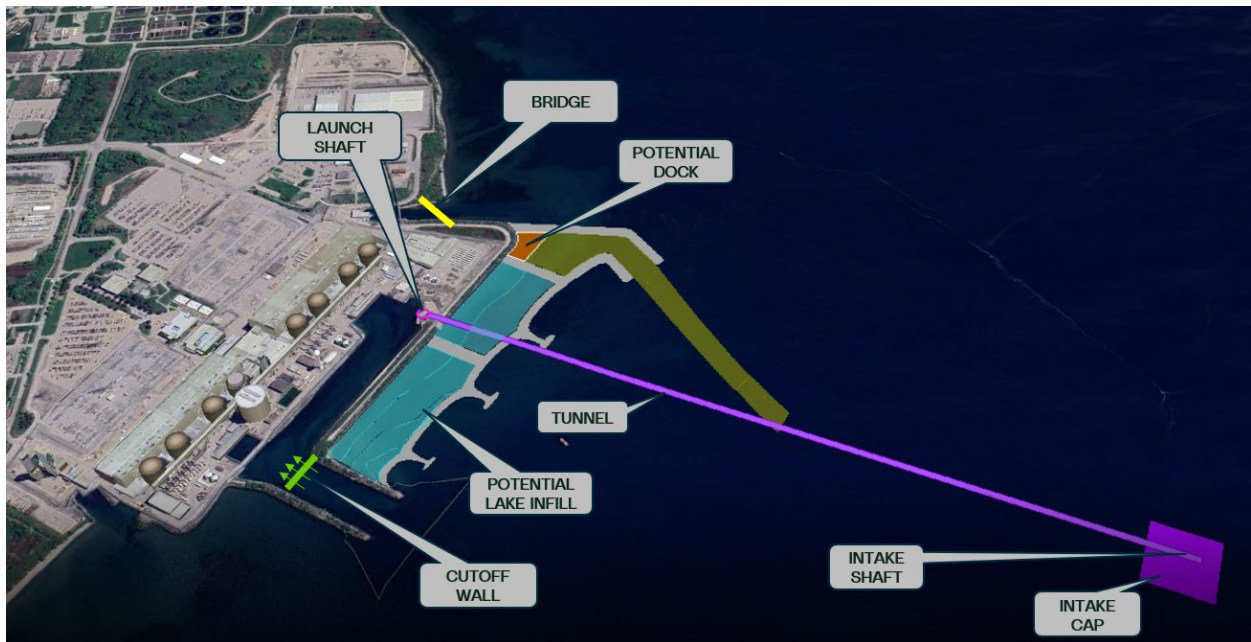


Figure 3-3: DWI and Associated Site Preparation Modifications

To accommodate equipment, space allocation, and construction activities for the DWI, OPG plans to relocate a portion of the Protected Area security fence northwards from Dike Road. Security fence relocation will be completed by Q2 2026. This would also require relocation in Q3 2025 of the Dry Storage Modules (DSMs) from which contain intermediate level waste from PNGS Units 1 to 4 Refurbishment that occurred in the mid-1980s and early-1990s and is located in the Retube Component Storage (RCS) Facility (approximately 36 DSMs). The DSMs are categorized as Intermediate Level Waste (ILW) and will need to be moved to an alternative location onsite within the NSS-PWMF Phase II site. New concrete pads will be constructed near DSC Storage Building #4 to store the relocated DSMs, and the old concrete pads where the DSMs are currently stored will be removed.

OPG also plans to relocate the NSS-PWMF fence to allow for road widening that will be used to reduce traffic on-site and connect the construction site to the East Complex.

3.1.2 Refurbishment

Starting in 2027 the first unit will enter refurbishment which includes replacing reactor components, replacement of steam generators, refurbishment of various systems including reactor auxiliary systems and feedwater systems, and normal upgrade and maintenance activities.

3.1.2.1 Replacement of Reactor Components

The following components will be replaced during refurbishment: pressure tubes, fuel channels, calandria tubes, end fittings, shield plugs, closure plugs, spacers, feeder coupling hardware,

feeder tubes (up to the headers), feeder tube supports, feeder cabinet insulation, and positioning assemblies. The work will include the following activities:

- **Vault Preparation:** removal of feeder cabinet and reactor face insulation, installation of shielding, and installation of additional services to support the work.
- **Removal of Fuel Channels, Calandria Tubes and Feeders:** feeder pipes will be removed. Shielding and automated tooling will be used where feasible to reduce worker dose. All of the components of the fuel channel assemblies (including pressure tubes) and calandria tubes will be removed.
- **Installation of New Fuel Channels, Calandria Tubes and Feeders:** New fuel channel assemblies and calandria tubes will be installed in the reactor core. New feeder piping will be installed. The reactor vaults will be returned to operational status through removal of all the temporary services, removal of temporary shielding and tooling, and reinstallation of feeder cabinet and reactor face insulation.
- **Waste Handling:** Refurbishment of fuel channel assemblies, calandria tubes and feeder piping is expected to generate low and intermediate level waste (L&ILW). ILW resulting from refurbishment will primarily include fuel channel assembly wastes (i.e., pressure tubes, calandria tubes and related components collectively referred to as "retube waste"). Pressure and calandria tubes, calandria tube inserts, and end fittings will be processed (e.g. volume reduced, packaged, etc.) before transfer to the PCSS for secure storage. Feeder pipes will be cut into lengths to fit in standardized waste containers, and transported off site as per routine LLW generated at PNGS Units 5-8. The total estimated volume of miscellaneous routine LLW is 4,000 m³ (1,000 m³ per unit). The estimated volume of ILW from fuel channel assembly waste is approximately 3,000 m³.

3.1.2.2 Removal and Replacement of Steam Generators

During refurbishment, all of the steam generators (also referred to as boilers) will be replaced. Each PNGS Units 5-8 unit has 12 steam generators, each approximately 14 m in length and 2 m wide, weighing approximately 90,000 kg per steam generator. Replacement of the steam generators will include the following activities:

- **Building and Equipment Preparation:** Specially prepared and approved openings will be created in the reactor building dome to provide crane access. A wet-cutting technique will be used to minimize dust. The holes will be temporarily covered to prevent precipitation from entering the reactor building. A large heavy lift crane will be placed on the south side of the reactor building that will be used to remove the steam generators. The crane will meet stringent safety requirements such as being seismically qualified and having a significant safety factor in terms of lifting capacity.
- **Removal of Steam Generators:** Steam generator removal includes removal of insulation, cutting or disconnecting all piping and equipment attached to the steam

generators, capping of all openings to prevent release of loose radioactive contamination. The exterior of steam generators will be shielded and coated to fix loose contamination.

- **Installation of Steam Generators:** New steam generators will be shipped to site. Steam generator installation will be carried out by reversing the procedure for removal. Connections to process piping and instrumentation will be made and insulation installed. When all new steam generators are installed, equipment will be returned to operational status by removing temporary services and lifting rigs and reinstalling any temporarily removed equipment. The holes in the reactor building dome will be restored to meet design requirements. Appropriate testing will be performed to confirm containment system integrity.
- **Waste Handling:** Steam generator replacement will generate liquid waste, LLW and ILW, including the steam generators themselves, insulation materials and miscellaneous components.
 - The liquid waste (i.e., light water) from the secondary heat transport system will be drained from the steam generators. The water will be monitored to ensure it is within Environmental Compliance Approval (ECA) limits for non-radionuclides before being released to the lake. Water will also be monitored for radionuclides. If contamination is detected during the monitoring, the water will be sent to the RLWMS for processing.
 - The removed steam generators will be shielded, sealed and loose contamination on the exterior surfaces will be coated and fixed prior to removal from the reactor building. This will ensure that neither loose contamination nor radioactivity releases will be present during loading onto and unloading from the transfer vehicle. The steam generators may be placed temporarily in a laydown area prior to being transferred to the PCSS for storage. The estimated volume of the 48 steam generators is 2,500 m³.
 - The concrete and dry solids from the cutting slurry used to cut the reactor dome would be checked to confirm that they are not radioactive and then disposed of as landfill waste or sent for recycling. If radioactive, the concrete and dry solids would be handled as LLW in a similar manner to other LLW.

3.1.2.3 Refurbishment of Other Plant Systems

Refurbishment/upgrades of the reactor auxiliary systems and feedwater systems includes normal maintenance and repair to be undertaken during each refurbishment outage, and normal maintenance activities required for the refuelling and restart of any reactor unit.

During refurbishment outages of PNGS Units 5-8, there may be opportunities to undertake normal repair, maintenance and upgrades of components. While these activities are undertaken

as part of normal operations and maintenance during typical unit outages, they are noted here to indicate the likelihood that ongoing repair and maintenance may also occur during the major refurbishment outages. This work may generate small volumes of LLW and non-radioactive waste. The wastes will be managed in a manner similar to current practice.

Replacement, upgrades, maintenance and commissioning of the majority of Turbine and Generator drive train and auxiliary equipment will be performed.

- A total of 12 low pressure turbine spindles (3 per unit), and 2 high pressure turbine spindles (Unit 6 and 8) will be replaced.
- The generator stator cores and windings will be replaced.
- The generator rotors will be refurbished and the windings will be replaced.
- The majority of the large turbine valves will undergo major maintenance with some components of the assembly being replaced.
- Moisture separator & Re-heater internals will be replaced.
- Turbine/Generator auxiliary equipment (stator cooling water, seal oil, hydrogen, lubrication oil, fire resistant fluid, glands) will undergo significant upgrades
- The turbine/generator controls system will undergo a significant upgrade.

Replacement of the Main Power Output Transformers will also occur as well as partial upgrade of the standby generators.

3.1.3 Refuelling and Restarting

Following completion of major component refurbishment activities, the reactor fuel channels will be loaded with new fuel bundles. Each reactor requires 4,560 bundles (385 tonnes of fuel for all 4 units). New fuel will be brought into the reactor building to a fuel receiving area. New fuel will likely be loaded into new fuel channels manually as per past practice for initial fuel load.

The moderator and heat transport systems will be filled with heavy water. Refilling the moderator and primary heat transport systems involves the transfer from storage of 242 m³ and 139 m³, respectively, of heavy water into the reactor systems.

Restarting reactors consists of system start up and testing, raising power and generating electricity for the electrical grid. The refurbished unit will be connected to the electrical grid and the reactor will be brought up to full power in a series of steps, meeting certain condition and performance criteria.

Refuelling and restarting is expected to generate LLW and ILW typical of maintenance outages. Returning the reactors to full power will produce used nuclear fuel and purification wastes, such

as filters and ion exchange (IX) resins, as well as other LLW. At the end of the Refurbishment Phase, all four reactors will be operational.

3.2 Continued Operations of PNGS Units 5-8

At the end of Refurbishment PNGS Units 5-8 will be returned to service and enter the Continued Operations phase. Continued Operations of the refurbished reactors will be similar to previous operations (6 operating units) and will include ongoing maintenance until end of life (an additional 30 years) of the reactors. More specifically, it is expected that three general areas of maintenance will be performed; namely, preventative maintenance, corrective maintenance, and improvement or upgrade activities. Additionally, during Continued Operations, radiological and non-radiological waste will need to be transported similar to previous operations (6 operating units).

During Continued Operations, used fuel will continue to be stored in the NSS-PWMF. Based on current planning, there are no future waste storage buildings planned beyond SB #5 for used fuel. DSCs currently stored at the NSS-PWMF will be transferred to a future deep geological repository for the safe, long-term management of used nuclear fuel.

3.3 Decommissioning of PNGS Units 1-4

Stabilization and SWS activities were previously assessed from an environmental impact perspective in the 2017 Safe Storage Predictive Effects Assessment (PEA) and 2022 PEA Addendum (Ecometrix, 2023b; Golder and Ecometrix, 2017). As such, the detailed activities for Stabilization and SWS are not presented below.

The focus below is on additional activities that were not previously considered in the 2017 Safe Storage PEA or 2022 PEA Addendum (Ecometrix, 2023b; Golder and Ecometrix, 2017).

One of the major changes in assumptions since the 2017 Safe Storage PEA and 2022 PEA Addendum is that dismantling of non-nuclear systems and outbuildings² to ground level will occur during the SWS Phase. This is done through the allowance given in REGDOC-2.11.2 to implement such risk reduction and removal activities during SWS. Previously, it was assumed that outbuildings would remain in place and demolition and dismantling would occur following completion of the SWS Phase. Additionally, in alignment with OPG's risk reduction strategy, OPG will initiate some dismantling activities in the irradiated fuel bays (IFB-A and AIFB) during the SWS Phase.

3.3.1 Decommissioning Timeline

The Pickering PERA covers the re-licensing timeframe up to 2037; however, the full PNGS Units 1-4 decommissioning timeline is identified below based on the Detailed Decommissioning Plan (DDP) Plan Overview document:

- Since 2010: Unit 2 and Unit 3 are currently in SWS.
- 2024-2028: Unit 1 and Unit 4 cease operations (defueled and dewatered) and Stabilization activities begin. Irradiated Fuel Bay (IFB-A) and Auxiliary Irradiated Fuel Bay (AIFB) remain in service.
- 2025-2034: Initiate Risk Reduction and removal strategy and transition Unit 1 and 4 to SWS.
- 2030s: Post Refurbishment separation between PNGS Units 1-4 and PNGS Units 5-8 complete.
- 2034: PNGS Units 1-4 IFB-A fuel removal complete by 2034.
- 2034 to 2058: Major Decontamination, Dismantling and Demolition of all SSCs except Reactor Buildings.

² Outbuildings refers to SSCs within the PNGS Units 1-4 protected area, but not part of the main Powerhouse structure.

- 2039: Fuel removed from AIFB.
- Post 2070: Reactor Building Structure removal and Site Restoration. This can be completed after PNGS Units 5-8 has reached the end of its commercial operations.

3.3.2 Separation of PNGS Units 1-4 and PNGS Units 5-8

Since PNGS Units 1-4 and PNGS Units 5-8 will be in different lifecycle phases, there will be a need to separate the two facilities to differentiate between the decommissioning side and the operational side. The separation of PNGS Units 1-4 and PNGS Units 5-8 is established by the AB Gate³ (**Figure 3-4**) which is defined based on the following criteria:

- Systems on the PNGS Units 1-4 side are to support SWS activities, while the systems on the PNGS Units 5-8 side are to support refurbishment and continued operations of PNGS Units 5-8.
- Terminal points to be established if required for energy sources crossing the AB gate barrier.
- At the appropriate point in decommissioning, the PNGS AB Gate may become a physical barrier to separate the operating island (PNGS Units 5-8) from the active decommissioning island (PNGS Units 1-4).

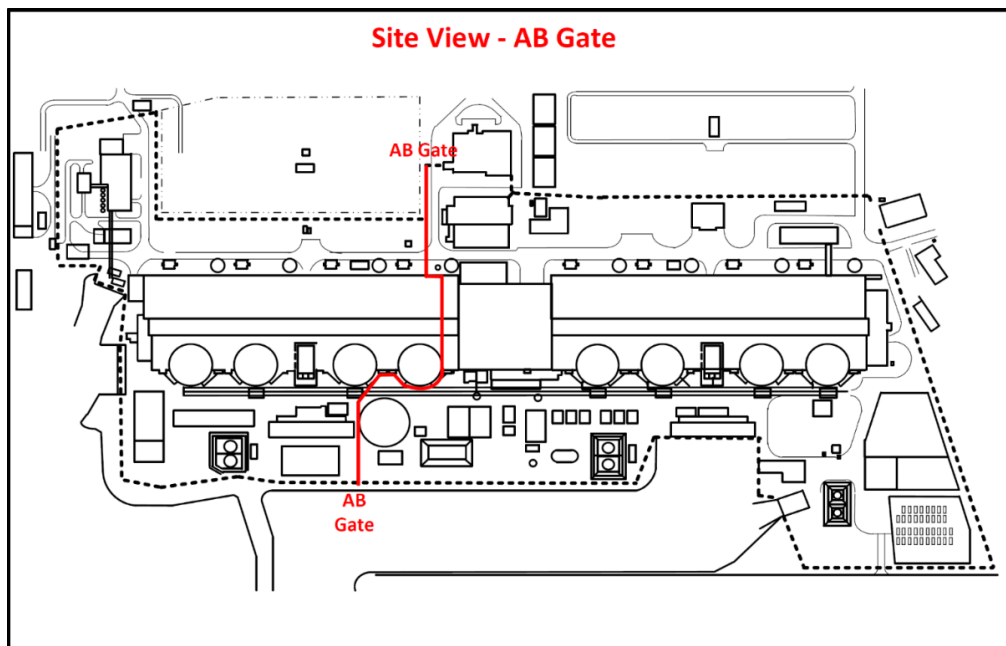


Figure 3-4: PNGS AB Gate

³ A conceptual and physical boundary established to separate the operational and decommissioning areas of a nuclear power plant site during concurrent activities.

3.3.3 Stabilization and Storage with Surveillance Activities

Stabilization is the period following end of commercial operations where activities are performed to transition the unit from permanent shutdown to SWS (commencement of decommissioning). The Stabilization activities are captured in the PNGS Stabilization Activity Plan (OPG, 2024a), and were previously assessed from an environmental impact perspective in the 2017 Safe Storage PEA and 2022 PEA Addendum (Ecometrix, 2023b; Golder and Ecometrix, 2017).

The Stabilization Activity Plan encompasses:

- Procedures for the ongoing maintenance and monitoring required to ensure the SSCs retain their integrity and do not compromise safety.
- Identification of critical SSCs that must be kept available (i.e. not end-stated) for future use in Decommissioning activities.
- Steps taken to progress from permanent shutdown of a unit to SWS.
- Stabilization for Units 1 and 4 will be complete by the end of 2028, and Units 1 and 4 will transition to SWS.

The SWS Plan details systems that are expected to remain active or partially active post Stabilization, and are necessary for the SWS period, planned continued operation of PNGS Units 5-8, or anticipated to be required for decontamination and dismantling activities at PNGS

3.3.3.1 Irradiated Fuel Bays

Following shutdown of Units 1 and 4, used fuel was transferred to the IFB-A and AIFB for a cooling period. Fuel in the AIFB is stored in modules and fuel in the IFB-A is stored in baskets. The modules and baskets are stacked in the bays using frames. Used fuel that has been stored in the AIFB or IFB-A for the required minimum cooling period will continue to be loaded into dry storage containers (DSCs) and transported to the NSS-PWMF using the existing programs and procedures for the management of used fuel; the removal of used fuel from the AIFB and IFB-A was most recently assessed in the 2022 PEA Addendum (Ecometrix, 2023b). As fuel is removed, empty baskets and associated frames will be removed from the AIFB and IFB-A and disposed of using existing waste routes. This work is being done to create space for installing equipment necessary for inspecting damaged fuel.

The sorting, segregation, and canning of damaged and defective fuel is a first-of-its-kind operation for OPG, expected to commence in 2029. OPG will notify CNSC before proceeding with these activities to ensure compliance with regulatory requirements and safety standards.

The IFB-A will be drained by 2034 and the AIFB will be drained by 2041. The draining of the bays is the final steps in preparing the AIFB and IFB-A for subsequent decommissioning and dismantling phases. Water drained from the AIFB and IFB-A will be released to Lake Ontario in a

controlled manner that keeps tritium concentrations at the Water Supply Plants within existing tritium levels and well below regulatory limits.

3.3.4 Risk Reduction and Removal Activities

In parallel with the Stabilization Phase of Unit 1 and Unit 4, the station will commence limited risk reduction and removal activities focused on PNGS Units 1-4. These activities will include dismantling non-nuclear systems and outbuildings. The risk reduction and removal activities are planned to begin in 2025. This approach is consistent with Section 8.1 of REGDOC-2.11.2 (CNSC, 2021), which allows OPG to initiate risk reduction and removal activities during the SWS phase in accordance with its licence and consultation with the CNSC. These risk reduction and removal activities from REGDOC-2.11.2 may include:

- reduction or removal of combustibles;
- removal and recycling of non-contaminated or slightly contaminated equipment;
- reduction or isolation of asbestos;
- demolition of non-nuclear buildings or facilities, provided that there are no safety impacts to the remainder of the site;
- removal of accumulated radioactive waste to an offsite licensed storage or disposal facility, location or site;
- reduction or removal of hazardous wastes.

The scope of the dismantling and demolishing activities is organized into planning envelopes (PEs)⁴ which are identified in detail in the DDP. The PEs that are considered in this PERA are execution of elements of PE-A (mostly non-nuclear buildings or facilities on site that are no longer required to support PNGS Units 1-4 operations or SWS) as well as PE-B (non-nuclear components and systems located within the TH and TAB). Risk reduction and removal activities will commence in 2025 and continue to 2037 and only occur on SSCs which have completed the Stabilization Phase and are end-stated.

The PEs are structured to facilitate sequencing of PNGS Units 1-4 decommissioning beginning with demolition of outbuildings and removal of non-nuclear systems, followed by dismantling and demolition of nuclear systems and reactor components, and finally removal of building structures and subsequent site remediation.

3.3.4.1 Activities Associated with Planning Envelope A

Activities associated with PE-A include the dismantling and removal of end-stated, abandoned, or retired structures within the PNGS Units 1-4 protected area, excluding the main powerhouse

⁴ A definable part or area of a facility that is sufficiently removed from, or otherwise independent of, other parts or areas such that the strategic approach to decommissioning that part or area can be planned in a relatively independent manner

structure. The PE-A is categorized into three groups and each includes SSCs that will no longer be required to support PNGS Units 1-4 (OPG, 2024c).

- Group A-1: Post PNGS Units 1 and 4 shutdown, Outbuildings and SSCs not required after shutdown (**Figure 3-5**).
 - Scaffolding Shed Buildings,
 - Oil Tank Farm A,
 - Off Gas System Building,
 - Old Water Treatment Plant,
 - Helium Trailers,
 - Hydrogen Skids,
 - Sulzer-A.
- Group A-2: Post separation of PNGS Units 1-4 and PNGS Units 5-8, Outbuildings and SSCs not required after common systems are separated along the AB Gate (**Figure 3-6**).
 - Gas Bottle Storage Enclosure 'A',
 - SDSE Instrument Rooms 1-2, SDSE Instrument Rooms 3-4,
 - PNGS Units 1-4 Standby Generator,
 - Standby Generator oil tanks PNGS Units 1-4,
 - Standby Generator Pumphouse PNGS Units 1-4
- Group A-3: Post IFB Empty, Outbuildings and SSCs not required after IFB-A and AIFB are emptied, drained, and dried (IFB-A will be drained by 2034 and the AIFB will be drained by 2041) (**Figure 3-7**). Group A-3 is planned to start in 2034 as part of Dismantling and Demolition. Activities are in the preliminary planning stage and will be developed further through future DDPs, including a safety assessment to be completed by the end of 2025.
 - Heavy Water Upgrading Plant,
 - Heavy Water UPPA Upgrading Towers,
 - UPP Expansion Feed Storage Area,
 - UPP Expansion Area, UPP Area,
 - PNGS-A Screenhouse,
 - Demineralized Water Tanks.

As part of PE-A, select SSCs will undergo complete removal of the internal components and the structures, including gas trailers, a standby generator, oil tanks and gas cylinders. Meanwhile, other selected SSCs will undergo partial removal of internal components leaving only the structures such as the off-gas system buildings, and the old water treatment plant. There are other non-operational components such as sheds and instrument rooms that will be removed completely which includes the internal components as well and the outbuilding structures.

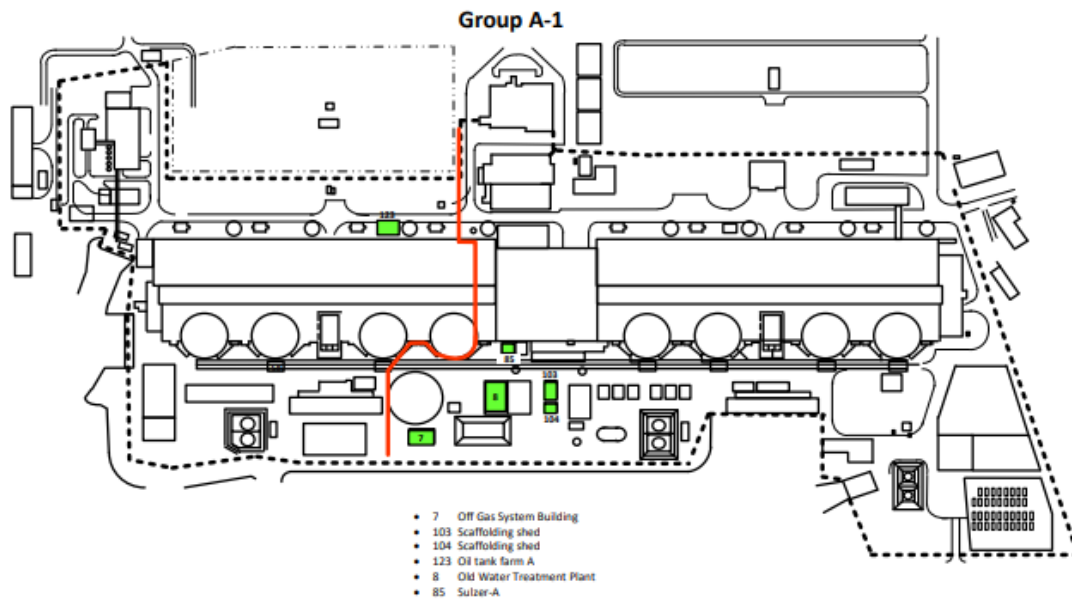


Figure 3-5: Planning Envelope A-1 – Outbuildings in Green

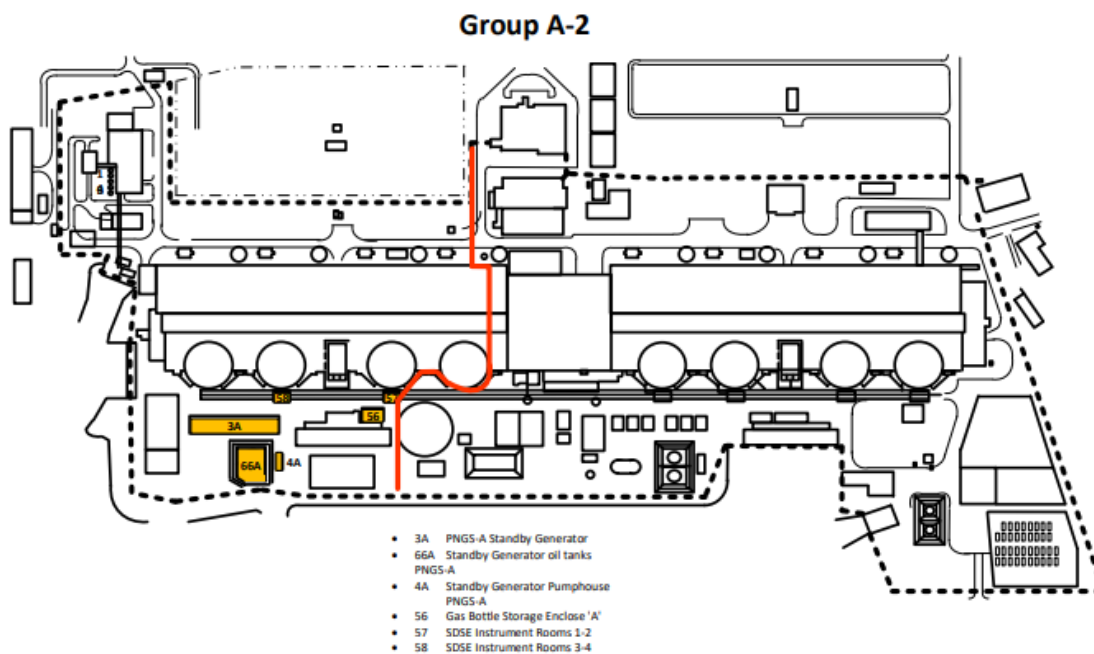


Figure 3-6: Planning Envelope A-2 – Outbuildings in Orange

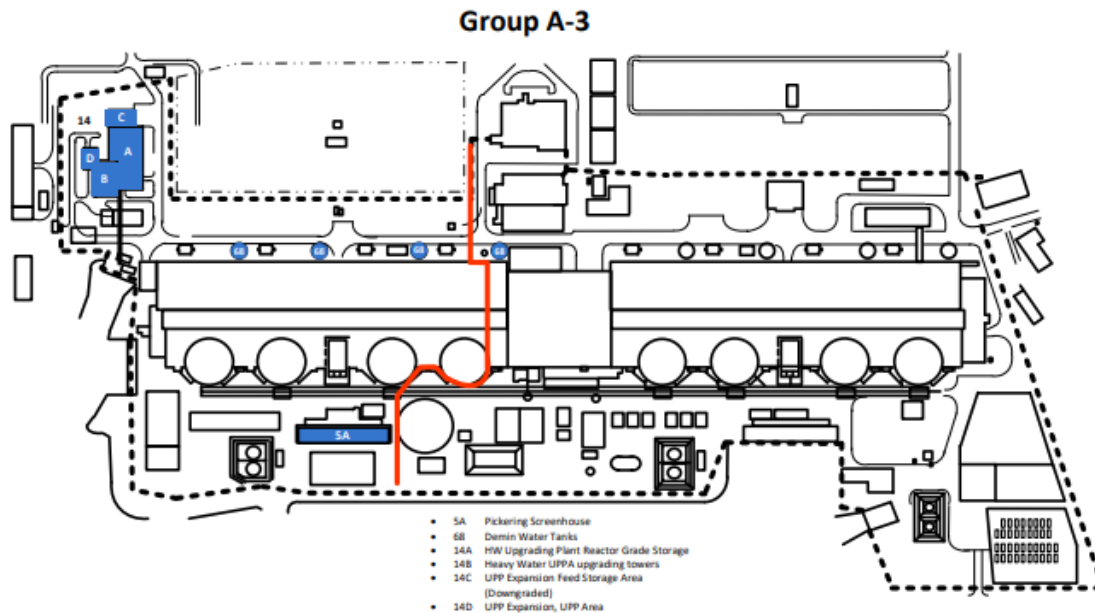


Figure 3-7: Planning Envelope A-3 – Outbuildings in Blue

3.3.4.2 Activities Associated with Planning Envelope B

The decommissioning process of PE-B includes the dismantling and removal of SSCs considered to be non-nuclear that are located within the TH and TAB. Components included in PE-B have been end-stated, abandoned or retired, and do not support PNGS Units 1-4 SWS, PNGS Units 5-8 refurbishment, or continued operations of PNGS Units 5-8. The PE-B is categorized into two groups based on location and the type of systems to be decommissioned and is described in detail in the DDP Program Volume 2:

- Group B-1: SSCs such as the turbine and generators located within the TH of PNGS Units 1-4 (**Figure 3-8**)
- Group B-2: SSCs such as the electrical supply and controls, located within the TAB of PNGS Units 1-4 (**Figure 3-9**)

The components included in this envelope are not anticipated to be radiologically contaminated. The decommissioning process in PE-B also includes removal of all equipment from the work area, such as tanks, valves, pumps, motors, heat exchangers, instrumentations and pipework. Selected SSCs in PE-B will undergo risk reduction and removal activities following these steps for both Groups B-1 and B-2:

- Clear work area to access the target equipment (e.g. pumps, heat exchangers, pipework).
- Dismantle/segment larger tanks/containers/gas cylinders/pipes.

- Electrical connections disconnected from the remaining instrumentation and removed to terminal points.
- Capping and sealing the remaining pipework (for those that are partially removed). Underground metal and concrete piping will be excavated for survey and removed, if necessary. Non-contaminated materials beyond one meter will be left in place. Any contaminated materials exceeding clearance levels will be removed and disposed of appropriately.
- Material/equipment will be characterized, surveyed, classified, and transported to an approved offsite disposal facility.
- Clear up work area and make safe.

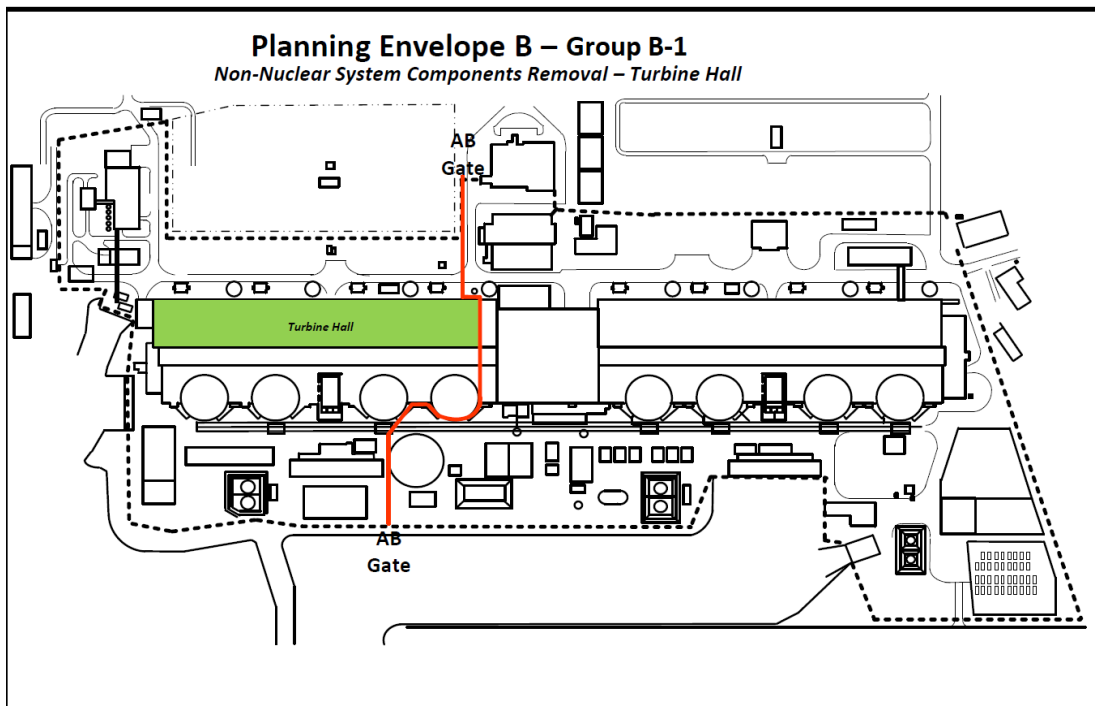


Figure 3-8: Planning Envelope B-1 – Turbine Hall

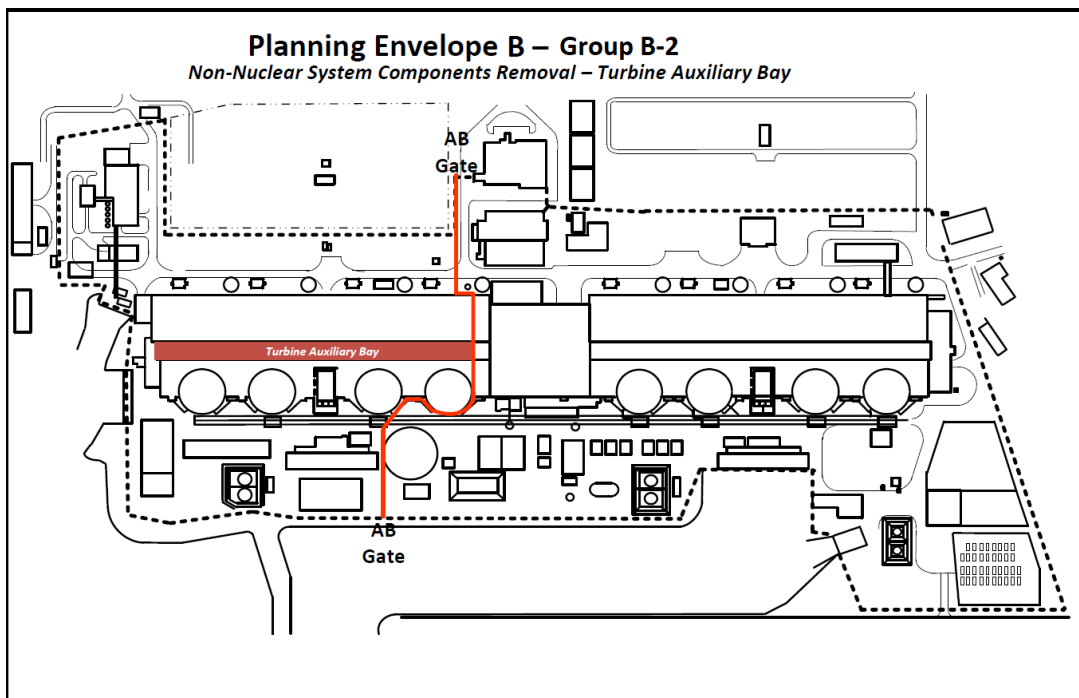


Figure 3-9: Planning Envelope B-2 – Turbine Auxiliary Bay

3.3.4.3 Waste Management

As the outbuildings in PE Group A-1 and Group A-2 are mostly considered non-nuclear, it is assumed that all waste generated will be non-radioactive. The exception is for the Sulzer-A building which will generate LLW.

For PE Group B-1 and Group B-2, all waste generated are expected to be non-radioactive except for the head tanks in Group B-2 which may be potentially contaminated. Characterization and surveying of SSCs in Group B-1 and Group B-2 will be completed to verify waste classifications. All waste will be managed in accordance with accepted procedures and licence requirements.

4.0 Summary of Existing Conditions

A concise summary of existing and previous conditions is provided in this section based on the data presented in the 2022 Pickering ERA (Ecometrix, 2023a) which focused on the five-year period from 2016 to 2020. Updated information on existing conditions is also provided based on any new data collected since the 2022 Pickering ERA through ongoing annual environmental monitoring programs, as well as the supplementary environmental field studies conducted in 2024 and 2025 that were completed to support this PERA. A summary of the 2024 and 2025 environmental field studies is presented in **Table 4-1**, with a detailed description of each program provided in the sections below.

Table 4-1: Summary of 2024-2025 Environmental Field Studies conducted in support of the PERA

Sampling/Monitoring program	Data collected	Locations sampled	Parameters Analyzed	Sampling Frequency
Air quality and noise monitoring program	Continuous air measurements Noise levels including A-weighted energy-equivalent sound levels (Leq), statistical sound-level measurements (e.g., Ln values including L10 and L90), and octave band sound levels	Air: PN site (1 location; Figure 4-1) Noise: PN site (4 locations; Figure 4-1)	Air samples: Suspended particulate matter (SPM), particulate matter less than 10 microns (PM ₁₀), particulate matter less than 2.5 microns (PM _{2.5}), nitrogen dioxide (NO ₂), sulphur dioxide (SO ₂), volatile organic compounds (VOC) as represented by acrolein) and polycyclic aromatic hydrocarbons (PAH; as represented by benzo[a]pyrene).	One continuous sampling event each for Air Quality and Noise: Air quality: Winter (January 2025) to Spring (May 2025) Noise: Winter (2-week event in October 2024)
Surface water sampling program	Surface water samples In-situ water quality measurements (Conductivity, dissolved oxygen, pH, temperature, turbidity)	Lake Ontario (4 locations in nearshore and 4 locations in proposed DWI area; Figure 4-3) Frenchman’s Bay (6 locations; Figure 4-4)	General chemistry parameters, metals, petroleum hydrocarbons (PHC) fractions F1 to F4, hydrazine, morpholine, radionuclides microbiological parameters, volatile organics, and petroleum hydrocarbons	Three sampling events: Spring (May 2024), Summer (July 2024), Fall (October 2024)
Sediment sampling program	Sediment samples	Proposed west infill area and shoreline erosion mitigation area (7 locations; Figure 4-6) Frenchman’s Bay (16 locations; Figure 4-5)	General chemistry and physical parameters, metals, methylmercury, radionuclides, polychlorinated Biphenyls (PCBs), pesticides, herbicides, polycyclic aromatic hydrocarbons and petroleum hydrocarbons	One sampling event each: Frenchman’s Bay: Summer (August 2024) Proposed west infill area and shoreline erosion mitigation area: Fall (November 2024)
Soil sampling program	Soil samples	PN site (8 locations; Figure 4-20)	General chemistry and physical parameters, metals, petroleum hydrocarbons, volatile organics, and radionuclides	One sampling event: Fall (September 2024)
Benthic Macroinvertebrate Community sampling program	Benthic macroinvertebrates samples In-situ water quality measurements (Conductivity, dissolved oxygen, pH, temperature, turbidity)	Proposed DWI area (Samples collected from lake bottom at 17-19 m depths; one location within each of the following sampling grids S4, S7, S8, and S9; Figure 4-7) Proposed west infill area and shoreline erosion mitigation area (0-3 m depth; Figure 4-6)	Total macroinvertebrate density, Invertebrate taxonomic richness (lowest practical level; LPL), Simpson’s Evenness, Simpson’s Diversity, Density of major taxonomic groups, Relative density of major taxonomic groups.	One sampling event each: Proposed DWI area: Fall (November 2024) Proposed west infill Area and shoreline erosion mitigation area: Fall (October 2024)
Macrozooplankton community sampling program	Macrozooplankton samples In-situ water quality parameters (e.g., Conductivity, dissolved oxygen, pH, temperature, turbidity) at the bottom, mid-depth, and 0.5 m below the surface	Proposed DWI area (12-14, 14-16 and 16-18 m depths; 6 locations with two locations at each depth; Figure 4-7)	Identification and enumeration of all microzooplankton, Biovolume calculations for dominant microzooplankton species.	Three sampling events: Spring (May 2024), Summer (July 2024), and Fall (October 2024)

Sampling/Monitoring program	Data collected	Locations sampled	Parameters Analyzed	Sampling Frequency
	Temperature profiles before and after each net set (Water temperature in °C at 1 m intervals)			
Deepwater Fish Community sampling program	Species and number of fish caught In-situ water quality measurements (Conductivity, dissolved oxygen, pH, temperature, turbidity) Temperature profile before and after each net set (Water temperature in °C at 1 m intervals) Fish tissue from up to eight individuals from up to three species in each of the spring and fall season	Proposed DWI area (12-14, 14-16 and 16-18 m depths; fixed-sequential-random design of three grids each; Figure 4-7)	Species composition and species richness, Catch per unit effort (CPUE; # fish/24h) by species and combined, Biomass per unit effort (BPUE; grams/24h) by species and combined, Morphometric summary (lengths and weights) of fish captured. Fish tissue was analyzed for metals and radionuclides.	Three sampling events: Spring (May 2024), Summer (July 2024), and Fall (October 2024)
Nearshore Fish community sampling program	Species and number of fish caught In-situ water quality measurements (Conductivity, dissolved oxygen, pH, temperature, turbidity) Fish tissue from up to eight individuals from up to three species in each of the spring and fall season	Proposed west infill area and shoreline erosion mitigation area (0-3 m depths depending on lake depth; 3 locations; Figure 4-10)	Species composition and species richness, Catch per unit effort (CPUE; # fish/24h) by species and combined, Morphometric summary (lengths and weights) of fish captured Fish tissue was analyzed for metals and radionuclides.	Three sampling events: Spring (May 2024), Summer (July 2024), and Fall (October 2024)
Aquatic Habitat Assessment program	Proposed DWI area: Sidescan sonar Proposed west infill area and shoreline erosion mitigation area: Underwater Transect video collection	Proposed DWI area (14 transects; Figure 4-7) Proposed west infill area and shoreline erosion mitigation area (5 transects; Figure 4-18)	Substrate information including substrate type and coverage, macrophyte presence, algae coverage, dreissenid mussel coverage, and fish observations	One sampling event: Proposed DWI area: Summer (July 2024) Proposed west infill area and shoreline erosion mitigation area: Spring (May 2024)

4.1 Atmospheric Environment

4.1.1 Air Quality

The atmospheric environment at the PN site is typical of a southern Ontario airshed within the Windsor-Québec corridor, with local air quality being dominated by traffic and industrial emissions released throughout the Greater Toronto Area (GTA) and the long-range transport of airborne pollutants from neighbouring Canadian provinces and the United States. Substances that dominate air quality impacts include carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO₂), total suspended particulates (TSP), inhalable particulates (PM₁₀) and respirable particulates (PM_{2.5}). Environment and Climate Change Canada (ECCC) and the Ministry of the Environment, Conservation and Parks (MECP) measure air quality at several locations between Toronto and Oshawa, though there are no ambient air quality stations located in close proximity to PNGS. The nearest ECCC/MECP Air Quality Monitoring (AQM) stations are the Oshawa (ID# 061703) and Toronto East (ID# 060410) stations. The PNGS emits relatively low quantities of chemical and radiological constituents to the atmosphere during the course of normal operations, overall, the PN site does not significantly contribute to air quality emissions at a regional level (OPG, 2003).

4.1.1.1 Radiological Air Emissions

The PN site emits relatively low quantities of radiological contaminants to the atmosphere during normal operations; routinely monitored parameters include tritium oxide (HTO), iodine-131 (I-131), carbon-14 (C-14), and radioactive noble gases and particulates.

OPG maintains an Environmental Monitoring Program (EMP) in the vicinity of PN in accordance with operating licence requirements. The program scope encompasses protection of both the public and the environment from nuclear materials, hazardous substances, and physical stressors resulting from PN site operations, including on-site waste management activities.

As described in the recent 2023 EMP report (OPG, 2024d), atmospheric HTO emissions within the last 10-years peaked during 2016 and 2017; since then, HTO emissions decreased over time until 2020, following improved management of airborne HTO. In 2020, HTO emissions increased due to a heat transport system leak in Unit 1 and a moderator purification valve leak on Unit 6. These leaks have since been repaired and HTO emissions have continued to decline from 2021, to 2023. In October 2020, a microscrubber was installed on Unit 4 and it was placed into service in 2021. The microscrubber removes a significant portion of the tritium from airborne emissions and converts it into waterborne tritium effluent, which is directed to the Active Liquid Waste Tanks (ALW) for controlled release to the CCW within acceptable limits. Overall, emissions of HTO have gradually decreased between 2020 and 2023 following the noted increase in 2020.

Atmospheric C-14 emissions have gradually increased between 2020 and 2023, but remain lower than the emissions recorded in 2018 which represent the 10-year high. C-14 emissions were elevated in 2018 due to work associated with the moderator purification system on Units 1 and 6. In 2023, elevated C-14 emissions were attributed to the removal of the Unit 6 moderator

purification system in preparation of a planned Unit 6 outage in Q1 and moderator gas purging on Unit 4 in Q2 (OPG, 2024d).

As described in the recent 2023 EMP report, radioactive noble gas stack emissions are often measured below instrument detection limits; thus, measurements taken from environmental noble gas monitors located outside of PNGS are used to trend PN noble gas emissions. Argon-41 is the predominant radionuclide measured in noble gas around PN and is associated with operation of PNGS Units 1 and 4. A Mann-Kendall trend analysis indicates Ar-41 emissions have increased over the last 10 years. In 2020, a notable decrease in Ar-41 emissions was attributed to a decrease in the operating time of Units 1 and 4. In 2021, Ar-41 emissions increased again but have gradually decreased in 2022 and 2023 (OPG, 2024d). Xenon-133 is occasionally measured above the detection limit at PN, though this radionuclide composes a relatively small percentage of noble gas emissions compared with Ar-41. Xe-135 and Iridium-192 were not detected in noble gas emissions at the PN site between 2021 and 2023 (OPG, 2024d). Additionally, radioactive particulates and radioiodine emissions are noted to have a minimal contribution to public dose (OPG, 2024d).

Overall, radiological air emissions from the PN site (**Table 4-2**) remain at a very small fraction of the site Derived Release Limits (DRLs) (OPG, 2024e). The DRLs represent radionuclide release rates that correspond to an exposure at the legal public dose limit of 1 millisievert per year (mSv/a) for the most affected critical group.

Table 4-2: Radiological Air Emissions from PN (2021-2023)

Parameter	Units	Average ¹ (2016-2020)	Year ²			Average (2021-2023)	Average (2021-2023) as % of DRL ³
			2021	2022	2023		
Tritium Oxide	Bq/a	6.40E+14	5.20E+14	4.90E+14	4.80E+14	4.97E+14	0.49%
Noble Gas	γBq-MeV/a	1.14E+14	1.40E+14	1.00E+14	1.20E+14	1.20E+14	0.45%
Iodine-131	Bq/a	1.27E+07	9.70E+06	1.10E+07	1.00E+07	1.02E+07	0.0004%
Particulate	Bq/a	5.11E+07	1.10E+07	1.10E+07	1.20E+07	1.13E+07	0.003%
Carbon-14	Bq/a	2.72E+12	2.60E+12	2.40E+12	3.20E+12	2.73E+12	0.010%

Notes:

¹ Average from the 2022 PN ERA (Ecometrix, 2023a) is the average of emissions from 2016 to 2020.

² Data for 2021, 2022 and 2023 obtained from the 2021, 2022 and 2023 PN EMP reports, respectively (OPG, 2023a, 2023b, 2024d)

³ The DRL used for comparison to 2021-2023 average emissions is obtained from the 2016 PN DRL report (OPG, 2024e).

4.1.1.2 Non-Radiological (Chemical) Air Emissions

The PN site emits low levels of chemical contaminants to the atmosphere during normal operations. The main sources of atmospheric emissions result from boiler chemical emissions and fossil fuel combustion associated with the testing of on-site standby generators. Chemicals associated with the treatment of boilers include hydrazine, morpholine and other degradation products (e.g., ammonia), which are used within the feedwater system to prevent corrosion of the boilers. These chemicals are released to the atmosphere through controlled boiler venting. Combustion emissions occur during testing of the standby generators and other minor sources, such as the on-site use of vehicles or motorized equipment. These sources can release CO, NO_x, and trace amounts of volatile organic compounds (VOCs), metals, and polycyclic aromatic hydrocarbons (PAHs). Emissions of SO₂ and TSP are relatively minor compared with other atmospheric emissions due to the use of low-sulphur diesel during testing of the standby generators.

4.1.1.2.1 Emission Summary and Dispersion Modelling Reports

The Emission Summary and Dispersion Modelling (ESDM) process uses dispersion modelling to predict the maximum air concentration at the property line (Point of Impingement; POI) for each chemical constituent. ESDM reports from 2015 (Golder, 2015) and 2017-2020 (Ortech, 2019a, 2019b, 2020, 2021) were consulted to aid in the selection of airborne chemical COPCs in the 2022 PN ERA (Ecometrix, 2023a) and the 2022 PEA and PEA Addendum for PN Safe Storage (Ecometrix, 2023b; Golder and Ecometrix, 2017). This PERA considers the most recent ESDM reports prepared for 2020, 2021, 2022 and 2023 (Ortech, 2021) to characterize previous conditions (with 6 operating units) relating to chemical emissions from PNGS.

Three operating scenarios are evaluated annually in the 2020-2023 ESDM reports. Scenario 1 represents a worst-case emission scenario, reflecting operations related to the production of electricity, and considers transitional operations associated with equipment start-up and shutdown. Scenario 2 considers potential additive effects of nitrogen oxide emissions related to testing of emergency standby equipment. Scenario 3 considers operation of the auxiliary steam boilers as the primary heating source for the PN site during the planned shutdown of nuclear power generation.

Contaminant emissions are assessed within the ESDM reports by comparing POI concentrations estimated from PNGS emission rates to POI exposure benchmarks listed in the MECP publication, *Air Contaminants Benchmarks (ACB) List: Standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants* (the 'ACB list'). The ACB list encompasses the air standards set out in O. Reg. 419/05, as well as a broader list of additional benchmarks intended to aid facilities in preparing ESDM reports. As of 2018, the modelling of all ESDM-reported contaminants transitioned to AERMOD, with POI concentrations provided for 1-hour, 24-hour, or annual averaging periods depending on the MECP POI limits.

Between 2020 and 2023, the ESDM reports indicated that the PN site was operating in compliance with s. 19 of O. Reg. 419/05. All contaminants with MECP POI standards that are

emitted from the PN site were found to have POI concentrations less than their respective MECP POI limits. Since 2020, modelled emissions of NO_x were routinely found to result in the highest maximum POI concentrations relative to the MECP standard, though no exceedances of the standard were modelled. As part of the ESDM reporting, hydrazine is the subject of a site-specific Maximum Ground Level Concentration (MAXGLC) approval. Between 2020 and 2023, hydrazine was found to have POI concentrations below the approved MAXGLC value.

4.1.1.2.2 Updated 2025 Air Quality Monitoring

As part of the supplementary environmental field studies completed to support this PERA, an air quality monitoring program was initiated in January 2025 to characterize existing atmospheric site conditions at the PN site. Overall, the program was designed and implemented following regulatory and guidance documents from federal and provincial agencies including the Canadian Council of Ministers of the Environment (CCME), ECCC, Health Canada (HC), and the Ontario Ministry of the Environment, Climate and Parks (MECP). Additionally, as is common practice for Canadian ambient air monitoring programs, the selection of monitoring instrumentation relied upon guidance provided by the U.S. Environmental Protection Agency (EPA).

Past air monitoring studies and the data requirements of this PERA provided the basis for the selection of airborne COPCs for the monitoring program. Several COPCs were identified as relevant to the program, including total suspended particulates (TSP), particulate matter less than 10 microns (PM₁₀), particulate matter less than 2.5 microns (PM_{2.5}), carbon monoxide (CO), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), volatile organic compounds (VOC; as represented by acrolein) and polycyclic aromatic hydrocarbons (PAH; as represented by benzo[a]pyrene). Measurements of these airborne COPCs were compared against applicable ambient air quality criteria, namely the Canadian Ambient Air Quality Standards (CAAQS) provided by the CCME (ECCC, 2023a) and the Ambient Air Quality Criteria (AAQC) provided by the Ontario MECP (MECP, 2023). Of note, acrolein and benzo(a)pyrene were selected as surrogate parameters for VOCs and PAHs, respectively, as these chemicals each have the lowest (i.e., most conservative) AAQC values within their respective chemical groups.

One monitoring station, named AQ1, was established for the air quality program as shown in **Figure 4-1** below. This location was selected by considering various parameters including location within the PN site, exposure to PN-associated air emissions, local obstructions, meteorological conditions, and site accessibility, maintenance and security considerations. The optimal placement of the monitoring station was determined by considering the inlet height, horizontal and vertical distances from the inlet to support structures and the distance from the inlet to nearby airflow obstructions.

Air sampling commenced in Q1 2025 and will continue for approximately five (5) months until the end of May 2025. In general, the operation of monitoring instrumentation followed a

schedule consistent with the National Air Pollution Surveillance (NAPS) program⁵. Over the course of the program, continuous monitors collected data on an hourly basis for PM₁₀ and PM_{2.5}, nitrogen oxides (NO_x), and SO₂. The intermittent sampling was conducted to coincide with the intermittent samples collected under the NAPS schedule of 1-in-6 days for TSP and the Ontario MECP schedule of 1-in-12 days for PAHs and VOCs.

Many air quality parameters require sufficiently large datasets to thoroughly characterize existing conditions for the purpose of air quality modelling and comparison against ambient air quality criteria, particularly those with annual averaging periods. As of March 2025, not enough site-specific air quality data has been collected to sufficiently characterize existing atmospheric conditions at the PN site. For the air quality parameters of interest, existing conditions were characterized by using regional atmospheric concentrations from the Darlington Nuclear (DN) West Station (for SO₂ and BaP) or the MECP's Oshawa air monitoring station (for PM_{2.5} and NO₂). Background concentrations of TSP and PM₁₀ were estimated using the MECP Oshawa station's monitoring data for PM_{2.5}. As CO is not measured at the DN and Oshawa MECP monitoring stations, available CO concentrations measured at the PN site were used to characterize existing conditions. Existing air quality concentrations used for the air quality modelling are presented in **Table 4-3**. It should be noted that air quality concentrations obtained from the DN and Oshawa MECP monitoring stations likely represent an overestimate of existing air quality conditions at PN as these monitoring locations are influenced by local industrial emission sources (e.g., St Marys Cement and the Durham York Energy Centre) that are considerably closer to the DN site compared to the PN site.

Summary statistics of the air quality data available to date from the PN monitoring station (AQ1) are provided in **Table 4-4** below for informational purposes only, as data collection remains ongoing. Air quality monitoring continues to be conducted at the PN site and the summary statistics presented here are subject to change as new data is collected. An analysis of the air quality modelling supporting this PERA is provided in **Section 5.1.1**; the air quality concentrations used to characterize existing conditions in the modelling are shown in the results tables (see **Table 5-4** to **Table 5-11**).

⁵ The National Air Pollution Surveillance (NAPS) Program, established in 1969 and coordinated by Environment and Climate Change Canada (ECCC), aims to provide robust and long-term ambient air quality data of a uniform standard across the populated regions of Canada.

Table 4-3: Summary of Existing Conditions Air Concentrations Used In AQ Modelling

COPC	Averaging Period	Measured Concentration ($\mu\text{g}/\text{m}^3$)	Source
TSP	24-hr (90 th percentile)	44.2	Estimated from MECP Oshawa PM _{2.5} data
	Annual (average)	25.5	Estimated from MECP Oshawa PM _{2.5} data
PM ₁₀	24-hr (90 th percentile)	22.1	Estimated from MECP Oshawa PM _{2.5} data
PM _{2.5}	24-hr (90 th percentile)	11.1	MECP Oshawa AQ Monitoring Station
	24-hr (98 th percentile)	18.6	MECP Oshawa AQ Monitoring Station
	Annual (average)	6.7	MECP Oshawa AQ Monitoring Station
NO ₂	1-hr (90 th percentile)	14.5	MECP Oshawa AQ Monitoring Station
	1-hr (98 th percentile)	25.6	MECP Oshawa AQ Monitoring Station
	24-hr (90 th percentile)	12.6	MECP Oshawa AQ Monitoring Station
	Annual (average)	6.7	MECP Oshawa AQ Monitoring Station
SO ₂	1-hr (90 th percentile)	3.6	Darlington New Nuclear Baseline Program
	1-hr (99 th percentile)	51.5	Darlington New Nuclear Baseline Program
	Annual (average)	4.2	Darlington New Nuclear Baseline Program
CO	1-hr (90 th percentile)	753.4	PN On-site AQ Data (Jan-Feb 2025)
	8-hr (90 th percentile)	738.0	PN On-site AQ Data (Jan-Feb 2025)
BaP	24-hr (90 th percentile)	6.85E-05	Darlington New Nuclear Baseline Program (2021-2022)
	Annual (average)	3.58E-05	Darlington New Nuclear Baseline Program (2021-2022)

Table 4-4: Summary of PN Air Quality Monitoring Data (Jan. 6 to Feb. 18, 2025)

COPC	Averaging Period	Min Conc. ($\mu\text{g}/\text{m}^3$)	Max Conc. ($\mu\text{g}/\text{m}^3$)	Average ($\mu\text{g}/\text{m}^3$)	Standard Deviation ($\mu\text{g}/\text{m}^3$)	90th Percentile ($\mu\text{g}/\text{m}^3$)	98/99 th Percentile
PM ₁₀	24-hr	20.8	42.3	29.3	5.7	36.9	NA
PM _{2.5}	24-hr	15.2	31.9	20.6	3.9	27.2	29.4 (98th)
NO ₂	1-hr	0.02	62.2	12.5	11.8	29.2	51.9 (98th)
	24-hr	2.9	32.6	13.1	7.0	22.6	NA
SO ₂	1-hr	0.01	151.1	4.8	5.547	8.9	9.7 (99th)
CO	1-hr	319.4	1150.6	617.4	104.6	753.4	NA
	8-hr	351.2	873.9	617.7	95.9	738.0	NA

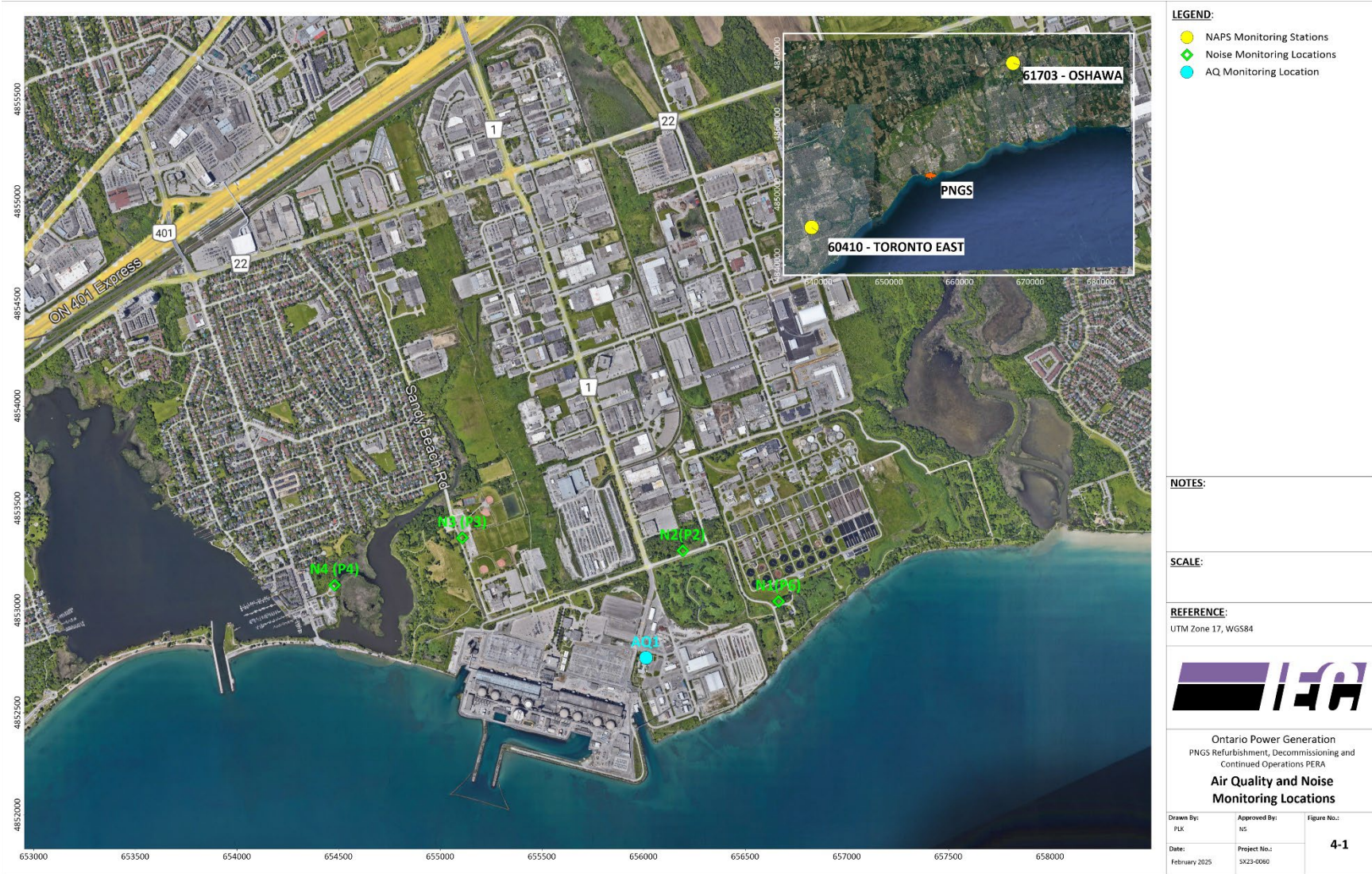


Figure 4-1: Monitoring Locations for the 2025 Air Quality and 2024 Noise Monitoring Program

4.1.2 Noise

Noise emissions from the PNGS originate from a wide variety of on-site sources. During the 2016-2020 period, the PN site operated under amended ECA No. 4766-A3YMB9, issued on December 2, 2015. This was replaced in 2019 by amended ECA No. 2372-BESHSC, issued October 17, 2019. The ECA application includes an assessment of on-site noise sources (OPG, 2023c). Past acoustic assessments have identified numerous on-site sources of noise emissions, including the following:

- Standby gas generators (SGs) for both PNGS Units 1-4 and U5-8;
- Emergency power generators (EPGs);
- Auxiliary Diesel Generators;
- Building exhaust and ventilation systems;
- Chillers and air conditioning units;
- Combustion turbine units (CTUs); and
- Emergency pumps.

The most significant sources of noise at the PN site are the SGs, EPGs, CTUs and other emergency equipment, such as pumps operated only during emergency situations (OPG, 2023c). Prior acoustic assessments, including those conducted annually since 2018 at receptor locations within the vicinity of the PN site, concluded that overall noise levels were compliant with applicable MECP Noise & Vibration Guideline (NPC-300 & NPC-207) sound level limits (OPG, 2011, 2019b, 2020a, 2021a, 2022a, 2023c, 2024f).

Although there are times when recorded maximum sound levels periodically exceed the MECP Class 1 (i.e., urban) and Class 2 (i.e., suburban) sound level limits (MECP, 2013), on-site monitoring has indicated that these exceedances are unlikely to be the result of PNGS activities and are more likely the result of localized events consistent with the surrounding populated urban environment (e.g., road traffic). Overall, the PNGS is compliant with noise limits and does not significantly contribute to noise levels experienced by local human and ecological receptors, which tend to be dominated by other sources consistent with an urbanized environment.

4.1.2.1 Updated September 2024 Noise Monitoring

As part of the supplementary environmental field studies completed to support this PERA, a noise monitoring program was conducted in September 2024 to characterize existing atmospheric site conditions at the PN site. As part of this program, various noise measurements, including A-weighted energy-equivalent sound levels⁶ (LAeq) and statistical sound-level

⁶ LAeq represents the equivalent continuous sound level, measured in A-weighted decibels (dBA)

measurements (e.g., Ln values⁷ including L10 and L90) were recorded at four monitoring locations around the PN site, shown in **Figure 4-1**.

Health Canada provides recommendations for criteria that may be adopted to evaluate the predicted effect of a project in terms of its potential to lead to noise-associated health effects in its 2017 publication *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise* (HC, 2017). These include recommended limits for impulse noise (e.g., blasting) that are protective against hearing loss, night-time sound level limits for indoor locations where people sleep, indoor and outdoor limits for the preservation of speech comprehension, and limits to evaluate the probable community annoyance. Regarding the latter, Health Canada relies on the results of socio-acoustic research that illustrates that the percentage of a community reported to be “highly annoyed” increases as noise levels in the community increase. These studies have resulted in a dose-response curve that relates sound levels to “percentage highly annoyed” (%HA).

The MECP Publication *NPC-300 Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning* (MECP, 2013) outlines sound level limits for outdoor and plane of window (POW) points of reception. These are the default limits that are applied in the absence of any other information regarding the actual background sound environment (i.e., without any contribution from the Project). If it can be demonstrated that the minimum 1-hr background noise level in each of the set periods (i.e., day, evening, night) are higher than the exclusionary limits, then the site-specific background levels may be applied as the sound level limits for future assessment purposes. Consistent with the guidance document, a “Class 1 area” refers to an acoustic environment typical of a major urban population centre where background sound levels are dominated by human activities, such as road traffic. Comparably, a “Class 2 area” refers to an acoustic environment that has qualities of a Class 1 area during daytime hours (7:00 a.m. to 7:00 p.m.) and qualities of a Class 3 area during nighttime hours (7:00 p.m. to 7:00 a.m.). A “Class 3 area” refers to an area dominated by natural sounds typical of a wilderness or agricultural area, or a small community with minimal road traffic (MECP, 2013).

Larson Davis Class 1 integrating sound level meters (SLM) were used for the collection of sound level data. Instrumentation and procedural guidelines for the measurement of sound as part of the recent noise monitoring program were consistent with the Ontario MECP’s NPC-102 (Instrumentation) and NPC-103 (Procedures) publications (MOE, 1978).

Noise monitoring stations were strategically placed in close proximity to sensitive receptors to ensure that exposures to existing noise levels may be sufficiently characterized. The SLMs were positioned such that they remained a minimum of 3 m away from any adjacent buildings or

⁷ Ln values are statistical noise measurements used to assess noise levels from fluctuating noise sources over time. L10 is the noise level exceeded for 10% of the measurement period; for 10% of the time, the sound pressure level is above this value. Similarly, L90 is the noise level exceeded for 90% of the measurement period; for 90% of the time, the sound pressure level is above this value. For this reason, the L90 is used to represent background or ambient noise levels of an environment.

structures and a minimum of 1.5 m above the ground surface. Consistent with the MECP NPC-103 guidance document, any noise data deemed to be negatively influenced by weather and poor meteorological conditions (e.g., high winds) were discarded from the dataset to ensure an accurate representation of existing noise conditions without interference from weather-related events. Noise monitoring was completed over a 2-week period in September 2024 using an averaging period of 1-hour for the collection of sound level measurements. A summary of the noise monitoring data and a comparison against the Class 1 and Class 2 sound level limits is provided in **Table 4-5**.

Consistent with previously completed noise monitoring programs, existing conditions at the PN site continue to be dominated by sound sources typical of a developed, urban environment. Although there are periodic exceedances of the MECP Class 1 (i.e., urban) and Class 2 (i.e., suburban) sound level limits (MECP, 2013), it is understood that these exceedances are not the result of PN site activities. In populated urban areas, it is common for sound level limits to be occasionally exceeded due to localized events, such as traffic (e.g., car alarm) or other human activity near the area of monitoring. Periodic exposure to sound levels in excess of the MECP sound level limits are not associated with human health effects and are considered a common occurrence in urban and semi-urban areas.

Table 4-5: PN Existing Conditions Noise Data Summary (September 2024)

Location ID	LAeq		LA90		Full Day		Min 1-hr LAeq		Data Count (Hours)		
	Day	Night	Day	Night	LAeq	LA90	Day	Night	Day	Night	Total
Class 1	50	50	50	50	50	50	50	50	-	-	-
Class 2	50	45	50	45	50	45	50	45	-	-	-
P2	60.1	57.2	47.7	<u>46.9</u>	59.5	<u>47.5</u>	49.4	<u>45.3</u>	97	40	137
P3	61.0	53.5	48.4	<u>46.9</u>	59.8	<u>48.0</u>	47.3	44.5	119	49	168
P4	49.1	50.9	47.3	<u>50.0</u>	49.7	<u>48.4</u>	44.0	<u>47.7</u>	121	54	175
P6	50.8	50.8	48.7	<u>49.5</u>	50.8	<u>49.0</u>	47.1	<u>47.9</u>	121	50	171

Notes:

Values are presented as A-weighted decibels (dBA).

"Class 1" and "Class 2" refer to the 1-hour sound level limits for outdoor points of reception in Table B-1 of the NPC-300 noise guidance document (MECP, 2013). Consistent with the guidance, "Day" refers to the hours of 7:00 a.m. to 7:00 p.m. and "Night" refers to the hours of 7:00 p.m. to 7:00 a.m.

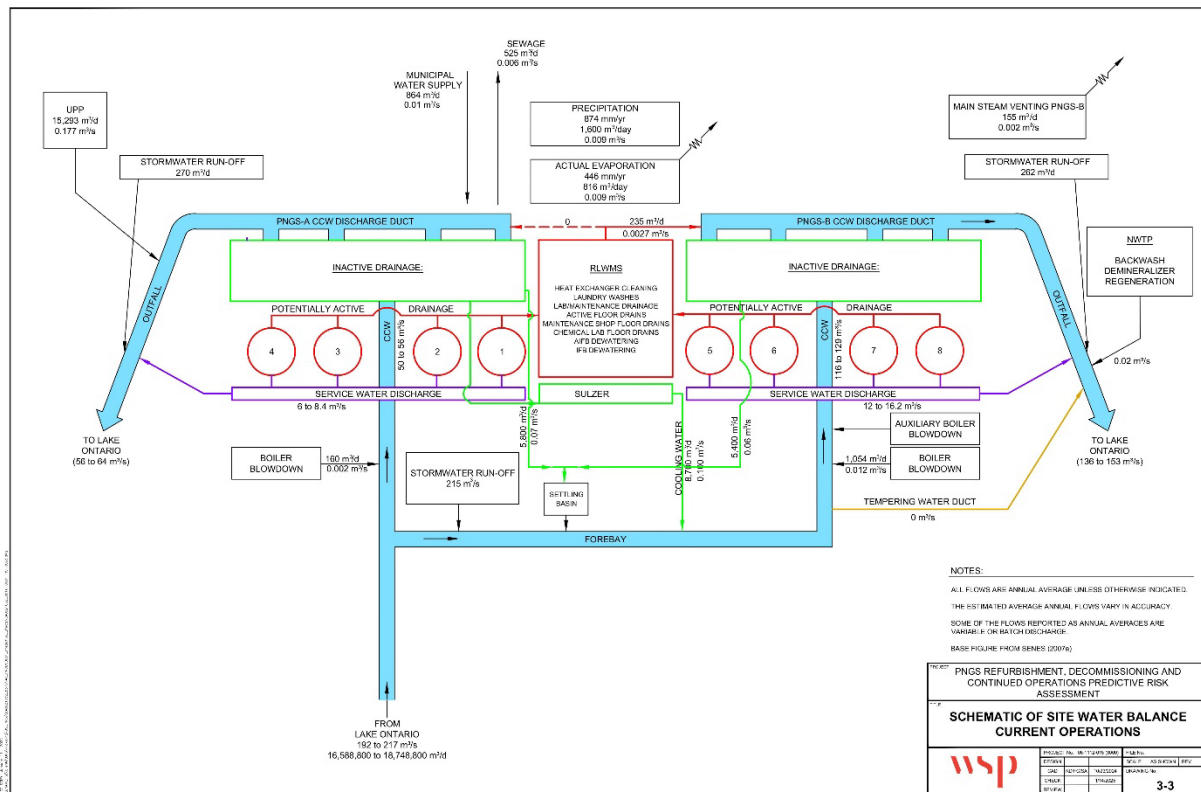
Bold indicates an exceedance of the Class 1 sound level limit; underline indicates an exceedance of the Class 2 sound level limit.

4.2 Surface Water Environment

4.2.1 Flow and Hydrology

The PN Site is situated on the north shore of Lake Ontario. Lake-wide circulation is primarily driven by wind and by seasonal temperature effects. The frequency of lake current flowing toward each direction and the maximum speed that occurred in each direction has been documented from 2011 to 2020; Ecometrix, 2023c). The average easterly and westerly current speeds were approximately 24 cm/s and 17 cm/s respectively.

Nearshore lake currents are affected by the PNGS operations via the condenser cooling water (CCW) discharge. The current water balance at the PN site, reflecting six functional units as assessed in the 2022 PN ERA (i.e., prior to the permanent shutdown of PNGS Units 1 and 4 at the end of 2024 and the pre-refurbishment state of PNGS Units 5-8), is depicted in **Figure 4-2**. The flow from the PNGS Units 1-4 CCW discharge duct is estimated at approximately 56-64 m³/s, and the flow from the PNGS Units 5-8 CCW discharge duct is 136-163 m³/s. Thus, localized effects are observed near these discharge points. Similarly, localized changes in flow can also be seen in the vicinity of intake groynes that are directed toward the plants and a zone of in-flowing water can be seen around the intake. Under the previous operational conditions (with 6 operating units), typical water withdrawal between the intake groynes and into the plant via the intake channel is estimated at 192-217 m³/s based on rated condenser CCW pump capacities and service water demand.



Note: Figure reflects previous operational conditions as presented in the 2022 PN ERA with 6 operating units.

Figure 4-2: Water Balance at PNGS under Previous Operational Conditions in 2022 PN ERA

4.2.2 Water and Sediment Quality

4.2.2.1 Water Quality

PNGS currently interacts with the surface water quality of Lake Ontario as all liquid effluent (except for sewage, which goes into the Regional Municipality of Durham sewage mains) and some stormwater drainage is discharged into the CCW discharge duct, the outfall structures or the forebay. All effluent collected through drainage systems is analyzed by OPG (and treated if necessary) to ensure it meets radiological and non-radiological limits prior to discharge to Lake Ontario.

Frenchman's Bay is a provincially significant wetland west of PNGS. To characterize conditions around the PN site in Frenchman's Bay, an environmental sampling program was conducted in the summer of 2015 in support of the 2017 ERA (Ecometrix and Golder, 2018). Surface water samples were collected from Lake Ontario and Frenchman's Bay during one sampling event to evaluate the quality of the water in these areas. Samples were analyzed for general chemistry parameters, metals, petroleum hydrocarbons (PHC) fractions F1 to F4, morpholine, radionuclides including tritium, carbon-14 (C-14), and cobalt-60 (Co-60), cesium-134 (Cs-134), and cesium-137 (Cs-137). The ERA also utilized hydrazine concentration determined from a supplementary EMP study conducted in 2014 (Ecometrix, 2015).

In 2024, water samples were collected from Lake Ontario and Frenchman's Bay to update the current understanding of existing conditions and to support this PERA. Samples were collected in the spring, summer, and fall to capture seasonal variability. The sampling stations are depicted in **Figure 4-3** and **Figure 4-4** and were based on locations sampled in 2015, with the addition of four locations (LW2401, LW2402, LW2403, and LW2404) in offshore Lake Ontario, to consider the location of the planned DWI. LWE-1, located offshore of the stormwater location M5-1 and previously sampled in 2015, was not included in the 2024 sampling program. As with previous sampling programs, a control location (LWC-1) on Lake Ontario near Cobourg WSP was included in the sampling. For the Lake Ontario stations, water samples were collected near the surface (0.5 m depth) and at the bottom (0.5 m off bottom) of the water column to capture the vertical profile. Mid-depth samples were collected in Frenchman's Bay, as thermal stratification is unlikely in the shallow depths observed in this area. The list of parameters evaluated in 2024 was expanded to include microbes, volatile organics, and radionuclides such as Iodine-131, Thorium-series, and Uranium-series. Results from this program were compared against relevant water quality guidelines, including the CCME Canadian Water Quality Guidelines (CWQG) (CCME, 2024), Ontario Provincial Water Quality Objectives (PWQO) and interim PWQO (MOEE, 1994), and Health Canada's Drinking Water Quality Guidelines (HC, 2024).

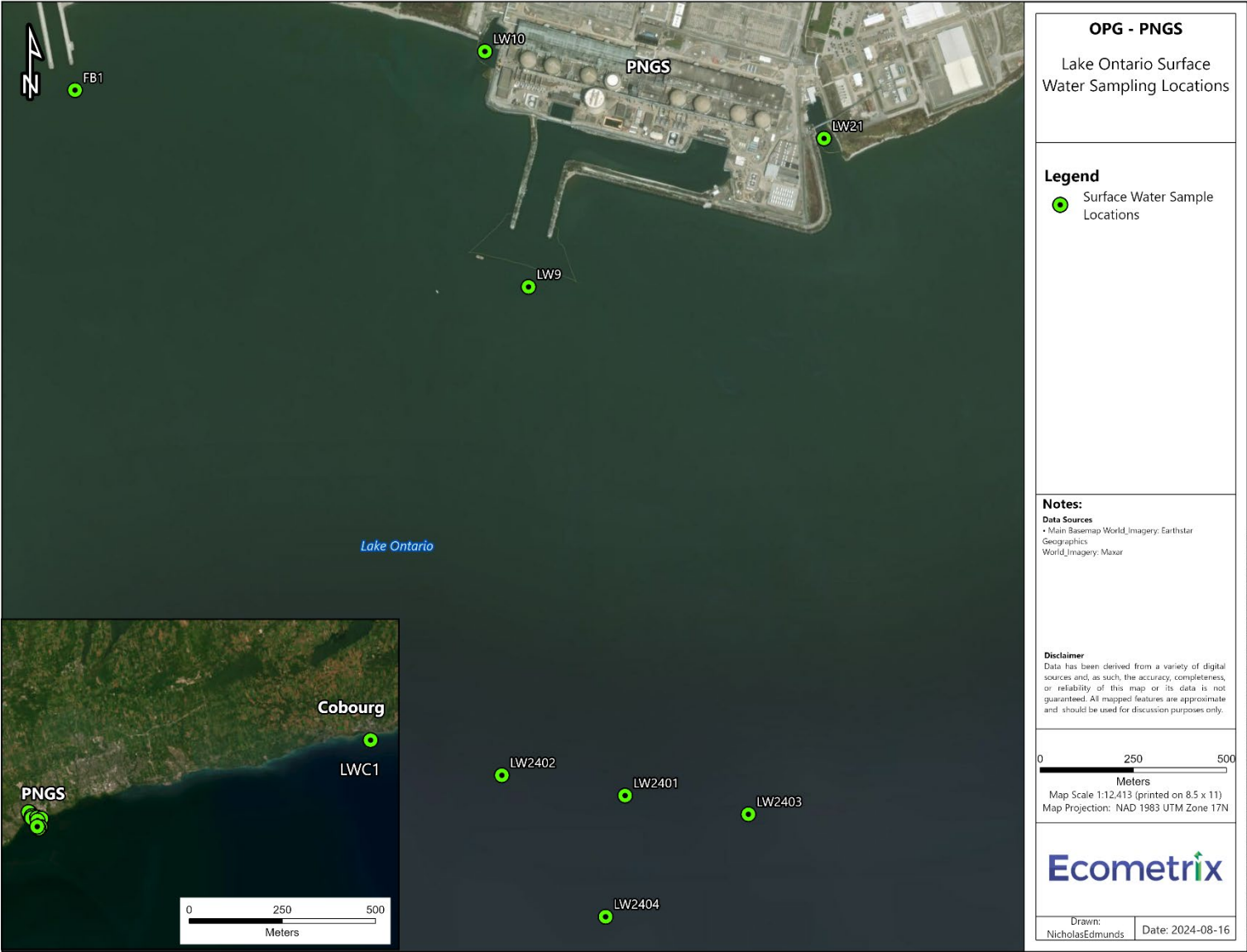


Figure 4-3: Lake Ontario Surface Water Sampling Locations, 2024

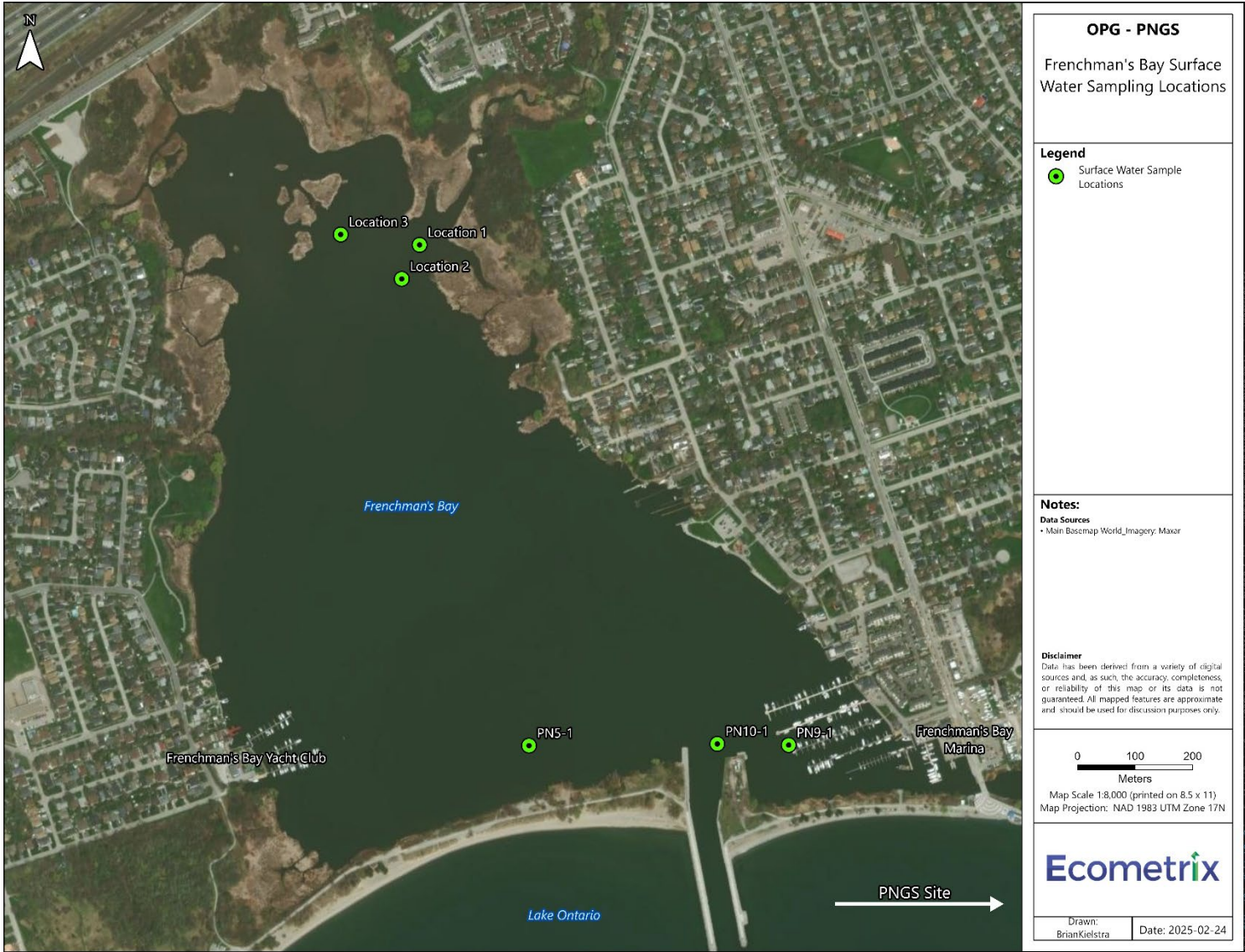


Figure 4-4: Frenchman’s Bay Surface Water Sampling Locations, 2024

4.2.2.1.1 Lake Ontario

Of the non-radiological parameters evaluated in the 2015 program, hydrazine and morpholine exceeded their respective water quality guidelines in Lake Ontario (Ecometrix and Golder, 2018). However, modeling the associated risk to human receptors from exposure to these COPCs indicated no threat to public health, based on the conclusions of the 2022 PN ERA.

Across the spring, summer, and fall sampling events as a part of the 2024 surface water sampling program, pH, ammonia (total and un-ionized), cobalt (total), copper (total), silver (total), total coliforms and *Escherichia coli* (*E. coli*) levels in Lake Ontario exceeded at least one of the water quality guidelines (**Table A-1, Table A-2, Table A-3**). It should be noted that the pH was 1.5% above the PWQO guideline in two samples from LW9 and one from LW2402 (see **Figure 4-3**) during the summer sampling event. While pH is not considered a chemical contaminant, it is measured as the MECP considers freshwater bodies with a pH between 6.5 to 8.5 to be the most bio-productive. Surface waters with pH above the upper limit of the PWQO may be less productive. However, Lake Ontario is a well-documented productive habitat for aquatic biota, as demonstrated by numerous aquatic biota studies (Barbiero et al., 2001; EC, 2009a; Golder, 2007a; OPG, 2016, 2023d), including the 2024 deepwater and nearshore fish community, macroinvertebrate, and microzooplankton studies (see Section 4.3). Given this, the slight exceedance is likely due to natural spatial variability and is not a cause for concern. Additionally, the CCME CWQG for pH ranges from 6.5 to 9.0 for the protection of freshwater biota, a standard also recommended by the International Joint Commission (IJC, 1977) and the U.S. EPA (US EPA, 1986). This range is considered protective of fish and benthic invertebrates, though pH changes within it may influence the toxicity of other contaminants, such as ammonia. Since all surface water samples collected fell within the CCME guideline range and Lake Ontario remains highly productive, the minor exceedances in pH are not expected to have any adverse impacts on aquatic biota in the lake.

Exceedances of the CCME guidelines for total and un-ionized ammonia were found in samples taken from the PN intake (LW9), mouth of Frenchman's Bay (FB1), and in the potential DWI area (LW2401, LW2402, LW2403, LW2404; **Figure 4-3**) during the summer sampling event. While ammonia can be a toxicant, it is also a key component of the nitrogen cycle and a source of bioavailable nitrogen. The occurrence of exceedances exclusively during the summer suggest the possibility that elevated water temperatures in this season contributed to increased decomposition of organic matter and enhanced biological activity, resulting in greater production of nitrogenous waste in the form of ammonia. Additionally, certain cyanobacterial genera associated with algal blooms are capable of nitrogen fixation, converting atmospheric nitrogen into various forms including ammonium (Favot et al., 2023). Adverse health effects for humans as well as birds and mammals are not expected, as ammonia is naturally produced and efficiently metabolized in healthy individuals from these groups (HC, 2013). All sample concentrations were below the 1.5 mg/L odor threshold which induces avoidance behaviors for birds and mammals, thereby limiting ingestion of surface water. Potential risks to aquatic biota in these areas will be assessed further in the 2027 ERA. However, the absence of exceedances near the outfalls and in all lake sampling locations during the spring and fall events, along with

waterborne ammonia emissions from PN consistently being below regulatory limits (as detailed **Section 4.2.2.1.3**), suggests that the elevated concentrations reflect a seasonal effect rather than an impact of PN operations.

The concentrations of cobalt, copper, and silver exceeded their respective guidelines in a single sample collected at the bottom of the water column at LW9 (i.e., LW9-B) from the fall surface water sampling event in 2024. In contrast, the concentrations of cobalt and silver were below detection limits in the samples from 2015, while the maximum copper concentration in 2015 was considerably lower than that of LW9-B in 2024. However, since these metal exceedances were not detected in any other samples near the PN outfall or the corresponding surface sample (LW9-S), and were absent in the spring and summer sampling events, they likely represent sporadic variations in nearshore water quality not related to PN operations.

The total coliform and *E. coli* levels in certain Lake Ontario surface water samples exceeded the Health Canada guideline that stipulates these microbial parameters must not be detectable (i.e., below method detection limit). However, it should be noted that, total coliforms, whose counts do not correlate well with the incidence of gastrointestinal illness, exceeded this guideline in many more locations than *E. coli*, which does. Ultimately though, both total coliforms and *E. coli* are naturally-occurring in the environment and are not released in the course of normal operations at PNGS. Thus, these levels are not considered hazardous and do not represent a risk from the PNGS.

Hydrazine exceeded the CCME screening guideline of 2.6 µg/L at the sampling station near the PNGS Units 5-8 outfall (LW-21) in the spring sampling event with a concentration of 4.2 µg/L. Hydrazine is added to feedwater for oxygen removal and is discharged into the aquatic environment through boiler blowdown and flushing to the intake forebay. Boiler blowdown is generally continuous and intermittent at PNGS Units 5-8 and intermittent at PNGS Units 1-4. As such, hydrazine concentrations in the CCW discharges from PNGS Units 1-4 and PNGS Units 5-8 are monitored weekly as a part of the ECA requirements for PNGS. Monitoring data indicated that during the week of the spring 2024 sampling event, the concentration of hydrazine in the CCW discharge from PNGS Units 5-8 was above the detection limit of 2 µg/L, measuring at 3 µg/L. However, concentrations fell below the detection limit in the following week. Additionally, 85% of samples from the PNGS Units 5-8 outfall were non-detect over the 2024 monitoring period, as were subsequent samples from LW-21 in the 2024 surface water sampling program. Taken together, this suggests that the exceedance observed in spring 2024 was transient and infrequent, with no sustained risk.

Hydrazine is also classified by the International Agency for Research on Cancer (IARC) as a Group 1A carcinogen and the US EPA as a Group B2 carcinogen (probable human carcinogen), and by the European Commission as Category 2 for carcinogenicity (should be regarded as if it is carcinogenic to man). Although there is no Health Canada drinking water guideline for hydrazine, the US EPA estimated that a hydrazine concentration of 0.00001 mg/L corresponds to a cancer risk level of one in one million (1×10^{-6}) (EC and HC, 2011; US EPA, 1988), based on a

drinking water intake rate of 2 L/day and no exposure amortization. The concentration at LW-21 in the spring 2024 sampling event exceeds the drinking water value of 0.00001 mg/L.

The exceedance at LW-21 is unlikely to pose a risk to the public for two key reasons. First, hydrazine has a short chemical half-life, ranging from 0.6 to 1.31 days (EC and HC, 2011), and degrades rapidly. Second, conditions during water treatment at nearby water supply plants (WSPs) such as Bowmanville and Oshawa WSPs further promote its degradation. The treatment process involves multiple chlorination steps using sodium hypochlorite, which increases pH, followed by pH adjustment with sulfuric acid (Durham Region, 2022a, 2022b). Hydrazine degradation is highly influenced by pH; alkaline conditions favour its degradation (Choudhary and Hansen, 1998). Additionally, degradation of hydrazine occurs through oxidation in the presence of oxygen; the reaction tends to be catalyzed (i.e., sped up) in the presence of certain compounds like Copper (II) and phosphate ions, which are likely to be present in some amount in drinking water. Hydrazine degradation is also favoured in the presence of organic matter, which also is likely to be present in drinking water. Hydrazine was found to decrease by more than 90% when added to chlorinated, filtered county water after 1 day (Choudhary and Hansen, 1998).

Therefore, the hydrazine concentration detected at LW-21 poses a minimal risk to ecological and human receptors in the vicinity. Nevertheless, the potential risk associated with this exceedance will be quantitatively evaluated in the 2027 ERA.

4.2.2.1.2 Frenchman's Bay

Results from the 2015 study showed that aluminum, copper, iron, and sodium in Frenchman's Bay exceeded screening guidelines. While concentrations of these metals exceeded toxicity benchmarks for some ecological receptors, such exceedances are expected as the bay receives a substantial amount of urban runoff. Modelling performed to estimate PNGS's contribution to these concentrations indicated that PNGS only accounted for 0.3-22% of COPC levels at Frenchman's Bay (Ecometrix and Golder, 2018).

In comparison, the 2024 sampling program at Frenchman's Bay found exceedances of relevant water quality guidelines for aluminum (total and dissolved), iron (total), pH, ammonia (total and un-ionized), total phosphorus, total coliforms, and *E. coli* (**Table A-1, Table A-2, Table A-3**).

As in 2015, aluminum and iron exceeded toxicity benchmarks in 2024 surface water samples from Frenchman's Bay. This is not uncommon for an area like Frenchman's Bay, which is heavily influenced by urban runoff. Based on the maximum concentrations of these parameters in the 2015 surface water and sediment samples, the 2017 and 2022 PN ERAs found that the HQs for aluminum and iron exceeded the acceptable risk level of 1 for certain receptors (Aluminum: Muskrat, Bufflehead; Iron: Bufflehead, Trumpeter Swan, Common Tern, and Ring-billed Gull). The ERA concluded that as most of these receptors do not reside exclusively in Frenchman's Bay, the HQs presented were conservative, and the overall communities were not expected to be affected. Additionally, HQs calculated for ecological receptors using a surface water model to

estimate aluminum and iron concentrations attributable to PN releases were all below 1. Since the maximum concentrations of aluminum and iron in surface water samples from 2024 are lower than those in 2015, and were below the relevant guidelines in the associated sediment samples (see Section 4.2.2.2.2), the conclusions from the 2017 ERA still remain applicable.

As with Lake Ontario, the maximum pH detected across all sampling locations and events at Frenchman's Bay was slightly above the PWQO guideline (1% above in this case), but does not exceed the CCME guideline, which is protective of aquatic receptors. Additionally, the exceedance of the total phosphorus guideline in surface water samples from 2024 likely does not pose a risk to ecological receptors, as it presents in the aquatic environment as phosphate which acts as a nutrient rather than a toxicant. Similarly, ammonia (un-ionized and total) also exceeded the associated CCME guidelines in samples from the summer and fall sampling event. As such, it is evident that Frenchman's Bay is nutrient enriched. However, as with the metal exceedances, the exceedances of ammonia and phosphorus are likely due to urban runoff rather than operations at the PN site.

Finally, the estimated total coliform and *E. coli* bacteria concentrations in surface water samples from Frenchman's Bay in 2024 did not meet the associated Health Canada screening criteria which stipulates that these bacteria must not be detectable. However, as highlighted earlier, *E. coli* and other coliform bacteria are naturally-occurring in the environment and not considered to be hazardous. Though the levels of these bacteria were higher in surface water samples from Frenchman's Bay compared to those from Lake Ontario, this is expected as Frenchman's Bay and other coastal wetlands along the lake's shoreline have been shown to act as reservoirs for *E. coli* (Harrow-Lyle et al., 2024). This is likely due to internal sources such the increased presence of waterfowl and other wildlife, as well as environmental conditions (pH, temperature, moisture) that promote microbial growth. These total coliform and *E. coli* exceedances do not result from normal PNGS operations, and they are not deemed a risk to human health.

4.2.2.1.3 Waterborne Emissions

Non-radiological emissions

Aqueous liquid effluent, except for domestic sewage and some stormwater drainage, from PN is discharged into the CCW discharge duct, the outfall structures, or the forebay. The majority of stormwater drainage is directed to Lake Ontario, and domestic sewage is directed to the York-Durham Water Pollution Control Plant. Non-radioactive liquid emissions are controlled in accordance with the provincial ECA requirements. OPG also operates under the Municipal Industrial Strategy for Abatement (MISA) program under O. Reg. 215/95 (Effluent Monitoring and Effluent Limits – Electric Power Generation Sector).

To meet these regulatory requirements, OPG monitors and reports the concentrations of ammonia, hydrazine, morpholine, pH, and total residual chlorine (TRC) in the final station discharge. Reports from 2016-2020 were consulted to aid in the selection of non-radiological waterborne COPCs in the 2022 PN ERA (Ecometrix, 2023a) and the 2022 PEA Addendum for PN

Safe Storage (Ecometrix, 2023b). This PERA considers the most recent reports prepared from 2021-2023 (OPG, 2022b, 2023e, 2024g) to characterize previous operational conditions (with 6 operating units) relating to waterborne chemical emissions from PNGS. During this time period, there were no regulatory non-compliances associated with the measured concentrations of Ammonia, Hydrazine, Morpholine, pH, or TRC in the effluent from PN.

Radiological emissions

During normal operations, the PN site releases small amounts of radiological contaminants into Lake Ontario. As a part of its annual effluent monitoring program, OPG monitors the total waterborne emissions of tritium oxide (HTO), C-14, and gross beta/gamma.

HTO emissions from the PN site were slightly elevated between 2018 and 2020 compared to historical emissions due to increased processing of Active Liquid Waste (ALW) (OPG, 2024d). These elevated levels persisted in 2021, and could be attributed to the installation of a microscrubber designed to reduce airborne tritium emissions. The microscrubber converts a portion of the tritium into waterborne effluent, which is then directed to the ALW tanks for controlled release within acceptable limits. Emissions of HTO decreased in 2023, following the peak in 2022 due to the extended operation of Units 1 and 4. Overall, waterborne tritium oxide emissions from 2020 to 2023 showed no significant deviation from the last 10 years of emissions data.

The gross beta-gamma water emissions peaked from 2016 and in 2020 due to spontaneous releases of concentrated, entrained active lake sediment materials from the Reactor Building Service Water (RBSW) system. The shallow surface intake for station cooling water allows suspended particulates from the lake to enter the station. Cs-137 is strongly attracted to clay minerals, which are easily suspended in the water column and can subsequently deposit on internal surfaces of station systems (e.g. in pipe work of the systems). As Cs-137 in the sediment originates from past nuclear weapons testing, the peak in gamma emissions in 2016 and 2020, does not represent a station generated source of activity. The results were also biased high in 2021 due to residue in the sampler. Gross beta-gamma emissions were reduced back to pre-2016 levels in 2022 and 2023. Waterborne carbon-14 emissions contribute minimally to the overall public dose, and the 2020 to 2023 emissions remained consistent with historical levels based on 10 years of longitudinal data. Overall, radiological water emissions from the PN site represent a very small fraction of the site's DRLs.

Radiological emissions to water are shown in **Table 4-6** below.

Table 4-6: Radiological Water Emissions from PN (2021-2023)

Parameter	Units	Average ¹ (2016-2020)	Year			Average (2021-2023)	Average (2021-2023) as % of DRL ²
			2021	2022	2023		
Tritium Oxide	Bq/a	3.96E+14	4.80E+14	5.00E+14	3.80E+14	4.53E+14	0.06%
Gross Beta-Gamma	Bq/a	1.05E+11	1.20E+11	2.00E+10	2.20E+10	5.40E+10	2.89%
Carbon-14	Bq/a	2.60E+09	4.60E+09	1.40E+09	3.30E+09	3.10E+09	0.008%

Notes:

¹ Average from the 2022 PN ERA (Ecometrix, 2023a) is the average of emissions from 2016 to 2020.

² The DRL used for comparison to 2021-2023 average emissions is obtained from the 2016 PN DRL report (OPG, 2024e). The DRL for gross-beta gamma assumes conservatively that all of the gross beta-gamma is comprised of the most radiotoxic beta-gamma emitter.

4.2.2.1.4 Radionuclide Concentrations in Lake water

In the 2015 surface water sampling program, the concentrations of radionuclides of interest, including tritium, C-14, Co-60, Cs-134, and Cs-137, were measured in lake water samples collected from a single event. The same radionuclides, along with potassium-40 (K-40), iodine-131 (I-131), Thorium-series, and Uranium-series radionuclides were analyzed in lake water samples on a quarterly basis in 2024 (**Table A-1, Table A-2, Table A-3**) consistent with the locations identified in **Figure 4-3** and **Figure 4-4**. Across both years, the concentrations of C-14, Co-60, Cs-134, and Cs-137 were below detection limits in most samples. Tritium was detected in some samples with levels ranging from 20 to 40 Bq/kg, which were comparable to those observed in 2015. K-40, which is environmentally abundant and is not associated with station operations, was also detected at levels ranging from 0 to 22.3 Bq/kg. Finally, Lake water for recreational use is sampled from three beaches in the vicinity of PN on a monthly basis and analysed for HTO. This data is used as an input to estimate public dose. In 2023, the average HTO concentration in lake water samples collected from beaches near the PN area was 21.9 Bq/L. A statistically significant trend was observed over the last 10 years, aligning with slight increases in HTO waterborne emissions over the same period (see **Section 4.2.2.1.3** for details). However, in 2023, a decrease in waterborne HTO emissions was observed relative to the peak in 2022, which was reflected in lower HTO concentrations in lake water compared to 2022 levels.

4.2.2.2 Sediment Quality

Current available data indicates that substrate in nearshore Lake Ontario is comprised of coarse sand which is transient and non-depositional due to high wave energy. As a result, appropriate material (i.e., fine-grained sediments) required for analysis of sediment quality is scarce in this area (Hart and Petersen, 2013). Additionally, the invertebrate community in this area is primarily epifaunal, i.e., residing on the surface of the substrate rather than within it. As such, invertebrates in the area have limited exposure to contaminants in the sediment, further restricting the applicability of sediment assessments here. Therefore, Frenchman's Bay, which is characterized by the presence of fine-grained sediments and relatively high concentrations of TOC is the nearest depositional area for sediment that is suitable for analysis.

As a part of the sediment sampling program conducted in 2015, sediment samples were collected from the north and south areas of Frenchman's Bay and were analyzed for metals and radionuclides. Water-to-sediment partitioning coefficients were used to estimate concentrations of parameters in the sediment near the PN outfall area of Lake Ontario (Ecometrix and Golder, 2018).

In the 2024 sediment sampling program, sediment was collected in the fall from locations used in the current PNGS EMP and in the 2015 sediment sampling program in support of the 2017 ERA (**Figure 4-5**). This included 8 north locations (i.e., in the interior of the bay) and 8 south locations (near the entrance of the bay). The chosen number of samples is considered appropriate for the assessment and quantification of sediment spatial heterogeneity. The range of parameters analyzed was expanded to include Polychlorinated Biphenyls (PCBs), pesticides, herbicides, PAHs, and petroleum hydrocarbons. Seven locations in nearshore Lake Ontario were

also sampled to assess the proposed areas for the construction of the west infill area and shoreline erosion mitigation area (**Figure 4-6**), with analyses focused solely on particle size and metals. Sediment samples were collected from these locations to assist in the interpretation of other field investigations (i.e., aquatic habitat assessment for fish and macroinvertebrates) and provide an understanding of the existing conditions in these areas prior to construction. Concentrations of parameters in sediment samples were compared against the CCME Interim Sediment Quality Guidelines (ISQGs), Ontario MECP Provincial Sediment Quality Guidelines (PSQG), and other applicable screening criteria.

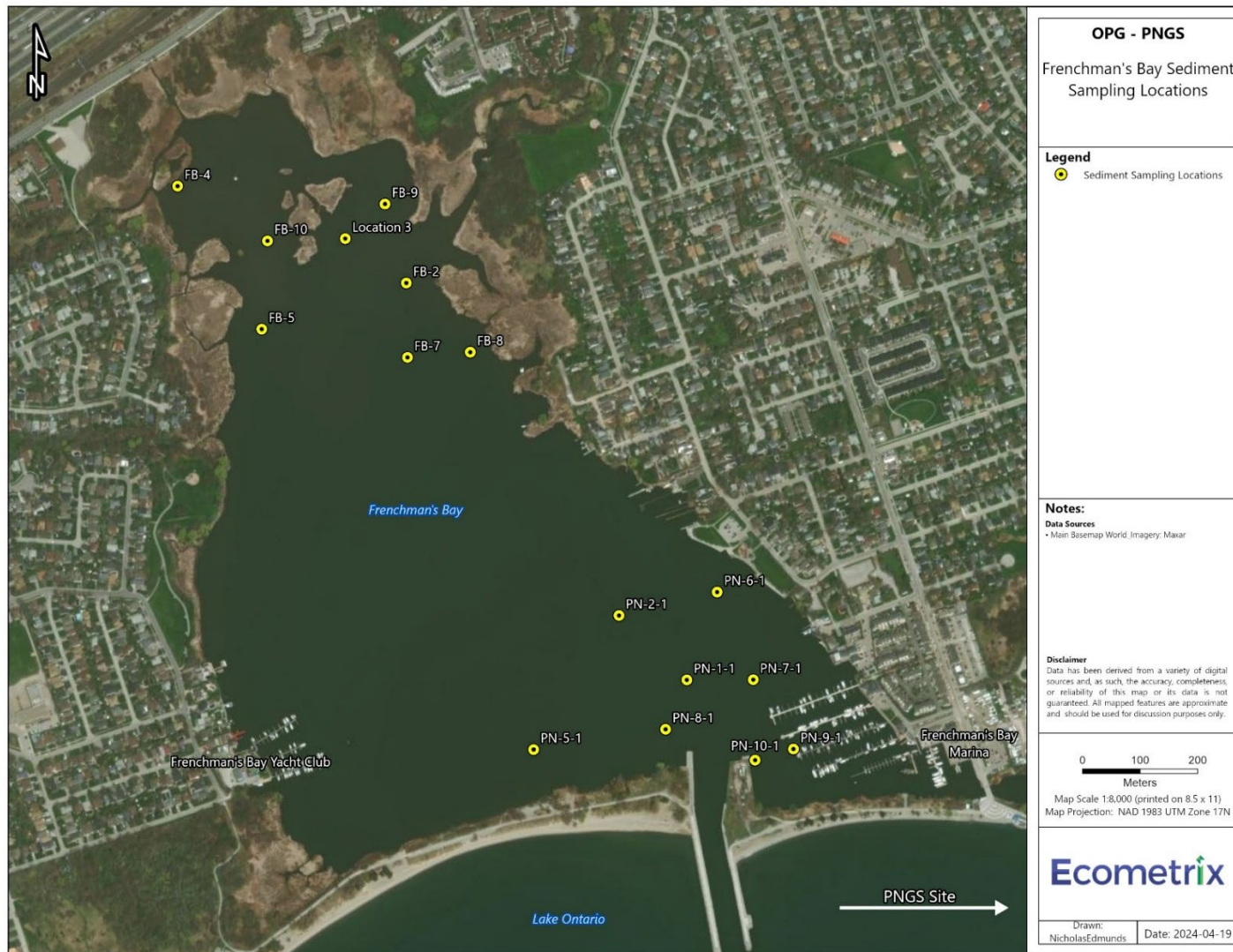


Figure 4-5: Frenchman's Bay Sediment Sampling Stations, 2024



Figure 4-6: Nearshore Lake Ontario Sediment and Benthic Macroinvertebrate Community Sampling Stations, 2024

4.2.2.2.1 Nearshore Lake Ontario

Estimated maximum copper concentrations in sediment near the PN outfall based on water concentrations in 2015 slightly exceeded benthic invertebrate benchmarks, though mean concentrations did not. However, this exceedance was not anticipated to impact the invertebrate community and should be interpreted with caution as the substrate in the area is transient and primarily comprised of coarse sand (Hart and Petersen, 2013). Both maximum and mean sediment concentrations of other parameters were below their respective ecological benchmarks.

The only parameter to exceed its associated screening guideline from the sediment samples collected in 2024 was total phosphorous (**Table A-4**). The Ontario Sediment Quality Guideline (600 mg/kg) was exceeded at two locations (Infill-03 and Infill-06; **Figure 4-6**). However, this guideline is not based on toxic effects to ecological receptors, but rather represents a nutrient effect on benthic community composition (MECP, 2008). Additionally, the elevated levels of phosphorus are probably a result of agricultural and urban inputs into Lake Ontario. Therefore, these exceedances most likely do not indicate facility-related impacts and are not associated with adverse impacts on aquatic invertebrates. The results from this sampling program cannot be directly compared to the 2015 estimates as the sampling stations were not in proximity to the outfall.

4.2.2.2.2 Frenchman's Bay

The concentrations of metals including aluminum, cadmium, chromium, copper, manganese, nickel, thallium, and tin in sediment samples from 2015 were found to exceed the established screening levels. These exceedances were anticipated, as Frenchman's Bay is highly influenced by urban runoff. Additionally, the levels of total organic carbon (TOC) were greater than the MECP guideline of 10,000 mg/kg (or 1%). However, as highlighted earlier, MECP guidelines for nutrients such as TOC are not based on toxic effects to ecological receptors. Additionally, wetland locations often exceed this screening criterion as organic matter content and nutrient levels may be naturally high in wetlands, which the guideline does not account for as it was established based on a Great Lakes dataset.

In 2024, the list of metals that exceeded their screening criteria (**Table A-4**) and the degree of exceedance of these criteria is comparable to the results from 2015. The only exceptions were aluminum, thallium, and tin, which exceeded screening criteria in 2015 but were below these criteria in 2024. Of the parameters that were quantified for the first time in 2024, certain PAHs and petroleum hydrocarbons, and Aroclor 1260 exceeded their respective sediment quality guidelines. As previously noted, these metal exceedances can be attributed to the ongoing impact of urban runoff. In line with the 2015 samples, TOC concentrations exceeded the MECP guideline at all locations in Frenchman's Bay. Unlike in 2015, all sediment samples collected from Frenchman's Bay exceeded the MECP guideline for Total Kjeldahl Nitrogen (TKN; 550 mg/kg). The exceedances of TOC and TKN are likely due to the naturally elevated organic content of

wetland ecosystems and are not associated with toxic effects. The elevated nutrient levels are probably a result of agricultural and urban inputs, rather than being linked to PNGS operations.

4.2.2.2.3 Radiological Parameters

Sediment samples collected from Frenchman's Bay during the 2015 sampling program were analyzed for radionuclides, including C-14, Co-60, Cs-134, and Cs-137 (Ecometrix and Golder, 2018). In 2019, additional sediment samples were collected and analyzed in support of OPG's EMP (OPG, 2020b), with K-40 included in the analysis. Sediment samples collected as a part of the 2024 sediment sampling program were also analyzed for the same radionuclides, with the addition of tritium, K-40, I-131, Thorium-series, and Uranium-series radionuclides.

Across all three sampling events (2015, 2019, 2024), the majority of sediment samples exhibited concentrations of Co-60 and Cs-134 well below detection limits. Cs-137 was generally detectable in samples from all three events, with similar results being observed. C-14 concentrations in 2019 were comparable to those from 2015, but were below detection limits in 2024 (**Table A-4**). Though tritium, K-40, I-131, Thorium-series and Uranium-series radionuclides were all detectable in the samples from the most recent 2024 monitoring program, the concentrations are low.

4.2.3 Stormwater runoff

Stormwater runoff from the PN site is collected by a drainage system and directed south to Lake Ontario. Runoff entering the discharge channels is estimated at 270 m³/day for PNGS Units 1-4 and 262 m³/day for PNGS Units 5-8, based on an annual precipitation of 872 mm. The 2017 ERA (Ecometrix and Golder, 2018) included results from a 2015–2016 stormwater sampling campaign to characterize the quality of stormwater. Final concentrations in the discharge channels and in Lake Ontario were compared to relevant water quality guidelines, and no exceedances of the selected benchmarks were identified.

Consistent with the requirements of CSA N288.6-12 clause 11.1 to periodically review changes to the facility, the expansion of PWMF Phase II will likely result in changes to the stormwater catchments in the East Complex. The appropriate stormwater outfalls in the East Complex should be reviewed and sampled accordingly to be representative of the catchment areas after the completion of the PWMF Phase II expansion. Gross beta-gamma in stormwater was monitored and reported quarterly over the 2016-2020 period; however, in 2021 OPG determined that no routine monitoring is required given the robust design of the used fuel dry storage containers (DSCs) and absence of liquid inside the DSCs during dry storage (OPG, 2021b). Following their review of the 2017 ERA, CNSC and ECCC recommended that a stormwater sampling plan be included in future ERA submissions. OPG plans to carry out this recommendation after the completion of the PWMF Phase II expansion and results from the stormwater sampling will be included in the subsequent routine updates of the ERA.

4.3 Aquatic Environment

4.3.1 Fish

4.3.1.1 Fish community

More than 90 species of migratory and resident fish species are known to inhabit Lake Ontario (see Ecometrix, 2023b for a complete list), with most of them utilizing nearshore waters for spawning, rearing, feeding, and migration. The three fish species at risk that have been identified at the PN site, along with their federal and provincial ranking is presented in **Table 4-7**. While the Lake Ontario population of Atlantic Salmon is listed federally as extinct, individual were last observed in 2020, likely as individuals from ongoing stocking programs (OPG, 2021c). American Eel, has been consistently recorded in annual impingement monitoring from 2016 to 2022 (OPG, 2016, 2016, 2017a, 2017a, 2018a, 2019c, 2021d, 2021c, 2022c, 2023d). OPG has an Ontario ESA Waterpower Agreement for the operation of the Saunders Generating Station on the St. Lawrence River, and as part of that ESA (Endangered Species Act) agreement, from 2006 – 2010, OPG stocked 4 million young eels (elvers) in the upper St. Lawrence and Lake Ontario. Lastly, a Lake Sturgeon was caught and released near PN in the fall of 2024 during the deepwater fish community studies, marking the first observed sighting since 2005 (OPG, 2012a; TRCA, 2022). The New York State Department of Environmental Conservation has stocked Lake Sturgeon in 13 waters within the Lake Ontario and St. Lawrence River drainage system intermittently since 1993, with the most recent program conducted from 2014 to 2019 (Great Lakes Fishery Commission, 2023; Stewart et al., 2012; Welsh et al., 2020).

While Round Whitefish is not considered a species at risk, they were considered a species of interest by regulators (OPG, 2013) as they are cold-water fish native to Lake Ontario, and because early embryonic stages are considered sensitive to thermal stressors (Eme et al., 2015; Griffiths, 1980; Petrudev, 2022). As such, this species has been the focus of several studies investigating the environmental impacts of PNGS (see **Section 4.3.1.3** for details). It was felt that absence of an effect observed for Round Whitefish embryo development would also be protective to other Great Lake fish species.

Table 4-7: Fish Species at Risk Observed in the PN Area

Scientific Name	Common Name	Federal Species at Risk Status (SARA) ⁽¹⁾	Provincial ESA Status (SARO) ⁽²⁾	Most Recent Year Observed
<i>Salmo salar</i>	Atlantic salmon	Extinct	Not listed	2020
<i>Anguilla rostrata</i>	American Eel	No status ⁽³⁾	Endangered	2022
<i>Acipenser fulvescens</i>	Lake Sturgeon	No status ⁽³⁾	Endangered	2024

Notes:

Statuses are up to date as of January 7th, 2025.

The Provincial Species at Risk in Ontario List, Federal List of Wildlife Species at Risk (Schedule 1 of the Species at Risk Act (SARA)), and Committee on the Status of Endangered Wildlife in Canada (COSEWIC) lists are frequently revised.

(1) SARA Schedule 1 ranks species at risk as Extirpated, Endangered, Threatened Species and Special Concern. Prohibitions of the Act do not apply to species of Special Concern.

(2) The provincial Endangered Species Act (2007) came into effect on June 30, 2008 and it applies to species once they appear on the official list.

(3) The COSEWIC status of the American Eel and Lake Sturgeon were assessed as Threatened.

Source: (OPG, 2012a, 2016, 2023d; TRCA, 2022)

Fish community studies were conducted in 2024 in the planned DWI region of Lake Ontario (**Figure 4-7**) and the nearshore sections associated with the proposed west infill and shoreline erosion mitigation areas (**Figure 4-10**). The methods used and the results are discussed below.

4.3.1.1.1 Deepwater Fish Community Study

Assessment of the fish community in the proposed DWI area followed a similar approach to that used at DNNP for intake siting (Ecometrix, 2021). In the design, the 1 km² study area was divided into nine sampling areas based on a 333 m x 333 m grid (labelled S1 to S9 in **Figure 4-7**). The gillnets used for fish community sampling were consistent with the Ontario Ministry of Natural Resources and Forestry (MNRF) *Lake Ontario Fish Community Index Netting Protocol* (MNRF, 2018) as well as with past studies conducted for OPG at Darlington Nuclear Generating Station (DNGS) (Ecometrix, 2021). The program comprised of three sampling events in the spring, summer, and fall of 2024. During each event, net sets were deployed in one of nine sampling grids using the the fixed-sequential-random design, where three net grids were fixed (one per depth stratum 12-14, 14-16 and 16-18 m), three were sequential (one per depth stratum; randomly assigned, excluding the fixed locations), and three were set at random grid locations.

All fish caught were identified and enumerated. Weight (in grams), length (in cm or mm), sex (where external determination was possible) and external condition (e.g., fin clips, eroded fins, deformities, lamprey scars) were also assessed for up to 30 individuals per species per season. Representative photos were taken of each fish species collected in the gillnets. Live fish from

gillnet catches were released. Eight individual fish from up to three abundant species were used for tissue burden assessment in the spring and fall seasons (see **Section 4.3.1.2**).

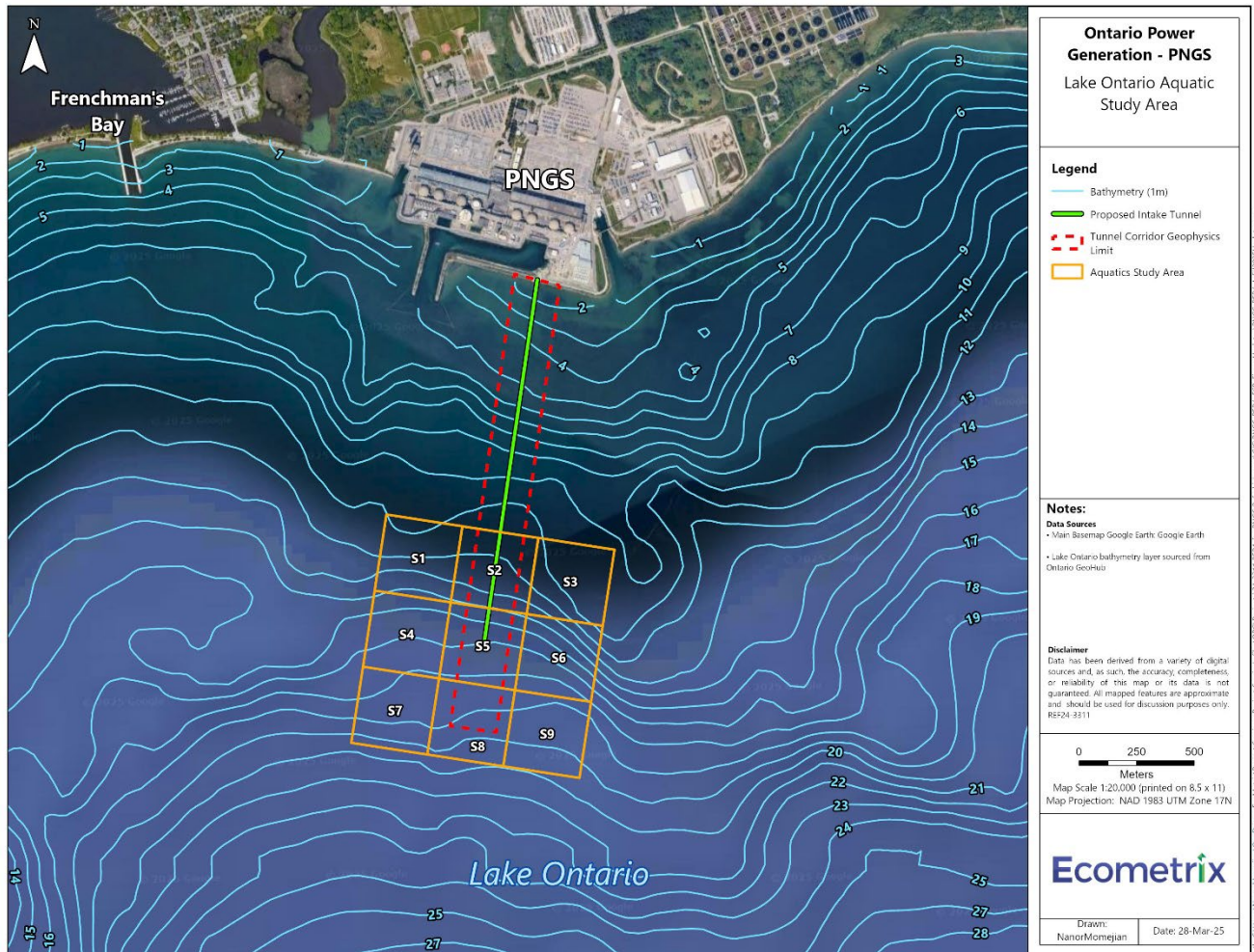


Figure 4-7: Sampling Area for 2024 PNGS Deepwater Fish Community, Benthic Macroinvertebrate Community, and Macrozooplankton Community Studies

Notes:

For the Deepwater Fish Community study, all nets set within one of the following depth strata: 12-14, 14-16, and 16-18m. Sets followed the fixed-sequential-random design where three fixed (one per depth stratum 12-14, 14-16 and 16-18 m), three sequential (one per depth stratum; randomly assigned, excluding the fixed locations), and three random grid locations (randomly generated S1-S9) were surveyed each season. For the Benthic Macroinvertebrate Community, samples were collected at depths ranging from 17-19 m within sampling grids S4, S7, S8, and S9. For the Macrozooplankton Community Studies, samples were collected from one of the following depth strata: 12-14, 14-16, 16-18 m. In each sampling event, six grid locations were used with two locations at each depth stratum.

Fish counts and species richness observed during the spring, summer, and fall sampling events are summarized in **Table 4-8**. Additional calculated parameters, including morphometric summaries, Mean Catch Per Unit Effort (CPUE), and Biomass Per Unit Effort (BPUE) are provided in **Table B-1**, **Table B-2**, and **Table B-3**, respectively. Across all three sampling events, 720 fish from 13 different species were captured. Species composition by season is depicted in **Figure 4-8**. Alewife comprised >92% of the catch in the spring and summer, while Lake Trout and Lake Whitefish dominated the fall catch. This seasonal shift in the dominant species captured is reflective of the migratory nature of Alewife, which make seasonal spawning migrations to the nearshore zone to spawn in the late spring. As detailed earlier, one Lake Sturgeon was caught and released during the deepwater fish community studies in the fall sampling event, marking the first observation of this species near PN in nearly two decades. Lake Sturgeon are generally uncommon in the main lake as they typically inhabit the cool, bottom waters of lakes and large streams, preferring sand and silt substrates (Holm et al., 2021). Of the nine sampling grids defined in the deepwater area for this study, S1 and S6 had the highest number of fish and species (8) collected during individual net sets across all three sampling events. In contrast, S3 had the fewest fish (49) and lowest species count (1) among sampling events.

To determine if and how deepwater fish communities varied through time or water depth, a set of generalized linear models (GLMs) were run for metrics of species richness, diversity, and abundance (CPUE and BPUE). Based on sample sizes, models could test the effects of season and depth but not their interaction (i.e., does the effect of season vary with depth). Additionally, since there was some imbalance in depth strata (overall: 8 at <14 m, 7 at 14–16 m, and 12 at >16 m depths), only the continuous measure of depth was used in the models.

Results of the GLMs are depicted in **Figure 4-9** and detailed in **Table B-4**. Based on the results, there was no influence from depth on any of the measured fish metrics, but, all metrics except for richness were significantly influenced by season. No differences were observed between spring and summer for diversity, or CPUE and BPUE considered for the entire fish community, or just small-bodied fish. However, when considering the entire fish community, the fall was found to have both significantly lower and significantly higher CPUE and BPUE, respectively, than both spring and summer. The higher CPUE observed in the spring and summer was driven primarily by the presence of Alewife in the area during those two seasons, which made up the majority of the catch. Conversely, significantly higher BPUE in the fall was driven by the higher proportions of large-bodied species, such as Lake Trout and Lake Whitefish, that were caught in the fall. These results were corroborated by the results when just considering small-bodied fish, which also showed significantly lower CPUE and BPUE in the fall relative to spring and summer.

**Table 4-8: Standardized Fish Counts and Species Richness observed during the 2024
Deepwater Fish Community Study**

Spring										
Grid	2	3	3 Dup	4	4 Dup	5	7	8	9	Total
Alewife	108.7	119	43	82.3	52.6	20.8	4.3	51.3	13.2	495.1
Lake Trout	0	0	0	0	0	1	3	3	5	12
Round Whitefish	0	0	0	1	0	0	0	0	0	1
Total	108.7	119	43	83.3	52.6	21.8	7.3	54.3	18.2	508.1
Species Richness	1	1	1	2	1	2	2	2	2	3
Summer										
Grid	1	1 Dup	2	4	5	6	6 Dup	7	8	Total
Alewife	36.6	56	62	36	52.2	38	71.9	33	31.6	417.3
Brown Trout	1	0	0	0	0	0	0	0	0	1
Burbot	0	0	0	0	0	0	1	0	0	1
Lake Trout	0	0	0	0	0	0	0	0	2	2
Round Goby	1	1	3	0	0	0	2	0	0	7
Round Whitefish	0	0	0	0	1	0	0	0	0	1
White Sucker	0	0	0	0	0	0	3.3	0	0	3.3
Total	38.6	57	65	36	53.2	38	78.2	33	33.6	432.7
Richness	3	2	2	1	2	1	4	1	2	7
Fall										
Grid	1	2	2 Dup	4	4 Dup	6	8	9	9 Dup	Total
Lake Sturgeon	0	0	0	0	0	0	1	0	0	1
Lake Trout	0	4	6	5	0	15	16	17	1	64
Lake Whitefish	6	0	3	5	2	17	5	11	8	57
Rainbow Smelt	0	0	0	0	0	0	1	1	0	2
Rock Bass	0	0	1	0	0	3	0	0	0	4
Round Goby	0	0	0	0	0	5.3	0	0	0	5.3
Round Whitefish	0	2	0	2	0	0	2	1	0	7
Sea Lamprey	0	0	1	0	0	0	0	0	0	1
Walleye	0	1	0	0	0	1	0	0	0	2
Total	6	7	11	12	2	41.3	25	30	9	148.3
Richness	1	3	4	3	1	5	5	4	2	9

Note: Standardized fish counts are based on an extrapolated catch from the 15 m 1 ½" mesh panel to the standard 50 m length and therefore fish counts can result in partial numbers.

PREDICTIVE ENVIRONMENTAL RISK ASSESSMENT FOR PICKERING REFURBISHMENT,
DECOMMISSIONING, AND CONTINUED OPERATIONS
Summary of Existing Conditions

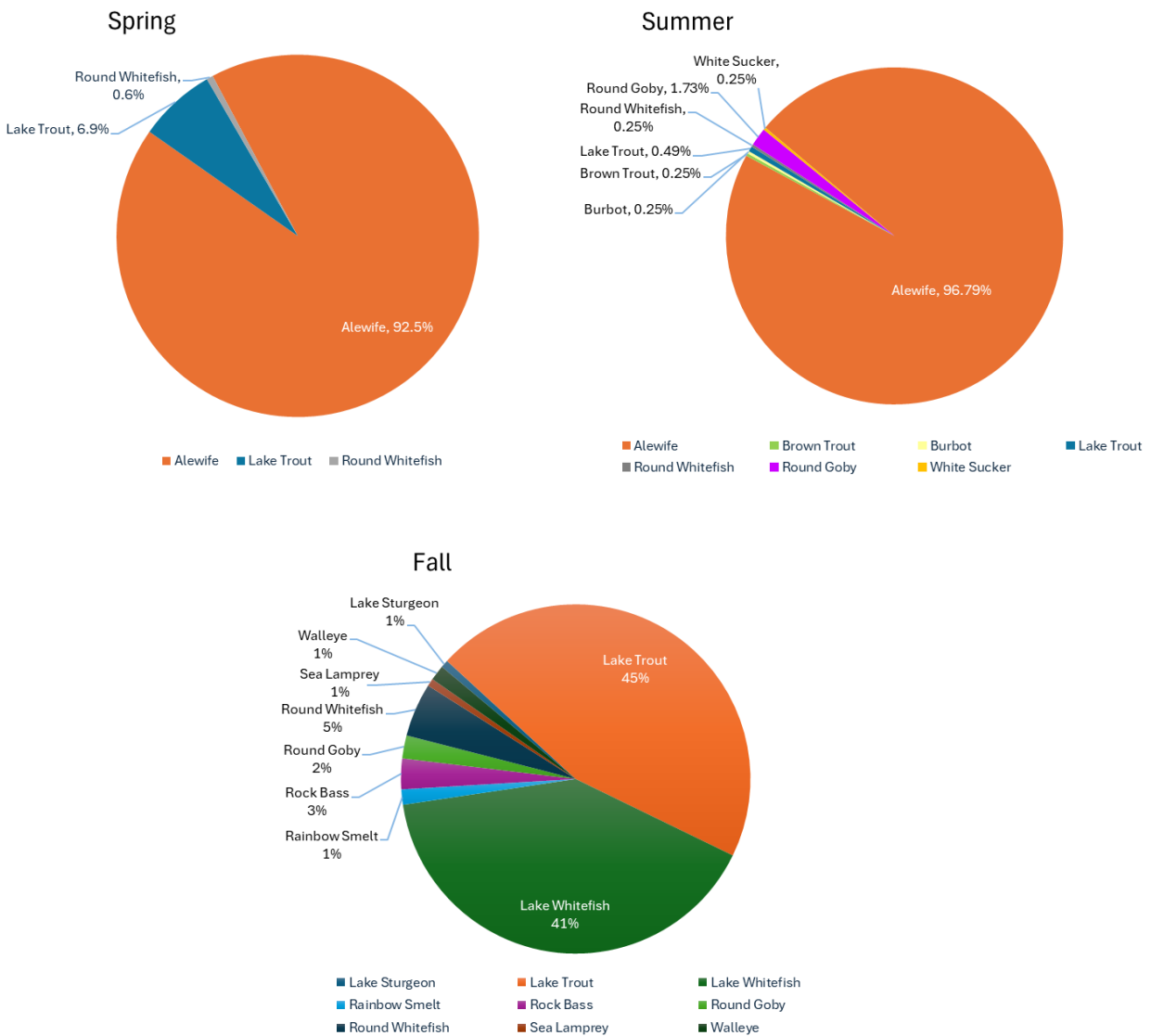


Figure 4-8: Fish Species Composition of fish caught in Monitoring Nets during the Spring, Summer, and Fall sampling events of the 2024 Deepwater Fish Community Study

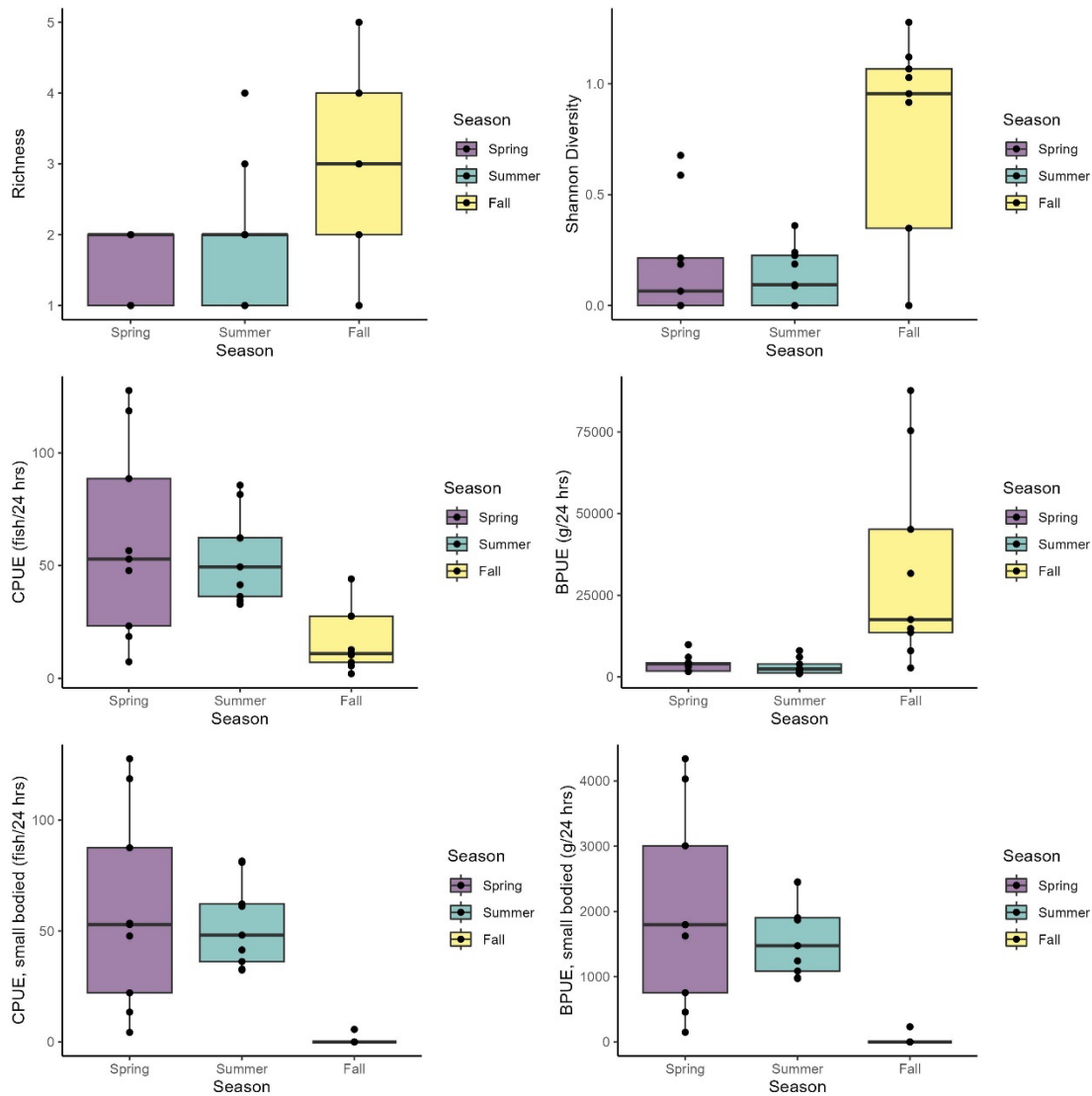


Figure 4-9: Boxplots and Raw Data (points) of Fish Endpoints Expressed by Season from the 2024 Deepwater Fish Community Study

Notes: CPUE – Catch-per-unit effort, BPUE – Biomass-per-unit effort. Boxplots are a common and useful when visually depicting variation of the raw data (black dots): the box spans the interquartile range (IQR; 25th percentile to 75th percentile), the horizontal line within the box is the median, the vertical lines extend outwards to the furthest datapoint within 1.5 x IQR, and any points outside of this vertical line are beyond 1.5 x IQR.

4.3.1.1.2 Nearshore Fish Community Study

For the nearshore fish community study, existing fish community data were collected in the proposed west infill and shoreline erosion mitigation areas during the spring, summer, and fall. Each sampling event employed two sets of MNRF small mesh broadscale monitoring (BSM) nets and one set of an experimental (EXP) long gillnet. These nets were deployed approximately perpendicular to shore, capturing depths from 0 to 3 m, depending on water depth at each location (**Figure 4-10**). Consistent with the Deepwater Fish Community Study, fish morphometrics were assessed for up to 30 individuals per species per season. Recorded parameters included weight (g), fork length (mm), total length (mm), sex (if identifiable), and general health indicators such as fin erosion, deformities, lamprey scars, and fin clips. Additionally, species composition, species richness, CPUE, and a morphometric summary were calculated.

Standardized fish counts (number of fish per net set) and species richness observed during the spring, summer, and fall sampling events are summarized in Table 4-9. Additional calculated parameters, including morphometric summaries from the BSM nets, morphometric summaries from EXP nets, as well as Catch Per Unit Effort (CPUE) are provided in **Table B-5**, **Table B-6**, and **Table B-7**, respectively. In the nearshore region, 574 fish from 20 different species were caught in the BSM and EXP nets across the spring, summer, and fall sampling events. Species composition in the spring, summer, and fall sampling events is depicted in **Figure 4-11**, **Figure 4-12**, **Figure 4-13**, respectively. Alewife and Round Goby consistently dominated the catch, accounting for >95% of the total catch in both the west infill and shoreline erosion mitigation areas in the spring and summer. Round Goby, an invasive benthic forage fish species, is abundant near the PN site and throughout Lake Ontario. Other species captured in the BSM nets included the Rainbow Trout, Brown Trout, and Atlantic Salmon, which like the Alewife, make seasonal spawning migrations into the nearshore zone. In the fall, species distributions varied more noticeably across the two net types and nearshore study areas. Round Goby continued to dominate the BSM net catch in both nearshore study areas; however, the shoreline erosion mitigation area exhibited greater species richness. Unlike the west infill area, fish captured here included benthic species such as Brown Bullhead, Yellow Perch, Logperch, Longnose Sucker, and Sculpin, all of which are common along the Lake Ontario shoreline. In the EXP nets, White Sucker and Walleye were commonly captured in the two nearshore areas.

Overall, the total number of fish caught across sampling events and net types was higher in the shoreline erosion mitigation area. Also, 7 unique species were caught in the shoreline erosion mitigation area, and 5 in the west infill area. However, these differences were not explained by species habitat preferences, foraging style and food habits. No species at risk were captured during the nearshore fish community sampling events.

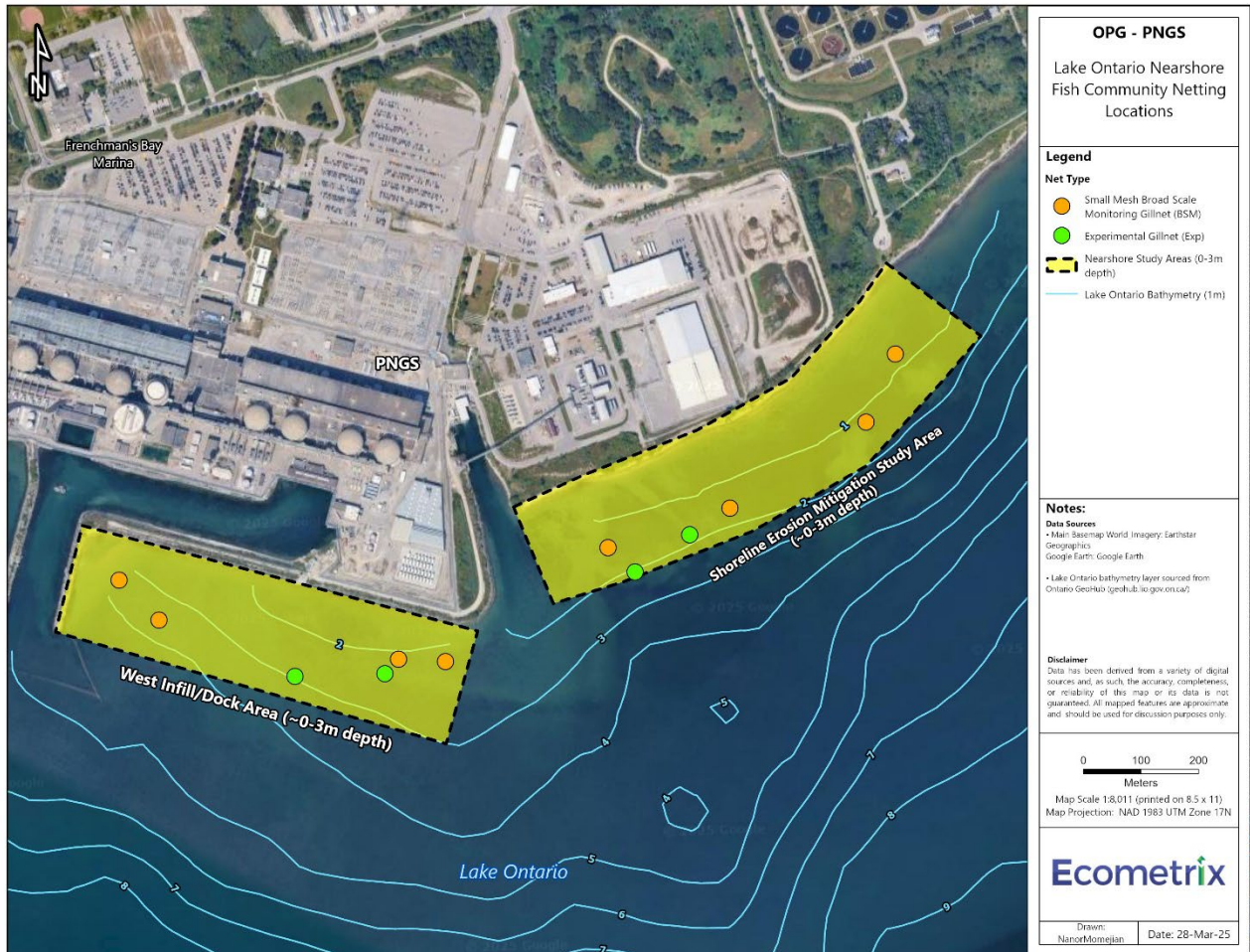


Figure 4-10: Sampling Area for the PNGS Nearshore Fish Community Study, 2024

Notes:

Net sets were set approximately perpendicular to shore at the sampling locations, resulting in sampling depth between 0-3 m depending on water depth. Sampling during each season consisted of two sets of the MNRF small mesh broadscale nets (12.5 m long, 1.8 m high) in each nearshore study area, and one set of the long gillnets (137 m, 1.8 m high, with 9 mesh panels 15.2 m long), resulting in 6 net sets per season.

Table 4-9: Fish Caught (count and %) and Species Richness in 2024 Nearshore Fish Community Study in Shoreline Erosion Mitigation Area and West Infill Area

Fish Species	EXP Nets				BSM Nets				Total
	Shoreline Erosion Mitigation Area		West Infill Area		Shoreline Erosion Mitigation Area		West Infill Area		
	Number	%	Number	%	Number	%	Number	%	
Spring									
Atlantic Salmon	-	-	2	2%	-	-	-	-	2
Alewife	2	33%	96	89%	8	17%	28	35%	134
Brown Trout	2	33%	-	-	-	-	-	-	2
Chinook Salmon	-	-	-	-	-	-	1	1%	1
Rainbow Trout	1	17%	1	1%	-	-	-	-	2
Round Goby	1	17%	9	8%	39	83%	49	62%	98
Threespine Stickleback	-	-	-	-	-	-	1	1%	1
Total Catch	6		108		47		79		240
Relative Total Catch	2.5%		45.0%		19.6%		32.9%		100%
Richness	4		4		2		4		7
Summer									
Alewife	48	81%	-	-	114	65%	20	48%	182
Brown Bullhead	-	-	-	-	1	1%	-	-	1
Coho Salmon	-	-	-	-	1	1%	-	-	1
Rock Bass	1	2%	-	-	-	-	-	-	1
Round Goby	10	17%	1	100%	59	34%	22	52%	92
Total Catch	59		1		175		42		277
Relative Total Catch	21.3%		0.4%		63.2%		15.2%		100%
Richness	3		1		4		2		5
Fall									
Alewife	-	-	-	-	3	11%	-	-	3
Brown Bullhead	-	-	2	18%	1	4%	-	-	3
Brown Trout	1	25%	-	-	-	-	-	-	1
Carp Sp	-	-	1	9%	-	-	-	-	1
Largemouth Bass	-	-	-	-	1	4%	-	-	1
Log Perch	-	-	-	-	1	4%	-	-	1
Longnose Sucker	1	25%	-	-	2	7%	-	-	3
Pumpkinseed	-	-	1	9%	-	-	-	-	1
Rainbow Trout	-	-	-	-	-	-	1	7%	1
Rock Bass	-	-	-	-	1	4%	1	7%	2
Round Goby	-	-	4	36%	15	54%	12	86%	31
Sculpin	-	-	-	-	3	11%	-	-	3
Walleye	1	25%	2	18%	-	-	-	-	3
White Sucker	1	25%	1	9%	-	-	-	-	2
Yellow Perch	-	-	-	-	1	4%	-	-	1

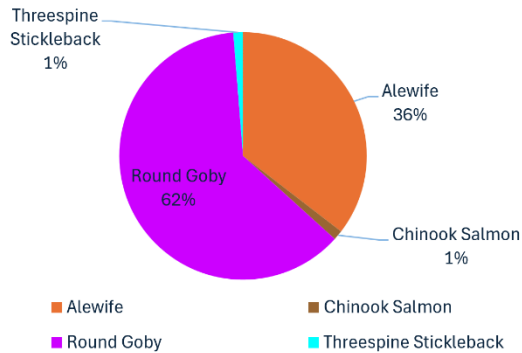
PREDICTIVE ENVIRONMENTAL RISK ASSESSMENT FOR PICKERING REFURBISHMENT,
DECOMMISSIONING, AND CONTINUED OPERATIONS
Summary of Existing Conditions

Fish Species	EXP Nets				BSM Nets				Total
	Shoreline Erosion Mitigation Area		West Infill Area		Shoreline Erosion Mitigation Area		West Infill Area		
	Number	%	Number	%	Number	%	Number	%	
Fall									
Total Catch	4		11		28		14		57
Relative Total Catch	7.0%		19.3%		49.1%		24.6%		100%
Richness	4		6		9		3		15

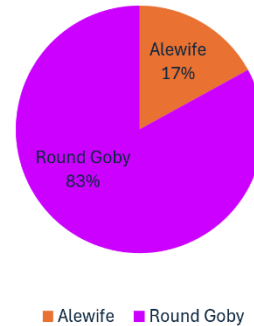
Notes: Total Indicates the total number of fish caught per area, per net type. Relative Total Catch indicates the proportion that the Total Catch makes up of the overall total for all areas and net types combined. Richness indicates the total number of taxa caught per area, per net type.

Broadscale Monitoring (BSM) Nets

West Infill Area

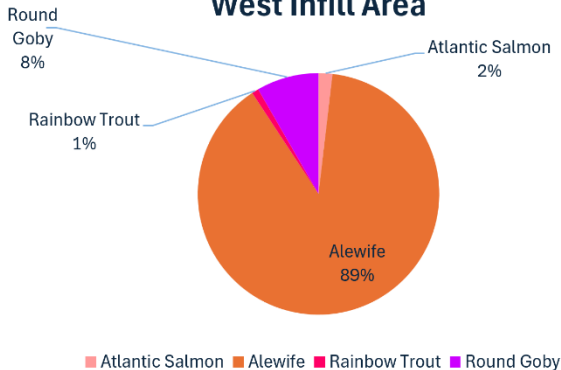


Shoreline Erosion Mitigation Area



Experimental (EXP) Nets

West Infill Area



Shoreline Erosion Mitigation Area

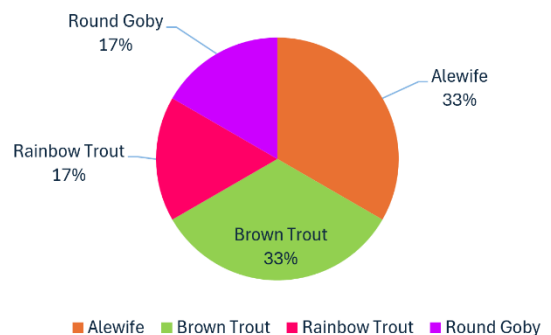


Figure 4-11: Fish Species Composition caught in Broad Scale Monitoring (BSM) and Experimental (EXP) Nets in Shoreline Erosion Mitigation Area and West Infill Area during the Spring sampling event of the 2024 Nearshore Fish Community Study

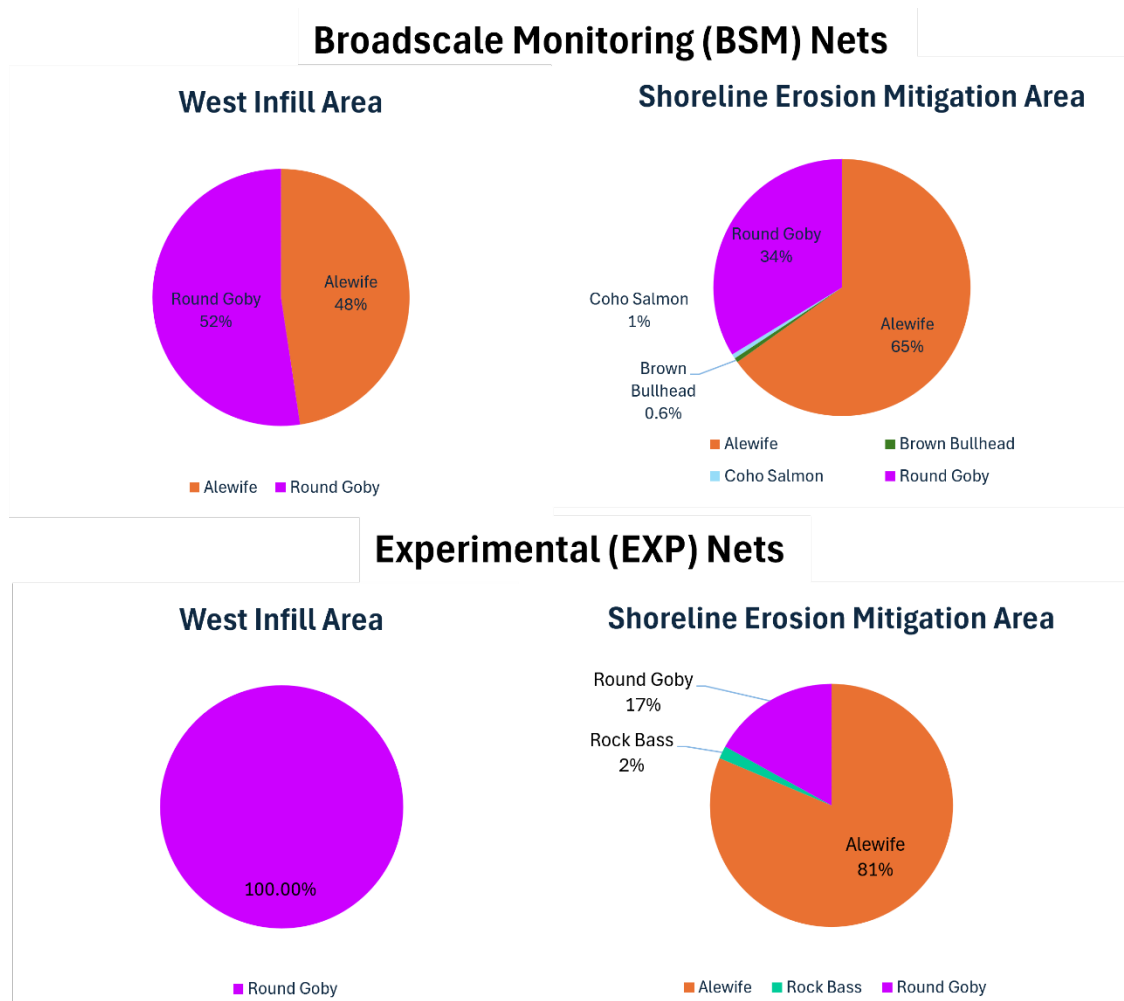
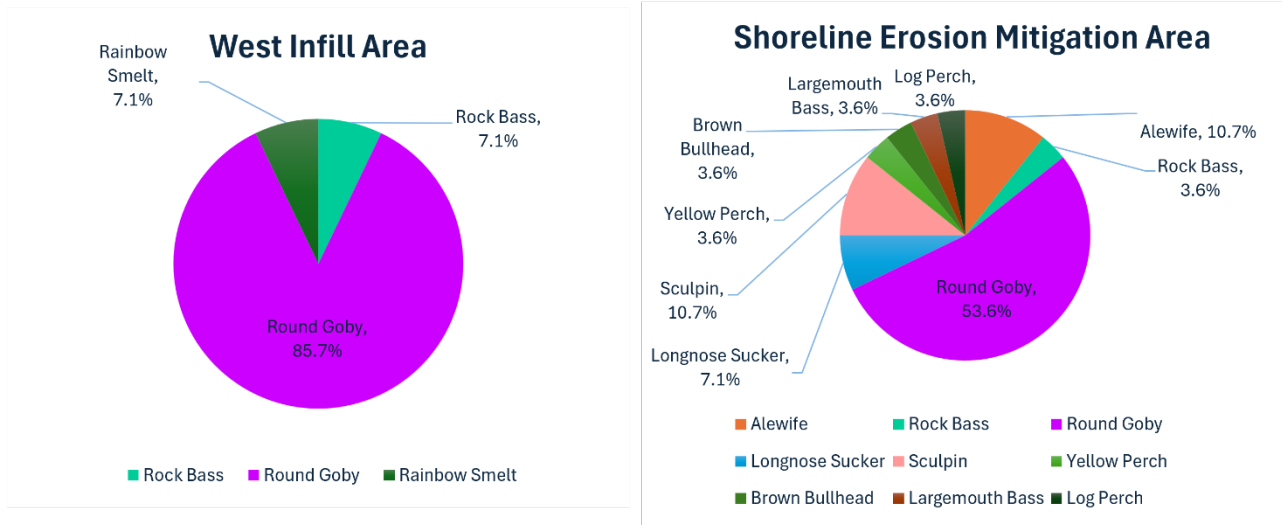


Figure 4-12: Fish Species Composition caught in Broad Scale Monitoring (BSM) and Experimental (EXP) Nets in the Shoreline Erosion Mitigation Area and West Infill Area during the Summer sampling event of the 2024 Nearshore Fish Community Study

Broadscale Monitoring (BSM) Nets



Experimental (EXP) Nets

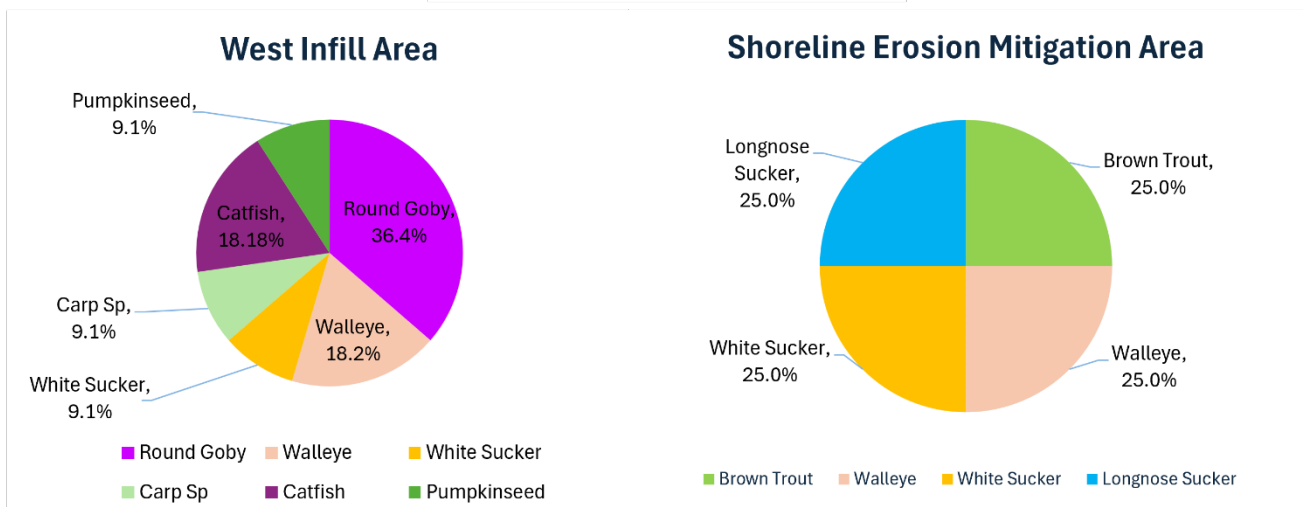


Figure 4-13: Fish Species Composition caught in Broad Scale Monitoring (BSM) and Experimental (EXP) Nets in the Shoreline Erosion Mitigation Area and West Infill Area during the Fall sampling event of the 2024 Nearshore Fish Community Study

4.3.1.2 Fish Tissue

As part of the annual EMP, White Sucker muscle tissue is analyzed for radionuclides (OPG, 2017b, 2018b, 2019d, 2020b, 2023b, 2023a, 2024d). As described in the 2023 EMP report (OPG, 2024d), the average HTO concentration in the tissue of fish from the PN outfall was 4.4 Bq/L, with no significant trend observed over the last decade. In contrast, C-14 levels in these fish averaged 283 Bq/kg-C, showing a small upward trend but remaining low. The majority of the gamma activity in fish from the PN outfall comes from naturally occurring potassium-40. This is followed by Cs-137, with an average concentration of 0.2 Bq/kg, which is consistent with data seen in the last 10 years. Cs-137 is typically present at low levels due to nuclear weapons testing in the early 1960s, and is not associated with reactor operations. Cs-134 and Co-60, which are indicative of reactor operations, were not detected in any fish samples over the last 10 years.

As part of the 2024 environmental sampling program, tissue samples from recreational species targeted and consumed by anglers and First Nations communities were collected during the fish community studies. Based on this, in the spring and fall, samples were collected from Alewife and Lake Trout caught in the planned DWI area (**Figure 4-7**), and Rainbow trout, Atlantic salmon, and Walleye caught in the nearshore regions (**Figure 4-10**). The tissues were analyzed for radionuclides and metals (**Table B-8**). Overall, there was a lot of variability in the concentrations of different parameters amongst the species, with no single species or location exhibiting a consistently higher affinity for metals or radionuclides compared to others. Mean tissue burdens of mercury, methylmercury, and selenium in each species were also compared to their respective guidelines. Mean concentrations of methylmercury in the tissue of Lake Trout and Walleye did exceed the CCME guideline for protection of wildlife consumers of aquatic biota (33 ng/g ww; CCME, 2000). Concentrations of selenium in the tissue of each species was well below the Federal Environmental Quality Guideline (FEQG; ECCC, 2022) for whole-body tissue burdens of selenium for the protection of fish i.e., 6.7 mg/kg dry weight (dw).

The average Cs-137 levels in nearshore and deepwater species are comparable with the past 10 years of data. Gamma spectrometry results are consistent with previous findings, with naturally occurring K-40 comprising most of the activity in fish from both areas (i.e. nearshore regions and deepwater intake areas), while Cs-134 and Co-60 values were below detection limits.

4.3.1.3 Thermal effects

Potential thermal effects of the PNGS thermal plume on fish near the station have been assessed across various studies considering species type (warm water vs coldwater), life stage (i.e. spawning, embryo, larval, juvenile or adult), and effect type (i.e. chronic or acute). The findings of these investigations are detailed extensively in the 2022 PN ERA. This section summarizes key results from these studies, and integrates the most recent temperature data to provide an updated characterization.

4.3.1.3.1 Thermal Plume Effects on Fish Eggs and Larvae

The potential effects of the thermal plume on the early life stages of 4 fish species were evaluated in the Aquatic Environment TSD for the EA for the refurbishment and continued operation of PNGS Units 5-8 (Golder, 2007a). The species assessed included two warm water fish species (Smallmouth Bass and Emerald Shiner) and two cold water species (Round Whitefish and Lake Trout) based on their abundance in the area, and sensitivity to thermal plume effects. A numerical model was used to delineate the thermal regime in various potential habitat areas within the receiving environment, incorporating seasonal and spatial variations in water temperature. The modelled water Maximum Weekly Average Temperatures (MWATs) within the plume were compared to species-specific Maximum Weekly Average Temperature (MWAT) criteria relevant to spawning and embryo-larval development. These criteria represent the upper bound of suitable temperatures for the biological processes under chronic exposure conditions.

In the timeframe relevant to the two warmwater species (April-May), only the discharge channels had modelled MWAT values marginally above MWAT criteria for embryo-larval development of Emerald Shiner. Given that this exceedance was limited to the discharge channels, it likely does not impact the population as a whole. In the winter period, relevant to the Lake Trout, modelled MWAT values above MWAT criteria were found in the discharge channels and at one lake location near the PNGS Units 5-8 discharge, both of which do not represent Lake Trout habitat. Therefore, it was concluded that temperatures in the thermal plume are unlikely to have adverse effects on fish embryo-larval development.

OPG continuously measures the temperatures within the discharge channels, providing data to assess the degree and frequency with which embryo-larval MWAT criteria are exceeded. In the 2022 PN ERA, the rolling 7-day average temperatures from the PNGS Units 5-8 discharge channels were calculated from the instantaneous daily maximum effluent temperatures between 2016-2020 (OPG, 2017c, 2018c, 2019e, 2020c, 2021e), and those exceeding MWAT criteria for the April-May embryo larval period for Smallmouth Bass (24.3°C) and Emerald Shiner (27°C) were counted. Over this 5 year period, there were no occurrences where the 7-day average exceeded MWAT criteria for Emerald Shiner, and only one occurrence for Smallmouth Bass. The results remained fairly consistent after incorporation of thermal data from 2021-2023 (OPG, 2022d, 2023f, 2024h) during which there were no exceedances of MWAT criteria for Emerald Shiner, and 4 exceedances for Smallmouth Bass. Additionally, the duration and degree of these exceedances remained consistent with previous years, with no exceedance persisting for more than 2 consecutive days in late May or exceeding 25.2°C. Thus, as concluded by the 2022 PN ERA, these exceedances are likely not detrimental to reproductive performance or embryo/larval development of these species because they occur infrequently, late in the embryo-larval life stages, and are localized to the discharge channel which spans a small area (0.0062 km²).

In 2013, the potential effects of the PNGS thermal plume on fish spawning and embryo-larval development were qualitatively evaluated by comparing lake temperatures near the PNGS Units 5-8 discharge against the thermal criteria for these physiological processes of 15 species found in the vicinity of PN (Cooper, 2013). Lake temperatures in reference areas (Thickson Point and

Bonnie Brae Point, 20 km east and 26 km east of Pickering Nuclear, respectively) were also compared against these thermal criteria to provide context for natural temperature conditions. Besides MWAT criteria, this study also used Short-Term Daily Maximum (STDM) criteria, which represents upper bound temperatures considered suitable for short periods such as 24 hours. Hazard quotients (HQs) were calculated by taking the measured MWAT or STDM at each location, for the period relevant to each species, and dividing by the MWAT or STDM criterion. HQs are a useful “screening” methodology for thermal effects assessments, where a HQ equal to or greater than 1 indicates the potential for thermal effects.

Of the 15 species evaluated, nine were considered as Valued Ecosystem Components in the 2022 PN ERA. The HQ values relevant to spawning and embryo-larval development for the highest temperature location in the plume area were at least marginally above 1 for five of these species, indicating potential adverse effects from the thermal plume. However, in cases where the HQs were above 1 in the plume area, they were not substantially elevated relative to the reference area. The presence of HQ values above 1 in the reference area may not reflect potential effects in these areas, but rather suggest that some of the thermal criteria used were lower than background levels observed in the lake (possibly due to a general warming trend in the lake since the development of these criteria). Overall, these results indicated that there is no evidence of adverse chronic or acute impacts on fish reproduction and development caused by the thermal plume.

4.3.1.3.2 Thermal Increments and Embryo-larval Survival of Round Whitefish

The effects of the thermal plume on embryo survival of Round Whitefish was quantitatively evaluated in 2018 (OPG, 2018d). Round Whitefish were chosen for the study as these fish spawn nearshore on coarse substrate in late fall, with eggs hatching in early spring. The embryos of this species are also particularly sensitive to elevated water temperatures during the winter months, making them susceptible to elevated plume temperatures. Using temperature data from Round Whitefish spawning beds over the 2009-2010, 2010-2011 and 2011-2012 embryo-larval incubation periods (OPG, 2010, 2012b, 2013a), a thermal survival model was generated to estimate survival losses in Block 1 (i.e., the early incubation period) and Block 3 (i.e., the late incubation period). The estimated survival loss at the plume stations compared to the reference stations (Thickson Point and Bonnie Brae) was below the CNSC threshold no-effect level of 10% for Round Whitefish embryo survival loss in all years. Following this, data from two years of additional monitoring over the winters of 2018-2019 and 2019-2020 was also incorporated into the model (OPG, 2021f). Across both years, the largest relative survival loss observed was well below the 10% survival loss threshold. Therefore, no chronic adverse effects are expected from the thermal plume on Round Whitefish egg survival.

As mentioned by OPG (OPG, 2018b), acute threshold temperatures for Round Whitefish embryos are not available. Although not designed to develop an acute threshold, a study that continuously exposed Round Whitefish embryos to 7°C found no increases in acute mortality in either Block 1 or Block 3 (Griffiths, 1980). However, continuous exposure at 10°C did result in increased mortality in both developmental stages. The study also tested the impacts of

temperature cycles, where the embryos were exposed to 7°C for 18 hours and 10°C for 6 hours each day, which resulted in increased mortality in Block 1 (50% survival after 17 days) and Block 3 (16% survival after 30 days). Though there are limitations to interpreting these findings as the experimental thermal regimes do not necessarily reflect the behavior of the plume, it can be postulated that 50% mortality could occur between 7°C and 10°C provided that the exposure time is of sufficient duration. Accordingly, OPG has chosen a conservative value of 6°C for plume temperature above which acute temperature effects could occur. Though short-term exceedances of this temperature were found to occur between December 2018 and March 2019, they were not expected to have any effects on the Round Whitefish development as they were transient and occasional (OPG, 2020b).

4.3.1.3.3 Thermal Plume Effects on Juvenile and Adult Fish

As a part of the Aquatic Environment TSD for the EA for the refurbishment and continued operation of the PNGS Units 5-8 (Golder, 2007a), the potential effects of the thermal plume on juvenile and adult stages of the 4 species evaluated were also assessed. The modelled water MWATs did not exceed associated criteria for growth of juveniles and adults of Round Whitefish and Lake Trout at the time that they are present in the nearshore area (mid-November to early December for Round Whitefish and mid-November to April for Lake Trout). In contrast, the modelled water MWATs marginally exceeded (by less than 1°C) the criteria for Smallmouth Bass occasionally at one lake location near the PNGS Units 5-8 discharge over the period that these fish would potentially be exposed to the thermal plume. Given that these exceedances occurred only in the surface water and not in the deeper waters where the fish primarily reside, it is unlikely that they would be exposed to temperatures that would negatively impact growth.

As highlighted earlier, OPG continuously measures the temperatures in the discharge channels. The rolling 7-day average temperatures near the PNGS Units 5-8 discharge from 2016-2020 (OPG, 2017c, 2018c, 2019e, 2020c, 2021e) were compared to the MWAT criteria for Smallmouth Bass and Emerald Shiner. There were 18 occurrences between 2016 and 2020 when the 7-day average exceeded the 30°C MWAT criterion for Emerald Shiner, with an average duration of 16 days. Similarly, there were 15 occurrences when the 7-day average exceeded the 32°C MWAT criterion for Smallmouth Bass, with an average event duration of 10 days. The number of occurrences that exceeded the MWAT criteria for both species as well as the average duration of these exceedances were slightly higher between 2021-2023 (OPG, 2022d, 2023f, 2024h). Specifically, there were 10 exceedances of the Emerald Shiner MWAT criterion, with an average duration of 15.5 days. For Smallmouth Bass, there were 8 exceedances of the MWAT criterion, with the average event lasting 24 days. However, these exceedances are not considered detrimental for growth of Smallmouth Bass or Emerald Shiner because they are occasional and localized to the discharge channel. Additionally, unlike the embryonic and larval stages, juvenile and adult fish can use behavioural thermoregulatory strategies such as moving in and out of the discharge channel to optimize exposure to these temperatures.

As a part of the quantitative evaluation of the potential effects of the PNGS thermal plume on the 15 species found in the vicinity of PN, the effects on juvenile and adult growth were also

assessed (Cooper, 2013). As with the developmental stages, HQs were calculated by taking the measured water MWAT or STD, for the seasonal period relevant to each species, and dividing by the MWAT or STD criterion. Of the nine species considered as Valued Ecosystem Components in the 2022 PN ERA, the highest HQs were only marginally above 1 in the plume for Lake Trout. However, these values were less than or equal to the reference values. Therefore, it is unlikely that there are any chronic or acute effects arising from the thermal plume on juvenile or adult stages of any fish species.

4.3.1.3.4 Thermal Plume Contribution to Winter Cold Shock

Cold shock in fish can occur either due to natural changes in water temperature, or can be induced by a reduction in temperature when the number of operating units declines, or when fish pass through the thermal plume and encounter a high thermal gradient between plume and ambient conditions. For example, during an outage, thermal additions to receiving water can be rapidly curtailed, such that water temperature in the plume decline more rapidly than fish are able to acclimate to lower temperatures (Coutant, 1977). Unless induced by natural events, cold shock is likely to occur only during a full station outage, which occurs infrequently. However, OPG takes into consideration the effects of cold shock in the planning and scheduling of the shutdown of PNGS units and will incorporate appropriate mitigative measures if needed such that the rate of lowering water temperature is unlikely to result in any significant effects to fish. OPG is currently evaluating the potential for natural and operationally induced cold shock at PN and are in discussion with DFO on this topic.

4.3.1.3.5 Thermal stratification in Lake Ontario

During the 2024 Deepwater Fish community and Macrozooplankton community studies, temperature measurements were taken at 1 m increments throughout the water column before each net set and lift to characterize thermal stratification in the proposed DWI area.

Thermal profiles generated from data collected during all three sampling events (i.e., spring, summer, and fall) for the Deepwater Fish community are presented in **Figure 4-14**. In the spring, thermal stratification was beginning to develop. A mixed epilimnion layer generally occurred at 0 to 2 m, however the level of mixing was variable, with notable temperature differences present within this upper layer. Temperature variation within the metalimnion (2 to approximately 14 m) ranged from approximately 15.0°C to 7.5°C, however there was little evidence of a defined thermocline. The divide between the metalimnion and the hypolimnion was not clearly defined.

In the summer, thermal stratification patterns were variable due to high winds on one of the sampling days. Prior to the weather event (i.e., for samples collected in sampling matrices S1, S2, S5, and S6), a mixed epilimnion layer was present between approximately 0 to 2 m depth with a distinct thermocline present at approximately 3 m depth within the metalimnion. Temperature continued to decrease gradually within the metalimnion until approximately 10 to 12 m where the hypolimnion was observed. Following the weather event (i.e., for sampling matrices S7, S4, S8, S1 Dup, S6 Dup), temperature change throughout the water column was more constant with little distinction between the various layers.

Thermal stratification patterns observed during the fall sampling event were variable between late-October (i.e., for sampling matrices S2, S4, S6, S8, and S9) and late-November (i.e., for sampling matrices S1, S2 Dup, S4 Dup, S9 Dup). Though surface temperatures were similar between the two months, some stratification was observed in the November profiles with a distinct thermocline present at approximately 2 m depth. To the contrary, October profiles showed much weaker stratification.

The thermal profiles from the three sampling events for the Macrozooplankton community study are shown in **Figure 4-15**. In the spring sampling event, there was little evidence of a significant temperature stratification throughout the water column, with no mixing observed within the upper layers. Temperature was quite variable between 0-2 m depth, ranging from 14.5° - 10.6°C, followed by a more gradual temperature change within the remainder of the metalimnion (2-14 m). The hypolimnion was observed at depths below 14 m at temperatures in the range of 9.3°C to 9.5°C.

In the summer, there was no mixing observed within the upper layer of the water column, instead a high degree of temperature change was observed between 0 to 2 m depth. Within the remainder of the metalimnion (2-18 m) a well mixed layer was present from approximately 2 to 13 m depth, followed by a distinct deepwater thermocline observed from approximately 13 to 14 m (18 m at deepest locations). The hypolimnion was observed at depths of approximately 18 m.

In the fall, there was no evidence of temperature stratification throughout the water column, with no mixing observed within the upper layers. Temperature was quite variable between 0-3 m depth. This was by a more gradual temperature change within the remainder of the metalimnion (3-14 m) from 11.2°C to 10.5°C. The followed hypolimnion was observed at depths below 14 m.

Across all three seasons in both studies, the temperature at depths of 10.5-12 m (the proposed range for the planned DWI, with the exact depth to be determined) is 3-5°C lower than surface temperatures. The implications of the change in the temperature of water being drawn in through the intake on the thermal plume, and potential effects on aquatic biota are further evaluated in **Section 5.3.3.1.2**.

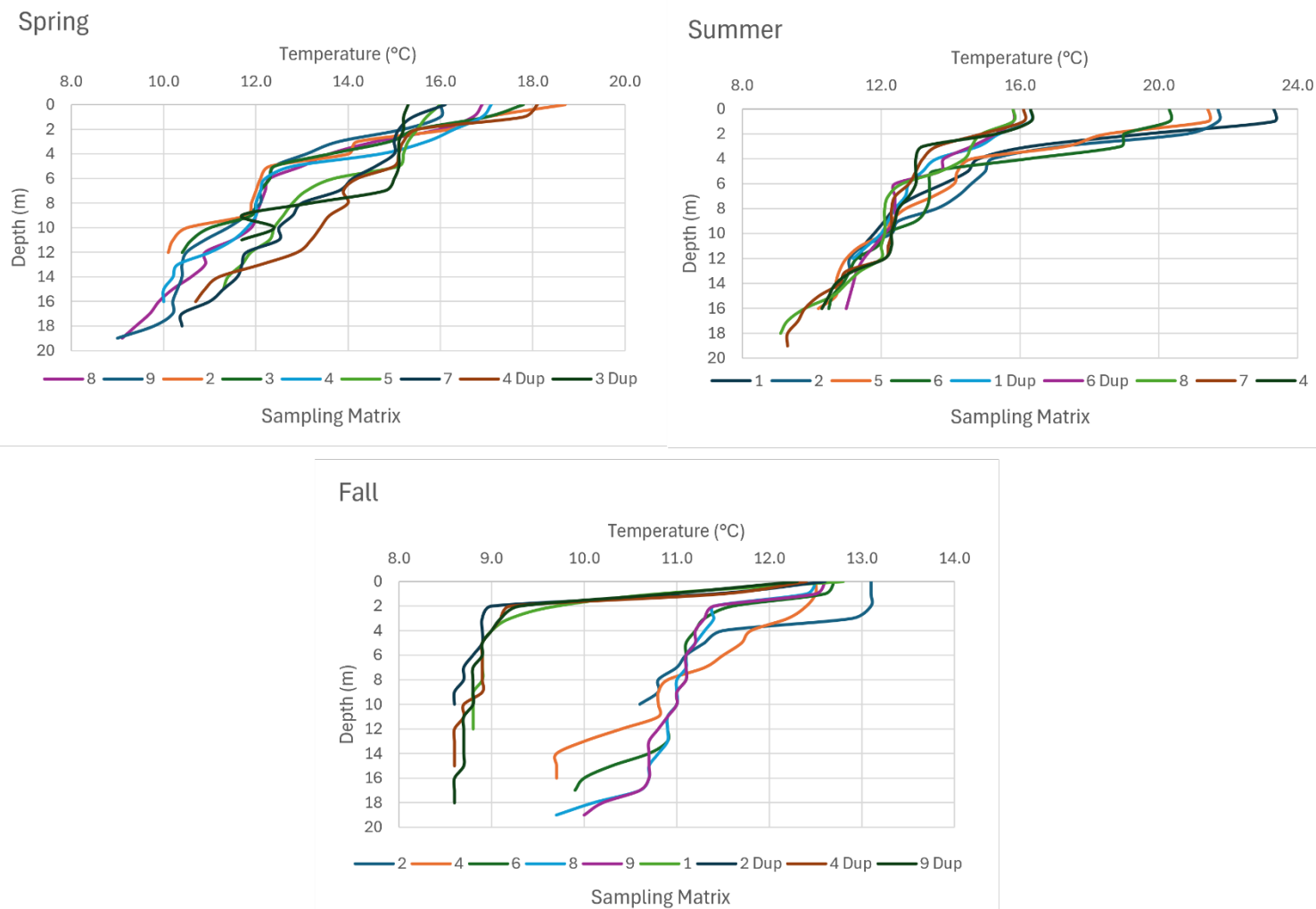


Figure 4-14: Water Temperature Profiles across the three Deepwater Fish community sampling events in 2024

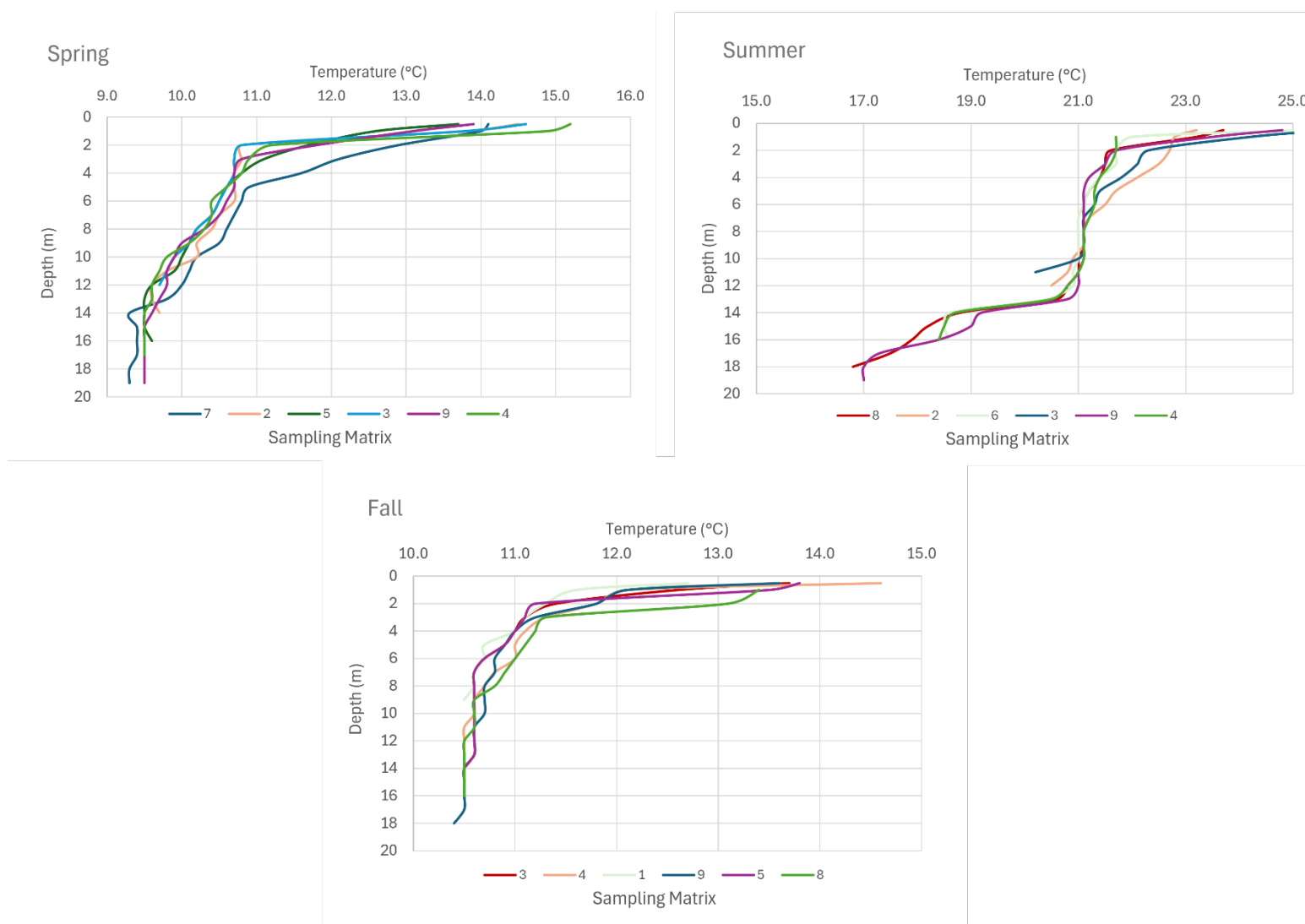


Figure 4-15: Water Temperature Profiles across the three Macrozooplankton Community sampling events in 2024

4.3.1.4 Entrainment and Impingement

In 2009, in response to an order by the CNSC to reduce impingement by 80%, OPG installed a fish diversion barrier net, which has demonstrated effectiveness in reducing fish impingement at PNGS (Patrick et al. 2014). A Fisheries Act Authorization (FAA) for PNGS operational activities was issued to OPG by DFO in 2018, requiring OPG to submit an annual impingement monitoring report to the DFO. The authorization also stipulates that consultation is required if the combined biomass of all species and ages impinged exceeds 3,619 kg/yr for two consecutive years (OPG, 2021d). In 2016, biomass lost to impingement was 88% lower than the levels recorded prior to the installation of the FDS. Exceedances of the two-year threshold were found in 2018-2019, prompting notification to DFO. However, these exceedances were likely not caused by PNGS operation but rather a cold shock event. Low temperature stress (cold shock/stress) is an often-overlooked challenge that many fish face as a result of both natural events and anthropogenic activities (Reid et al. 2022). The high impingement rate in 2018-2019 was primarily attributed to a polar vortex in January which caused water temperatures to plunge below 2°C and led to the formation of frazzle ice in the intake forebay. Primarily, Gizzard Shad were impinged during this period, and this species is known to be susceptible to “cold shock” at or below 2°C (Patrick, 2020). From 2020 to 2022, impingement estimates were below the threshold (OPG, 2021c, 2022c, 2023d). Alewife, Gizzard Shad, and Common Carp were the most commonly impinged species, consistent with prior years.

The CNSC also mandated OPG to reduce entrainment by 60% (OPG, 2012c). There is no feasible retrofit solution to achieve this; however, the proposed offshore intake location and further mitigation measures (described in **Section 5.3.2.1.2**) should reduce fish entrainment. Estimated ichthyoplankton entrainment losses at PNGS between 1975 and 2006 were summarized by (OPG, 2012d). During the most recent entrainment monitoring study at PNGS (undertaken in 2006), Alewife, Common Carp, and Freshwater Drum eggs and larvae; and Round Goby larvae were reported. All the species are invasive to Lake Ontario, with exception of Freshwater Drum (Morrison, 2019). It is acknowledged that Alewife and Common Carp entered Lake Ontario many decades ago and have since naturalized. Round Goby, however, remain a Regulated Species, and are excluded from the 2018 FAA value for the PNGS.

An updated entrainment monitoring program was initiated in October 2024 to meet Condition 3.2.3 of the 2018 FAA. The objective of the program was to quantify the impact of entrainment at PNGS with the existing shoreline intake. The 12-month program adheres to the guidelines recommended by Electric Power Research Institute (EPRI) (EPRI, 2014) and CSA for entrainment sampling at nuclear facilities in Canada including DNGS (CSA, 2018, 2024, Patrick et al. 2021). The program is comprised of 60 sampling events with both daytime and nighttime collections conducted in a 24-hour period once a week from October 2024 to April 2025. From April to August 2025, sampling will occur twice weekly from April to August 2025 to target peak entrainment periods identified from previous studies (Golder, 2005, 2007a). Entrained eggs, larvae, and fish are identified to the lowest practical taxonomic level using taxonomic keys and/or genetic barcoding. As part of the entrainment program, benthic sled surveys will be conducted in Summer 2025 to identify larval fish and eggs in the DWI area, along with vertical

tows to assess other entrainable organisms throughout the water column. Losses from entrainment are currently being offset by measures approved in the FAA. These measures include allocation of a portion of the OPG Big Island Wetland habitat bank, stocking of Atlantic Salmon in Duffins Creek, and the construction and monitoring of the Simcoe Point Wetland.

4.3.2 Benthic Macroinvertebrates

As highlighted in the 2022 PN ERA, the benthic community along Lake Ontario's north shore reflects the severe conditions of an exposed coast, and is dominated by oligochaetes and chironomids (Golder, 2007a). These taxa had higher abundances at sites within or close to the PNGS Units 1-4 thermal plume than at reference sites. Additionally, species diversity at depths of 6–10 m was lower in the plume than at reference sites. Historically, gastropods and bivalves were scarce in the nearshore due to wave abrasion and/or unsuitable substrates, but invasive species such as zebra mussels and quagga mussels have colonized these areas in the last few decades (Golder, 2007a). The aquatic macroinvertebrate communities in wetlands near PNGS were studied as part of a wetland monitoring project from 2002 to 2007 (EC, 2009a). The study used Indices of Biological Integrity (IBI) to assess and compare wetland conditions. The IBI values for macroinvertebrate communities were derived using measures of species richness and relative abundance. Durham Region's aquatic macroinvertebrate communities in wetlands were in poorer condition compared to some other Lake Ontario wetlands. Around the PN site in particular, aquatic macroinvertebrate communities at the Hydro Marsh, Frenchman's Bay and Duffins Creek Marsh were rated "poor", "fair", and "good" respectively (EC, 2009b).

To obtain an updated characterization of the benthic macroinvertebrate community near the proposed DWI location and the nearshore study areas for this PERA, benthic samples were collected as part of the 2024 aquatic studies. Benthic macroinvertebrates were collected using standard ponar grab in the same study area used for the Deepwater Fish Community survey (**Figure 4-7**) with samples collected from grids S4, S7, S8, and S9 at depths of 17-19 m. Similarly, samples were collected from 10 stations in the nearshore areas, with the stations presented in **Figure 4-6**. Benthic macroinvertebrate Lowest Practical Level (LPL) densities at all stations are provided in **Table B-9**. Various metrics, including total invertebrate density, taxonomic richness, Simpson's Evenness, Simpson's Diversity, and relative density that were computed using the samples to provide a comprehensive assessment of the community's structure and diversity are discussed below.

4.3.2.1 Proposed DWI Area

Calculated benthic macroinvertebrate metrics are presented in **Table 4-10** for deepwater samples. Density ranged from 2,462 (S9) to 7,552 (S8) organisms/m². LPL richness ranged from 13 taxa in S8 to 21 taxa in S9. All stations had relatively diverse communities, with Simpson's Diversity values ranging from 0.59 in S9 to 0.84 in S4 indicating a variety of species present at all stations. The communities were not very evenly distributed with Simpson's Evenness values ranging from 0.12 at S9 to 0.45 at S4. These low evenness values are likely due to the high

proportion of crustaceans, specifically copepods belonging to Order Harpacticoida, found at each sampling station.

Communities in S9, S8, and S7 were dominated by copepods such as O. Harpacticoida, followed by worms from Phylum Nemata for S9, and Oligochaetes for S8 and S7. S4 was dominated by Oligochaetes, closely followed by O. Harpacticoida.

All Cl. Bivalvia organisms were *Dreissena bugensis*, otherwise knowns as the Quagga mussel. This invasive dreissenid mussel species was observed in three of the four deepwater samples, but only made up 4.8 to 12.8% of the overall community composition in the samples it was observed. As noted, sampling with a ponar targets finer sediments whereas mussels tend to prefer attachment to hard substrates. Consequently, the numbers of mussels noted in the samples collected are not likely reflective of the overall presence of mussels in the entirety of the deepwater study area. Sampling of the deepwater area with the benthic sled in 2025 will help provide a more complete indication of the benthic community the variety of mixed substrate habitats present.

Therefore, the deepwater benthic community was predominantly composed of O. Harpacticoida, P. Nemata, Cl. Oligochaeta, and O. Diptera (primarily Chironomidae), consistent with findings from previous studies in the area (Golder, 2007a).

Table 4-10: Benthic Macroinvertebrate Community Metrics in Samples collected from Deepwater Area, 2024

Station		SED-1	SED-2	SED-3	SED-4
Grid		S9	S8	S7	S4
Density (organisms/m ²) ^a		2,462	7,552	2,921	3,623
Richness (LPL)		21	13	18	14
Simpson's Diversity ^b		0.59	0.76	0.73	0.84
Simpson's Evenness ^c		0.12	0.33	0.21	0.45
Major Taxonomic Group (% Composition)	P. Nemata	13.99	8.78	13.97	4.23
	Cl. Oligochaeta	3.63	16.22	17.90	46.48
	Cl. Arachnida	2.33	4.05	0.44	0.70
	O. Harpacticoida	61.92	42.57	47.16	28.17
	Cl. Ostracoda	3.89	9.46	0.44	8.45
	Cl. Entognatha	0.00	0.00	0.44	0.00
	O. Diptera	7.77	6.08	14.85	11.97
	Cl. Gastropoda	0.52	0.00	0.00	0.00
	Cl. Bivalvia	5.96	12.84	4.80	0.00
Major Taxonomic Group (Density, organisms/m ²)	P. Nemata	344.45	663.38	408.23	153.09
	Cl. Oligochaeta	89.30	1224.69	523.05	1683.95
	Cl. Arachnida	57.41	306.17	12.76	25.51
	O. Harpacticoida	1524.49	3214.82	1377.78	1020.58
	Cl. Ostracoda	95.68	714.40	12.76	306.17
	Cl. Entognatha	0.00	0.00	12.76	0.00
	O. Diptera	191.36	459.26	433.75	433.75
	Cl. Gastropoda	12.76	0.00	0.00	0.00
	Cl. Bivalvia	146.71	969.55	140.33	0.00

Notes:

P. = Phylum, Cl. = Class, O. = Order

LPL = Lowest Practical Level

 a - Total invertebrate density was determined as the total number of individuals of all taxonomic categories collected at a station expressed per unit area (numbers/m²).

b - Simpson's Diversity is a measure of the diversity of a biological community. It considers both species richness (the number of different species present) and species evenness (the relative abundance of each species). Calculated at the LPL.

c - Simpson's Evenness is an expression of how equitably taxa are represented within a given sample. Evenness ranges from zero to one (one representing a sample in which all taxa have the same abundance). Calculated at the LPL.

4.3.2.2 Proposed Shoreline Erosion Mitigation and West Infill areas

Calculated benthic macroinvertebrate metrics for the ten stations sampled in the nearshore areas are presented in **Table 4-11**. Densities in these samples ranged from 19 (Infill-8) to 1,990 organisms/m² (Infill-1). LPL richness ranged from 2 (Infill-5) to 20 (Infill-9). Most stations had medium to high species diversity with Simpson's Diversity values greater than 0.50, apart from stations 1 (0.41), 2 (0.45), 4 (0.37), and 5 (0.49). Excluding those stations, Diversity values ranged from 0.67 to 0.91. Evenness was varied among stations, with some stations having low Simpson's Evenness values, such as station 1 (0.17) and station 4 (0.18), and some stations having very high evenness values, such as station 5 (0.97), 6 (0.84) and 8 (1.00).

Sampling stations 1, 2 and 4 had very high proportions of Oligochaetes, while stations 3 and 10 were dominated by Bivalves. Station 5's community was close to even with only two taxa present, Arachnids and Ostracods. Stations 6, 7, and 9 were dominated by Dipterans, mostly consisting of Chironomids. Station 8 only had 3 taxa present which were completely evenly distributed, consisting of Cl. Arachnida, O. Diptera, and Cl. Bivalvia.

Dreissenid mussel made up the entirety of the Cl. Bivalvia organisms identified. Only Quagga mussels were able to be identified to species level, whereas the rest of the dreissenids were identified as immature and could include both Quagga and Zebra mussel species. Dreissenids made up a higher proportion of the benthic invertebrate communities in the Infill stations compared to the deepwater stations with proportions ranging from 0.56% to 50%. This finding is supported by the aquatic habitat assessments conducted in 2024 (detailed in **Section 4.3.4**), where dreissenid mussel coverage was estimated in the nearshore region to evaluate habitat quality and quantity before the construction of shoreline erosion mitigation and west infill areas. Sparse (<25% coverage) to moderate (25–75% coverage) dreissenid mussel densities were observed in areas with larger substrate materials.

Therefore, the composition of the nearshore benthic community is consistent with previous studies in the area and reflects the habitat characteristics and severe conditions of the exposed coastline (Golder, 2007a).

Table 4-11: Benthic Macroinvertebrate Community Metrics in Samples Collected from Nearshore study areas, 2024

Station		1	2	3	4	5	6	7	8	9	10
Density (organisms/m ²)		1,990	1,129	1,301	491	38	153	249	19	549	179
Richness (LPL)		10	7	12	9	2	6	10	3	20	7
Simpson's Diversity		0.41	0.45	0.76	0.37	0.49	0.80	0.81	0.67	0.91	0.75
Simpson's Evenness		0.17	0.26	0.35	0.18	0.97	0.84	0.53	1.00	0.55	0.57
Major Taxonomic Group (% Composition)	P. Nemata	1.92	0.56	3.92	3.90	0.00	0.00	5.13	0.00	13.95	3.57
	Cl. Oligochaeta	92.95	96.61	31.37	84.42	0.00	12.50	23.08	0.00	38.37	3.57
	Cl. Arachnida	0.00	0.56	0.00	0.00	58.33	8.33	2.56	33.33	2.33	35.71
	Cl. Ostracoda	0.00	0.00	7.84	2.60	41.67	0.00	0.00	0.00	0.00	0.00
	O. Amphipoda	0.00	0.00	0.00	1.30	0.00	0.00	0.00	0.00	0.00	0.00
	Cl. Entognatha	0.00	0.00	0.00	0.00	0.00	0.00	2.56	0.00	0.00	0.00
	O. Diptera	3.21	1.69	9.80	6.49	0.00	50.00	53.85	33.33	38.37	7.14
	Cl. Bivalvia	1.92	0.56	47.06	1.30	0.00	29.17	12.82	33.33	6.98	50.00
Major Taxonomic Group (Density, organisms/m ²)	P. Nemata	38.27	6.38	51.03	19.14	0.00	0.00	12.76	0.00	76.54	6.38
	Cl. Oligochaeta	1849.80	1090.74	408.23	414.61	0.00	19.14	57.41	0.00	210.49	6.38
	Cl. Arachnida	0.00	6.38	0.00	0.00	22.33	12.76	6.38	6.38	12.76	63.79
	Cl. Ostracoda	0.00	0.00	102.06	12.76	15.95	0.00	0.00	0.00	0.00	0.00
	O. Amphipoda	0.00	0.00	0.00	6.38	0.00	0.00	0.00	0.00	0.00	0.00
	Cl. Entognatha	0.00	0.00	0.00	0.00	0.00	0.00	6.38	0.00	0.00	0.00
	O. Diptera	63.79	19.14	127.57	31.89	0.00	76.54	133.95	6.38	210.49	12.76
	Cl. Bivalvia	38.27	6.38	612.35	6.38	0.00	44.65	31.89	6.38	38.27	89.30

Notes:

P. = Phylum, Cl. = Class, O. = Order

LPL = Lowest Practical Level

 a - Total invertebrate density was determined as the total number of individuals of all taxonomic categories collected at a station expressed per unit area (numbers/m²).

b - Simpson's Diversity is a measure of the diversity of a biological community. It considers both species richness (the number of different species present) and species evenness (the relative abundance of each species). Calculated at the LPL.

c - Simpson's Evenness is an expression of how equitably taxa are represented within a given sample. Evenness ranges from zero to one (one representing a sample in which all taxa have the same abundance). Calculated at the LPL.

4.3.3 Plankton Communities

As discussed in the 2022 PN ERA, plankton communities in Lake Ontario near the PN site have undergone significant changes over the past 30 years due to factors unrelated to PNGS operations (EC, 1998; Ecometrix, 2023a). Since the 1970s, phytoplankton biomass has declined considerably, presumably due to phosphorus reduction programs and the colonization of zebra mussels. Similarly, an overall decrease in algal density has been observed (Winter et al., 2012), with diatoms currently dominating the community. Zooplankton community composition has remained stable since the 1960s, and is primarily comprised of the cladocerans *Bosmina* and *Daphnia* (Barbiero et al., 2001; Barbiero and Tuchman, 2001; Lampman and Makarewicz, 1999).

As a part of the macrozooplankton community study conducted in 2024 plankton tow nets were used to collect macroinvertebrate samples from the proposed DWI area depicted in **Figure 4-7** to get an updated characterization of the existing free-floating invertebrate community in the area and identify potentially entrainable organisms (besides ichthyoplankton). The sampling program comprised of a spring, summer, and fall event, with six locations sampled per event. These six locations comprised three depth strata (12-14, 14-16 and 16-18 m), with two locations sampled at each.

Proportions of major macrozooplankton groups in samples from the spring, summer, and fall sampling events are presented in **Table 4-12**. A detailed composition of the macrozooplankton community in each sample is provided in **Table B-10**. Of the major groups identified, Cladocera were the most abundant in the spring and summer samples (>82% of total community composition), which is consistent with the findings previous studies of zooplankton communities in the area (EC, 1998; Barbiero et al., 2001). This was followed by Calanoida, and Cyclopoida. Mysida were the least abundant group in the spring (<1% of total composition) and were not recorded in any of the summer samples. Unlike spring and summer, Calanoida made up the majority of the community in the five out of six samples (56-79% of total community composition) in the fall. The most common cladoceran species in the samples included *Daphnia sp.*, *Leptodora sp.*, *Bythotrephes sp.*, and *Cercopagis sp.*, and the most common calanoidan species included *Skistodiaptomus sp.*, *Leptodiaptomus sicilis* and *Epischura sp.*

A summary of parameters such as density (no. of organisms/L), BPUE, family-level taxa richness, and Simpson's Diversity from the samples collected in the spring, summer, and fall are presented in **Table 4-13**, **Table 4-14**, **Table 4-15**, respectively. During the summer sampling program, algal mats were present that were inhabited by three species of Cladocera (*Bythotrephes sp.*, *Cercopagis sp.*, and *Leptodora sp.*), which significantly influenced the abundance and biomass of the samples collected. As such, density, biomass per unit effort, and Simpson's Diversity are presented both with and without organisms found in algae in **Table 4-14**. To determine if and how the macrozooplankton community varied through time (i.e., season) or by depth within the study area, metrics of richness (lowest-practical-level, or LPL, and family-level), diversity (family-level), and abundance (Density in #/L and Biomass in mg/L) were compared using Generalized Linear Models (GLMs). Results are detailed in **Table B-11**, and presented in **Figure 4-16**.

Results indicated that, excluding organisms associated with algae, there was no influence from depth on macrozooplankton community metrics; however, all metrics were significantly influenced by season. Specifically, LPL richness was significantly different across all three sampling seasons, and was highest in the summer and lowest in the fall. For family richness, no difference was observed between spring and summer, and both seasons were had significantly greater richness than observed in fall. Although density was significantly influenced by seasonal effects and fall had the highest mean density observed, between season comparisons did not show any differences due to high variability between the replicates. Finally, diversity at the family level was significantly highest in the summer, and no difference was observed between spring and fall. The seasonal differences in diversity and richness indicate fluctuations in communities in the DWI area throughout the year, potentially due to seasonal variability in the timing of various zooplankton species peaks as well as the influence of lake currents, which are known to affect macrozooplankton distribution. When consideration of organisms associated with algae was given, similar significant seasonal effects were observed in density, biomass, and diversity; however, diversity was also significantly influenced by depth, whereby the metric increased 0.034 at every 1 m depth interval.

The seasonal differences in diversity and richness indicate fluctuations in communities in the deepwater area throughout the year, potentially due to seasonal variability in the timing of various zooplankton species peaks. In addition, lake currents, which are known to affect macrozooplankton distribution, can have a significant influence on species distributions. When consideration of organisms associated with algae was given, similar significant seasonal effects were observed in density, biomass, and diversity; however, diversity was also significantly influenced by depth. This increase in diversity at depth was driven by the presence of three additional species, and this effect was only apparent though in the summer when algal mats were observed.

Overall, the macrozooplankton community went through seasonal changes as expected, but did not appear to be influenced by depth when algal mats were not present. This would imply that the placement of the deepwater intake does not need to take depth into consideration with regard to macrozooplankton communities.

**Table 4-12: Proportions of Major Macrozooplankton Groups in Samples from 2024
Macrozooplankton Community Study**

Spring						
Group	S2	S3	S4	S5	S7	S9
Cladocera	87.6	95.5	83	81.6	82.1	93.1
Calanoida	11.2	4.5	14.1	15.8	14.3	4.6
Cyclopoida	1.2	0	2.2	2.5	3.2	2.3
Mysida	0	0	0.7	0	0.4	0
Total	100	100	100	100	100	100
Summer						
Group	S2	S3	S6	S4	S8	S9
Cladocera	98.7	97.8	97.7	96.5	97.5	97.1
Calanoida	1	1.2	2	3.5	2.1	1.9
Cyclopoida	0.3	1	0.3	0	0.3	1
Mysida	0	0	0	0	0	0
Total	100	100	100	100	100	100
Fall						
Group	S1	S3	S4	S5	S8	S9
Cladocera	21.43	77.49	34.76	44.3	34.59	35.94
Calanoida	78.57	22.51	65.24	55.7	65.41	64.06
Cyclopoida	0	0	0	0	0	0
Mysida	0	0	0	0	0	0
Total	100	100	100	100	100	100

Table 4-13: Summary Statistics for Calculated Macrozooplankton Metrics, Spring 2024

Station	Station Depth (m)	Richness-LPL	Richness-Family	Density (#/L)	Biomass (dw mg/L)	Simpson's Diversity-Family
S3	12.4	5	5	0.0122	0.00006	0.93
S2	14.5	7	7	0.0264	0.00019	0.81
S5	16.9	10	8	0.0423	0.00029	1.24
S4	17.4	8	8	0.0176	0.00019	1.16
S7	19.3	11	9	0.0328	0.00033	1.34
S9	19.4	7	8	0.1488	0.00095	0.79
Minimum	12.4	5	5	0.0122	0.00006	0.79
Median	17.2	8	8	0.0296	0.00024	1.04
Mean	16.7	8.2	7.5	0.0467	0.00033	1.04
Standard Deviation	2.8	2.1	1.4	0.0511	0.00032	0.23
Q25 (First quartile)	15.1	7.3	7.3	0.0198	0.00019	0.84
Q75 (Third quartile)	18.8	9.5	8	0.04	0.00032	1.22
Maximum	19.4	11	9	0.1488	0.00095	1.34

Table 4-14: Summary Statistics for Calculated Macrozooplankton Metrics, Summer 2024

Station	Station Depth (m)	Richness-LPL	Richness-Family	No Algae			With Algae		
				Density (#/L)	Biomass (dw mg/L)	Simpson's Diversity-Family	Density (#/L)	Biomass (dw mg/L)	Simpson's Diversity-Family
S3	11.4	14	10	0.1592	0.00254	1.83	0.3665	0.00462	1.17
S2	12.5	11	9	0.2274	0.00193	1.59	0.4686	0.00362	1.33
S6	16.4	15	10	0.1049	0.00092	1.62	0.1645	0.00128	1.31
S4	16.6	12	9	0.337	0.00236	1.74	0.4941	0.00319	1.71
S8	19	15	11	0.1195	0.00093	1.8	0.2022	0.00161	1.57
S9	20	13	10	0.109	0.00092	1.89	0.1752	0.00144	1.63
Minimum	11.4	11	9	0.1049	0.00092	1.59	0.1645	0.00128	1.17
Median	16.5	13.5	10	0.1394	0.00143	1.77	0.2844	0.0024	1.45
Mean	16	13.3	9.8	0.1762	0.0016	1.75	0.3119	0.00263	1.45
Standard Deviation	3.4	1.6	0.8	0.0912	0.00077	0.12	0.1505	0.00138	0.21
Q25 (First quartile)	13.5	12.3	9.3	0.1116	0.00092	1.65	0.1819	0.00148	1.32
Q75 (Third quartile)	18.4	14.8	10	0.2104	0.00225	1.82	0.4431	0.00351	1.61
Maximum	20	15	11	0.337	0.00254	1.89	0.4941	0.00462	1.71

Table 4-15: Summary Statistics for Calculated Macrozooplankton Metrics, Fall 2024

Station	Station Depth (m)	Richness-LPL	Richness-Family	Density (#/L)	Biomass (dw mg/L)	Simpson's Diversity-Family
S3	10.5	3	3	0.5203	0.05148	0.58
S1	10.6	5	4	0.1014	0.00514	0.75
S5	15	5	5	0.3107	0.02408	0.94
S4	16.8	4	4	0.2475	0.01462	0.82
S8	18.7	3	3	0.2285	0.01604	0.83
S9	19.7	4	4	0.1868	0.01101	0.89
Minimum	10	3	3	0.1014	0.00514	0.58
Median	15.5	4	4	0.238	0.01533	0.83
Mean	14.7	4	3.8	0.2659	0.02039	0.8
Standard Deviation	3.9	0.9	0.8	0.1427	0.01645	0.13
Q25 (First quartile)	11.3	3.3	3.3	0.1972	0.01191	0.77
Q75 (Third quartile)	17.5	4.8	4	0.2949	0.02207	0.87
Maximum	19	5	5	0.5203	0.05148	0.94

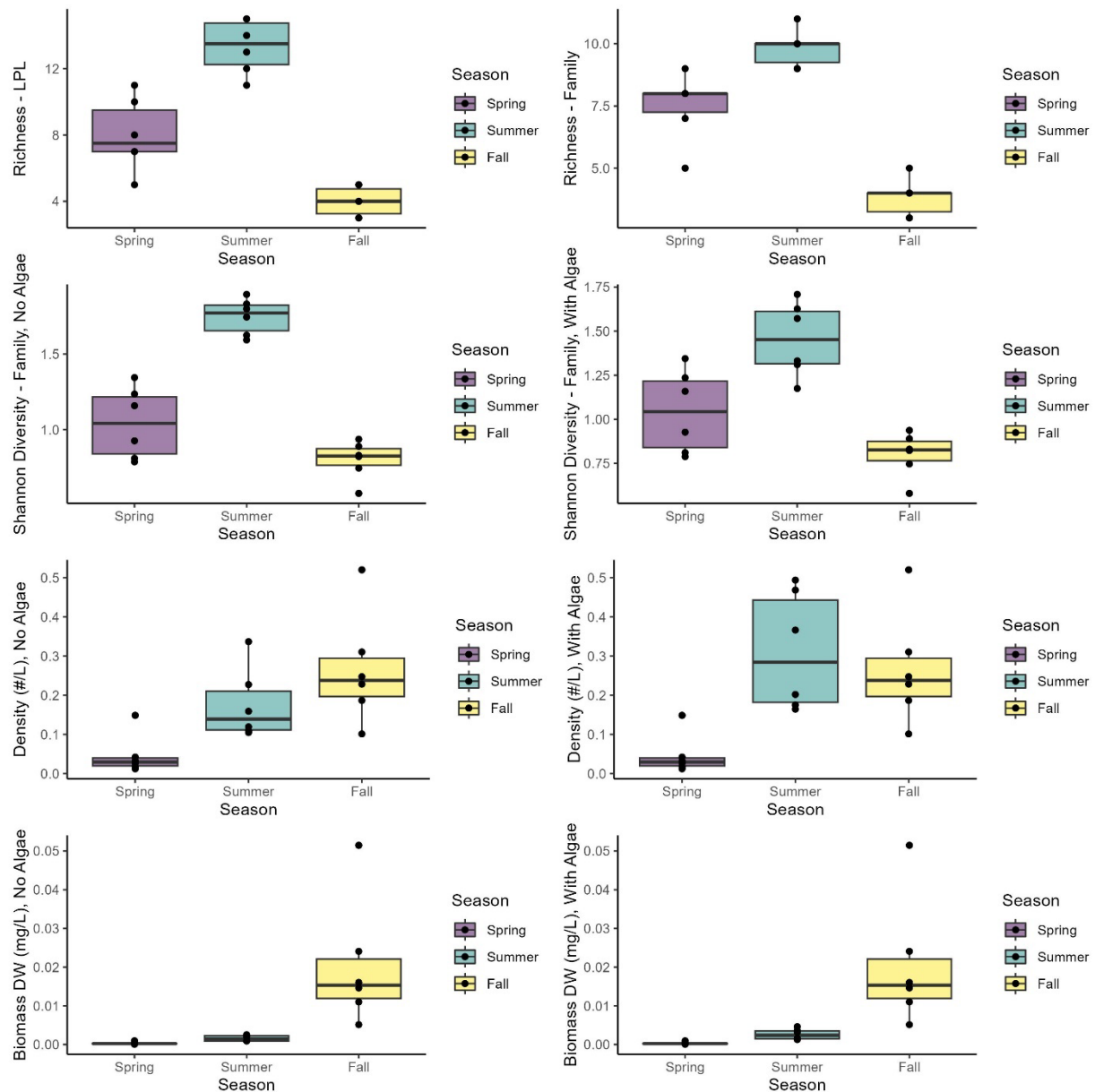


Figure 4-16: Boxplots and Raw Data (points) of Macrozooplankton Endpoints Expressed by Season

Note: "No Algae" indicates that zooplankton estimates for those trapped in dense algae were not included whereas "With Algae" indicates they were.

4.3.4 Aquatic Habitat

The aquatic habitat surrounding PNGS was discussed extensively in the Aquatic Environment TSD for the EA for the refurbishment and continued operation of the PNGS Units 5-8 (Golder, 2007a) and the 2022 PN ERA (Ecometrix, 2023a). This section integrates findings from the 2024 environmental studies to characterize existing fish habitat within the proposed DWI area and the nearshore region associated with the proposed west infill and shoreline erosion mitigation areas, informing the assessment of potential project-related impacts in Section 5. Key environmental components evaluated include water and sediment quality, substrate type, aquatic vegetation/productivity, and fish community composition. Details on water quality (**Section 4.2.2.1**), sediment quality (**Section 4.2.2.2**) are presented elsewhere in the PERA, and will be summarized below in the context of fish habitat quality in the proposed areas.

4.3.4.1 Proposed DWI Area

4.3.4.1.1 Water Quality

Concentrations of metals, petroleum hydrocarbons (PHC) fractions F1 to F4, morpholine, and volatile organics in water samples from the DWI area (i.e., LW2401, LW2402, LW2403, LW2404) were either below associated screening guidelines or below detection limits. Additionally, radionuclide levels in these samples were also either below detection limits or consistent with historical Lake Ontario levels. General chemistry parameters such as turbidity, conductivity, dissolved oxygen, and pH conditions in these samples were comparable to other habitats/environments found along the northern shore of Lake Ontario (Stephenson and Mackie, 1988; Stephenson, 1990). While one location in the DWI area exceeded the PWQO guideline for pH during the summer sampling event, the value remained within the CCME CWQG range of 6.5 to 9.0 for the protection of freshwater biota. Overall, the water quality in the DWI area is considered suitable for fish habitat.

4.3.4.1.2 Sediment Quality

As sediment in Lake Ontario is transient and sparse in offshore areas, its quality in the DWI could not be assessed. However, based on the water quality conditions in the area, there is no indication that sediment quality in the area would pose a risk to aquatic biota.

4.3.4.1.3 Physical Habitat features

As a part of the 2024 aquatic habitat assessment studies conducted in support of this PERA, Sidescan sonar was taken in 14 transects within the 9 sampling grids of the DWI area (**Figure 4-7**). Sidescan data was imported into ReefMaster v 2.2.57 (Reefmaster, 2024), where the bottom classification tool was used to characterize the substrate based on hardness estimations. These classifications were then compared to the sidescan imagery and the Aquaview substrate checks to assign representative substrate types across the area. Substrate was classified as Sand, Sand/Gravel, Sand/Gravel/Cobble, Gravel/Cobble, Gravel/Cobble/Boulder, Cobble/Boulder, or Boulder throughout the study area. Though mussel and algal/vegetation coverage was not quantified, general observations were recorded.

Overall, substrate throughout the DWI area was composed of gravel/cobble, with a tendency for coarser substrates (gravel/cobble/boulder, cobble/boulder, and boulder) to the northeast and finer substrates (sand, sand/gravel) to the south and southwest of the DWI. Areas with cobble and boulder substrate exhibited high mussel densities. Periphyton (benthic algal material) coverage was generally sparse on gravel and fine sediments, but more abundant on cobble and boulder substrates. No macrophytes were observed. Additionally, there did not appear to be any unique habitat features (e.g., rocky shoals or steep drop-offs) that would serve to concentrate fish, with the habitat likely similar to other surrounding areas of Lake Ontario. Substrate types within each sampling grid are detailed in **Table 4-16**, and are mapped in **Figure 4-17**.

S8 and S9 tended to have the highest diversity of substrate types and were two of the grid squares with substantial portions of sand and gravel/sand. Proceeding towards shore, shallower, substrates were larger and the overall diversity was reduced. It is likely that proceeding even shallower and more towards shore would like result in a reduction in fine grained sediments even further and an increase in large substrates like cobble and boulder. This is due to the increase in the potential effects of wave action and weather as the water depth decreases. Further habitat assessment in 2025 of an addition onshore row of assessment grids will help substantiate this inference.

Table 4-16: Substrate characterization in the proposed DWI area, 2024

Sampling grid	Depths (m)	Substrate characterization
S1	10-14	<p>Substrates primarily comprised of sand/gravel/cobble.</p> <p>Other substrate types identified include sand/gravel/cobble, gravel/cobble, and gravel/cobble/boulder. In general, coarser substrates (cobble and infrequent boulder) were observed in the mid and northern section of the grid in depths of approximately 10 to 13m. Finer substrates were observed in deeper areas (12 to 14m), with a large patch of sand/gravel/cobble present in the southwest section of the sampling grid.</p>
S2	11-14	<p>Substrates primarily comprised of sand/gravel/cobble.</p> <p>Small sections containing larger substrates (cobble/boulder) are present to the northwest and mid grid to the east. These sections of larger substrates are generally associated with the 12m depth contours.</p>
S3	10-13	<p>Substrates primarily comprised of coarser substrates (gravel/cobble/boulder).</p> <p>Substrate size tends to increase in size from west to east in the sampling grid. The furthest eastern edge of this sampling grid is comprised primarily of cobble and boulder substrates.</p>
S4	14-17	<p>Substrates primarily comprised of sand/gravel/cobble.</p> <p>Finer substrates are found in patches located to the south and southeast between depths of 16 to 17m. Coarser substrates are present along the edge of the southeast section of the sampling grid in 16 to 17 m depths.</p>
S5	14-17	<p>Substrates primarily composed of gravel/cobble. These substrates are generally located throughout the northwestern section of the sampling grid. The southern/southeastern section of the sampling grid contains diverse substrate types, containing substrates ranging from sand to boulder in patches throughout the entire southeast section of the sampling grid.</p>
S6	11-17	<p>Substrates primarily composed of gravel/cobble and gravel/cobble/boulder.</p> <p>There was a general pattern of less coarse substrates in the southwest and more coarse substrates to the northeast. The largest substrates (cobble/boulder and boulder) within this sampling grid are located in the north-east section between the 11 to 14 m depth contours.</p>
S7	16-19	<p>Substrates primarily composed of gravel/cobble and gravel/cobble/boulder.</p> <p>Finer substrates are generally located to the mid-south (17 to 19 m) sections of the sampling grid, while coarser substrates tend to be located to the east and west, adjacent to the sampling grid extent.</p>

Sampling grid	Depths (m)	Substrate characterization
S8	17-20	<p>Substrates are variable throughout the sampling grid, with all substrate types observed.</p> <p>Generally, coarser substrates (gravel/cobble/boulder and cobble/boulder) are present to the west, between the 17 and 18 m depth contours, while patches of finer substrates (sand/gravel) tend to be present throughout the middle and to the east of the sampling grid across all depths.</p>
S9	17-20	<p>The substrate is diverse and comprised of sand/gravel, sand/gravel/cobble, and gravel/cobble, with patches of sand and gravel/cobble/boulder.</p> <p>The finest substrates (sand and sand/gravel) generally occur between the 18 and 19m depth contours, while coarser substrates are present throughout the eastern extent of the sampling grid across all depths.</p>

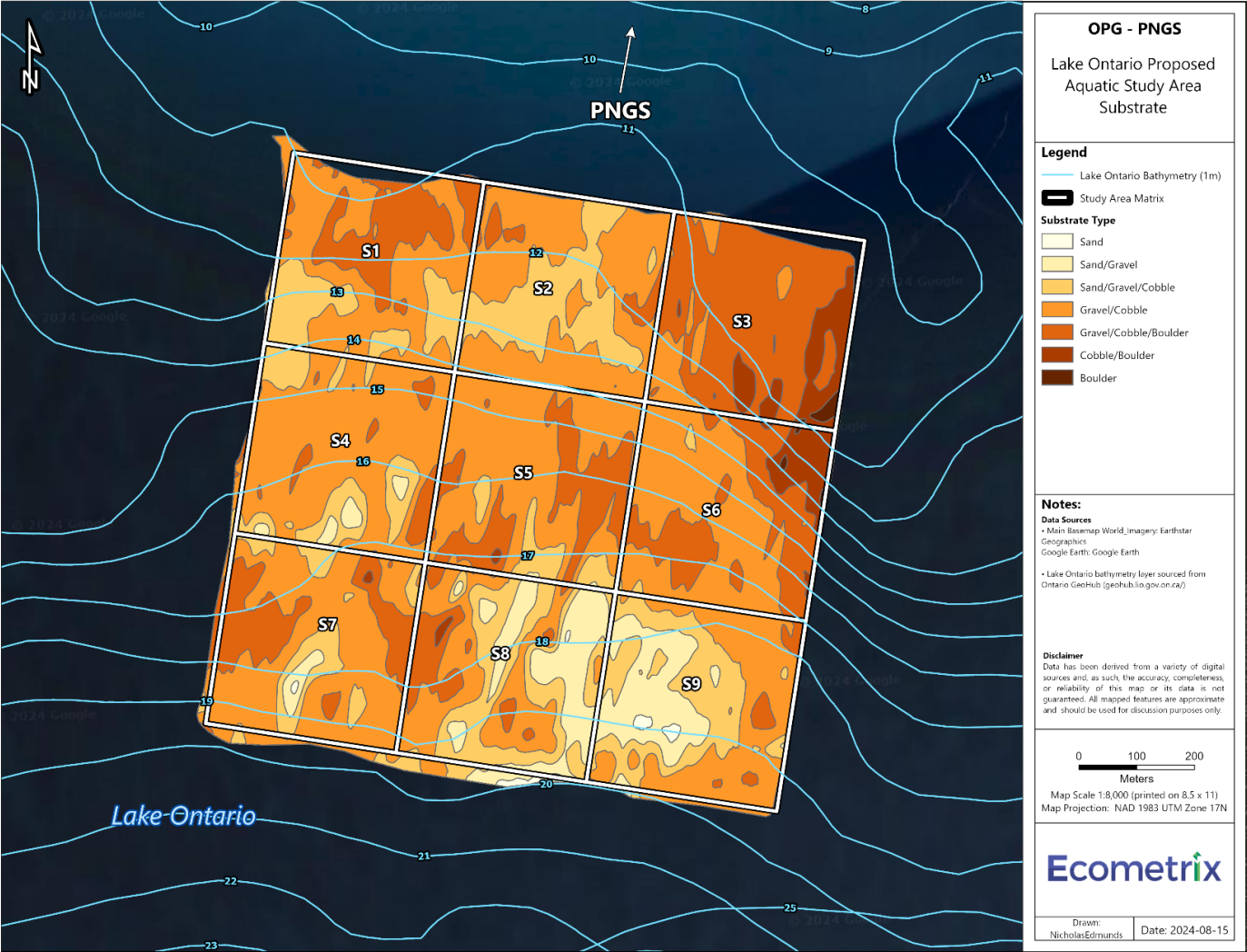


Figure 4-17: Proposed DWI Area Substrate Coverage, 2024

4.3.4.2 Proposed Shoreline Erosion Mitigation Area and West Infill Area

4.3.4.2.1 Water Quality

Although water samples were not collected directly from the nearshore region associated with the proposed shoreline erosion mitigation and west infill areas during the 2024 surface water sampling program, samples from the PN Outfalls (LW-10, LW-21) and Intake channel (LW-9) can be used to provide a conservative assessment of the water quality in these areas. This is because the outfalls and intake are expected to have the highest concentrations of contaminants and thermal inputs due to their proximity to the discharge channels and PNGS. Thus, the water quality in the shoreline erosion mitigation and west infill areas is likely to be less impacted due to natural dilution and dispersion.

The concentrations of petroleum hydrocarbons (PHC) fractions F1 to F4, morpholine, and volatile organics near the outfalls and intake channel were either below associated screening guidelines or below detection limits. Across the three sampling events, exceedances of pH and ammonia were found to exceed associated guidelines at LW9 in the summer sampling event. However, as highlighted in **Section 4.2.2**, these exceedances are likely not attributable to PN operations and do not pose a risk to aquatic biota. Similarly, exceedances of copper, cobalt, and silver were noted near the intake channel in the fall. However, as highlighted earlier, these exceedances likely represent sporadic variations in nearshore water quality not related to PN operations. Radionuclide concentrations were either below detection limits or consistent with historical Lake Ontario levels. As with the DWI area, general chemistry parameters such as turbidity, conductivity, dissolved oxygen, and pH in water samples from these locations fall within the range observed in habitats along the northern shore of Lake Ontario. Thus, the water quality in the potential shoreline erosion mitigation and west infill areas is considered suitable for fish habitat.

4.3.4.2.2 Sediment Quality

Sediment samples collected from the nearshore study areas in 2024 were analyzed for sediment size, general chemistry parameters, and metals. No exceedances of metal screening guidelines were observed. While phosphorus exceeded the guideline at one location in each nearshore area, this threshold reflects potential nutrient enrichment effects on benthic community composition rather than toxicity to ecological receptors. Overall, sediment quality in the shoreline erosion mitigation and west infill areas is considered suitable for fish habitat.

4.3.4.2.3 Physical Habitat features

As a part of the 2024 aquatic habitat assessment conducted in support of this PERA, underwater video was collected from five transects in the shoreline erosion mitigation and west infill areas each to characterize the available habitat. The transect coverage is outlined in **Figure 4-18**. Consistent with the methodology used in previous assessments (Golder and SENES, 2009; SENES, 2011a, 2011b), videos along each transect were split into 11 images and reviewed. In each image, observations regarding sediment composition (base and surficial sediment size and substrate type), macrophyte and algal coverage, dreissenid mussel coverage, and fish counts

were recorded. Basen on sediment classifications, substrates were categorized into six types: fine sediments over bedrock with patches of exposed bedrock (Type 1), Finer sediments usually with distinct ridges and or ripple (Type 2), Finer sediments with scattered gravel and cobble (Type 3), Gravel and cobble in a base of fine sediments (Type 4), Rocks ranging in size from gravel to boulders in a base of finer sediments (Type 5), and Rocks ranging in size from gravel to boulders in a base of finer sediments (Type 6). When classifying mussel and algae coverage, the terms sparse (0-25% coverage), moderate (25-75% coverage) and dense (75-100% coverage) were utilized. If fish were seen within a transect, fish presence was noted.

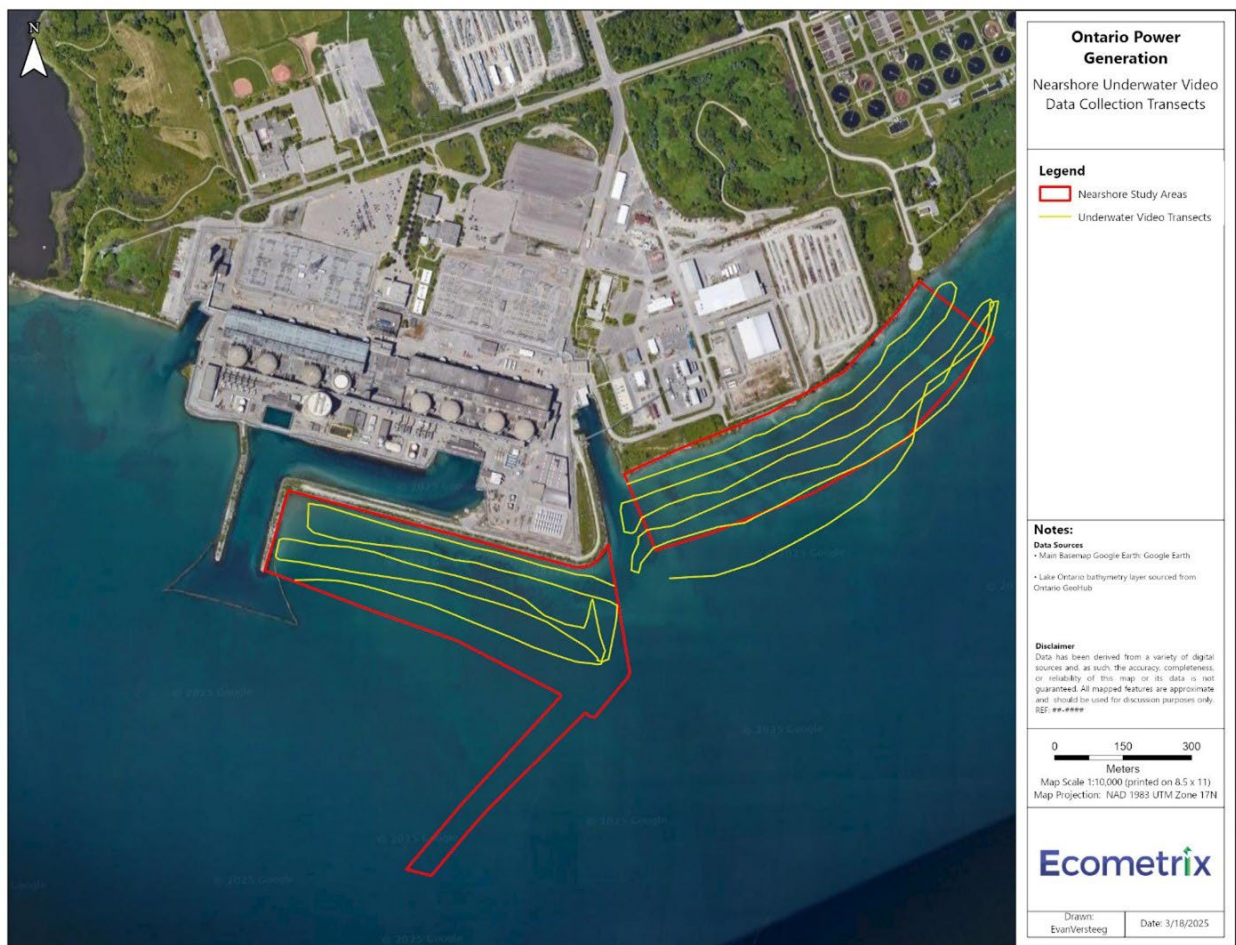


Figure 4-18: Underwater Video Data Collection Area in the Nearshore Study Areas for the Aquatic Habitat Assessment Study, 2024

Substrate classification results for each transect in the shoreline erosion mitigation and west infill areas are presented in **Table B-12**. Classification values at each point were then used in the Nearest Neighbor interpolation tool within the Spatial Analyst toolbox in ArcGIS to estimate the substrate coverage across each nearshore area, which is presented in **Figure 4-19**. In general, substrates in the shoreline erosion mitigation area consisted of five substrate types; these were Type 2, Type 3, Type 4, Type 5, and Type 6. Type 2 substrates (finer sediments usually with distinct ridges and or ripples) were the most common and Type 3 (finer sediments with scattered gravel and cobble) the least common. Finer substrates were seen closer to shore and to the west, with coarser substrates found further from shore. Overall, the dominant substrates indicate that the area is energetic and provides limited high quality fish habitat. Aquatic vegetation (including macrophytes and algae) was observed throughout most of every transect, with only six of the 55 images containing no aquatic vegetation. Nearly 100 % coverage was seen in 13 of 55 images. The majority of images within transects 2, 3 and 5 also had no observable mussels and no mussels were observed in transect 1 or 4., with mostly sparse and some moderate amounts observed occasionally. Mussel density tended to increase with substrate particle size. No fish were observed along any of the transects conducted within the shoreline erosion mitigation area.

Substrates in the west infill area consisted of three substrate types; these were Type 2, Type 5, and Type 6. The finer Type 2 substrates represented the majority of the area, especially concentrated on the west side of the area. The prevalence of sand with distinct ridges and ripples suggest poor fish habitat based on it being a high energy area. Aquatic vegetation was not observed in most of the west infill area. The east section of the study area had high levels of vegetation coverage (>90%), which tended to coincide with coarser substrates. The majority of transects 1, 2, 4, and 5 did not contain mussels, and no mussels were observed throughout transect 3. Though infrequent, areas of sparse to moderate mussel density tended to be observed coincident with areas containing larger substrates (cobble/boulder). No fish were observed along any of the transects conducted within the west infill area.

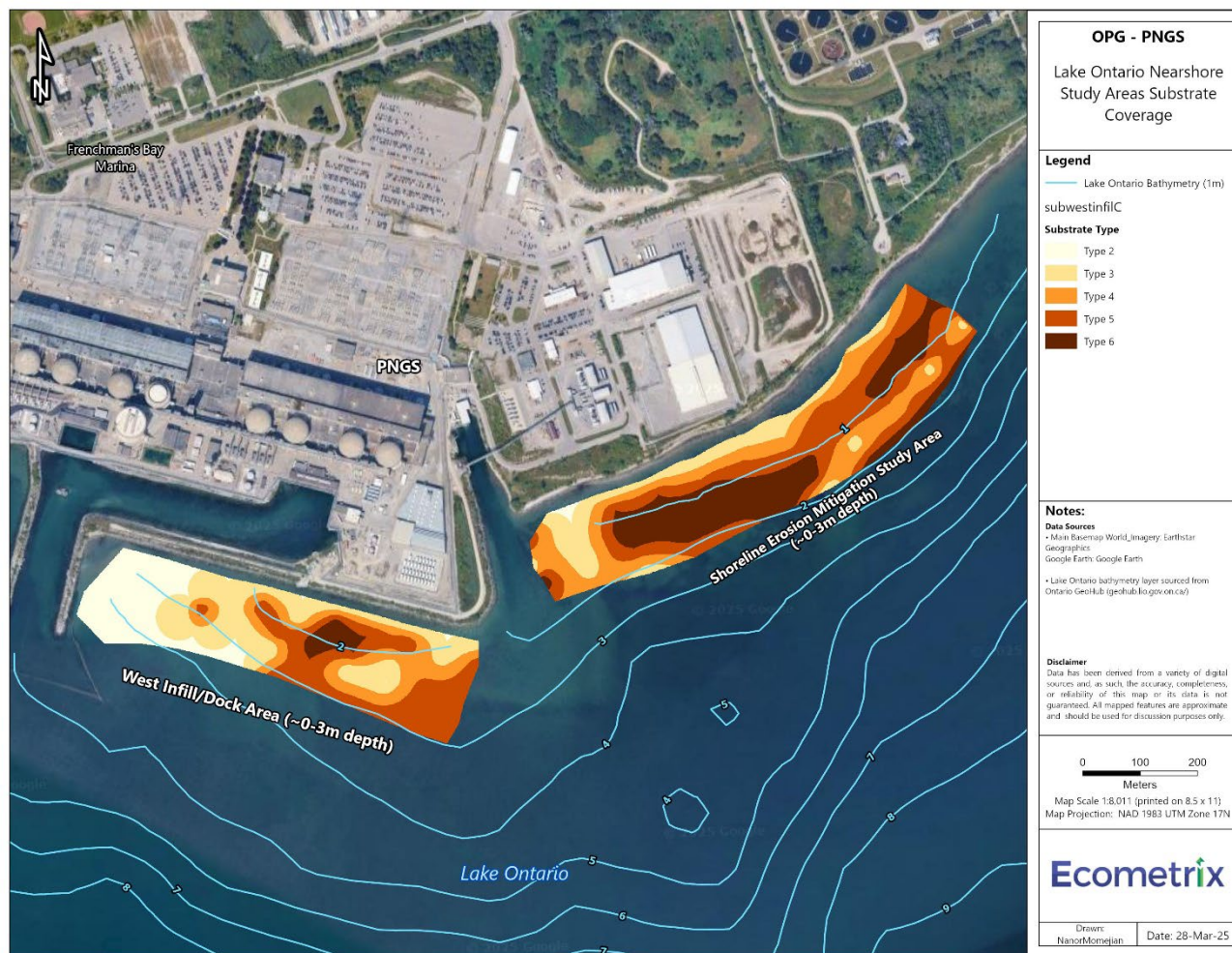


Figure 4-19: Proposed Shoreline Erosion Mitigation and West Infill Areas Substrate Coverage, 2024

4.4 Geological and Hydrogeological Environment

4.4.1 Surficial Geology and Soil

The PN site is situated between the Oak Ridges Moraine to the north and Lake Ontario to the south. The moraine is composed of thick deposits of glacial till and sand and gravel that are associated with hummocky terrain at the surface (Golder, 2007b). South of the moraine, the north shore of Lake Ontario is largely underlain by glacial till and glaciolacustrine deposits of clayey silt to silty clay composition. The underlying soil sequence at PN can be subdivided into three main layers generally comprised of construction fill materials, a recent Upper Till Complex and an older Lower Till Complex directly overlying the local bedrock (Golder, 2007b).

Historical operations at the PN site have resulted in isolated areas of chemical and radiological contamination in soil. The 2017 ERA (Ecometrix and Golder, 2018) determined that risks posed by soil contaminants to human and ecological receptors were low. Following the 2015 soil sampling program, no additional soil samples were collected for evaluation in the 2022 PN ERA (Ecometrix, 2023a).

The first site-wide soil monitoring program was initiated in 1999 to characterize soil quality at the PN site. As part of the 2014 ERA, soil samples (0-1.5 metres in depth) collected as part of the site-wide monitoring program were compared against newly issued soil standards at the time following the Ontario MECP's update to O. Reg. 153/04. The 2014 ERA had identified a short-list of metals that were found to exceed their respective soil screening criteria. Ultimately, the 2014 ERA concluded that additional monitoring was recommended in areas of the PN site where metal concentrations were found to exceed soil benchmarks to ensure the protection of plants and soil organisms. To address this recommendation, an updated soil monitoring program was conducted in October 2015 in support of the 2017 ERA, focusing on the areas of contamination identified in the 2014 ERA.

The 2017 ERA (Ecometrix and Golder, 2018) and the 2022 PN ERA (Ecometrix, 2023a) documented that surface soil samples (collected in 2015 between 0 to 20 cm in depth) were analyzed for polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), petroleum hydrocarbons (PHC) fractions F1 to F4, metals and inorganics, glycol, tritium (H-3), gamma emitters (i.e., Cs-137, Cs-134, Co-60) and C-14. Concentrations of chemical constituents were compared against soil quality guidelines from the MECP and CCME that are considered protective of various classes of ecological receptors (e.g., plants, soil organisms, birds and mammals). In the 2015 sampling program, the maximum measured on-site concentration of PHC F4 was found to exceed the selected screening criteria and was hypothesized to be related to minor historic spills and impacted surface water runoff. Cadmium, strontium, and thallium, which were assessed as soil COPCs in the 2014 ERA, did not exceed their selected screening criteria based on the 2015 site soil data and were dropped as COPCs in the 2017 and 2022 PN ERAs. As of the most recent 2022 PN ERA, the list of soil COPCs included metals (arsenic, copper, lead and zinc), free cyanide, and PHC F4. Overall, based on the soil samples collected in 2015, exceedances of soil screening criteria were found to be localized and generally limited to the

eastern portion of the PN site, suggesting that contamination was not a result of widespread atmospheric deposition and that further accumulation of contaminants in soil was unlikely to occur over time (Ecometrix, 2023a).

4.4.1.1 2024 Soil Monitoring Program

4.4.1.1.1 Chemical Soil COPCs

In mid-2024, a soil monitoring program was initiated to characterize existing soil conditions at the PN site. Soil samples from the top 15 cm of soil were collected from a variety of different sampling locations (see **Figure 4-20**), consisting of locations assessed in previous soil sampling programs and/or known areas of concern at the PN site. Consistent with previous soil monitoring programs, soil samples were analyzed for PAHs, VOCs, PHC fractions F1 to F4, metals and inorganics, and radiological parameters including tritium, gamma emitters and carbon-14. Non-radiological chemical parameters were screened against the lower of either the MECP's ecological component values (Eco CVs) (MECP, 2011), or the CCME's soil quality guidelines (SQGs) for the protection of environmental and human health (CCME, 2010). Where an Eco CV is provided for both plants and soil organisms, and for birds and mammals, the lower of the two values was retained. Where Eco CVs were unavailable, for PAHs and VOCs, the free phase threshold value was used as the screening criteria. Where SQGs were provided for both ecological protection and human health protection, the lower of the two values was retained. Where SQGs were unavailable, interim SQGs from the CCME were retained for the screening assessment. Lastly, in cases where the selected screening criterion was found to be more conservative than the MECP's Ontario background soil value, the background soil value was retained as the screening criteria since screening criteria should not be set below a reasonable upper end of background (as per Clause 7.2.5.3.2 in CSA N288.6:22).

Based on the results of the recent soil monitoring program, the maximum concentration of zinc (350 µg/g) was found to exceed its selected soil screening criterion (340 µg/g), though this occurred at only one sampling location (**Table A-5**). The maximum concentration of zinc in the 2022 PN ERA (3,200 µg/g) is approximately a full order of magnitude higher than the concentration measured during the recent 2024 sampling event. Compared with the previous ERAs, arsenic, copper and lead all met their respective soil screening criteria and would no longer be considered soil COPCs. Similarly, cyanide and PHC F4, which exceeded their respective screening criteria in 2015, met these criteria during the 2024 soil sampling event. However, in contrast to the previous soil sampling event, two general soil quality parameters, electrical conductivity and sodium adsorption ratio, exceeded their respective screening criteria at two of the assessed sampling locations.

Overall, soil quality at the PN site has remained consistent compared with previously completed ERA reports. Concentrations of historical soil COPCs (i.e., arsenic, copper, lead, PHC F4, and cyanide) have improved such that these parameters do not screen in as soil COPCs based on the results of the 2024 soil monitoring program.

4.4.1.1.2 Radiological Soil COPCs

As part of its normal operations, the PN site contributes small amounts of radiological materials to the environment. Atmospheric deposition represents the primary transport pathway of radiological COPCs to soils within and near the PN site. Historically, radiological parameters including tritium, gamma emitters (i.e., Cs-137, Cs-134, Co-60), I-131 and C-14 have been monitored in soil at the PN site.

Compared with the 2015 soil monitoring event, the maximum measured concentrations of C-14 and H-3 were found to have increased approximately 2.1- and 1.7-times, with the maximum concentrations being measured at the same sampling location (GMS-26) during both the 2015 and the recent 2024 soil monitoring program. Co-60, Cs-134 and Cs-137 were all previously reported as being measured below laboratory detection limits; more recently, these radionuclides were measured above detection in some of the 2024 soil samples. The maximum measured concentration of K-40 remains comparable between the previous and recent soil sampling events. The maximum concentration of I-131 was reported as below the laboratory detection limit. Lastly, the maximum reported concentrations for the Th-series and U-series naturally occurring radionuclides were 25.4 Bq/kg and 23 Bq/kg, respectively.

In general, K-40 is environmentally abundant and is not associated with station operations. The cesium and cobalt isotopes are included as COPCs to address potential concern about deposition of particulate activity. Only Cs-134 and Co-60 are specific to reactor operations, and these are usually not detected in PN's annual environmental monitoring program (Ecometrix, 2023a). The presence of Cs-137 is primarily due to historic atmospheric weapons test fallout and not reactor operations. However, exposure to Cs-134, Cs-137, and Co-60 in soil are included in the public dose calculations in the interest of public safety.



Figure 4-20: Monitoring Locations for the 2024 Soil Monitoring Program

4.4.2 Groundwater

4.4.2.1 Groundwater Flow

At a regional scale, the sand and gravel layers buried within and between low permeability till deposits under the PN site constitute aquifers that support groundwater flow. The tills and lower bedrock deposits of shale and limestone that underlie the surficial deposits typically have low permeability and behave as aquitards, restricting infiltration and the recharge of water to more permeable layers, weathered zones and areas with open fractures.

Historical site investigations and groundwater monitoring programs have provided an understanding of the groundwater flow system below the PN site. A hydrogeological conceptual site model (CSM) for the PN site (Ecometrix, 2023c) was presented as part of developing the 2020 Groundwater Protection Plan for the PN Site (OPG, 2023g). Groundwater flow south of the Oak Ridges Moraine, including the area where the PN site is situated, is southward toward Lake Ontario.

Eight hydrostratigraphic units (HUs) have been identified beneath the PN site. The eight HUs have been grouped into four primary groundwater flow systems. These include the “shallow groundwater system” (HU 1-3); “intermediate overburden groundwater system” (HU 6); “deep overburden groundwater system” (HU 7) and the “shallow bedrock groundwater system” (HU 8). Hydrostratigraphic units 4 and 5 are not always observed, and where they are observed, are generally thin and are grouped into the shallow groundwater system. The shallow groundwater system is an aquifer, and the intermediate overburden and bedrock groundwater flow systems are considered to be aquitards. The deep overburden groundwater system may represent an aquifer; however, contaminant migration into this HU from overlying HUs is considered to be limited due to the low permeability of the till materials in HU 6.

Continued monitoring has revealed that the predominant groundwater flow direction and water table elevation have not significantly changed over time and do not experience any meaningful seasonal variability. In general, vertical flow is downward in the overburden and upward in the bedrock, consistent with regional groundwater discharge to Lake Ontario.

Groundwater flow within the PN site is significantly influenced by the inactive Turbine Auxiliary Bay foundation drainage system located beneath the deep building foundations. The inactive Turbine Auxiliary Bay foundation drainage system is used to control groundwater beneath the building. Groundwater from the Turbine Auxiliary Bay foundation drains flows into each unit’s sump and then is discharged via a monitored pathway to the intake channel via pumping. Groundwater from the granular horizons in the Lower Till and the granular foundation backfill is collected in the foundation drains. The drainage system has locally lowered groundwater levels below the level of Lake Ontario, creating a hydraulic sink that captures groundwater beneath and immediately adjacent to the PN reactor buildings (SENES, 2007). Measured flow into the Turbine Auxiliary Bay foundation drains is on the order of about 25 and 77 m³/day for PNGS Units 1-4 and U5-8, respectively. Estimated horizontal flow velocities in groundwater across the site range from 0.3 to 11 m/y (CH2M, 2000).

The vacuum building ramp sump (VBRS) is also a hydraulic sink for the south portion of the PNGS Units 1-4 side. The VBRS is located at the bottom of a truck ramp that is installed at basement elevation of the vacuum building and collects shallow groundwater in the vicinity of the building. During operations the groundwater collected in the VBRS is also discharged via a monitored pathway to the forebay.

Other subsurface features that have the potential to influence groundwater flow at the site include the RLWMS foundation drains and the reactor building (RB) foundation drains. The RLWMS foundation drains and sumps are located at a lower elevation than the TAB foundation drains. The RB foundation drains are installed at a higher elevation and may intercept shallow groundwater.

4.4.2.2 Groundwater Quality

Numerous hydrogeological investigations have been conducted at the PN site, primarily in relation to known elevated tritium concentrations in groundwater, but also relating to other chemical COPCs such as petroleum hydrocarbons, chloride and metals (iron) in areas of the site that represent potential sources of these contaminants.

Since December 2020, the PN site has maintained a robust groundwater protection program (GWPP) and groundwater monitoring program (GWMP) compliant with CSA N288.7-15, *"Groundwater protection programs at Class I nuclear facilities and uranium mines and mills"* (OPG, 2023g). The GWPP is a comprehensive document that defines groundwater protection goals for the PN site based on site-specific hydrogeological conditions and groundwater end uses that are presented in a CSM (Ecometrix, 2023c). Groundwater monitoring and reporting, beginning in 2021, follows the design provided in the GWMP. Prior to 2021, groundwater monitoring had been ongoing for many decades at the PN site, most recently under the Groundwater Monitoring Program Design (Ecometrix, 2012). This PERA relies on OPG's annual groundwater monitoring program reports from 2021 to 2023 (OPG, 2022e, 2023h, 2024i).

In the groundwater CSM, structures, systems, and components (SSCs) were identified in order to identify high priority SSCs (i.e., those which act as potential sources of chemicals to groundwater). Chemicals associated with the SSCs were screened as COPCs for monitoring in the GWMP on the basis of recent (primarily, 2012-2018) groundwater concentrations of those chemicals at the PN site. Tritium was identified as a COPC in groundwater at the PN site; though there are no published standards for tritium in groundwater, tritium was retained as a COPC for the GWMP because of its presence in groundwater and association with SSCs.

4.4.2.2.1 Chemical COPCs in Groundwater

Non-radiological COPCs monitored during the 2021-2023 period (OPG, 2022e, 2023h, 2024i) focused on PHC F1-F4, benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds, and dissolved iron; these parameters are monitored based on the screening assessment of past monitoring events. Screening benchmarks for non-radiological COPCs included Ontario MECP Site Condition Standards (SCS), specifically Table 3 (Full Depth Generic Site Condition Standards

in a Non-Potable Ground Water Condition) or Table 9 (Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Ground Water Condition) standards (MECP, 2011). For substances without MECP SCS, groundwater data were compared against screening levels based on 10 times (10x) the lowest of the Ontario Provincial Water Quality Objectives (PWQO) and the CCME water quality guidelines. The 10x factor is consistent with the MECP derivation of the groundwater to surface water pathway component values (GW3), which assumes at least 10-fold dilution of groundwater in surface water (MECP, 2011).

A monitored natural attenuation program (MNA) was implemented in the Units 1 to 4 Standby Generators (SG-A) area, SG-A Overflow area, and the Units 5 to 8 Standby Generators (SG-B) area in 2011, following remedial activities. The SG-A area is monitored annually, the other areas are monitored biennially.

In total, within the MNA areas, one (1) monitoring well was sampled in 2021 and twenty-four (24) monitoring wells were sampled in 2022. Six (6) monitoring wells were monitored in 2023; however, consistent with the PN Sampling Analysis Plan and GWMP, none of the wells were sampled as free phase product was found in all six wells. Free phase product thicknesses were measured and were found to be comparable with historical monitoring results in recent years.

Concentrations of PHC F2 and PHC F3 were found to have exceeded their respective MECP SCS in both 2021 and 2022 at three MNA monitoring well locations. Similarly, in both 2021 and 2022, maximum concentrations of dissolved iron were also found to exceed the selected screening criteria of 3,000 µg/L, derived by multiplying the Ontario PWQO value of 300 µg/L by a factor of 10 as described above. All exceedances were measured in close proximity to PNGS Units 1-4 and occurred in wells drilled to approximately the same depth (~15 m below ground surface). The localized presence of PHCs and iron at concentrations above the groundwater evaluation criteria are expected in these areas, where remediation using a natural monitored attenuation approach is ongoing.

In 2022, one monitoring well associated with each of the East and West Landfills was sampled for the analysis of dissolved iron (MW-024-20 and MW-205-35). Concentrations of iron were found to be 1,000 µg/L and 1,900 µg/L, respectively, and remained within the historical range and below the evaluation criteria of 3,000 µg/L.

Although there are exceedances reported for PHCs and dissolved iron, these chemical constituents are not expected to pose adverse effects to human health and the environment. As noted in the 2022 PN ERA, continued monitoring has shown that PHCs are not migrating from groundwater to the intake channel or Lake Ontario. Human receptors are restricted from accessing the intake channel and recreational activities would occur further out into the lake, away from any potential groundwater inputs to Lake Ontario. Furthermore, the nearest water supply plant (WSP) is situated approximately 7 km east of the PN site in Ajax, Ontario; concentrations of any COPCs in groundwater would thus be subject to considerable dilution before they could migrate to a point of water intake for human consumption. With respect to dissolved iron, no health risks are expected based on the same assumptions provided above.

Furthermore, the Ontario PWQO from which the dissolved iron screening criteria is derived is based on the protection of freshwater aquatic life and is considered extremely conservative for assessing risk to humans.

Similarly, groundwater COPCs are not expected to pose any risks to ecological receptors at the PN site. Most terrestrial ecological receptors are unlikely to be exposed to groundwater as there is no reasonable complete exposure pathway. Continued monitoring has shown that aquatic receptors most at-risk of potentially contacting discharged groundwater (e.g., benthic invertebrates, bottom-feeding and pelagic fish in Lake Ontario) are not at risk as any groundwater COPCs discharging into the lake are sufficiently diluted and COPC concentrations within sampled lake water are consistently measured below screening guidelines protective of ecological health.

4.4.2.2.2 Radiological COPCs in Groundwater

During normal operations, the PN site contributes small amounts of radiological materials to the environment. Tritium is the only radiological parameter currently measured as part of the PN GWMP consistent with the PN CSM (Ecometrix, 2023c). There is potential for tritiated groundwater to migrate to surface water (i.e., Lake Ontario); however, groundwater flux from the site into Lake Ontario is likely to be small based on the estimated groundwater velocity and influence of site infrastructure (CH2M, 2000). Therefore, any COPCs in groundwater that reach the lake are subject to considerable dilution before they can migrate to a point of water intake for human consumption. Tritium concentrations in all boundary and shoreline wells at the PN site perimeter remain substantively below groundwater evaluation criteria, demonstrating no potential for off-site impacts from tritium in groundwater at PNGS.

A groundwater evaluation criterion for tritium has been developed as part of the N288.7-compliant GWPP for the PN site that would be protective of the drinking water pathway from the Ajax WSP intake. A tritium concentration of 6.19×10^9 Bq/L in groundwater was derived to be protective of human receptors (Ecometrix, 2023d). Over the past three years of groundwater monitoring, measured tritium groundwater concentrations have remained well below the screening criterion (OPG, 2022e, 2023h, 2024i).

The on-site groundwater is not considered potable. There are no groundwater supply wells downgradient of potential source areas on-site. Off-site drinking water wells may be influenced by the atmospheric tritium and this is taken into account in the public dose calculations conducted as part of OPG's annual EMP reporting. Overall, groundwater quality results from groundwater monitoring conducted from 2021 to 2023 are consistent with previous groundwater assessments.

4.5 Terrestrial Environment

The PN site spans 105 ha and encompasses limited areas of naturalization in a generally urban setting which provides habitat for many terrestrial plant and animal species. The PN Study Area is an additional 100 ha in area and includes some of the surrounding adjacent natural and park

areas as shown in **Figure 4-21**. Biodiversity monitoring has been conducted within the PN Study Area since 2009 and continues on an annual basis (TRCA, 2009, 2009, 2013, 2015a). Specifically, the transects monitored outside the site include Hydro Marsh, Alex Robertson Park, Bay Ridges Park, PN East Landfill. A standardized program was developed in 2016 (Beacon, 2017a) and was implemented annually until 2019 (Beacon, 2017b, 2018), followed by a three-year compilation from 2019 to 2021 (Beacon, 2022), an annual report in 2022 (Beacon, 2023a), and a three-year program from 2023 to 2025 (Beacon, 2023b). The program includes monitoring of amphibians, breeding birds, and bats, as well as identification of species at risk. Vegetation communities within and in the vicinity of the PN site were initially characterized in 2004 and 2006 (Golder, 2007c), further studied from 2009 to 2015 (TRCA, 2015a, 2015b), and remapped in 2018 and 2023 (Beacon, 2018, 2023b).

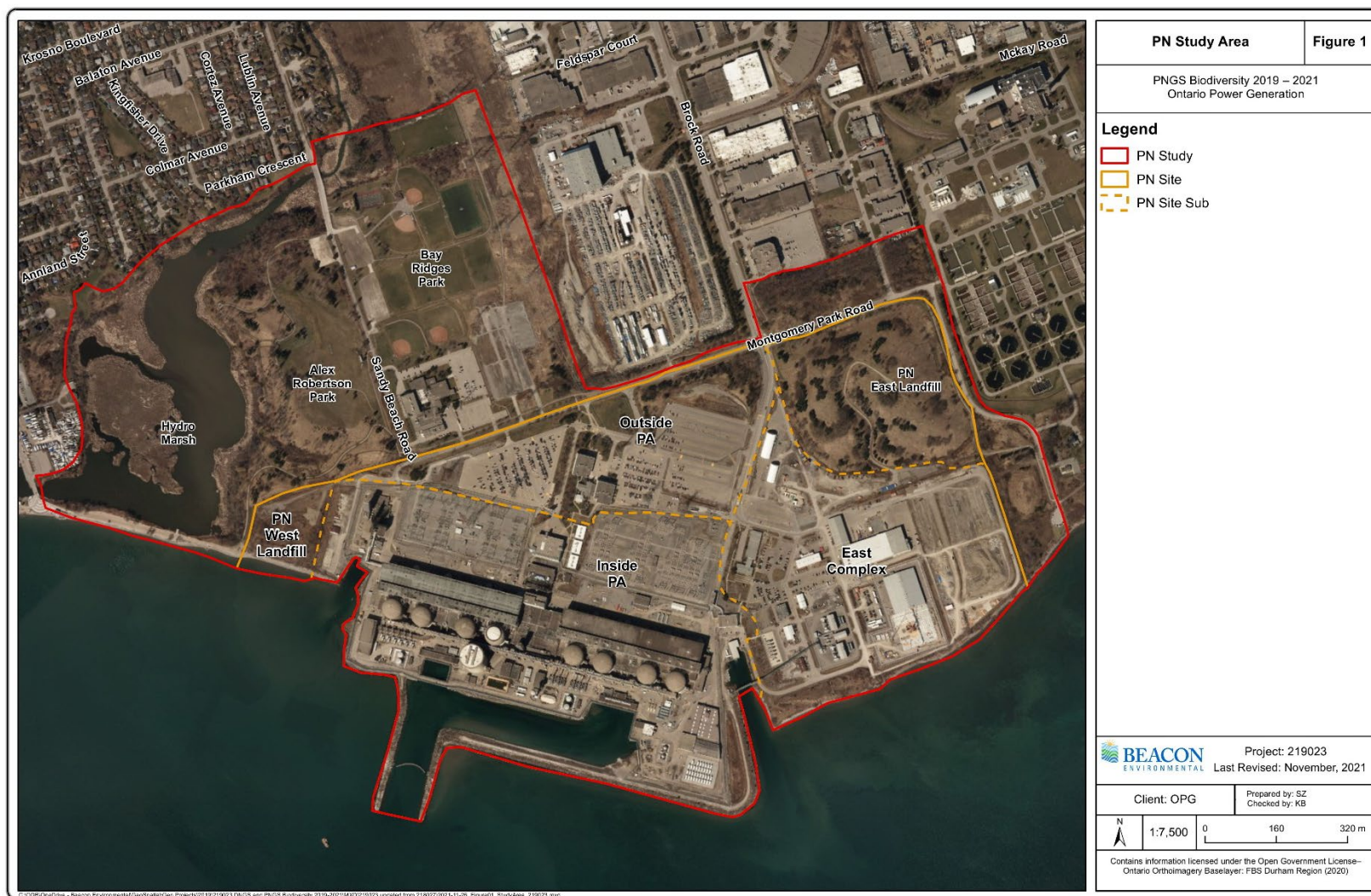


Figure 4-21: Terrestrial Monitoring Study Area (Beacon, 2022)

4.5.1 Vegetation

The vegetation around the PN site comprises a mix of terrestrial, wetland, and cultural communities. Vegetation within the site is sparse, and characterized by weeds, grasses, and small shrubs. The forested lots outside the site boundaries contain 2 ha of forested areas with a mix of native and non-native trees and shrubs (Golder, 2007c). Notably, a Butternut (*Juglans cinerea*) tree, classified as endangered under the Ontario Endangered Species Act (ESA), Schedule 1 of the Species at Risk Act (SARA) and by the Committee on the Status of Species at Risk in Ontario (COSSARO), is present in Alex Robertson Park (Beacon, 2022, 2023b). Regenerating shrublands and open fields along the Lake Ontario shoreline serve as transitional ecosystems and support a diverse range of riparian species.

The wetland communities surrounding the PN site are diverse, including swamp thickets, meadow marshes, and shallow marshes (TRCA, 2013). Key areas such as Hydro Marsh, Frenchman's Bay, and Krosno Creek feature vegetation dominated by emergent species like cattails (*Typha angustifolia*) and speckled alder (*Alnus incana*), with native species providing the majority of ground cover and species richness. Although non-native species like Common Reed (*Phragmites australis*) are present in some regions, the overall floristic quality and species diversity have remained stable (Golder, 2007c; Ecometrix, 2023a). In addition to Butternut, other species at risk recorded within the PN Study Area include Kentucky Coffee-tree (*Gymnocladus dioica*), Red Mulberry (*Morus rubra*), and Slender Bush-clover (*Morus rubra*). However, these species have not been observed since 2000 (Beacon, 2022; OPG, 2016; TRCA, 2015a), and the Kentucky coffee-tree is thus no longer considered part of the PN Species list (Beacon, 2020).

4.5.2 Wildlife

The most recent species lists for the PN Study Area, up to and including 2023 (Beacon, 2023b), document a total of 807 species of flora and fauna, categorized into the following wildlife groups: 27 mammals, 10 reptiles and amphibians, 252 birds, 26 butterflies and moths, 18 dragonflies and damselflies, 64 fish, and 320 species of vascular plants.

The PN Study Area supports a variety of bird species, most of which are considered secure in the urban landscape of the greater Toronto region. Influenced by its location on Lake Ontario and the surrounding habitat, the area provides valuable stopover sites for migratory birds including waterfowl. As of 2023, 76 bird species were recorded as breeding within the site. Though there has been some fluctuation in the number of breeding bird species over last decade, the bird community is considered robust. Four new bird species were observed in 2023, including the American Bittern, Eastern Whip-poor-will, Red-headed Woodpecker, and Yellow-throated Vireo.

Bats were most recently surveyed in 2018 (Beacon, 2018), 2020 (Beacon, 2022) and 2022 (Beacon, 2023a). The last observation of bats on site was in 2020 (Beacon, 2022). This could be attributed to the complexity of the PN Study Area, which experiences significant anthropogenic activity throughout the day, evening, and overnight, likely discouraging bat use of the area.

Terrestrial animal species at risk that have been recorded in the PN Study Area (Beacon, 2017a, 2017b, 2018, 2022, 2023a, 2023b; OPG, 2016), along with their federal and provincial status are presented in **Table 4-17**. Since OPG inventories include incidental observations and migrants, the species listed in **Table 4-17** are not necessarily breeding within the PN site.

Most of the listed species were observed in the parklands, wetlands, and woodlands beyond the PN Site boundaries, with a few exceptions. In 2023, one Midland Painted Turtle was found in a greenhouse collection bin, and one Eastern Whip-poor-will was found in the Screenhouse, likely as migrants from nearby areas. The Chimney Swift, last recorded as a group of four flying over the PN site in 2020, is not regularly observed on-site. While suitable nesting habitat may exist within site structures, this species forages widely and without additional evidence of breeding on site, these observations are considered only possible breeding records. Peregrine Falcon and Barn Swallow pairs have been confirmed to be breeding inside the Protected Area. OPG continues to monitor the presence, distribution, and breeding of species within and around the PN site and ensures compliance with federal and provincial legislation.

In 2021, the MECP issued OPG a Safe Harbour Stewardship Agreement (SHA) under Section 16(1) of the Endangered Species Act. The SHA allows OPG to test the performance and feasibility of an artificial nesting structure design for Bank Swallows. The design selected for the structure was a Fixed Face Earthen Embankment (FFEE) and was constructed to the east of the East Complex (just outside the PN Site boundary) in 2021. In accordance with the conditions of the SHA, OPG is required to undertake effectiveness monitoring of the FFEE for the duration of the conservation period, which is seven breeding seasons (i.e., 2021 – 2027). In 2023, during the third year of monitoring, Bank Swallows successfully colonized the artificial embankment for the first time. Similarly, in 2024, Bank Swallows colonized the artificial embankment. In both years, there was high occupancy and successful nesting by Bank Swallows.

Table 4-17: Terrestrial Animal Species at Risk Observed within the PN Study Area

Scientific Name	Common Name	Federal Species at Risk Status (SARA) ⁽¹⁾	Provincial ESA Status (SARO) ⁽²⁾	Most Recent Year Observed
Amphibians and Reptiles				
<i>Emydoidea blandingii</i>	Blanding's turtle	Endangered	Threatened	2006
<i>Chrysemys picta marginata</i>	Midland Painted Turtle	Special Concern	-	2023
Birds				
<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	2020
<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern	Special Concern	2022
<i>Ixobrychus exilis</i>	Least Bittern	Threatened ⁽³⁾	Threatened	2023
<i>Antrastomus vociferus</i>	Eastern Whip-poor-will	Threatened ⁽³⁾	Threatened	2023
<i>Falco peregrinus</i>	Peregrine Falcon	- (4)	Special concern	2023
<i>Melanerpes erythrocephalus</i>	Red-headed woodpecker	Endangered	Endangered	2023
<i>Hirundo rustica</i>	Barn Swallow	Threatened ⁽³⁾	Special Concern	2023
<i>Chordeiles minor</i>	Common Nighthawk	Special Concern	Special Concern	2010
<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened ⁽³⁾	Threatened	2006
<i>Riparia riparia</i>	Bank Swallow	Threatened	Threatened	2008
Butterflies and Moths				
<i>Danaus plexippus</i>	Monarch	Endangered	Special Concern	2023

Notes:

Statuses are up to date as of January 7th, 2025. Observations were included up to 2023.

The Provincial Species at Risk in Ontario List, Federal List of Wildlife Species at Risk (Schedule 1 of the Species at Risk Act (SARA)), and Committee on the Status of Endangered Wildlife in Canada (COSEWIC) lists are frequently revised.

(1) SARA Schedule 1 ranks species at risk as Extirpated, Endangered, Threatened Species and Special Concern. Prohibitions of the Act do not apply to species of Special Concern.

(2) The provincial Endangered Species Act (2007) came into effect on June 30, 2008 and it applies to species once they appear on the official list.

(3) The COSEWIC status of the Least Bittern, Eastern Whip-poor-will, Barn swallow, and Bobolink were assessed as Special Concern.

(4) The COSEWIC status of the Peregrine Falcon was assessed as Not at Risk.

Sources: (Beacon, 2017a, 2017b, 2018, 2022, 2023a, 2023b; OPG, 2016).

4.6 Radiation and Radioactivity

During normal operations, the PN site releases radiation fields into the surrounding environment. It is also a source of radionuclide emissions to air and water, as discussed in **Section 4.1.1.1** and **Section 4.2.2.1.3**, respectively. Radiation doses arising from these sources are discussed in the following sections.

4.6.1 Human Dose

In 2013, the annual Radiological Environmental Monitoring Program report was changed to the annual EMP report entitled “Results of Environmental Monitoring Programs”. During this time, the EMP was redesigned to meet the requirements of CSA N288.4-10 (CSA, 2010) and expanded to include conventional contaminants, physical stressors and non-human biota, in addition to the radiological contaminants and human receptors. More recently, the EMP is now compliant with CSA N288.4-19 (CSA, 2019).

For the radiological exposure assessment, exposure point concentrations are either based on measured data from the annual EMP or modelled from emissions data, as described in the EMP report (OPG, 2024d). Additionally, when measurement averages or other calculations are performed, they are calculated using all results obtained, including detection limit values if the results are below the critical level for detection (OPG, 2024d).

Table 4-18 below presents a summary of the annual doses reported for the potential critical groups from 2021 to 2023. Although the current PN EMP design currently focuses on the Urban Resident, Dairy Farm, Sport Fisher, and Industrial Worker, the dose for receptors at the correctional institution is also reported to show variation in dose. **Table 4-19** presents a summary of the maximum dose to each limiting critical group from 2021 to 2023. The annual dose during the three-year period of interest (2021 to 2023) ranged from 1.5 to 2.0 μSv . The limiting critical group for all years was the Urban Resident (adult). The dominant pathways and radionuclides that contribute significantly to the total dose are inhalation of tritium and external exposure to noble gases. Overall, the reported annual doses between 2021 and 2023 are comparable with those presented in the recent 2022 PN ERA, which assessed annual doses from 2016 to 2020.

Table 4-18: Summary of Dose to Potential Critical Groups from 2021-2023

Year	Age Class	Radiological Dose ($\mu\text{Sv/a}$)				
		Dairy Farm	Urban Resident	Sport Fisher	Correctional Institution	Industrial Worker
2021	Adult	0.30	1.99	0.38	1.00	1.56
	Child	0.35	1.74	0.43	1.03	--

Year	Age Class	Radiological Dose (µSv/a)				
		Dairy Farm	Urban Resident	Sport Fisher	Correctional Institution	Industrial Worker
	Infant	0.43	1.97	0.38	--	--
2022	Adult	0.35	1.94	0.17	0.98	1.45
	Child	0.40	1.76	0.19	1.04	--
	Infant	0.50	1.90	0.15	--	--
2023	Adult	0.38	1.54	0.19	0.94	1.42
	Child	0.47	1.31	0.20	0.98	--
	Infant	0.63	1.44	0.17	--	--

Source: (OPG, 2023b, 2023a, 2024d)

Table 4-19: Summary of Dose to Limiting Critical Group from 2021 to 2023

Year	Limiting Receptor Group	Effective Dose (µSv)	Percentage of Regulatory Limit (%)	Percentage of Dose from Canadian Background Radiation (%)
2021	Urban Resident (Adult)	1.99	0.20%	0.14%
2022	Urban Resident (Adult)	1.94	0.19%	0.14%
2023	Urban Resident (Adult)	1.54	0.15%	0.11%

Source: (OPG, 2023b, 2023a, 2024d)

4.6.1.1 Radiological Dose from the NSS-PWMF

Radiation fields outside the NSS-PWMF are due primarily to contributions from direct gamma radiation and secondarily from gamma skyshine. Given that radiation intensity decreases as distance from the source increases, the Sport Fisher is the only critical group for which gamma radiation would likely be measurable due to its relatively close proximity to the PN site compared to the other critical groups. Based on a study from 2017 (OPG, 2024d), at a distance

of 400 m from the NSS-PWMF, the measured air kerma rate was below the detection limit of 0.33 nGy/h. At a distance of 1 km from the NSS-PWMF, the air kerma rate was estimated to be negligible.

When the NSS-PWMF Dry Storage Container (DSC) Buildings #1 to #4 are filled to capacity, the calculated dose rate at the eastern lakeside exclusion zone boundary is 1.41×10^{-3} $\mu\text{Sv/hr}$, or 1.41 μSv per year based on 1,000 hours occupancy (OPG, 2023i). This is conservative for the Sport Fisher who is assumed to have 1% occupancy at the outfall, or 87.6 hours per year. By adjusting the occupancy to 1%, the predicted total annual dose to the Sport Fisher from the NSS-PWMF when DSC Buildings #1 to #4 are at capacity is 0.124 μSv (**Table 4-20**).

Table 4-20: Dose Rate at the NSS-PWMF Exclusion Zone Boundary

Occupancy	Dose Rate – Full Capacity ($\mu\text{Sv/h}$)	Annual Dose – Full Capacity (μSv)
1,000 hrs/yr (11%)	1.41×10^{-3}	1.41
87.6 hrs/yr (1%)	1.41×10^{-3}	0.124

Source: (OPG, 2023i)

4.6.2 Ecological Dose

Ecological receptors are exposed to radiation fields and radionuclides released by the PN site during normal operations.

In the 2022 PN ERA, radiation dose benchmarks of 400 $\mu\text{Gy/h}$ (9.6 mGy/d) and 100 $\mu\text{Gy/h}$ (2.4 mGy/d) (UNSCEAR, 2008) were selected for the assessment of radiological effects on aquatic biota and terrestrial biota, respectively, as recommended in the CSA N288.6 standard. This is a total dose benchmark, therefore the dose to biota due to each radionuclide of concern is summed to compare against this benchmark. Further information as to the selection of these benchmarks is provided in Section 4.3.2 of the 2022 PN ERA (Ecometrix, 2023a).

A summary of estimated radiological doses for ecological receptors from the 2022 PN ERA is provided in **Table 4-21** below.

No exceedances of the selected radiation dose benchmarks were reported for any terrestrial and aquatic receptors assessed in the 2022 PN ERA, a conclusion shared with the prior 2017 PN ERA report. The most recent maximum terrestrial dose was estimated to be 2.79×10^{-2} mGy/d for the Ring-billed Gull assessed at the Outfall. This dose represents 1.2% of the radiological dose benchmark of 100 $\mu\text{Gy/h}$ (2.4 mGy/d) for terrestrial ecological receptors. The maximum aquatic dose was estimated to be 3.82×10^{-2} mGy/d for benthic invertebrates in the Outfall. This dose represents 0.4% of the radiological dose benchmark of 400 $\mu\text{Gy/h}$ (9.6 mGy/d) for aquatic ecological receptors.

The above results represent an improvement in the existing radiological conditions at the PN site from the earlier 2014 PN ERA, where it was estimated that the terrestrial radiological dose benchmark of 100 $\mu\text{Gy/h}$ (2.4 mGy/d) was exceeded for the Earthworm and Red-winged Blackbird receptors at the PN Site. It was noted at the time that the areas of high radiological exposure are highly localized near the reactor buildings and do not present a risk to populations of earthworms and other soil-dwelling organisms across the overall PN site. The exceedance of the terrestrial benchmark for the Red-winged Blackbird was determined to be driven by the assumed ingestion of maximally exposed earthworms; however, since the blackbird is a mobile receptor and is unlikely to be ingesting maximally exposed earthworms at all times, the calculated mean dose was considered a more representative dose for the blackbird, which did not exceed the dose benchmark.

Overall, ecological receptors are not expected to be at risk of radiological effects from current environmental conditions at the PN site.

4.6.2.1 Radiological Dose from the NSS-PWMF

The dose rate for ecological receptors within the immediate vicinity of the NSS-PWMF could be up to 0.5 $\mu\text{Gy/h}$ (0.012 mGy/d), assuming full capacity of the NSS-PWMF (OPG, 2023i). The dose rate to any ecological receptors at the closest PN property boundary would be lower than 0.5 $\mu\text{Gy/h}$ (0.012 mGy/d). As noted in the 2022 PN ERA (Ecometrix, 2023a), the above assumption is conservative as it assumes the receptor is always located at the NSS-PWMF and does not incorporate an occupancy factor based on the fraction of time a receptor is likely to be in close proximity to the NSS-PWMF.

As noted above, the maximum dose rate to any ecological receptor residing in close proximity to the NSS-PWMF could be up to 0.012 mGy/d , which is lower than the 2.4 mGy/d radiation benchmark for terrestrial biota. When considering the maximum dose from the NSS-PWMF ($1.20 \times 10^{-2} \text{ mGy/d}$) together with the maximum dose to any ecological receptor ($2.79 \times 10^{-2} \text{ mGy/d}$ for the Ring-Billed Gull) from being exposed to radionuclides through other existing PN operations (see **Table 4-21**), the total combined dose of $3.99 \times 10^{-2} \text{ mGy/d}$ remains below the 2.4 mGy/d radiation benchmark for terrestrial biota.

Table 4-21: Summary of Radiation Dose Estimates for Biota at the Pickering Site

Location	Receptor	Units	C-14		Cs-134		Cs-137		Co-60		Tritium (HTO+OBT)		I-131		Ar-41		Total Dose	
			Max	UCLM	Max	UCLM	Max	UCLM	Max	UCLM	Max	UCLM	Max	UCLM	Max	UCLM	Max	UCLM
Outfall	Benthic Fish	mGy/d	3.96E-05	2.18E-05	2.37E-02	1.47E-03	1.28E-06	6.78E-07	7.75E-07	5.58E-07	2.74E-05	2.43E-06	-	-	-	-	2.38E-02	1.49E-03
	Pelagic Fish	mGy/d	1.43E-05	3.11E-06	1.56E-02	9.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E-05	1.17E-05	-	-	-	-	1.56E-02	9.76E-04
	Benthic Invertebrate	mGy/d	1.40E-05	3.04E-06	3.82E-02	2.36E-03	0.00E+00	0.00E+00	3.36E-06	2.42E-06	2.58E-05	1.17E-05	-	-	-	-	3.82E-02	2.38E-03
	Ring-Billed Gull	mGy/d	4.43E-03	2.03E-03	2.29E-02	1.44E-03	2.37E-05	2.37E-05	3.97E-05	3.93E-05	5.17E-04	2.16E-04	1.01E-11	1.76E-12	7.05E-05	9.82E-06	2.79E-02	3.76E-03
PN Site	Earthworm	mGy/d	1.81E-04	3.63E-05	2.00E-05	2.00E-05	7.35E-06	7.35E-06	3.14E-05	3.10E-05	5.96E-04	2.47E-04	1.06E-08	1.84E-09	7.05E-05	9.82E-06	9.07E-04	3.52E-04
	Grass/Shrub	mGy/d	2.16E-04	4.33E-05	7.54E-05	7.54E-05	2.86E-05	2.86E-05	1.16E-04	1.12E-04	5.74E-04	2.38E-04	1.02E-07	1.77E-08	7.05E-05	9.82E-06	1.08E-03	5.07E-04
	Pine	mGy/d	2.16E-04	4.33E-05	2.25E-05	2.25E-05	8.14E-06	8.14E-06	3.54E-05	3.40E-05	5.74E-04	2.38E-04	5.77E-09	1.00E-09	7.05E-05	9.82E-06	9.26E-04	3.55E-04
	Red-winged Blackbird	mGy/d	3.68E-04	7.39E-05	3.30E-05	3.16E-05	1.14E-05	1.14E-05	4.78E-05	4.69E-05	3.25E-04	1.35E-04	8.19E-11	1.42E-11	7.05E-05	9.82E-06	8.56E-04	3.08E-04
	Red-tailed Hawk	mGy/d	4.84E-04	9.70E-05	3.34E-05	3.15E-05	1.13E-05	1.13E-05	4.69E-05	4.68E-05	1.85E-04	7.69E-05	2.84E-11	4.92E-12	7.05E-05	9.82E-06	8.30E-04	2.73E-04
	Red Fox	mGy/d	2.95E-03	1.33E-03	3.54E-05	3.41E-05	2.85E-05	2.83E-05	4.54E-05	4.54E-05	3.27E-04	1.36E-04	2.35E-09	4.07E-10	7.05E-05	9.82E-06	3.46E-03	1.58E-03
	Meadow Vole	mGy/d	4.34E-04	8.69E-05	3.18E-05	3.13E-05	1.17E-05	1.17E-05	4.95E-05	4.94E-05	2.51E-04	1.05E-04	1.27E-08	2.20E-09	7.05E-05	9.82E-06	8.48E-04	2.94E-04
	White-tailed Deer	mGy/d	4.34E-04	8.69E-05	2.30E-05	1.66E-05	5.87E-06	5.87E-06	2.63E-05	2.52E-05	2.83E-04	1.18E-04	8.22E-08	1.42E-08	7.05E-05	9.82E-06	8.42E-04	2.62E-04
Frenchman's Bay	White Sucker	mGy/d	1.74E-03	9.15E-04	1.72E-03	1.72E-03	1.55E-03	1.54E-03	3.92E-05	3.23E-05	6.16E-06	4.10E-06	-	-	-	-	5.05E-03	4.21E-03
	Lake Trout	mGy/d	1.74E-03	9.15E-04	1.72E-03	1.72E-03	1.54E-03	1.54E-03	3.06E-05	3.06E-05	6.16E-06	4.10E-06	-	-	-	-	5.03E-03	4.21E-03
	Frog	mGy/d	1.74E-03	9.15E-04	8.10E-04	8.10E-04	1.13E-03	1.12E-03	2.09E-05	1.33E-05	6.16E-06	4.10E-06	-	-	-	-	3.70E-03	2.87E-03
	Aquatic Plant	mGy/d	1.80E-03	9.47E-04	6.44E-05	6.43E-05	8.19E-05	7.59E-05	1.79E-04	1.71E-04	5.95E-06	3.96E-06	-	-	-	-	2.13E-03	1.26E-03
	Benthic Invertebrate	mGy/d	1.70E-03	8.93E-04	3.17E-05	3.10E-05	6.24E-05	3.56E-05	5.40E-05	2.42E-05	6.18E-06	4.11E-06	-	-	-	-	1.85E-03	9.88E-04
	Bufflehead	mGy/d	7.28E-03	3.83E-03	8.87E-05	8.85E-05	8.45E-05	7.55E-05	6.34E-05	5.50E-05	1.11E-05	6.50E-06	1.28E-14	2.23E-15	9.84E-06	3.71E-06	7.54E-03	4.06E-03
	Common Tern	mGy/d	3.51E-03	1.85E-03	2.17E-03	2.17E-03	1.85E-03	1.85E-03	2.68E-05	1.87E-05	7.94E-06	4.41E-06	1.21E-14	2.10E-15	9.84E-06	3.71E-06	7.58E-03	5.90E-03
	Trumpeter Swan	mGy/d	3.51E-03	1.85E-03	1.26E-04	1.26E-04	1.14E-04	1.06E-04	1.80E-04	1.71E-04	7.78E-06	4.30E-06	1.37E-14	2.37E-15	9.84E-06	3.71E-06	3.94E-03	2.26E-03
	Ring-Billed Gull	mGy/d	1.05E-02	5.55E-03	1.34E-03	1.34E-03	1.15E-03	1.14E-03	5.90E-05	5.10E-05	1.55E-05	9.06E-06	1.33E-14	2.31E-15	9.84E-06	3.71E-06	1.31E-02	8.09E-03
	Muskrat	mGy/d	2.89E-03	1.52E-03	7.94E-05	7.92E-05	8.59E-05	7.87E-05	1.66E-05	8.12E-06	7.33E-06	4.19E-06	8.86E-13	1.53E-13	9.84E-06	3.71E-06	3.09E-03	1.70E-03

Source: (Ecometrix, 2023a)

Notes:

Dashed line indicates radionuclide not assessed for the specified receptor.

Bold and shaded values exceed the aquatic benchmark of 9.6 mGy/d or the terrestrial benchmark of 2.4 mGy/d.

Max and mean dose for Cobalt-60, Cesium-134, and Cesium-137 are generally equivalent for most receptors since their concentrations in surface water, sediment, and soil were generally measured below the detection limit. Iodine-131 and Argon-41 are only applicable to terrestrial and riparian biota.

HTO – tritiated water; OBT – organically bound tritium

4.7 Uncertainty in the Existing Conditions

Considering the effort spent in 2024 and 2025 to collect additional data on existing conditions at the PN site, including supplementary studies for air quality data, noise levels, surface water and sediment quality, soil quality, fish tissue, and aquatic habitat characterization; along with OPG's routine annual environmental and groundwater monitoring programs, the PN Site is well-characterized.

For this PERA, less than 2 months (beginning of January 2025 to middle of February 2025) of air monitoring data were available, which are used to represent existing air quality conditions in **Section 4.1.1**. The air monitoring study for existing conditions will continue so that 6 months of data will be collected. The additional air quality result will be incorporated into the next revision of the PERA.

Aquatic monitoring studies were completed based on project planning for the DWI at the time when the studies were designed. Further data collection is planned for 2025 for the aquatic environment to accommodate the changes to DWI planning since the studies were initiated. The additional aquatic environment results will also be incorporated in the next revision of the PERA.

No other residual uncertainties in the existing environment site characterization have been identified.

5.0 Tier 1 Qualitative Assessment

This section presents the qualitative Tier 1 assessment to identify Project interactions that are not bounded by existing conditions or previous assessments. The qualitative assessment utilizes the description of activities identified in **Section 3.0** that are planned to occur during PNGS Units 1-4 decommissioning and PNGS Units 5-8 refurbishment and continued operations, and the understanding of existing conditions identified in **Section 4.0** to identify potentially increasing interactions with environmental components during the Project phases.

Where Project-environment interactions are bounded by previous operational conditions as assessed in the 2022 PN ERA for 6 operating units (Ecometrix, 2023a), or other assessments such as the 2017 Safe Storage PEA and 2022 PEA Addendum, they are considered to be adequately assessed and are not considered further in this PERA. The existing operating licence for PNGS allows for OPG to operate PNGS Units 1 and 4 until the end of 2024, operate PNGS Units 5-8 until the end of 2026, and perform Stabilization and SWS activities.

As shown in the conceptual timeline for the Project in **Figure 1-2**, there will be activities occurring in one phase that occur at the same time as another phase. For example, while PNGS Units 1 and 4 are in the Stabilization Phase, and PNGS Units 2 and 3 are in SWS phase, risk reduction and removal activities will also occur, along with PNGS Units 5-8 refurbishment activities, and construction of the DWI. The assessment by environmental component considers activities that are occurring at the same time, where relevant.

Those Project-environment interactions not readily bounded by previous operational conditions in the 2022 PN ERA (for 6 operating units), or by previous assessment in the 2017 Safe Storage PEA and 2022 PEA Addendum, are considered in this PERA to identify whether predicted effects could exceed accepted screening values for the protection of human health and the environment. If screening values are predicted to be exceeded, the interactions are evaluated further in the Tier 2 quantitative assessment (**Section 6.0**).

The results of the qualitative assessment of Project-environment interactions are shown in **Table 5-1** and described in the subsections below by environmental component: atmospheric environment (air, noise), surface water environment (surface water flow, surface water and sediment quality), geological and hydrogeological environment (soil, groundwater), radiation and radioactivity, aquatic environment (fish and fish habitat, benthic invertebrates), and terrestrial environment (vegetation, wildlife).

Table 5-1: Identification of Project-Environment Interactions

Project Activities	Atmospheric Environment (Air/Noise)	Surface Water Environment - Flow	Surface Water Environment - Quality	Hydrogeological and Geological Environment – Groundwater Flow	Hydrogeological and Geological Environment – Groundwater Quality	Hydrogeological and Geological Environment - Soils	Radiation and Radioactivity (Gamma Radiation Field)	Terrestrial Environment	Aquatic Environment
PNGS Units 1-4 Decommissioning									
PNGS Units 1 and 4 Stabilization	✓	✓	✓	✓	✓	✓	✓	✓	✓
PNGS Units 1-4 Storage with Surveillance	✓	✓	✓	✓	✓	✓	✓	✓	✓
Risk Reduction and Removal Activities	✓	-	-	✓	✓	✓	-	✓	-
Dismantle/Demolish	✓	-	-	✓	✓	✓	✓	✓	-
PNGS Units 5-8 Refurbishment									
<i>Preparation for Refurbishment</i>									
• Procurement and Mobilization of Equipment and Components	✓	-	-	-	-	-	-	✓	✓
• Relocation/Removal/Construction of Buildings, Structures, and Equipment	✓	-	-	✓	-	✓	-	✓	-
• Construction of PCSS and SB #5	✓	-	-	✓	-	✓	-	✓	-
• Defuel and Dewater	✓	✓	✓	-	-	-	-	-	-
• Islanding the Unit	-	-	-	-	-	-	-	-	-
• Management of Heavy Water	✓	-	-	-	-	-	-	-	-
• Construction of DWI	✓	✓	✓	-	-	-	-	✓	✓
<i>Refurbishment</i>									
• Replacement of Reactor Components	✓	-	-	-	-	-	-	-	-
• Removal and Replacement of Steam Generators	✓	-	-	-	-	-	-	-	-
• Operation of DWI	-	✓	✓	-	-	-	-	-	✓
• Refurbishment of Other Plant Systems	✓	-	-	✓	-	-	-	-	-
• Waste Management and Transportation	✓	-	-	-	-	-	✓	✓	-
• Refuelling and Restarting	✓	✓	✓	-	-	-	-	-	-

Project Activities	Atmospheric Environment (Air/Noise)	Surface Water Environment - Flow	Surface Water Environment - Quality	Hydrogeological and Geological Environment – Groundwater Flow	Hydrogeological and Geological Environment – Groundwater Quality	Hydrogeological and Geological Environment - Soils	Radiation and Radioactivity (Gamma Radiation Field)	Terrestrial Environment	Aquatic Environment
Continued Operations									
• Operation and Maintenance of PNGS Units 5-8	✓	✓	✓	✓	✓	✓	✓	✓	✓
• Waste Management and Transportation	✓	-	-	-	-	-	✓	✓	-

Notes:

✓: Indicates an interaction between the Project activity and the environmental component. The Tier 1 assessment determines if this interaction is negligible and/or bounded by another previous assessment (2017 Safe Storage PEA and 2022 PEA Addendum, the PCSS PERA, or 2022 PN ERA), or if further quantitative evaluation in the Tier 2 assessment is warranted.

- : Indicates no interaction between the Project activity and the environmental component.

5.1 Atmospheric Environment

5.1.1 Air Quality

5.1.1.1 PNGS Units 1-4 Decommissioning

5.1.1.1.1 Stabilization and Storage with Surveillance

Non-Radiological Emissions

As stated in the 2017 Safe Storage PEA and updated in the 2022 PEA Addendum, non-radiological emissions will gradually decrease during the Stabilization Phase compared to previous operations (6 operating units). Steam generating boilers for electricity production are the only emission sources with the potential to change emissions notably. Starting in 2026, emissions will be reduced, 4 electrode boilers will be used to provide steam for building heating. The Auxiliary Boiler will be standby and only used if required to meet peak load. No other substantial changes to non-radiological atmospheric emission sources are anticipated. These findings from the 2017 Safe Storage PEA and updated in the 2022 PEA Addendum continue to remain valid for Stabilization and SWS; therefore, no further assessment is conducted in this PERA.

Radiological Emissions

As indicated in the 2017 Safe Storage PEA and 2022 PEA Addendum, tritium is released to the environment during reactor dewatering and draining during the Stabilization Phase. It was concluded that previous operational conditions (for 6 operating units) are bounding of tritium emissions to air during the Stabilization Phase. Additionally, tritium and C-14 emissions during SWS will be even lower and remain below existing emissions assessed in the 2022 PN ERA (for 6 operating units). Even though tritium and C-14 emissions are expected to be lower than existing emissions (for 6 operating units), the 2017 Safe Storage PEA evaluated the resulting radiation dose to human receptors in the vicinity of PN and it was determined to be a small fraction of the public dose limit. These findings from the 2017 Safe Storage PEA and updated in the 2022 PEA Addendum continue to remain valid for Stabilization and SWS; therefore, no further assessment is conducted in this PERA.

While no specific radiological COPCs were identified for the atmospheric environment during Stabilization and SWS, general feedback from the WTFNs during engagement on other PERAs has indicated that it would be beneficial to include a Harvester receptor, to account for Indigenous people who may live and work near the facility and consume traditional foods harvested near the facility. As such, assessment of a Harvester for atmospheric radiological emissions is considered in the Tier 2 quantitative assessment.

The 2022 PEA Addendum identified that approximately 1,500 Mg of heavy water (D₂O) will be transported to the Darlington Nuclear (DN) site for storage towards the end of the Stabilization Phase at the DN Heavy Water Management Building – West Annex. The movement of heavy water to the DN site may result in some additional releases of tritium to air during the

Stabilization Phase due to venting. However, PN currently transports heavy water to Darlington on a routine basis to modulate tritium concentration in the heavy water inventory. OPG will continue to use existing processes and practices of transporting heavy water and the frequency for transporting heavy water will be bounded by previous operational conditions (for 6 operating units). Additionally, OPG will manage heavy water in accordance with the D₂O Management Plan for Pickering Safe Storage. These findings from the 2022 PEA Addendum continue to remain valid for Stabilization and SWS; therefore, no further assessment is conducted in this PERA.

One activity not assessed in the 2017 Safe Storage PEA and 2022 PEA Addendum is removal of modules and baskets from the AIFB and IFB-A. As fuel is removed, empty baskets and associated frames will be removed from the AIFB and IFB-A and disposed of using existing waste routes (see **Section 3.3.3.1**). The modules and baskets will have some radiological contamination. All waste being transported will be radiologically surveyed before transportation and disposal, as part of best practices and in accordance with procedures for waste removal. If waste is identified that does not meet clearance criteria, OPG has procedures in place to appropriately handle radioactive waste before and during transportation.

5.1.1.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess risk reduction and removal activities. As identified in **Section 3.3.4**, during the 2025 to 2033 timeframe OPG plans to initiate risk reduction and removal activities, which will include dismantling of non-nuclear systems and outbuildings. More specifically, PE-A (Groups A-1 and A-2) includes dismantling and removal of end-stated and abandoned/retired structures within the PNGS Units 1-4 protected area, excluding the main powerhouse structure; and PE-B (Groups B-1 and B-2) includes the dismantling and removal of SSCs considered to be non-nuclear that are located within the TH and TAB.

From 2034 to 2037, OPG plans to execute PE-A (Group A-3) which includes complete removal of non-nuclear outbuildings, as identified in **Figure 3-7**.

Non-Radiological Emissions

During dismantling of non-nuclear systems and outbuildings, air emissions may result from general activities such as clearing of the work area and accessing the structure, which involve vehicle movement, and lifting and removing structures. Dismantling and/or segmenting larger tanks and water lines may emit particles or fumes from the grinding work. It is expected that all grinding and segmentation work would be carried out indoors in a ventilated environment. Work related to CCW lines may include hazards from asbestos in gaskets, tiles and insulation. These hazards will be mitigated by complying with OPG's Asbestos management procedures. OPG will follow typical construction best practices including implementation of an Environmental Management Plan. The decommissioning phase work plan will include protocols for dust suppression to reduce the release of particulates and dust into the atmosphere. Vehicle

traffic associated with transporting dismantled material off-site will be similar to or slightly higher than the traffic associated with current PN operations; thus, the slight increase of traffic volumes would overall be considered negligible. OPG's implementation of the Environmental Management Plan is sufficient to mitigate the expected negligible impacts.

Radiological Emissions

No radiological atmospheric emissions to the environment are expected during the dismantling and demolition activities. Other than removal of frames and baskets from IFB-A and AIFB, none of the dismantled equipment are from radiological systems or systems that are likely to be radiologically contaminated. All waste being transported will be radiologically surveyed before transportation and disposal, as part of best practices and in accordance with existing procedures of waste removal.

Execution of PE-A-3 (dismantle/demolish activities from 2034 to 2037) involves complete removal of non-nuclear outbuildings shown in **Figure 3-7**. Complete removal for these specific non-nuclear outbuildings may have residual radiological contamination. The specific plans for environmental risk mitigation and strategy to execute any radiological work safely will be determined via the completion of a Decommissioning Safety Assessment, which is planned for the next DDP update. All SSCs will be characterized prior to dismantling and demolishing in accordance with OPG's Characterization Implementation Strategy which follows industry best practices (OPG, 2024j).

Overall, air emissions during risk reduction and dismantle/demolish activities during this licensing period will be similar to that assessed in the 2022 PN ERA with 6 operating units; therefore, no further assessment is warranted in the PERA.

5.1.1.2 PNGS Units 5-8 Refurbishment

Non-Radiological Emissions

During routine operations at the PN site, there are emissions to air from boiler chemicals, ventilation and chemical use, combustion equipment, and vehicular movement. During preparation for refurbishment, releases to the atmospheric environment are expected from construction activities as well as activities during refurbishment such as replacement of reactor components, removal and replacement of steam generators, waste management, and refuelling and restarting. Similar to SWS, during Refurbishment, in 2026 the heating source will transition to electric boilers and the Auxiliary Boiler will be available on standby.

To support this PERA, a maximum bounding emission scenario was developed to assess the effects of refurbishment and decommissioning activities. The bounding scenario considered was the combined emissions from activities that will occur on the PN site in 2027 for both PNGS Units 5-8 refurbishment as well as PNGS Units 1-4 decommissioning activities. A screening activity was performed to identify all activities that will occur during all Project phases, and the

year 2027 was identified as the bounding case where maximum emissions from equipment and vehicular traffic are expected.

Potential effects associated with site and facility preparation for refurbishment, management of heavy water, transfer of low and intermediate level refurbishment waste, transportation of low and intermediate level refurbishment waste, and the management of non-nuclear waste were not considered for the bounding scenario as they are only a small fraction of the potential effects from the bounding emission scenario.

Construction equipment, such as cranes, forklifts, excavators and loaders, will be used during the site preparation earthworks and the removal and replacement of steam generators, and will result in the release of constituents such as particulate matter, carbon monoxide (CO), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), PAHs, and VOCs.

During preparation for refurbishment, the PCSS, RFRISA, and other buildings needed to support refurbishment will be constructed. Activities associated with the construction of the PCSS for the storage of low and intermediate-level refurbishment waste were assessed as part of the PCSS PERA (Ecometrix, 2024). The activities associated with construction of the RFRISA are expected to be similar to the PCSS. While construction of these buildings is not explicitly included in the updated air model for this PERA, the results of the air model are considered bounding of building construction.

Additionally, construction is planned for SB #5 in the PWMF Phase II Site for future storage of used fuel, with an in-service date of Q3 2027. Assessment of the construction of SB #5 was completed as part of the approved Pickering B Refurbishment EA.

During refurbishment, the steam generators (also known as boilers) will be physically removed and replaced. A temporary construction opening will be created in the roof of the reactor buildings to allow for extraction of the large steam generators. It is assumed that any concrete cutting will be done with wet methods (i.e., hydrojet cutting) and will have spray drift covers, thus ensuring that dust emissions are minimal.

Refurbishment activities will also involve metal cutting and welding within the reactor buildings to remove and replace reactor components. The reactor buildings will generally remain sealed; therefore, emissions from this activity would be contained within the building. Given that these activities would still occur within the building and would likely be minimized during these complicated lift operations, emissions released from the building are considered to be insignificant and are not considered further.

The maximum bounding emission scenario also considered on-site vehicular traffic (approximately 2,200 vehicles per day), specifically haul trucks for movement of material associated with refurbishment activities (i.e., hauling of excavated materials, concrete trucks supporting construction), as well as employee and delivery traffic from previous conditions (with 6 operating units) and additional refurbishment contract employee and delivery traffic.

Sources of emissions considered in the model included combustion emissions from construction equipment, activity in the harbour (tugboats), tailpipe emissions and re-suspended road dust generated by vehicle movements, wind-blown dust from construction sites, and dust generated from material handling (e.g., fugitive dust from transferring excavated materials to trucks). With regard to combustion emissions, it was assumed that diesel fuel would be used to run construction equipment. With regard to fugitive dust emissions (i.e., from road dust, wind erosion and material handling), it was assumed that watering methods would be utilized as a dust control measure, and this was accounted for in the modelling. The constituents that were modelled included: nitrogen dioxide, sulphur dioxide, carbon monoxide, total suspended particulates, PM_{2.5}, PM₁₀, benzo(a)pyrene (surrogate for total PAHs), and acrolein (representative of VOCs).

5.1.1.2.1 Screening of Atmospheric Non-Radiological Constituents of Potential Concern

The modelled concentrations of non-radiological COPCs in air were compared against provincial and federal ambient air quality standards, including the MECP Ambient Air Quality Criteria (AAQCs) (MECP, 2023) and Canadian Ambient Air Quality Standards (CAAQS) from the Canadian Council of Ministers of the Environment (CCME) (CCME, 2019) to determine whether modelled concentrations of atmospheric COPCs could pose a risk to human and ecological receptors. Modelled concentrations were directly compared to guidelines with the same averaging periods. The air quality criteria with averaging times of 24 hours or longer are considered protective of chronic health effects, while air quality criteria with averaging times of 1-hr and 8-hr are considered protective of short-term health effects. The air quality guidelines used as part of this risk assessment are shown in **Table 5-2**. The human and ecological receptor locations retained for the air quality modelling assessment are shown in **Figure 5-1** and **Figure 5-2**, respectively.

The human receptor locations are generally consistent with existing receptor locations considered in OPG's existing annual EMP (OPG, 2024d) and the 2022 PN ERA (Ecometrix, 2023a), except for the new Harvester and three Local Harvesting Area locations. The Harvester is assumed to live close to the PN site (at the Urban Resident) and also hunts and gathers traditional foods at Hydro Marsh (R1-R3, three local harvesting areas). The ecological receptor locations were chosen from a larger list of locations used in the air quality and noise modelling for the PERA. Some locations overlap with those in the 2022 PN ERA, and an additional location (R3) was included to represent ecological receptors in Hydro Marsh.

A summary of the predicted exceedances of applicable ambient air quality criteria are shown in **Table 5-3**. Detailed results of the air modelling and comparison with applicable ambient air quality criteria are presented from **Table 5-4** to **Table 5-11**. Further discussion of ambient air quality criteria exceedances, and a summary of the non-radiological emission screening, are provided in **Section 5.1.1.2.2.1** and **Section 5.1.1.2.2.2** for human and ecological receptors, respectively.

Table 5-2: Ambient Air Quality Screening Criteria

Constituent	Units	Averaging Period	Value	Basis	Reference	Notes
Total suspended particulates (TSP)	$\mu\text{g}/\text{m}^3$	24-hr	120	Visibility	(MECP, 2023)	--
	$\mu\text{g}/\text{m}^3$	Annual	60	Visibility	(MECP, 2023)	--
Particulate matter <10 μm (PM ₁₀)	$\mu\text{g}/\text{m}^3$	24-hr	50	Health	(MECP, 2023)	--
Particulate matter <2.5 μm (PM _{2.5})	$\mu\text{g}/\text{m}^3$	24-hr	27	Health / Environment	(CCME, 2019; MECP, 2023)	--
	$\mu\text{g}/\text{m}^3$	Annual	8.8	Health / Environment	(CCME, 2019; MECP, 2023)	--
Sulphur dioxide (SO ₂)	$\mu\text{g}/\text{m}^3$	1-hr	170	Health / Environment	(CCME, 2019)	Converted from 65 ppb, where 1 ppb of SO ₂ is equal to 2.62 $\mu\text{g}/\text{m}^3$ at 20°C and 1 atm.
	$\mu\text{g}/\text{m}^3$	1-hr	105	Health	(MECP, 2023)	Converted from 40 ppb, where 1 ppb of SO ₂ is equal to 2.62 $\mu\text{g}/\text{m}^3$ at 20°C and 1 atm.
	$\mu\text{g}/\text{m}^3$	Annual	11	Vegetation	(CCME, 2019; MECP, 2023)	Converted from 4 ppb, where 1 ppb of SO ₂ is equal to 2.62 $\mu\text{g}/\text{m}^3$ at 20°C and 1 atm.
Nitrogen dioxides (as NO ₂)	$\mu\text{g}/\text{m}^3$	1-hr	79	Health / Environment	(CCME, 2019)	Converted from 42 ppb, where 1 ppb of NO ₂ is equal to 1.88 $\mu\text{g}/\text{m}^3$ at 20°C and 1 atm.
	$\mu\text{g}/\text{m}^3$	1-hr	400	Health	(MECP, 2023)	--
	$\mu\text{g}/\text{m}^3$	24-hr	200	Health	(MECP, 2023)	--

Constituent	Units	Averaging Period	Value	Basis	Reference	Notes
	$\mu\text{g}/\text{m}^3$	Annual	23	Health / Environment	(CCME, 2019)	Converted from 12 ppb, where 1 ppb of NO_2 is equal to 1.88 $\mu\text{g}/\text{m}^3$ at 20°C and 1 atm.
Carbon monoxide (CO)	$\mu\text{g}/\text{m}^3$	1-hr	36,200	Health	(MECP, 2023)	--
	$\mu\text{g}/\text{m}^3$	8-hr	15,700	Health	(MECP, 2023)	--
Acrolein	$\mu\text{g}/\text{m}^3$	1-hr	4.5	Health	(MECP, 2023)	Surrogate for Volatile Organic Compounds (VOCs) without separate AAQC.
	$\mu\text{g}/\text{m}^3$	24-hr	0.4	Health	(MECP, 2023)	
Benzo(a)pyrene (BaP)	$\mu\text{g}/\text{m}^3$	24-hr	0.00005	Health	(MECP, 2023)	Surrogate for total Polycyclic Aromatic Hydrocarbons (PAHs) without separate AAQC
	$\mu\text{g}/\text{m}^3$	Annual	0.00001	Health	(MECP, 2023)	

Notes: $\mu\text{g}/\text{m}^3$ – micrograms per cubic meter

ppb – parts per billion

atm – standard atmosphere of pressure

MECP, 2023 – Ontario's Ambient Air Quality Criteria (AAQC)

CCME, 2019 – CCME's Canadian Ambient Air Quality Standards (CAAQS)





Table 5-3: Summary of Exceedances of Ambient Air Quality Guidelines during PNGS Units 5-8 Refurbishment

Constituent	Averaging Period	Existing Conditions	Refurbishment
Total suspended particulates (TSP)	24-hr	-	✓
	Annual	-	-
Particulate matter <10 µm (PM ₁₀)	24-hr	-	✓
Particulate matter <2.5 µm (PM _{2.5})	24-hr	-	✓
	Annual	-	-
Sulphur dioxide (SO ₂)	1-hr (CCME)	-	-
	1-hr (AAQC)	-	-
	Annual	-	-
Nitrogen dioxides (as NO ₂)	1-hr (CAAQS)	-	✓
	1-hr (AAQC)	-	✓ (on-site)
	24-hr	-	-
	Annual	-	✓ (on-site)
Carbon monoxide (CO)	1-hr	-	-
	8-hr	-	-
Acrolein	1-hr	-	-
	24-hr	-	-
Benzo(a)pyrene (BaP)	24-hr	✓	✓
	Annual	✓	✓

Notes:

✓ = exceedance of ambient air quality criteria at both human and ecological receptor locations.

✓ (on-site) = exceedance of ambient air quality criteria at on-site ecological receptor locations only.

- = no exceedance of ambient air quality criteria.

5.1.1.2.2 Discussion of Air Quality Modelling Results

5.1.1.2.2.1 Human Health

Ambient air concentrations at the human receptor locations shown in **Figure 5-1** were predicted for different averaging periods for TSP, PM₁₀, PM_{2.5}, SO₂, NO₂, CO, acrolein, and BaP. It is acknowledged that there are exceedances of the selected air quality criteria for some constituents at a number of the human receptor locations. The specific predicted exceedances are discussed below:

- **TSP (Table 5-4):** There are no exceedances of the annual TSP criterion of 60 µg/m³ at any of the human receptor locations. There are predicted exceedances of the 24-hr TSP criterion of 120 µg/m³ at a number of receptor locations, including the three local harvesting areas, the industrial/commercial worker, the correctional institute (C2), and the three urban resident/harvester locations. Except for the industrial/commercial worker, exceedances of the 24-hr criterion for TSP at the other receptor locations tend to be relatively infrequent (<45 days per year, representing approximately 12% of the year).
- **PM₁₀ (Table 5-5):** There are predicted exceedances of the 24-hr PM₁₀ criterion of 50 µg/m³ at a number of receptor locations, including the three local harvesting areas, the industrial/commercial worker, and the three urban resident/harvester locations. Except for the industrial/commercial worker, exceedances of the 24-hr criterion for PM₁₀ at the other receptor locations tend to be relatively infrequent (<8 days per year, representing approximately 2% of the year).
- **PM_{2.5} (Table 5-6):** There are no exceedances of the annual PM_{2.5} criterion of 8.8 µg/m³ at any of the human receptor locations. There are predicted exceedances of the 24-hr PM_{2.5} criterion of 27 µg/m³ at one receptor location, specifically the industrial/commercial worker. Exceedances at the industrial/commercial worker are predicted to occur 249 days of the year.
- **NO₂ (Table 5-7):** There are no predicted exceedances of both the maximum 1-hr (400 µg/m³), 24-hr (200 µg/m³) and annual (23 µg/m³) air quality criteria for NO₂ at any of the human receptor locations. The 1-hr 98th percentile criterion of 79 µg/m³ is only predicted to be exceeded at the sport fisher receptor location.
- **SO₂ and CO (Table 5-8 and Table 5-9):** Predicted air concentrations for all averaging periods for SO₂ and CO are predicted to remain below air quality criteria at all human receptor locations.
- **BaP (Table 5-10):** Predicted BaP concentrations exceed both the 24-hr criterion of 5.00E-05 µg/m³ and the annual criterion of 1.00E-05 µg/m³ at all human receptor locations; however, it should be noted that the existing 24-hr and annual concentrations of BaP are already above their respective criteria without the addition of BaP from PN site activities. The maximum predicted 24-hr and annual incremental increases in BaP concentrations

resulting from planned Project activities respectively represent 8.22×10^{-10} % and 2.36×10^{-11} % changes from existing 24-hr and annual conditions.

- Acrolein (**Table 5-11**): 24-hr and annual acrolein concentrations are predicted to be below their respective air quality criteria at all human receptor locations.

Total suspended particulates (TSP) and inhalable/respirable particulates (PM₁₀/PM_{2.5})

The 24-hr TSP criterion of 120 µg/m³ is from the Ontario MECP, which identifies visibility as the sensitive endpoint for the TSP criterion rather than human or ecological health. Elevated TSP concentrations are generally not considered to pose significant health risks because these particles are too large (50 – 100 µm) to be inhaled deep into the lungs ; therefore, TSP is not considered for further assessment for human receptors in this PERA.

Occasional exceedances of the 24-hr PM₁₀ criterion are predicted at various human receptor locations. Exposures to elevated concentrations of PM₁₀ are associated with various adverse respiratory and cardiovascular effects in humans. When inhaled, PM₁₀ can deposit onto surfaces of the upper region of the lungs. However, finer particles that can be inhaled deeply into the lungs (i.e., PM_{2.5}) are associated with greater risk because they are more chemically active, and have more complex characteristics than larger particles (HC, 2016a). If individuals are present during short periods of elevated PM₁₀ they may experience short-term respiratory symptoms such as coughing, difficulty breathing, asthma symptoms and/or chronic bronchitis; however, effects should be reversible and subside after exposure. Excluding the industrial/commercial worker, exceedances of the 24-hr criterion for PM₁₀ at the receptor locations further away from the PN site tend to be relatively infrequent (<8 days per year), suggesting that any short-term effects would be temporary and expected to subside after the exposure ends. Considering PM_{2.5}, and again excluding the industrial/commercial worker, no exceedances of the 24-hr criterion for PM_{2.5} are predicted to occur at any of the other human receptor locations.

Considering the industrial/commercial worker, there are numerous predicted exceedances of both 24-hr criteria for PM₁₀ and PM_{2.5}. The annual PM_{2.5} criterion is not predicted to be exceeded at any human receptor locations, which is an indication that long-term, chronic health effects associated with PM_{2.5} exposure are not expected to occur. However, daily exceedances of the 24-hr criteria can result in temporary respiratory symptoms. It is expected that OPG will develop and implement a dust management plan and utilize construction best practices to mitigate dust and particulate generation during planned Project activities. Potential mitigation options to manage dust generation include the application of dust suppressants, stabilization of completed soil surfaces, and the suspension of dust-generating activities during periods of inclement weather. It is expected that dust mitigation measures would also reduce concentrations of smaller particulates (PM₁₀ and PM_{2.5}), further limiting exposures to nearby human receptors. It should also be noted that the air quality modelling conducted for the PERA is extremely conservative in its assumptions, and is intended to represent a worst-case scenario for potential air quality impacts. The predicted concentrations were calculated assuming maximum equipment use, fuel consumption, and emission factors, without accounting for any significant

variability in operational practices. As such, real-world emissions during the Units 5-8 refurbishment and Units 1-4 decommissioning activities are expected to be lower than those estimated in the modelled scenario. As project details continue to develop over time, the air quality modelling is expected to be revisited to provide results more representative of the planned Project activities.

Considering the conservative assumptions used in the modelling and the expected implementation of a dust management plan, ambient concentrations of PM₁₀ and PM_{2.5} are not expected to result in risks to any human receptors. As such, further assessment of PM₁₀ and PM_{2.5} is not included in this PERA. As noted above, the air quality modelling is likely to be updated in a future iteration of the PERA as details of the planned Project activities become better refined over time. At that point, the updated predicted concentrations of the relevant air quality parameters will be re-evaluated for their potential to result in health risks to local human receptors.

Nitrogen oxides (NO_x)

There are no predicted exceedances of both the 24-hr and annual screening criteria at any of the human receptor locations; therefore, no long-term effects are expected.

There is one predicted exceedance of the short-term 1-hr screening criterion provided by the CCME for the sport fisher receptor. Potential adverse health effects that are attributed to short-term exposures to ambient NO₂ include asthma exacerbations and possibly increased risk of cardiopulmonary effects, and to a lesser extent cardiovascular and respiratory mortality (HC, 2016b). Individuals with certain pre-existing diseases such as asthma appear to be sensitive to exposure to ambient NO₂. Although it has been suggested that there may not be a threshold for the health effects of NO₂, even considering short-term (1-hour) exposures (CCME, 2020), at least some reviews (Hesterberg et al., 2009) do not support this assertion and rather support a 1-hour threshold. Hesterberg et al. (2009) completed a critical review of over 50 human clinical studies in which human volunteers (including sensitive sub-populations: the elderly, children, and asthmatics) were exposed to NO₂ at concentrations ranging from 0.1 to 3.5 ppm (equivalent to 188 to 6,580 µg/m³ [1 ppm = 1,880 µg/m³]) for periods of 30 minutes to 6 hours, often combined with exercise and co-pollutants. Their findings indicated that there is evidence of no-effect at low concentrations, and that a threshold of approximately 0.2 ppm (or 376 µg/m³) is supported. Additionally, as reported in Health Canada (2016b), both the WHO and US EPA concluded that healthy individuals do not experience any adverse effects at concentrations up to 1 ppm (or 1,880 µg/m³).

The highest 98th percentile 1-hr NO₂ concentration, which represents a more realistic real-world exposure concentration than the 1-hr maximum concentration, was predicted to be 115.1 µg/m³ at the sport fisher receptor location. This concentration represents 6% of the concentration protective for short-term exposures in asthmatics per Hesterberg et al. (2009).

Considering the above discussion, NO_x (as NO₂) is not considered for further assessment for any human receptors in the PERA.

Benzo(a)pyrene (BaP)

The 24-hr and annual BaP air quality criteria are predicted to be exceeded at all human receptor locations. However, exceedances are exclusively associated with elevated existing concentrations of BaP in air at the PN site. The contribution of BaP from the PN site to the atmospheric environment (represented as the “increment” values in **Table 5-10**) is noted to be many orders of magnitude less than both the 24-hr and annual BaP air quality criteria. Thus, BaP is not assessed further in this PERA.

5.1.1.2.2.2 Ecological Health

Similar to the assessment of human health receptors, ambient air concentrations at the ecological receptor locations shown in **Figure 5-2** were predicted for different averaging periods for TSP, PM₁₀, PM_{2.5}, SO₂, NO₂, CO, acrolein, and BaP. It is acknowledged that there are exceedances of the selected air quality criteria for some constituents at a number of the ecological receptor locations. The specific predicted exceedances are discussed below:

- TSP (**Table 5-4**): There are no exceedances of the annual TSP criterion of 60 µg/m³ at any of the ecological receptor locations. There are predicted exceedances of the 24-hr TSP criterion of 120 µg/m³ at all receptor locations. At the receptor locations representative of Frenchman’s Bay and the nearby Hydro Marsh, exceedances of the 24-hr criterion for TSP tend to be less frequent (<49 days per year, representing approximately 13% of the year) compared with receptor locations representing the PN site and nearshore area of Lake Ontario at the PN southern property boundary (predicted exceedances range from 115 to 364 days per year).
- PM₁₀ (**Table 5-5**): There are predicted exceedances of the 24-hr PM₁₀ criterion of 50 µg/m³ at a number of ecological receptor locations, excluding the three furthest receptor locations within Frenchman’s Bay (R15, R16 and P8). Predicted exceedances of the 24-hr criterion for PM₁₀ at the other receptor locations representative of Frenchman’s Bay and the Hydro Marsh tend to be relatively infrequent (<9 days per year, representing approximately 2.5% of the year). Predicted PM₁₀ concentrations at receptors within the PN site and nearshore Lake Ontario area are modelled to exceed the 24-hr criterion between 56 and 353 days per year.
- PM_{2.5} (**Table 5-6**): There are no exceedances of the annual PM_{2.5} criterion of 8.8 µg/m³ at any of the ecological receptor locations. There are predicted exceedances of the 24-hr PM_{2.5} criterion of 27 µg/m³ at all ecological receptor locations within the PN site and nearshore Lake Ontario area. The noted exceedances are predicted to occur between 4 and 296 days per year. There are no exceedances of the 24-hr PM_{2.5} criterion for any of the receptor locations representing Frenchman’s Bay and the Hydro Marsh.

- **NO₂ (Table 5-7):** There are no predicted exceedances of the maximum 24-hr (200 µg/m³) air quality criterion for NO₂ at any of the ecological receptor locations. The annual NO₂ air quality criterion (23 µg/m³) is predicted to be exceeded at two receptor locations, R10 within the PN site and along the southern property boundary in the nearshore Lake Ontario area. The 1-hr maximum criterion of 400 µg/m³ is modelled to be exceeded at two receptor locations within the PN site (R11 and R28) and again along the southern property boundary representative of the nearshore Lake Ontario area. The 1-hr 98th percentile criterion of 79 µg/m³ is predicted to be exceeded at every ecological receptor location within the PN site (with the exception of location R13) and again along the southern property boundary in the nearshore Lake Ontario area.
- **SO₂ and CO (Table 5-8 and Table 5-9):** Predicted air concentrations for all averaging periods for SO₂ and CO are predicted to remain below air quality criteria at all ecological receptor locations.
- **BaP (Table 5-10):** Predicted BaP concentrations exceed both the 24-hr criterion of 5.00E-05 µg/m³ and the annual criterion of 1.00E-05 µg/m³ at all ecological receptor locations; however, it should be noted that the existing 24-hr and annual concentrations of BaP are already above their respective criteria without the addition of BaP from PN site activities. The maximum predicted 24-hr and annual incremental increases in BaP concentrations resulting from planned Project activities represent 8.22x10⁻¹⁰ % and 2.36x10⁻¹¹ % changes from existing 24-hr and annual conditions, respectively.
- **Acrolein (Table 5-11):** 24-hr and annual acrolein concentrations are predicted to be below their respective air quality criteria at all ecological receptor locations.

Total suspended particulates (TSP) and inhalable/respirable particulates (PM₁₀/PM_{2.5})

Dust (TSP), including particulates (PM₁₀, PM_{2.5}), could be generated from Project activities including mobilization, clearing, grubbing, on-land earthmoving, grading, and excavation. Dust deposition onto vegetation could impact growth and function. It should be noted that the air quality modelling assumptions are considered conservative and represent a “worst-case” scenario that is unlikely to occur. Furthermore, a dust management plan will be implemented that could involve mitigative measures such as the application of dust suppressants, stabilization of completed soil surfaces, and suspension of dust-generating activities during periods of inclement weather. It is expected that dust mitigation measures would also reduce concentrations of smaller particulates (PM₁₀ and PM_{2.5}). As such, no adverse effects to vegetation and terrestrial/riparian habitat associated with vegetation are expected.

Mammals and birds are mobile receptors; thus, it is unlikely that these receptors would be continuously exposed to maximum concentrations of TSP, PM₁₀ or PM_{2.5}. These receptors are presumed to be able to limit their exposure to TSP, PM₁₀ and PM_{2.5} by moving away from areas of elevated dust and particulate deposition and returning once the dust-generating activities have concluded. Mammals and birds are also expected to be protected through the

implementation and adherence with a dust management plan. Additionally, it should be noted again that the 24-hr TSP criterion of $120 \mu\text{g}/\text{m}^3$ is derived with visibility as the sensitive endpoint rather than ecological (or human) health. Thus, exceedance of this criterion does not necessarily indicate a potential for ecological health risks. Exceedances of the 24-hr $\text{PM}_{2.5}$ criterion of $27 \mu\text{g}/\text{m}^3$ are localized to the PN site, with no exceedances predicted at nearby Frenchman's Bay. While exceedances of the 24-hr PM_{10} criterion of $50 \mu\text{g}/\text{m}^3$ are predicted to occur at receptor locations in Frenchman's Bay, the exceedances are modelled to occur, at most, for 9 days out of the year, representing approximately 2.5% of a calendar year. For this reason, exceedances of the 24-hr PM_{10} criterion at Frenchman's Bay are considered largely negligible, and the area is expected to remain an important habitat for local terrestrial and riparian receptors.

Considering the above, elevated TSP, PM_{10} and $\text{PM}_{2.5}$ concentrations are generally not considered to pose significant ecological health risks and are expected to be sufficiently mitigated through the implementation of a dust management plan. Thus, TSP, PM_{10} and $\text{PM}_{2.5}$ are not assessed further for any ecological receptors in this PERA.

Benzo(a)pyrene (BaP)

The 24-hr and annual BaP air quality criteria are predicted to be exceeded at all ecological receptor locations. However, exceedances are exclusively associated with elevated existing concentrations of BaP in air at the PN site. As noted in the bulleted list earlier in this section, the contribution of BaP from the PN site to the atmospheric environment (represented as the "increment" values in **Table 5-10**) is noted to be many orders of magnitude less than both the 24-hr and annual BaP air quality criteria. Thus, BaP is not assessed further in this PERA.

Nitrogen oxides (NO_x), sulphur dioxide (SO_2), carbon monoxide (CO), and acrolein

Substances that do not partition to soil include gases such as NO_x , SO_2 , CO, and acrolein. No exceedances of any air quality criteria were identified for predicted concentrations of SO_2 , CO, and acrolein at all ecological receptor locations; thus, these air quality parameters are not assessed further for any ecological receptors in the PERA.

As previously noted, modelled concentrations of NO_2 are predicted to exceed the 1-hr criteria from both CCME ($79 \mu\text{g}/\text{m}^3$, based on 98th percentile concentrations) and MECP ($400 \mu\text{g}/\text{m}^3$, based on maximum concentrations), in addition to the CCME annual criterion of $23 \mu\text{g}/\text{m}^3$. There is no annual MECP AAQC and the CCME CAAQS are not appropriate for ecological receptors, thus, exceedance of the annual criterion does not suggest any potential risk to ecological receptors. Adverse effect levels for NO_x under short-term exposure are not expected below 5 ppm ($9,000 \mu\text{g}/\text{m}^3$) for dogs (Kleinman and Mautz, 1991), and below 3.5 ppm ($6,300 \mu\text{g}/\text{m}^3$) for plants (Heck, 1964). Predicted NO_2 concentrations are well below these adverse effect levels and are not considered to pose any potential short-term risk to ecological receptors. For these reasons, NO_x (as NO_2) is not assessed further for any ecological receptors in the PERA.

Table 5-4: Total Suspended Particulate Matter (TSP) Air Modelling Results

Receptor ID	Receptor Name	24-hr Maximum					Annual Maximum			
		24-hr 90th TSP (Existing Conditions)	Max 24-hr TSP (Increment)	Max 24-hr TSP (Total)	% of Criteria	# of Exceedances	Average Annual TSP (Existing Conditions)	Annual TSP (Increment)	Annual TSP (Total)	% of Criteria
		(µg/m³)	(µg/m³)	(µg/m³)	(%)	DAYS/YR	(µg/m³)	(µg/m³)	(µg/m³)	(%)
Criteria (µg/m³)		120					60			
Human Receptors										
R1	Local Harvesting Area 1 ^a	44.2	266.1	310.3	258.5%	30	25.5	1.1	26.6	44.4%
R2	Local Harvesting Area 2 ^a	44.2	247.2	291.4	242.9%	42	25.5	1.3	26.8	44.7%
R3	Local Harvesting Area 3 ^a	44.2	255.8	300.0	250.0%	44	25.5	1.3	26.8	44.7%
R20	Industrial/Commercial Worker	44.2	1605.8	1650.0	1375.0%	361	25.5	20.5	46.0	76.6%
R21	Sport Fisher	44.2	57.5	101.7	84.7%	0	25.5	0.7	26.2	43.6%
R22	Correctional Institute (C2)	44.2	80.6	124.8	104.0%	1	25.5	0.3	25.8	43.0%
R23	Farm	44.2	38.0	82.2	68.5%	0	25.5	0.1	25.6	42.6%
R24	Dairy Farm	44.2	15.7	59.9	49.9%	0	25.5	0.0	25.5	42.6%
R25	Urban Resident/Harvester ^b (WNW)	44.2	201.2	245.4	204.5%	38	25.5	1.2	26.7	44.4%
R26	Urban Resident/Harvester ^b (NW)	44.2	214.6	258.8	215.7%	22	25.5	1.0	26.5	44.1%
R27	Urban Resident/Harvester ^b (NNW)	44.2	250.1	294.3	245.2%	22	25.5	1.0	26.5	44.1%
Ecological Receptors										
R3	Hydro Marsh	44.2	255.8	300.0	250.0%	44	25.5	1.3	26.8	44.7%
R6	Frenchman's Bay	44.2	193.5	237.7	198.0%	36	25.5	1.1	26.6	44.4%
R8	Frenchman's Bay	44.2	213.7	257.9	214.9%	29	25.5	1.1	26.6	44.3%
R15	Frenchman's Bay	44.2	140.0	184.2	153.5%	5	25.5	0.6	26.1	43.5%
R16	Frenchman's Bay	44.2	134.6	178.8	149.0%	13	25.5	0.7	26.2	43.7%
R19	Frenchman's Bay	44.2	249.4	293.6	244.6%	48	25.5	1.4	26.9	44.8%
R25	Frenchman's Bay	44.2	201.2	245.4	204.5%	38	25.5	1.2	26.7	44.4%
P8	Frenchman's Bay	44.2	135.1	179.3	149.4%	20	25.5	0.9	26.4	44.0%
R9	PN Site	44.2	1131.6	1175.8	979.8%	282	25.5	11.6	37.1	61.8%
R10	PN Site	44.2	967.6	1011.8	843.2%	245	25.5	8.8	34.3	57.2%
R11	PN Site	44.2	488.4	532.6	443.8%	182	25.5	4.6	30.1	50.2%
R13	PN Site	44.2	1739.8	1784.0	1486.7%	364	25.5	24.6	50.1	83.5%
R14	PN Site	44.2	496.7	540.9	450.8%	115	25.5	2.7	28.2	47.0%
R28	PN Site	44.2	579.6	623.8	519.9%	214	25.5	5.1	30.6	51.0%
FL_WEN_1-394	PN Site ^c	44.2	2144.1	2188.3	1823.6%	348	25.5	30.8	56.3	93.8%
FL_S_1-144	Nearshore Lake Ontario ^d	44.2	1184.7	1228.9	1024.1%	326	25.5	19.3	44.8	74.7%

Notes:
µg/m³ – micrograms per cubic meter.
Highlighted cell indicates an exceedance of the applicable ambient air quality criteria.
^a Represents a location where the Harvester is assumed to engage in traditional harvesting activities.
^b Represents modelled concentrations experienced by the Urban Resident/Harvester assuming the specified predominant wind direction.
^c Represents the maximum concentration modelled along the western, eastern and northern fenceline property boundaries of the PN site.
^d Represents the maximum concentration modelled along the southern fenceline property boundary of the PN site.

Table 5-5: Inhalable Particulates (PM₁₀) Air Modelling Results

Receptor ID	Receptor Name	24-hr Maximum				
		90th PM ₁₀ (Existing Conditions)	Max 24-hr PM ₁₀ (Increment)	Max 24-hr PM ₁₀ (Total)	% of Criteria	# of Exceedances
		(µg/m³)	(µg/m³)	(µg/m³)	(%)	DAYS/YR
Criteria (µg/m³)		50				
Human Receptors						
R1	Local Harvesting Area 1 ^a	22.1	51.4	73.5	146.9%	6
R2	Local Harvesting Area 2 ^a	22.1	48.0	70.1	140.1%	5
R3	Local Harvesting Area 3 ^a	22.1	49.7	71.8	143.6%	7
R20	Industrial/Commercial Worker	22.1	309.3	331.4	662.9%	346
R21	Sport Fisher	22.1	11.5	33.6	67.1%	0
R22	Correctional Institute (C2)	22.1	15.6	37.7	75.5%	0
R23	Farm	22.1	7.4	29.5	59.1%	0
R24	Dairy Farm	22.1	3.1	25.2	50.4%	0
R25	Urban Resident/Harvester ^b (WNW)	22.1	39.4	61.5	123.0%	4
R26	Urban Resident/Harvester ^b (NW)	22.1	41.6	63.7	127.5%	2
R27	Urban Resident/Harvester ^b (NNW)	22.1	48.2	70.3	140.7%	5
Ecological Receptors						
R3	Hydro Marsh	22.1	49.7	71.8	143.6%	7
R6	Frenchman's Bay	22.1	38.2	60.3	120.5%	5
R8	Frenchman's Bay	22.1	42.2	64.3	128.6%	3
R15	Frenchman's Bay	22.1	27.6	49.7	99.5%	0
R16	Frenchman's Bay	22.1	26.2	48.3	96.5%	0
R19	Frenchman's Bay	22.1	48.9	71.0	142.0%	9
R25	Frenchman's Bay	22.1	39.4	61.5	123.0%	4
P8	Frenchman's Bay	22.1	26.7	48.8	97.6%	0
R9	PN Site	22.1	219.9	242.0	484.0%	226
R10	PN Site	22.1	190.6	212.7	425.5%	155
R11	PN Site	22.1	95.9	118.0	236.0%	101
R13	PN Site	22.1	335.0	357.1	714.2%	353
R14	PN Site	22.1	98.4	120.5	241.1%	56
R28	PN Site	22.1	113.3	135.4	270.8%	130
FL_WEN_1-394	PN Site ^c	22.1	413.0	435.1	870.1%	316
FL_S_1-144	Nearshore Lake Ontario ^d	22.1	231.0	253.1	506.2%	297

Notes:
µg/m³ – micrograms per cubic meter.
Highlighted cell indicates an exceedance of the applicable ambient air quality criteria.
^a Represents a location where the Harvester is assumed to engage in traditional harvesting activities.
^b Represents modelled concentrations experienced by the Urban Resident/Harvester assuming the specified predominant wind direction.
^c Represents the maximum concentration modelled along the western, eastern and northern fenceline property boundaries of the PN site.
^d Represents the maximum concentration modelled along the southern fenceline property boundary of the PN site.

Table 5-6: Respirable Particulates (PM_{2.5}) Air Modelling Results

Receptor ID	Receptor Name	24-hr Maximum					Annual Maximum			
		90th 24-hr PM _{2.5} (Existing Conditions)	Max 24-hr PM _{2.5} (Increment)	Max 24-hr PM _{2.5} (Total)	% of Criteria	Exceedance	Mean Annual PM _{2.5} (Existing Conditions)	Annual PM _{2.5} (Increment)	Annual PM _{2.5} (Total)	% of Criteria
		(µg/m³)	(µg/m³)	(µg/m³)	(%)	DAYS/YR	(µg/m³)	(µg/m³)	(µg/m³)	(%)
Criteria (µg/m³)		27					8.8			
Human Receptors										
R1	Local Harvesting Area 1 ^a	11.1	12.6	23.7	87.7%	0	6.70	0.08	6.78	77.0%
R2	Local Harvesting Area 2 ^a	11.1	11.8	22.9	84.7%	0	6.70	0.09	6.79	77.1%
R3	Local Harvesting Area 3 ^a	11.1	12.3	23.4	86.6%	0	6.70	0.09	6.79	77.2%
R20	Industrial/Commercial Worker	11.1	75.8	86.9	322.0%	249	6.70	0.99	7.69	87.4%
R21	Sport Fisher	11.1	2.9	14.0	51.9%	0	6.70	0.10	6.80	77.3%
R22	Correctional Institute (C2)	11.1	3.8	14.9	55.3%	0	6.70	0.02	6.72	76.4%
R23	Farm	11.1	1.9	13.0	48.1%	0	6.70	0.01	6.71	76.2%
R24	Dairy Farm	11.1	0.8	11.9	43.9%	0	6.70	0.00	6.70	76.2%
R25	Urban Resident/Harvester ^b (WNW)	11.1	9.8	20.9	77.5%	0	6.70	0.09	6.79	77.2%
R26	Urban Resident/Harvester ^b (NW)	11.1	10.3	21.4	79.1%	0	6.70	0.07	6.77	76.9%
R27	Urban Resident/Harvester ^b (NNW)	11.1	11.8	22.9	84.9%	0	6.70	0.07	6.77	76.9%
Ecological Receptors										
R3	Hydro Marsh	11.1	12.3	23.4	86.6%	0	6.70	0.09	6.79	77.2%
R6	Frenchman's Bay	11.1	9.7	20.8	77.1%	0	6.70	0.09	6.79	77.1%
R8	Frenchman's Bay	11.1	10.7	21.8	80.9%	0	6.70	0.09	6.79	77.1%
R15	Frenchman's Bay	11.1	7.0	18.1	67.2%	0	6.70	0.05	6.75	76.7%
R16	Frenchman's Bay	11.1	6.5	17.6	65.4%	0	6.70	0.07	6.77	76.9%
R19	Frenchman's Bay	11.1	12.4	23.5	87.0%	0	6.70	0.12	6.82	77.5%
R25	Frenchman's Bay	11.1	9.8	20.9	77.5%	0	6.70	0.09	6.79	77.2%
P8	Frenchman's Bay	11.1	6.9	18.0	66.5%	0	6.70	0.08	6.78	77.0%
R9	PN Site	11.1	54.1	65.2	241.6%	87	6.70	0.66	7.36	83.6%
R10	PN Site	11.1	48.1	59.2	219.3%	48	6.70	1.05	7.75	88.0%
R11	PN Site	11.1	24.1	35.2	130.2%	16	6.70	0.42	7.12	80.9%
R13	PN Site	11.1	82.0	93.1	344.8%	296	6.70	1.19	7.89	89.7%
R14	PN Site	11.1	25.0	36.1	133.7%	4	6.70	0.27	6.97	79.2%
R28	PN Site	11.1	27.8	38.9	144.2%	23	6.70	0.40	7.10	80.7%
FL_WEN_1-394	PN Site ^c	11.1	100.9	112.0	414.9%	222	6.70	1.48	8.18	92.9%
FL_S_1-144	Nearshore Lake Ontario ^d	11.1	57.0	68.1	252.2%	180	6.70	1.30	8.00	90.9%

Notes:
µg/m³ – micrograms per cubic meter.
Highlighted cell indicates an exceedance of the applicable ambient air quality criteria.
^a Represents a location where the Harvester is assumed to engage in traditional harvesting activities.
^b Represents modelled concentrations experienced by the Urban Resident/Harvester assuming the specified predominant wind direction.
^c Represents the maximum concentration modelled along the western, eastern and northern fenceline property boundaries of the PN site.
^d Represents the maximum concentration modelled along the southern fenceline property boundary of the PN site.

Table 5-7: Nitrogen Oxides (as NO₂) Air Modelling Results

Receptor ID	Receptor Name	1-hr 98th Percentile				1-hr Maximum					24-hr Maximum					Annual Maximum			
		98th 1-hr NO ₂ (Existing Conditions)	98th 1-hr NO ₂ (Increment)	98th 1-hr NO ₂ (Total)	% of Criteria	90th 1-hr NO ₂ (Existing Conditions)	Max 1-hr NO ₂ (Increment)	Max 1-hr NO ₂ (Total)	% of Criteria	# of Exceedances	90th 24-hr NO ₂ (Existing Conditions)	24-hr NO ₂ (Increment)	Max 24-hr NO ₂ (Total)	% of Criteria	# of Exceedances	Mean Annual NO ₂ (Existing Conditions)	Annual NO ₂ (Increment)	Annual NO ₂ (Total)	% of Criteria
		(µg/m ³)	(µg/m ³)	(µg/m ³)	(%)	(µg/m ³)	(µg/m ³)	(µg/m ³)	(%)	HRS/YR	(µg/m ³)	(µg/m ³)	(µg/m ³)	(%)	DAYS/YR	(µg/m ³)	(µg/m ³)	(µg/m ³)	(%)
Criteria (µg/m ³)		79				400					200					23			
Human Receptors																			
R1	Local Harvesting Area 1 ^a	25.6	19.5	45.1	57.1%	14.5	259.9	274.4	68.6%	0	12.6	37.2	49.8	24.9%	0	6.7	1.5	8.2	35.5%
R2	Local Harvesting Area 2 ^a	25.6	21.9	47.5	60.1%	14.5	267.0	281.5	70.4%	0	12.6	37.7	50.3	25.2%	0	6.7	1.6	8.3	36.1%
R3	Local Harvesting Area 3 ^a	25.6	22.9	48.5	61.3%	14.5	235.1	249.6	62.4%	0	12.6	37.4	50.0	25.0%	0	6.7	1.7	8.4	36.3%
R20	Industrial/Commercial Worker	25.6	43.9	69.5	88.0%	14.5	251.3	265.8	66.4%	0	12.6	47.1	59.7	29.9%	0	6.7	1.6	8.3	36.0%
R21	Sport Fisher	25.6	89.5	115.1	145.8%	14.5	142.9	157.4	39.3%	0	12.6	58.5	71.1	35.6%	0	6.7	3.9	10.6	46.0%
R22	Correctional Institute (C2)	25.6	4.3	29.9	37.8%	14.5	141.4	155.9	39.0%	0	12.6	11.4	24.0	12.0%	0	6.7	0.4	7.1	30.7%
R23	Farm	25.6	1.3	26.9	34.1%	14.5	60.5	75.0	18.7%	0	12.6	5.6	18.2	9.1%	0	6.7	0.2	6.9	29.8%
R24	Dairy Farm	25.6	0.3	25.9	32.8%	14.5	62.3	76.8	19.2%	0	12.6	2.6	15.2	7.6%	0	6.7	0.1	6.8	29.5%
R25	Urban Resident/Harvester ^b (WNW)	25.6	24.3	49.9	63.1%	14.5	199.2	213.7	53.4%	0	12.6	45.0	57.6	28.8%	0	6.7	1.8	8.5	36.8%
R26	Urban Resident/Harvester ^b (NW)	25.6	17.5	43.1	54.5%	14.5	207.7	222.2	55.5%	0	12.6	29.2	41.8	20.9%	0	6.7	1.3	8.0	34.7%
R27	Urban Resident/Harvester ^b (NNW)	25.6	18.4	44.0	55.7%	14.5	252.7	267.2	66.8%	0	12.6	35.2	47.8	23.9%	0	6.7	1.3	8.0	35.0%
Ecological Receptors																			
R3	Hydro Marsh	25.6	22.9	48.5	61.3%	14.5	235.1	249.6	62.4%	0	12.6	37.4	50.0	25.0%	0	6.7	1.7	8.4	36.3%
R6	Frenchman's Bay	25.6	22.9	48.5	61.4%	14.5	197.2	211.7	52.9%	0	12.6	44.3	56.9	28.5%	N/A	6.7	1.7	8.4	36.3%
R8	Frenchman's Bay	25.6	28.8	54.4	68.9%	14.5	184.3	198.8	49.7%	0	12.6	41.7	54.3	27.1%	N/A	6.7	1.9	8.6	37.5%
R15	Frenchman's Bay	25.6	18.7	44.3	56.0%	14.5	145.3	159.8	40.0%	0	12.6	26.4	39.0	19.5%	N/A	6.7	1.2	7.9	34.3%
R16	Frenchman's Bay	25.6	36.8	62.4	79.0%	14.5	125.9	140.4	35.1%	0	12.6	31.5	44.1	22.1%	N/A	6.7	1.7	8.4	36.6%
R19	Frenchman's Bay	25.6	47.8	73.4	92.9%	14.5	172.0	186.5	46.6%	0	12.6	47.8	60.4	30.2%	N/A	6.7	2.7	9.4	41.1%
R25	Frenchman's Bay	25.6	24.3	49.9	63.1%	14.5	199.2	213.7	53.4%	0	12.6	45.0	57.6	28.8%	N/A	6.7	1.8	8.5	36.8%
p8	Frenchman's Bay	25.6	35.0	60.6	76.7%	14.5	142.0	156.5	39.1%	0	12.6	33.5	46.1	23.0%	N/A	6.7	1.8	8.5	36.9%
R9	PN Site	25.6	70.5	96.1	121.7%	14.5	297.3	311.8	78.0%	0	12.6	76.0	88.6	44.3%	N/A	6.7	5.5	12.2	53.0%
R10	PN Site	25.6	206.4	232.0	293.7%	14.5	350.8	365.3	91.3%	0	12.6	115.3	127.9	64.0%	N/A	6.7	31.8	38.5	167.4%
R11	PN Site	25.6	107.4	133.0	168.3%	14.5	516.8	531.3	132.8%	15	12.6	94.4	107.0	53.5%	N/A	6.7	10.0	16.7	72.4%
R13	PN Site	25.6	52.3	77.9	98.7%	14.5	293.8	308.3	77.1%	0	12.6	48.7	61.3	30.6%	N/A	6.7	1.9	8.6	37.3%
R14	PN Site	25.6	94.6	120.2	152.2%	14.5	343.0	357.5	89.4%	0	12.6	89.9	102.5	51.3%	N/A	6.7	7.0	13.7	59.5%
R28	PN Site	25.6	91.3	116.9	148.0%	14.5	417.2	431.7	107.9%	2	12.6	78.2	90.8	45.4%	N/A	6.7	7.8	14.5	62.9%
FL_WEN_1-394	PN Site ^c	25.6	80.4	106.0	134.1%	14.5	334.2	348.7	87.2%	0	12.6	80.0	92.6	46.3%	N/A	6.7	6.2	12.9	56.0%
FL_S_1-144	Nearshore Lake Ontario ^d	25.6	235.5	261.1	330.6%	14.5	402.4	416.9	104.2%	4	12.6	128.6	141.2	70.6%	N/A	6.7	20.3	27.0	117.6%

Notes:
µg/m³ – micrograms per cubic meter.
Highlighted cell indicates an exceedance of the applicable ambient air quality criteria.
^a Represents a location where the Harvester is assumed to engage in traditional harvesting activities.
^b Represents modelled concentrations experienced by the Urban Resident/Harvester assuming the specified predominant wind direction.
^c Represents the maximum concentration modelled along the western, eastern and northern fenceline property boundaries of the PN site.
^d Represents the maximum concentration modelled along the southern fenceline property boundary of the PN site.

Table 5-8: Sulphur Dioxide (SO₂) Air Modelling Results

Receptor ID	Receptor Name	1-hr 99th Percentile				1-hr Maximum					Annual Maximum			
		99th 1-hr SO ₂ (Existing Conditions)	99th 1-hr SO ₂ (Increment)	99th 1-hr SO ₂ (Total)	% of Criteria	90th 1-hr SO ₂ (Existing Conditions)	Max 1-hr SO ₂ (Increment)	Max 1-hr SO ₂ (Total)	% of Criteria	# of Exceedances	Annual SO ₂ (Existing Conditions)	Annual SO ₂ (Increment)	Annual SO ₂ (Total)	% of Criteria
		(µg/m³)	(µg/m³)	(µg/m³)	(%)	(µg/m³)	(µg/m³)	(µg/m³)	(%)	DAYS/YR	(µg/m³)	(µg/m³)	(µg/m³)	(%)
Criteria (µg/m³)		170				105					11			
Human Receptors														
R1	Local Harvesting Area 1 ^a	51.45	0.04	51.49	30.3%	3.60	0.36	3.96	3.8%	0	4.20	0.0006	4.20	38.2%
R2	Local Harvesting Area 2 ^a	51.45	0.04	51.49	30.3%	3.60	0.35	3.95	3.8%	0	4.20	0.0007	4.20	38.2%
R3	Local Harvesting Area 3 ^a	51.45	0.03	51.49	30.3%	3.60	0.29	3.89	3.7%	0	4.20	0.0007	4.20	38.2%
R20	Industrial/Commercial Worker	51.45	0.12	51.57	30.3%	3.60	0.42	4.02	3.8%	0	4.20	0.0014	4.20	38.2%
R21	Sport Fisher	51.45	0.10	51.55	30.3%	3.60	0.17	3.77	3.6%	0	4.20	0.0020	4.20	38.2%
R22	Correctional Institute (C2)	51.45	0.01	51.46	30.3%	3.60	0.17	3.77	3.6%	0	4.20	0.0002	4.20	38.2%
R23	Farm	51.45	0.004	51.46	30.3%	3.60	0.05	3.65	3.5%	0	4.20	0.0001	4.20	38.2%
R24	Dairy Farm	51.45	0.002	51.45	30.3%	3.60	0.05	3.65	3.5%	0	4.20	0.0001	4.20	38.2%
R25	Urban Resident/Harvester ^b (WNW)	51.45	0.03	51.49	30.3%	3.60	0.20	3.80	3.6%	0	4.20	0.0007	4.20	38.2%
R26	Urban Resident/Harvester ^b (NW)	51.45	0.03	51.48	30.3%	3.60	0.26	3.86	3.7%	0	4.20	0.0006	4.20	38.2%
R27	Urban Resident/Harvester ^b (NNW)	51.45	0.04	51.49	30.3%	3.60	0.35	3.95	3.8%	0	4.20	0.0006	4.20	38.2%
Ecological Receptors														
R3	Hydro Marsh	51.45	0.03	51.49	30.3%	3.60	0.29	3.89	3.7%	0	4.20	0.0007	4.20	38.2%
R6	Frenchman's Bay	51.45	0.03	51.49	30.3%	3.60	0.22	3.82	3.6%	0	4.20	0.001	4.20	38.2%
R8	Frenchman's Bay	51.45	0.04	51.49	30.3%	3.60	0.19	3.79	3.6%	0	4.20	0.001	4.20	38.2%
R15	Frenchman's Bay	51.45	0.03	51.48	30.3%	3.60	0.16	3.76	3.6%	0	4.20	0.001	4.20	38.2%
R16	Frenchman's Bay	51.45	0.05	51.51	30.3%	3.60	0.13	3.73	3.6%	0	4.20	0.001	4.20	38.2%
R19	Frenchman's Bay	51.45	0.07	51.53	30.3%	3.60	0.19	3.79	3.6%	0	4.20	0.001	4.20	38.2%
R25	Frenchman's Bay	51.45	0.03	51.49	30.3%	3.60	0.20	3.80	3.6%	0	4.20	0.001	4.20	38.2%
P8	Frenchman's Bay	51.45	0.05	51.50	30.3%	3.60	0.14	3.74	3.6%	0	4.20	0.001	4.20	38.2%
R9	PN Site	51.45	0.13	51.58	30.3%	3.60	0.48	4.08	3.9%	0	4.20	0.002	4.20	38.2%
R10	PN Site	51.45	0.12	51.58	30.3%	3.60	0.42	4.02	3.8%	0	4.20	0.005	4.21	38.2%
R11	PN Site	51.45	0.12	51.57	30.3%	3.60	0.83	4.43	4.2%	0	4.20	0.002	4.20	38.2%
R13	PN Site	51.45	0.14	51.59	30.3%	3.60	0.48	4.08	3.9%	0	4.20	0.002	4.20	38.2%
R14	PN Site	51.45	0.09	51.55	30.3%	3.60	0.38	3.98	3.8%	0	4.20	0.002	4.20	38.2%
R28	PN Site	51.45	0.10	51.55	30.3%	3.60	0.70	4.30	4.1%	0	4.20	0.002	4.20	38.2%
FL_WEN_1-394	PN Site ^c	51.45	0.16	51.62	30.4%	3.60	0.55	4.15	4.0%	0	4.20	0.002	4.20	38.2%
FL_S_1-144	Nearshore Lake Ontario ^d	51.45	0.38	51.83	30.5%	3.60	0.54	4.14	3.9%	0	4.20	0.007	4.21	38.2%

Notes:
µg/m³ – micrograms per cubic meter.
Highlighted cell indicates an exceedance of the applicable ambient air quality criteria.
^a Represents a location where the Harvester is assumed to engage in traditional harvesting activities.
^b Represents modelled concentrations experienced by the Urban Resident/Harvester assuming the specified predominant wind direction.
^c Represents the maximum concentration modelled along the western, eastern and northern fenceline property boundaries of the PN site.
^d Represents the maximum concentration modelled along the southern fenceline property boundary of the PN site.

Table 5-9: Carbon Monoxide (CO) Air Modelling Results

Receptor ID	Receptor Name	1-hr Maximum				8-hr Maximum			
		90th 1-hr CO (Existing Conditions)	Max 1-hr CO (Increment)	Max 1-hr CO (Total)	% of Criteria	90th 8-hr CO (Existing Conditions)	Max 8-hr CO (Increment)	Max 8-hr CO (Total)	% of Criteria
		(µg/m³)	(µg/m³)	(µg/m³)	(%)	(µg/m³)	(µg/m³)	(µg/m³)	(%)
Criteria (µg/m³)		36,200				15,700			
Human Receptors									
R1	Local Harvesting Area 1 ^a	753	1,476	2,229	6.2%	738	713	1,451	9.2%
R2	Local Harvesting Area 2 ^a	753	1,573	2,326	6.4%	738	616	1,354	8.6%
R3	Local Harvesting Area 3 ^a	753	1,445	2,199	6.1%	738	673	1,411	9.0%
R20	Industrial/Commercial Worker	753	11,381	12,134	33.5%	738	3,766	4,504	28.7%
R21	Sport Fisher	753	397	1,150	3.2%	738	111	849	5.4%
R22	Correctional Institute (C2)	753	1,643	2,396	6.6%	738	223	961	6.1%
R23	Farm	753	588	1,342	3.7%	738	131	869	5.5%
R24	Dairy Farm	753	394	1,148	3.2%	738	50	788	5.0%
R25	Urban Resident/Harvester ^b (WNW)	753	1,420	2,173	6.0%	738	533	1,271	8.1%
R26	Urban Resident/Harvester ^b (NW)	753	1,191	1,944	5.4%	738	546	1,284	8.2%
R27	Urban Resident/Harvester ^b (NNW)	753	1,422	2,176	6.0%	738	646	1,384	8.8%
Ecological Receptors									
R3	Hydro Marsh	753	1,445	2,199	6.1%	738	673	1,411	9.0%
R6	Frenchman's Bay	753	1,342	2,096	5.8%	738	499	1,237	7.9%
R8	Frenchman's Bay	753	1,322	2,075	5.7%	738	581	1,319	8.4%
R15	Frenchman's Bay	753	961	1,715	4.7%	738	359	1,097	7.0%
R16	Frenchman's Bay	753	699	1,453	4.0%	738	313	1,051	6.7%
R19	Frenchman's Bay	753	1,223	1,976	5.5%	738	698	1,436	9.1%
R25	Frenchman's Bay	753	1,420	2,173	6.0%	738	533	1,271	8.1%
P8	Frenchman's Bay	753	883	1,636	4.5%	738	396	1,134	7.2%
R9	PN Site	753	6,708	7,461	20.6%	738	2,366	3,104	19.8%
R10	PN Site	753	6,342	7,095	19.6%	738	2,739	3,477	22.1%
R11	PN Site	753	3,022	3,776	10.4%	738	1,434	2,172	13.8%
R13	PN Site	753	5,066	5,819	16.1%	738	3,215	3,953	25.2%
R14	PN Site	753	2,935	3,688	10.2%	738	1,321	2,059	13.1%
R28	PN Site	753	2,820	3,574	9.9%	738	1,606	2,344	14.9%
FL_WEN_1-394	PN Site ^c	753	15,410	16,163	44.7%	738	5,019	5,757	36.7%
FL_S_1-144	Nearshore Lake Ontario ^d	753	4,537	5,290	14.6%	738	2,448	3,186	20.3%

Notes:
µg/m³ – micrograms per cubic meter.
Highlighted cell indicates an exceedance of the applicable ambient air quality criteria.
^a Represents a location where the Harvester is assumed to engage in traditional harvesting activities.
^b Represents modelled concentrations experienced by the Urban Resident/Harvester assuming the specified predominant wind direction.
^c Represents the maximum concentration modelled along the western, eastern and northern fenceline property boundaries of the PN site.
^d Represents the maximum concentration modelled along the southern fenceline property boundary of the PN site.

Table 5-10: Benzo(a)pyrene (BaP) Air Modelling Results

Receptor ID	Receptor Name	24-hr Maximum				Annual Maximum			
		24-hr Avg BaP (Existing Conditions)	Max 24-hr BaP (Increment)	Max 24-hr BaP (Total)	% of Criteria	Annual Average BaP (Existing Conditions)	Annual BaP (Increment)	Annual BaP (Total)	% of Criteria
		(µg/m³)	(µg/m³)	(µg/m³)	(%)	(µg/m³)	(µg/m³)	(µg/m³)	(%)
Criteria (µg/m³)		5.00E-05				1.00E-05			
Human Receptors									
R1	Local Harvesting Area 1 ^a	6.85E-05	7.05E-17	6.85E-05	137%	3.58E-05	3.17E-19	3.58E-05	358%
R2	Local Harvesting Area 2 ^a	6.85E-05	6.71E-17	6.85E-05	137%	3.58E-05	3.58E-19	3.58E-05	358%
R3	Local Harvesting Area 3 ^a	6.85E-05	7.23E-17	6.85E-05	137%	3.58E-05	3.74E-19	3.58E-05	358%
R20	Industrial/Commercial Worker	6.85E-05	4.53E-16	6.85E-05	137%	3.58E-05	5.61E-18	3.58E-05	358%
R21	Sport Fisher	6.85E-05	1.52E-17	6.85E-05	137%	3.58E-05	2.84E-19	3.58E-05	358%
R22	Correctional Institute (C2)	6.85E-05	1.86E-17	6.85E-05	137%	3.58E-05	8.13E-20	3.58E-05	358%
R23	Farm	6.85E-05	1.09E-17	6.85E-05	137%	3.58E-05	1.99E-20	3.58E-05	358%
R24	Dairy Farm	6.85E-05	4.05E-18	6.85E-05	137%	3.58E-05	9.88E-21	3.58E-05	358%
R25	Urban Resident/Harvester ^b (WNW)	6.85E-05	5.82E-17	6.85E-05	137%	3.58E-05	3.29E-19	3.58E-05	358%
R26	Urban Resident/Harvester ^b (NW)	6.85E-05	5.96E-17	6.85E-05	137%	3.58E-05	2.70E-19	3.58E-05	358%
R27	Urban Resident/Harvester ^b (NNW)	6.85E-05	6.58E-17	6.85E-05	137%	3.58E-05	2.76E-19	3.58E-05	358%
Ecological Receptors									
R3	Hydro Marsh	6.85E-05	7.23E-17	6.85E-05	137%	3.58E-05	3.74E-19	3.58E-05	358%
R6	Frenchman's Bay	6.85E-05	5.68E-17	6.85E-05	137%	3.58E-05	3.22E-19	3.58E-05	358%
R8	Frenchman's Bay	6.85E-05	6.33E-17	6.85E-05	137%	3.58E-05	3.16E-19	3.58E-05	358%
R15	Frenchman's Bay	6.85E-05	4.16E-17	6.85E-05	137%	3.58E-05	1.90E-19	3.58E-05	358%
R16	Frenchman's Bay	6.85E-05	3.73E-17	6.85E-05	137%	3.58E-05	2.42E-19	3.58E-05	358%
R19	Frenchman's Bay	6.85E-05	7.14E-17	6.85E-05	137%	3.58E-05	4.28E-19	3.58E-05	358%
R25	Frenchman's Bay	6.85E-05	5.82E-17	6.85E-05	137%	3.58E-05	3.29E-19	3.58E-05	358%
P8	Frenchman's Bay	6.85E-05	4.03E-17	6.85E-05	137%	3.58E-05	2.76E-19	3.58E-05	358%
R9	PN Site	6.85E-05	2.85E-16	6.85E-05	137%	3.58E-05	3.10E-18	3.58E-05	358%
R10	PN Site	6.85E-05	3.22E-16	6.85E-05	137%	3.58E-05	2.68E-18	3.58E-05	358%
R11	PN Site	6.85E-05	1.52E-16	6.85E-05	137%	3.58E-05	1.33E-18	3.58E-05	358%
R13	PN Site	6.85E-05	4.63E-16	6.85E-05	137%	3.58E-05	6.85E-18	3.58E-05	358%
R14	PN Site	6.85E-05	1.40E-16	6.85E-05	137%	3.58E-05	8.09E-19	3.58E-05	358%
R28	PN Site	6.85E-05	1.78E-16	6.85E-05	137%	3.58E-05	1.48E-18	3.58E-05	358%
FL_WEN_1-394	PN Site ^c	6.85E-05	5.63E-16	6.85E-05	137%	3.58E-05	8.45E-18	3.58E-05	358%
FL_S_1-144	Nearshore Lake Ontario ^d	6.85E-05	3.17E-16	6.85E-05	137%	3.58E-05	5.26E-18	3.58E-05	358%

Notes:
µg/m³ – micrograms per cubic meter.
Highlighted cell indicates an exceedance of the applicable ambient air quality criteria.
^a Represents a location where the Harvester is assumed to engage in traditional harvesting activities.
^b Represents modelled concentrations experienced by the Urban Resident/Harvester assuming the specified predominant wind direction.
^c Represents the maximum concentration modelled along the western, eastern and northern fenceline property boundaries of the PN site.
^d Represents the maximum concentration modelled along the southern fenceline property boundary of the PN site.

Table 5-11: Acrolein Air Modelling Results

Receptor ID	Receptor Name	1-hr Maximum				24-hr Maximum			
		90th 1-hr Acrolein (Existing Conditions)	Max 1-hr Acrolein (Increment)	Max 1-hr Acrolein (Total)	% of Criteria	90th 24-hr Acrolein (Existing Conditions)	Max 24-hr Acrolein (Increment)	Max 24-hr Acrolein (Total)	% of Criteria
		(µg/m³)	(µg/m³)	(µg/m³)	(%)	(µg/m³)	(µg/m³)	(µg/m³)	(%)
Criteria (µg/m³)		4.50E+00				4.00E-01			
Human Receptors									
R1	Local Harvesting Area 1 ^a	NA ^e	6.12E-14	6.12E-14	<0.01%	NA ^e	1.04E-14	1.04E-14	<0.01%
R2	Local Harvesting Area 2 ^a	NA ^e	6.38E-14	6.38E-14	<0.01%	NA ^e	1.02E-14	1.02E-14	<0.01%
R3	Local Harvesting Area 3 ^a	NA ^e	6.10E-14	6.10E-14	<0.01%	NA ^e	1.11E-14	1.11E-14	<0.01%
R20	Industrial/Commercial Worker	NA ^e	3.97E-13	3.97E-13	<0.01%	NA ^e	6.55E-14	6.55E-14	<0.01%
R21	Sport Fisher	NA ^e	1.69E-14	1.69E-14	<0.01%	NA ^e	2.85E-15	2.85E-15	<0.01%
R22	Correctional Institute (C2)	NA ^e	6.03E-14	6.03E-14	<0.01%	NA ^e	2.90E-15	2.90E-15	<0.01%
R23	Farm	NA ^e	2.25E-14	2.25E-14	<0.01%	NA ^e	1.78E-15	1.78E-15	<0.01%
R24	Dairy Farm	NA ^e	1.52E-14	1.52E-14	<0.01%	NA ^e	6.53E-16	6.53E-16	<0.01%
R25	Urban Resident/Harvester ^b (WNW)	NA ^e	6.77E-14	6.77E-14	<0.01%	NA ^e	1.01E-14	1.01E-14	<0.01%
R26	Urban Resident/Harvester ^b (NW)	NA ^e	5.07E-14	5.07E-14	<0.01%	NA ^e	8.97E-15	8.97E-15	<0.01%
R27	Urban Resident/Harvester ^b (NNW)	NA ^e	5.59E-14	5.59E-14	<0.01%	NA ^e	9.61E-15	9.61E-15	<0.01%
Ecological Receptors									
R3	Hydro Marsh	NA ^e	6.10E-14	6.10E-14	<0.01%	NA ^e	1.11E-14	1.11E-14	<0.01%
R6	Frenchman's Bay	NA ^e	6.50E-14	6.50E-14	<0.01%	NA ^e	1.04E-14	1.04E-14	<0.01%
R8	Frenchman's Bay	NA ^e	6.18E-14	6.18E-14	<0.01%	NA ^e	1.15E-14	1.15E-14	<0.01%
R15	Frenchman's Bay	NA ^e	4.42E-14	4.42E-14	<0.01%	NA ^e	7.29E-15	7.29E-15	<0.01%
R16	Frenchman's Bay	NA ^e	2.98E-14	2.98E-14	<0.01%	NA ^e	5.95E-15	5.95E-15	<0.01%
R19	Frenchman's Bay	NA ^e	5.69E-14	5.69E-14	<0.01%	NA ^e	1.16E-14	1.16E-14	<0.01%
R25	Frenchman's Bay	NA ^e	6.77E-14	6.77E-14	<0.01%	NA ^e	1.01E-14	1.01E-14	<0.01%
P8	Frenchman's Bay	NA ^e	4.06E-14	4.06E-14	<0.01%	NA ^e	6.92E-15	6.92E-15	<0.01%
R9	PN Site	NA ^e	2.49E-13	2.49E-13	<0.01%	NA ^e	4.43E-14	4.43E-14	<0.01%
R10	PN Site	NA ^e	2.62E-13	2.62E-13	<0.01%	NA ^e	6.01E-14	6.01E-14	<0.01%
R11	PN Site	NA ^e	1.70E-13	1.70E-13	<0.01%	NA ^e	2.67E-14	2.67E-14	<0.01%
R13	PN Site	NA ^e	1.74E-13	1.74E-13	<0.01%	NA ^e	6.69E-14	6.69E-14	<0.01%
R14	PN Site	NA ^e	1.50E-13	1.50E-13	<0.01%	NA ^e	2.92E-14	2.92E-14	<0.01%
R28	PN Site	NA ^e	1.52E-13	1.52E-13	<0.01%	NA ^e	2.91E-14	2.91E-14	<0.01%
FL_WEN_1-394	PN Site ^c	NA ^e	5.32E-13	5.32E-13	<0.01%	NA ^e	8.14E-14	8.14E-14	<0.01%
FL_S_1-144	Nearshore Lake Ontario ^d	NA ^e	1.83E-13	1.83E-13	<0.01%	NA ^e	5.36E-14	5.36E-14	<0.01%

Notes:
µg/m³ – micrograms per cubic meter.
Highlighted cell indicates an exceedance of the applicable ambient air quality criteria.
^a Represents a location where the Harvester is assumed to engage in traditional harvesting activities.
^b Represents modelled concentrations experienced by the Urban Resident/Harvester assuming the specified predominant wind direction.
^c Represents the maximum concentration modelled along the western, eastern and northern fenceline property boundaries of the PN site.
^d Represents the maximum concentration modelled along the southern fenceline property boundary of the PN site.
^e No reliable concentration of acrolein is available for characterizing existing conditions.

Radiological Emissions

As described in **Section 3.1.1**, during preparation for refurbishment, the reactor will be defueled and dewatered. During reactor dewatering there may be emissions of radionuclides; however, emissions are expected to remain below previous operational conditions assessed in the 2022 PN ERA for 6 operating units. This reduction in emissions is shown in the 2017 Safe Storage PEA, which presented airborne tritium emissions data collected from PNGS Unit 2 and Unit 3 during draining, flushing, and drying, that were several times less than operational conditions. Draining, flushing, and drying activities are the first step for both the Stabilization Phase and the Refurbishment Phase.

Since the data demonstrates that tritium emissions from PNGS Unit 2 and Unit 3 during dewatering and drying activities were substantially lower compared to operational units, a similar decrease in other radionuclides such as noble gases, particulates, radioiodines, and carbon-14 is expected. During refurbishment, OPG will use lessons learned from the PNGS Unit 1 and Unit 4 Stabilization Phase, as well as the Darlington refurbishment, to ensure emissions are minimized and maintained As Low as Reasonably Achievable (ALARA).

During the times when there will be openings in containment (i.e., specially prepared and approved openings in the reactor building dome for steam generator removal and replacement, and/or open airlocks), procedures will be in place to control radioactive releases to the environment and keep within previous levels (as evaluated in the 2022 PN ERA for 6 operating units). Prior to creating an opening in the dome, the unit will be isolated from the other operating units. Additionally, the heat transport and moderator system components will be dried to reduce potential for tritium emissions to the atmosphere through the opening. The specific control measures will be determined through an assessment of work that will be in progress and system/equipment availability (e.g. status of vapour barriers between boiler room and reactor vaults, status of reactor building ventilation and filter systems, status of monitoring systems). The controls will take into account allowed parallel work activities, directing air flow towards the inside of the reactor buildings, maintaining negative pressure in the reactor buildings, radioactivity monitoring, decontamination, and contingency actions should an abnormal event or condition occur.

Overall, radiological emissions to the atmospheric environment are expected to be similar to that evaluated in the 2017 Safe Storage PEA and overall bounded by that evaluated in the 2022 PN ERA for 6 operating units. As such, no further assessment is conducted in this PEA of radiological emissions to air during refurbishment.

5.1.1.3 PNGS Units 5-8 Continued Operations

Following refurbishment, PNGS Units 5-8 will operate in the same manner as current PNGS Units 5-8 operations; therefore, assessment of the potential effects from the Continued Operation Phase on the environment is similar to the assessment of effects under the 2022 PN ERA with 6

operating units; therefore, no further assessment is warranted in the PERA for continued operations.

During Continued Operations of PNGS Units 5-8, activities associated with PNGS Units 1-4 SWS and dismantle/demolish will be occurring, which could result in increased air emissions. It is expected that air predictions would be within the bounding air quality assessment presented in **Section 5.1.1.2**.

5.1.2 Noise

5.1.2.1 PNGS Units 1-4 Decommissioning

5.1.2.1.1 Stabilization and Storage with Surveillance

As stated in the 2017 Safe Storage PEA and the 2022 PEA Addendum, noise levels will be reduced during Stabilization and SWS as reactor units (including Units 1 and 4) are shutdown and facilities are transitioned to a SWS state. These findings from the 2017 Safe Storage PEA and updated in the 2022 PEA Addendum continue to remain valid for Units 1 and 4; therefore, no further assessment is conducted in this PERA.

5.1.2.1.2 Risk Reduction/Removal activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess risk reduction and removal activities, which will include dismantling and demolishing of buildings and structures. Dismantling activities (either under risk reduction and removal activities in 2025-2033 or dismantle/demolish activities in 2034-2037) will require equipment that may generate noise. These noise emissions would be coming from various sources such as road traffic and hauling machineries. Some SSCs require segmentation of the unit, which will generate additional noise as part of the process, which is temporary until the completion of the segmentation. Additional temporary noise would also be emitted from lifting the material on carts/buggies to transport to off-site waste disposal. Generally, it is anticipated that noise emitting activities will be associated with clearing work, segmentation/dismantling activities, hoisting and transporting the equipment.

OPG will implement a Noise Management Plan to mitigate noise generation at the site, maintain equipment in proper mechanical condition, and comply with applicable noise standards and regulations.

Overall, noise levels during risk reduction and removal activities and dismantle/demolish activities during this licensing period will be similar to noise levels assessed in the 2022 PN ERA with 6 operating units; therefore, no further assessment is warranted in the PERA.

5.1.2.2 PNGS Units 5-8 Refurbishment

During ongoing operations at the PN site, on-site continuous noise sources are primarily from building ventilation systems. Intermittent noise sources are primarily from the standby turbine

generator set, steam relief valves, switchyard, emergency power supply generator, auxiliary steam boiler, and the auxiliary power supply.

During refurbishment additional noise will be emitted from operation of all construction-related equipment, operating outside of the building envelope, including additional on-site vehicle movements (e.g., haul trucks, additional workforce traffic).

To support this PERA, a maximum bounding scenario was developed to evaluate the effects of refurbishment and decommissioning on noise levels. The noise assessment focused on noise from construction equipment such as diesel generators, cranes, excavators, loaders, drilling, tugboats for DWI construction, and use of a multi-wheeled ground transporter for moving construction equipment. The maximum bounding emission scenario also considered on-site vehicular traffic (approximately 2,200 vehicles per day), specifically haul trucks for movement of material associated with refurbishment activities (i.e., hauling of excavated materials, concrete trucks supporting construction), as well as employee and delivery traffic from existing conditions and additional refurbishment contract employee and delivery traffic.

Noise levels were previously evaluated as part of the Pickering B Refurbishment EA; however, an updated noise model was developed in 2025 which took into account current Project planning as well as activities not considered in the Pickering B Refurbishment EA, including construction of the DWI.

5.1.2.2.1 Noise Screening Guidelines

Human Health

The measurement used to assess sound levels is the day-night sound level (Ldn). This value represents a 24-hour energy equivalent sound level that includes a 10 dB penalty for sounds that occur during night-time hours (22:00-07:00). The intention is to account for the heightened sensitivity to noise during night-time hours and capture a higher potential for annoyance during common sleeping hours. To assess the impact of noise on human receptors, noise guidelines were retained from Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise* (HC, 2017). This document provides a novel method for estimating the percentage of people that would be "highly annoyed" (%HA) by exposure to different noise levels and types. A dose-response curve is used to identify the %HA by sounds at the calculated levels. Health Canada suggests that a noise impact requiring further evaluation and noise control measures occurs when an activity causes a change in %HA of +6.5%.

In addition to the %HA guidance, Health Canada considers Project-associated noise levels greater than 75 dBA to potentially result in adverse effects such as sleep impairment and disturbance to vulnerable populations. Additional noise control measures are required when Project-associated Ldn values exceed 75 dBA (HC, 2017).

Ecological Health

There are minimal regulatory noise limits for the protection of ecological receptors. N288.6:22 (CSA, 2022a) points to Environment and Climate Change Canada's (ECCC) guidelines established to avoid causing harm to migratory birds and their nests (ECCC, 2023b). According to ECCC (2023b), birds can be potentially impacted by noise when:

- noise levels exceed 10 decibels (dB) above ambient noise levels in the natural environment (i.e., existing conditions pre-project); and,
- noises greater than about 50 dB are produced.

While ECCC caveats these guidelines as advice rather than regulatory limits, the ECCC values have been retained as the screening guidelines for assessing potential noise impacts to ecological receptors for the PERA.

5.1.2.2.2 Noise Modelling Results and Discussion

The human and ecological receptor locations retained for the noise modelling assessment are shown in **Figure 5-1** and **Figure 5-2**, respectively. Results of the noise modelling and comparisons with human health and ecological noise guidelines are presented in **Table 5-12** below.

Human Health

Predicted noise levels at the industrial/commercial worker receptor location are predicted to exceed the 75 dBA guideline provided by Health Canada. Modelled noise levels at these same receptor locations, in addition to the sport fisher, are predicted to exceed the +6.5 %HA guideline from Health Canada.

Despite some noted exceedances of the Health Canada noise guidelines, human receptors are not expected to be impacted by Project-associated noise levels. The industrial/commercial worker represents an off-site worker that be acclimated to elevated noise levels through exposure to other industrial activities. Noise impacts tend to be more disruptive during nighttime hours when sounds can be perceived as being louder than during the daytime and sleep can potentially be interrupted. Sleep disturbance is not considered a relevant health endpoint for this receptor location. Additionally, noise impacts tend to be more disruptive for certain sensitive receptors, such as residential areas, schools and daycares, hospitals, and places of worship. The industrial/commercial worker location is representative of a mix of various industrial and commercial operations and businesses and do not represent an area with receptors sensitive to noise impacts.

The sport fisher receptor represents a location where humans may be temporarily exposed to elevated noise levels resulting from Project activities. As described in **Section 6.1.1.2**, the sport fisher receptor is assumed to spend 1% of their time at the outfall location where atmospheric

exposure occurs. This equates to approximately 87.6 hours in a full calendar year. Similar to the industrial/commercial worker, the sport fisher receptor does not represent a location where sleep disturbance is a relevant health endpoint, nor is it representative of an area with elevated sensitivity to noise impacts.

Considering the above, noise impacts are not assessed further for human receptors in this PERA.

Ecological Health

When considering existing conditions characterized by the recent noise monitoring program conducted at the PN site in October 2024, no background noise levels exceeded the ECCC's 50 dB guideline. When considering Project-related sound sources only, predicted noise levels exceeded the 50 dB guideline for all ecological receptor locations excluding the two locations farthest away within Frenchman's Bay (R15 and R16). When the influence of Project-related activities are considered together with existing noise levels, the 50 dB guideline was exceeded at all ecological receptor locations. Predicted sound levels at all ecological receptor locations within the PN site (including the Bank Swallow Habitat) and along the southern fenceline (representative of the nearshore Lake Ontario area) exceeded current noise levels by more than 10 dB, with the exclusion of receptor location R9, which met the ECCC guideline by demonstrating a predicted 9.7 dB increase from current noise conditions.

Although the ECCC noise guidelines are predicted to be exceeded at many of the ecological receptor locations assessed, these guidelines are interpreted to be provided by ECCC as recommended reference values and are not representative of strict regulatory limits. Nonetheless, mitigation measures are expected to be implemented to minimize Project-related noise disturbances to local terrestrial and riparian biota. As much as its feasible to do so, work should be planned to occur during daytime hours when background sound levels are higher than nighttime hours to minimize disruption of nocturnal wildlife. The development and implementation of a Noise Management Plan will outline best construction practices and available mitigation measures for controlling noise generation. Noise levels at the PN site are characteristic of a typical urban and semi-urban environment; thus it is likely that many on-site ecological receptors are accustomed to living near human developments and are well adjusted to sound levels consistent with local human activities.

Predicted noise levels at the receptor locations representative of Frenchman's Bay (an important local habitat for terrestrial and riparian biota) are considerably lower than the predicted noise levels within the PN site and, in many cases, only slightly exceed the ECCC's 50 dB guideline. It is thus anticipated that noise impacts to Frenchman's Bay will be less severe relative to the PN site, allowing the area to continue to provide important refuge to local wildlife. This notion is further supported by the fact that predicted noise levels at the ecological receptor locations for Frenchman's Bay meet the ECCC recommendation that Project noise levels do not exceed background (i.e., pre-project) noise levels by more than 10 dB.

Predicted noise levels at the Bank Swallow Habitat location (receptor BSH) exceeded both noise guidelines provided by ECCC. This location corresponds to the site of the Fixed Face Earthen Embankment (FFEE), a pilot artificial nesting test structure designed for Bank Swallow, a Species at Risk (SAR). It should be noted that, without the pilot FFEE structure, the PN site does not provide suitable breeding habitat for the Bank Swallow. In addition to monitoring of the FFEE currently undertaken as part of the SHA, OPG maintains an annual biodiversity monitoring program that documents and monitors wildlife populations at the PN site, including for breeding birds.

Mitigation measures should be explored to reduce noise levels to species at risk during the breeding season including Bank Swallow. However, it should be noted that the noise modelling conducted for this PERA was developed with highly conservative assumptions relating to the planned Project activities, including maximum equipment use, without accounting for any significant variability in operational practices. The results represent a “worst-case” bounding scenario for potential noise impacts. It is expected that under real-world conditions, noise impacts to ecological receptors would be less severe than the predicted modelling values.

Considering the above discussion, noise impacts are not assessed further for any ecological receptors for this PERA; however, recommendations are provided for noise levels associated with species at risk such as the Bank Swallow.

Table 5-12: Human Health and Ecological Noise Modelling Results

Receptor ID	Receptor Name	Existing Conditions					PNGS Sources Only			Existing Conditions + PNGS Sources										
										Day		Night		24-hr		%HA Analysis				
		Day	Night	24-hr	Ldn	%HA	Day	Night	24-hr	Total	Increment	Total	Increment	Total	Increment	Total Ldn	Total %HA	Δ%HA		
Noise Guidelines - Human Health (HC, 2017)																75			+6.5	
Human Receptors																				
R1	Local Harvesting Area 1 ^a	48.4	46.9	48.0	53.6	3.5	49.0	49.0	49.0	51.7	3.3	51.1	4.2	51.6	3.5	57.6	5.8	2.3		
R2	Local Harvesting Area 2 ^a	48.4	46.9	48.0	53.6	3.5	49.4	49.4	49.4	51.9	3.5	51.4	4.4	51.8	3.7	57.9	5.9	2.5		
R3	Local Harvesting Area 3 ^a	48.4	46.9	48.0	53.6	3.5	49.1	49.1	49.1	51.8	3.4	51.2	4.2	51.6	3.6	57.7	5.8	2.3		
R20	Industrial/Commercial Worker	47.7	46.9	47.5	53.4	3.4	70.3	70.3	70.3	70.3	22.7	70.3	23.4	70.3	22.9	76.7	43.3	39.9		
R21	Sport Fisher	47.3	50.0	48.4	56.2	4.8	63.0	63.0	63.0	63.1	15.8	63.2	13.2	63.1	14.8	69.6	22.9	18.1		
R22	Correctional Institute (C2)	47.7	46.9	47.5	53.4	3.4	42.5	42.5	42.5	48.8	1.2	48.2	1.3	48.7	1.2	54.7	4.0	0.6		
R23	Farm	48.7	49.5	49.0	55.8	4.6	28.8	28.8	28.8	48.8	0.0	49.6	0.0	49.0	0.0	55.9	4.6	0.0		
R24	Dairy Farm	48.7	49.5	49.0	55.8	4.6	16.9	16.9	16.9	48.7	0.0	49.5	0.0	49.0	0.0	55.8	4.6	0.0		
R25	Urban Resident/Harvester ^b (WNW)	47.3	50.0	48.4	56.2	4.8	52.5	52.5	52.5	53.7	6.3	54.5	4.4	53.9	5.6	60.8	8.5	3.7		
R26	Urban Resident/Harvester ^b (NW)	47.3	50.0	48.4	56.2	4.8	46.9	46.9	46.9	50.1	2.8	51.8	1.7	50.7	2.3	58.0	6.0	1.2		
R27	Urban Resident/Harvester ^b (NNW)	48.4	46.9	48.0	53.6	3.5	48.3	48.3	48.3	51.4	2.9	50.7	3.7	51.2	3.1	57.2	5.5	2.0		
Noise Guidelines - Ecological (ECCC, 2023)		50					50			50						+10				
Ecological Receptors																				
R3	Hydro Marsh	48.4	46.9	48.0	53.6	3.5	49.1	49.1	49.1	51.8	3.4	51.2	4.2	51.6	3.6	57.7	5.8	2.3		
R6	Frenchman's Bay	47.3	50.0	48.4	56.2	4.8	52.0	52.0	52.0	53.3	5.9	54.1	4.1	53.6	5.2	60.4	8.2	3.3		
R8	Frenchman's Bay	47.3	50.0	48.4	56.2	4.8	51.3	51.3	51.3	52.8	5.4	53.7	3.7	53.1	4.7	60.0	7.7	2.9		
R15	Frenchman's Bay	47.3	50.0	48.4	56.2	4.8	47.7	47.7	47.7	50.5	3.2	52.0	2.0	51.1	2.7	58.3	6.2	1.4		
R16	Frenchman's Bay	47.3	50.0	48.4	56.2	4.8	48.1	48.1	48.1	50.7	3.4	52.2	2.1	51.2	2.9	58.4	6.4	1.6		
R19	Frenchman's Bay	47.3	50.0	48.4	56.2	4.8	53.5	53.5	53.5	54.4	7.1	55.1	5.1	54.7	6.3	61.4	9.2	4.4		
R25	Frenchman's Bay	47.3	50.0	48.4	56.2	4.8	52.5	52.5	52.5	53.7	6.3	54.5	4.4	53.9	5.6	60.8	8.5	3.7		
P8	Frenchman's Bay	47.3	50.0	48.4	56.2	4.8	50.5	50.5	50.5	52.2	4.9	53.3	3.2	52.6	4.2	59.6	7.3	2.5		
R9	PN Site	48.7	49.5	49.0	55.8	4.6	58.2	58.2	58.2	58.7	9.9	58.8	9.2	58.7	9.7	65.1	14.2	9.6		
R10	PN Site	48.4	46.9	48.0	53.6	3.5	73.5	73.5	73.5	73.5	25.1	73.5	26.6	73.5	25.5	79.9	53.7	50.3		
R11	PN Site	48.4	46.9	48.0	53.6	3.5	70.0	70.0	70.0	70.0	21.6	70.0	23.1	70.0	22.0	76.4	42.3	38.8		
R13	PN Site	47.7	46.9	47.5	53.4	3.4	65.0	65.0	65.0	65.1	17.4	65.1	18.2	65.1	17.6	71.5	27.6	24.2		
R14	PN Site	48.4	46.9	48.0	53.6	3.5	58.8	58.8	58.8	59.2	10.8	59.1	12.1	59.2	11.1	65.5	14.8	11.3		
R28	PN Site	47.7	46.9	47.5	53.4	3.4	70.3	70.3	70.3	70.3	22.7	70.3	23.4	70.3	22.9	76.7	43.3	39.9		
BSH	Bank Swallow Habitat	48.7	49.5	49.0	55.8	4.6	63.2	63.2	63.2	63.4	14.6	63.4	13.9	63.4	14.4	69.8	23.4	18.8		

Notes:
Shaded cells indicate exceedance of the specified noise guideline.
Background noise levels are L90 measurements presented in dBA.
“PNGS Sources Only” and “Existing Conditions + PNGS Sources” presented as Leq values in dBA, unless otherwise specified.

“Existing Conditions”: Background (i.e., pre-Project) noise levels characterized during the recent PN noise monitoring study conducted in October 2024.
“PNGS Sources Only”: Modelled noise levels associated with the planned Refurbishment and Decommissioning activities.
“Existing Conditions + PNGS Sources”: Predicted noise levels calculated by considering the influence of the modelled PNGS Refurbishment and Decommissioning activities together with existing noise levels. “Total” values represent sound levels considering both existing conditions and PNGS activities; “Increment” values represent the contribution to total noise values from PNGS activities only.

5.1.2.3 PNGS Units 5-8 Continued Operations

Following refurbishment, PNGS Units 5-8 will operate in the same manner as current PNGS Units 5-8 operations; therefore, assessment of the potential effects from the Continued Operation Phase on the environment is similar to the assessment in the 2022 PN ERA with 6 operating units; therefore, no further assessment is warranted in the PERA for continued operations.

During Continued Operations of PNGS Units 5-8, activities associated with PNGS Units 1-4 SWS and dismantle/demolish will be occurring, which could result in increased noise levels. It is expected that noise predictions would be within the bounding noise assessment presented in **Section 5.1.2.2**.

5.1.3 Summary of Tier 1 Assessment

The initial screening of potential effects of Project activities on the atmospheric environment included consideration of both air quality and noise levels. The predicted interactions between the atmospheric environment and Project activities are summarized in **Table 5-13**.

Table 5-13: Summary of Interactions between Project Activities and Atmospheric Environment

Project Activities	Air	Noise
PNGS Units 1-4 Decommissioning		
PNGS Units 1 and 4 Stabilization	2017 Safe Storage PEA and 2022 PEA Addendum is bounding	2017 Safe Storage PEA and 2022 PEA Addendum is bounding
PNGS Units 1-4 Storage with Surveillance	2017 Safe Storage PEA and 2022 PEA Addendum is bounding <ul style="list-style-type: none"> Activities associated with removal of modules and baskets from IFB-A and AIFB not previously assessed. Included in air model completed to support this PERA. Radiological emissions consistent with previous assessments. Harvester receptor not previously considered. Harvester receptor exposed to radiological COPCs in atmospheric environment considered further in Tier 2 assessment. 	2017 Safe Storage PEA and 2022 PEA Addendum is bounding <ul style="list-style-type: none"> Activities associated with removal of modules and baskets from IFB-A and AIFB not previously assessed. Included in noise model completed to support this PERA.
Risk Reduction and Removal Activities (2025-2033) Dismantle/Demolish (2034-2037)	Not assessed in 2017 Safe Storage PEA or 2022 PEA Addendum <ul style="list-style-type: none"> Non-Radiological Emissions – negligible and mitigated by Environmental Management Plan 	Not assessed in 2017 Safe Storage PEA or 2022 PEA Addendum. Noise levels would be mitigated by Noise Management Plan.

PREDICTIVE ENVIRONMENTAL RISK ASSESSMENT FOR PICKERING REFURBISHMENT,
DECOMMISSIONING, AND CONTINUED OPERATIONS

Tier 1 Qualitative Assessment

Project Activities	Air	Noise
	<ul style="list-style-type: none"> Radiological Emissions – All SSCs will be characterized prior to dismantle/demolish. Decommissioning Safety Assessment will be completed 	Noise levels would be similar to or bounded by the 2022 PN ERA for 6 operating units.
PNGS Units 5-8 Refurbishment		
<i>Preparation for Refurbishment</i>		
<ul style="list-style-type: none"> Procurement and Mobilization of Equipment and Components 	This activity is bounded by the activities assessed in the air model completed to support this PERA. Not a significant air source.	The activity is bounded by the activities assessed in the noise model completed to support this PERA. Not a significant noise source.
<ul style="list-style-type: none"> Relocation/Removal/Construction of Buildings, Structures, and Equipment 	This activity is bounded by the activities assessed in the air model completed to support this PERA. Not a significant air source.	The activity is bounded by the activities assessed in the noise model completed to support this PERA. Not a significant noise source.
<ul style="list-style-type: none"> Construction of PCSS and SB #5 	This activity is bounded by the activities assessed in the air model completed to support this PERA. Not a significant air source.	The activity is bounded by the activities assessed in the noise model completed to support this PERA. Not a significant noise source.
<ul style="list-style-type: none"> Defuel and Dewater 	<ul style="list-style-type: none"> This activity is bounded by the activities assessed in the air model completed to support this PERA. Not a significant air source. Radiological emissions bounded by existing conditions assessed in the 2022 PN ERA for 6 operating units. 	The activity is bounded by the activities assessed in the noise model completed to support this PERA. Not a significant noise source.
<ul style="list-style-type: none"> Islanding the Unit 	No interaction	No interaction
<ul style="list-style-type: none"> Management of Heavy Water 	This activity is bounded by activities assessed in the air model completed to support this PERA. Not a significant air source	The activity is bounded by the activities assessed in the noise model completed to support this PERA. Not a significant noise source.
<ul style="list-style-type: none"> Construction of DWI 	Included in air model completed to support this PERA. Emissions associated with DWI construction such as launch shaft and tunnel construction, infill, construction equipment, etc. considered, as well as DSM moves.	Included in noise model completed to support this PERA. Noise associated with DWI construction such as launch shaft and tunnel construction, infill, construction equipment, etc. considered, as well as DSM moves.
<i>Refurbishment</i>		
<ul style="list-style-type: none"> Replacement of Reactor Components 	Equipment used to perform activity included in air model completed to support this PERA.	Equipment used to perform activity included in noise model completed to support this PERA.

Project Activities	Air	Noise
<ul style="list-style-type: none"> Removal and Replacement of Steam Generators 	Equipment used to perform activity included in air model completed to support this PERA.	Equipment used to perform activity included in noise model completed to support this PERA.
<ul style="list-style-type: none"> Operation of DWI 	No interaction	No interaction
<ul style="list-style-type: none"> Refurbishment of Other Plant Systems 	Included in air model completed to support this PERA.	Included in noise model completed to support this PERA.
<ul style="list-style-type: none"> Waste Management and Transportation 	On-site transportation included in air model completed to support this PERA.	On-site transportation included in noise model completed to support this PERA.
<ul style="list-style-type: none"> Refuelling and Restarting 	Equipment used to perform activity included in air model completed to support this PERA.	Equipment used to perform activity included in noise model completed to support this PERA.
Continued Operations		
<ul style="list-style-type: none"> Operation and Maintenance of PNGS Units 5-8 	2022 PN ERA is bounding	2022 PN ERA is bounding
<ul style="list-style-type: none"> Waste Management and Transportation 	2022 PN ERA is bounding	2022 PN ERA is bounding

5.2 Surface Water Environment

5.2.1 Surface Water Flow

5.2.1.1 PNGS Units 1-4 Decommissioning

5.2.1.1.1 Stabilization and Storage with Surveillance

The 2017 Safe Storage PEA and 2022 PEA Addendum assumed that the PN water balance will change in a stepwise manner during the Stabilization Phase, from its previous operational configuration (6 operating units) to its configuration during the SWS Phase (PNGS Units 1 and 4, and PNGS Units 5-8 shut down). PNGS Units 1 and 4 were shut down in Q4 2024, and based on current Project planning, PNGS Units 5-8 will continue to operate until the end of 2026 after which they will enter refurbishment (see **Section 5.2.1.2**). During Units 1 and 4 Stabilization and Units 1-4 SWS, the most significant change from previous operational conditions (for 6 operating units) results from the gradual shutting down of the CCW pumps throughout Stabilization and SWS.

During Stabilization a minimum of 2 CCW pumps (approximately 2,050,000 m³/day) will continue to operate to support Stabilization activities.

Based on current Project planning, during Unit 1 and 4 Stabilization, some or all of PNGS Units 5 to 8 will be shutdown for refurbishment. As shown in the water balance in **Figure 5-3** for Stabilization, when all units at PNGS Units 5-8 are shutdown, the RLWMS flow will discharge through the PNGS Units 1-4 CCW discharge channel – no RLWMS effluent will be discharged from the PNGS Units 5-8 CCW discharge channel. Reactor building service water (RBSW) will be released through the PNGS Units 5-8 outfall. Consistent with the 2022 PEA Addendum, inactive

drainage will be discharged to the respective PNGS Units 1-4 or PNGS Units 5-8 CCW intake duct.

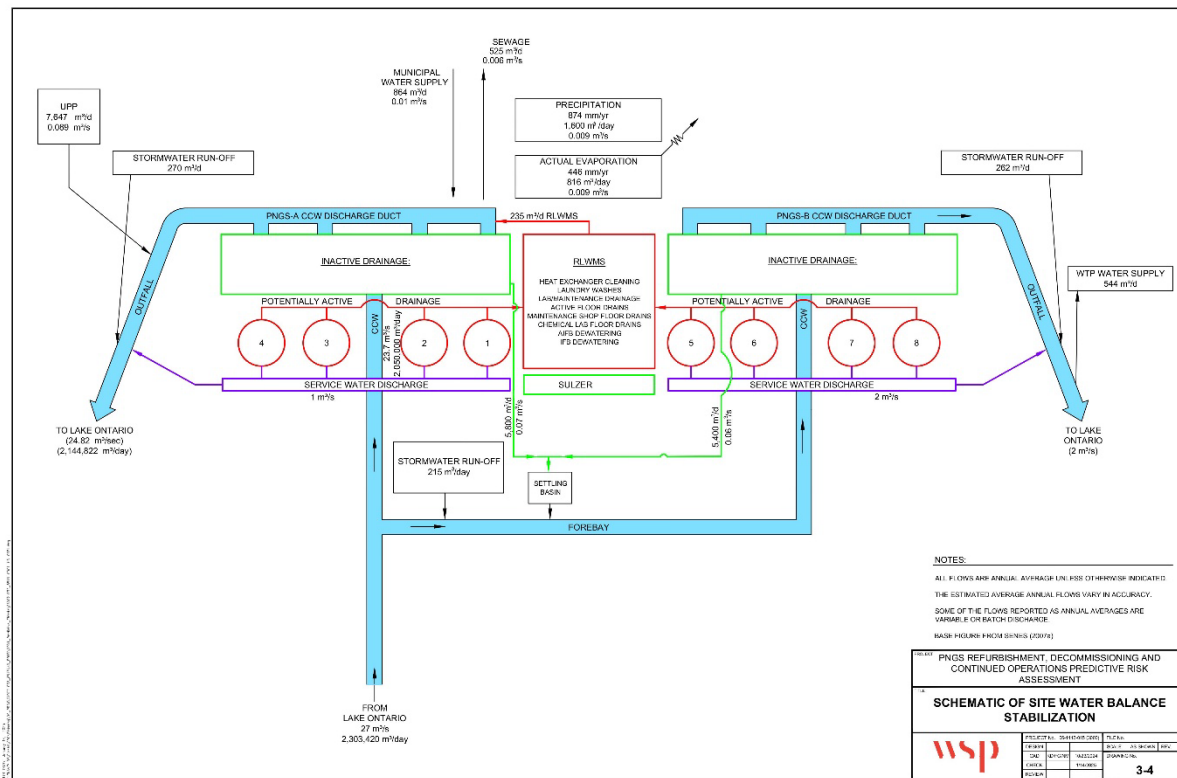
The 2022 PEA Addendum assumed that during SWS, the expected CCW intake flow will be 250,500 m³/day (2,899 L/s).

A hydrodynamic surface water model (RMA10) was initially developed for the 2017 Safe Storage PEA and re-assessed in the 2022 PEA Addendum, to evaluate the changes to the nearshore hydraulic environment resulting from the reduced flow conditions during SWS (SWS in the 2017 Safe Storage PEA and 2022 PEA Addendum was for both PNGS Units 1-4 and Units 5-8). The model was employed to predict changes in lake currents during SWS. The model assumed a much lower flow of 50,000 m³/day (from RBSW only), compared to current Project planning. The 2022 PEA Addendum concluded that the model used in 2017 provides a reasonable representation of existing lake water physical conditions (water level, water temperature, current speed) and that the concentration factors provided in the 2017 Safe Storage PEA continue to remain valid for PNGS Units 1-4 SWS. Furthermore, no changes in the amount of stormwater runoff were anticipated during the Stabilization and SWS activities. Overall, the findings from the 2017 Safe Storage PEA and updated in the 2022 PEA Addendum are bounding for PNGS Units 1 and 4 Stabilization and PNGS Units 1-4 SWS; therefore, no further assessment is conducted in this PERA.

A summary of assumptions made for surface water quantity from previous assessments and current Project planning is provided in **Table 5-14**.

Table 5-14: Summary of Surface Water Assumptions during the Project

Project Phase	2017 Safe Storage PEA	2022 PEA Addendum	Current Project Planning (this PEA)
PNGS Units 1 and 4 Stabilization	CCW pumps will be taken out of service as reactor units are shut down.	CCW pumps will be taken out of service as reactor units are shut down.	2 CCW pumps running (2,050,000 m ³ /day), RLWMS released to PNGS Units 1-4 discharge channel PNGS Units 5-8 shutdown in 2026 for initiation of refurbishment (no CCW pumps running) – see Figure 5-3
PNGS Units 1 to 4 SWS	50,000 m ³ /day cooling water from RBSW only. No CCW pumps operating. Assessed in RMA10 model.	Increased flow of 250,500 m ³ /day compared to 2017 Safe Storage PEA	Same as Stabilization row
PNGS Units 5-8 Refurbishment	Not assessed; however, considered shutdown of PNGS Units 5-8 which is the first step of refurbishment	Not assessed; however, considered shutdown of PNGS Units 5-8 which is the first step of refurbishment	Bounding condition evaluated in additional RMA10 model scenario (Figure 5-4) - 1 unit has completed refurbishment and is operational, water drawn in from DWI (approximately 2,050,000 m ³ /day) to PNGS Units 5-8, no flow to PNGS Units 1-4.



Note: Figure reflects PNGS Units 1 and 4 in Stabilization and PNGS Units 5-8 shutdown for initiation of Refurbishment.

Figure 5-3: Site Water Balance During PNGS Unit 1 and Unit 4 Stabilization

5.2.1.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess risk reduction and removal activities that will occur during the 2025 to 2033 timeframe, nor the additional dismantle/demolish activities that will occur from 2034 to 2037.

As outlined in **Section 3.3.4**, OPG intends to dismantle certain non-nuclear systems and outbuildings associated with PNGS Units 1-4. However, these specific SSCs do not interact with the drainage system, forebay, intake channel, and intake and discharge ducts.

Considering risk reduction and removal activities and dismantling/demolition activities of non-nuclear outbuildings, from 2025 to 2037, will have no impact on surface water quantity, no further assessment is warranted.

5.2.1.2 PNGS Units 5-8 Refurbishment

PNGS Units 5-8 will undergo refurbishment and return to operations in a staged manner. While PNGS Units 5-8 are shut down for refurbishment, water will be discharged via PNGS Units 1-4. Once PNGS Units 5-8 return to service, the discharge will be via PNGS Units 5-8 CCW discharge channel. The bounding water balance for the Refurbishment phase is shown in **Figure 5-4**.

Other refurbishment activities associated with the replacement of reactor components, replacement of steam generators, waste management, and refuelling and restarting are not anticipated to result in any major changes to the volume of effluent discharged or to Lake Ontario's hydrology.

Construction activities during the Refurbishment phase may disturb existing surfaces and reduce pervious cover, potentially altering stormwater volumes and flow rates, with an increase in sediment from disturbed areas and storm events. However, all activities during this phase will be conducted in accordance with an Erosion and Sediment Control Plan to ensure there are no measurable effects on stormwater runoff. Additionally, a Stormwater Management Plan will be developed. The assessment of potential modifications to existing stormwater infrastructure (e.g., the development of a new stormwater outfall, or the installation of new drainage ditches and storm sewers) needed to support the Project will be completed by a civil engineer. It is assumed that any modifications or expansions to the stormwater management system will meet water quality protection criteria as per MECP requirements. Additionally, any shoreline work for potential stormwater outfalls, if needed, would be done as per Toronto and Region Conservation Authority approvals. The stormwater management system itself will not represent an adverse effect to surface water quantity

As discussed in **Section 3.1.1.7**, the construction and operation of a DWI is proposed. The DWI is proposed to be located approximately 1.5 km offshore from the east end of the existing forebay and will replace the current shoreline surface water intake. Its construction will comprise shoreline modifications, including the potential addition of a dock structure will also involve shoreline modifications including a potential dock and possible West Infill, shoreline erosion mitigation area east of the PNGS Unit 5-8 outfall, and disposal of construction and dredged material.

The hydrodynamic surface water model (RMA10) developed for the 2017 Safe Storage PEA and re-assessed in the 2022 PEA Addendum did not consider the DWI. As such the RMA10 model was updated by WSP to change the intake location to the proposed location for the DWI and assess changes to lake circulation patterns. This was used to determine if previously used concentration factors at various receptor locations would change based on the new configuration. A bounding condition was evaluated where only 1 unit from PNGS Units 5-8 has completed refurbishment (and the remaining 3 units are not operating); therefore, the flow through the DWI is approximately 23.7 m³/s. At that time all CCW pumps are shutdown on the PNGS Units 1-4 side. The water balance for the bounding condition during refurbishment is shown in **Figure 5-4**.

The RMA10 simulation periods included two modelling periods (September 4, 2011 to December 24, 2011, and March 29, 2012 to July 10, 2012), as used in the 2017 Safe Storage PEA. The 2022 PEA Addendum checked if the model predictions were still accurate using updated lake water data and future climate trends up to 2039. It concluded that the RMA10 model accurately represents current and future conditions. Based on that conclusion, the modelling periods continue to remain valid as simulation periods for the updated model.

The following assumptions in the RMA10 model were made to align with current Project planning:

- The future plant configuration includes a submerged DWI located approximately 1,500 m from the plant. The model was modified to draw intake water from a model element that was centered on the location of the new intake. The existing intake channel was removed from the model.
- The intake flow and CCW flow from PNGS Units 5-8 was assumed to be 23.7 m³/s based on the latest flow diagram (**Figure 5-4**) for the bounding condition.
- The flow from the PNGS Units 1-4 discharge channel was assumed to be limited to the average stormwater runoff rate of 270 m³/d (0.0031 m³/s).
- The RLWMS discharge is to the PNGS Units 5-8 discharge channel and not PNGS Units 1-4 based on current Project planning.
- The intake temperature was assumed to be equal to the measured lake water temperature at temperature loggers near PNGS, consistent with the 2017 Safe Storage PEA.

The RMA10 model was used to predict the transport and dispersion of a conservative tracer for the future conditions. Concentration factors were developed for each receptor location based on a constant discharge concentration of 1 g/m³ (1 mg/L), and are shown on **Table 5-15**. The concentration factors represent the inverse of dilution factors. The concentration factor can be multiplied by a contaminant's outfall concentration to estimate its concentration at different lake locations. The conservative tracer is not intended to represent any specific contaminant, but is intended to provide a consistent method to determine concentrations at various receptors consistent with the 2017 Safe Storage PEA.

For the discussion on surface water quantity, the main differences in the assumptions behind the concentration factors for the 2025 modelling update and those from the 2017 Safe Storage PEA are that the 2025 modelling assumes 2,050,000 m³/day of cooling water from CCW pumps, released to the PNGS Units 5-8 CCW discharge duct, whereas the 2017 Safe Storage PEA assumed 50,000 m³/day of cooling water from the RBSW only. As well, addition of the DWI changes the circulation patterns. The concentration factors used in the 2017 Safe Storage PEA, along with those for existing condition (for 6 operating units) and the 2025 bounding condition are shown in **Table 5-15**. The main difference between the concentration factors is that in the 2017 Safe Storage PEA water was planned to be released to the PNGS Units 5-8 outfall from the RBSW only; however, in 2025 water is planned to be released via the PNGS Units 5-8 discharge duct with a greater flowrate. Interpretation of the concentration factors in terms of predicted concentrations of radionuclides and non-radionuclides is presented in **Section 5.2.2.2**.

Table 5-15: Summary of Predicted Surface Water Concentration Factors for PNGS Units 5-8 Outfall

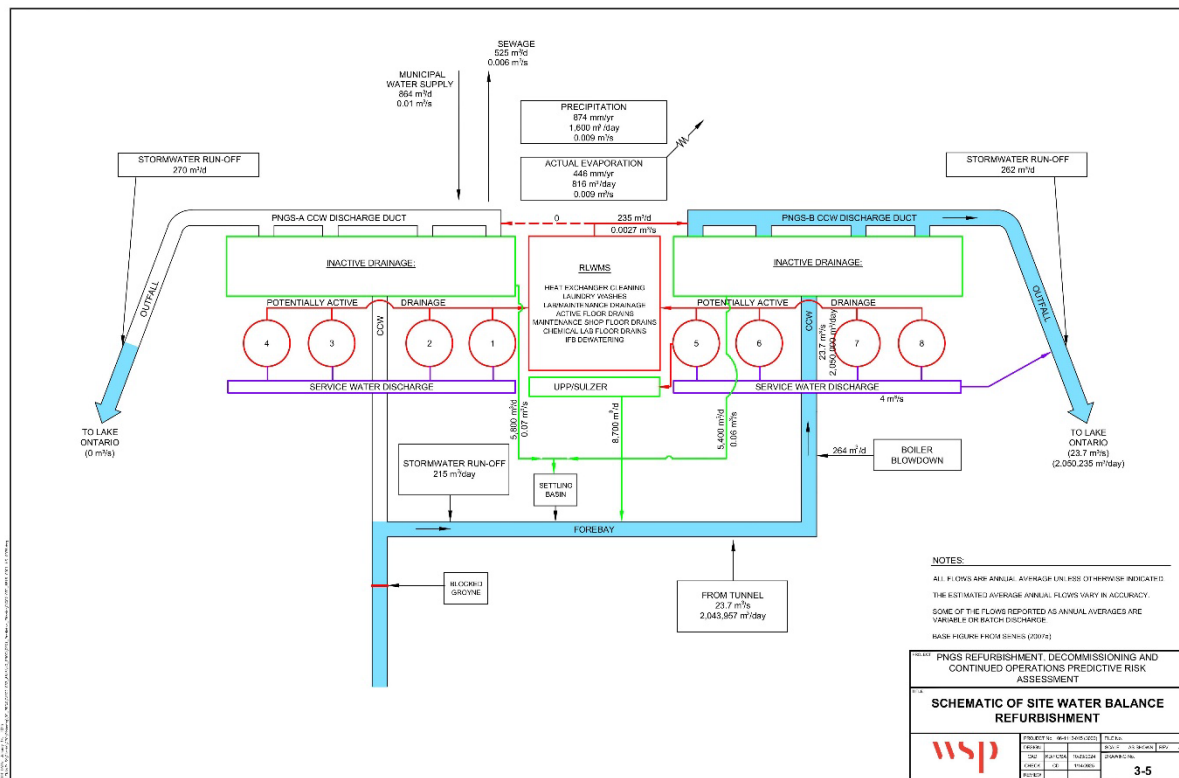
Location of Interest	Distance from PNGS Units 5-8 Outfall (m)	2017 Safe Storage PEA RBSW Discharge to PNGS Units 5-8 ⁽¹⁾	Existing Conditions ⁽²⁾ Discharge to PNGS Units 1-4	Existing Conditions ⁽²⁾ Discharge to PNGS Units 5-8	2025 Modelling Update Discharge to PNGS Units 5-8, during Refurbishment ⁽³⁾
PNGS Units 1-4 Discharge Channel	939	3.56E-04	9.44E-01	3.84E-03	9.88E-03
PNGS Units 5-8 Discharge Channel	212	6.80E-02	1.05E-04	9.97E-01	8.97E-01
Off PNGS / Sport Fisher	515	1.25E-03	5.72E-02	1.81E-01	5.58E-02
Squires Beach	2,100	7.48E-04	1.26E-02	1.06E-01	2.93E-02
Liverpool Beach	1,485	3.62E-04	1.68E-01	4.54E-02	1.67E-02
Frenchman's Bay Inlet	1,970	3.16E-04	9.67E-02	4.28E-02	1.44E-02
Ajax Intake	5,061	1.01E-04	5.50E-03	1.86E-02	3.08E-03

Notes: Estimated average concentration factors based on constant discharge concentration of 1 g/m³ (1 mg/L)

(1) Concentration factor applies to RBSW end of pipe concentration where flow is 50,000 m³/day

(2) Existing conditions represents PNGS Units 1 and 4 operating and Units 5-8 operating.

(3) Concentration factor applies to PNGS Units 5-8 CCW discharge duct end of pipe where flow is 2,050,00 m³/day. A bounding condition was evaluated where only 1 unit from PNGS Units 5-8 has completed refurbishment (and the remaining 3 units are not operating), and all of PNGS U1-4 are shut down.



Note: Figure reflects a bounding condition where 1 unit is operating for PNGS Units 5-8, DWI tunnel is operating, and PNGS Units 1-4 has no intake or discharge flow.

Figure 5-4: Water Balance for Bounding Condition during Refurbishment

5.2.1.3 PNGS Units 5-8 Continued Operations

As outlined in the previous section, the construction of the proposed DWI and associated activities will modify surface water flow and hydrology compared to previous conditions (with 6 operating units as assessed in the 2022 PN ERA).

During Continued Operations, the intake flow will come from the DWI, and will be lower than previous operational conditions (with 6 operating units) since there will be no flow to PNGS Units 1-4. The intake flow from the DWI will range from approximately 141 to 172 m³/s (average of 156.5 m³/s) with a similar discharge through the PNGS Units 5-8 discharge channel (see **Figure 5-5**). Since there will be no flow out the PNGS Units 1-4 discharge channel, the Continued Operations scenario will be similar to or lower than previous operational conditions (with PNGS Units 1 and 4 operating); therefore, no further assessment is warranted in the PERA for continued operations.

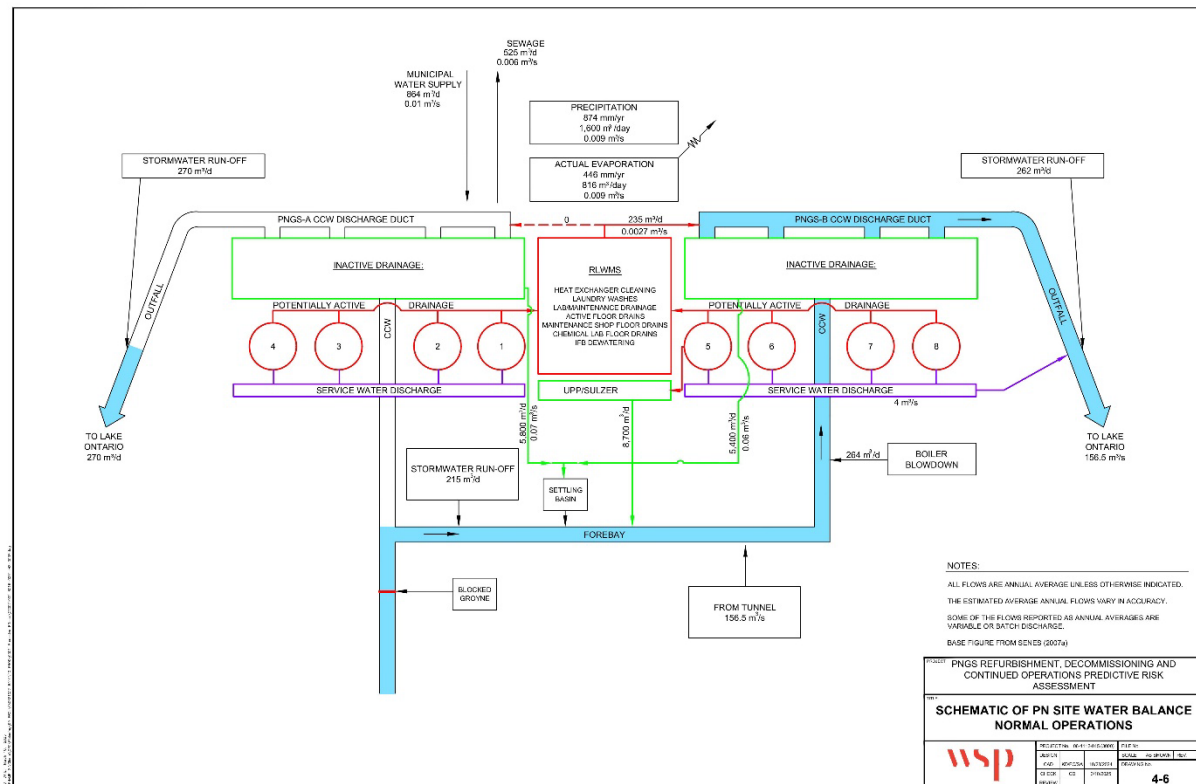


Figure 5-5: Water Balance for PNGS Units 5-8 Continued Operations

5.2.2 Surface Water Quality

5.2.2.1 PNGS Units 1-4 Decommissioning

5.2.2.1.1 Stabilization and Storage with Surveillance

5.2.2.1.1.1 Forebay

Non-Radiological and Radiological Emissions

In the 2017 Safe Storage PEA and 2022 PEA Addendum, the forebay was assessed as a potential aquatic habitat during the SWS Phase following reduced flows and removal of the FDS. In the 2022 PEA Addendum an updated mass balance box model was developed to predict surface water concentrations in the forebay during the SWS Phase based on groundwater contributions from the turbine auxiliary bay (TAB) inactive drainage (IAD) sumps and the vacuum building ramp sump (VBRS), as well as stormwater to the forebay. As shown in the 2022 PEA Addendum, predicted concentrations of non-radionuclides in the forebay were below screening criteria. For radionuclides, total doses to ecological receptors in the forebay were calculated using measured concentrations of tritium, C-14, Co-60, Cs-134 and Cs-137. Based on the modelling results, there were no potential adverse effects identified. All doses to the receptors assessed were predicted to be below the aquatic benchmark of 9.6 mGy/d, or the terrestrial benchmark of 2.4 mGy/d, as applicable to each receptor.

Based on current Project planning, a DWI will be used to draw water into the forebay and then into the PNGS Units 5-8 intake duct. The DWI will be used starting in 2030, and the FDS will remain operational as necessary. A cut-off wall will be installed at the entrance to the intake channel and water flowing through the cut-off wall into the forebay may serve as an emergency service water supply to the station. While some small fish may be able to enter the forebay through small holes in the cut-off wall, the forebay would not be considered fish habitat according to the DFO definition as “water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration area.” The cut-off wall will include fish mitigation measures to minimize the risk of fish entry, including species at risk such as American Eel. Since the assessment conducted in the 2022 PEA Addendum assumed that during SWS the forebay would become a potential aquatic habitat and assessed effects of radionuclides and non-radionuclides on ecological receptors, the 2022 PEA Addendum is considered bounding; therefore, no further assessment of water quality in the forebay is conducted in this PERA.

5.2.2.1.1.2 Stormwater

Non-Radiological and Radiological Emissions

Consistent with the 2017 Safe Storage PEA and 2022 PEA Addendum, there are no changes to the stormwater runoff anticipated as a result of the Stabilization and SWS activities. Stormwater is discharged through stormwater runoff outfalls at the shore of Lake Ontario, into the forebay and into the PNGS Units 1-4 and PNGS Units 5-8 discharge channels. Stormwater runoff catchments to Lake Ontario have been assessed in the 2022 PN ERA and that assessment is considered bounding for Stabilization and SWS. The stormwater runoff that drains into the discharge channels is assumed to be 270 m³/day and 262 m³/day for PNGS Units 1-4 and PNGS Units 5-8, respectively, based on annual precipitation of 872 mm (see **Figure 5-3**). The 2017 Safe Storage PEA assessed stormwater runoff mixed with cooling water (50,000 m³/day) in the discharge channel. Using the maximum stormwater quality from the 2015/2016 sampling program, mixed with cooling water, all concentrations were below screening criteria. Based on current Project planning, with 2 CCW pumps running, additional cooling water will be available for dilution instead of 50,000 m³/day (cooling water needs from RBSW assumed in 2017 Safe Storage PEA); therefore, concentrations in the PNGS Units 1-4 discharge channel are expected to be lower and will be bounded by the 2017 Safe Storage PEA and 2022 PEA Addendum. Additionally, during the end of Stabilization, all PNGS Units 5-8 units will be shutdown for refurbishment, so there will be a period of time where only RBSW and stormwater are discharged to the PNGS Units 5-8 discharge channel (no CCW pumps will be running) PNGS Units 5-8. Since additional dilution will be available from operation of the CCW pumps, the scenario for PNGS Units 1 and 4 Stabilization and Units 5-8 refurbishment is bounded by the stormwater concentrations predicted in the discharge channels for SWS in the 2017 Safe Storage PEA (Golder and Ecometrix, 2017). Overall, these findings for stormwater quality from the 2017 Safe Storage PEA are bounding for Stabilization and SWS; therefore, no further assessment is conducted in this PERA.

5.2.2.1.1.3 Lake Water Quality

Non-Radiological and Radiological Emissions

As discussed in **Section 5.2.1.1.1**, during Stabilization and SWS, a minimum of 2 CCW pumps will continue to be available.

During the end of PNGS Units 1 and 4 Stabilization, all PNGS Units 5-8 will be shutdown for refurbishment, so there may be a period of no flow (no CCW pumps running for PNGS Units 5-8), where the RLWMS will discharge through the PNGS Units 1-4 CCW discharge channel and only RBSW (and stormwater) will be released through the PNGS Units 5-8 CCW outfall (see **Figure 5-3**). Consistent with the 2022 PEA Addendum, the inactive drainage will be discharged to the respective PNGS Units 1-4 or PNGS Units 5-8 CCW intake duct, and not diverted to the RLWMS or RBSW. In addition, the increase in expected minimum flow rate from 50,000 m³/day (assumed in the 2017 Safe Storage PEA) to 250,500 m³/day (assumed in the 2022 PEA Addendum) will improve the dilution of contaminants discharged at the outfall.

The 2017 Safe Storage PEA evaluated lake water quality during SWS based on expected liquid effluent quality for tritium, carbon-14, and gross beta/gamma from the RLWMS and groundwater inputs. In the 2017 Safe Storage PEA, the release from the RLWMS and groundwater was assumed to be mixed with 50,000 m³/day of RBSW, released to the PNGS Units 5-8 discharge channel. The end of pipe RBSW concentrations were multiplied by the concentration factors from the RMA10 model to calculate concentrations at various receptor locations as reproduced from the 2017 Safe Storage PEA in **Table 5-16**. End of pipe RBSW concentrations for non-radionuclides were compared against screening values in the 2017 Safe Storage PEA and it was determined that further consideration in a Tier 2 assessment was not warranted.

Table 5-16: Predicted Lake Water Concentrations for Radionuclides during SWS

Receptor Locations	Tritium (Bq/L)	Carbon-14 (Bq/L)	Beta/Gamma (Bq/L)
RBSW Discharge	7.00E+03	3.00E-01	5.00E-01
PNGS Units 1-4 Discharge Channel	2.49E+00	1.07E-04	1.78E-04
PNGS Units 5-8 Discharge Channel	4.76E+02	2.04E-02	3.40E-02
Sport Fisher	8.78E+00	3.76E-04	6.27E-04
Squires Beach	5.24E+00	2.24E-04	3.74E-04
Liverpool Beach	2.53E+00	1.08E-04	1.81E-04
Frenchman's Bay Inlet	2.21E+00	9.47E-05	1.58E-04
Ajax Intake	7.08E-01	3.03E-05	5.06E-05

Overall, since based on current Project planning more cooling water flow will be available for dilution during Stabilization and SWS than previously assessed, the findings from the 2017 Safe Storage PEA and updated in the 2022 PEA Addendum are bounding for PNGS Unit 1 and 4

Stabilization and PNGS Units 1-4 SWS. Therefore, no further assessment of lake water quality is warranted in this PERA.

While no specific COPCs were identified for the surface water environment during Stabilization and SWS, general feedback from the WTFNs on other PERAs has indicated that it would be beneficial to include a Harvester receptor in the PERA. As such, assessment of a Harvester for surface water radiological emissions is considered in the Tier 2 quantitative assessment.

5.2.2.1.1.4 Irradiated Fuel Bays

During SWS, the IFB-A will be drained by 2034. OPG may flush the IFB-A water directly to the PNGS Units 1-4 outfall using U1 CCW pump for dilution. Water drained from IFB-A will be released to Lake Ontario in a controlled manner that keeps tritium concentrations at the Water Supply Plants within existing tritium levels and well below regulatory limits.

5.2.2.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess risk reduction and removal activities that will occur during the 2025 to 2033 timeframe, nor the additional dismantle/demolish activities that will occur from 2034 to 2037.

As outlined in **Section 3.3.4**, OPG plans to dismantle certain non-nuclear systems and outbuildings associated with PNGS Units 1-4. As part of the dismantling activities, any potential impacts to surface water quality will be minimized or eliminated by following construction best practices and OPG's spill management protocols, which include the highest precautions to control and contain any potential spill and prevent release to the environment. Considering minimal interaction between surface water quality and risk reduction and removal activities and dismantling/demolition activities of non-nuclear buildings, from 2025-2037, no effects on surface water quality are expected; therefore, no further assessment is warranted.

5.2.2.2 PNGS Units 5-8 Refurbishment

Construction equipment, such as cranes and forklifts, will be used during the site preparation and the removal and replacement of steam generators. Possible effects of increased traffic, clearing operations and sanding/salting of parking and lay-down areas will be mitigated by implementing the procedures outlined in the Erosion and Sediment Control Plan or Stormwater Management Plan. Therefore, measurable changes to stormwater runoff, and consequently, to surface water and sediment quality are unlikely.

Project activities associated with the removal and replacement of reactor components, refurbishment of other plant systems (e.g., reactor auxiliary systems, feedwater systems), general upgrades and maintenance, and refuelling and restarting are not expected to have an increased interaction with surface water and sediment quality from previous operations (with 6 operating units). Activities associated with the construction of the PCSS for the storage of low and intermediate-level refurbishment waste were assessed as part of the PCSS PERA and were determined to have negligible interactions with surface water (Ecometrix, 2024). Consistent with

the PCSS PERA, and applicable for all planned construction of buildings to support the Project, OPG will employ best practices for stormwater management that would meet Ontario MECP requirements and industrial sewage works rules.

The main interactions between Project activities and surface water are likely to occur during PNGS Units 5-8 shutdown, defueling and dewatering since there will be a reduction in cooling water flow which may lead to changes in the surface water quality. This is discussed further below.

Non-Radiological Emissions

The reduction in CCW flow is not expected to result in any measurable changes in the concentrations of non-radiological parameters of interest within the CCW discharge channel compared to previous operational conditions (for 6 operating units). When a unit is shutdown there may be some liquid effluent discharges associated with draining and decontamination of systems and equipment; however, after this initial work there will be a proportional decrease in both liquid effluent and CCW flow.

During reactor shut down for refurbishment, morpholine and hydrazine will continue to be used to protect equipment and piping from corrosion. Hydrazine, a corrosion inhibitor utilized in station water systems and known to produce ammonia as a by-product, will continue to be applied at current levels during refurbishment. Under existing conditions, hydrazine, morpholine, and ammonia concentrations have been maintained below the boiler blowdown ECA limits (OPG, 2018b, 2019d, 2020b, 2021g, 2023b, 2023a, 2024d), and are expected to remain well within acceptable thresholds during refurbishment. If necessary, CCW flows can be adjusted to ensure discharges are within ECA limits. As such the assessment of hydrazine and morpholine in the 2022 PN ERA is bounding (for 6 operating units); therefore, no further assessment is conducted in the PERA for lake water quality during refurbishment.

Overall, it is expected that the waterborne non-radiological emissions released through the PNGS Units 5-8 CCW discharge channel during this phase would reduce considerably. Based on historical water quality monitoring, this will likely result in either a minor measurable decrease or no change in concentrations in Lake Ontario compared to previous operational conditions (as assessed in the 2022 PN ERA for 6 operating units). Consistent with the Surface Water TSD in the 2008 Pickering B Refurbishment EA (updated in **Table 5-17**), mixing calculations of inputs to the CCW duct show concentrations below the PWQO during refurbishment, assuming a CCW flow of 76.5 m³/s for 2 units operating and 23.7 m³/s for 1 unit operating (Golder, 2007d).

Table 5-17: Summary of CCW Mixing Calculations for RLWMS and NWTP

Parameter	Units	Intake Concentration ¹	ECA Limit at Effluent Discharge	Maximum Predicted Concentration in CCW (2 Units Operating)	Maximum Predicted Concentration in CCW (1 Unit Operating)	PWQO
RLWMS						

Parameter	Units	Intake Concentration ¹	ECA Limit at Effluent Discharge	Maximum Predicted Concentration in CCW (2 Units Operating)	Maximum Predicted Concentration in CCW (1 Unit Operating)	PWQO
Phosphorus	mg/L	<0.01	1	<0.01	<0.01	0.02
Total suspended solids	mg/L	<2	73	<2	<2	N/A
Zinc	mg/L	0.01	1	0.010	0.011	0.03
Iron	mg/L	0.025	9	0.026	0.030	0.3
Oil and Grease	mg/L	<1	36	<1	<1	Narrative
NWTP						
Aluminum	mg/L	0.004	13	0.0064	0.0117	0.075
Total suspended solids	mg/L	<2	70	<2	<2	N/A
Iron	mg/L	0.0025	2.5	0.0255	0.0265	0.3

Note:

¹ (Golder, 2007d)

Radiological Emissions

During refurbishment heavy water systems will be drained, moderator system flushed, and all other liquids, wastes and potentially hazardous transient materials will be removed. Initial dewatering may result in some increase in radiological emissions from the RLWMS. However, this activity is bounded by the assumptions in the 2017 Safe Storage PEA and 2022 PEA Addendum.

During the removal and replacement of steam generators, light water will be drained from the steam generators and released to Lake Ontario. This water will be monitored for non-radionuclides to ensure it is within ECA limits before being discharged to the lake. Water will also be monitored for radionuclides. If contamination is detected during the monitoring, the water will be sent to the RLWMS for processing.

OPG is developing a tritium emissions plan for light water to ensure that tritium concentrations at the Ajax WSP remain within the range seen during previous operations (6 operating units), i.e. below roughly 10 Bq/L. Since OPG intends to manage tritium emissions during refurbishment in alignment with previous operations, the 2022 PN ERA (with 6 operating units) is considered bounding and no further assessment of tritium emissions to lake water during refurbishment is warranted.

5.2.2.2.1 Deep Water Intake

The construction and operation of the planned DWI, as well as associated activities including the potential addition of a dock, possible infill and shoreline erosion mitigation areas, and material disposal, have the potential to alter sediment and water quality. Specifically, this includes disturbance of the sediment during dredging and subsequent relocation of dredge spoils, and possible changes in local hydrology during operation with intake flow. It is likely that these activities will only cause a temporary impact, or little-to-no impact, on surface water and sediment in Lake Ontario and Frenchman's Bay. As discussed in **Section 5.2.1.2**, an updated hydrodynamic surface water model (RMA10) was used to determine changes to concentration factors at various receptor locations due to the change in configuration with a DWI. A bounding condition was evaluated where only 1 unit from PNGS Units 5-8 has completed refurbishment (and the remaining 3 units are not operating); therefore, the flow through the DWI is approximately 23.7 m³/s, as per the water balance for the bounding condition shown in **Figure 5-4**.

The expected bounding concentrations in the RLWMS are consistent with the 2017 Safe Storage PEA based on average operational RLWMS emissions from 2011 to 2015 and include:

- Tritium: 1.2E+06 Bq/L;
- Carbon-14: 46 Bq/L; and
- Beta/Gamma: 91 Bq/L.

The flow rate from the RLWMS is approximately 235 m³/day and approximately 2,050,000 m³/day of cooling water is being released from the PNGS Units 5-8 discharge channel. Using the concentration factors from the 2025 RMA10 modelling for refurbishment, the predicted concentrations at various receptor locations are shown in **Table 5-18**.

Predicted concentrations of radionuclides in surface water under the refurbishment bounding scenario are expected to be lower than those assessed in the 2017 Safe Storage PEA; therefore, the assessment in the 2017 Safe Storage PEA is bounding and no further assessment of radionuclides in surface water is warranted in the PERA for the Refurbishment Phase. As mentioned in **Section 5.2.2.1.1.3**, while no specific COPCs were identified for the surface water environment, general feedback from the WTFNs on other PERAs has indicated that it would be beneficial to include a Harvester receptor in the PERA. As such, assessment of a Harvester for surface water radiological emissions is considered in the Tier 2 quantitative assessment.

Table 5-18: Predicted Surface Water Concentrations for Radionuclides Released to PNGS Units 5-8 Outfall During Refurbishment

Location of Interest	Distance from PNGS Units 5-8 Outfall (m)	2017 Safe Storage PEA Concentrations (50,000 m ³ /day cooling water from RBSW)			Refurbishment Concentrations (2,050,000 m ³ /day CCW cooling water)		
		Tritium (Bq/L)	Carbon-14 (Bq/L)	Beta/Gamma (Bq/L)	Tritium (Bq/L)	Carbon-14 (Bq/L)	Beta/Gamma (Bq/L)
PNGS Units 1-4 Discharge Channel	939	2.49E+00	1.07E-04	1.78E-04	1.36E+00	5.21E-05	1.03E-04
PNGS Units 5-8 Discharge Channel	212	4.76E+02	2.04E-02	3.40E-02	1.23E+02	4.73E-03	9.36E-03
Sport Fisher	515	8.78E+00	3.76E-04	6.27E-04	7.68E+00	2.94E-04	5.82E-04
Squires Beach	2,100	5.24E+00	2.24E-04	3.74E-04	4.03E+00	1.55E-04	3.06E-04
Liverpool Beach	1,485	2.53E+00	1.08E-04	1.81E-04	2.30E+00	8.81E-05	1.74E-04
Frenchman's Bay Inlet	1,970	2.21E+00	9.47E-05	1.58E-04	1.98E+00	7.59E-05	1.50E-04
Ajax Intake	5,061	7.08E-01	3.03E-05	5.06E-05	4.24E-01	1.62E-05	3.21E-05

5.2.2.3 PNGS Units 5-8 Continued Operations

The construction and operation of the proposed DWI and associated activities could modify lake circulation and associated dilution patterns and surface water quality compared to previous operational conditions (with 6 operating units as assessed in the 2022 PN ERA). As described in Section 5.2.1.3, during Continued Operations the intake flow will be provided by the DWI, and will be lower than previous operational conditions for 6 operating units, since there will be no flow to PNGS Units 1-4. Concentrations in effluent released from PNGS Units 5-8 should be similar to previous operational conditions (for 6 operating units); however, concentrations in the nearshore Lake Ontario may be different, as water released from the PNGS Unit 5-8 outfall will no longer be drawn into the forebay due to the cutoff wall (while there will be some flow through the cut-off wall, recirculation of water into the forebay will be reduced).

Surface water quality during Continued Operations will be similar to previous operational conditions (with 6 operating units); however, continued monitoring of lake water through the EMP will confirm this assumption over time. No further assessment is warranted in the PERA for continued operations.

Beyond this, no significant changes to surface water are anticipated during this phase as PNGS Units 5-8 is expected to continue operating consistent with current practices.

5.2.3 Summary of Tier 1 Assessment

The initial screening of potential effects of Project activities on the surface water environment included consideration of both surface water flow and quality. The predicted interactions between the surface water environment and Project activities are summarized in **Table 5-19**.

Table 5-19: Summary of Interactions between Project Activities and Surface Water Environment

Project Activities	Surface Water Flow	Surface Water Quality
PNGS Units 1-4 Decommissioning		
PNGS Units 1 and 4 Stabilization	2017 Safe Storage PEA and 2022 PEA Addendum is bounding <ul style="list-style-type: none"> 2 CCW pumps at PNGS Units 1-4 will continue to operate PNGS Units 5-8 will enter refurbishment during PNGS Units 1 and 4 Stabilization – bounding condition when all U5-8 is shutdown for refurbishment 	2017 Safe Storage PEA and 2022 PEA Addendum is bounding <ul style="list-style-type: none"> Forebay not considered aquatic habitat Stormwater and Lake water quality predictions bounded by 2017 Safe Storage PEA and 2022 PEA Addendum
PNGS Units 1-4 Storage with Surveillance	2017 Safe Storage PEA and 2022 PEA Addendum is bounding <ul style="list-style-type: none"> Low flow of 50,000 m³/day assumed in 2017 Safe Storage 	2017 Safe Storage PEA and 2022 PEA Addendum is bounding

PREDICTIVE ENVIRONMENTAL RISK ASSESSMENT FOR PICKERING REFURBISHMENT,
DECOMMISSIONING, AND CONTINUED OPERATIONS

Tier 1 Qualitative Assessment

Project Activities	Surface Water Flow	Surface Water Quality
	PEA is bounding since flow will be higher based on current Project planning (less change).	<ul style="list-style-type: none"> Forebay not considered aquatic habitat due to cut-off wall. Lake water quality assessed in 2017 Safe Storage PEA considered bounding; however, Harvester receptor not previously considered. Harvester receptor exposed to radiological COPCs in surface water considered further in Tier 2 assessment.
Risk Reduction and Removal Activities (2025-2033) Dismantle/Demolish (2034-2037)	Not assessed in 2017 Safe Storage PEA or 2022 PEA Addendum <ul style="list-style-type: none"> No interaction with water quantity 	Not assessed in 2017 Safe Storage PEA or 2022 PEA Addendum <ul style="list-style-type: none"> No interaction with water quality
PNGS Units 5-8 Refurbishment		
<i>Preparation for Refurbishment</i>		
<ul style="list-style-type: none"> Procurement and Mobilization of Equipment and Components 	No interaction	No interaction
<ul style="list-style-type: none"> Relocation/Removal/Construction of Buildings, Structures, and Equipment 	No interaction	No interaction
<ul style="list-style-type: none"> Construction of PCSS and SB #5 	No interaction	No interaction
<ul style="list-style-type: none"> Defuel and Dewater 	<ul style="list-style-type: none"> Reduction in cooling water flow during refurbishment The impact of PNGS Units 5-8 on nearshore lake circulation will be reduced. 	<ul style="list-style-type: none"> Reduction in cooling water flow during refurbishment Non-radiological emissions will remain below ECA limits and screening values. 2022 PN ERA is bounding Radiological emissions from dewatering bounded by 2017 Safe Storage PEA and 2022 PEA Addendum Tritium emissions will be managed to ensure tritium concentrations at Ajax WSP are within existing levels – 2022 PN ERA is bounding.
<ul style="list-style-type: none"> Islanding the Unit 	No interaction	No interaction
<ul style="list-style-type: none"> Management of Heavy Water 	No interaction	No interaction
<ul style="list-style-type: none"> Construction of DWI 	<ul style="list-style-type: none"> Once construction complete, DWI will be used for water intake instead of the forebay Updated hydrodynamic surface water model (RMA10) indicates flow pattern and velocity in the lake will be altered when DWI is operating, 	<ul style="list-style-type: none"> Bounding condition assessed with a CCW flow reduction to 23.7 m³/s representing 1 unit operating on PNGS Units 5-8 side, no CCW flow through PNGS Units 1-4 side, and DWI operational (partial flow). Updated concentration factors for the RMA10 model for the

PREDICTIVE ENVIRONMENTAL RISK ASSESSMENT FOR PICKERING REFURBISHMENT,
DECOMMISSIONING, AND CONTINUED OPERATIONS

Tier 1 Qualitative Assessment

Project Activities	Surface Water Flow	Surface Water Quality
	and velocities will be reduced during Refurbishment phase.	bounding condition show radiological concentrations in surface water from the 2017 Safe Storage PEA are bounding for the Refurbishment phase. <ul style="list-style-type: none"> Harvester receptor not previously considered. Harvester receptor exposed to surface water considered further in Tier 2 assessment.
<i>Refurbishment</i>		
<ul style="list-style-type: none"> Replacement of Reactor Components 	No interaction	No interaction
<ul style="list-style-type: none"> Removal and Replacement of Steam Generators 	No interaction	No interaction
<ul style="list-style-type: none"> Operation of DWI 	<ul style="list-style-type: none"> DWI will be used for water intake instead of the forebay Updated hydrodynamic surface water model (RMA10) indicates flow pattern and velocity in the lake will be altered when DWI is operating and velocities will be reduced during Refurbishment phase. 	<ul style="list-style-type: none"> Bounding condition assessed with a CCW flow reduction to 23.7 m³/s representing 1 unit operating on PNGS Units 5-8 side, no CCW flow through PNGS Units 1-4 side, and DWI operational (partial flow). Updated concentration factors for the RMA10 model for the bounding condition show radiological concentrations in surface water from the 2017 Safe Storage PEA are bounding for the Refurbishment phase.
<ul style="list-style-type: none"> Refurbishment of Other Plant Systems 	No interaction	No interaction
<ul style="list-style-type: none"> Waste Management and Transportation 	No interaction	No interaction
<ul style="list-style-type: none"> Refuelling and Restarting 	<ul style="list-style-type: none"> CCW pumps will return to full capacity for PNGS Units 5-8. 2022 PN ERA is bounding. 	<ul style="list-style-type: none"> CCW pumps will return to full capacity for PNGS Units 5-8. 2022 PN ERA is bounding.
Continued Operations		
<ul style="list-style-type: none"> Operation and Maintenance of PNGS Units 5-8 	2022 PN ERA is bounding	2022 PN ERA is bounding
<ul style="list-style-type: none"> Waste Management and Transportation 	No interaction	No interaction

5.3 Aquatic Environment

5.3.1 Fish and Fish Habitat

5.3.1.1 PNGS Units 1-4 Decommissioning

5.3.1.1.1 Stabilization and Storage with Surveillance

As discussed in **Section 5.2.2.1.1.3**, the 2017 Safe Storage PEA evaluated the effects of lake water quality during Stabilization and SWS activities.

Dose to ecological receptors at the outfall, Frenchman's Bay and forebay were calculated in the 2017 Safe Storage PEA and 2022 PEA Addendum – all doses to aquatic receptors including fish were below the aquatic dose benchmark of 9.6 mGy/d. No non-radiological constituents were identified that exceeded screening levels and required further quantitative assessment. The 2017 Safe Storage PEA and 2022 PEA Addendum remain bounding for Stabilization and SWS and no further assessment of effects on fish and fish habitat is required.

5.3.1.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess risk reduction and removal activities. As outlined in **Section 3.3.4**, OPG plans to initiate risk reduction and removal activities, which will include dismantling and demolishing of certain non-nuclear systems and outbuildings associated with PNGS Units 1-4.

The primary concern for aquatic habitats during dismantling activities is the potential release of contaminants into surface water. For example, residue from tanks could leak during the segmenting process. However, OPG's spill management protocols effectively mitigate this risk by ensuring all dismantling activities occur in controlled areas with proper containment systems and implementing practices to prevent any release of contaminants. By adhering to these precautions, OPG expects the impact on fish and their habitats from risk reduction and removal activities and dismantle/demolish activities during this licensing period to be negligible. As such, no further assessment is warranted in the PERA.

5.3.1.2 PNGS Units 5-8 Refurbishment

The construction of the intake structure as well as shoreline modifications including a potential dock, possible infill and erosion mitigation areas, and disposal of material during the Project are the main activities that will interact with the aquatic environment during refurbishment. Placement of the potential lake infill and dock structure will alter the conditions in the nearshore of Lake Ontario. Additionally, construction of the DWI will result in removal of lake bottom aquatic habitat within the construction footprint.

The modernized federal Fisheries Act provides two core prohibitions related to fish and fish habitat protection: a prohibition against persons carrying out works, undertakings, or activities that result in the death of fish by means other than fishing (subsection 34.4(1)), and a prohibition against persons carrying out works, undertakings, or activities that result in the

harmful alteration, disruption, or destruction (HADD) of fish habitat (subsection 35(1)) (Government of Canada, 2019). The modernized federal Fisheries Act includes a more comprehensive definition of fish habitat under subsection 2(1): “water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes”. The types of areas that can directly or indirectly support life processes include, but are not limited to, spawning grounds and nursery, rearing, food supply, and migration areas.

Given that the proposed DWI, west infill, and shoreline erosion mitigation areas provide potential fish habitat for certain species in Lake Ontario (refer to **Section 4.3.1** for details), project activities may result in HADD of aquatic habitat in these areas. Although designs are still being developed, preliminary estimates indicate that the DWI intake cap construction area may have a footprint of approximately 2.5Ha (2,500 m²) and navigational channel and effect from the bridge may have a footprint of approximately 4.8 ha (48,000 m²). Potential modifications to the west infill area, including cutoff wall, bridge structures, forebay channel dredging, permanent intake cap structure, lake infilling, dock construction, and supporting structures such as a seawall, are expected to cover roughly 13.5 ha (13,500 m²). Similarly, the total area impacted by lake infilling in the east shoreline erosion mitigation area is estimated to be approximately 4 ha (40,000 m²). These values have been conservatively derived based on the maximum potential extent of disruption, and final assessments may yield different estimates as designs are refined.

The modernized federal Fisheries Act also includes a prohibition against the deposit of deleterious substances of any type in water frequented by fish (subsection 36(3)) (Government of Canada 2019), which is administered by Environment and Climate Change Canada. In accordance with this regulation, OPG is currently evaluating various spoil management options to develop a comprehensive spoil management plan and minimize environmental impacts. Preliminary plans indicating that much of the rock will be disposed of in a lake infill, near-surface materials sent for inland disposal, and overburden materials disposed of in open aquatic areas. OPG is working with Indigenous Nations and communities to gather input and identify the best disposal options and mitigation measures.

To minimize the mobilization of suspended materials into the water, an Erosion and Sediment Control Plan will be developed, focusing on reducing sedimentation during all phases of the project. Measures include conducting in-water works in isolation of open or flowing water to reduce sediment introduction into the watercourse, regular inspection and maintenance of erosion controls, monitoring for signs of sedimentation, and ensuring the proper disposal of dredged materials. Similarly, a spill response plan will also be implemented to prevent spills of deleterious substances. This includes measures such as planning activities to ensure chemicals such as paints, solvents, and fuels do not enter the watercourse. Machinery used will be maintained in a clean condition to avoid fluid leaks, and an emergency spill kit will be on site during operations. Any spills will be contained, cleaned up, and disposed of properly to prevent further impact to the watercourse.

A Fisheries Act Authorization Application will be required for these works as they are affecting potential fish habitat. When death of fish or a HADD of fish habitat cannot be avoided or mitigated, an authorization under subsections 34.4(2) and 35(2), respectively, may be provided by the Minister of Fisheries and Oceans with the provision of appropriate offsetting of residual adverse effects.

Therefore, the habitat type lost, as well as the type of disturbance, and potential changes to habitat quality, resulting from the construction of the proposed DWI and associated structures such as the west infill area, shoreline erosion mitigation area, and dock are further evaluated in the Tier 2 Assessment.

5.3.1.1.3 PNGS Units 5-8 Continued Operation

Following refurbishment, continued operation of PNGS Units 5-8 is not expected to result in further loss of aquatic habitat. The DWI will be used to draw water into the station, and all other operations will be bounded by previous operational conditions (with 6 operating units). As such, no further assessment is warranted in the PERA for continued operations.

5.3.2 Impingement and Entrainment

5.3.2.1.1 PNGS Units 1-4 Decommissioning

5.3.2.1.1.1 Stabilization and Storage with Surveillance

The 2017 Safe Storage PEA and 2022 PEA Addendum assumed that the PN water balance will change in a stepwise manner during the Stabilization Phase, from its previous operational configuration (6 operating units) to its configuration during the SWS Phase (PNGS Units 1 and 4, and PNGS Units 5-8 shut down). Based on current Project planning, PNGS Units 1 and 4 were shut down in Q4 2024 and have entered stabilization, and PNGS Units 5-8 will continue to operate until the end of 2026 after which they will enter refurbishment (see **Section 5.2.1.2**). A minimum of 2 CCW pumps (see **Figure 5-3**) will be available to support PNGS Units 1 and 4 Stabilization activities. Given that this is considerably lower than the flow volumes under previous operational conditions (with 6 operating units) and is expected to result in a corresponding decrease in intake velocities, impingement and entrainment is also expected to be reduced accordingly in this phase. As the FDS is expected to remain in place during the Stabilization phase, the assumptions of the 2017 Safe Storage PEA and 2022 PEA Addendum remain bounding, and no further assessment is required. The 2022 PEA Addendum assumed a CCW intake flow rate of 250,500 m³/day during the SWS Phase, an update from the 50,000 m³/day estimate in the 2017 Safe Storage PEA. The velocity associated with the reduced flow relative to operational conditions was calculated in the forebay modelling update for the 2022 PEA Addendum to be a maximum of 11.5 mm/s. This maximum velocity is below the threshold established by the US EPA, which states that impingement is not considered an issue if intake water velocity is less than 0.5 fps (150 mm/s; US EPA, 2014). This value was derived from swim speed studies which demonstrated that an intake velocity of 0.5 fps or lower results in a 96% or greater reduction in impingement mortality for most species. Furthermore, the maximum velocity remains less than the mean swim speed of pertinent local fish species considered in the

2022 PN ERA, which range from 221 mm/s for Northern Pike to 3,612 mm/s for White Sucker. Therefore, impingement rates will decrease because of the significant reduction in flow volume into the station.

The proposed flow during the SWS Phase when cooling requirements are reduced will be 2.9 m³/s, which is less than the flow of 5.5 m³/s identified as the volume of flow where entrainment may be of concern (US EPA, 2014). Therefore, entrainment will be negligible during SWS. There are a few deviations in assumptions between the 2022 PEA Addendum and current project planning. In the 2022 PEA Addendum, it was assumed the FDS would be removed during SWS. Based on current Project planning, the FDS will not be removed until the DWI is operational, and may remain in place even afterward as necessary. This would further reduce impingement and entrainment rates relative to the 2022 estimate. The 2022 PEA Addendum also assumed that PNGS Units 5-8 would be permanently shut down by 2026, while current project planning anticipates the refurbishment of these units beginning in 2026. As a result, there is expected to be some overlap of the SWS phase of PNGS Units 1-4 with the refurbishment/operations phase of PNGS Units 5-8. When PNGS Units 1-4 is in SWS and PNGS Units 5-8 is in the Refurbishment/Operations phase, the previous operational conditions (for 6 operating units) are assumed to be bounding (see **Section 5.3.2.1.2**). Therefore, no further assessment is conducted in this PERA.

5.3.2.1.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess the dismantling and demolishing of buildings and structures. As outlined in **Section 3.3.4**, OPG plans to dismantle certain non-nuclear systems and outbuildings associated with PNGS Units 1-4. The activities associated with dismantling and demolishing will not impact impingement and entrainment of fish; therefore, no further assessment is conducted in this PERA.

5.3.2.1.2 PNGS Units 5-8 Refurbishment

The main activity to interact with impingement and entrainment is the DWI. The DWI is planned to be operational by 2030. A preliminary evaluation of the change in impingement and entrainment levels resulting from the change in depth and design associated with the proposed DWI was conducted in 2024. The analysis compared impingement and entrainment levels at the existing shoreline intake at PNGS to those at the offshore intake at DNGS, as well as the estimated levels for the proposed DWI intake at PNGS. Initial estimates suggested that entrainment will be reduced by 60% following the change in intake location at PNGS. This value was derived from a similar assessment for the offshore intake at DNGS which estimated a baseline entrainment reduction of 60% relative to the onshore one because larval tow data from Lake Ontario indicated that larval abundance decreases with increasing depth (OPG, 2013b). Specifically, 44% of larvae captured in the area were located at approximately 5 m depth, with the majority being collected in waters less than 15 m in depth. Given that the DWI at PNGS is expected to be at a similar depth as the one at DNGS, a comparable reduction in entrainment is expected occur at PNGS. However, there is uncertainty in this estimate, and an entrainment monitoring program is planned for 2024-2025 to substantiate the value.

Similarly, the DWI is expected to result in an 89% reduction in impingement compared to levels prior to the implementation of any mitigation measures such as the FDS. This reduction is primarily due to two factors. First, deeper waters have lower fish productivity and are predominantly inhabited by larger-bodied fish, thereby reducing the number of fish susceptible to impingement. The second reason is due to the adoption of a porous veneer intake structure, flush with the lake bottom, similar to the intake structure at DNGS. A recent Best Available Techniques and Technology Economically Achievable (BATEA) assessment of different intake technologies and techniques showed that an enhanced porous veneer intake has the potential to significantly reduce I&E compared to other intake designs currently used in the Great Lakes watershed by preventing the entrapment of large fish schools.

Additional design modifications aimed at reducing impingement and entrainment, similar to those incorporated into the DNNP Intake Structure (OPG, 2013b) and the existing porous veneer intake at DNGS (Black & Veatch, 2024), are also being considered for the DWI at PNGS. These include modifications to optimize approach velocity and slot spacing to further reduce impingement (>89%) and entrainment (>60%). For example, a 15 cm/s approach velocity will not exclude larval fish based on operating experience (OPEX) and scientific literature, but will serve to reduce impingement. An approach velocity closer to 6-7 cm/s would minimize entrainment, while further reducing impingement. It should be noted that even an approach velocity as low as 6 cm/s would not effectively exclude entrained fish eggs or recently hatched yolk-sac larvae, the latter of which have limited swimming speed capabilities. However, several measures can be implemented to reduce these impacts. These include fine mesh screens (e.g., ≤2 mm) such as cylindrical wedge-wire screen structure, traveling screens, or specialized fish protection systems such as Geiger Multidisc or Hydrolox (Patrick et al., 2018). Narrow slot spacing of wedge-wire screens would result in reduced fish passage. Operational modifications, such as reducing intake flow during periods of peak entrainment, also serve as potential mitigation strategies. Furthermore, the proposed DWI is strategically located at a depth where the presence of eggs and early life stages of key species, such as Round Whitefish and Lake Trout, is unlikely, further minimizing entrainment risks. The specific approach velocity and screen size of the DWI structure, along with the methods to achieve them, are currently being determined.

While the DWI is under construction, PNGS Units 5-8 will be shut down in preparation for refurbishment. During this time, station requirements for cooling water will be substantially reduced relative to previous operational conditions (with 6 operating units), resulting in lower impingement and entrainment rates. The FDS will also continue to remain in place. As such, existing impingement and entrainment rates, as evaluated in the 2022 PN ERA, remain bounding. Once the DWI is in use a cut-off wall will be installed in the intake-forebay channel, as it will no longer be needed to supply water to the station; however, the cut-off wall will have small holes to allow for minimal exchange flow through the wall into the forebay. Current estimates suggest that the maximum flow into the forebay will be 5,395 L/s, with the potential to

be reduced to 600 L/s, both of which are considerably lower than the current flow rate (192,000-217,000 L/s).

The reduction in intake flow during Refurbishment, as well as a corresponding decrease in intake velocity, is expected to result in a proportional reduction in impingement and entrainment during this phase. Given that the flow is over the wide forebay, the velocity of the water may allow fish to escape the water flow, further reducing impingement counts. Additionally, the cut-off wall estimated flow rates into the forebay are below 5.5 m³/s (5500 L/s), which is identified as the volume of flow where entrainment may be of concern (US EPA, 2014). However, the flow volumes still exceed 125 L/s, the threshold beyond which facilities require impingement and entrainment monitoring unless mitigation measures consistent with the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline (CSA, 2018) are implemented. As such, the FDS will remain operational as necessary. Since the water flowing through the cut-off wall into the forebay may serve as an emergency service water supply to the station, an application for a FAA may be required for its operation following the expiry of the current FAA in 2028 as the flow volumes exceed 125 L/s. OPG may seek approval from the DFO to discontinue the use of the FDS in the future, provided such a decision is deemed feasible and adequately justified.

The intake flow rate through the DWI during the Refurbishment phase (see **Figure 5-4**), is estimated to be approximately 23.7 m³/s (23,700 L/s). Consequently, the reduction in flow rate and intake velocity due to decreased station requirements for cooling water during Refurbishment is expected to result in lower impingement and entrainment rates.

Overall, given the lower intake flow rate and velocity, optimized intake design features, and lower abundance of ichthyoplankton and fish at deeper depths, impingement and entrainment rates are expected to be substantially reduced following construction of the DWI. Accordingly, no further assessment is conducted in this PERA.

5.3.2.1.3 PNGS Units 5-8 Continued Operations

Following refurbishment, continued operation of PNGS Units 5-8 and the DWI is expected to result in reduced impingement and entrainment compared to previous operational conditions (for 6 operating units) as discussed in **Section 5.3.2.1.2**. The reduction of impingement and entrainment will be confirmed through ongoing monitoring programs. As such no further assessment is warranted in the PERA for continued operations.

5.3.3 Thermal Effects

5.3.3.1 PNGS Units 1-4 Decommissioning

5.3.3.1.1 Stabilization and Storage with Surveillance

Consistent with the 2017 Safe Storage PEA and 2022 PEA Addendum, during Stabilization and SWS, as CCW pumps are shut down in a step-wise manner, the temperature difference between the water intake temperature and the CCW discharge temperature will be reduced. Units 1 and 4 were permanently shut down in Q4 of 2024, with a three-month interval between them. This

phased shutdown strategy mitigated the risk of cold shock, which can result from a sudden and simultaneous reduction in discharge temperatures. In general, the lake near the PNGS Units 1-4 discharge will be returned to a thermal condition that is more normal for the nearshore zone of Lake Ontario. Whereas the warmed waters in the current operating condition have attracted certain fish species to the discharge (e.g., Smallmouth Bass), and have enhanced aquatic productivity near the discharge, the cooler waters after shutdown will offer thermal habitat more similar to the regional nearshore zone. The findings in the 2017 Safe Storage PEA and 2022 PEA Addendum continue to remain valid; therefore, no further assessment is conducted in this PERA.

5.3.3.1.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess the dismantling and demolishing of buildings and structures. As outlined in **Section 3.3.4**, OPG plans to dismantle certain non-nuclear systems and outbuildings associated with PNGS Units 1-4 during SWS phase. The activities associated with dismantling and demolishing will not impact the thermal regime in the nearshore of Lake Ontario; therefore, no further assessment is conducted in this PERA.

5.3.3.1.2 PNGS Units 5-8 Refurbishment

In preparation for Refurbishment, PNGS Units 5-8 will be shutdown in 2026. To minimize cold shock-induced stress in fish caused by a sudden drop in discharge temperatures, shutdown of the units is planned to be staggered to facilitate a gradual reduction in thermal discharge temperatures. Each unit requires 48 hours for a complete shutdown. Once PNGS Units 5-8 are shutdown, water temperatures in the lake near the discharge will more closely resemble natural conditions.

During refurbishment, the DWI will be constructed and become operational by 2030. Once the DWI is in use, a cut-off wall will be installed in the intake channel, as it will no longer be needed to supply water to the station. The existing PNGS Units 5-8 CCW discharge channel will still be used. The DWI will be situated approximately 1.5 km offshore at an approximate depth between 10.5-12 m. Thermal profiles generated from temperature data collected during the macrozooplankton and deepwater fish community studies indicate that the temperature at the depth proposed for the DWI (between 10.5 - 12 m) is 3-5°C lower than at the surface water. OPG monitors temperature daily at the intake and discharge. For the past 5 years of monitoring, intake temperatures ranged from approximately 5°C in winter to greater than 20°C in summer. Since intake temperatures through the DWI are expected to be up to 3-5°C colder (depending on the season) than through the existing intake channel, average water temperature in the discharge channel is expected to be the same or lower than that currently observed.

The potential changes to the thermal plume resulting from the relocation of the intake, and its impacts on indicator fish species, will be quantitatively evaluated in the Tier 2 assessment.

5.3.3.1.3 PNGS Units 5-8 Continued Operations

Following refurbishment, continued operation of PNGS Units 5-8 and the DWI is expected to result in thermal effects that are either comparable to or lower than those observed under previous operational conditions (with 6 operating units as assessed in the 2022 PN ERA) as discussed in **Section 5.3.3.1.2**. Future monitoring of intake and discharge temperatures will confirm any resulting changes in the thermal plume. However, to assess potential future impacts on the thermal plume from PNGS, particularly in the context of climate change, the potential effluent temperatures following DWI construction and implementation will be evaluated in the Tier 2 assessment.

5.3.4 Summary of Tier 1 Assessment

The initial screening of potential effects of Project activities on the aquatic environment included consideration of fish and fish habitat, impingement and entrainment, and thermal effects. The predicted interactions between the surface water environment and Project activities are summarized in **Table 5-20**.

Table 5-20: Summary of Interactions between Project Activities and Aquatic Environment

Project Activities	Fish and Fish Habitat	Impingement and Entrainment	Thermal Effects
PNGS Units 1-4 Decommissioning			
PNGS Units 1 and 4 Stabilization	2017 Safe Storage PEA and 2022 PEA Addendum is bounding	2017 Safe Storage PEA and 2022 PEA Addendum is bounding.	2017 Safe Storage PEA and 2022 PEA Addendum is bounding. <ul style="list-style-type: none"> PNGS Units 1 and 4 were permanently shut down in Q4 2024, with a three-month interval between them to prevent cold shock.
PNGS Units 1-4 Storage with Surveillance	2017 Safe Storage PEA and 2022 PEA Addendum is bounding	2022 PEA Addendum is bounding. <ul style="list-style-type: none"> The 2022 PEA Addendum assumed an intake flow rate of 250,000 m³/day, an increase from the 2017 PEA. The updated flow rate and velocity result in negligible impingement and entrainment. The 2022 PEA Addendum assumed that the FDS would be removed. The 	2017 Safe Storage PEA and 2022 PEA Addendum is bounding.

PREDICTIVE ENVIRONMENTAL RISK ASSESSMENT FOR PICKERING REFURBISHMENT,
DECOMMISSIONING, AND CONTINUED OPERATIONS

Tier 1 Qualitative Assessment

Project Activities	Fish and Fish Habitat	Impingement and Entrainment	Thermal Effects
		continued use of the FDS will further reduce impingement and entrainment.	
Risk Reduction and Removal Activities (2025-2033) Dismantle/Demolish (2034-2037)	Not assessed in 2017 Safe Storage PEA or 2022 PEA Addendum • No interaction.	Not assessed in 2017 Safe Storage PEA or 2022 PEA Addendum • No interaction.	Not assessed in 2017 Safe Storage PEA or 2022 PEA Addendum • No interaction
PNGS Units 5-8 Refurbishment			
<i>Preparation for Refurbishment</i>			
<ul style="list-style-type: none"> Procurement and Mobilization of Equipment and Components 	No interaction	As PNGS Units 5-8 will be shutdown in 2026 in preparation for refurbishment, impingement and entrainment are expected to be lower than previous operational conditions. FDS will remain in place. 2022 PN ERA is bounding.	PNGS Units 5-8 will be shutdown in a staggered manner to gradually reduce the temperature differential between the effluent and ambient waters. This will reduce likelihood of cold shock and return the lake water temperatures to natural conditions.
<ul style="list-style-type: none"> Relocation/Removal/Construction of Buildings, Structures, and Equipment 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Construction of PCSS and SB #5 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Defuel and Dewater 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Islanding the Unit 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Management of Heavy Water 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Construction of DWI 	Construction of DWI and associated nearshore modifications (shoreline erosion mitigation area, west infill area, and dock) is expected to result in habitat loss and changes to habitat quality. Potential effects will be quantitatively evaluated in the Tier 2 assessment.	No interaction	No interaction
<i>Refurbishment</i>			
<ul style="list-style-type: none"> Replacement of Reactor Components 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Removal and Replacement of Steam Generators 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Operation of DWI 	Once construction is complete, DWI will be used for water intake. No further loss of habitat is expected.	Cut-off wall will be installed at the current nearshore intake. Flows and velocity through wall will be considerably	Once the DWI is operational, discharge temperatures are expected to be similar to or lower than existing discharge temperatures.

PREDICTIVE ENVIRONMENTAL RISK ASSESSMENT FOR PICKERING REFURBISHMENT,
DECOMMISSIONING, AND CONTINUED OPERATIONS

Tier 1 Qualitative Assessment

Project Activities	Fish and Fish Habitat	Impingement and Entrainment	Thermal Effects
	2022 PN ERA is bounding.	<p>lower, resulting in reduced impingement and entrainment. FDS to remain in place as necessary. 2022 PN ERA is bounding.</p> <p>Impingement and entrainment rates are expected to be substantially reduced by the DWI due to lower intake flow rate and velocity, optimized intake design features, and lower abundance of ichthyoplankton and fish at deeper depths.</p>	Potential thermal effects from this change will be quantitatively evaluated in the Tier 2 assessment.
<ul style="list-style-type: none"> Refurbishment of Other Plant Systems 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Waste Management and Transportation 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Refuelling and Restarting 	No interaction	No interaction	No interaction
Continued Operations			
<ul style="list-style-type: none"> Operation and Maintenance of PNGS Units 5-8 	The DWI will be used to draw water into the station, and all other operations will be bounded by previous operational conditions.	The continued operation of the DWI is expected to result in reduced impingement and entrainment compared to previous operational conditions (for 6 operating units).	The continued operation of the DWI is expected to result in thermal effects that are lower than or similar to previous operational conditions (for 6 operating units). However, potential impacts of climate change on the thermal plume during continued operations are evaluated in the Tier 2 assessment.
<ul style="list-style-type: none"> Waste Management and Transportation 	No interaction	No interaction	No interaction

5.4 Geological and Hydrogeological Environment

5.4.1 Soil

5.4.1.1 PNGS Units 1-4 Decommissioning

5.4.1.1.1 Stabilization and Storage with Surveillance

Non-Radiological Constituents

As outlined in the 2017 Safe Storage PEA and 2022 PEA Addendum, soil quality beyond the protected area is expected to remain consistent with previous operational conditions (for 6 operating units). This finding continues to remain valid for Stabilization and SWS; therefore, no further assessment is conducted in this PERA.

Radiological Constituents

As indicated in the 2017 Safe Storage PEA and 2022 PEA Addendum and summarized in **Section 5.1.1.1.1**, tritium will be released to the atmospheric environment during reactor dewatering and draining during the Stabilization Phase. It was concluded that previous operational conditions (for 6 operating units) are bounding of atmospheric tritium emissions during the Stabilization Phase. Additionally, tritium emissions during SWS will be even lower. As atmospheric deposition is the primary transport mechanism by which radionuclides are deposited to soils within and surrounding the PN site, tritium concentrations in soil (pore water) are expected to decrease over time following the reduction of atmospheric emissions and as natural decay of tritium currently present in soil occurs. These findings continue to remain valid for Stabilization and SWS; therefore, no further assessment is conducted in this PERA.

The 2022 PEA Addendum identified that approximately 1,500 Mg of heavy water will be transported to the DN site for storage near the end of the Stabilization Phase. The transfer of heavy water to the DN site may result in additional releases of tritium to air. However, PN currently transports heavy water to Darlington on a routine basis to modulate the concentration of tritium in the heavy water inventory. OPG will continue to use existing processes and practices of transporting heavy water, and the frequency for transporting heavy water will be bounded by previous operational conditions (for 6 operating units). The findings from the 2022 PEA Addendum continue to remain valid for Stabilization and SWS; therefore, no further assessment is conducted in this PERA.

5.4.1.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess risk reduction and removal activities or the dismantling and demolishing of buildings and structures. As identified in **Section 3.3.4**, during the 2025 to 2033 timeframe OPG will initiate some risk reduction and removal activities, which will include dismantling of non-nuclear systems and outbuildings. More specifically PE-A (Groups A-1 and A-2) includes dismantling and removal of end-stated and abandoned/retired structures within the PNGS Units 1-4 protected area, excluding the main

powerhouse structure; and PE-B (Groups B-1 and B-2) includes the dismantling and removal of non-nuclear SSCs that are located within the TH and TAB.

From 2034 to 2037, OPG plans to execute PE-A (Group A-3) which includes complete removal of non-nuclear outbuildings, as identified in **Figure 3-7**.

Most of the waste generated from the dismantled/demolished buildings and structures will be conventional waste, disposed of at approved conventional disposal facilities. Interim storage of conventional waste is not planned; therefore, soil is unlikely to be impacted.

Non-Radiological Constituents

Clearing the work area and accessing the structures involve vehicle movement, lifting and removing structures, which may release non-radiological emissions that could deposit on local soil. Dismantling and/or segmenting larger tanks and water lines may emit particles or fumes from the grinding work, but this work would occur indoors with adequate ventilation.

Spills to soil could potentially occur from ineffective capping of existing pipework, especially the CCW lines, but this risk is expected to be mitigated by planning for containment pre-dismantling. OPG will use existing spill recovery equipment and spill management procedures during decommissioning activities, with appropriate precautions to reduce risk. Overall, the risk of spills is considered negligible due to the presence of paved areas and secondary containment structures that are designed to prevent releases to the environment.

OPG will follow best construction practices and implement an Environmental Management Plan for dismantling and demolition activities. The Decommissioning Phase Work Plan will include protocols for dust suppression to mitigate the release of particulates and dust that could deposit onto nearby soil surfaces. Vehicle traffic for transporting dismantled material off-site is expected to be similar to or marginally higher than current traffic levels at the PN site; overall, any small increase in traffic volume is considered negligible.

Overall, OPG's Environmental Management Plan is considered sufficient to mitigate negligible impacts to soil quality, and no further quantitative assessment is warranted in this PERA.

Radiological Constituents

No radiological atmospheric emissions to the environment are expected during the dismantling and demolition activities. Other than the removal of frames and baskets from IFB-A and AIFB, none of the dismantled equipment will be from radiological systems or systems that are likely to be radiologically contaminated. All waste will be radiologically surveyed before transportation and disposal, utilizing current best practices and operating in accordance with OPG's existing procedures for waste removal. The risk to soil quality from radiological contamination during dismantling/demolition is considered adequately mitigated, and no further quantitative assessment is warranted in this PERA.

5.4.1.2 PNGS Units 5-8 Refurbishment

Refurbishment activities identified as having a potential interaction with soil quality are related to the preparation of the site and facilities for refurbishment.

Non-Radiological Constituents

During preparation for refurbishment there may be interactions with soil quality due to construction of parking and laydown areas, set up of temporary construction facilities, construction of buildings including waste storage buildings at the NSS-PWMF. These buildings/areas are located in paved or gravel areas, and no change to soil quality is expected due to any site or refurbishment preparation activities. This is consistent with the conclusions of the Pickering B Refurbishment EA (SENES, 2007). Furthermore, the 2003 PWMF Phase II EA did not identify any soil issues that would require consideration for the redistribution of soil within the NSS-PWMF area (OPG, 2003).

Activities associated with the construction of the PCSS for the storage of low and intermediate-level refurbishment waste were assessed as part of the PCSS PERA (Ecometrix, 2024). The PCSS PERA did not identify any activities that would pose a risk to soil quality that are not sufficiently mitigated by construction best practices, the implementation of an Environmental Management Plan, and/or the adherence to existing OPG policies and procedures for environmental protection and management. The activities associated with construction of the RFRISA or other buildings that will be constructed to support the Project are expected to be similar to those assessed for construction of the PCSS, and soil quality impacts are similarly considered sufficiently mitigated.

Construction is planned for DSC Storage Building #5 in the NSS-PWMF Phase II Site for future storage of used fuel, with a planned in-service date of Q3 2027. Assessment of the construction of additional DSC storage buildings was completed as part of the Pickering B Refurbishment EA.

The Pickering B Refurbishment EA did not assess the construction of the proposed DWI and any associated shoreline modifications, including construction of a dock, infilling and disposal of generated waste materials. The 2009 DNNP EIS is used for comparison purposes since the construction of a deepwater intake and discharge structures was assessed as part of general excavation and grading activities for the DNNP (SENES & MMM, 2009). Overall, shoreline and marine works were found not to affect soil quality and were not assessed further (SENES & MMM, 2009). The construction of the DWI and associated works for PNGS Units 5-8 Refurbishment are expected to be similar to those assessed in the 2009 DNNP EIS, and are not expected to result in impacts to soil quality at the PN site.

Considering the above, the assessment of soil quality is considered sufficiently mitigated by current construction best practices and OPG's existing environmental protection procedures. Thus, no further quantitative assessment of non-radiological soil quality is required for this PERA.

Radiological Constituents

As described in **Section 3.1.1**, the reactors will be defueled and dewatered during preparation for refurbishment. During reactor dewatering there may be atmospheric emissions of radionuclides; however, emissions at this time are expected to be below those of previous operational conditions (for 6 operating units). This reduction in emissions is described in the 2017 Safe Storage PEA that demonstrates that tritium emissions from PNGS Unit 2 and Unit 3 during dewatering and drying activities were substantially lower compared to operational units. A similar decrease in other radionuclides such as noble gases, particulates, radioiodines, and carbon-14 is expected. The reduction in atmospheric radionuclide emissions is expected to result in a decrease in the deposition of radionuclides to soil. Additionally, soil quality is expected to gradually improve over time as natural decay of deposited radionuclides occurs. Thus, the radiological soil quality condition as assessed in the 2022 PN ERA and the more recent 2024 soil data (see **Section 4.4.1.1**) is considered bounding for PNGS Units 5-8 Refurbishment. Furthermore, during refurbishment, OPG will rely on lessons learned from the PNGS Units 1-4 Stabilization Phase, as well as the refurbishment of DN to ensure that radiological emissions (and their deposition to soil) are minimized and maintained As Low as Reasonably Achievable (ALARA).

During the times when there will be openings in containment (i.e., specially prepared and approved openings in the reactor building dome for steam generator removal and replacement, or open airlocks), procedures will be in place to control and minimize radioactive releases to the environment. It is assumed that any concrete cutting will be done with wet methods (i.e., hydrojet cutting) and will have spray drift covers, thus ensuring that dust emissions and deposition to soil are minimal.

No radiological materials are associated with construction of the proposed DWI, and thus no radiological impacts to soil quality are expected.

Overall, any risk to soil quality resulting from potential radiological contamination during PNGS Units 5-8 Refurbishment is bounded by the 2022 PN ERA, and is considered sufficiently mitigated by OPG's existing policies and procedures for environmental protection and management. No further quantitative analysis is warranted in this PERA.

5.4.1.3 PNGS Units 5-8 Continued Operations

Once PNGS Units 5-8 refurbishment activities are complete and the remaining reactors re-enter normal operations, chemical and radiological emissions from the PN site are expected to resume. Since the number of operating units will be reduced to 4, it is anticipated that chemical and radiological emissions post-refurbishment would be similar to or lower than previous operational conditions assessed in the 2022 PN ERA with 6 operating units. Thus, any human health and ecological impacts resulting from the release and deposition of chemical and radiological materials to soil post-refurbishment would be bounded by the results of the 2022 PN ERA and are not assessed further in this PERA.

During Continued Operations of PNGS Units 5-8, activities associated with PNGS Units 1-4 SWS and dismantle/demolish will be occurring. PNGS Units 1-4 SWS and dismantle/demolish have already been determined to have minimal interaction with soil quality (see **Section 5.4.1.1**), so no further discussion is warranted.

5.4.2 Groundwater

5.4.2.1 Groundwater Quantity and Flow

5.4.2.1.1 PNGS Units 1-4 Decommissioning

5.4.2.1.1.1 Stabilization and Storage with Surveillance

Groundwater flow at PNGS is significantly influenced by the inactive TAB foundation drainage system located beneath the deep building foundations. The drainage system has locally lowered groundwater levels below the level of Lake Ontario, creating a hydraulic sink that captures groundwater beneath and immediately adjacent to the PNGS reactor buildings. Groundwater from the TAB foundation drains and VBRS sumps flows, ultimately discharged to the forebay via pumping.

During Stabilization and SWS, the groundwater flow regime is not expected to change substantially as the existing drainage systems are expected to remain operational. The 2017 Safe Storage PEA assumed that discharges from the TAB foundation drains and the VBRS would be routed to the RLWMS. However, in the 2022 PEA Addendum, this assumption was updated to assess the continued discharge of groundwater from the TAB foundation drains and VBRS to the CCW intake ducts, eventually reaching the forebay. The assumption in the 2022 PEA Addendum is still valid.

The forebay was assessed as a habitat for aquatic and riparian ecological receptors during SWS, with loadings contributing to the forebay from stormwater and the additional tritium contribution from groundwater collected in the TAB foundation IAD sumps on the PNGS Units 1-4 side and the VBRS. Based on the modelling results in the 2022 PEA Addendum, there were no potential adverse effects identified. All doses to the receptors assessed were below the aquatic benchmark of 9.6 mGy/d or the terrestrial benchmark of 2.4 mGy/d (Ecometrix, 2023b).

The 2022 PEA Addendum remains bounding of the planned Stabilization and SWS activities for PNGS Units 1-4, and no further assessment of these activities is warranted in this PERA.

5.4.2.1.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess the risk reduction and removal activities or the dismantling and demolition of buildings and structures. However, it is not expected that risk reduction and removal activities and/or dismantling and demolition activities would disrupt the quantity and flow of groundwater at the PN site. All drainage systems, including stormwater runoff, sewer, and active and inactive drainage systems will remain operational to the extent necessary to meet operational and regulatory requirements. Some excavation of underground piping and utilities may be necessary; it is expected that all

excavation activities will follow construction best practices and will adhere to the Environmental Management Plan. Dewatering of groundwater is not expected during excavation activities. However, if dewatering is needed, it will only be done with necessary permissions, intended to be protective against the discharge or re-infiltration of collected groundwater.

In general, the risk of impacts to groundwater flow during the planned risk reduction and removal activities and dismantling and demolition activities is considered negligible, and no further quantitative assessment is warranted in this PERA.

5.4.2.1.2 PNGS Units 5-8 Refurbishment

As noted in **Table 5-1**, certain activities related to PNGS Units 5-8 refurbishment are expected to interact with the groundwater flow component of the PN site. These activities include the relocation, removal, and construction of buildings (i.e., RFRISA), structures, and equipment, in addition to the construction of the PCSS and SB #5.

As described in **Section 3.1.1.2**, some structures and equipment within the PNGS Protected Area will need to be temporarily relocated or removed to accommodate the large crane. Additional structures may need to be temporarily relocated or removed to allow for the movement of refurbishment equipment, system components and waste materials through the station. Most of this work is not expected to require excavation at depths that would intersect with the groundwater at the site. In cases where excavation and dewatering are required, it will only be done with necessary permissions, intended to be protective against the discharge or re-infiltration of collected groundwater.

It is likely that site preparation will include the hardening of surfaces by grading, paving and constructing buildings and laydown areas, potentially increasing runoff and reducing infiltration to the underlying Upper Till aquifer. However, paving a relatively small portion of the PN site for any proposed buildings or laydown areas will not measurably affect local shallow groundwater recharge enough to cause any significant change in local groundwater flow (SENES, 2007).

As part of preparation for refurbishment, a number of buildings will need to be constructed including the PCSS, SB #5, and the RFRISA, among others (see **Section 3.1.1.2** and **3.1.1.3**).

The PCSS PERA (Ecometrix, 2024) concluded there would be no expected impacts to groundwater quantity and flow from construction and operation of the PCSS. Dewatering during excavation would be completed with the necessary permissions following MECP regulations intended to be protective against discharge or re-infiltration of collected groundwater. The activities associated with construction of the RFRISA or other planned buildings are expected to be similar to those assessed for construction of the PCSS, and groundwater flow impacts are similarly considered sufficiently mitigated. Similar to the PCSS, any dewatering required during construction of the RFRISA would be completed with the necessary permissions following applicable MECP regulations (i.e., water takings over 50,000 L/d require the project to register under the Environmental Activity and Sector Registry, intended to be protective against the discharge or re-infiltration of collected groundwater). A geotechnical investigation will be

completed to determine if dewatering is required for any buildings that will be constructed on the PN site. Overall, building construction is not expected to change the groundwater quantity and flow conditions during the Refurbishment Phase.

PNGS Units 5-8 TAB inactive building effluent sumps receive both groundwater and inactive water from the stations' inactive systems. Groundwater flows into the PNGS Units 5-8 TAB inactive building effluent sumps via the TAB foundation drains are relatively low, but these drains act as groundwater level controls to keep groundwater from entering the lower levels of the powerhouses (SENES, 2007). The 2022 PEA Addendum concluded that groundwater discharges from the TAB foundation drains would continue to be routed to CCW intake ducts, eventually reaching the forebay (Ecometrix, 2023b); this assumption continues to be applicable to reactor shutdown procedures for PNGS Units 5-8 Refurbishment. Overall, the 2022 PEA Addendum concluded there would be no significant changes to groundwater quantity and flow during PNGS Units 5-8 unit shutdowns, and this result remains valid for the planned PNGS Units 5-8 Refurbishment.

5.4.2.1.3 PNGS Units 5-8 Continued Operations

Following refurbishment, PNGS Units 5-8 will operate under conditions similar to previous operations (with 6 operating units). The Continued Operations Phase is not expected to influence groundwater quantity or flow in any way that differs from previous operations at the site. Thus, previous operations (with 6 operating units) remain bounding to PNGS Units 5-8 Continued Operations post-refurbishment and no further assessment of groundwater quantity or flow is required as part of this PERA.

During Continued Operations of PNGS Units 5-8, activities associated with PNGS Units 1-4 SWS and dismantle/demolish will be occurring. During PNGS Units 1-4 SWS and dismantle/demolish groundwater quantity and flow will remain similar to previous operations (with 6 operating units), as discussed in **Section 5.4.2.1**, so no further discussion is warranted.

5.4.2.2 Groundwater Quality

5.4.2.2.1 PNGS Units 1-4 Decommissioning

5.4.2.2.1.1 Stabilization and Storage with Surveillance

As identified in **Section 5.4.2.1.1.1**, during Stabilization and SWS, groundwater from the TAB foundation drains and VBRS sumps will continue to be discharged to the forebay. Assessment of surface water quality in the forebay due to inputs from PNGS including groundwater was assessed in the 2022 PEA Addendum and is also discussed in **Section 5.2.2.1.1.1**. Based on the modelling results in the forebay, there were no potential adverse effects identified for radionuclides and non-radionuclides. All doses to the receptors assessed were below the aquatic benchmark of 9.6 mGy/d or the terrestrial benchmark of 2.4 mGy/d (Ecometrix, 2023b).

The 2022 PEA Addendum remains valid for PNGS Unit 1 and 4 Stabilization and Units 1-4 SWS; thus, no further assessment of groundwater quality is required as part of this PERA.

5.4.2.2.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess risk reduction and removal activities or the dismantling and demolishing of buildings and structures. However, it is not expected that risk reduction and removal activities and dismantling and demolition activities would disrupt groundwater quality at the PN site. During system opening when the risk of spills is highest, precautions will be taken to prevent or minimize the potential for release to the environment. Furthermore, any risk during the planned risk reduction and removal activities and dismantling activities will be mitigated by planning for containment in the event of a spill.

Overall, with respect to radiological groundwater quality, risk reduction and removal activities and dismantling and demolition activities associated with PNGS Units 1-4 Decommissioning are not assessed further in this PERA.

5.4.2.2.2 PNGS Units 5-8 Refurbishment

No refurbishment activities were identified that would impact groundwater quality at the PN site (SENES, 2007). As noted previously, a large portion of the PN site consists of paved and hardened surfaces, limiting infiltration into the underlying groundwater. It is also expected that OPG and all sub-contractors will utilize construction best practices and follow the construction Environmental Management Plan to ensure that all equipment is well maintained and functioning correctly to limit fuel spills and environmental contamination. Spills of any hazardous materials will be sufficiently managed utilizing OPG's existing spill management protocols. Overall, the potential for impacts to groundwater quality resulting from the planned refurbishment activities is considered negligible and is not assessed further in this PERA.

5.4.2.2.3 PNGS Units 5-8 Continued Operations

Consistent with **Section 5.4.1.3**, chemical and radiological emissions from the PN site are expected to resume once PNGS Units 5-8 refurbishment activities are complete and the remaining reactors re-enter normal operations. Since the number of operating units will be reduced to 4, it is anticipated that chemical and radiological emissions post-refurbishment would be similar to or lower than previous operational conditions assessed in the 2022 PN ERA with 6 operating units. Thus, any human health and ecological impacts resulting from the release of chemical and radiological materials to groundwater (via atmospheric deposition) post-refurbishment would be bounded by the results of the 2022 PN ERA and are not assessed further in this PERA.

During Continued Operations of PNGS Units 5-8, activities associated with PNGS Units 1-4 SWS and dismantle/demolish will be occurring. PNGS Units 1-4 SWS and dismantle/demolish have already been determined to have minimal impact on groundwater quality (see **Section 5.4.2.2.1**), so no further discussion is warranted.

5.4.3 Summary of Tier 1 Assessment

The initial screening of potential effects of Project activities on the geological and hydrogeological environment included consideration of soil quality, groundwater flow, and groundwater quality. The predicted interactions between the geological and hydrogeological environment and Project activities are summarized in **Table 5-21**.

Table 5-21: Summary of Interactions between Project Activities and Geological and Hydrogeological Environment

Project Activities	Soil Quality	Groundwater Flow	Groundwater Quality
PNGS Units 1-4 Decommissioning			
PNGS Units 1 and 4 Stabilization	2017 Safe Storage PEA and 2022 PEA Addendum are bounding <ul style="list-style-type: none"> Impacts further mitigated by OPG's existing radiological waste handling procedures 	2022 PEA Addendum is bounding	2022 PEA Addendum is bounding
PNGS Units 1-4 Storage with Surveillance	2017 Safe Storage PEA and 2022 PEA Addendum are bounding <ul style="list-style-type: none"> Impacts further mitigated by OPG's existing radiological waste handling procedures 	2022 PEA Addendum is bounding	2022 PEA Addendum is bounding
Risk Reduction and Removal Activities (2025-2033) Dismantle/Demolish (2034-2037)	Negligible impacts; impacts sufficiently mitigated by OPG's spill management procedures, construction best practices, and implementation of an Environmental Management Plan	Negligible impacts; excavation and dewatering impacts mitigated by construction best practices and adherence to the Environmental Management Plan	Negligible impacts; groundwater quality impacts mitigated by spill prevention and sufficiently planned containment
PNGS Units 5-8 Refurbishment			
<i>Preparation for Refurbishment</i>			
<ul style="list-style-type: none"> Procurement and Mobilization of Equipment and Components 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Relocation/Removal/Construction of Buildings, Structures, and Equipment 	<ul style="list-style-type: none"> Soil impacts limited by gravel and paved surfaces 	2022 PEA Addendum is bounding <ul style="list-style-type: none"> No significant changes to groundwater flow 	No interaction

PREDICTIVE ENVIRONMENTAL RISK ASSESSMENT FOR PICKERING REFURBISHMENT,
DECOMMISSIONING, AND CONTINUED OPERATIONS

Tier 1 Qualitative Assessment

Project Activities	Soil Quality	Groundwater Flow	Groundwater Quality
	<ul style="list-style-type: none"> Further mitigation through construction best practices and OPG's existing environmental protection procedures 	during PNGS Units 5-8 shutdown and refurbishment	
<ul style="list-style-type: none"> Construction of PCSS and SB #5 	PCSS PERA is bounding	PCSS PERA is bounding	No interaction
<ul style="list-style-type: none"> Defuel and Dewater 	No interaction – indirect reduced interaction through reduction in atmospheric radionuclide emissions resulting in decrease in deposition to soil.	No interaction	No interaction
<ul style="list-style-type: none"> Islanding the Unit 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Management of Heavy Water 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Construction of DWI 	No interaction	No interaction	No interaction
<i>Refurbishment</i>			
<ul style="list-style-type: none"> Replacement of Reactor Components 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Removal and Replacement of Steam Generators 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Operation of DWI 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Refurbishment of Other Plant Systems 	No interaction	2022 PEA Addendum is bounding <ul style="list-style-type: none"> No significant changes to groundwater flow during PNGS Units 5-8 shutdown and refurbishment 	No interaction
<ul style="list-style-type: none"> Waste Management and Transportation 	No interaction	No interaction	No interaction
<ul style="list-style-type: none"> Refuelling and Restarting 	No interaction	No interaction	No interaction
Continued Operations			
Operation and Maintenance of PNGS Units 5-8	2022 PN ERA is bounding	2022 PN ERA is bounding	2022 PN ERA is bounding
Waste Management and Transportation	No interaction	No interaction	No interaction

5.5 Terrestrial Environment

5.5.1 Vegetation and Wildlife

5.5.1.1 PNGS Units 1-4 Decommissioning

5.5.1.1.1 Stabilization and Storage with Surveillance

As outlined in previous sections, non-radiological airborne and waterborne emissions are expected to decrease gradually during the Stabilization and SWS phases relative to previous operational conditions (for 6 operating units). This reduction is anticipated to either lower or maintain current levels of contaminant loading to the soil, as assessed in the 2022 PN ERA. Consequently, exposures to non-radiological contaminants for terrestrial receptors on or near the PN site are expected to remain within the bounds of previous operational conditions (for 6 operating units) in the 2022 PN ERA. These findings continue to remain valid for Stabilization and SWS; therefore, no further assessment is conducted in this PERA related to impacts of airborne and waterborne emissions on vegetation and wildlife during Stabilization and SWS.

Levels of noise, traffic, and light associated with PNGS Units 1-4 will remain similar to or decrease relative to current conditions during the Stabilization and SWS phases as the units are shut down, further minimizing disturbances to birds and other wildlife relative to current conditions. Thus, the activities during SWS are not expected to significantly affect the terrestrial environment and are considered to be bounded by the 2022 PN ERA. Therefore, they are not assessed further in this PERA.

5.5.1.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The 2017 Safe Storage PEA and 2022 PEA Addendum did not assess risk reduction and removal activities or the dismantling and demolishing of buildings and structures. Activities such as site clearing, structure removal, excavation, and dismantling larger tanks and water lines are expected to have minimal impacts on air, surface water, stormwater, and soil quality due to adherence to best construction practices and OPG's Environmental Management Plan. Consequently, exposures of terrestrial biota to particulates, dust, and non-radiological contaminants from PNGS are expected to remain within the range of current conditions (with 6 operating units).

Construction activities such as dismantling and removal of structures, as well as land excavation, are expected to occur outdoors and can therefore interact with the terrestrial environment. However, these activities are not expected to result in a measurable change to vegetation communities and species as the type of habitat provided by the disturbed area is common and found in adjacent areas, or is of poor quality due to its fragmented, sparse and disturbed character. No effect on vegetation communities in nearby wetlands (e.g., Frenchman's Bay and Hydro Marsh), woodlands (e.g., Brock Woodlot and Alex Robertson Woodlot), shrubland, shoreline and open water, is likely to occur as a result of project activities. Notably, only one terrestrial plant species at risk is currently present within the PN Study Area: a single Butternut

tree located within the Alex Robertson Woodlot (Beacon, 2023a, 2023b). This tree is not anticipated to be impacted by these activities, as it lies outside the affected area. Though excavation activities may cause localized impacts on soil organisms inhabiting the subsurface, the affected area represents only a small fraction of the site and does not represent unique habitat for these organisms. Consequently, the overall soil biota on the site is not expected to be significantly impacted.

Noise, odour, and light generated from clearing work, segmentation/dismantling activities, and the utilization and transportation of equipment during this phase can temporarily reduce the attractiveness of the PN site as habitat for wildlife. However, these impacts can be mitigated through application of various management plans and strategies. Activities are not expected to result in elevated vibration levels that would impact wildlife and are not considered. The impact of sound levels is expected to be mitigated through proper equipment maintenance and the implementation of a Noise Management Plan. Odour and emissions produced from diesel or gasoline powered equipment and vehicles will be kept to a minimum by reducing vehicle idling and making use of construction best practices. Additionally, since most wildlife in the area (onsite and offsite) are likely to be accustomed to noise and light levels associated with an urban environment, as PNGS has been fully operational for over three decades (Golder, 2007c), the increase in noise levels is expected to have a negligible effect. While some of the more noise or light sensitive species may display an escape response to the increased disturbance, they may be able to habituate and resume current behaviors over time, as they have done with existing levels of noise, light, and human presence on site (OPG, 2000). If habituation does not occur, species can relocate to adjacent habitats such as Frenchman's Bay, Hydro Marsh, Krosno Creek valley, and other areas on the PN site that are not predicted to be influenced by these activities and are close enough to not require substantial energy expenditures for relocation.

As detailed in **Section 4.5.2**, most terrestrial species at risk have been observed beyond the PN Site boundaries in adjacent woodlots, parks, and wetlands (Beacon, 2018, 2022, 2023a, 2023b; OPG, 2016). These areas are not predicted to be degraded by activities in this phase. Species at risk observed within the site have mostly been recorded occasionally while transiting between nearby areas. Two species at risk have been confirmed to breed within the PN site boundaries. These are the Peregrine Falcon and Barn Swallow. Pairs of these species have been observed nesting at the PN site. OPG will comply with the species and habitat protection provisions of the Endangered Species Act, Species at Risk Act, and Migratory Birds Convention Act during all project activities. Additionally, to mitigate potential disturbances from project activities, various measures are currently being evaluated.

Mitigation measures under consideration include undertaking project activities outside of the sensitive bird nesting period (approximately April 1st to August 31st; after confirming that no nesting is taking place in the areas to be disturbed; or by avoiding nesting areas during project activities. Additionally, other mitigation measures should be explored to reduce noise levels during the breeding season, which may include alternate truck routes.

It should be noted that the PN site does not provide unique breeding habitat for other species observed on-site (i.e., species that are not at risk, non-migratory birds and other birds not covered under the Migratory Birds Convention Act). Thus, individuals, have the potential to temporarily relocate to other nearby areas until construction activities are complete.

Vehicle traffic associated with transporting dismantled material off-site is expected to be similar to or slightly higher than the traffic levels associated with current PN operations. As a result, the slight increase in traffic volumes would likely have a negligible impact on wildlife road mortality. Safe driving best practices will also be implemented to minimize vehicle collisions with wildlife.

Environmental Management Plans will be developed for the construction activities, such that all project works are carried out in accordance with regulatory requirements to minimize impacts on the terrestrial environment and local wildlife. These plans will outline mitigation measures including best practices for air and water management, noise control, contaminated soil management, and wildlife management. As a result, no adverse impacts on terrestrial biota are anticipated during dismantling and demolition activities. Thus, the changes in this phase are considered bounded by previous operational conditions (with 6 operating units) and will not be assessed further in this PERA.

5.5.1.2 PNGS Units 5-8 Refurbishment

The effects of PNGS Units 5-8 refurbishment activities on terrestrial biota, with the exception of the construction of the DWI, have been evaluated in either the Pickering B Refurbishment EA or the PCSS PERA. In support of this PERA, predictive air quality and noise modelling associated with planned Project activities was completed and is described in further detail in **Section 5.1.1.2** (air quality) and **Section 5.1.2.2** (noise). Discussion of the modelling includes interpretation of predicted exceedances of applicable air quality and noise screening guidelines and a discussion of potential impacts and associated mitigation measures, as necessary.

As noted in **Table 5-1**, the procurement and mobilization of equipment, as well as relocation, removal, and construction of buildings and structures planned for this phase have the potential to interact with the terrestrial environment. These activities are not expected to affect terrestrial plant communities and species as vegetation on site is sparse and consistent with rugged vegetation typical of a highly-disrupted, developed environment (e.g., weeds, grasses, small shrubs). Vegetation communities in nearby wetlands, woodlands, shrubland, open grassland, parkland, and the built environment on the PN site are not expected to be affected as a result of these construction activities. Consequently, the overall effect on vegetation is expected to be negligible.

Disturbances associated with construction activities, including increased human presence, have the potential to startle wildlife in the affected areas through the increase of auditory, olfactory, visual, and mechanical stimuli. Noise levels during Refurbishment were previously estimated in Pickering B Refurbishment EA. However, an updated noise model was developed in 2025 which accounted for the change in vehicles and equipment associated with current Project planning as

well as activities not considered in the Pickering B Refurbishment EA, including construction of the DWI in 2025.

As described in **Section 5.1.2.2.2**, despite predicted exceedances of ecological noise guidelines, no adverse impacts are expected for local ecological receptors. Since most wildlife species in the affected area are likely acclimatized to urban noise and lighting conditions, the impact of activities in this phase on wildlife is expected to be minimal. Residual impacts from elevated levels of noise are expected to be mitigated through proper maintenance of machinery and vehicles, and the implementation of construction best practices, a Noise Management Plan, and various Environmental Management Plans.

Elevated noise levels on site during refurbishment may impact species at risk including Bank Swallow nesting at the FFEE, or Barn Swallow and Peregrine Falcon which have historically nested on the PN site. As discussed in **Sections 5.5.1.1.2** and **5.1.2.2.2**, mitigation measures to reduce noise impacts to species at risk should be implemented. Additionally, OPG will comply with the species and habitat protection provisions of the Endangered Species Act, Species at Risk Act, and Migratory Birds Convention Act during all project activities.

The maximum bounding emissions scenario used in the air/noise model considered on-site vehicular traffic (approximately 2,200 vehicles per day), which is inclusive of trucks to support DWI construction, employee and delivery traffic from previous conditions (with 6 operating units) as well as additional refurbishment contract employee and delivery traffic. A small increase in wildlife mortality may occur as a result of increased traffic associated with Refurbishment activities. However, this change is considered to be negligible, because the loss of a few individuals that may be struck by vehicles at the PN site will not affect populations of terrestrial animals. Additionally, past monitoring data (Golder, 2007c) indicates that no species at risk have been involved in vehicle collisions on or near the PN site. This trend is expected to continue due to the absence of significant changes in traffic patterns, habitat use, or species movement corridors in the area. Best safe driving practices will also be implemented to further minimize the likelihood of wildlife strikes.

Nearby wildlife habitats, such as Frenchman's Bay, are not expected to be impacted by Refurbishment activities and offer suitable alternate habitat for displaced mammals and birds if habituation to the elevated levels of noise and light is not possible. As detailed in **Section 4.5.2**, the only species at risk confirmed to breed within the site are Peregrine Falcon and Barn Swallow pairs, which have been observed nesting inside the Protected Area. However, the PN site does not provide unique breeding habitat for these species. Therefore, any disturbances during Refurbishment will likely have only a minor effect on wildlife communities and species.

Activities associated with the construction of the PCSS for the storage of low and intermediate-level refurbishment waste were assessed as part of the PCSS PERA (Ecometrix, 2024). The PCSS PERA did not identify any activities that would pose a risk to terrestrial biota that are not sufficiently mitigated by construction best practices, the implementation of an Environmental

Management Plan, and/or the adherence to existing OPG policies and procedures for environmental protection and management.

The Pickering B Refurbishment EA did not assess the construction of the proposed DWI and any associated shoreline modifications, including construction of a dock, infilling and disposal of generated waste materials. For comparison purposes, the 2009 DNNP EIS assessed the construction of a deepwater intake and discharge structure as part of general excavation and grading activities for the DNNP. The placement of excavated earth and/or rock as lakefill was similarly assessed as part of general marine and shoreline works (Beacon, 2009). Based on current terrestrial species accounts at the PN site from the ongoing biodiversity monitoring program (Beacon, 2017b, 2018, 2022, 2023b; OPG, 2016), the potential shoreline erosion mitigation and west infill areas are primarily inhabited by riparian birds which forage in the nearshore. Though construction activities in the excavation and grading phase could interfere with riparian birds use of the inshore lake area, these effects are predicted to be minimized through construction best practices. Marine and shoreline works were also expected to have the potential to affect waterfowl use of the waterfront, as well as shoreline vegetation communities and species. However, since most of the riparian birds that nest and forage along the shoreline can temporarily relocate to other suitable habitats nearby, and shoreline vegetation is sparse and hardy, wildlife and vegetation communities are not expected to be affected. Following lake infilling and the construction of the dock, it is possible that the new infrastructure could provide suitable habitat for riparian birds.

The Pickering B Refurbishment EA concluded that the effects of refurbishment on air quality, as well as surface water flow, temperature, and quality, were expected to be bounded by effects of operation under previous operational conditions (with 6 operating units). Considering the recent inclusion of DWI construction, updated modeling scenarios were developed to assess the potential influence of DWI construction activities on the aforementioned environmental parameters. As described in **Section 5.1.1.2.1**, despite predicted exceedances of the selected air quality criteria, no adverse impacts to ecological receptors are expected. Air quality impacts resulting from Project activities are expected to be negligible or sufficiently managed by construction best practices and dust reduction measures. For other air quality parameters, the inhalation exposure route is considered a minor pathway relative to food and water ingestion and is considered negligible. As surface water and soil conditions during refurbishment were considered to be bounded by previous operational conditions (with 6 operating units) as discussed in **Sections 5.2.2.2.1** and **5.4.1.2**, the impacts of the quality of these media on terrestrial biota will not be evaluated further.

5.5.1.3 PNGS Units 5-8 Continued Operation

Following refurbishment, PNGS Units 5-8 will operate in the same manner as previous operations. As such, the levels of noise, light, and traffic will return to previous conditions (with 6 operating units). No further changes to the physical habitat features or habitat quality are expected from operations. Therefore, assessment of the potential effects from the Continued

Operation Phase on the environment is bounded by the assessment of effects under the 2022 PN ERA with 6 operating units.

During Continued Operations of PNGS Units 5-8, activities associated with PNGS Units 1-4 SWS and dismantle/demolish will be occurring, which could result in increased airborne emissions and noise levels. It is expected that air and noise predictions would be within the bounding air and noise assessment presented in **Sections 5.1.1.2** and **5.1.2.2**, respectively.

5.5.2 Summary of Tier 1 Assessment

The initial screening of potential effects of Project activities on the terrestrial environment included consideration of vegetation and wildlife. The predicted interactions between the terrestrial environment and Project activities are summarized in **Table 5-22**.

Table 5-22: Summary of Interactions between Project Activities and Terrestrial Environment

Project Activities	Vegetation and Wildlife
PNGS Units 1-4 Decommissioning	
PNGS Units 1 and 4 Stabilization	2022 PN ERA is bounding. Assumptions in 2017 Safe Storage PEA and 2022 PEA Addendum are still valid.
PNGS Units 1-4 Storage with Surveillance	2022 PN ERA is bounding. <ul style="list-style-type: none"> Exposures to non-radiological contaminants for terrestrial receptors are expected to remain within the bounds of previous operational conditions (with 6 operating units). Noise, light, and traffic levels are expected to be bounded by previous operational conditions (with 6 operating units).
Risk Reduction and Removal Activities (2025-2033) Dismantle/Demolish (2034-2037)	2022 PN ERA is bounding. Not assessed in 2017 Safe Storage PEA or 2022 PEA Addendum. <ul style="list-style-type: none"> Exposures of terrestrial biota to particulates, dust, and non-radiological contaminants are expected to remain within the bounds of previous operational conditions (with 6 operating units). No unique habitat will be affected. No work is planned in nearby wetlands, woodlots, or parklands. Residual impacts are expected to be mitigated through proper maintenance, construction best practices, a Noise Management Plan, and various Environmental Management Plans Elevated noise levels for breeding species at risk should be mitigated Though a slight increase in traffic is expected, population-level impacts to terrestrial biota from vehicle collisions are not expected. There are no significant changes in traffic patterns and routes in this project phase. Best safe driving practices will also be implemented to further minimize the likelihood of wildlife strikes.

Project Activities	Vegetation and Wildlife
PNGS Units 5-8 Refurbishment	
<i>Preparation for Refurbishment</i>	
<ul style="list-style-type: none"> Procurement and Mobilization of Equipment and Components 	<p>This activity is bounded by results of air/noise modelling.</p> <ul style="list-style-type: none"> Exposures of terrestrial biota to particulates, dust, and non-radiological contaminants from PNGS are bounded by previous operational conditions (with 6 operating units). No unique habitat will be affected. No work is planned in nearby wetlands, woodlots, or parklands. Noise levels are bounded by the activities assessed in the noise model completed to support this PERA. Not a significant noise source. Though a slight increase in traffic is expected, population-level impacts to terrestrial biota from vehicle collisions are not expected.
<ul style="list-style-type: none"> Relocation/Removal/Construction of Buildings, Structures, and Equipment 	<p>This activity is bounded by results of air/noise modelling.</p> <ul style="list-style-type: none"> Exposures of terrestrial biota to particulates, dust, and non-radiological contaminants from PNGS are bounded by previous operational conditions (with 6 operating units). No unique habitat will be affected. No work is planned in nearby wetlands, woodlots, or parklands. Noise levels are bounded by the activities assessed in the noise model completed to support this PERA. Not a significant noise source. Though a slight increase in traffic is expected, population-level impacts to terrestrial biota from vehicle collisions are not expected.
<ul style="list-style-type: none"> Construction of PCSS and SB #5 	<p>This activity is bounded by results of air/noise modelling.</p> <ul style="list-style-type: none"> Exposures of terrestrial biota to particulates, dust, and non-radiological contaminants from PNGS are bounded by previous operational conditions (with 6 operating units). No unique habitat will be affected. No work is planned in nearby wetlands, woodlots, or parklands. Noise levels are bounded by the activities assessed in the noise model completed to support this PERA. Not a significant noise source. Though a slight increase in traffic is expected, population-level impacts to terrestrial biota from vehicle collisions are not expected.
<ul style="list-style-type: none"> Defuel and Dewater 	No interaction
<ul style="list-style-type: none"> Islanding the Unit 	No interaction
<ul style="list-style-type: none"> Management of Heavy Water 	No interaction
<ul style="list-style-type: none"> Construction of DWI 	<p>This activity is bounded by results of water, air, and noise modelling.</p> <ul style="list-style-type: none"> Exposures of terrestrial biota to particulates, dust, and non-radiological contaminants from PNGS are bounded by previous operational conditions (with 6 operating units). Some shoreline vegetation will be removed during nearshore modifications associated with DWI construction. This vegetation is sparse, hardy, and not unique.

Project Activities	Vegetation and Wildlife
	<ul style="list-style-type: none"> No unique habitat will be affected. No work is planned in nearby wetlands, woodlots, or parklands. Noise levels are bounded by the activities assessed in the noise model completed to support this PERA. Not a significant noise source. Though a slight increase in traffic is expected, population-level impacts to terrestrial biota from vehicle collisions are not expected.
<i>Refurbishment</i>	
<ul style="list-style-type: none"> Replacement of Reactor Components 	No interaction
<ul style="list-style-type: none"> Removal and Replacement of Steam Generators 	No interaction
<ul style="list-style-type: none"> Operation of DWI 	No interaction
<ul style="list-style-type: none"> Refurbishment of Other Plant Systems 	No interaction
<ul style="list-style-type: none"> Waste Management and Transportation 	<p>This activity is bounded by results of water, air, and noise modelling.</p> <ul style="list-style-type: none"> Exposures of terrestrial biota to particulates, dust, and non-radiological contaminants from PNGS are bounded by previous operational conditions (with 6 operating units). Noise levels are bounded by the activities assessed in the noise model completed to support this PERA. Not a significant noise source. Though a slight increase in traffic is expected, population-level impacts to terrestrial biota from vehicle collisions are not expected.
<ul style="list-style-type: none"> Refuelling and Restarting 	No interaction
Continued Operations	
<ul style="list-style-type: none"> Operation and Maintenance of PNGS Units 5-8 	2022 PN ERA is bounding.
<ul style="list-style-type: none"> Waste Management and Transportation 	2022 PN ERA is bounding.

5.6 Radiation and Radioactivity

This section focuses on gamma radiation fields from waste storage structures on the PN site. An assessment of radionuclide emissions to the atmospheric and surface water environments resulting from PNGS Units 1-4 Decommissioning and PNGS Units 5-8 Refurbishment is provided in **Section 5.1.1** and **Section 5.2.2**, respectively.

The NSS-PWMF (**Figure 3-2**) consists of the Phase I site which contains two used fuel dry storage buildings and a Retube Component Storage area, and the Phase II site which contains two used dry storage buildings (SB #3 and SB #4) with a third dry storage building (SB #5) planned for Q3 2027, located east of SB #3 and SB #4.

New to this PERA is the addition of the Harvester receptor. While not specifically assessed in the 2022 PN ERA, the Harvester is not expected to be affected by gamma radiation due to this

receptor's relatively far distance from the PN site. The dose received by the Sport Fisher, the closest human receptor to PN site, would be considered conservative for the Harvester for assessment of gamma radiation.

5.6.1 PNGS Units 1-4 Decommissioning

5.6.1.1 Stabilization and Storage with Surveillance

The 2017 Safe Storage PEA and 2022 PEA Addendum assessed a scenario in which 100 DSCs containing 6-year decayed used fuel in SB #3, and additional storage in the newly constructed SB #4, were considered following the shutdown and transition of all six operational PNGS reactors into Stabilization and SWS. The predicted annual dose at the PN east property boundary was found to be well below the public dose limit for radiation protection, and below the terrestrial and aquatic dose benchmarks for the protection of ecological receptors (Ecometrix, 2023b; Golder and Ecometrix, 2017). The Stabilization and SWS activities assessed as part of the 2017 Safe Storage PEA and 2022 PEA Addendum are generally the same as the planned activities for PNGS Units 1-4 Decommissioning. However, refurbishment is now planned for PNGS Units 5-8 instead of shutdown. Additionally, a change in assumptions since the 2017 Safe Storage PEA and 2022 PEA Addendum would see OPG initiate some dismantling activities in the AIFB and IFB-A, specifically the removal of modules and baskets to aid in the removal of used fuel from the AIFB and IFB-A, an activity not previously assessed as part of Stabilization and SWS.

The planned dismantling activities in the IFBs are described in **Section 3.3.3.1**. To summarize, used fuel stored in the AIFB and IFB-A will continue to be loaded into DSCs and transported to the NSS-PWMF using the existing programs and procedures for the management of used fuel. As fuel is removed, empty baskets and associated frames will be removed from the AIFB and IFB-A and disposed of using existing waste routes. The removal of used fuel from the AIFB and IFB-A and the subsequent transfer of used fuel to the NSS-PWMF is part of OPG's current licensing and was most recently assessed in the 2022 PEA Addendum (Ecometrix, 2023b).

As the transfer of DSCs to the NSS-PWMF falls under current licensing activities for the PN site, the removal of used fuel from the AIFB and IFB-A during Stabilization and SWS is considered bounded by the 2017 Safe Storage PEA and 2022 PEA Addendum. The removal of empty modules and baskets will adhere to OPG's existing waste handling procedures and their disposal will utilize existing waste routes. Overall, the findings of the 2017 Safe Storage PEA and 2022 PEA Addendum remain valid and bounding of the planned Stabilization and SWS. The dismantling activities planned for the AIFB and IFB-A are bounded by current licensed activities and operational conditions. For this reason, no further assessment of Stabilization and SWS for PNGS Units 1-4 is warranted for this PERA.

5.6.1.2 Risk Reduction/Removal Activities and Dismantle/Demolish

The structures selected for dismantlement as part of risk reduction and removal activities would include non-nuclear systems that are non-operational and are not expected to contain

radioactivity above procedural or regulatory limits. Despite the dismantling activities occurring in parallel to the stabilization activities, OPG will ensure that no interaction between non-nuclear and nuclear components occurs. Furthermore, equipment will be surveyed before dismantling (to confirm no radiological hazards are present before beginning work), after decontamination (if required), and prior to off-site transportation to prevent any radiation risk. Thus, no radiological effects are anticipated resulting from risk reduction and removal activities, and these activities (with respect to radiation hazards) are not assessed further in this PERA.

The SSCs in PE-A and PE-B (see **Section 3.3.4.1** and **3.3.4.2**, respectively) selected for dismantlement and demolition (beyond those dismantled during earlier risk reduction and removal activities) include non-operational, non-nuclear systems that are not anticipated to be radiologically contaminated above procedural or regulatory limits. Prior to dismantling, equipment and materials will be surveyed to confirm no radiological hazards are present, and if required, again after decontamination (in cases where radiological hazards are encountered). Any dismantled equipment or materials selected for off-site transportation will be surveyed for radiological contamination prior to removal from the PN site.

PE-A Group A-3 decommissioning activities focus on the removal of outbuildings after IFB-A and AIFB are emptied, drained, and dried. Wastes produced during the dismantlement of the Heavy Water Upgrading Plant and its associated structures are expected to contain some level of radiological contamination due to the historic presence of heavy water within these structures. Consistent with current OPG waste handling procedures, equipment and structures will be surveyed to determine the extent of any radiological hazards prior to dismantlement or demolition. All waste will be managed in accordance with accepted procedures and licence requirements.

Overall, no radiological effects are expected resulting from dismantling and demolition activities, and these activities (with respect to radiation hazards) are not assessed further in this PERA. All risk reduction and removal activities and dismantling/demolition activities will adhere to OPG's existing waste management procedures to mitigate any potential radiological effects to human and ecological receptors.

5.6.2 PNGS Units 5-8 Refurbishment

The refurbishment of PNGS Units 5-8 is expected to involve the handling, repair or replacement of radiologically contaminated SSCs. Further details regarding the planned refurbishment activities are provided in **Section 3.1.2**.

5.6.2.1 Gamma Radiation Fields

During Refurbishment, project works and activities have the potential to interact with the human receptors and the terrestrial environment through gamma radiation fields. External gamma radiation fields are associated with the replacement of reactor components, removal of steam generators, and the management and transfer of radiological waste.

The storage of L&ILW waste is expected to adhere to OPG's existing waste management procedures and is part of current licensing activities for the PN site. Wastes from refurbishment activities will be sent for storage within the planned PCSS; gamma radiation resulting from operation of the PCSS is discussed in **Section 5.6.2.1.2** below.

5.6.2.1.1 Radiological Dose from DSC Storage Buildings Within the NSS-PWMF

Gamma radiation associated with the DSC storage buildings within the NSS-PWMF is bounded by the 2022 PEA Addendum, which assessed dose rates assuming the storage of 6-year aged fuel (i.e., higher activity than 10-year aged fuel) within the NSS-PWMF. Used fuel is typically stored within the IFBs for 10 years; however, OPG is authorized to process and store up to 100 DSCs with used fuel that has been stored in the IFBs for 6 years to free up space for additional fuel in the IFB.

In the 2022 PEA Addendum (Ecometrix, 2023b), up to 100 DSCs containing 6-year-cooled fuel were assumed to compose 20% of SB #3's storage capacity, while SB #4 was assumed to contain 10-year-cooled fuel at 40% capacity. The highest predicted annual dose of 3.56 $\mu\text{Sv/a}$ was modelled to occur at the PNGS eastern boundary fence and is considered to be representative of industrial/commercial workers and members of the public walking by the PN perimeter fenceline. This dose rate is below both the radiation safety requirement for the NSS-PWMF (10 $\mu\text{Sv/a}$) and the public dose limit (1,000 $\mu\text{Sv/a}$) when considering dose from the NSS-PWMF alone and together with the dose from the PNGS during SWS (cumulative dose of 5.56 $\mu\text{Sv/a}$). The highest predicted annual dose at the shoreline is 0.14 $\mu\text{Sv/a}$ and is representative of the dose to a future Sport Fisher. Once again, this dose rate is below both the radiation safety requirement for the NSS-PWMF (10 $\mu\text{Sv/a}$) and the public dose limit (1,000 $\mu\text{Sv/a}$) when considering dose from the NSS-PWMF alone and together with the dose from the PNGS during SWS (cumulative dose of 0.35 $\mu\text{Sv/a}$). As noted earlier in this chapter, the Sport Fisher result is considered conservatively protective of a Harvester receptor.

With respect to ecological receptors, the dose rates at the NSS-PWMF Phase II fence were considered. As indicated in the 2022 PEA Addendum, the tissue absorbed dose for ecological receptors in close proximity to SB #3 (assuming storage of up to 100 DSCs containing 6-year aged fuel) and SB #4 would be no more than 0.85 $\mu\text{Gy/h}$ at the west fence line. This is well below the terrestrial dose benchmark of 100 $\mu\text{Gy/h}$ for terrestrial and riparian receptors (Ecometrix, 2023b).

Construction is planned for SB #5 in the PWMF Phase II Site for future storage of used fuel, with an in-service date of Q3 2027. The assessment of the construction of additional DSC storage buildings was completed as part of the Pickering B Refurbishment EA. The design and construction of SB #5 to ensure the regulatory dose limits and OPG's dose targets for the public and workers at the facility fence and beyond are met.

Considering the storage of used fuel at the NSS-PWMF falls within OPG's current licensing activities for the PN site, and dose rates from the NSS-PWMF are well below the public dose

limit, no further assessment of gamma radiation fields from DSCs stored within the NSS-PWMF is warranted in this PERA. A safety assessment will be completed by the end of 2025 for SB #5 prior to construction to confirm dose limits and targets will be achieved.

5.6.2.1.2 Construction and Operation of the PCSS

Construction of the PCSS is planned to support refurbishment activities and will be used for the storage of L&ILW from decommissioning and refurbishment, including components such as steam generators, pressure and calandria tubes, calandria tube inserts, and end fittings, and concrete LLW. An evaluation of the environmental effects of the PCSS was part of a separate PERA (Ecometrix, 2024). The PCSS will be incorporated into the existing NSS-PWMF operating policies and procedures.

The PCSS PERA determined that there are no expected radiological risks to human and ecological receptors resulting from the operation of the PCSS (Ecometrix, 2024). The human health risk assessment evaluated the impact on human health of gamma radiation from the PCSS. The estimated dose for the Sport Fisher was 4.89×10^{-3} $\mu\text{Sv/a}$ (which includes contributions from PCSS, SB #3, #4, and #5); considering the other existing facilities on the PN site, the cumulative dose to the Sport Fisher could be up to 0.57 $\mu\text{Sv/a}$. This estimate represents less than 1% of the regulatory public dose limit of 1,000 $\mu\text{Sv/a}$. Overall, since the dose estimates were found to be a small fraction of the public dose limit and natural background exposure, no human health effects are anticipated due to exposure to gamma radiation from the PCSS (Ecometrix, 2024).

Similarly, the ecological risk assessment evaluated the impact on ecological health due to gamma radiation from the PCSS. For exposure of ecological terrestrial receptors to gamma radiation from the PCSS, the maximum dose rate to any ecological receptors residing in close proximity to the PCSS could be up to 0.057 mGy/d, and lower than 0.057 mGy/d for off-site ecological receptors residing at the PN fenceline. All predicted doses were found to be lower than the 2.4 mGy/d radiation benchmark for terrestrial biota. It was concluded that there are likely no radiological effects to ecological receptors, including in the scenario when the maximum dose from the PCSS is combined with the dose from exposure to radionuclides through other existing PN operations (Ecometrix, 2024).

Overall, the results of the PCSS PERA remain valid for the operation of the PCSS as part of PNGS Units 5-8 Refurbishment, and no further assessment is warranted for this PERA.

5.6.2.1.3 Dry Storage Module Transfer

Currently, the Retube Component Storage Facility (RCSF) sits within the NSS-PWMF I licensed site and is the location of a series of 36 DSMs used to contain ILW. Of these, 34 are loaded and two are empty. OPG has proposed the relocation of these DSMs by Q3 2025 to the NSS-PWMF II licensed site to accommodate the spatial requirements related to construction of the DWI (e.g., operation of the tunnel boring machine) and other shoreline works. Additionally, OPG has proposed the temporary relocation of the Protected Area fenceline in this area. OPG assessed

that the relocation of the DSMs falls within the bounds of permitted activities under existing NSS-PWMF licensing and has notified the CNSC of the intended relocation (OPG, 2024b).

Radiological impacts associated with the relocation of DSMs from the NSS-PWMF I site to the NSS-PWMF II site were assessed in December 2024 (OPG, 2024b). The assessment assumed that the DSMs would be transferred utilizing the same transfer route that existing DSCs use when being transferred to used fuel dry storage buildings within the NSS-PWMF II site.

Dose measurements from the existing NSS-PWMF Phase I DSM storage area (referred to as the RCS area) range from 0.067 $\mu\text{Sv/h}$ (south fence) to 1.24 $\mu\text{Sv/h}$ (north fence). Dose rates on the north fence have contributions from used fuel dry storage buildings and represent conservative estimates of DSM dose rates. The assessment concluded that the dose rate acceptance criteria (5.00×10^{-2} $\mu\text{Sv/h}$, equivalent to 10% of the limit for a member of the public when scaled with an occupancy of 2,000 hours per year) is unlikely to be exceeded in the planned DSM storage location within the NSS-PWMF II area, even with the contributions from the existing SB #3 and SB #4 structures (OPG, 2024b).

The nearest site boundary on land is noted to be approximately 200 m from the proposed DSM storage location. The worst-case dose rate calculated at the site boundary was found to be 1.75×10^{-2} $\mu\text{Sv/h}$, which includes dose contributions from SB #3, SB #4, SB #5 and the PCSS. The dose rate is below the acceptance criterion of 5.00×10^{-2} $\mu\text{Sv/h}$ (OPG, 2024b).

Assuming a single DSM results in a maximum dose rate of 1.24 $\mu\text{Sv/h}$ at a distance of 8 m (conservatively estimated from the existing highest measurement on the north RCS fence, which again includes contributions from multiple DSMs and existing Dry Storage Containers), the attenuation at 200 m (NSS-PWMF II to site boundary) was estimated to be a factor of 10,000. Conservatively assuming the 36 relocated DSMs have the same dose rate, the dose rate at the site boundary is 4.50×10^{-3} $\mu\text{Sv/h}$. This result assumes a straight line-of-sight to the site boundary and no shielding provided by other DSMs and other structures (e.g., SB #3 and SB #4), which is considered conservative. Thus, the assessment concluded there is sufficient margin to the dose rate target to accommodate the relocated DSMs on the NSS-PWMF II licensed site (OPG, 2024b). As the findings and assumptions used in this recently completed assessment remain valid, no further assessment is required for this PERA.

The assessment of radiological impacts associated with the relocation of the DSMs did not specifically address potential impacts to ecological receptors. Mobile ecological receptors (e.g., birds and mammals) can access the NSS-PWMF Phase II site and could be near the relocated DSMs. At present, ecological receptors can access the NSS-PWMF I licensed site and could also be near the DSMs in their current location; thus, current conditions at the NSS-PWMF Phase I site are considered representative of the future conditions at the NSS-PWMF Phase II site after DSM transfer. Off-site ecological receptors may exist closer than the 200 m assumed for the nearest fenceline. The maximum dose rate of 1.24 $\mu\text{Sv/h}$ (measured at 8 m from the DSM, the existing highest measurement on the north RCS fence) can conservatively be assumed as the dose rate at the fenceline for the NSS-PWMF II site. Considering this, the estimated fenceline

dose rate would be 2.98×10^{-2} mGy/d, which represents approximately 1.2% of the terrestrial radiation dose benchmark. Though ecological receptors may periodically exist closer than 8 m to the DSMs, the maximum dose rate of 1.24 μ Sv/h includes contributions from multiple DSMs and existing DSCs, making it a conservative estimate of dose from any one DSM. It is also unlikely that ecological receptors would remain in long-term close contact with the DSMs as the areas around the DSMs are paved and devoid of vegetation, and generally do not present suitable foraging or nesting habitat for birds and mammals. Thus, ecological receptors are not considered at risk from the relocation of the DSMs to the NSS-PWMF Phase II licensed site. Current conditions within the NSS-PWMF Phase I site are considered representative and no further assessment is warranted for this PERA.

While this PERA has included an assessment of modelled NSS-PWMF dose rates following the transfer of DSMs to the NSS-PWMF Phase II area, the next iteration of the PN ERA will consider the new NSS-PWMF layout and use updated measured dose rates to evaluate revised doses to human and ecological receptors and ensure that OPG's operational and regulatory limits continue to be met. Following transfer to the NSS-PWMF Phase II area, a series of thermoluminescent dosimeters (TLDs) will be installed to monitor gamma radiation fields surrounding the DSMs. At the current DSM storage location, quarterly catch basin stormwater samples are collected for the analysis of gross beta/gamma; this monitoring is expected to continue at the new DSM storage location within the NSS-PWMF Phase II site.

5.6.3 PNGS Units 5-8 Continued Operations

During normal operations, the PN site emits gamma radiation fields into the surrounding environment, primarily due to the storage of radiological waste within the NSS-PWMF. It is anticipated that gamma radiation fields post-refurbishment would be similar to those assessed in the PCSS PERA since those estimates include contributions from other facilities on the NSS-PWMF Phase II site including SB #3, #4, #5 (Ecometrix, 2024)

While the reactors themselves contribute minimally to gamma radiation due to extensive shielding from the reactor buildings, their contribution to gamma fields will be lower than previous operations (with 6 operating units) as the number of operational reactors will have been reduced to four.

In general, the Continued Operations Phase of the PNGS Units 5-8 Refurbishment Project is similar to the PCSS PERA; however, future TLD monitoring at the NSS-PWMF Phase II site will confirm gamma radiation fields.

5.6.4 Summary of Tier 1 Assessment

The initial screening of potential effects of Project activities on the radiation and radioactivity included consideration of gamma radiation. The predicted interactions between radiation and radioactivity and Project activities are summarized in **Table 5-23**.

Table 5-23: Summary of Interactions between Project Activities and Gamma Radiation

Project Activities	Gamma Radiation
PNGS Units 1-4 Decommissioning	
PNGS Units 1 and 4 Stabilization	Bounded by 2017 PEA and 2022 PEA Addendum
PNGS Units 1-4 Storage with Surveillance	Bounded by 2017 PEA and 2022 PEA Addendum <ul style="list-style-type: none"> Removal of modules and baskets from AIFB and IFB-A bounded by current licensing activities and mitigated by existing waste management procedures
Risk Reduction and Removal Activities (2025-2033) Dismantle/Demolish (2034-2037)	Radiological effects sufficiently mitigated by adherence to OPG waste management procedures and licence requirements
PNGS Units 5-8 Refurbishment	
<i>Preparation for Refurbishment</i>	
<ul style="list-style-type: none"> Procurement and Mobilization of Equipment and Components 	No interaction
<ul style="list-style-type: none"> Relocation/Removal/Construction of Buildings, Structures, and Equipment 	No interaction
<ul style="list-style-type: none"> Construction of PCSS and SB #5 	No interaction
<ul style="list-style-type: none"> Defuel and Dewater 	No interaction
<ul style="list-style-type: none"> Islanding the Unit 	No interaction
<ul style="list-style-type: none"> Management of Heavy Water 	No interaction
<ul style="list-style-type: none"> Construction of DWI 	No interaction
<i>Refurbishment</i>	
<ul style="list-style-type: none"> Replacement of Reactor Components 	No interaction
<ul style="list-style-type: none"> Removal and Replacement of Steam Generators 	No interaction
<ul style="list-style-type: none"> Operation of DWI 	No interaction
<ul style="list-style-type: none"> Refurbishment of Other Plant Systems 	No interaction
<ul style="list-style-type: none"> Waste Management and Transportation 	<ul style="list-style-type: none"> PCSS PERA is valid Safety assessment will be completed for SB #5 by the end of 2025, prior to construction to confirm dose limits and targets will be achieved TLDs will be installed to monitor gamma radiation fields around the DSMs transferred to NSS-PWMF Phase II site
<ul style="list-style-type: none"> Refuelling and Restarting 	No interaction
Continued Operations	
<ul style="list-style-type: none"> Operation and Maintenance of PNGS Units 5-8 	Bounded by 2022 PN ERA and 2022 PEA Addendum
<ul style="list-style-type: none"> Waste Management and Transportation 	PCSS PERA is valid

5.7 Climate Change Considerations

OPG acquired local climate change projections and indicators for PNGS in 2023 (AECOM, 2023) which focused on the identification of climate change hazards and their bounding values. OPG

will be obtaining CMIP6 (Climate Model Intercomparison Project) climate projections for analysis and will include the updated projections during the next PERA update.

The bounding analysis considered gradual climate change and extreme weather events under two scenarios: Representative Concentration Pathway (RCP) 4.5, which accounts for intermediate Greenhouse Gas (GHG) emissions; and RCP 8.5, with accounts for high emissions. The future projections were analyzed for two time periods – 2021-2050 (which covers the licensing period of this PERA) and 2051-2080. The impacts of climate change on Project activities, and potential GHG emissions from these activities, during different phases are summarized below.

5.7.1 PNGS Units 1-4 Decommissioning

5.7.1.1 Stabilization and Storage with Surveillance

The potential influence of climate change on activities during the Stabilization and SWS phase was evaluated in the 2022 PEA Addendum. Regional Climate Models (RCMs) for RCP 4.5 and 8.5 scenarios indicated show slightly increasing water levels in Lake Ontario and greater variability, particularly as temperatures increase by 2050. The hydrodynamic surface water model developed for the 2017 Safe Storage PEA and the 2022 PEA Addendum utilized elevated water temperatures and levels, as well as early spring warming conditions, making it representative of future climate change scenarios. Additionally, as the discharges from PNGS Units 1-4 during the SWS Phase are non-thermal and small in volume, the thermal plume is expected to be reduced considerably from previous operational conditions (with 6 operating units). Furthermore, the predicted increase in the frequency and occurrence of extreme weather events (intense precipitation and drought) may increase exchange rates between the forebay and the lake, thus reducing concentrations of any contaminants in the forebay.

The results of the bounding analysis are consistent with the climate projections from the RCP models developed for the 2022 PEA Update. Additional climate hazards not considered in the PEA, such as increased annual ambient air temperatures, higher occurrences of biofouling and algal blooms, and a greater likelihood of heatwaves and storm events, are not expected to impact activities during this phase, as these changes primarily affect operations, which have ceased for PNGS Units 1-4. Consequently, the impacts of climate change on project activities during this phase are considered negligible.

5.7.1.2 Dismantle/Demolish Activities

The impact of climate change on dismantling activities for PNGS Units 1-4 was not evaluated in the 2022 PEA Addendum. As per the results of the bounding analysis, Lake Ontario's annual mean water temperature is projected to increase by 1.7 °C by mid-century under the RCP 8.5 scenario, which aligns with the activities during this phase. This gradual increase in average water temperatures will be minor relative to changes to the receiving environment as a result of reduction of the thermal plume due to minimal releases via the PNGS Units 1-4 discharge channel. Additionally, while increased ambient air temperatures due to climate change could

elevate fire risks for certain structures and equipment, the dismantling and removal of non-nuclear SSCs during this phase reduces this risk greatly.

The predicted increase in the frequency and intensity of extreme precipitation events and storms may result in higher runoff. However, existing drainage and stormwater systems will remain operational and are expected to accommodate these changes, with potential adjustments and modifications made to confer additional capacity as needed through adaptive management strategies. In the unlikely event of rainfall exceeding design capacity, localized erosion of ditches or soil cover may occur, but the integrity of site structures and equipment is anticipated to remain unaffected, minimizing risks to the public and environment. This is based on engineering best practices and safety margins at the time they were developed. OPG is currently evaluating the design to determine if it addresses future climatic conditions.

Finally, the utilization of vehicles and equipment for dismantling activities are expected to emit a small amount of greenhouse gases. However, vehicular traffic is not expected to increase significantly compared to previous operational conditions (with 6 operating units), and equipment will be operated intermittently and as efficiently as possible to limit emissions. Therefore, considering the relatively short time frame of project activities, limited project-environmental interactions, and robust mitigation measures (e.g., Emergency Management Program, climate considerations in infrastructure design at the time they were developed), the impacts of climate change on project activities during the Dismantle and Demolish phase are likely negligible.

5.7.2 PNGS Units 5-8 Refurbishment

An evaluation of the effects of climate change on activities during Refurbishment, except the construction and operation of the proposed DWI, was conducted as a part of the Pickering B Refurbishment EA (SENES, 2007). The conclusions of this evaluation are summarized in this section, integrating the predictions of climate parameters derived from the 2023 bounding analysis and recent climate change literature.

As suggested by the thermal stratification patterns in Lake Ontario (see **Section 4.3.1.3.5**), the water drawn through the proposed offshore DWI is expected to be 3–5°C cooler than that drawn through the existing nearshore intake channel at the surface, supporting improved thermal management in the future. Compared to surface water, deeper layers in lakes are expected to warm at a slower rate with climate change due to weaker coupling with air temperature (Anderson et al., 2021; Butcher et al., 2015; Pilla et al., 2020). The interactions that result in increasing water temperatures in Lake Ontario are complex and still the subject of ongoing studies. Additionally, preliminary estimates of the discharge temperature following intake relocation account for these climate change-induced increases and indicate that the discharge temperature will remain the same or lower than current conditions. As such, the thermal plume for previous operations (with 6 operating units) remains applicable under climate change conditions.

As water temperatures, particularly maximum temperatures, are expected to rise in the coming decades, an increased frequency and duration of biofouling events and algal blooms during the summer is anticipated. Lake buoyancy, surface winds, and lake currents can concentrate cyanobacteria near the surface. This suggests the projected increase in algal growth is expected to be less pronounced near the DWI. Additionally, increased turbidity in the epilimnion of stratified lakes due to algal blooms is expected to maintain or lower water temperatures in deeper layers. This is because higher turbidity leads to greater light absorption at the surface, limiting heat transfer to subsurface layers (Richardson et al., 2017; Rose et al., 2016). Consequently, this effect would buffer against increased algal growth in deeper layers. Despite this, potential impacts on operations from increased algal growth at depths between 10.5 - 12 m (within which the DWI will be sited), including blocking and restrictions of the intake, remain possible. To minimize these risks, OPG will deploy protective screens, prepare systems, and implement design modifications as necessary. OPG will also continue utilizing the Advanced Algae Warning System (AAWS), a predictive tool developed in 2019 (OPG, 2020c), to forecast and monitor algae events, and adjust operations accordingly to mitigate the effects.

The predicted increase in annual precipitation as well as the frequency and intensity of extreme weather events such as storms. This is expected to result in higher lake water levels in the coming years. Specifically, the bounding analysis projects that annual lake levels could rise to 76.3 m by the end of 2080 under the RCP 8.5 scenario, a 1 m increase from historical levels. However, as the projected annual level remains below the PN shoreline protection level of 78.6 m, the shoreline is expected to remain adequately protected even in the context of climate-induced changes. Conversely, the findings of the bounding analysis indicate that, despite predicted increases in drought events, a significant decline in annual lake levels is not expected under the RCP 8.5 scenario. Importantly, the International Joint Commission regulates lake levels through controlled outflows and is expected to continue doing so in the future. Thus, given the minor fluctuations in lake levels under climate change, along with the active regulation by the International Joint Commission, lake levels are anticipated to remain relatively stable and below the PNGS shoreline protection level.

OPG's severe weather emergency preparedness procedure (OPG, 2023j) has been effective in managing severe weather events, ensuring that the station operates without risk to the public or the environment. As climate change is expected to increase the frequency and intensity of extreme weather events, this procedure will continue to play a critical role in responding to these challenges and maintaining safe operations. Finally, all project-related structures, i.e., the DWI, shoreline erosion mitigation area, west infill area, and dock, will be designed using engineering best practices to withstand extreme weather conditions such as storms, droughts, floods, and blizzards.

The increased occurrence of extreme weather events such as storms and floods expected to occur with climate change, could result in increased shore erosion due to greater wave intensity, potentially impacting the stability of the nearshore study areas. Erosion is currently an ongoing process along the PN shoreline, and no adverse impacts on nearshore aquatic biota have been

observed as a result. However, the implementation of armoring measures is anticipated to effectively mitigate these effects. As the name suggests, the shoreline erosion mitigation area is specifically designed to support shoreline restoration in the nearshore area east of the PNGS Unit 5-8 outfall. Lake acidification due to climate change will also be considered in the design of the DWI intake and associated nearshore modifications.

Activities related to the relocation and removal of buildings, structures, and equipment, and the construction of buildings such as the PCSS and RFRISA, are anticipated to last for a short duration, and are expected to encounter a minimal impact from climate change. As detailed in the PCSS PERA (Ecometrix, 2024), though extreme precipitation events are predicted to increase in the coming decades, the water management infrastructure of the site would be designed to include additional capacity to accommodate this increase as applicable. Additionally, these buildings will be designed according to the National Building Code of Canada and will be constructed using engineering best practices to account for any impacts of extreme weather events. OPG's existing Emergency Management Program and severe weather emergency preparedness procedure are dynamic, and address actions to be taken to respond to emergencies including extreme weather events. Additionally, greenhouse gas emissions associated with the construction activities will be minimized by reducing vehicle idling and using energy-efficient systems and equipment.

5.7.3 Continued Operations

Following refurbishment, continued operation of PNGS Units 5-8 with the DWI is expected to result in the discharge temperature remaining the same or lower than current conditions. Therefore, climate change impacts on the thermal plume are not considered to be significantly different from current conditions based on these preliminary predictions. This will be confirmed through future monitoring of intake and discharge temperatures. As a subsequent step, the Tier 2 assessment evaluates thermal effects further.

Climate change is expected to lead to an increase in ambient air temperatures, with the average annual ambient air temperature in 2080 under the RCP 8.5 scenario projected to reach 16.5°C, increasing 4.3°C from historical observations. Ambient air temperatures are used as one of the inputs to the atmospheric dispersion model used in the 2022 PN ERA. As ambient air temperature increases, there is less difference between the ambient air temperature and the air emissions gas temperature from the PNGS stack. A lower difference between the gas and ambient air temperature results in less buoyancy of the plume and lower atmospheric dispersion. This would likely result in exposure to higher air concentrations for receptors proximal to the site, and lower concentrations for receptors farther from the PN site. The atmospheric dispersion of emissions is also expected to be influenced by higher wind speeds associated with tropical storms in the coming decades. In a 2°C warmer world, wind speeds during storms are projected to increase by 1-10%, with tropical cyclone wind speeds increasing by 0.5 to 5.2 km/h and extra-tropical cyclones increasing by 0.6 to 6.6 km/h compared to historical observations. These stronger winds would result in broader dispersion of emissions, further supporting the conservative nature of this assessment.

Finally, the refurbishment of PNGS Units 5-8 will allow the operational lifespan of the station to increase by 30 years. Given the role of greenhouse gas emissions in exacerbating climate change, the continued generation of electricity with minimal carbon emissions will contribute to Canada's efforts to reduce its overall greenhouse gas emissions, aligning with broader climate mitigation objectives.

5.8 Uncertainty in the Tier 1 Assessment

The Tier 1 assessment presented a qualitative assessment to identify Project interactions that are not bounded by previous operational conditions (with 6 operating units) or previous assessments. The qualitative assessment utilizes the description of Project activities that are planned to occur during PNGS Units 1-4 decommissioning, and during PNGS Units 5-8 refurbishment until the end of 2037 followed by continued operations. The Tier 1 assessment is based on understanding of Project activities as the Project is defined for the purposes of the PERA. The Project activities may evolve over time as the Project moves forward. As such, where there is uncertainty in the approach for executing activities, conservative or bounding assumptions have been made to capture the range of potential future effects, to ensure that effects are not underestimated.

5.9 Summary of Tier 1 Assessment

PNGS Units 1-4 Decommissioning and PNGS Units 5-8 Refurbishment activities were evaluated for interactions with environmental pathways and receptors in the Tier 1 assessment. **Table 5-24** provides a summary of the interactions and the findings (i.e., screening) from this assessment to determine which interactions require further quantitative assessment in the Tier 2 assessment. In general, interactions associated with project activities during the Stabilization and SWS phases of PNGS Units 1-4 are considered sufficiently bounded by the findings of the 2017 Safe Storage PEA and the 2022 PEA Addendum, or the 2022 PN ERA, and do not warrant further evaluation. Although PNGS Units 1-4 risk reduction and removal activities and dismantling and demolition activities were not evaluated in previous assessments, these activities are not anticipated to result in significant environmental effects as construction best practices and applicable mitigation plans will be implemented to minimize impacts. Environmental effects of future dismantle and demolish activities planned to start in 2050 will be detailed in subsequent DDP updates and PERA updates when more detailed work packages are defined.

Refurbishment activities for PNGS Units 5-8 including islanding the unit, refurbishment of reactor auxiliary systems, and other upgrades were determined in the Tier 1 assessment to have negligible interaction with the environment. Some activities, such as the construction of the PCSS, are evaluated as part of a separate PERA. Other activities, such as defueling and dewatering the units, are bounded by the 2017 Safe Storage PEA and the 2022 PEA Addendum, while still others, such as management of tritium emissions, are bounded by the 2022 PN ERA. These activities bounded by other assessments do not warrant further evaluation in the Tier 2 assessment.

The construction and operation of the DWI, along with associated activities such as the potential addition of a dock, potential infill, and material disposal, are major activities that were not part of the project scope at the time of earlier assessments. The Tier 1 screening identified that the impacts resulting from these activities—particularly in relation to the atmospheric environment, and aquatic ecosystems—are not bounded by earlier assessments or previous conditions (with 6 operating units). Specifically, aquatic habitat impacts from the DWI construction and thermal effects, especially as they relate to climate change, require further assessment. As such, these project-environment interactions will be comprehensively evaluated in the Tier 2 quantitative assessment to characterize the potential for adverse impacts.

While no specific COPCs were identified for the atmospheric or surface water environment, general feedback from the WTFNs on other PERAs has indicated that it would be beneficial to include a Harvester receptor in the PERA. As such, assessment of a Harvester is considered in the Tier 2 quantitative assessment.

Following refurbishment, PNGS Units 5-8 will operate in a manner consistent with previous operations (6 operating units). Consequently, the potential effects of the Continued Operation Phase on most environmental components are similar to those previously assessed in the 2022 PN ERA for 6 operating units and comparable to current conditions with 4 units (PNGS Units 5-8) operating.

As shown in the conceptual timeline for the Project in **Figure 1-2**, there will be activities occurring in one phase that occur at the same time as another phase. For example, while PNGS Units 1 and 4 are in the Stabilization Phase and PNGS Units 2 and 3 are in SWS phase, risk reduction and removal activities will also occur, along with PNGS Units 5-8 refurbishment activities, and construction of the DWI. The air and noise modelling, and surface water quality modelling considered a bounding condition when activities are occurring at the same time, where relevant to the assessment.

In summary, the following potential effects are evaluated in the Tier 2 assessment:

- Inclusion of a Harvester in the Predictive Human Health Risk Assessment (HHRA) to assess radiation dose from exposure to releases of tritium, carbon-14, and beta/gamma to the atmospheric and surface water environment.
- Evaluation of aquatic habitat loss and potential changes to habitat quality in the Predictive Ecological Risk Assessment (EcoRA) from construction of the proposed DWI and associated nearshore modifications.
- Evaluation of changes to thermal effects on indicator fish species in the Predictive EcoRA due to operation of the DWI, with consideration of long-term climate change.

Table 5-24: Project-Environment Interactions Carried Forward into the Tier 2 Assessment

Project Activities	Atmospheric Environment (Air/Noise)	Surface Water Environment - Flow	Surface Water Environment - Quality	Hydrogeological and Geological Environment – Groundwater Flow	Hydrogeological and Geological Environment – Groundwater Quality	Hydrogeological and Geological Environment - Soils	Radiation and Radioactivity (Gamma Radiation Field)	Terrestrial Environment	Aquatic Environment
PNGS Units 1-4 Decommissioning									
PNGS Units 1 and 4 Stabilization	-	-	-	-	-	-	-	-	-
PNGS Units 1- 4 Storage with Surveillance	✓*	-	✓*	-	-	-	-	-	-
Risk Reduction and Removal Activities	-	-	-	-	-	-	-	-	-
Dismantle/Demolish	-	-	-	-	-	-	-	-	-
PNGS Units 5-8 Refurbishment									
<i>Preparation for Refurbishment</i>									
• Procurement and Mobilization of Equipment and Components	-	-	-	-	-	-	-	-	-
• Relocation/Removal/Construction of Buildings, Structures, and Equipment	-	-	-	-	-	-	-	-	-
• Construction of PCSS and SB #5	-	-	-	-	-	-	-	-	-
• Defuel and Dewater	-	-	-	-	-	-	-	-	-
• Islanding the Unit	-	-	-	-	-	-	-	-	-
• Management of Heavy Water	-	-	-	-	-	-	-	-	-
• Construction of DWI	-	-	-	-	-	-	-	-	✓*
<i>Refurbishment</i>									
• Replacement of Reactor Components	-	-	-	-	-	-	-	-	-
• Removal and Replacement of Steam Generators	-	-	-	-	-	-	-	-	-
• Operation of DWI	-	-	-	-	-	-	-	-	✓*
• Refurbishment of Other Plant Systems	-	-	-	-	-	-	-	-	-
• Waste Management and Transportation	-	-	-	-	-	-	-	-	-
• Refuelling and Restarting	-	-	-	-	-	-	-	-	-

Project Activities	Atmospheric Environment (Air/Noise)	Surface Water Environment - Flow	Surface Water Environment - Quality	Hydrogeological and Geological Environment – Groundwater Flow	Hydrogeological and Geological Environment – Groundwater Quality	Hydrogeological and Geological Environment - Soils	Radiation and Radioactivity (Gamma Radiation Field)	Terrestrial Environment	Aquatic Environment
Continued Operations									
• Operation of PNGS Units 5-8	-	-	-	-	-	-	-	-	✓*
• Waste Management and Transportation	-	-	-	-	-	-	-	-	-

Notes:

"✓*" Indicates an interaction between the Project activity and the environmental component that is not bounded by previous operational conditions (with 6 operating units) or previous assessments as determined by the Tier 1 assessment. These interactions will be evaluated quantitatively in the Tier 2 assessment.

"-" Indicates conclusions of the Tier 1 assessment show that no Tier 2 assessment is needed.

6.0 Tier 2 Quantitative Assessment

6.1 Predictive Human Health Risk Assessment (HHRA)

The conclusion from the Tier 1 assessment identified that the Harvester receptor should be evaluated in the Tier 2 assessment and that the radiological emissions to air and water assessed in the 2017 Safe Storage PEA continue to remain a conservative estimate of radiological emissions based on current Project planning for PNGS Units 1-4 Stabilization and SWS, as well as for PNGS Units 5-8 Refurbishment.

This predictive HHRA provides the conservative radiation dose for the Harvester, and also an updated dose prediction for the other human receptors evaluated in the 2017 Safe Storage PEA based on more recent meteorological data from PN (2017 to 2021).

6.1.1 Problem Formulation

The problem formulation provides the objectives, goals, framework and methodology for the PERA and consists of identifying the relevant components for the predictive human health risk assessment (HHRA). These components include the identification of human receptors that may be potentially present in or around the PN Site, the COPCs that may occur in or around the PN Site; and the exposure pathways by which receptors could be exposed to contaminants in the environment. A conceptual site model illustrates all of these relationships, based on the results of the problem formulation.

6.1.1.1 Health and Safety of On-site Workers

On-site workers, contractors, and visitors are potentially exposed to environmental contaminants, both chemical and radiological, but these exposures are considered and controlled through OPG's Health and Safety Management System and the Radiation Protection Program, and are not considered in this HHRA, as discussed below.

OPG's Health and Safety Management System Program is designed to ensure the protection of employees, contractors and visiting members of the public. The program outlines a systems approach used to manage risks associated with activities, products and services of OPG Nuclear operations. Contractors are required to maintain a level of safety equivalent to OPG staff while working at an OPG workplace. Work at OPG is subject to safe work planning requirements where safety hazards are identified and mitigating measures are communicated through Pre-Job Briefings. Routine or planned work is governed by approved procedures and operating instructions.

During PNGS Units 1-4 Decommissioning, PNGS Units 5-8 Refurbishment and Continued Operations, OPG's Radiation Protection Program will be applied. The Radiation Protection Program is designed to ensure that doses for employees, contractors and visiting members of the public are below regulatory limits, and As Low As Reasonably Achievable (ALARA), social and economic factors being taken into account. Employee radiation doses are monitored to ensure

they do not exceed exposure control levels that are below regulatory limits. Doses to visitors and contractors are also monitored. Only workers classified as Nuclear Energy Workers (NEWs) may perform radioactive work. Visitors are limited to non-radioactive work and escorted by a qualified NEW. Personal information is collected for the purposes of dose reporting.

As human exposures on the site are kept within safe levels through the Health and Safety Management System Program and Radiation Protection Program, on-site receptors are not addressed further in the predictive HHRA. The focus of the HHRA is on off-site members of the public.

6.1.1.2 Receptor Selection and Characterization

The focus of the HHRA is on potential risk to off-site members of the public. Off-site members of the public are potentially exposed to low levels of airborne or waterborne contaminants. The most-affected off-site members of the public are defined as potential “critical groups” or “representative persons”. Potential critical groups are defined through site specific surveys and their doses are calculated in the OPG EMP Reports.

As a result of engagement activities to support the DNNP PERA, representatives from the WTFNs expressed interest in including a new human receptor in the DNNP PERA that aims to better represent the lifestyle characteristics of an Indigenous person who may work and/or live near the DN site and may also harvest traditional foods (animals and plants that are fished, hunted, or gathered from the land and consumed as food (HC, 2018) in the local area. This receptor is assumed to hunt, fish and consume traditional foods in a greater proportion compared to the lifestyles represented by the list of receptors currently characterized in OPG’s existing EMPs and ERAs. The new receptor was identified in the DNNP PERA as a “Harvester”. The Harvester was developed using publicly available information to form the basis of the diet and exposure characteristics; it is expected that this receptor will be further refined over time through the site-specific survey as well as ongoing engagement activities with Indigenous Nations and communities. The same diet and exposure characteristics from the DNNP PERA have been implemented in this PERA. The development of the Harvester receptor’s diet is described in more detail in **Section 6.1.2.4.1**.

The potential critical group receptors used for the predictive HHRA (shown in **Figure 1-3**) are consistent with OPG’s annual PN EMP reports and the 2022 PN ERA (Ecometrix, 2023a), with the addition of the Harvester receptor included as part of this PERA. The seven potential critical groups are:

- The **C2** potential critical group consists of inhabitants at a correctional institute located approximately 3 km NNE of the PN Site. The C2 group obtains drinking water from the Ajax Water Supply Plant (WSP) and does not consume locally grown fruits or vegetables. The C2 resident is conservatively assumed to be at this location 100 percent of the time over the full year.

- The **Industrial/Commercial** potential critical group consists of adult workers whose work location is close to the nuclear site. Members of this group are typically at this location about 23% of the time. They consume water from the Ajax WSP. The closest location for this group is about 1 km NNE of the site.
- The **Urban Residents** potential critical group consists of Pickering and Ajax area residents which surround the PN Site (e.g., Fairport, Fairport Beach, Rosebank, Liverpool, Pickering Village, etc.). The members of this group mostly consume water from the Ajax WSP and also consume a diet composed in part of locally grown produce and some locally caught fish. Members of this potential critical group are also externally exposed to beach sand at local beaches (Beachpoint Promenade, Beachfront Park, or Squires Beach). Surveys indicate that 16% of urban residents work within 5 km of the PN site.
- The **Farm** potential critical group consists of residents of agricultural farms (but not dairy farms) within a 10 km radius of the PN Site. Members of this group obtain most of their water supply from wells but also a portion from the Ajax WSP. Members of this potential critical group consume locally grown produce and animal products, as well as locally caught fish. They are also externally exposed to beach sand at local beaches (Beachpoint Promenade, Beachfront Park, or Squires Beach).
- The **Dairy Farm** potential critical group consists of residents of dairy farms within a 20 km radius of the PN Site. This group obtains most of their water supply from local wells. They also consume locally grown fruit and vegetables and locally produced animal products, including fresh cow's milk. Members of this potential critical group are also externally exposed to beach sand at local beaches (Beachpoint Promenade, Beachfront Park, or Squires Beach).
- The **Sport Fisher** potential critical group is comprised of non-commercial individuals fishing near the PN site outfalls, 0.5 km south of the PN site. Members of this group were conservatively assumed to obtain their entire amount of fish for consumption from the vicinity of the PN site and spend 1% of their time at the outfall location where atmospheric exposure occurs.
- The **Harvester** potential critical group represents local residents in the vicinity of PN site who hunt, fish and regularly consume traditional foods harvested from the areas around the PN site. The Harvester is meant to represent Indigenous local residents, some of whom may also work near the PN site. It is conservatively assumed that 16% of the adult Harvesters work within 5 km of the PN site (consistent with the assumption from the EMP for the urban resident). Doses to this portion of adults are adjusted using the Industrial/Commercial worker dose to account for the increased exposure while at work due to proximity of this worker location to the station. The Harvester potential critical group has been conservatively placed in the WNW wind sector, approximately 1 km from the PN site, consistent with the urban resident location.

The predictive HHRA and receptor selection does not directly address sensitive or vulnerable populations; however, demonstration that the receptors evaluated are well below the public dose limit would indicate that sensitive or vulnerable human health groups are considered protected as well. The public dose limit of 1 mSv/a is protective of all ages and populations.

6.1.1.3 Selection of Chemical, Radiological, and Other Stressors

The only COPCs that were identified for further assessment were radionuclides including tritium and C-14 in air, and tritium, C-14, and beta/gamma in water. Airborne particulates, noble gases and radioiodine emissions were not assessed as their sources terms are either minor or will be eliminated as described in 2017 Safe Storage PEA (Golder and Ecometrix, 2017).

Non-radionuclide COPCs or physical stressors were not identified for the Tier 2 assessment.

6.1.1.4 Selection of Exposure Pathways

For exposure of human receptors to radiological COPCs, the relevant exposure pathways include:

- Air inhalation and external exposure to air;
- Ingestion of water (WSP, wells) and external exposure to water (lakes, WSPs, wells)
- Incidental ingestion of soil and beach sand;
- External exposure to soil and beach sand; and,
- Ingestion of food (homegrown and traditional foods).

The complete exposure pathways, as defined in OPG's EMP, for exposure of relevant receptors to radiological COPCs are summarized in **Table 6-1**, with the addition of the Harvester receptor.

Table 6-1: Complete Exposure Pathways for Receptors for Exposure to Radiological COPCs

Receptor	Exposure Pathway	Environmental Media
Sport Fisher	Inhalation	Air
	Ingestion	Aquatic animals (fish)
	External	Air
Industrial/Commercial Worker ⁽¹⁾	Inhalation	Air
	Ingestion	Water (Ajax WSP) Soil (incidental) Sediment (incidental) Aquatic animals (fish) Terrestrial plants (local produce) Terrestrial animals (local produce)
	External	Air Water

Receptor	Exposure Pathway	Environmental Media
		Soil Sediment
Urban Resident	Inhalation	Air
	Ingestion	Water (Ajax WSP) Soil (incidental) Sediment (incidental) Aquatic animals (fish) Terrestrial plants (local produce) Terrestrial animals (local produce)
	External	Air Water Soil Sediment
Correctional Institution	Inhalation	Air
	Ingestion	Water (Ajax WSP) Soil (incidental)
	External	Air Water Soil
Farm	Inhalation	Air
	Ingestion	Water (Wells/Ajax WSP) Soil (incidental) Sediment (incidental) Terrestrial plants (locally grown) Terrestrial animals (locally grown)
	External	Air Water Soil Sediment
Dairy Farm	Inhalation	Air
	Ingestion	Water (Wells) Soil (incidental) Sediment (incidental) Terrestrial plants (locally grown) Terrestrial animals (locally grown)
	External	Air Water Soil Sediment
Harvester	Inhalation	Air
	Ingestion	Water (Ajax WSP) Soil (incidental) Sediment (incidental)

Receptor	Exposure Pathway	Environmental Media
		Aquatic animals (fish) Terrestrial plants (traditional foods) Terrestrial animals (traditional foods)
	External	Air Water Soil Sediment

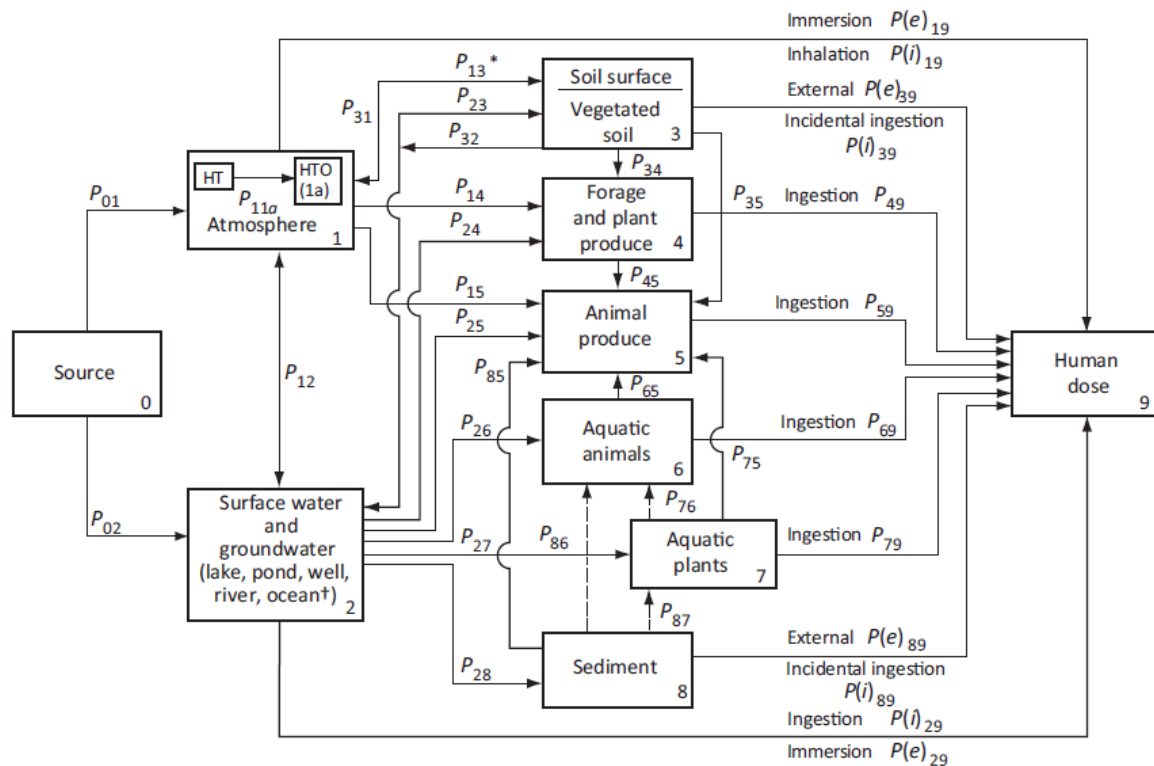
Note:

(1) A small fraction of Industrial/Commercial workers are also Urban Residents; therefore, the ingestion pathway is included to account for when the worker is at home.

6.1.1.5 Human Health Conceptual Site Model

The human health conceptual site model (CSM) illustrates how human receptors are exposed to COPCs. It represents the relationship between the source and receptors by identifying the source of contaminants, receptor locations and the exposure pathways to be considered in the assessment for each receptor. Exposure pathways represent the various routes by which radionuclides and/or chemicals may enter the body of the receptor, or (for radionuclides) how they may exert effects from outside the body.

A generic CSM, taken from CSA N288.1:20 (CSA, 2020) is shown in **Figure 6-1**, and is applied to human receptors around the PN Site. This represents the exposure pathways from source to receptor. It is appropriate for radiological and non-radiological COPCs, except that, for non-radionuclides, external and immersion pathways are represented by dermal exposure. No non-radiological COPCs were identified for the predictive HHRA.



*Includes transfer factors $P_{13\text{area}}$, $P_{13\text{mass}}$, and $P_{13\text{spw}}$

†For ocean water, pathways P_{23} , P_{24} , P_{25} , and $P(i)_{29}$ are not used.

Notes:

- (1) The broken lines represent pathways that are not explicitly considered in the model or are considered only in special circumstances.
- (2) Factors include multiple transfers where appropriate.

Figure 6-1: Conceptual Model for Human Receptors (CSA, 2020)

6.1.1.6 Uncertainties in the Problem Formulation

The data used in the predictive HHRA problem formulation were concluded to be of adequate quality and quantity to support the objectives of the PERA.

The development of the Harvester receptor relied on generic, non-site-specific information relating to Indigenous diet composition and traditional food consumption rates from the Ontario First Nations Food, Nutrition and Environment Study (FNFNES) published by Chan et al. (2014). The data used were for the ecozone that includes the PN site, but were not specific to the PN local area. Though the data used are considered adequate for modelling exposures to local Indigenous receptors via the traditional food consumption pathway, the inclusion of site-specific consumption information would reduce uncertainties in future risk assessments relating to the Harvester receptor's exposure to COPCs in local traditional foods.

6.1.2 Exposure Assessment

The exposure assessment includes identification of exposure locations and exposure factors for each receptor, explanation of dispersion models, and presentation of modelled exposure concentrations and doses. Uncertainties are also discussed. This section presents the information used in the IMPACT model, and the model results.

6.1.2.1 Exposure Locations

An exposure location is the place where the receptor comes into contact with a COPC. The relevant human receptors are the potential critical groups defined in OPG's annual PN EMP reports and the 2022 PN ERA (Ecometrix, 2023a), with the addition of the Harvester receptor included as part of this PERA. The exposure locations of the human receptors have been conservatively located at the nearest/most exposed location for each potential critical group. **Figure 1-3** presents the locations of these receptors which are generally consistent with the 2022 PN ERA (Ecometrix, 2023a), with the exception of the new Harvester receptor conservatively located at the same location as the urban resident location, which consistently receives the highest radionuclide concentrations in air due to the predominant wind direction to the west-north-west (WNW) basing on the annual average meteorology data from 2017 to 2021.

6.1.2.2 Exposure Duration and Frequency

Consistent with the 2017 Safe Storage PEA and the 2022 PN ERA, full-time residency was assumed for the correctional institute resident, Urban Resident, Farm resident, and Dairy Farm resident. For the Industrial/Commercial worker and the Sport Fisher a residency of 23% and 1% was assumed, respectively. A small fraction (16%) of urban residents living near the PN Site also work within 5 km of the PN Generating Station; therefore, they receive a portion of their dose while at home and a portion of their dose while at work. The same fraction (16%) as the urban resident was assumed for the harvester. A small fraction (8%) of workers in the Industrial/Commercial critical group also live near the PN Site; therefore, they receive a portion of their dose while at work and a portion of their dose while at home. The dose received by these critical groups has been adjusted to account for these lifestyles, consistent with the annual EMP reports.

6.1.2.3 Exposure and Dose Calculations

Radiological dose calculations follow the equations presented in CSA N288.1:20 (CSA, 2020) which are not reproduced in this report. IMPACT 5.5.2 is used for the dose calculations and is consistent with the method of dose calculation described in CSA N288.1:20 (CSA, 2020).

As no non-radiological contaminants of potential concern were carried forward from the Tier 1 screening assessment, non-radiological exposure and dose calculations were not required.

6.1.2.4 Exposure Factors

For the radiological dose calculations, the exposure factors (e.g., intake rates, occupancy and shielding factors, etc.) are generally those in CSA N288.1:20 (CSA, 2020). The intake rates for

ingestion and inhalation are the central or mean intake rates provided in CSA N288.1:20 (CSA, 2020), with the exception of the drinking water intake rate for a 1-year old infant. The drinking water intake rate for the 1-year old infant was adjusted from the default value in CSA N288.1 based on guidance in Clause 6.15.3.2, since the PN infant is assumed to drink only cow's milk (and not water and infant formula) (OPG, 2024e). **Table 6-2** summarizes the exposure factors used in the radiological dose calculations that were used for the 2023 EMP report (OPG, 2024g).

Table 6-2: Human Exposure Factors for Radiological Dose Calculations

Exposure Factor	Units ⁽⁴⁾	Infant 1 year	Child 10 year	Adult
Inhalation rate	m ³ /a	1830	5660	5950
Inhalation occupancy factor	unitless	1.0	1.0	1.0
Incidental soil ingestion rates	g dw/d	0.061	0.055	0.004
Incidental ingestion of sediment	g dw/d	0.061	0.055	0.004
Drinking water intake rate ⁽¹⁾	L/a	0	151.1	379.6
Aquatic animal intake rate ⁽²⁾	kg/a	1.68	4.82	6.86
Terrestrial animal intake rates	kg/a	262.3	286.3	255.5
Terrestrial plant intake rates	kg/a	144.5	331.1	440
Outdoor occupancy factor	unitless	0.2	0.2	0.2
Indoor plume shielding factor (skin dose and pure beta emitters)	unitless	1.0	1.0	1.0
Indoor groundshine shielding factor (gamma emitters) ⁽³⁾	unitless	0.5	0.5	0.5
Groundshine shielding factor (uneven surface shielding)	unitless	0.2	0.2	0.2
Beach swim occupancy factor	unitless	0	0.014	0.014
Bathing occupancy factor	unitless	0.014	0.014	0.014
Pool swim occupancy factor (WSP fill)	unitless	0	0.028	0.028
Pool swim occupancy factor (Well water fill)	unitless	0	0.014	0.014
Skin area	m ²	0.72	1.46	2.19
Dilution factor (DF) for shoreline sediments	unitless	1.0	1.0	1.0
Shore Width factor (lake)	unitless	0.3	0.3	0.3
Shoreline occupancy factor	unitless	0.02	0.02	0.02
No. days/a soil ingested	d/a	135	135	135
No. days/a sediment ingested	d/a	45	45	45

Notes:

- (1) The infant is conservatively assessed as consuming only cow's milk which is included in the terrestrial animal intake rate.
- (2) Excludes shellfish due to fresh water environment at PN. Shellfish are a marine environment food product.
- (3) For effective and skin dose. For essentially pure beta emitters, this shielding factor is zero.
- (4) dw used in specification of units indicates dry weight.

Sources: (COG, 2013; CSA, 2020)

6.1.2.4.1 Harvester Diet

Neither a site-specific traditional foods diet study nor a WTFNs Indigenous Knowledge study is available currently as inputs to this PERA; therefore, publicly available information is used to form the initial basis of the diet for the Harvester. The assumptions for the Harvester diet identified below are consistent with those assumed in the DNNP PERA prepared in 2024.

The diet for the Harvester is composed of traditional foods as well as store-bought foods. Traditional foods are animals and plants that are fished, hunted, or gathered from the land and consumed as food (HC, 2018). The discussion below is focused on the traditional foods component of the diet. The main source of information for ingestion rates and food components of traditional foods is the First Nations Food, Nutrition and Environment Study (FNFNES) for Ontario (Chan et al., 2014). Part of the FNFNES included household interviews to collect information on foods consumed. The FNFNES is the most recent publicly available study from Ontario on traditional food consumption rates. The FNFNES is split up by the three ecozones in Ontario: Boreal Shield, Hudson Plains, and Mixedwood Plains.

The Harvester receptor utilizes, as an initial set of characteristics, available information from the FNFNES for the Mixedwood Plains (Chan et al., 2014). The PN site is located in the Mixedwood Plains ecozone which consists of gentle rolling hills and lowlands, bounded by the Great Lakes. Data were collected from 18 First Nations communities in Ontario, with 4 located in the Mixedwood Plains. Based on the data review, the following key assumptions and methodologies for traditional foods consumption were applied:

- The consumption rates for the average consumer were assumed to be representative of the Harvester receptor. Harvesting of traditional food was conservatively assumed to occur near the PN site.
- The consumption rates were assumed to be the average of those reported for male and female, for each traditional food category (fish, game meat, game organs, birds, and plants). The consumption rate for fish, game meat and organs is higher for males, and the consumption rate for birds and plants is higher for females; therefore, the gender-averaged consumption rates were considered appropriate.
- The traditional food categories are broken down into more detailed categories which include: fish, large mammal, small mammal, mammal organs, riparian bird, terrestrial bird, and plants.
- Based on knowledge of ecological receptors that exist near the PN site, a representative traditional food was then selected to represent the traditional foods identified in each traditional food category (**Table 6-4**).
 - Walleye was selected as the representative fish since it was more commonly observed in Lake Ontario near the PN site than yellow perch or smallmouth bass.

- Deer was selected as the representative large mammal. While deer are uncommon at the PN site, deer potentially breed near the PN site and are present year-round. The closest Wildlife Management Unit in Ontario that allows sustainable harvest of moose is approximately 100 km away. While members of Indigenous peoples may harvest moose, deer is more common near the PN site.
- Canada goose was selected as the representative terrestrial bird. While both Canada goose and wild turkey have been observed on the PN site, Canada goose was selected since it was identified as a species that has been injured/killed through vehicle collisions; indicating it is likely more common than wild turkeys near the PN site.

The consumption rates used for each food category for the Harvester receptor are shown in **Table 6-3** in the column “proportioned consumption rate”. The specific food items that are modelled to represent each food category are shown in **Table 6-4** in the column “representative traditional food for modelling”. It is understood that this is the starting point to represent the Harvester diet for assessment purposes and these characteristics will be refined over time and updated in future ERAs.

Table 6-3: Proportioned Consumption Rates for Harvester Modelling

Traditional Food Category	Table 10a FNFNES (g/d) ^(b)	Table 10e FNFNES (g/d) ^(b)	% of Traditional Food Category	Traditional Food Category (Detailed)	% of Traditional Food Category (Detailed)	Proportioned Consumption Rate (g/d)	% of Traditional Food Diet
Total Traditional Food^(a)	41.81	-	-	-	-	41.81	100%
Fish	10.35	-	100%	-	-	-	-
Walleye/pickereel	-	4.92	34%	Fish	100%	10.35	25%
Yellow perch	-	6.69	46%				
Smallmouth bass	-	2.99	20%				
Game meat	8.21	-	100%	-	-	-	-
Deer	-	6.71	55%	Large mammal	83%	6.85	16%
Moose	-	3.51	29%				
Rabbit	-	2.03	17%	Small mammal	17%	1.36	3%
Game organs	4.88	-	100%	-	-	-	-
Moose liver	-	3.69	56%	Mammal organs	100%	4.88	12%
Deer liver	-	2.9	44%				
Birds	2.28	-	100%	-	-	-	-
Wild turkey	-	0.97	30%	Terrestrial bird	69%	1.58	4%
Canada Goose	-	1.27	39%				
Ducks	-	1.00	31%	Riparian bird	31%	0.7	2%
Plants	16.09	-	100%	-	-	-	-
Corn	-	3.79	37%	Terrestrial Plants	100%	16.09	38%
Squash	-	2.30	22%				
Beans	-	4.28	41%				

Notes:

^(a) The sum of the consumption rates for the Traditional Food Categories is used rather than the total reported in Table 10e in the FNFNES (Chan et al., 2014). This is considered conservative.

^(b) Represents an average consumer, average of men and women surveyed in the FNFNES (Chan et al., 2014).

Table 6-4: Traditional Foods Selected for Harvester Modelling

Traditional Food Category	Traditional Food Category (Detailed)	Traditional Foods Most Consumed (from FNFNES)	Representative Traditional Food for Modelling
Fish	Fish	Walleye/pickering	Walleye
		Yellow perch	
		Smallmouth bass	
Game	Large mammal	Deer	Deer
		Moose	
	Small mammal	Rabbit	Rabbit
Game Organs	Mammal organs	Deer organs	Deer organs
		Moose organs	
Birds	Riparian bird	Duck	Mallard
	Terrestrial bird	Canada goose	Canada goose
		Wild turkey	
Plants	Plants	Corn	Vegetables
		Squash	
		Beans	

The adult, child, and infant age groups were assessed for the Harvester in this PERA. The Harvester was conservatively assumed to be located at the same location as the Urban Resident potential critical group characterized in OPG's existing EMP and ERAs, since the Urban Resident location consistently has the highest radionuclide concentrations in air due to the predominant wind direction to the west-north-west (WNW), based on the annual average meteorology data from 2017 to 2021. The Harvester was conservatively assumed to reside at the most exposed residential location 100% of the time, except for those who may work near the PN site.

The Harvester is assumed to obtain the majority of drinking water from the Ajax WSP, which is the same as the Urban Resident. Other water for drinking, bathing, and gardening is obtained from both shallow and deep wells. Consistent with existing EMP assumptions, a small fraction of adult residents living near PN also work within 5 km of the PN site. Therefore, it is assumed that 16% of the Harvester residents are also Industrial/Commercial workers, spending 23% of their time at work and 77% of the time at home.

The traditional food items consumed by the Harvester adult were conservatively assumed to be taken from locations close to the residence, and fish were obtained from the outfall location at PN, which is representative of fish in Lake Ontario in the initial mixing zone.

The local food intake fractions implemented in the IMPACT model for the Harvester receptor are shown in **Table 6-5**. The local food intake fraction was calculated as follows:

Local Intake Fraction (%) = (Annual Intake of a Traditional Food Type / Total Annual Food Intake in the Corresponding Food Category) * Local Harvest Fraction * 100%

where,

Annual Intake of a Traditional Food Type = annual ingestion rate of a traditional food type consumed within each relevant food category (kg/yr).

Total Annual Food Intake in the Corresponding Food Category = annual ingestion rate for traditional + store bought food in the food category (kg/yr).

Local Harvest Fraction = the fraction of the traditional food type that is harvested locally (unitless). For this assessment a local harvest fraction of 1 has been conservatively assumed for all food types.

As discussed above, the annual traditional food intake of the Harvester adult was developed utilizing the available information from the FNFNES for the Mixedwood Plains ecozone, while the total annual food intake of a Harvester adult is taken from Table G.9b in CSA N288.1:20 (CSA, 2020), split up by food categories. The data in CSA N288.1:20 (CSA, 2020) are based on a survey conducted jointly by Health Canada and Statistics Canada in 2004 (Statistics Canada, 2004). They represent the average dietary intakes for the different age groups of the general population, with diets adjusted to reference energy intakes. The FNFNES report only provides traditional food intake rates for adults. The traditional food intake rates for the Harvester 10y-child and Harvester 1y-infant were determined based on the ratio of the consumption rates by food item for the 10y-child/adult and 1y-infant/adult, as provided in CSA N288.1:20; Table G.9b (CSA, 2020).

Table 6-5: Local Food Intake Fractions for Harvester for IMPACT Model – Adult, Child, and Infant

Food Category in IMPACT Model	Traditional Food Type (Detailed)	Representative Traditional Food for Modelling	Adult			Child-10y			Infant-1y		
			Total Diet by Food Category (kg fw/a) ^(a)	Proportioned Traditional Foods Consumption Rate (kg fw/a) ^(b)	Local Intake Fraction ^(c)	Total Diet by Food Category (kg fw/a) ^(a)	Proportioned Traditional Foods Consumption Rate (kg fw/a) ^(d)	Local Intake Fraction ^(c)	Total Diet by Food Category (kg fw/a) ^(a)	Proportioned Traditional Foods Consumption Rate (kg fw/a) ^(d)	Local Intake Fraction ^(c)
Aquatic Animals	Fish	Walleye	6.86	3.78	55.07%	4.82	2.65	55.03%	1.68	0.92	55.02%
Terrestrial Animals	Large mammal	Deer	253.9	2.50	0.98%	286.25	0.70	0.24%	262.28	0.20	0.08%
	Small mammal	Rabbit		0.50	0.20%		0.14	0.05%		0.05	0.02%
	Mammal organs	Deer organs		1.78	0.70%		1.24	0.43%		0.45	0.17%
	Riparian bird	Mallard		0.26	0.10%		0.14	0.05%		0.05	0.02%
	Terrestrial bird	Canada goose		0.58	0.23%		0.32	0.11%		0.12	0.05%
Terrestrial Plants	Plants	Vegetables	441.7	5.87	1.33%	331.09	3.19	0.96%	144.54	0.12	0.08%

Notes:

^(a) Total diet by food category is from CSA N288.1:20; Table G.9b.

^(b) Proportioned consumption rate in Table 6-3 with unit conversion from g/d to kg/a.

^(c) Local Intake Fraction represents the percentage of food in the food category that is obtained from traditional foods near the PN site. The remaining portion of the diet is obtained from store bought foods which are not impacted by releases from the PN site. Local Intake Fraction = (annual food Intake of a traditional food type / total annual food intake in the corresponding food category) * local harvest fraction * 100%. Note, local harvest fraction is conservatively assumed to be 1 indicating that all traditional food to be consumed is obtained locally.

^(d) Consumption rates for 10y-child and 1y-infant were proportioned from adult based on the consumption rate ratio of 10y-child/adult and 1y-infant/adult by food item as provided in CSA N288.1:20; Table G.9b.

6.1.2.5 Dispersion Models

An environmental transport and pathways model, IMPACT Version 5.5.2, is used to evaluate the transport and effects of contaminants on the local environment including human and ecological receptors. IMPACT is a modelling tool, created, maintained and supported by Ecometrix Incorporated (Ecometrix). The IMPACT model is a customizable tool that allows the user to assess the transport and fate of COPCs through a user-specified environment. The model is used to estimate concentrations of COPCs in a range of media.

IMPACT Version 5.5.2 is consistent with the equations outlined in CSA N288.1:20 (CSA, 2020) for pathways analysis and for calculation of radiological dose to humans. IMPACT uses specific activity models for tritium and C-14 as per CSA N288.1:20 (CSA, 2020) and as recommended by CSA N288.6:22 (CSA, 2022a). The formation of organically bound tritium (OBT) in plants and animals from HT (elemental tritium) and HTO (tritium oxide) is accounted for in the specific activity model for tritium and the dose from OBT is included in the dose results in IMPACT.

The model was originally developed in 1993 as part of research projects funded by the Atomic Energy Control Board (now the CNSC). Since the initial development, the IMPACT software package has been continuously revised to improve the interface, and the integration with various operating systems, and most importantly to embody an up-to-date understanding of the fate, transport and dose impacts of radionuclides released to the environment. There are several built in libraries for parameters relevant to atmospheric dispersion, groundwater transport, soil processes, and water-sediment interaction. IMPACT can be used in various applications such as: human and ecological risk assessment; environmental impact assessments; pathways analysis; food-chain modeling; cumulative impacts; and derived release limits. IMPACT is able to model doses from emissions that can otherwise not be calculated from environmental measurements, including doses for future timeframes.

IMPACT was verified and validated in accordance with CSA N286.7-99. It has also been audited against CSA N286.7-16 and meets these requirements. The IMPACT code is verified in the IMPACT 5.5.2 – Tool Qualification Report (Ecometrix, 2023e).

IMPACT is designed to model routine, continuous and low-level emissions, and models transport of radionuclides through equilibrium partitioning. Time-dependent equations are used to model the soil compartment. Initial concentrations in environmental media (background concentrations) are not accounted for in the analysis. Thus, doses calculated from facility emissions are incremental doses.

The IMPACT code models radionuclides cycling through the biosphere from both airborne and waterborne effluent releases.

A hydrodynamic surface water model (RMA10) was used in the 2017 Safe Storage PEA to predict changes to lake currents, sediment transport and water temperature in Lake Ontario during the previous operational conditions (for 6 operating units) and SWS. The surface water model provides plume concentration factors at selected receptor locations that were used to predict

concentration of COPCs at these locations. The concentrations of COPCs were used as inputs (dictator sources) to the IMPACT model to calculate radiological doses to human receptors identified in **Section 6.1.1.2**.

6.1.2.6 Exposure Point Concentrations and Doses

Exposure point concentrations are based on the predicted airborne and waterborne emissions from the PN Generating Station for the conservative estimate of emissions (during the SWS Phase).

Concentration factors (**Table 5-15**) from the surface water model for a number of receptor locations were applied to the predicted waterborne emissions. Assumption in 2017 Safe Storage PEA is that 50,000 m³/day of cooling water from the RBSW is released with the RLWMS stream via the PNGS Units 5-8 outfall during the SWS Phase. Since based on current Project planning, additional dilution will be available from CCW pumps, the concentration factors from the 2017 Safe Storage PEA are a conservative representation of conditions during PNGS Units 1-4 decommissioning and PNGS Units 5-8 refurbishment, see **Table 5-14**, to determine the exposure point concentrations for tritium, carbon-14, and gross beta/gamma. Cs-134 is considered appropriate to represent gross beta/gamma in water based on the most recent derived release limit calculations (OPG, 2024e).

The exposure point concentrations for waterborne radionuclides used as input (dictator sources) to the IMPACT model for dose calculations are presented in **Table 6-6**. For receptors exposed to the beach (e.g., urban resident), the average of the water concentrations from Squires Beach, Liverpool Beach, and Frenchman's Bay Inlet were used.

Table 6-6: Exposure Point Concentrations for Water Contaminants of Potential Concern Used in Dose Calculations

Receptor Locations	Unit	Tritium	Carbon-14	Beta/Gamma
RBSW Discharge	Bq/L	7.00E+03	3.00E-01	5.00E-01
Sport Fisher	Bq/L	8.78E+00	3.76E-04	6.27E-04
Squires Beach	Bq/L	5.24E+00	2.24E-04	3.74E-04
Liverpool Beach	Bq/L	2.53E+00	1.08E-04	1.81E-04
Frenchman's Bay Inlet	Bq/L	2.21E+00	9.47E-05	1.58E-04
Average Beach	Bq/L	3.33E+00	1.43E-04	2.38E-04
Ajax Intake	Bq/L	7.08E-01	3.03E-05	5.06E-05

Notes:

- (a) Gross beta / gamma is represented in IMPACT by cesium-134 (In the 2017 Safe Storage PEA Cs-137 was used based on the 2016 PN DRLs).
- (b) "Average Beach" is the average of Squires Beach, Liverpool Beach, and Frenchman's Bay (inlet)
- (c) This table is reproduced from Table 6-3 in the 2017 Safe Storage PEA

For airborne emissions, predicted releases of tritium and carbon-14 were presented in **Table 4-2** in the 2017 Safe Storage PEA and reconfirmed in the 2022 PEA Addendum (Table 5.1). Airborne

particulates, noble gases and radioiodine emissions were not assessed as their sources terms are either minor or will be eliminated as described in 2017 Safe Storage PEA (Golder and Ecometrix, 2017).

The Gaussian plume model described in CSA N288.1:20 (CSA, 2020) and implemented in IMPACT was used to estimate COPC concentrations in air at receptor locations. The PN Generating Station has multiple sources of airborne releases; however, two virtual sources were modelled, one in the midpoint of PNGS Units 1-4 and one in the midpoint of PNGS Units 5-8, consistent with the 2017 Safe Storage PEA. This simplification has been shown to have little effect on modelled concentrations at receptor locations 1 km or more off-site (COG, 2019). The air concentrations at human receptor locations including the Harvester are shown in **Table 6-7**.

Meteorological data used in the atmospheric dispersion model were average triple joint frequencies of wind direction, speed and stability class compiled from hourly data collected over the 5-year period 2017 to 2021 from the on-site Pickering meteorological tower at the 10 m elevation.

Table 6-7: Air Concentrations at Human Receptor Locations

Receptor Locations	Unit	Carbon-14	Tritium
Farm	Bq/m ³	6.96E-05	4.14E-01
Dairy Farm	Bq/m ³	2.96E-05	1.77E-01
Sport Fisher	Bq/m ³	6.24E-03	3.78E+01
Urban Resident WNW	Bq/m ³	7.62E-04	4.47E+00
Harvester	Bq/m ³	8.80E-04	5.16E+00
Industrial/Commercial	Bq/m ³	1.25E-03	7.39E+00
C2	Bq/m ³	2.22E-04	1.33E+00

The resulting dose to the harvester as well as the other human receptors based on the exposure point concentrations for air and water presented above are summarized in **Table 6-8**. The dose breakdown by pathway is presented for each potential critical group in **Appendix C**.

Table 6-8: Total Dose to Human Receptors for Conservative Estimate

Receptors	Adult Total Dose (μSv/a)	Child 10 yr old Total Dose (μSv/a)	Infant 1 yr old Total Dose (μSv/a)
Farm	1.95E-01	1.79E-01	1.35E-01
Dairy Farm	8.63E-02	9.11E-02	9.54E-02
Sport Fisher	3.51E-01	2.32E-01	1.19E-01
Urban Resident+	8.75E-01	9.99E-01	6.99E-01
Harvester+	1.17E+00	1.24E+00	8.26E-01
Industrial Commercial+	3.58E-01	N/A	N/A
C2	2.42E-01	2.84E-01	N/A

Note:

"+" indicates that a portion of the adults work near PN site and for modelling purposes are attributed the Industrial Commercial receptor dose while at work.

Bold indicates the receptor with the highest dose.

6.1.2.7 Uncertainties in the Exposure Assessment

The IMPACT model was used to predict dose to identified human receptors from the Project. This model is a steady state model; however, it includes time dependent equations to account for buildup in soil from deposition, for all radionuclides released.

It includes progeny buildup through use of progeny inclusive dose coefficients. Forty years of ingrowth was used to develop the progeny inclusive external dose coefficients for sediment and soil for each radionuclide, which is the timeframe used in CSA N288.1:20 for development of progeny-inclusive dose coefficients for sediment and soil exposure (CSA, 2020). This is a reasonable assumption considering the timeline for the Project. Exposure factors were based on best-available information from literature with preference for exposure factors identified in CSA N288.1:20 (CSA, 2020).

Uncertainties in predictions of media concentrations arise from inherent uncertainty in the air model in IMPACT. The model reports an annual average concentration, and typically over-predicts this concentration by a factor of 1.5. Uncertainty in the air predictions arises from the following assumptions made in the model:

- The activity in the plume has a normal distribution in the vertical plane.
- The effects of building-induced turbulence on the effective release height and plume spread have been generalized, while data suggest that effects of building wakes vary substantially depending upon the geometry of the buildings and their orientation with respect to wind direction.
- A given set of meteorological and release conditions leads to a unique modelled air concentration, whereas in reality measured concentrations can vary by a factor of 2 under identical conditions.

The dispersion model is valid for distances up to approximately 20 km. CSA N288.1:20 indicates that at distances greater than 20 km the dispersion model should be used with caution because at distances greater than 20 km the assumption of steady state meteorological conditions implicit in the model becomes less valid (CSA, 2020).

The concentration factors developed through the hydrodynamic surface water model were used to predict water concentrations used in the dose calculations. The uncertainties associated with the hydrodynamic model were outlined in the 2017 Safe Storage PEA. The main uncertainties include:

- The data available for use in developing the model has limits, as is common for any field data, and the limits are discussed in Section A.2 of the 2017 Safe Storage PEA.

- The calibration of the model indicates acceptable results however, as with all surface water models there is not perfect reproducibility of actual conditions. A qualitative assessment of the model indicates that the model predicts alongshore current well, but is less accurate for offshore components of flow. Alongshore current is considered the primary factor affecting thermal and contaminant plumes and therefore this was not considered a significant limitation. A quantitative calibration and verification was conducted and indicates the model generally meets industry standard acceptance criteria with a higher degree of uncertainty for offshore flow (see Section A.3 of the 2017 Safe Storage PEA).
- The sensitivity of the model predictions with respect to the concentration factors is addressed by providing predictions for extended simulation periods. These simulation periods are expected to encompass all of the expected variations and combinations of current speed, current direction, duration of current event, and water temperature. Appendix A of the 2017 Safe Storage PEA provides the average, minimum, maximum, and standard deviation for concentration factors at each of the receptor locations. Use of the average concentration factor was considered suitable for long term predictions. However, it is expected that use of the maximum concentration factors would still result in acceptable dose calculations as the doses calculated are orders of magnitude below the acceptable limits.

The uncertainties from the exposure assessment also include uncertainty in the exposure factors selected. In general, exposure factors used to characterize human receptors were selected from published sources such as CSA N288.1:20 (CSA, 2020), or site-specific values were identified based on OPG's site-specific surveys.

For the Harvester, there is uncertainty related to the dietary assumptions. Publicly available information from FNFNES (Chan et al., 2014) was used; however, the intent is to refine the assumptions through site specific surveys, if possible. In lieu of site specific information for the Harvester, various conservative assumptions were made. The Harvester was conservatively assumed to live at the Urban Resident location that has the highest air concentrations for a residential location and harvest traditional foods nearby. The Harvester was also conservatively assumed to remain at this location 100% of their time, except for those who may work within 5 km of the PN site, which is also considered in the total dose.

Considering the conservatism described above in the air and surface water model, and in the exposure factors, it is reasonable to conclude that doses arising from Project activities have not been underestimated.

6.1.3 Toxicity Assessment

The public dose limit for radiation protection is 1 mSv/a, as described in the Radiation Protection Regulations under the Nuclear Safety and Control Act. This limit is defined as an incremental dose. It is set at a fraction of natural background exposure to radiation. Public doses

arising from licensed facilities are compared to the public dose limit. Doses above the public dose limit are considered unacceptable.

6.1.4 Risk Characterization

The total radiation doses to human receptors are compared to the regulatory public dose limit of 1 mSv/a. A summary of the total dose for each human receptor and age group and comparison against the dose limit is provided in **Table 6-9**.

The total dose to the Harvester is 1.24 μ Sv/a for the Harvester (child). The dose estimate for the Harvester is 0.12% of the regulatory public dose limit (1,000 μ Sv/a). The highest dose for other receptors is 0.999 μ Sv/a to an urban resident (child), which is 0.10% of the regulatory public dose limit. Demonstrating that these human receptor groups are protected implies that other receptor groups near the PN site with anticipated lower exposure are also protected.

Since the dose estimates are a small fraction of the incremental public dose limit of 1 mSv/a, and of the natural background dose of 1.4 mSv/a, no health effects are anticipated due to exposure of potential critical groups to radiological releases from the PN Site.

Table 6-9: Summary of Total Dose to Human Receptors and Comparison to Dose Limit

Human Receptor	Adult		Child-10y		Infant-1y	
	Total Dose (μ Sv/a)	% of Dose Limit	Total Dose (μ Sv/a)	% of Dose Limit	Total Dose (μ Sv/a)	% of Dose Limit
Farm	1.95E-01	0.02%	1.79E-01	0.02%	1.35E-01	0.01%
Dairy Farm	8.63E-02	0.01%	9.11E-02	0.01%	9.54E-02	0.01%
Sport Fisher	3.51E-01	0.04%	2.32E-01	0.02%	1.19E-01	0.01%
Urban Resident+	8.75E-01	0.09%	9.99E-01	0.10%	6.99E-01	0.07%
Harvester+	1.17E+00	0.12%	1.24E+00	0.12%	8.26E-01	0.08%
Industrial Commercial+	3.58E-01	0.04%	N/A	N/A	N/A	N/A
C2	2.42E-01	0.02%	2.84E-01	0.03%	N/A	N/A

Note:

"+" indicates that a portion of the adults work near PN site and for modelling purposes are attributed the Industrial Commercial receptor dose while at work.

The bold value indicates the highest total dose for human receptor due to radiological releases to air and water

NA: not applicable.

There are no exceedances of the public dose limit of 1,000 μ Sv/a.

6.1.4.1 Uncertainty in Risk Characterization

The uncertainties in the characterization of risk consist of those identified in the exposure assessment (**Section 6.1.2.7**) and toxicity assessment (**Section 6.1.3**), since these two assessments are the inputs to the risk characterization.

The uncertainties from the exposure assessment include model uncertainty and uncertainty in the exposure factors selected. There were no major uncertainties identified from the toxicity assessment. In general, in each step of the predictive HHRA, conservative assumptions were used to address uncertainties or realistic assumptions were made. The use of this approach is far more likely to overestimate potential risk than to underestimate it.

6.2 Predictive Ecological Risk Assessment (EcoRA)

6.2.1 Problem Formulation

The Tier 1 assessment concluded that further evaluations of aquatic habitat impacts and thermal effects should be conducted in the Tier 2 assessment. All other Project-related interactions with the environmental components examined in the Tier 1 assessment were deemed to pose negligible risks, or to be sufficiently mitigated, or they are bounded by previously completed risk assessments or current operating conditions.

The predictive EcoRA provides a detailed assessment of aquatic impacts and thermal effects with respect to aquatic receptors in Lake Ontario.

6.2.1.1 Receptor Selection and Characterization

In total, 30 fish species were considered for the Tier 2 assessment. Most species (26) were found during the 2024 Deepwater and/or Nearshore fish community studies. The remaining 4 fish species (Emerald Shiner, American Eel, Smallmouth Bass, and Northern Pike) were not found during either of the 2024 fish community studies but have been included in the assessment due to their known presence near PN and inclusion as ecological receptors in the 2022 PN ERA.

As of late February 2025, two fish species, Lake Sturgeon and American Eel are notably species at risk (SAR). Lake Sturgeon (Great Lakes – Upper St. Lawrence populations) are currently not on Schedule 1 of the *Species at Risk Act* (SARA) but are under consideration for addition. They are listed as “Threatened” by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Provincially, Lake Sturgeon are listed as “Endangered” on the Species at Risk in Ontario (SARO) list (O. Reg. 230/08). Similarly, the American Eel is also currently not listed on Schedule 1 of the SARA but is under consideration for addition. They are classified as “Threatened” by COSEWIC. In Ontario, the provincial government has listed American Eel as “Endangered” on the SARO list.

6.2.1.2 Assessment and Measurement Endpoints

Assessment endpoints are explicit expressions of the environmental values that are to be protected. Assessment endpoints should include the ecological receptor and the attribute of the receptor that is to be protected (e.g., abundance or viability of populations) (FCSAP, 2012). Measurement endpoints are conceptually related to assessment endpoints and are defined as the tools that are used to measure exposure of or effects on each ecological receptor. Based on these measures, a potential for effect on the attribute of an assessment endpoint can be inferred. Measurement endpoints are the foundation for the lines of evidence (LOE) that are used to estimate risks to ecological receptors (FCSAP, 2012).

For most ecological receptors, the assessment endpoint is the viability of the population. This implies that very localized areas of effect on individuals may be tolerated, based on minimal expected effect at the population level. For SAR, the assessment endpoint is individual health, recognizing that each individual is important to the population.

The assessment and measurement endpoints considered for the predictive EcoRA are presented in **Table 6-10**.

Table 6-10: Assessment Endpoints, Measurement Endpoints, and Lines of Evidence

Organism Class	Level of Protection	Protection Goal	Assessment Endpoint	Lines of Evidence (LOE)	
				Line of Evidence	Use of Measurement Endpoints for Specific LOEs
Bottom Feeding Fish	Population or Individual for SAR (i.e., Lake Sturgeon, American Eel)	Population: Maintenance of bottom feeding fish populations in Lake Ontario as source of food for piscivorous fish and wildlife. Species at Risk: Survival of individual organisms.	Viability of bottom-feeding fish populations.	Habitat Loss	Evaluate the amount, quality and type of habitat lost in relation to the habitat needs of each species and life stage.
				Water Temperature	Comparison of water temperature metrics with thermal benchmarks for effect on each species and life stage. TRV
Pelagic Fish	Population	Maintenance of pelagic fish populations in Lake Ontario as source of food for piscivorous fish and wildlife.	Viability of pelagic fish populations.	Habitat Loss	Evaluate the amount, quality and type of habitat lost in relation to the habitat needs of each species and life stage.
				Water Temperature	Comparison of water temperature metrics with thermal benchmarks for effect on each species and life stage.

6.2.1.3 Selection of Chemical, Radiological and Other Stressors

Based on the results of the Tier 1 assessment, aquatic habitat loss and thermal effects are the only stressors retained for the Tier 2 ecological assessment. No chemical or radiological COPCs were identified based on the Tier 1 assessment.

6.2.1.4 Selection of Exposure Pathways

As no chemical or radiological COPCs were identified for the Tier 2 assessment, an assessment of selected exposure pathways is not warranted.

6.2.1.5 Ecological Health Conceptual Site Model

The ecological health conceptual site model (CSM) illustrates how receptors are exposed to the physical stressors retained for the Tier 2 EcoRA. It identifies the source of the stressors, main exposure effects and receptor responses to be considered in each assessment. The CSM for the predictive EcoRA is illustrated in **Figure 6-2**.

6.2.1.6 Uncertainties in the Problem Formulation

In general, the data used in the predictive EcoRA Problem Formulation were concluded to be of adequate quality and quantity to support the objectives of the PERA. The EcoRA Problem Formulation is based on the current understanding of the existing aquatic habitat and thermal conditions in Lake Ontario. Aquatic monitoring studies were completed based on project planning for the DWI at the time when the studies were designed. Further data collection is planned for 2025 for the aquatic environment to accommodate the changes to DWI planning since the studies were initiated (see **Section 4.3.1.4**). Additional aquatic environment studies will help to further reduce uncertainties associated with the proposed changes to the DWI and will further characterize the aquatic habitat for the predictive EcoRA. The results of these studies will be incorporated in the next revision of the PERA.

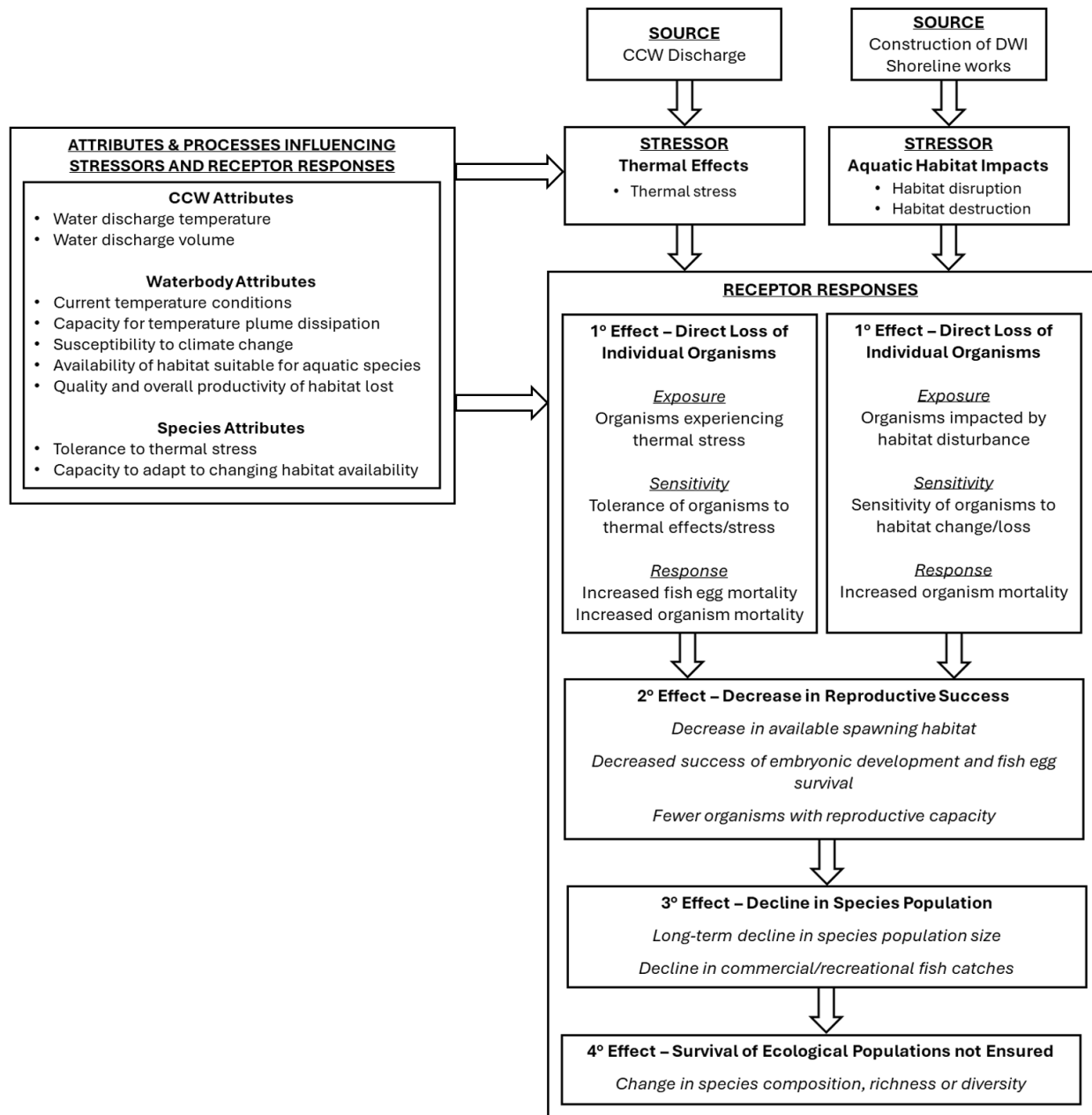


Figure 6-2: Ecological Health CSM for Physical Stressors in the Tier 2 Assessment

6.2.2 Aquatic Habitat Impacts

The aquatic environment around PNGS will primarily be impacted during PNGS Units 5-8 Refurbishment. Specifically, refurbishment activities expected to contribute to these impacts include the construction of a DWI intake cap, a bored tunnel running several metres below the lake bed from the intake cap to PNGS, and modifications to the shoreline. The proposed shoreline works include the potential installation of a dock, lake infilling and armoring, construction of a cut-off wall in the forebay and a bridge over the current CCW outfall for PNGS Units 5-8, and managed disposal of spoils including soil, sand, and rock. Currently, the intake cap is planned for 1.5 km offshore, south of the existing forebay. An alternate location, is under consideration for the intake cap, sited at 1.25 km offshore. The areal footprint of the construction activities associated with these modifications is depicted in **Figure 6-3**. This section integrates results of the 2024 environmental studies conducted within these areas to estimate the potential impacts of refurbishment activities on fish habitat.

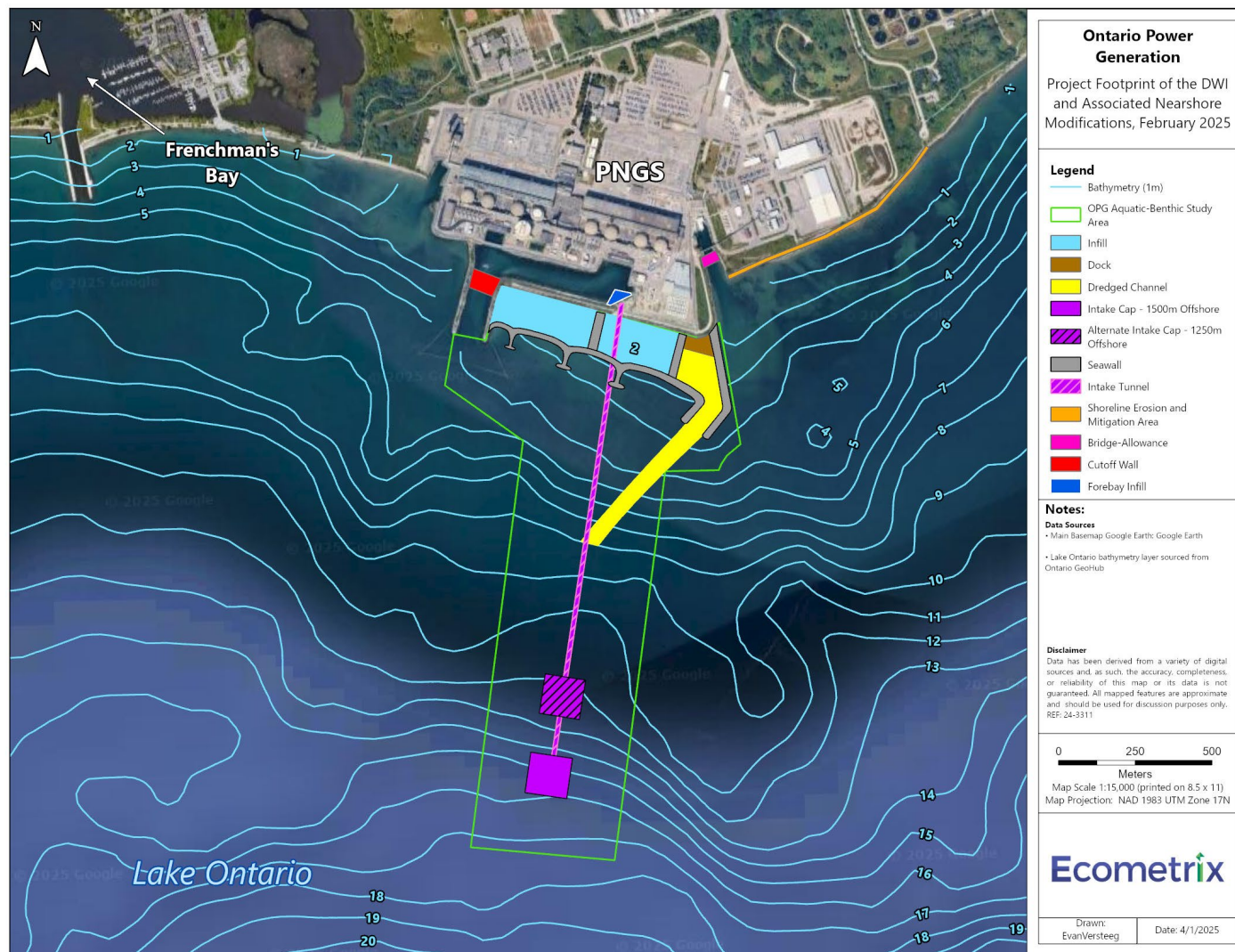


Figure 6-3: Project Footprint of Potential DWI and Nearshore Modifications Associated with the PNCGS Refurbishment

6.2.2.1 Characterization of Habitat disturbance associated with Project activities

The proposed DWI and associated nearshore structures are located within Lake Ontario, which is home to a rich diversity of aquatic life, including over 90 fish species. As part of the 2024 environmental studies, the Deepwater Fish Community Study documented 13 fish species in the area proposed for the DWI intake cap, while the Nearshore Fish Community Study recorded 20 species across the shoreline erosion modification and west infill study areas. Thus, construction works associated with project activities could lead to direct fish mortality, which is prohibited under subsection 34.4(1) of the Fisheries Act. Additionally, harmful alteration, disruption or destruction of fish habitat (HADD) may result from physical changes or habitat loss due to infrastructure development. As such, a FAA application will be submitted to the DFO for the proposed activities.

In order to assess the potential impacts on aquatic habitat, the areal extent (in hectares) of the footprint associated with each project activity was estimated, along with the corresponding type of disturbance (i.e., alteration, disruption, or destruction, as defined in the Fisheries Act). These estimates are presented in **Table 6-11**. It is important to note that these numbers are preliminary estimates based on conceptual designs and are subject to change as the design progresses.

Table 6-11: Estimated Areal Footprint and Disturbance Type for Construction Activities in the DWI and Nearshore Study Areas

Component	Disturbance Type	Structure / Area	Approximate Aquatic Habitat Use	Estimated Area Disturbed (ha)
DWI	Destruction	DWI (1500m) ^a	Transient foraging and seasonal movement corridor	1.00
		Alternate DWI Location (1250m) ^a		1.0
	Disruption	Intake Cap	Transient foraging and seasonal movement - progressing to potential spawning and sheltering habitat with decreasing depth	2.5
Erosion Control	Destruction	Shoreline Erosion Mitigation Area	Foraging habitat and physical shelter for small fish species	4.00
Bridge allowance	Alteration	Bridge over outfall	Foraging habitat and physical shelter for small fish species	0.3
	Destruction	Bridge over outfall	Foraging habitat and physical shelter for small fish species	0.3
Forebay	Destruction	Cut-off wall	Transient foraging and sheltering habitat when FDS is not in place.	0.50
	Destruction	Forebay Infill	Transient foraging and sheltering habitat when FDS is not in place.	0.20
Dock	Alteration	Dredged Dock Channel	Transient foraging and seasonal movement – progressing to potential spawning and sheltering habitat with decreasing depth	4.5
	Destruction	Dock	Nearshore spawning habitat	0.47
Seawall	Destruction	Seawall	Nearshore spawning habitat. Presence of macrophytes may	3.92

Component	Disturbance Type	Structure / Area	Approximate Aquatic Habitat Use	Estimated Area Disturbed (ha)
			provide spawning options specifically for phytophiles.	
West Infill	Destruction	West Infill Area	Potential nearshore spawning habitat. Presence of macrophytes may provide spawning options specifically for phytophiles. Foraging habitat and physical shelter for small fish species	7.12

Notes: a – Based on 100x100m intake cap structure.

6.2.2.2 Habitat Suitability Assessment – Exposure Assessment

To assess the suitability of the DWI and nearshore study areas for fish captured during the 2024 Deepwater and Nearshore fish community studies, species-specific habitat preferences from the literature were compared against the existing habitat conditions identified through the 2024 aquatic habitat studies. Additionally, although Emerald Shiner, American Eel, Smallmouth Bass, and Northern Pike were not captured in the 2024 fish community studies, these species were included in this assessment due to their known presence in the area and status as ecological receptors in the 2022 PN ERA.

The habitat preferences for spawning and adult life stages were evaluated separately, as these can differ significantly. The habitat preferences for the adult stage of the species considered, including substrate type, water temperature, depth, and other relevant requirements, are presented in **Table 6-12**. Similarly, habitat preferences for spawning are listed in **Table 6-13**. The substrate types identified in the DWI and nearshore study areas, as well as their associated proportions, are presented in **Table 6-14**. Substrate was considered one of the most important physical habitat parameters because many species require specific substrates for spawning because eggs adhere to them. The depth ranges considered were 12-18 m for the DWI, as used in the Deepwater Fish Community Study, and 0-3 m for the nearshore study areas, as determined by the Nearshore Fish Community Study.

Table 6-12: Catch and/or Life History Information of Adult Fish Species Near PNGS

Catch Location ^{1,2}	Catch Season ³	Species	Scientific Name	Thermal Regime ⁵	Catch / Life History Information ^{1,4}			
					Trophic Class	Catch Depth(s) (m)	Temperature(s) (°C) at Catch Depth(s)	Substrate at Catch Location(s)
Nearshore	SP	Atlantic Salmon	<i>Salmo salar</i>	Cold	invertivore/carnivore	2.4	14.3	sand/cobble/boulder
Nearshore	SU,FA	Brown Bullhead	<i>Ameiurus nebulosus</i>	Warm	invertivore/herbivore/carnivore	1.9-3.4	20.3-22.9	sand/gravel/boulder
Nearshore	FA	Common Carp	<i>Cyprinus carpio</i>	Warm	invertivore/detritivore	3.4	21.2	sand/cobble/boulder
Nearshore	SP	Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	Cold	invertivore/carnivore	1.6	15.0	sand/cobble/boulder
Nearshore	SU	Coho Salmon	<i>Oncorhynchus kisutch</i>	Cold	invertivore/carnivore	2	22.8	sand/gravel/boulder
Nearshore	FA	Largemouth Bass	<i>Micropterus nigricans</i>	Warm	invertivore/carnivore	4.9	21	sand/gravel/boulder
Nearshore	FA	Log Perch	<i>Percina caprodes</i>	Warm	invertivore	4.9	21	sand/gravel/boulder
Nearshore	FA	Longnose Sucker	<i>Catostomus catostomus</i>	Cold	invertivore	3.8-4.9	21-21.1	sand/gravel/boulder
Nearshore	FA	Pumpkinseed	<i>Lepomis gibbosus</i>	Warm	invertivore/carnivore	3.4	20.6	sand/cobble/boulder
Nearshore	SP	Rainbow Trout	<i>Oncorhynchus mykiss</i>	Cold	invertivore/carnivore	4.1	11.1	sand/gravel/cobble/boulder
Nearshore	FA	Sculpin	<i>Cottus bairdii</i>	Cold	invertivore	3.8	21	sand/gravel/boulder
Nearshore	SP	Threespine Stickleback	<i>Gasterosteus aculeatus</i>	Cold	invertivore	1.6	15	sand/cobble/boulder
Nearshore	FA	Yellow Perch	<i>Perca flavescens</i>	Cold	invertivore/carnivore	3.8	21	sand/gravel/boulder
Nearshore/Offshore	SP,SU,FA	Brown Trout	<i>Salmo trutta</i>	Cold	invertivore/carnivore	5.5 - 14	11.4-21.1	sand/gravel/cobble/boulder
Nearshore/Offshore	SP,SU	Alewife	<i>Alosa pseudoharengus</i>	Cold	planktivore	1.6 - 19.7	8.6-27	sand/gravel/cobble/boulder
Nearshore/Offshore	FA	Rainbow Smelt	<i>Osmerus mordax</i>	Cold	invertivore/carnivore	2.8 - 19.7	9.7-22.6	sand/gravel/cobble/boulder
Nearshore/Offshore	SU,FA	Rock Bass	<i>Ambloplites rupestris</i>	Cold	invertivore/carnivore	2.8 - 17	8.6-22.6	sand/gravel/cobble/boulder
Nearshore/Offshore	SP,SU,FA	Round Goby	<i>Neogobius melanostomus</i>	Cold	invertivore	1.6 - 17	10.4-27	sand/gravel/cobble/boulder
Nearshore/Offshore	FA	Walleye	<i>Sander vitreus</i>	Cold	invertivore/carnivore	5.5 - 17	9.9-21.1	sand/gravel/cobble/boulder
Nearshore/Offshore	SU,FA	White Sucker	<i>Catostomus commersonii</i>	Cold	invertivore/detritivore	3.4 - 15	9.9-21.2	gravel/cobble/boulder
Offshore	SU	Burbot	<i>Lota lota</i>	Cold	invertivore/carnivore	15	10.8	gravel/cobble/boulder
Offshore	FA	Lake Sturgeon	<i>Acipenser fulvescens</i>	Cool	invertivore/herbivore	19.5	10.7	gravel/cobble/boulder
Offshore	SP,SU,FA	Lake Trout	<i>Salvelinus namaycush</i>	Cold	invertivore/carnivore	11 - 21.1	8.6-10.6	sand/gravel/cobble/boulder
Offshore	FA	Lake Whitefish	<i>Coregonus clupeaformis</i>	Cold	invertivore/carnivore	11 - 21.1	8.6-10.7	sand/gravel/cobble/boulder
Offshore	SP,SU,FA	Round Whitefish	<i>Prosopium cylindraceum</i>	Cold	invertivore/carnivore	11 - 19.7	9.7-10	sand/gravel/cobble/boulder
Offshore	FA	Sea Lamprey	<i>Petromyzon marinus</i>	Cold	herbivore/detritivore (carnivore)	13.1	8.6	sand/gravel/cobble
NA ²	-	American Eel	<i>Anguilla rostrata</i>	Cool	invertivore/carnivore	<15 ³	-	mud/sand/cobble/boulder ³
NA ²	-	Emerald Shiner	<i>Notropis atherinoides</i>	Cold	planktivore	Shallow ³	-	sand/gravel ³
NA ²	-	Northern Pike	<i>Esox lucius</i>	Cold	carnivore	Shallow ³	-	mud/sand/gravel - Weeds ³
NA ²	-	Smallmouth Bass	<i>Micropterus dolomieu</i>	Cold	invertivore/carnivore	5-7 ³	-	rocky and sandy areas ³

1 - Catch information was collected during the 2024 field study at PNGS

2 - Fish species with "NA" catch location are included in this table despite not being caught in the 2024 field study. These were chosen due either to their ecological importance, SAR status, and/or due to their known prevalence in the area

3 - SP = Spring, SU = Summer, FA = Fall

4 - In the case of fish species that were not caught in 2024, known depth and substrate preferences were used in the place of catch information.

5 – Fish species are grouped into thermal guilds based on their thermal optimums. In general, cold-water species prefer waters <19°C in the summer, cool-water fish prefer between 19-25°C, and warm-water fish prefer waters >25°C (Coker et al., 2001; Magnuson et al., 1979).

Notes: Fish life history data was collected from Scott and Crossman (1973), and from the Ontario Fishes Life History database (Eakins, R.J. 2024, accessed February 2025).

Table 6-13: Habitat Preferences of Fish Species Based on Spawning Requirements

Catch Location ¹²	Catch Season ³	Species	Scientific Name	Thermal Regime	Adult Fish Spawning Preferences				
					Preferred Spawning Substrate	Spawning Guild	Preferred Spawning Temperature (°C)	Preferred Spawning Depth (m)	Preferred Spawning Season
Nearshore	SP	Atlantic Salmon	<i>Salmo salar</i>	Cold	NA (Riverine)	Lithophils	6-10	NA (Riverine)	Oct-Nov
Nearshore	SU,FA	Brown Bullhead	<i>Ameiurus nebulosus</i>	Warm	Cobble/Boulder	Speleophils	14-25	Shallow	May-June
Nearshore	FA	Common Carp	<i>Cyprinus carpio</i>	Warm	vegetation, logs, etc	Phyto-lithophils	17-26	Shallow	May-Aug
Nearshore	SP	Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	Cold	NA (Riverine)	Lithophils	5.5-14.5	NA (Riverine)	Sept-Oct
Nearshore	SU	Coho Salmon	<i>Oncorhynchus kisutch</i>	Cold	NA (Riverine)	Lithophils	4-8	NA (Riverine)	Oct-Nov
Nearshore	FA	Largemouth Bass	<i>Micropterus nigricans</i>	Warm	Sand/Gravel	Polyphils	15-21	<6	May-June
Nearshore	FA	Log Perch	<i>Percina caprodes</i>	Warm	Sand/Gravel/Cobble	Lithophils	10-18	Shallow	May-June
Nearshore	FA	Longnose Sucker	<i>Catostomus catostomus</i>	Cold	Gravel/Cobble	Litho-pelagophils	5-15	<1-2	April-June
Nearshore	FA	Pumpkinseed	<i>Lepomis gibbosus</i>	Warm	Sand/Gravel	Polyphils	17-26	Shallow	May-Aug
Nearshore	SP	Rainbow Trout	<i>Oncorhynchus mykiss</i>	Cold	NA (Riverine)	Lithophils	4-10	NA (Riverine)	March-May
Nearshore	FA	Sculpin	<i>Cottus bairdii</i>	Cold	Cobble/Boulder	Speleophils	5-16	Shallow	April-May
Nearshore	SP	Threespine Stickleback	<i>Gasterosteus aculeatus</i>	Cold	vegetation	Ariadnophils	10-22	Shallow	May-July
Nearshore	FA	Yellow Perch	<i>Perca flavescens</i>	Cold	vegetation/logs, etc	Phyto-lithophils	6-12	Shallow	April-May
Nearshore/Offshore	SP,SU,FA	Brown Trout	<i>Salmo trutta</i>	Cold	NA (Riverine)	Lithophils	6-9	NA (Riverine)	Oct-Nov
Nearshore/Offshore	SP,SU	Alewife	<i>Alosa pseudoharengus</i>	Cold	vegetation/logs, etc	Phyto-lithophils	13-21	Shallow	June-Aug
Nearshore/Offshore	FA	Rainbow Smelt	<i>Osmerus mordax</i>	Cold	Sand/Gravel	Litho-pelagophils	4.5-11	Shallow	March-April
Nearshore/Offshore	SU,FA	Rock Bass	<i>Ambloplites rupestris</i>	Cold	Veg, Gravel/Cobble/Boulder	Polyphils	16-23	Shallow	May-June
Nearshore/Offshore	SP,SU,FA	Round Goby	<i>Neogobius melanostomus</i>	Cold	Sand/Gravel/Cobble	Lithophils	9-26	Shallow	May-July
Nearshore/Offshore	FA	Walleye	<i>Sander vitreus</i>	Cold	Gravel/Cobble/Boulder	Litho-pelagophils	4-11	Shallow	April-June
Nearshore/Offshore	SU,FA	White Sucker	<i>Catostomus commersonii</i>	Cold	Gravel/Cobble	Litho-pelagophils	10-20	Shallow	April-June
Offshore	SU	Burbot	<i>Lota lota</i>	Cold	Sand/Gravel	Litho-pelagophils	1-4	Shallow	Jan-March
Offshore	FA	Lake Sturgeon	<i>Acipenser fulvescens</i>	Cool	Gravel/Cobble/Boulder	Litho-pelagophils	11-18	1-8m	May-June
Offshore	SP,SU,FA	Lake Trout	<i>Salvelinus namaycush</i>	Cold	Gravel/Cobble/Boulder	Lithophils	9-14	Wide Range, prefer shoals	Sept-Nov
Offshore	FA	Lake Whitefish	<i>Coregonus clupeaformis</i>	Cold	Gravel/Cobble/Boulder	Litho-pelagophils		5-10	Oct-Dec
Offshore	SP,SU,FA	Round Whitefish	<i>Prosopium cylindraceum</i>	Cold	Sand/Gravel/Cobble	Lithophils	2-4.5	1-2m	Nov-Dec
Offshore	FA	Sea Lamprey	<i>Petromyzon marinus</i>	Cold	NA (Riverine)	Lithophils	11-24	NA (Riverine)	May-June
NA ²	-	American Eel	<i>Anguilla rostrata</i>	Cool	NA (Marine)	Litho-pelagophils	17	NA (Marine)	Feb-March
NA ²	-	Emerald Shiner	<i>Notropis atherinoides</i>	Cold	Sand/Gravel	Pelagophils	20-24	Shallow	June-Aug
NA ²	-	Northern Pike	<i>Esox lucius</i>	Cold	vegetation	Phytophils	4-11	Shallow	March-May
NA ²	-	Smallmouth Bass	<i>Micropterus dolomieu</i>	Cold	Sand/Gravel	Polyphils	13-20	Shallow	May-June

1 - Catch information was collected during the 2024 field study at PNGS

2 - Fish species with "NA" catch location are included in this table despite not being caught in the 2024 field study. These were chosen due either to their ecological importance, SAR status, and/or due to their known prevalence in the area

3 - SP = Spring, SU = Summer, FA = Fall

Notes: Fish life history data was collected from Scott and Crossman (1973), and from the Ontario Fishes Life History database (Eakins, R.J. 2024, accessed February 2025).

Table 6-14: Substrate Types and Proportions in the Footprint of the DWI and Nearshore modifications

Components	Disturbance Type	Structure / Area	Total Area (ha)	Type 2 Sediment		Type 3 Sediment		Type 4 Sediment		Type 5 Sediment		Type 6 Sediment	
				Fine sediments with distinct ridges		Sand/Gravel/Cobble		Gravel and Cobble in a base of sediment		Rocks ranging in size from gravel to boulders in a base of finer sediments		Densely packed cobble and boulder	
				Prop %	Area (ha)	Prop %	Area (ha)	Prop %	Area (ha)	Prop %	Area (ha)	Prop %	Area (ha)
DWI	Destruction	DWI Cap (1500 m) ^a	1.00	-	-	-	-	74.43%	0.74	25.57%	0.26	-	-
	Destruction	Alternate DWI Cap Location (1250 m)	1.00	-	-	72.93%	0.73	21.40%	0.21	-	-	-	-
	Disruption	DWI Cap	2.5	-	-	-	-	74.53%	1.86	25.57%	0.64	-	-
Erosion Control	Destruction	Shoreline Erosion Mitigation Area	4.00	20.00%	0.80	20.00%	0.80	20.00%	0.80	20.00%	0.80	20.00%	0.80
Bridge allowance	Alteration	Bridge over outfall	0.3	NA									
	Destruction	Bridge over outfall	0.3	NA									
Forebay	Destruction	Cut-off wall, Forebay Infill	0.7	NA									
West Infill, Dock, Seawall	Alteration	Dredged Dock Channel	4.5	NA									
	Destruction	Dock, West Infill, Seawall	11.5	25.00%	2.88	25.00%	2.88	35.00%	4.03	10.00%	1.15	5.00%	0.58

* For shoreline erosion mitigation area and west infill area, proportions were estimated and area then calculated. For DWI the area was calculated first, followed by proportions
NA = Not evaluated during the 2024 field study
a - Based on 100x100m intake cap.

6.2.2.2.1 DWI Area

The 2024 Deepwater Fish Community Study identified 13 fish species utilizing the offshore waters of the DWI area. Substrate types and depths consistent with the adult foraging habitat of all species could be found in the DWI area. Adult stages of most species captured in the study utilize substrate Types 4 (gravel and cobble in a base of sediment), 5 (gravel/boulders in a base of finer sediments), and 6 (densely packed cobble and boulder). While neither of the proposed intake cap locations contains substrate of Type 6, the first intake location (1.5 km offshore) is primarily composed of Type 4 substrate (74%), while the alternate intake location (1.25 km offshore) is dominated by Type 3 substrate (77%). Therefore, the first intake location resides in more suitable habitat for the adult stages of the species identified in the DWI area.

The species observed in this area in 2024 were Alewife, Brown Trout, Burbot, Lake Sturgeon, Lake Trout, Lake Whitefish, Rainbow Smelt, Rock Bass, Round Goby, Round Whitefish, Sea Lamprey, Walleye, and White Sucker. Alewife was the most frequently caught species in the spring and summer sampling events of the 2024 deepwater fish community study, while Lake Trout and Lake Whitefish dominated the fall catch. This seasonal shift in the dominant species captured is reflective of the migratory nature of Alewife, which make seasonal spawning migrations to the nearshore zone to spawn in the late spring. Other species captured likely also use the area for foraging. Salmonid species encountered at various times during the sampling program such as Brown Trout and Lake Trout are known to prey on smaller fish species such as Alewife, Rainbow Smelt, and Round Goby. Other species caught such as Walleye and White Sucker use the waters in Lake Ontario to move into, around, and between foraging habitats along the lake's shoreline and nearby waterbodies such as Frenchman's Bay, Rouge River, and Duffin's Creek. Most of the species identified in the DWI belonged to the invertivore/carnivore trophic class, reflecting the foraging opportunities available in the deepwater habitat (see **Section 4.3.3**).

Two invasive species, namely, Round Goby and Sea Lamprey, were caught in the DWI area. Round Goby have historically been a sub-dominant yet ubiquitous species in past OPG studies near PNGS and DNGS (Golder 2007a, Hatch, 2013, Ecometrix, 2021). Sea Lamprey are parasitic and prey on Lake Trout, Salmon, Whitefish, Cisco and Burbot in the Great Lakes.

A Lake Sturgeon was captured during the fall 2024 sampling event, which is a rare occurrence at that location and depth in the lake. Lake Sturgeon have been stocked by the New York state into the Lake Ontario-St. Lawrence River system intermittently since 1993, with the most recent program conducted from 2014 to 2019 (Great Lakes Fishery Commission, 2023; Stewart et al., 2012; Welsh et al., 2020). While Lake Sturgeon occasionally migrate long distances in search of food or suitable spawning habitat and to avoid unfavourable environmental conditions, they are rarely found outside their shallow riverine spawning areas (Auer, 1996; Bemis and Kynard, 1997; Peterson et al., 2007). Given that sturgeon prefer muddy, sandy or gravel substrates, rather than the cobble/boulder of the DWI area, it is possible that this individual was caught moving between foraging habitats. It should be noted that American Eel, a species at risk that has been consistently recorded in the annual impingement monitoring from 2016 to 2022, was not captured in the 2024 Deepwater Fish Community Study. Typically, the freshwater habitat in lakes

for American Eel spans from depths of 10 m to deeper waters (COSEWIC, 2012). Given their frequent detection in previous studies and consistent presence in impingement monitoring, it is likely that American Eel remain present in the area despite not being captured in this study.

Generally, it is unlikely that the species found in the DWI area will use the DWI area as spawning habitat. Although substrate suitable for spawning is available for species such as Burbot, Lake Trout, Alewife, Rainbow Smelt, Rock Bass, Round Goby, Walleye, and White Sucker, these fish typically utilize shallower nearshore waters with faster flow rates for spawning. Round Whitefish typically spawn over gravel or cobble substrates at depths of 5–10 m (Haymes and Kolenosky, 1984; Petrudev, 2022), though they have also been reported to spawn at depths greater than 10 m. Similarly, Lake Whitefish have been documented spawning in deeper lake waters (e.g., 18–45 m), with most spawning occurring at depths of less than 25 m (Schaefer et al., 2022). Therefore, it is possible that both Round Whitefish and Lake Whitefish spawn in the DWI areas, though this was not evaluated in the 2024 Deepwater Fish Community study.

Of the four species that were not caught in the 2024 fish community studies but were assessed as ecological receptors in the 2022 PN ERA (Ecometrix 2023), those being American Eel, Emerald Shiner, Northern Pike, and Smallmouth Bass, all four species may potentially utilize the DWI area for foraging as adults. None of the four fish species would utilize the substrates or depths of the DWI for spawning.

Overall, the primary use of the potential DWI areas by fish species caught in the 2024 sampling event appears to be for transient foraging and as a seasonal movement corridor. Although coregonine species such as Lake Whitefish and Round Whitefish may spawn in the DWI area, this was not confirmed, as spawning was not evaluated in the 2024 Deepwater Fish Community Study. Given that the approximate loss of 1.0 ha of bottom habitat for DWI construction represents a relatively small percentage of the total offshore foraging area available to these species, and that the available zooplankton and benthic species and habitat features in this region are ubiquitous, any long-term negative impact on foraging opportunities is unlikely. The approximate loss of 1.0 ha of bottom habitat for DWI construction is therefore unlikely to have any long-term negative impact on foraging opportunities for these species.

6.2.2.2.2 Nearshore Study Areas

The 2024 Nearshore Fish Community Study identified 20 fish species in the shoreline erosion mitigation and west infill study areas. Small-bodied forage fish such as Alewife and Round Goby dominated spring and summer communities, while fall communities were more varied, and were characterized by larger-bodied bottom feeders, salmonids, and predatory fish. As seen in the DWI area, the adult stages of most species captured in the nearshore study areas utilized substrate of Types 3, 4 and 5. The west infill area comprised substrates from Types 2 to 6, with Type 4 being the most dominant (35%), followed by Type 2 (25%) and Type 3 (25%). The shoreline erosion mitigation area had a more even spread, with Types 2 through 6 each comprising 20%. As such, both nearshore study areas provide diverse substrate opportunities, which can be utilized by the species identified based on their specific habitat preferences.

The nearshore study areas likely serve as adult foraging habitats for the species captured. As with the fish in the DWI area, most species captured belong to invertivore/carnivore trophic levels. Small-bodied fish species such as Alewife, Round Goby, and Rainbow Smelt present in these areas likely serve as prey for larger species observed in the area such as Walleye, Brown Trout, Rainbow Trout, Largemouth Bass, Atlantic Salmon, and Coho Salmon. The presence of aquatic vegetation in the nearshore study areas, specifically the west infill, likely enhances foraging opportunities and provides protective cover. Additionally, species such as Common Carp, Largemouth Bass, Yellow Perch, Threespine Stickleback, and Pumpkinseed are commonly found in areas with significant aquatic vegetation, and all but the bass use plant material for spawning.

Of the species that were not captured in the nearshore study areas but observed in the DWI areas, most are deepwater species that utilize offshore waters as adults. However, Round Whitefish may feed on benthic invertebrates associated with aquatic vegetation and diverse substrates found within the nearshore study areas, as they have previously been seen in nearshore environments. Additionally, although Emerald Shiner, American Eel, Northern Pike, and Smallmouth Bass were not captured in the 2024 fish community study, it is possible that these species use the nearshore study areas as foraging habitats. Emerald Shiner, a small planktivorous species, is typically found in the nearshore regions of Lake Ontario, including the shallows near breakwalls of the forebay. As highlighted in **Section 6.2.2.2.1**, although American eels were not captured in the Fish Community Study of the area, it is possible that the species traverses the nearshore study areas, as they have been impinged at PNGS.

Based only on substrate types available and depth of water, the nearshore areas may support spawning for 15 of the 20 species identified in the 2024 Nearshore Fish Community Study. Species like Round Whitefish and Lake Trout, known to spawn on shoals and rocky substrates in shallow nearshore study areas, may utilize these habitats. The vegetation in the nearshore study areas provides attachment sites for the embryos of species such as Common Carp, Threespine Stickleback, Alewife, Yellow Perch, and Rock Bass, and offers protective cover for early life stages. The west infill area, with its greater abundance of vegetation compared to the shoreline erosion mitigation area, is more suitable for species that require vegetative cover to reproduce. Notably, though, both nearshore study areas are subjected to high wave energy from the lake, making them sub-optimal for spawning for most species. The west infill area, with the protection offered by the intake channel's seawall, may provide some relief from the wave action, potentially enhancing its suitability for spawning of phytophiles. The nearshore waters may also serve as overwintering habitats for species such as Lake Trout and White Sucker, though these fish may prefer embayments to avoid the effects of wave action along the shoreline. Overall, the proposed shoreline erosion mitigation and west infill areas likely offer potential foraging, juvenile, and overwintering habitats for certain fish species in Lake Ontario, though they generally provide unsuitable spawning habitat.

6.2.2.3 Potential Impacts and Mitigation Strategies – Risk Characterization

Based on the habitat assessment results, the construction of the DWI cap will result in the destruction of approximately 1.0 ha of habitat utilized by species for foraging and migration.

The shoreline erosion mitigation area would result in the destruction of approximately 4 ha of potential foraging, juvenile, and overwintering habitat. Construction of the possible dock and seawall, as well as lake infilling in the West Infill area is expected to result in the destruction of approximately 11.5 ha of similar habitat.

Although the substrate and depth in both nearshore study areas meet the spawning requirements of some species, high wave energy along the shoreline makes them unsuitable for spawning. Furthermore, both the DWI and nearshore study areas lack unique habitat features, as they are typical of other areas found throughout Lake Ontario. Therefore, while construction activities will result in habitat loss, no rare or unique habitats will be lost.

To mitigate the impacts of habitat loss resulting from project activities, several strategies will be implemented during construction. These include measures to limit the spread of aquatic invasive species, such as cleaning, draining, and drying any equipment used in the water, and avoiding the transfer of organisms or water between bodies of water. Additionally, OPG will replace and restore disturbed habitat features, as well as remediate any impacted areas, in accordance with DFO authorization requirements, if applicable.

6.2.3 Thermal Effects

PNGS Units 1 and 4 were permanently shut down in Q4 of 2024 and are now in Stabilization phase. Units were shut down in two phases with a three-month interval between phases, reducing the risk of cold shock to aquatic life in the area. To facilitate PNGS Units 1 and 4 Stabilization activities, a minimum of one CCW pump from PNGS Units 1 and 4 will continue to run while PNGS Units 5-8 are still operating; therefore, water will continue to be released through the PNGS Units 1-4 discharge channel. Over time, as all PNGS Units 1-4 CCW are shut down, water temperatures around the PNGS Units 1-4 CCW discharge will return to temperatures typical of the regional Lake Ontario nearshore habitat. Fish species that were drawn to the warmer temperatures of the PNGS Units 1-4 discharge (e.g., Smallmouth Bass, Common Carp, and Emerald Shiner), will likely reduce in number in the immediate vicinity of the discharge channel over the coming seasons. Aquatic productivity in the area around the discharge is also expected to be reduced to levels more commonly associated with natural Lake Ontario nearshore habitat in the region. No long-term adverse thermal effect is anticipated from the shutdown of the PNGS Units 1-4 discharge.

During PNGS Units 5-8 refurbishment, the DWI will be constructed and become operational by 2030. Once the DWI is in use, a cut-off wall will be installed in the intake channel, with small holes to allow some water to pass through. The existing PNGS Units 5-8 CCW discharge channel will still be used. All CCW discharge from Units 5-8 will be paused starting in the fall of 2026 as Units 5-8 will be shut down for refurbishment (**Figure 5-3**). The shutdown will be done in stages to reduce potential cold shock to aquatic life and, likewise, re-start near the end of the refurbishment process will also occur in stages allowing time for aquatic life to thermally adjust.

During PNGS Units 5-8 continued operations, the DWI will operate at full capacity bringing water into PNGS Units 5-8 for use during operations. As such, the discussion around thermal effects below is focused on continued operations.

6.2.3.1 Anticipated Discharge Temperatures post DWI Implementation – Exposure Assessment

The PNGS DWI is currently planned to be constructed and become operational by 2030, at which point the plant will receive intake water at temperatures below what is currently being used from the surface intake since the water will be drawn in from the bottom of the lake, at a farther distance than the intake channel. Discharge temperatures are estimated to be similar to or slightly less than previous operational conditions (with 6 operating units). Thermal data from the existing PNGS intake channel and PNGS Units 5-8 CCW discharge channel were compared to similar data from DNGS to estimate potential effluent temperatures at PNGS post DWI construction and implementation.

DNGS currently utilizes a DWI roughly 800-1000 m offshore at a depth of about 10 m. Water is pulled in through the DWI for the four DNGS reactor units and then discharged to Lake Ontario via a diffuser system. The flow rate through the DNGS DWI as it is currently operated is 123.1 m³/s (OPG, 2022f). The flow rate at PNGS once Units 5-8 are back online from refurbishment is expected to be slightly higher than at DNGS. The DWI setup and operational load (i.e., providing cooling for four reactor units) at DNGS is akin to what PNGS would experience post-refurbishment, with the exception of moderately lower flow rates at DNGS than what is projected for PNGS. This, along with the proximity of the stations (roughly 27 km apart) on the north shore of Lake Ontario, suggests that future PNGS discharge temperatures upon continued operation of PNGS Units 5-8 would be similar to or slightly lower than those at DNGS.

Figure 6-4 presents the surface intake and effluent temperatures at PNGS, and the DWI intake and calculated effluent temperatures at DNGS, from January 2021 to December 2023.

DNGS DWI intake temperatures were consistently 3-5 °C cooler than PNGS surface intake temperatures across the three years. This is expected given the colder temperatures at the depth in which the DWI operates, as opposed to the warmer surface water currently being used by PNGS at the intake. Notably however, DNGS calculated discharge temperatures were equivalent to current PNGS discharge temperatures. Therefore, while DNGS intake temperatures are lower than those at PNGS, DNGS experiences a larger ΔT , resulting in similar discharge temperatures between sites.

Though the DWI intake at PNGS will be installed at a depth ranging from 11-11.5m, roughly 1-1.5 m deeper than that at DNGS (10 m), thermal profiles taken offshore from PNGS in 2024 (**Figure 6-5**) indicate that the change in temperature from 10 m to 11.5 m depth is minimal (roughly 1°C) once the lake has turned over (Lake Ontario turnover occurred during late May and late October in 2024).

It is anticipated that the discharge temperatures at PNGS during continued operations could be similar to or slightly lower than current temperatures.

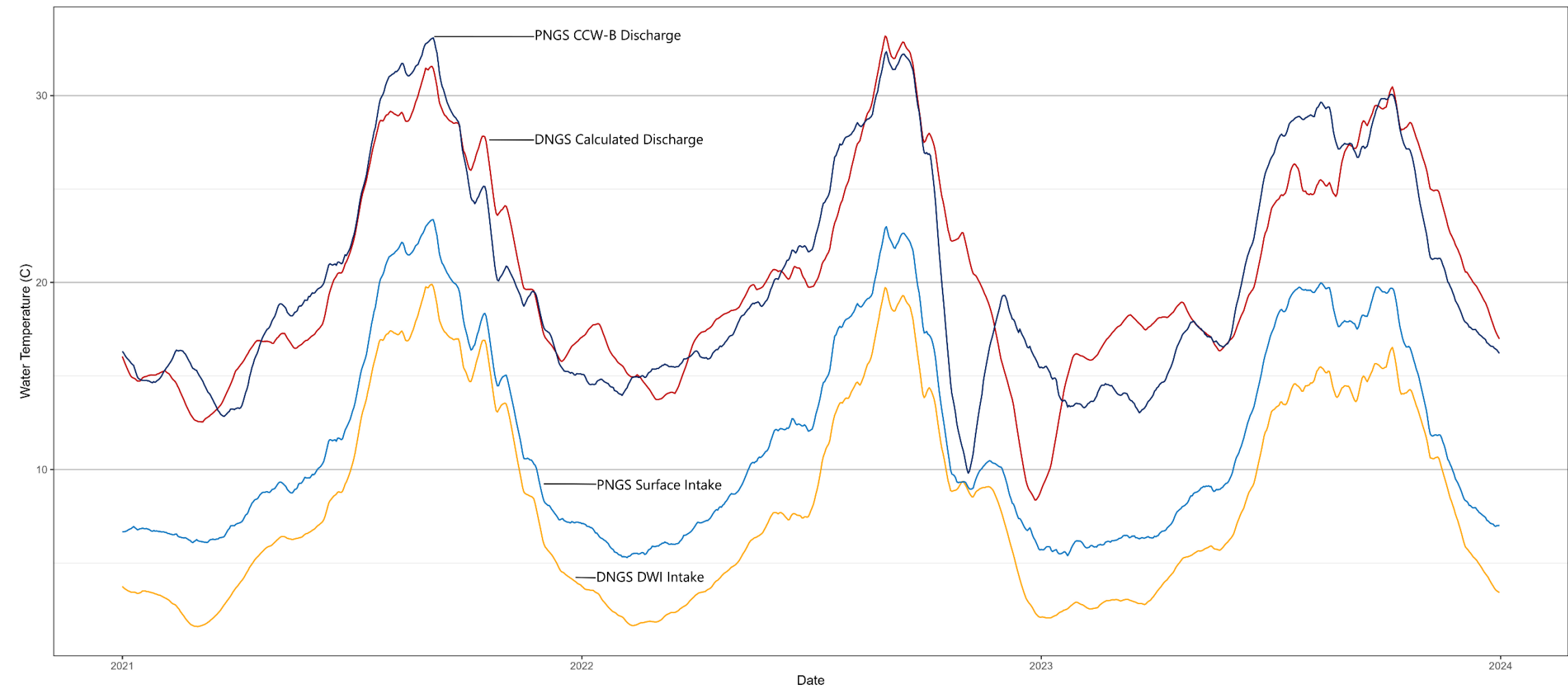


Figure 6-4: Intake and Discharge Temperatures (°C) at PNGS and DNGS from January 2021 to December 2023

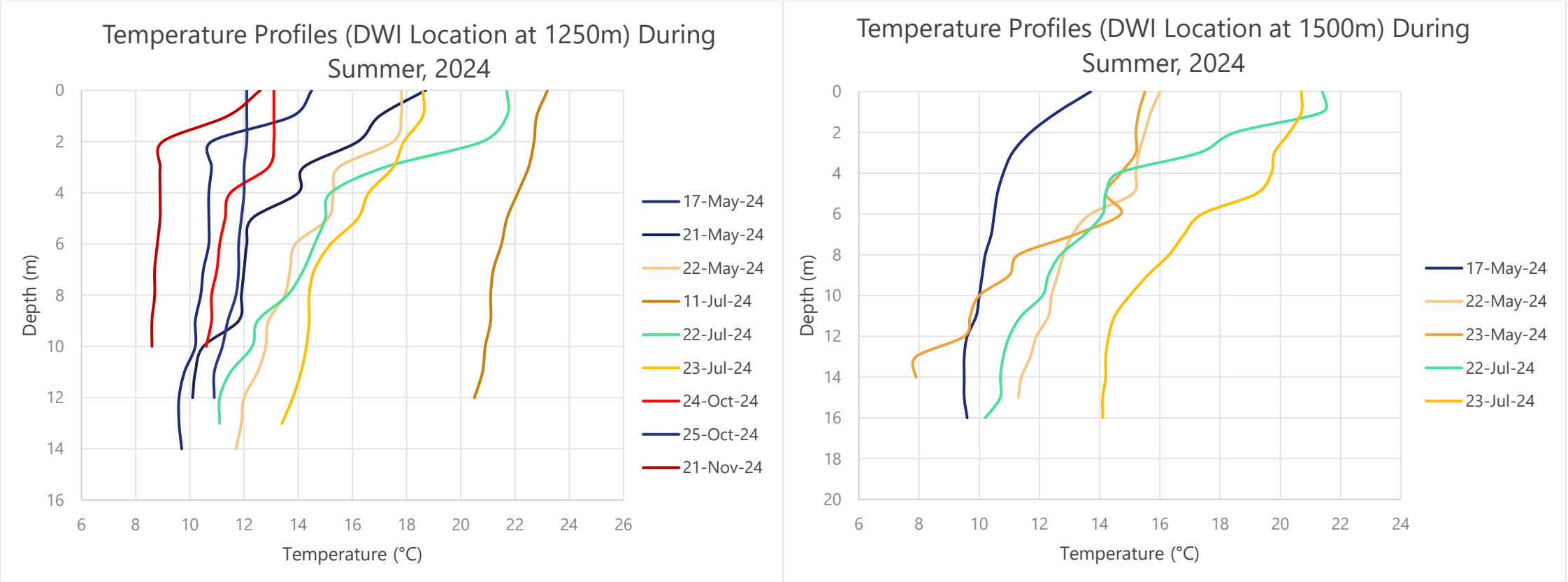


Figure 6-5: Thermal Profiles Taken Across Multiple Seasons in 2024 at Both Potential Locations for the PNGS DWI

6.2.3.2 Anticipated Thermal Effects on Fish Communities – Risk Characterization

The potential effects of the thermal plume on fish eggs and larvae were evaluated several times at PNGS (Cooper, 2013; Golder, 2007a; OPG, 2018d, 2021f). Golder (2007a) evaluated modeled Maximum Weekly Average Temperature (MWAT) against MWAT criteria provided by the ECCC for Smallmouth Bass (*Micropterus dolomieu*), Emerald Shiner (*Notropis atherinoides*), and Lake Trout (*Salvelinus namaycush*), and Round Whitefish (*Prosopium cylindraceum*). Water temperatures were monitored across all four seasons in the PNGS Intake channel, PNGS Units 5-8 CCW discharge channel, the nearshore study areas west and east of PNGS, and the nearshore area in front (south) of PNGS. They found no exceedances during the appropriate timeframes for these species. Cooper (2013) compared water temperatures around the PNGS Units 5-8 discharge to MWAT and Short Term Daily Maximum (STDM) criteria of 15 different fish species, nine of which are considered in the 2022 PN ERA. These fish were American Eel (*Anguilla rostrata*), Brown Bullhead (*Ameiurus nebulosus*), Round Whitefish (*Prosopium cylindraceum*), White Sucker (*Catostomus commersonii*), Emerald Shiner, Lake Trout (*Salvelinus namaycush*), Northern Pike (*Esox Lucius*), Smallmouth Bass and Walleye (*Sander vitreus*). Cooper found that five of the nine species had exceedances in their criteria when using temperatures from the PNGS Units 5-8 thermal plume. Four of these species however, had exceedances in the reference areas (Thickson Point and Bonnie Brae Point) as well. Only Walleye demonstrated a marginally high exceedance (5% above the thermal criteria) in the thermal plume. However, the temperatures in the reference area were only slightly below the Walleye thermal criteria (4%).

OPG evaluated the effects of the PNGS thermal plume on Round Whitefish embryo survival in 2009-2012 (OPG, 2018d) and 2019-2020 (OPG, 2021f). The plume was modelled using measured water temperature in the winter (December). In both studies, embryo losses generally fell well below the CNSC threshold of concern of 10% relative survival loss. Both studies found that there is no chronic adverse effect on round whitefish egg survival. Griffiths (1980) conducted a study on acute round whitefish egg mortality at varying water temperatures (2, 4, 7, and 10°C). After continuous exposure, only the eggs in 10°C water experienced acute mortality. OPG chose to use a conservative value of 7°C as the threshold at which there could be a possible indication of acute temperature effects on Round Whitefish embryonic development. Any exceedances in lake bottom temperatures greater than 7°C during the study were short term (max 26 hours), and are believed to have no adverse effects on the development of round whitefish embryos. More recently, in a Tri-party meeting (CNSC, ECCC, and OPG), it was agreed that 6°C would serve as the thermal threshold that triggers an adaptive management response for Round Whitefish embryos, particularly during Block 1 development.

Previous work at PNGS on the potential thermal effects from the PNGS Units 5-8 CCW discharge have found there to be minimal impact on the local fish communities (Specifically the species described above). Considering that PNGS Units 5-8 discharge temperatures during continued operations are estimated to be the same or slightly lower than current conditions (with 6 operating units), no change in direct thermal effects are expected after the refurbishment and continued operation of PNGS Units 5-8.

6.2.3.3 Climate Change Considerations for Thermal Effects

Thermal plume temperatures are not anticipated to increase from current conditions as a direct result of the PNGS Units 5-8 refurbishment and continued operations. However, indirect impacts to the lake thermal environment must be considered. Lake water temperatures are anticipated to increase as climate change progresses over the long-term. Generally, larger waterbodies like Lake Ontario are expected to see less severe climate related changes than small waterbodies (Woolway and Merchant, 2019). In a recent paper, (Ivanova et al., 2024) summarize the potential environmental changes in the Great Lakes. These could include shorter periods of ice cover, earlier spring and later fall overturn, which would in turn create a longer stratification period, and a smaller hypolimnion because of a deeper thermocline (Ivanova et al., 2024). Water column temperatures are anticipated to increase by 2°C by 2050-2100, with most of this temperature increase anticipated to occur in the epilimnion of stratified lakes (Logfren, 2014). It is still not fully understood how this may impact fish communities. Adult cold-water fish may be able to behaviorally thermoregulate by moving to deeper waters, but their spawning needs may not be as adaptable (i.e., requiring specific substrates, water temperatures, plant growth, etc.). Warmwater fish species might be most exposed to climate-related changes in lake water temperature, as they typically dwell in the epilimnion and near shore.

Future conditions resulting from climate change related warming in Lake Ontario is a large and fluctuating topic in the scientific literature. Several assumptions have to be made when considering the intersection of climate change and warm-water discharge from PNGS, and how these may impact the local aquatic environment. These assumptions are as follows:

- 1) Any discussion involving long term environmental impacts as a result of climate change are subject to change. Water temperature predictions are estimated via climate modelling, and may vary between sources, and fluctuate over time from the same source.
- 2) Recent literature indicates that deeper layers in lakes are expected to warm at a slower/more variable rate under climate change due to weaker coupling with air temperature (Anderson et al., 2021; Butcher et al., 2015; Pilla et al., 2020). For example, projections specific to Lake Ontario which account for this predicts that annual water temperature is predicted to increase by 1.3-1.6°C at the surface and by 0.4-1.0°C in the hypolimnion by 2070. These projections, originally developed by (Trumpickas et al., 2009) and later utilized in Ivanova et al., (2024) based on low and high CO₂ emission scenarios for the period 2011–2070 (IPCC, 2000) with earlier onset of spring and delay of fall. Therefore, for the purposes of the following evaluation, it was assumed that water temperature is expected to increase by 1.3-1.6°C at the surface and 0.4-1.0°C below the thermocline to address thermal effects from the PNGS Units 5-8 CCW discharge and climate change on the local fish communities.
- 3) It is assumed based on current modelling that, despite increases in water temp due to effects of climate change, the discharge temp following the shift will not increase relative

to current. OPG intends to confirm these predictions via further thermal monitoring once the DWI is operational.

6.2.3.3.1 Potential Effects to Round Whitefish

Past assessments by OPG on thermal effects of PNGS discharge on Round Whitefish have found there to be no chronic or acute adverse effects on embryo survival and development (OPG, 2018d, 2021f). The monitoring threshold of 6°C was exceeded several times within the thermal plume, but only for short periods of time and at specific locations. Given that Round Whitefish typically spawn over gravel and cobble substrates at preferred depths of 5–10 m, the warming experienced in these habitats is likely to align with hypolimnion conditions more, resulting in more gradual and less extreme increases in temperature. Under a lower warming rate scenario, with an annual increase of +0.4°C, minimal impacts on embryo survival are anticipated. However, under higher warming projections of +1.0°C, effects may be more pronounced. The climate-driven increases may lead to an increase in the frequency and duration of threshold exceedances, resulting in lower survival and recruitment. Moreover, under this climate change scenario, it is possible that water temperatures in Lake Ontario may not fall below 4°C, which is one degree warmer than the spawning MWAT criteria for round whitefish (ECCC, 2019; Logfren, 2014). Thus, it is possible that climate change may reduce the spawning success of Round Whitefish in general, as well as embryo survival within the thermal plume of PNGS Units 5-8 CCW discharge.

Importantly, discharge temperatures are expected to remain similar to or lower than current conditions following the construction and operation of the DWI, even under climate change. This suggests that there will be no additional thermal load from PNGS following Refurbishment, with the potential for improved conditions. Future monitoring of intake and discharge temperatures will validate any changes in the thermal plume, and potential impacts on Round Whitefish will be assessed in subsequent ERAs and additional studies as required.

6.2.3.3.2 Potential Effects to Other Fish Species

Cooper (2013) found that, while there were HQ exceedances of the thermal criteria of several fish species within the thermal plume of PNGS, similar exceedances (with the exception of Walleye) were seen in reference areas outside of the effect of the PNGS Units 5-8 CCW discharge. This suggests that exceedances of thermal criteria may be more tied to high ambient lake temperatures than to the Units 5-8 discharge. However, HQ are useful as a screening tool for assessing potential impacts, and as such are more of a qualitative tool. Golder (2007) found that modeled temperatures (predicted for the timeline of the refurbishment) in the PNGS discharges, nearshore environment south of PNGS, and the nearshore environments east and west of PNGS, did not exceed the thermal criteria for Smallmouth Bass, Round Whitefish, Emerald Shiner, or Lake Trout in the months critical to spawning and development (Golder, 2007a). Apart from Smallmouth Bass, even an additional warming of 1.3–1.6°C at the surface would not exceed these fish's upper lethal temperatures. Smallmouth Bass were found to utilize the PNGS discharge channels for spawning and can be exposed to fairly high temperatures relative to natural Lake Ontario habitats.

The effects of lake warming are anticipated to impact all fish in varying degrees. In conjunction with warm water discharge from PNGS Units 5-8, this is likely to place more stress on the local fish communities by reducing the margin between water temperatures and fish thermal criteria. Walleye and Smallmouth Bass populations might experience the greatest shift in stress from the combined inputs of climate change and the PNGS discharge. It is likely these fish would have to shift to different habitats as climate change progresses to stay within a more optimal temperature range.

6.2.3.3.3 Future Investigations

Discharge temperatures from PNGS Units 5-8 during continued operations are anticipated to remain similar to or slightly lower than current temperatures. As thermal effects have already been examined for previous operational conditions (with 6 operating units), an additional thermal effects assessment of existing conditions is not considered necessary. However, as climate change progresses, future assessments may be required to verify how rising lake temperatures are impacting the nearshore environment down-current of the PNGS Units 5-8 discharge, and whether mitigation measures may have to be implemented to reduce thermal stress on fish communities.

7.0 Cumulative Effects Consideration

Cumulative effects are those that may result from the combined effects of one project with those of other existing, planned, and/or reasonably anticipated future projects. The focus of this discussion is on other OPG projects on the same site, or at nearby sites. Environmental monitoring data collected at PN would include the contribution, if any, from DNGS effluent and emissions as well as, in the future, DNNP effluent and emissions. However, considering the PN site is approximately 34 km west of the DN site, the influence from the DNGS and future DNNP at PN would be small.

As part of OPG's commitment under the Environmental Monitoring and Environmental Assessment Follow-up (EMEAF) Program for the DNNP, OPG has initiated a cumulative effects assessment for the aquatic environment. The thermal plume, habitat loss, impingement and entrainment, and climate change will be integrated to inform a cumulative effects assessment for the aquatic environment which considers PNGS, DNGS, and DNNP. The cumulative effects assessment for the aquatic environment is being performed as part of a separate assessment for the DNNP outside of this PERA.

This PERA encompasses all existing and known future activities on the PN site including evaluation of: previous PNGS operations (for 6 operating units), PNGS Units 1 and 4 Stabilization, PNGS Units 1-4 SWS and dismantle/demolish activities, PNGS Units 5-8 Refurbishment (including construction and operation of the DWI), PNGS Units 5-8 Continued Operations, the NSS-PWMF including construction of additional storage building (SB #5) and the PCSS, and construction of other planned buildings. As shown in **Figure 1-2**, based on the conceptual timeline, some Project activities will occur at the same time. For example, in 2027, PNGS Units 1 and 4 are still in the Stabilization Phase and PNGS Units 2 and 3 are in SWS phase, risk reduction and removal activities will also occur, along with early PNGS Units 5-8 refurbishment activities, and construction of the DWI. In the Tier 1 assessment, the air and noise model conservatively evaluated this bounding case where maximum emissions from equipment and vehicular traffic are expected to occur from Project activities occurring at the same timeframe. In the Tier 1 surface water assessment three configurations of water balance were evaluated: PNGS Units 1 and 4 in Stabilization with PNGS Units 5-8 in shutdown for Refurbishment (**Figure 5-3**), PNGS Units 1-4 in SWS and 1 unit from PNGS Units 5-8 returned to service (DWI is operational, **Figure 5-4**), and PNGS Units 5-8 in continued operations with PNGS Units 1-4 in SWS (**Figure 5-5**). As such, cumulative effects on the PN site have been considered in this PERA.

8.0 Conclusions

8.1 Tier 1 Assessment Conclusions

The Tier 1 assessment evaluated PNGS Units 1-4 Decommissioning and PNGS Units 5-8 Refurbishment activities to determine potential Project interactions with various environmental components and receptors. **Table 5-24** summarizes these interactions and the findings from this assessment, identifying which interactions require further quantitative evaluation in the Tier 2 assessment. In general, Project activities during the Stabilization and SWS phases of PNGS Units 1-4 were found to be sufficiently bounded by the 2017 Safe Storage PEA, the 2022 PEA Addendum, or the 2022 PN ERA; thus no additional evaluation is needed. Although risk reduction and removal activities, and dismantling activities for PNGS Units 1-4 were not previously assessed, they are expected to have minimal environmental effects due to the implementation of construction best practices and mitigation plans. Future dismantling and demolition activities, starting in 2050, will be detailed in subsequent DDP updates and PERA updates when more precise work packages are defined.

Refurbishment activities for PNGS Units 5-8, including islanding the unit, refurbishment of reactor auxiliary systems, and other enhancements were determined to have negligible interaction with the environment in the Tier 1 assessment. Some activities, such as the construction of the PCSS, are evaluated as part of a separate PERA. Other activities, including defueling and dewatering the units, are bounded by the 2017 Safe Storage PEA and the 2022 PEA Addendum, while other activities, such as the management of tritium emissions, are bounded by the 2022 PN ERA. As these activities are bounded by previous assessments, no further evaluation was warranted in the Tier 2 assessment.

The construction and operation of the DWI, along with associated activities such as the potential addition of a dock, potential infill, and material disposal, are major activities that were not part of the project scope at the time of earlier assessments. The Tier 1 screening identified that the impacts resulting from these activities—particularly in relation to the atmospheric environment, and aquatic ecosystems—are not bounded by earlier assessments or previous operational conditions (with 6 operating units). Specifically, aquatic habitat impacts from DWI construction and thermal effects, particularly as they relate to climate change, required further assessment. These interactions were retained for further evaluation in the Tier 2 assessment to determine the potential for negative impacts.

To support this PERA, predictive air quality and noise modelling was completed to assess potential impacts to human and ecological receptors resulting from the planned PNGS Units 1-4 Decommissioning and PNGS Units 5-8 Refurbishment. The modelling was developed as a conservative “worst-case” bounding scenario for the planned Project activities.

No long-term human health effects are expected to occur as a result of the predicted ambient air quality or noise conditions for the bounding scenario. Exceedances of the selected ambient air quality criteria were predicted for TSP, PM₁₀, PM_{2.5}, nitrogen dioxide (NO₂, representative of nitrogen oxides [NO_x]), and benzo(a)pyrene (BaP, representative of polycyclic aromatic

hydrocarbons [PAHs]) for at least one of the human receptor locations assessed. No health risks are anticipated for the bounding scenario since short-term air quality criteria exceedances are predicted to occur infrequently (i.e., only a few days up to a few weeks in the year), or at receptor locations where people stay for short periods of time (i.e., the Sport Fisher). For noise, predicted exceedances of human health noise guidelines are modelled to only occur at locations where people stay for short periods of time (i.e., the Sport Fisher, Industrial/Commercial Worker), limiting the overall exposure to elevated noise levels.

No long-term ecological health effects are expected to occur as a result of the predicted ambient air quality for the bounding scenario. Some exceedances of the selected ambient air quality criteria were predicted for TSP, PM₁₀, PM_{2.5}, NO₂, and BaP for at least one of the ecological receptor locations assessed. No effects are expected since exceedances are largely localized to the PN site where mitigation measures (e.g., dust suppression measures) will be utilized to further minimize dust and particulate emissions. Project-related exceedances of short-term 24-hr TSP and PM₁₀ criteria off-site at Frenchman's Bay occur relatively infrequently (i.e., exceedances on a few days up to a few weeks in a year). It is expected that Frenchman's Bay will continue to provide suitable habitat for local terrestrial and riparian biota over the course of the Project.

No noise impacts to receptors at Hydro Marsh and Frenchman's Bay are expected since predicted noise levels are less than the 10 dB guideline for incremental change above existing conditions. Exceedances of noise guideline are localized to the PN site. It is presumed that wildlife currently inhabiting the PN site are well adjusted to noise levels characteristic of an urban/semi-urban environment and are relatively tolerant of human activity. Increased noise levels above the 10 dB guideline are predicted at the Bank Swallow FFEE. As such, mitigation measures should be considered to reduce noise levels during the breeding season (approximately April 1st to August 31st). Additionally, the assumptions in the noise model can be re-evaluated once Project planning is further underway to provide more realistic predictions.

While air quality and noise were not assessed further for any human or ecological receptors in the Tier 2 assessment, recommendations are included to protect breeding birds on-site including species at risk from elevated air concentrations and noise levels (see recommendations, **Section 8.3**). Barn swallow, bank swallow, and peregrine falcon are known to breed on the PN site.

No specific COPCs were identified for the atmospheric or surface water environment. However, feedback from WTFNs on other PERAs indicated the inclusion of a Harvester receptor would be beneficial for the PERA. Thus, an assessment of a Harvester was considered as part of the Tier 2 quantitative assessment.

Post-refurbishment, PNGS Units 5-8 will operate in a manner consistent with previous operations (with 6 operating units). Therefore, the potential effects of the Continued Operation Phase on most environmental components are similar to those previously assessed in the 2022 PN ERA for six operating units and comparable to existing conditions with four units (PNGS Units 5-8) operating.

As shown in the conceptual timeline for the Project in **Figure 1-2**, there will be activities occurring in one phase that occur at the same time as another phase. For example, while PNGS Units 1 and 4 are in the Stabilization Phase and PNGS Units 2 and 3 are in SWS phase, risk reduction and removal activities will also occur, along with PNGS Units 5-8 refurbishment activities, and construction of the DWI. The air quality and noise modelling and surface water quality modelling considered a bounding scenario when activities are occurring at the same time, where relevant to the assessment.

In summary, the following potential effects were evaluated in the Tier 2 assessment:

- Inclusion of a Harvester in the Predictive Human Health Risk Assessment (HHRA) to assess radiation dose from exposure to releases of tritium, carbon-14, and beta/gamma to the atmospheric and surface water environment.
- Evaluation of aquatic habitat loss and potential changes to habitat quality in the Predictive Ecological Risk Assessment (EcoRA) from construction of the proposed DWI and associated nearshore modifications.
- Evaluation of changes to thermal effects on indicator fish species in the Predictive EcoRA due to operation of the DWI.

8.2 Tier 2 Assessment Conclusions

8.2.1 Predictive Human Health Risk Assessment (HHRA)

A Harvester receptor was further evaluated in the Tier 2 assessment. The radiological emissions to air and water assessed in the 2017 Safe Storage PEA continue to remain a conservative estimate of radiological emissions based on current Project planning for PNGS Units 1-4 Stabilization and SWS, as well as for PNGS Units 5-8 Refurbishment.

The incremental radiation dose from the Project to all human receptors evaluated is predicted to be well below the regulatory public dose limit of 1 mSv/a. The total dose to the Harvester is 1.24 μ Sv/a for the Harvester (child), representing 0.12% of the regulatory public dose limit (1,000 μ Sv/a). The highest dose to other receptors is 0.99 μ Sv/a for an urban resident (child), which is 0.10% of the regulatory public dose limit. This PERA has demonstrated that receptor groups near the PN site with anticipated lower exposure are also protected.

Since the dose estimates are a small fraction of the incremental public dose limit of 1 mSv/a and of the natural background dose of 1.4 mSv/a, The Tier 2 predictive HHRA determined there are no health effects anticipated due to exposure of potential critical groups to radiological releases from the PN site.

Based on the results of this PERA, the planned safe storage of PNGS Units 1 and 4, decommissioning of PNGS Units 1-4 and refurbishment of PNGS Units 5-8 are not predicted to cause any adverse effects to the human receptors evaluated.

8.2.2 Predictive Ecological Risk Assessment (EcoRA)

Further evaluations of aquatic habitat impacts and thermal effects were conducted in the Tier 2 assessment. All other Project interactions with the environmental components examined in the Tier 1 assessment were deemed to either pose negligible risks, be sufficiently managed or mitigated, or are bounded by previously completed assessments or current operating conditions.

8.2.2.1 Aquatic Habitat Impacts

Based on the habitat assessment, the construction of the DWI and associated lake infill areas and dock could result in the destruction of approximately 17.5 ha of fish habitat utilized by species for potential spawning, foraging and migration, and 4.8 ha of habitat alteration from dredging and potential bridge over the PNGS Units 5-8 CCW outfall. Additionally, the construction of the intake channel (a bored tunnel running from the intake cap to PNGS) could result in temporary disruption of approximately 2.5 ha of fish habitat.

Although the substrate and depth in both nearshore study areas meet the spawning requirements of some species, high wave energy along the shoreline (0-1 m) makes them unsuitable for spawning. Furthermore, both the DWI and nearshore study areas lack unique habitat features, as they are typical of other areas found throughout Lake Ontario. Therefore, while construction activities will result in significant habitat loss, it was determined that no rare or unique habitats will be lost. A habitat suitability assessment using DFO's HEAT tool may be utilized to quantitatively assess this loss.

8.2.2.2 Thermal Effects

The thermal impact of the PNGS Units 5-8 discharge during operation of the DWI was evaluated. It is anticipated that once the DWI is in operation the discharge temperature will be the same or lower than the existing PNGS Units 5-8 discharge temperatures. Thus, the PNGS Refurbishment activities are not expected to add any additional thermal load to the aquatic environment, and may even result in an improvement relative to current thermal conditions.

In the future, lake water temperatures are anticipated to increase as climate change progresses over the long-term; however, it is generally understood that larger waterbodies like Lake Ontario are expected to see less severe climate related changes than smaller waterbodies. The effects of lake warming are anticipated to impact all fish in varying degrees. Some fish species may have to shift to different habitats to remain within their optimal temperature range or acclimate as climate change continues to progress.

During Continued Operation the thermal effects are expected to be similar or slightly less than previous conditions (i.e., with 6 operating units), in the future, unrelated to the thermal discharge from PNGS, climate change and rising lake temperatures may result in increased thermal stress to local fish communities.

Based on the results of the PERA, most activities associated with PNGS Units 1-4 Decommissioning, PNGS Units 5-8 Refurbishment, and Continued Operations are not predicted to result in adverse effects to human and/or ecological receptor groups evaluated. Some aquatic habitat will be disturbed or removed from DWI construction – OPG will meet all Fisheries and Oceans Canada (DFO) authorization requirements including implementation of fish habitat compensation measures to offset the loss of habitat and associated productivity, As such the effect of aquatic habitat loss should be minimal with implementation of mitigation measures. While some individual exceedances of air quality or noise guidelines were identified, monitoring and mitigation measures identified in **Section 8.3** will be implemented to confirm no adverse effects.

8.3 Recommendations for Monitoring and Mitigation

OPG has a robust environmental monitoring program where environmental media are sampled and analyzed at locations within and outside the PN site. This program will continue during PNGS Units 1-4 Decommissioning, PNGS Units 5-8 Refurbishment, and Continued Operations.

Through the normal course of implementation of the N288 standards, the changes in activities associated with the Project will be considered as part of the periodic review and update of the monitoring programs resulting in a continual assessment of effects on human and non-human biota.

Based on the results of this PERA, the following recommendations are made for monitoring and mitigation in **Table 8-1** below.

Table 8-1: Recommendations for Monitoring and Mitigation

Environmental Component	Recommendation for Monitoring and Mitigation
Atmospheric Environment	<ul style="list-style-type: none"> • <u>Air Quality</u>: Air monitoring of existing conditions should continue so that at least 6 months of air quality data are available to characterize the existing environment. The additional air monitoring data should be included in the next iteration of the PERA. • <u>Air Quality</u>: Implementation of a dust management plan that could involve mitigative measures such as the application of dust suppressants, stabilization of completed soil surfaces, and suspension of dust-generating activities during periods of inclement weather. This is expected to reduce dust and particulate emissions and deposition on to vegetation surfaces, limiting pollution of local wildlife habitat. • <u>Noise</u>: The development and implementation of a Noise Management Plan will outline best construction practices and available mitigation measures for controlling noise generation. • <u>Noise</u>: Mitigation measures should be explored to reduce noise levels to species at risk during the breeding season, including Bank Swallow, Barn Swallow, and Peregrine Falcon (known to nest on the PN site). Mitigation measures may include alternate truck routes, revisiting assumptions in noise model to reduce conservatism.
Surface Water Environment	<ul style="list-style-type: none"> • No additional recommendations beyond continuing to implement surface water quality monitoring through OPG's ongoing environmental monitoring program. • OPG will employ best practices for stormwater management that would meet Ontario Ministry of Environment, Conservation and Parks (MECP) requirements and industrial sewage works rules.
Aquatic Environment	<ul style="list-style-type: none"> • Aquatic monitoring studies were completed to support this PERA based on current Project planning for the DWI at the time of study design. As the design of the DWI evolves, it presents some uncertainty in the study area size and location. As such, further data (fish community, benthic macroinvertebrate community, microzooplankton community) should be collected for the aquatic environment to reflect changes to DWI planning since the Project was initiated. The additional aquatic environment data should be included in the next version of the PERA. • <u>Aquatic Habitat</u>: To mitigate impacts of habitat loss from DWI construction, measures should be taken to limit the spread of aquatic invasive species, such as cleaning, draining, and drying

Environmental Component	Recommendation for Monitoring and Mitigation
	<p>any equipment used in the water, and avoiding the transfer of organisms or water between bodies of water. Additionally, OPG will replace and restore disturbed habitat features, as well as remediate any impacted areas, in accordance with DFO authorization requirements, if applicable.</p> <ul style="list-style-type: none"> • <u>Aquatic Habitat</u>: An Erosion and Sediment Control Plan should be developed to minimize the mobilization of suspended materials into the water during DWI construction. Mitigation measures may include conducting in-water works in isolation of open or flowing water to reduce sediment introduction into the watercourse, regular inspection and maintenance of erosion controls, monitoring for signs of sedimentation, and ensuring the proper disposal of dredged materials. Similarly, a spill response plan should be implemented to prevent spills of deleterious substances. • <u>Impingement and Entrainment</u>: The reduction of impingement and entrainment once the DWI is operational should be confirmed through monitoring programs. • <u>Thermal Effects</u>: The assumption that PNGS Units 5-8 discharge temperatures post-DWI implementation will be the same or slightly lower than previous operational conditions (with 6 operating units) should be confirmed through evaluation of lake water temperatures in terms of hazard quotients to key indicator fish species, as well as evaluation of the influence of climate change over time. This evaluation should be included in routine PN ERA updates. Additionally, monitoring of lake bottom temperatures within the thermal plume, once the DWI is operational is recommended to improve the understanding of habitat conditions.
Geological and Hydrogeological Environment	<ul style="list-style-type: none"> • During construction of the PCSS, SB #5, and RFRISA, and other planned buildings any dewatering during excavation should be completed with the necessary permissions following MECP regulations intended to be protective against discharge or re-infiltration of collected groundwater. • A geotechnical investigation should be completed to determine if dewatering is required for the RFRISA or any other planned building. A geotechnical investigation has already been completed for the PCSS and is discussed in the PCSS PERA.
Terrestrial Environment	<ul style="list-style-type: none"> • See atmospheric environment row for recommendations on reducing noise levels for species at risk.

Environmental Component	Recommendation for Monitoring and Mitigation
	<ul style="list-style-type: none"> As much as its possible to do so, construction activities should be adjusted as needed to minimize impacts, such as modifying work schedules or implementing noise and activity restrictions near nesting sites. To further reduce disturbance, heavy construction activity should be avoided during key breeding periods. Furthermore, work could be planned to occur during daytime hours to minimize disruption of nocturnal wildlife. OPG will comply with the species and habitat protection provisions of the Endangered Species Act, Species at Risk Act, and Migratory Birds Convention Act during all project activities. OPG will continue to monitor breeding birds and conduct broader biodiversity monitoring on an annual basis to support conservation efforts and regulatory compliance.
Radiation and Radioactivity (Gamma Radiation)	<ul style="list-style-type: none"> Future iterations of the PN ERA (based on the time period they encompass) should consider the new NSS-PWMF layout with inclusion of the transferred DSMs from the Phase I to the Phase II NSS-PWMF site. Data from TLDs surrounding the DSMs as well as quarterly catch basin stormwater monitoring can be used to verify that the conclusion that doses remain acceptable.

9.0 References

- AECOM, 2023. Technical Memorandum – Bounding Analysis for PNGS. Report No. NK30-CORR-07007–1235347. February.
- Anderson, E.J., Stow, C.A., Gronewold, A.D., Mason, L.A., McCormick, M.J., Qian, S.S., Ruberg, S.A., Beadle, K., Constant, S.A., Hawley, N., 2021. Seasonal overturn and stratification changes drive deep-water warming in one of Earth’s largest lakes. *Nat Commun* 12, 1688. March. <https://doi.org/10.1038/s41467-021-21971-1>
- Auer, N.A., 1996. Importance of habitat and migration to sturgeons with emphasis on lake sturgeon. *Can. J. Fish. Aquat. Sci.* 53, 152–160. December. <https://doi.org/10.1139/f95-276>
- Barbiero, R.P., Little, R.E., Tuchman, M.L., 2001. Results from the U.S. EPA’s Biological Open Water Surveillance Program of the Laurentian Great Lakes: III. Crustacean Zooplankton. *Journal of Great Lakes Research* 27, 167–187.
- Barbiero, R.P., Tuchman, M.L., 2001. Results from the U.S. EPA’s Biological Open Water Surveillance Program of the Laurentian Great Lakes: I. Introduction and Phytoplankton Results. *Journal of Great Lakes Research* 27, 134–154.
- Beacon, 2017a. Pickering Nuclear Site Biodiversity Monitoring Program Annual Report 2016. February.
- Beacon, 2017b. Pickering Nuclear Site Biodiversity Monitoring Program Annual Report 2017. December.
- Beacon, 2018. Pickering Nuclear Site Biodiversity Monitoring Program Annual Report 2018. December.
- Beacon, 2020. Draft Pickering Nuclear Generating Station Study Area Species Lists.
- Beacon, 2022. Pickering Nuclear Site Biodiversity Monitoring Program Three Year Report (2019 - 2021). January.
- Beacon, 2023a. Pickering Nuclear Site Biodiversity Monitoring Program Annual Report 2022. February.
- Beacon, 2023b. 2023 Pickering Nuclear Biodiversity Program Technical Memo. December.
- Bemis, W.E., Kynard, B., 1997. Sturgeon rivers: an introduction to acipenseriform biogeography and life history. *Environmental Biology of Fishes* 48, 167–183. March. <https://doi.org/10.1023/A:1007312524792>
- Black & Veatch, 2024. Methodology for Estimating Percent Reduction in Impingement & Entrainment. Darlington New Nuclear Project.
- Butcher, J.B., Nover, D., Johnson, T.E., Clark, C.M., 2015. Sensitivity of lake thermal and mixing dynamics to climate change. *Climatic Change* 129, 295–305. March. <https://doi.org/10.1007/s10584-015-1326-1>
- CCME (Canadian Council of Ministers of the Environment), 2000. Canadian Tissue Residues Guidelines for the Protection of Wildlife Consumers of Aquatic Biota – Methylmercury.
- CCME (Canadian Council of Ministers of the Environment), 2010. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health – Polycyclic Aromatic Hydrocarbons.

- CCME (Canadian Council of Ministers of the Environment), 2019. Guidance Document on Air Zone Management. URL https://ccme.ca/en/res/guidancedocumentonairzonemanagement_secured.pdf
- CCME (Canadian Council of Ministers of the Environment), 2020. Guidance Document on Achievement Determination for Canadian Ambient Air Quality Standards for Nitrogen Dioxide. Report No. PN 1608.
- CCME (Canadian Council of Ministers of the Environment), 2024. Canadian Environmental Quality Guidelines - Canadian Water Quality Guidelines for the Protection of Aquatic Life and Recreational Water Quality Guidelines and Aesthetics.
- CH2M (CH2M Gore and Storrie), 2000. Tritium in Groundwater Study. Report No. NA44-REP-07010-10001. September.
- Chan, L.A., Receveur, O., Batal, M., David, W., Schwartz, H., Ing, A., 2014. First Nations Food, Nutrition & Environment Study. Results from Ontario 2011/2012.
- Choudhary, G., Hansen, H., 1998. Human health perspective on environmental exposure to hydrazines: A review. Chemosphere 37, 801-843.
- CNSC (Canadian Nuclear Safety Commission), 2009. CNSC Letter, L. Levert to D.P. McNeil, OPG Record of Proceedings - Ontario Power Generation Inc. Report No. CD# NK30-CORR-00531-05083. January.
- CNSC (Canadian Nuclear Safety Commission), 2018. REGDOC-3.2.1, Public Information and Disclosure. May.
- CNSC (Canadian Nuclear Safety Commission), 2020. Environmental Protection. Environmental Principles, Assessments and Protection Measures. Report No. REGDOC-2.9.1 Version 1.2. September.
- CNSC (Canadian Nuclear Safety Commission), 2021. REGDOC-2.11.2, Decommissioning.
- CNSC (Canadian Nuclear Safety Commission), 2022. REGDOC-3.2.2, Indigenous Engagement, Version 1.2. February.
- COG (CANDU Owners Group), 2013. Derived Release Limits Guidance. Report No. COG-06-3090-R3-I, 2013-12.
- COG (CANDU Owners Group), 2019. Derived Release Limits Guidance. Report No. COG-06-3090-R4.
- Coker, G.A., Portt, C.B., Minns, C.K., 2001. Morphological and Ecological Characteristics of Canadian Freshwater Fishes. January.
- Cooper, F., 2013. Thermal effects Risk Assessment for the Darlington and Pickering Nuclear Generating Stations. Report No. COG-12-3053.
- COSEWIC, 2012. COSEWIC assessment and status report on the American Eel *Anguilla rostrata* in Canada. Committee on the Status of Endangered Wildlife in Canada. May.
- Coutant, C.C., 1977. Cold shock to aquatic organisms: guidance for power plant siting, design and operation. Nuclear Safety 329-342.
- CSA (Canadian Standards Association), 2010. Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills. Report No. CSA N288.4-10 (Reaffirmed 2015). May.
- CSA (Canadian Standards Association), 2012. Environmental risk assessments at Class I nuclear facilities and uranium mines and mills. Report No. CSA N288.6-12 (Reaffirmed 2017).

- CSA (Canadian Standards Association), 2018. Guideline for design of fish impingement and entrainment programs at nuclear facilities. Report No. CSA N288.9-18.
- CSA (Canadian Standards Association), 2019. Environmental monitoring programs at nuclear facilities and uranium mines and mills. Report No. CSA N288.4-19. September.
- CSA (Canadian Standards Association), 2020. Guidelines for modelling radionuclide environmental transport, fate, and exposure associated with the normal operation of nuclear facilities. Report No. CSA N288.1:20. March.
- CSA (Canadian Standards Association), 2022a. Environmental risk assessments at nuclear facilities and uranium mines and mills. Report No. CSA N288.6:22.
- CSA (Canadian Standards Association), 2022b. N288.6:22. Environmental risk assessments for nuclear facilities and uranium mines and mills.
- CSA (Canadian Standards Association), 2024. N288.9-24, Guideline for Design of Fish Impingement and Entrainment Programs at Nuclear Facilities. Draft in progress.
- Durham Region (The Regional Municipality of Durham), 2022a. Oshawa Drinking Water System 2022 Annual Report.
- Durham Region (The Regional Municipality of Durham), 2022b. Bowmanville Drinking Water System 2022 Annual Report.
- EC (Environment Canada), 1998. Lakewide Management Plan for Lake Ontario. Environment Canada, USEPA, Ontario, NYDEC.
- EC (Environment Canada), 2009a. Durham Regional Coastal Wetland Monitoring Project: 6-year Technical Report. Module 3 - Biological Condition.
- EC (Environment Canada), 2009b. Durham Regional Coastal Wetland Monitoring Project: 6-year Technical Report. Module 1 - Introduction and Assessment Methods.
- EC, HC (Environment Canada and Health Canada), 2011. Screening Assessment for the Challenge. Hydrazine. Report No. CAS Registry Number 302-01-2.
- ECCC (Environment and Climate Change Canada), 2019. Guidance document: environmental effects assessment of freshwater thermal discharge. February. URL <http://publications.gc.ca/site/eng/9.867894/publication.html>
- ECCC (Environment and Climate Change Canada), 2022. Canadian Environmental Protection Act, 1999. Federal Environmental Quality Guidelines Selenium.
- ECCC (Environment and Climate Change Canada), 2023a. Canadian Ambient Air Quality Standards (CAAQS).
- ECCC (Environment and Climate Change Canada), 2023b. Guidelines to avoid harm to migratory birds. July. URL <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/reduce-risk-migratory-birds.html>
- Ecometrix (Ecometrix Incorporated), 2012. Pickering Nuclear Generating Station Groundwater Monitoring Program Design. Report No. P-REP-10120-10037-R000. September.
- Ecometrix (Ecometrix Incorporated), 2015. Pickering EMP Supplementary Study - Hydrazine in Lake Water - 2014. Report No. P-REP-03443-0538647. April.
- Ecometrix (Ecometrix Incorporated), 2021. DNNP Aquatic Community Characterization for Siting of Intake and Diffuser – Final Report. Prepared for Ontario Power Generation. Report No. NK054-REP-07730-0731545. August.
- Ecometrix (Ecometrix Incorporated), 2023a. Environmental Risk Assessment Report for Pickering Nuclear. Report No. P-REP-07701-00007-R001. March.

- Ecometrix (Ecometrix Incorporated), 2023b. Pickering Safe Storage Project Predictive Effects Assessment - 2022 Addendum Update. Report No. P-REP-07701-00006 R001. March.
- Ecometrix (Ecometrix Incorporated), 2023c. Conceptual Site Model – CSA N288.7 Implementation at Pickering Nuclear. Prepared for: OPG. Report No. P-REP-07294-00001. September.
- Ecometrix (Ecometrix Incorporated), 2023d. Groundwater Protection and Monitoring Programs for Pickering Nuclear - CSA N288.7 Implementation. Report No. P-REP-07294-00002. September.
- Ecometrix (Ecometrix Incorporated), 2023e. IMPACT-DRL v5.5.2 - Tool Qualification Report. December.
- Ecometrix (Ecometrix Incorporated), 2024. Predictive Environmental Risk Assessment for Pickering Component Storage Structure. Report No. 92896-REP-07701-00019 R002 (LOF). November.
- Ecometrix, Golder (Ecometrix Incorporated and Golder Associates Ltd), 2018. Environmental Risk Assessment Report for Pickering Nuclear. Report No. P-REP-07701-00001-R000. February.
- Eme, J., Mueller, C.A., Manzon, R.G., Somers, C.M., Boreham, D.R., Wilson, J.Y., 2015. Critical windows in embryonic development: Shifting incubation temperatures alter heart rate and oxygen consumption of Lake Whitefish (*Coregonus clupeaformis*) embryos and hatchlings. *Comp Biochem Physiol A Mol Integr Physiol* 179, 71–80. January.
<https://doi.org/10.1016/j.cbpa.2014.09.005>
- EPRI (Electric Power Research Institute), 2014. Entrainment Abundance Monitoring Technical Support Document: updated for the New Clean Water Act 316(b) Rule. Technical Report. Palo Alto CA. September.
- Favot, E.J., Holeton, C., DeSellas, A.M., Paterson, A.M., 2023. Cyanobacterial blooms in Ontario, Canada: continued increase in reports through the 21st century. *Lake and Reservoir Management* 39, 1–20. February. <https://doi.org/10.1080/10402381.2022.2157781>
- FCSAP (Federal Contaminated Sites Action Plan), 2012. Federal Contaminated Sites Action Plan (FCSAP): Ecological Risk Assessment Guidance. March.
- Golder, Ecometrix (Golder Associates Ltd. and Ecometrix Incorporated), 2017. Pickering Safe Storage Project Predictive Effects Assessment. Report No. P-REP-07701-00002-R000. April.
- Golder (Golder Associates Ltd.), 2005. Elements 4.1, 4.3 and 4.4 – Aquatic Environment Post-Restart Follow-Up Monitoring Program 2004 Pickering A Return To Service. Report No. N44-REP-07701.1-00004. April.
- Golder (Golder Associates Ltd.), 2007a. Aquatic Environment Technical Support Document Refurbishment and Continued Operation of Pickering B Nuclear Generating Station Environmental Assessment. Report No. NK30-REP-07701-00008. March.
- Golder (Golder Associates Ltd.), 2007b. Geology, Hydrogeology and Seismicity Technical Support Document Refurbishment and Continued Operation of Pickering B Nuclear Generating Station Environmental Assessment. Report No. NK30-REP-07701-00006. March.
- Golder (Golder Associates Ltd.), 2007c. Terrestrial Environment Technical Support Document Refurbishment and Continued Operation of Pickering B Nuclear Generating Station Environmental Assessment. Report No. NK30-REP-07701-00009. March.

- Golder (Golder Associates Ltd.), 2007d. Surface Water Resources Technical Support Document Refurbishment and Continued Operation of Pickering B Nuclear Generating Station Environmental Assessment. Report No. NK30-REP-07701-00007. April.
- Golder (Golder Associates Ltd.), 2015. Emission Summary and Dispersion Modelling Report. Report No. P-REP-00541-00014-R001. August.
- Golder, SENES (Golder and SENES Consultants Limited), 2009. Aquatic Environment Existing Environmental Conditions Technical Support Document New Nuclear – Darlington Environmental Assessment. Prepared for Ontario Power Generation. Report No. NK054-REP-07730-00003-R000. September.
- Government of Canada, 2018. Canada, Ontario and Williams Treaties First Nations reach negotiated settlement agreement for Alderville Litigation. Crown-Indigenous Relations and Northern Affairs Canada. September.
- Government of Canada, 2019. Fisheries Act, R.S.C., 1985, c. F-14.
- Great Lakes Fishery Commission, 2023. Great Lakes Fishery Commission - Fish Community Objective indicator [WWW Document]. December. URL <https://www.glfc.org/indicator.php?indicator=54>
- Griffiths, J.S., 1980. Potential Effects of Unstable Thermal Discharges on Incubation of Round Whitefish Eggs. Ontario Hydro Research Division. Report No. 80-140-K.
- Harrow-Lyle, T.J., Chomicki, K.M., Kirkwood, A.E., 2024. Coastal wetlands as sources of *Escherichia coli* to the nearshore of Lake Ontario. Journal of Great Lakes Research 50, 102292. April. <https://doi.org/10.1016/j.jglr.2024.102292>
- Haymes, G.T., Kolenosky, Dianne P., 1984. Distribution and characteristics of spawning round whitefish in Lake Ontario, 1976-1981. Ontario Ministry of Natural Resources, Toronto.
- HC (Health Canada), 2013. Guidelines for Canadian Drinking Water Quality: Guideline Technical Document — Ammonia. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
- HC (Health Canada), 2016a. Human Health Risk Assessment for Coarse Particulate Matter.
- HC (Health Canada), 2016b. Human Health Risk Assessment for Ambient Nitrogen Dioxide.
- HC (Health Canada), 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise. January.
- HC (Health Canada), 2018. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Country Foods. May.
- HC (Health Canada), 2024. Guidelines for Canadian Drinking Water Quality - Summary Tables. October. URL <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html>
- Heck, W., 1964. Plant injury induced by photochemical reaction products of propylene-nitrogen dioxide mixtures. J. Air Pollut. Control Assoc 14, 255–261.
- Hesterberg, T.W., Bunn, W.B., McClellan, R.O., Hamade, A.K., Long, C.M., Valberg, P.A., 2009. Critical review of the human data on short-term nitrogen dioxide (NO₂) exposures: evidence for NO₂ no-effect levels. Critical Reviews in Toxicology 39, 743–81.
- Holm, E., Mandrake, N.E., Burridge, M.E., 2021. A Field Guide to Freshwater Fishes of Ontario, Second Edition. Royal Ontario Museum.

- IJC (International Joint Commission), 1977. New and Revised Great Lakes Water Quality Objectives, Volume II. October.
- Ivanova, S.V., Fisk, A.T., Johnson, T.B., 2024. Predicted growth of lake trout and Chinook salmon in a warming lake. *Journal of Great Lakes Research* 50, 102310. April.
<https://doi.org/10.1016/j.jglr.2024.102310>
- Kleinman, M.T., Mautz, W.J., 1991. The Effects of Exercise on Dose and Dose Distribution of Inhaled Automotive Pollutants. *Res Rep Health Eff Inst.* 45, 1–40. October.
- Lampman, G.G., Makarewicz, J.C., 1999. The Phytoplankton Zooplankton Link in the Lake Ontario Food Web. *Journal of Great Lakes Research* 25, 239–249. January.
[https://doi.org/10.1016/S0380-1330\(99\)70733-1](https://doi.org/10.1016/S0380-1330(99)70733-1)
- Logfren, B.M., 2014. Simulation of atmospheric and lake conditions in the Laurentian Great Lakes region using the Coupled Hydrosphere-Atmosphere Research Model (CHARM).
- Magnuson, J.J., Crowder, L.B., Medvick, P.A., 1979. Temperature as an Ecological Resource. *American Zoologist* 19, 331–343. February. <https://doi.org/10.1093/icb/19.1.331>
- MECP (Ministry of Environment, Conservation and Parks), 2008. Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario. May.
- MECP (Ministry of the Environment, Conservation and Parks), 2011. Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario. Standards Development Branch. April.
- MECP (Ministry of the Environment, Conservation and Parks), 2013. Environmental Noise Guideline - Stationary and Transportation Sources - Approval and Planning (NPC-300). August. URL <https://www.ontario.ca/page/environmental-noise-guideline-stationary-and-transportation-sources-approval-and-planning>
- MECP (Ministry of the Environment, Conservation and Parks), 2023. Ontario's Ambient Air Quality Criteria. URL <https://www.ontario.ca/page/ontarios-ambient-air-quality-criteria>
- MNRF (Ministry of Natural Resources and Forestry), 2018. Lake Ontario Fish Communities and Fisheries: 2017 Annual Report of the Lake Ontario Management Unit. Ontario Ministry of Natural Resources and Forestry, Picton, Ontario, Canada. Report No. ISSN 1201-8449.
- MOE (Ontario Ministry of the Environment), 1978. Model Municipal Noise Control By-Law - Final Report. August.
- MOEE (Ministry of Environment and Energy), 1994. Water management: policies, guidelines, provincial water quality objectives.
- Morrison, B., 2019. Chronology of Lake Ontario ecosystem and fisheries. *Aquat. Ecosyst. Health Manag.* 22, 294–304.
- OPG (Ontario Power Generation), 2000. Pickering A Return to Service Environmental Assessment Report Volume 1 Main Report. Report No. NA44-REP-07730–372537. April.
- OPG (Ontario Power Generation), 2003. Pickering Waste Management Facility Phase II Project - Submission of Final Environmental Assessment Study Report. December.
- OPG (Ontario Power Generation), 2007. OPG Letter, D.P. McNeil to T.E. Schaubel, CNSC, Pickering B Environmental Assessment (EA) for Proposed Refurbishment and Continued Operation - Submission of Final EA Study Report. Report No. Cd# NK30-CORR-00531-04644. December.

- OPG (Ontario Power Generation), 2010. Impact of PNGS Thermal Discharge During the Winter of 2010 on Potential Round Whitefish Spawning. Report No. P-REP-07250-00001-R000. August.
- OPG (Ontario Power Generation), 2011. Acoustic Assessment of Pickering Nuclear Generating Station, Supporting Document for a Renewal of a Basic Comprehensive Certificate of Approval (C of A) - Air & Noise). Report No. P-REP-00541-00015 R00. May.
- OPG (Ontario Power Generation), 2012a. Pickering Nuclear Site Species List - 2011. Report No. P-LIST-07811-00001. July.
- OPG (Ontario Power Generation), 2012b. PNGS Thermal Plume Monitoring During Winter of 2010-2011. Report No. P-REP-07250-00003. May.
- OPG (Ontario Power Generation), 2012c. Pickering Nuclear Generating Station 2011 Impingement Monitoring Report. Report No. P-REP-07263-00003-R000. October.
- OPG (Ontario Power Generation), 2012d. Mitigation of Fish Entrainment at PNGS. Report No. PREP-07262-00001-R000. April.
- OPG (Ontario Power Generation), 2013a. PNGS Thermal Plume Monitoring During Winter of 2011-2012. Report No. P-REP-07250-00004. October.
- OPG (Ontario Power Generation), 2013b. Condenser Cooling Water Option Assessment Report - OPG Darlington New Nuclear Project. Report No. NK054-REP-01210-00093 R002. January.
- OPG (Ontario Power Generation), 2016. Pickering Nuclear Site Species List 2015. Report No. P-LIST-07811-00001-R005. April.
- OPG (Ontario Power Generation), 2017a. Pickering Nuclear 2016 Impingement Monitoring Report. Report No. P-REP-07263-00010-R000. April.
- OPG (Ontario Power Generation), 2017b. 2016 Results of Environmental Monitoring Programs. Report No. N-REP-03443-10016-R000. April.
- OPG (Ontario Power Generation), 2017c. Memorandum: 2016 Pickering Nuclear Thermal Effluent Report. Report No. P-CORR-00541-00848. April.
- OPG (Ontario Power Generation), 2018a. Pickering Nuclear 2017 Impingement Monitoring Report. Report No. P-REP-07263-00011-R000. April.
- OPG (Ontario Power Generation), 2018b. 2017 Results of Environmental Monitoring Program. Report No. N-REP-03443-10017-R000. April.
- OPG (Ontario Power Generation), 2018c. Memorandum: 2017 Pickering Nuclear Thermal Effluent Report. Report No. P-CORR-00541-00863. May.
- OPG (Ontario Power Generation), 2018d. Potential Effect of the Thermal Plume from the Pickering Nuclear Generating Station on the Survival of Round Whitefish Embryos. Report No. P-REP-07250-00005-R001. February.
- OPG (Ontario Power Generation), 2019a. Dosimetry and Radiological Environmental Quality Assurance Program Manual. Report No. N-MAN-03416.3-0020 R016. November.
- OPG (Ontario Power Generation), 2019b. 2018 Acoustic Assessment Report for Pickering Nuclear Generating Station. Report No. P-REP-00541-10011-R002. April.
- OPG (Ontario Power Generation), 2019c. Pickering Nuclear Generating Station 2018 Impingement Monitoring Report. Report No. P-REP-07263-00012-R000. October.
- OPG (Ontario Power Generation), 2019d. 2018 Results of Environmental Monitoring Program. Report No. N-REP-03443-10019-R000. April.

- OPG (Ontario Power Generation), 2019e. Memorandum: 2018 Pickering Nuclear Thermal Effluent Report. Report No. P-REP-00541-0766719. May.
- OPG (Ontario Power Generation), 2020a. 2019 Acoustic Assessment Report for Pickering Nuclear Generating Station. Report No. P-REP-00541-10018-R000. June.
- OPG (Ontario Power Generation), 2020b. 2019 Results of Environmental Monitoring Programs. Report No. N-REP-03443-10023-R000. March.
- OPG (Ontario Power Generation), 2020c. Memorandum: 2019 Pickering Nuclear Thermal Emission Protection (TEEP) Effluent Report. Report No. P-REP-00541-10017. May.
- OPG (Ontario Power Generation), 2021a. 2020 Acoustic Assessment Report for Pickering Nuclear Generating Station. Report No. P-REP-00541-10024-R000. June.
- OPG (Ontario Power Generation), 2021b. Stormwater and Foundation Drainage Monitoring Assessment for the Darlington and Pickering Waste Management Facilities. Report No. W-CORR-00531-01762. September.
- OPG (Ontario Power Generation), 2021c. Pickering Nuclear Generating Station 2020 Impingement Monitoring Report. Report No. P-REP-07263-00014-R000. April.
- OPG (Ontario Power Generation), 2021d. Pickering Nuclear Generating Station 2019 Impingement Monitoring Report. Report No. P-REP-07263-00013-R000. January.
- OPG (Ontario Power Generation), 2021e. Memorandum: 2020 Pickering Nuclear Thermal Emission Protection (TEEP) Effluent Report. Report No. P-REP-00541-10022. April.
- OPG (Ontario Power Generation), 2021f. Potential Effects of the Pickering Nuclear Generating Station Thermal Plume on the Survival of Round Whitefish Embryos, 2018-2020. Report No. P-REP-07250-00007-R002. August.
- OPG (Ontario Power Generation), 2021g. 2020 Pickering Nuclear Environmental Compliance Approval NO. 0590- BEDKHH-Annual Performance Report. Report No. P-REP-00541-10023-R000. May.
- OPG (Ontario Power Generation), 2022a. 2021 Acoustic Assessment Report for Pickering Nuclear Generating Station. Report No. P-REP-00541-10029-R000. May.
- OPG (Ontario Power Generation), 2022b. 2021 Pickering Nuclear Environmental Compliance Approval No. 0590- BEDKHH- Annual Performance Report. Report No. P-REP-00541-10028-R000. April.
- OPG (Ontario Power Generation), 2022c. Pickering Nuclear Generating Stations 2021 Impingement Monitoring Report. Report No. P-REP-07263-00015. March.
- OPG (Ontario Power Generation), 2022d. Memorandum: 2021 Pickering Nuclear Thermal Emission Environmental Protection (TEEP) Effluent Report. Report No. P-REP-00541-10027. April.
- OPG (Ontario Power Generation), 2022e. 2021 Pickering Nuclear Groundwater Monitoring Program Results. Report No. P-REP-10120-10048. March.
- OPG (Ontario Power Generation), 2022f. Derived Release Limits and Environmental Action Levels for Darlington Nuclear Generating Station. Report No. NK38-REP-03482-100001-R003. December.
- OPG (Ontario Power Generation), 2023a. 2022 Results of Environmental Monitoring Programs for Darlington and Pickering Nuclear. Report No. N-REP-03443-10029, R000. April.
- OPG (Ontario Power Generation), 2023b. 2021 Results of Environmental Monitoring Programs. Report No. N-REP-03443-10027-R001. July.

- OPG (Ontario Power Generation), 2023c. 2022 Acoustic Assessment Report for Pickering Nuclear Generating Station. Report No. P-REP-00541-10034-R000. May.
- OPG (Ontario Power Generation), 2023d. Pickering Nuclear Generating Stations 2022 Impingement Monitoring Report. Report No. P-REP-07263-00016-000. March.
- OPG (Ontario Power Generation), 2023e. 2022 Pickering Nuclear Environmental Compliance Approval No. 1859- C5AKBZ- Annual Performance Report. Report No. P-REP-00541-10033-R000. May.
- OPG (Ontario Power Generation), 2023f. Memorandum: 2022 Pickering Nuclear Thermal Emission Environmental Protection (TEEP) Effluent Report. Report No. P-REP-00541-10032. April.
- OPG (Ontario Power Generation), 2023g. Groundwater Protection and Monitoring Programs for Pickering Nuclear - CSA N288.7 Implementation. Prepared by: Ecometrix Inc. Report No. P-REP-07294-00002. September.
- OPG (Ontario Power Generation), 2023h. 2022 Pickering Nuclear Groundwater Monitoring Program Results. Report No. P-REP-10120-10050. November.
- OPG (Ontario Power Generation), 2023i. Nuclear Sustainability Services - Pickering Waste Management Facility - Safety Report. Report No. 92896-SR-01320-10002-R007. October.
- OPG (Ontario Power Generation), 2023j. Severe Weather Emergency preparedness. September.
- OPG (Ontario Power Generation), 2024a. Pickering NGS Stabilization Activity Plan (SAP). Report No. P-PLAN-00990-00007 R005. November.
- OPG (Ontario Power Generation), 2024b. OPG Letter, K. Aggarwal to N. Greencorn, Pickering Waste Management Facility – Notification of Relocation of the Dry Storage Modules from the Phase I Site to the Phase II Site. Report No. CD# 92896-CORR-00531-01600 P. December.
- OPG (Ontario Power Generation), 2024c. PNGS-A Detailed Decommissioning Plan Volume 1 - Outbuildings Removal. Report No. NA44-PLAN-00960-00005-00. December.
- OPG (Ontario Power Generation), 2024d. 2023 Results of Environmental Monitoring Programs for Darlington and Pickering Nuclear. Report No. N-REP-03443-10031 R000. April.
- OPG (Ontario Power Generation), 2024e. Derived Release Limits and Environmental Action Levels for Pickering Nuclear. Report No. P-REP-03482-00006-R001. July.
- OPG (Ontario Power Generation), 2024f. 2023 Acoustic Assessment Report for Pickering Nuclear Generating Station. Report No. P-REP-00541-10040-R000. June.
- OPG (Ontario Power Generation), 2024g. 2023 Pickering Nuclear Environmental Compliance Approval No. 1859 - C5AKBZ Annual Performance Report. Report No. P-REP-00541-10038-R000. May.
- OPG (Ontario Power Generation), 2024h. Memorandum: 2023 Pickering Nuclear Thermal Emission Environmental Protection (TEEP) Effluent Report. April.
- OPG (Ontario Power Generation), 2024i. 2023 Pickering Nuclear Groundwater Monitoring Program Results. Report No. P-REP-10120-10052. April.
- OPG (Ontario Power Generation), 2024j. PNGS-A Detailed Decommissioning Plan Volume 0 - Program Overview. Report No. NA44-PLAN-00960-00004-00. December.
- OPG (Ontario Power Generation), 2025. Pickering Nuclear Generating Station B Preliminary Decommissioning Plan. Report No. NK30-PLAN-00960-00001 R000.

- Ortech (Ortech Consulting Inc.), 2019a. 2017/2018 (Reg 345 Version) Emission Summary and Dispersion Modelling Report. Report No. P-REP-00541-10008-R002. February.
- Ortech (Ortech Consulting Inc.), 2019b. 2018 Emission Summary and Dispersion Modelling Report (AERMOD) for Pickering Nuclear Generating Station. Report No. P-REP-00541-10013-R000. February.
- Ortech (Ortech Consulting Inc.), 2020. 2019 Emission Summary and Dispersion Modelling Report for Pickering Nuclear Generating Station. Report No. P-REP-00541-10019-R000 P. June.
- Ortech (Ortech Consulting Inc.), 2021. 2020 Emission Summary and Dispersion Modelling Report for Pickering Nuclear Generating Station. Report No. P-REP-00541-10025-R003. August.
- Patrick, P.H., 2020. Analysis of 2018 and 2019 Two-Year Impingement Threshold Exceedances at PNGS. February.
- Patrick, P.H., Powell, J., Mason, E., Tai, M.-K., Stanko, T., Dziedzic, H.D., 2018. Size distribution of larvae entrained and the role of fine mesh screening in excluding larvae at an operating power plant. *Lake and Reservoir Management* 34, 306–319. March.
<https://doi.org/10.1080/10402381.2018.1436625>
- Peterson, D.L., Vecsei, P., Jennings, C.A., 2007. Ecology and biology of the lake sturgeon: a synthesis of current knowledge of a threatened North American Acipenseridae. *Rev Fish Biol Fisheries* 17, 59–76. February. <https://doi.org/10.1007/s11160-006-9018-6>
- Petrudev (Petrudev Incorporated), 2022. Round Whitefish Action Plan (RWAP) Update and Recommendation for Closure of Darlington New Nuclear Project Deliverable D-P-15.1. Report No. NK054-REP-07730-0942713. June.
- Pilla, R.M., Williamson, C.E., Adamovich, B.V., Adrian, R., Anneville, O., Chandra, S., Colom-Montero, W., Devlin, S.P., Dix, M.A., Dokulil, M.T., Gaiser, E.E., Girdner, S.F., Hambright, K.D., Hamilton, D.P., Havens, K., Hessen, D.O., Higgins, S.N., Huttula, T.H., Huuskonen, H., Isles, P.D.F., Joehnk, K.D., Jones, I.D., Keller, W.B., Knoll, L.B., Korhonen, J., Kraemer, B.M., Leavitt, P.R., Lepori, F., Luger, M.S., Maberly, S.C., Melack, J.M., Melles, S.J., Müller-Navarra, D.C., Pierson, D.C., Pislegina, H.V., Plisnier, P.-D., Richardson, D.C., Rimmer, A., Rogora, M., Rusak, J.A., Sadro, S., Salmaso, N., Saros, J.E., Saulnier-Talbot, É., Schindler, D.E., Schmid, M., Shimaraeva, S.V., Silow, E.A., Sitoki, L.M., Sommaruga, R., Straile, D., Strock, K.E., Thiery, W., Timofeyev, M.A., Verburg, P., Vinebrooke, R.D., Weyhenmeyer, G.A., Zadereev, E., 2020. Deeper waters are changing less consistently than surface waters in a global analysis of 102 lakes. *Sci Rep* 10, 20514. November. <https://doi.org/10.1038/s41598-020-76873-x>
- Reefmaster, 2024. Reefmaster v 2.2.57.0. Reefmaster Software Ltd. 2012-2024.
- Richardson, D.C., Melles, S.J., Pilla, R.M., Hetherington, A.L., Knoll, L.B., Williamson, C.E., Kraemer, B.M., Jackson, J.R., Long, E.C., Moore, K., Rudstam, L.G., Rusak, J.A., Saros, J.E., Sharma, S., Strock, K.E., Weathers, K.C., Wigdahl-Perry, C.R., 2017. Transparency, Geomorphology and Mixing Regime Explain Variability in Trends in Lake Temperature and Stratification across Northeastern North America (1975–2014). *Water* 9, 442. June.
<https://doi.org/10.3390/w9060442>
- Rose, K.C., Winslow, L.A., Read, J.S., Hansen, G.J.A., 2016. Climate-induced warming of lakes can be either amplified or suppressed by trends in water clarity. *Limnology and Oceanography Letters* 1, 44–53. October. <https://doi.org/10.1002/lol2.10027>
- Schaefer, H.M., Honsey, A.E., Bunnell, D.B., Weidel, B.C., DeBruyne, R., Diana, J.S., Gorksy, D., Roseman, E.F., 2022. Predicting physical and geomorphic habitat associated with historical

- lake whitefish and cisco spawning locations in Lakes Erie and Ontario. *Journal of Great Lakes Research* 48, 1636–1646. December. <https://doi.org/10.1016/j.jglr.2022.08.014>
- SENES & MMM (SENES Consultants Limited and MMM Group), 2009. Environmental Impact Statement New Nuclear – Darlington Environmental Assessment. Report No. NK054-REP-07730–00029.
- SENES (SENES Consultants Limited), 2007. Refurbishment and Continued Operation of Pickering B Nuclear Generating Station Environmental Assessment. Report No. NK30-REP-07701–00002. December.
- SENES (SENES Consultants Limited), 2011a. Fall 2010 Fish Community Sampling Program Final Report. Report No. NK054-REP-07730–0388705. January.
- SENES (SENES Consultants Limited), 2011b. Spring 2011 Fish Community and Larval Sampling Program. Report No. NK054-REP-07730–00047. October.
- Statistics Canada (Statistics Canada), 2004. Canadian Community Health Survey, Cycle 2.2, Nutrition. URL <https://www.canada.ca/en/health-canada/services/food-nutrition/food-nutrition-surveillance/health-nutrition-surveys/canadian-community-health-survey-cchs/canadian-community-health-survey-cycle-2-2-nutrition-focus-food-nutrition-surveillance-health-canada.html>
- Stephenson, M., Mackie, G.L., 1988. Multivariate Analysis of Correlations Between Environmental Parameters and Cadmium Concentrations in *Hyalella azteca* (Crustacea: Amphipoda) from Central Ontario Lakes. *Can. J. Fish. Aquat. Sci.* 45, 1705–1710. October. <https://doi.org/10.1139/f88-202>
- Stephenson, T.D., 1990. Fish Reproductive Utilization of Coastal Marshes of Lake Ontario Near Toronto. *Journal of Great Lakes Research* 16, 71–81. January. [https://doi.org/10.1016/S0380-1330\(90\)71399-8](https://doi.org/10.1016/S0380-1330(90)71399-8)
- Stewart, T., Todd, A., LaPan, S., 2012. Fish-Community Objectives for Lake Ontario. Public Consultation Draft-2012.
- TRCA (Toronto and Region Conservation Authority), 2009. Frenchman’s Bay Harbour Entrance Environmental Impact Study. March. URL <http://www.trca.on.ca/dotAsset/50330.pdf>
- TRCA (Toronto and Region Conservation Authority), 2013. Ontario Power Generation Landfill. Terrestrial Biological Inventory and Assessment. Report No. P-REP-07811-0508418. December.
- TRCA (Toronto and Region Conservation Authority), 2015a. Terrestrial Long-Term Monitoring Project (2014 Monitoring Season). Report No. P-REP-07811-00012. February.
- TRCA (Toronto and Region Conservation Authority), 2015b. Ontario Power Generation Terrestrial Long-Term Monitoring Project (2015 Monitoring Season). Report No. P-REP-07811-0584553. December.
- TRCA (Toronto and Region Conservation Authority), 2022. TRCA Electrofishing Data in Areas near OPG PNGS Thermal Discharges (1997-2022 data). Provided to OPG through data sharing agreement. November.
- Trumpickas, J., Shuter, B.J., Minns, C.K., 2009. Forecasting impacts of climate change on Great Lakes surface water temperatures. *Journal of Great Lakes Research* 35, 454–463. September. <https://doi.org/10.1016/j.jglr.2009.04.005>

- UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation), 2008. Sources and Effects of Ionizing Radiation. URL https://www.unscear.org/docs/reports/2008/09-86753_Report_2008_GA_Report_corr2.pdf
- US EPA (U.S. Environmental Protection Agency), 1986. National Recommended Water Quality Criteria - Aquatic Life Criteria Table. URL <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#table>
- US EPA (U.S. Environmental Protection Agency), 1988. Chemical Assessment Summary - Hydrazine/Hydrazine sulfate; CASRN 302-01-2. Drinking Water Concentration with 1 in 100,000 risk level. URL https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0352_summary.pdf#nameddest=canceroral
- US EPA (U.S. Environmental Protection Agency), 2014. National pollutant discharge elimination system – Final regulations to establish requirements for cooling water intake structures at existing facilities and amend requirements at Phase I facilities. Report No. Federal Register, Vol. 79, No. 158. URL <https://www.federalregister.gov/documents/2014/08/15/2014-12164/national-pollutant-discharge-elimination-system-final-regulations-to-establish-requirements-for>
- Welsh, A.B., Carlson, D.M., Schlueter, S.L., Jackson, J.R., 2020. Tracking Stocking Success in a Long-Lived Species through Genetics and Demographics: Evidence of Natural Reproduction in Lake Sturgeon after Twenty-Two Years. Transactions of the American Fisheries Society 149, 121–130. January. <https://doi.org/10.1002/tafs.10214>
- WHO (WHO Regional Office for Europe), 2000. Air Quality Guidelines - Second Edition. Chapter 10 - Effects of sulphur dioxide on vegetation: critical levels. URL <https://www.who.int/publications/i/item/9789289013581>
- Winter, J.G., Howell, E.T., Nakamoto, L.K., 2012. Trends in nutrients, phytoplankton, and chloride in nearshore waters of Lake Ontario: Synchrony and relationships with physical conditions. Journal of Great Lakes Research, The Lake Ontario Nearshore Zone: A Binational Study 38, 124–132. January. <https://doi.org/10.1016/j.jglr.2011.09.003>
- Woolway, R.I., Merchant, C.J., 2019. Worldwide alteration of lake mixing regimes in response to climate change. Nat. Geosci. 12, 271–276. April. <https://doi.org/10.1038/s41561-019-0322-x>

Appendix A Screening Tables

A.1 Surface water

Table A-1: Screening of Surface Water Quality Parameters in Spring 2024 samples

Parameter	Detection Limit	Units	CCME (1)	PWQO (2)	Interim PWQO (2)	Health Canada (3)	Station																						
							Lake Ontario																Frenchman's Bay						
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9	
Field Measurements																													
Temperature	N/A	Celsius	-	-	-	-	10.1	9.4	17.6	13.5	10.6	20.9	13.4	10.4	11.9	9.9	12.3	9.0	12.5	9.2	12.3	8.7	17.6	17.4	17.3	17.3	15.8	13.6	
pH	N/A	pH	6.5-9.0	6.5-8.5	-	-	8.12	8.12	8.29	8.35	8.31	8.23	8.40	8.42	8.27	8.35	8.35	8.36	8.25	8.33	8.32	8.35	8.56	8.51	8.34	8.59	8.50	8.44	
Specific Conductivity	N/A	µs/cm	-	-	-	-	303.0	303.1	321.0	323.9	335.8	334.7	399.0	318.9	339.7	319.8	330.2	315.8	339.6	421.0	334.6	310.2	796.0	843.0	869.0	744.0	625.0	704.0	
Conductivity	N/A	µs/cm	-	-	-	-	217.9	217.5	280.4	284.4	243.2	308.4	311.0	230.7	254.9	225.0	248.8	219.9	258.2	217.9	253.2	213.7	685.0	721.0	739.0	639.0	516.0	604.0	
DO	N/A	%	-	-	-	-	107.9	108.2	124.0	116.4	113.0	132.2	113.2	115.3	114.6	109.8	114.7	110.1	115.1	109.1	115.1	109.5	122.8	115.8	102.4	122.9	114.5	118.7	
DO	N/A	mg/L	-	-	-	-	12.13	12.37	11.92	12.15	12.58	12.24	11.81	12.59	12.33	12.44	12.32	12.34	12.25	12.54	12.30	12.74	11.69	11.06	10.25	11.74	11.31	11.52	
Turbidity	N/A	NTU	-	-	-	-	-0.52	-0.53	-0.18	-0.43	-0.5	0.37	1.60	-0.34	-0.37	-0.48	-0.37	-0.48	-0.34	-0.46	-0.37	-0.48	6.50	11.90	9.72	4.68	10.34	5.26	
Calculated Parameters																													
Dissolved Hardness (CaCO3)	0.50	mg/L	-	-	-	-	111	110	115	112	116	115	125	115	125	118	125	121	120	123	120	121	179	184	192	169	166	165	
Total Un-ionized Ammonia	0.0015	mg/L	0.019	0.02	-	-	0.0000	0.0000	0.0000	0.0000	0.0027	0.0098	0.0045	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Chromium (+3)	0.5	ug/L	8.9	8.9	-	-	0.104	0.113	0.000	0.000	0.000	0.000	0.000	0.104	0.000	0.189	0.000	0.000	0.000	0.000	0.105	0.166	0.000	0.000	0.123	0.000	0.000	0.114	
Unfiltered Chromium (+3)	0.99	ug/L	-	-	-	-	0.12	0.10	0.18	0.10	0.13	0.10	0.14	0.11	0.12	0.00	0.11	0.17	0.00	0.13	0.00	0.11	0.22	0.66	0.27	0.16	0.21	0.22	
Total Hardness (CaCO3)	0.50	mg/L	-	-	-	-	120	119	117	114	117	117	120	117	120	116	118	117	116	121	120	114	187	161	161	177	138	138	
Inorganics																													
Total Ammonia-N	0.050	mg/L	0.141-0.855**	-	-	-	0.0185	0.0405	0.0147	0.0494	0.059	0.12	0.064	0.0184	0.0188	0.0223	0.0178	0.0154	0.01	-0.0095	0.0172	0.0154	0.0031	0.0001	0.046	0.012	0.016	0.0244	
Total Biochemical Oxygen Demand (BOD)	2	mg/L	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	4	3	3	3	
Total Chemical Oxygen Demand (COD)	4.0	mg/L	-	-	-	-	4.3	5.7	4.3	7.8	5.7	4.3	9.2	4.6	5.5	4.7	5.1	5.5	8.3	4	5.5	5.5	19	19	24	15	13	18	
Conductivity	1.0	umho/cm	-	-	-	-	300	310	330	330	340	340	350	330	340	330	340	330	340	330	360	350	340	810	880	920	780	660	730
Total Kjeldahl Nitrogen (TKN)	0.10	mg/L	-	-	-	-	0.15	0.17	0.2	0.3	0.17	0.24	0.29	0.24	0.25	0.23	0.26	0.28	0.26	0.27	0.2	0.28	0.36	0.42	0.42	0.36	0.39	0.32	
Dissolved Organic Carbon	0.40	mg/L	-	-	-	-	1.9	1.9	1.9	2	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.9	2	1.8	3.9	4.1	3.9	3.5	3.2	3.4	
Orthophosphate (P)	0.010	mg/L	-	-	-	-	0.0006	0.0001	0.0003	0.0001	0.0001	0.0002	-0.0001	0	0.0002	0.0002	0.0001	0	0	0.0001	0.0002	0	-0.0002	-0.0002	-0.0001	0.0001	0.0001	-0.0002	
pH		pH	-	-	-	-	8.07	8.18	8.23	8.23	8.25	8.22	8.22	8.22	8.2	8.24	8.12	8.25	8.17	8.21	8.18	8.25	8.28	8.18	8.15	8.14	8.2	8.21	
Total Phosphorus	0.020	mg/L	0.02-0.03	-	0.02	-	0.0001	-0.0002	0.0028	0.017	0.0102	0.0031	0.0126	0.003	0.0062	0.0076	0.0037	0.0015	0.0044	0.0013	0.0041	0.0015	0.0199	0.025	0.023	0.0132	0.0153	0.0168	
Total Residual Chlorine	0.003	mg/L	0.0005	0.002	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Suspended Solids	1	mg/L	-	-	-	-	0	0.6	0.8	0.8	0.4	1	0.8	1	0.4	0.4	0.6	0.4	0.4	0.4	0.6	0.4	24	19	19	12	14	11	
Turbidity	0.1	NTU	-	-	-	-	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.3	0.3	0.2	0.4	0.2	0.2	0.3	0.3	0.2	4.5	4.5	5.5	4	3.8	6.3	
Alkalinity (Total as CaCO3)	1.0	mg/L	-	-	-	-	94	95	100	96	97	98	100	99	100	100	100	100	100	100	100	100	150	160	170	150	130	130	
Nitrite (N)	0.010	mg/L	0.197	-	-	1	0.0007	0.0001	-0.0007	0.0001	0.0007	0.0015	-0.0005	-0.0002	0.0013	0.0009	0.0010	0.0005	-0.0004	0.0000	0.0018	0.0005	0.0005	0.0057	0.0076	0.0034	0.0029	0.0041	
Nitrate (N)	0.10	mg/L	13	-	-	10	0.29	0.29	0.55	0.48	0.72	0.64	0.4	0.4	0.61	0.38	0.48	0.35	0.32	0.52	0.56	0.35	0	0	0	0	0	0	
Nitrate + Nitrite (N)	0.10	mg/L	-	-	-	-	0.29	0.29	0.55	0.48	0.72	0.64	0.4	0.4	0.61	0.38	0.48	0.35	0.32	0.52	0.56	0.35	-0.0031	0.0227	-0.0218	-0.0037	0.0751	0.0561	
Metals																													
Total Hexavalent Chromium (Cr 6+)	0.99	µg/L	-	-	-	50	0.58	0.96	0.1	0.24	0.23	0.36	0.21	0.48	-0.13	-0.1	-0.07	-0.2	0.35	-0.25	-0.24	-0.2	-0.55	-0.02	0	0.27	0.03	-0.21	
Dissolved Aluminum (Al)	0.5	µg/L	-	75**	-	-	42.3	10.8	1.67	2.37	2.5	1.9	4.41	2.51	2.26	3.56	2	2.24	3.77	5.18	2.4	2.24	2.63	3.68	4.05	2.3	2.79	7.85	
Total Aluminum (Al)	0.5	µg/L	100**	-	-	2900	2.63	5.59	3.93	4.41	36.6	4.31	11.3	6.18	5.41	3.37	6.19	6	6.2	2.23	4.71	6	108	146	126	56.5	81.4	84	
Dissolved Antimony (Sb)	0.02	µg/L	-	-	-	-	0.149	0.143	0.13	0.132	0.141	0.131	0.148	0.127	0.137	0.131	0.134	0.136	0.155	0.136	0.133	0.136	0.24	0.245	0.28	0.232	0.227	0.243	
Total Antimony (Sb)	0.02	µg/L	-	20	-	6	0.145	0.141	0.131	0.135	0.137	0.13	0.133	0.128	0.148	0.126	0.139	0.129	0.13	0.132	0.133	0.129	0.254	0.231	0.236	0.246	0.185	0.24	
Dissolved Arsenic (As)	0.02	µg/L	-	-	-	-	0.78	0.827	0.704	0.708	0.711	0.688	0.66	0.692	0.701	0.713	0.716	0.721	0.766	0.714	0.71	0.721	0.528	0.551	0.561	0.536	0.593	0.616	
Total Arsenic (As)	0.02	µg/L	5	100	5	10	0.818	0.842	0.718	0.714	0.692	0.688	0.715	0.715	0.689	0.692	0.706	0.703	0.716	0.684	0.681	0.703	0.625	0.578	0.544	0.654	0.576	0.794	
Dissolved Barium (Ba)	0.02	µg/L	-	-	-	-	21.7	21.1	21.5	21.8	21.8	21.6	25.1	21.9	22.5	21.8	21.9	22.2	23.7	22	21.7	22.2	37.7	39.4	41.2	37.2	36.4	36.7	
Total Barium (Ba)	0.02	µg/L	-	-	-	2000	23.1	23.1	21.6	21.6	21.4	21.4	23	22.1	21.7	21	21.6	21.6	21.2	21.5	21.2	21.6	42.2	37.1	37.2	40.3	30.5	32.4	
Dissolved Beryllium (Be)	0.01	µg/L	-	-																									

Parameter	Detection Limit	Units	CCME (1)	PWQO (2)	Interim PWQO (2)	Health Canada (3)	Station																											
							Lake Ontario																		Frenchman's Bay									
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9						
Total Boron (B)	10	µg/L	1500	-	200	5000	25	24	23	22	24	24	21	21	25	23	25	23	23	26	27	23	37	40	42	35	41	40						
Dissolved Cadmium (Cd)	0.005	µg/L	-	-	-	-	0.0066	0.004	0.0038	0.0029	0.0037	0.0039	0.0025	0.0034	0.0035	0.0024	0.0026	0.0025	0.0034	0.0032	0.0023	0.0025	0.0008	-0.0001	0	0.0008	0.0012	0.0008						
Total Cadmium (Cd)	0.005	µg/L	0.17-0.30**	0.2	0.5**	7	0.0033	0.004	0.0035	0.0046	0.0031	0.0033	0.0038	0.0032	0.0046	0.0033	0.0041	0.0047	0.003	0.0066	0.0051	0.0047	0.0077	0.0298	0.0169	0.007	0.0066	0.0236						
Dissolved Chromium (Cr)	0.1	µg/L	-	-	-	-	0.1	0.11	0.0803	0.0944	0.0913	0.0793	0.0771	0.1	0.0993	0.19	0.0926	0.0767	0.0884	0.0751	0.11	0.0767	0.0605	0.0514	0.12	0.0831	0.0432	0.11						
Total Chromium (Cr)	0.1	µg/L	-	-	-	50	0.12	0.1	0.18	0.1	0.13	0.1	0.14	0.11	0.12	0.0796	0.11	0.17	0.0905	0.13	0.0921	0.17	0.22	0.66	0.27	0.16	0.21	0.22						
Dissolved Cobalt (Co)	0.005	µg/L	-	-	-	-	0.0165	0.0113	0.0171	0.0139	0.0209	0.0187	0.0175	0.0136	0.0228	0.0146	0.0197	0.0116	0.0105	0.0229	0.0194	0.0116	0.032	0.0363	0.0379	0.0303	0.0321	0.0334						
Total Cobalt (Co)	0.005	µg/L	-	-	0.9	-	0.0096	0.0096	0.0176	0.0146	0.0227	0.0181	0.0182	0.0146	0.0225	0.0111	0.0269	0.0135	0.0113	0.0237	0.0213	0.0135	0.107	0.139	0.105	0.0758	0.069	0.087						
Dissolved Copper (Cu)	0.05	µg/L	-	-	-	-	0.925	0.721	0.777	0.762	0.714	0.736	0.711	0.693	0.751	0.664	0.707	0.725	0.79	0.834	0.72	0.725	0.602	0.627	0.578	0.627	0.693	1.11						
Total Copper (Cu)	0.05	µg/L	2.6-4.0**	5	5.0**	2000	0.733	0.77	1.25	0.776	0.825	0.887	0.775	0.712	0.778	0.631	0.78	0.664	0.642	0.769	0.746	0.664	1.25	1.29	1.09	1.04	1.03	1.78						
Dissolved Iron (Fe)	1	µg/L	-	-	-	-	6.3	8.8	1.5	2.2	3.2	1.3	4	5.8	1.8	3.7	2	1.6	2.1	9.2	2.2	1.6	6.4	8.5	10.9	6.4	11.4	11.4						
Total Iron (Fe)	1	µg/L	300	300	-	-	2.5	3.5	8.8	6.6	8.4	7.3	15.3	12.2	9.6	4.9	9.4	4.6	3.7	2.7	10.5	4.6	309	324	320	177	187	212						
Dissolved Lead (Pb)	0.005	µg/L	-	-	-	-	0.279	0.111	0.0093	0.0162	0.0095	0.0074	0.0161	0.0116	0.0165	0.0169	0.0072	0.0074	0.02	0.0129	0.0116	0.0074	0.0162	0.0268	0.0671	0.0154	0.0281	0.0385						
Total Lead (Pb)	0.005	µg/L	3.6-7.0**	25	5.0**	5	0.0213	0.0336	0.0145	0.0317	0.0254	0.0134	0.0358	0.0245	0.0193	0.008	0.0229	0.016	0.009	0.0103	0.0191	0.016	0.612	0.605	0.554	0.385	0.369	0.42						
Dissolved Lithium (Li)	0.5	µg/L	-	-	-	-	1.63	1.47	1.72	1.69	1.8	1.73	1.83	1.65	1.78	1.64	1.68	1.65	1.67	1.72	1.73	1.65	2.29	2.25	2.31	2.35	2.15	2.42						
Total Lithium (Li)	0.5	µg/L	-	-	-	-	1.59	1.62	1.66	1.48	1.6	1.59	1.62	1.56	1.74	1.75	1.77	1.79	1.68	1.78	1.75	1.79	2.31	2.43	2.36	2.25	2.27	2.64						
Dissolved Manganese (Mn)	0.05	µg/L	180-270**	-	-	-	1.02	0.675	1.31	1.01	1.59	1.36	2.05	0.978	1.63	0.834	1.31	0.637	0.744	2.02	1.53	0.637	4.34	8.07	9.19	2.28	3.92	12						
Total Manganese (Mn)	0.05	µg/L	-	-	-	120	0.474	0.538	1.59	1.35	2.09	1.65	2.68	2.31	2	0.798	1.63	0.73	0.651	1.65	1.73	0.73	79.5	66.4	66.7	64.1	49.7	57.6						
Dissolved Molybdenum (Mo)	0.05	µg/L	-	-	-	-	1.17	1.12	1.19	1.18	1.29	1.2	1.21	1.17	1.19	1.16	1.17	1.14	1.28	1.21	1.22	1.14	1.33	1.34	1.35	1.33	1.35	1.38						
Total Molybdenum (Mo)	0.05	µg/L	73	-	40	-	1.23	1.22	1.21	1.17	1.26	1.21	1.16	1.15	1.17	1.11	1.21	1.14	1.12	1.2	1.18	1.14	1.37	1.15	1.11	1.36	1.09	1.12						
Dissolved Nickel (Ni)	0.02	µg/L	-	-	-	-	0.668	0.536	0.838	0.549	0.606	0.562	0.495	0.505	0.574	0.513	0.495	0.548	0.592	0.567	0.523	0.548	0.521	0.553	0.535	0.533	0.533	0.557						
Total Nickel (Ni)	0.02	µg/L	103-150**	25	-	-	0.553	0.565	0.794	0.541	0.685	0.724	0.591	0.507	0.569	0.484	0.571	0.529	0.503	0.562	0.549	0.529	0.752	0.73	0.63	0.609	0.61	0.69						
Dissolved Selenium (Se)	0.04	µg/L	-	-	-	-	0.124	0.136	0.136	0.128	0.148	0.135	0.12	0.119	0.131	0.131	0.126	0.118	0.119	0.123	0.138	0.118	0.105	0.094	0.095	0.099	0.105	0.117						
Total Selenium (Se)	0.04	µg/L	1	100	-	50	0.143	0.149	0.137	0.113	0.131	0.142	0.127	0.122	0.132	0.132	0.125	0.108	0.123	0.138	0.139	0.117	0.131	0.101	0.124	0.125	0.094	0.123						
Total Silicon (Si)	50	µg/L	-	-	-	-	359	325	270	266	278	278	258	264	263	216	236	224	216	265	250	253	1230	1140	1070	1080	821	721						
Dissolved Silicon (Si)	50	µg/L	-	-	-	-	332	304	268	267	290	279	354	265	260	217	256	226	224	280	251	226	1090	1090	1090	987	856	742						
Dissolved Silver (Ag)	0.005	µg/L	-	-	-	-	0.0029	0.0015	0.0019	0.0043	0.0017	0.0015	0.001	0.0023	0.0012	0.0003	0.0008	0.0019	0.0003	0.0007	0.0004	0.0019	0	0.0003	0	0.0008	0.0005	0.0023						
Total Silver (Ag)	0.005	µg/L	0.25	0.1	-	-	0.0006	-0.0002	0.0006	0.001	0.0019	0.0009	0.0009	0.0013	0.0008	-0.0001	0.0005	0.0013	0.0002	0.0012	0.0006	0.0013	0.0031	0.0023	0.0019	0.0012	0.0033	0.0082						
Dissolved Strontium (Sr)	0.050	µg/L	-	-	-	-	175	174	176	174	181	177	197	176	198	190	191	195	207	193	193	195	273	298	304	260	276	296						
Total Strontium (Sr)	0.050	µg/L	-	-	-	7000	189	192	176	173	176	172	178	175	178	172	175	174	174	178	175	174	294	256	258	297	226	250						
Dissolved Thallium (Tl)	0.002	µg/L	-	-	-	-	0.0058	0.0049	0.0058	0.007	0.0081	0.0055	0.0052	0.0066	0.0071	0.0065	0.0063	0.0072	0.0077	0.0063	0.0058	0.0072	-0.0009	0.0004	0.0008	-0.0004	0.0014	0.0019						
Total Thallium (Tl)	0.002	µg/L	0.8	-	0.3	-	0.0059	0.0067	0.0062	0.0069	0.0059	0.0049	0.0067	0.0067	0.004	0.0057																		

Parameter	Detection Limit	Units	CCME (1)	PWQO (2)	Interim PWQO (2)	Health Canada (3)	Station																							
							Lake Ontario																		Frenchman's Bay					
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9		
Total Potassium (K)	10	µg/L	-	-	-	-	1570	1610	1680	1650	1840	1760	1660	1570	1800	1570	1680	1600	1580	1750	1770	1600	2160	1910	1870	2130	1730	1760		
Dissolved Sodium (Na)	10	µg/L	-	-	-	-	12700	12500	15800	14900	16700	16300	30100	15600	17300	14600	16200	15100	15500	17200	16400	15100	85100	87200	92900	78000	66700	66700		
Total Sodium (Na)	10	µg/L	-	-	-	-	13600	13600	15700	15200	16700	16000	17600	15600	17000	14700	16300	14800	14700	17000	16700	14800	84000	74600	78300	77600	52500	58600		
Dissolved Thorium (Th)	0.05	µg/L	-	-	-	-	0.0035	0.0029	-0.0033	0.0041	0.013	-0.0016	-0.0006	-0.0005	0.0059	0.006	0.0034	0.0032	-0.0012	0.0033	0.002	0.0032	-0.0018	0.0054	0.0028	-0.0016	0.0047	0.0012		
Total Thorium (Th)	0.05	µg/L	-	-	-	-	0.0039	0.004	0.0099	0.0046	0.0052	0.0072	0.0069	0.0125	-0.0013	0.0031	0.0008	-0.0014	-0.0027	-0.0003	-0.0018	-0.0014	0.0247	0.0225	0.0265	0.0197	0.0172	0.0137		
Dissolved Tungsten (W)	0.01	µg/L	-	-	-	-	0.073	0.076	0.08	0.071	0.089	0.076	0.071	0.078	0.074	0.077	0.075	0.079	0.083	0.073	0.076	0.079	0.046	0.048	0.053	0.048	0.06	0.065		
Total Tungsten (W)	0.01	µg/L	-	-	30	-	0.077	0.082	0.078	0.071	0.08	0.073	0.071	0.071	0.071	0.07	0.07	0.074	0.069	0.072	0.072	0.074	0.056	0.044	0.051	0.059	0.056	0.056		
Chromium (VI)	0.50	ug/L	1	1	-	50	0.1955	0.1935	0.2596	0.1465	0.2148	0.2131	0.2383	0.1869	0.2094	0.2011	0.2053	0.2183	0.2303	0.233	0.2251	0.1752	0.1724	0.1765	0.145	0.1502	0.1747	0.1591		
Mercury (Hg)	0.01	ug/L	0.026	-	-	1	0.0007	0.0003	0.0009	0.0018	0.0016	0.0012	0.0012	0.0005	0.0031	0.0018	0.0017	0.0021	0.0033	0.0024	0.0031	0.0028	0.0024	0.0019	0.0027	0.0017	0.0026	0.002		
Dissolved Mercury (Hg)	0.01	ug/L	-	0.2	-	-	0.0026	0.0019	0.0011	0.002	0.0017	0.0024	0.002	0.0014	0.0022	0.0018	0.0027	0.0023	0.0024	0.0012	0.002	0.0023	0.0014	0.0025	0.001	0.0018	0.0023	0.0017		
Volatile Organics																														
Benzene	0.10	ug/L	370	-	100	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Bromodichloromethane	0.10	ug/L	-	-	200	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Bromoform	0.20	ug/L	-	-	60	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Chloroform	0.10	ug/L	1.8	-	-	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Ethylbenzene	0.10	ug/L	90	-	8	140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Hydrocarbons																														
F1 (C6-C10)	25	ug/L	167	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F1 (C6-C10) - BTEX	25	ug/L	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F2 (C10-C16 Hydrocarbons)	100	ug/L	42	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F3 (C16-C34 Hydrocarbons)	200	ug/L	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
F4 (C34-C50 Hydrocarbons)	200	ug/L	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Reached Baseline at C50		ug/L	-	-	-	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Surrogate Recovery (%)																														
1,4-Difluorobenzene		%	-	-	-	-	107	107	110	109	108	114	109	108	100	101	101	99	101	100	102	102	104	100	101	101	105	103		
4-Bromofluorobenzene		%	-	-	-	-	96	101	94	90	97	93	93	95	90	94	96	95	90	96	94	94	90	96	96	92	94	96		
D10-o-Xylene		%	-	-	-	-	117	114	109	107	111	111	111	109	86	90	86	85	91	81	91	90	95	89	91	91	89	86		
D4-1,2-Dichloroethane		%	-	-	-	-	101	99	96	97	96	92	95	97	101	100	101	105	100	100	98	101	102	100	101	100	97	100		
o-Terphenyl		%	-	-	-	-	104	103	99	102	99	102	100	100	103	103	103	105	102	101	99	100	96	98	98	95	103	99		
4-Bromofluorobenzene		%	-	-	-	-	92	93	94	103	92	92	93	92	99	97	96	95	94	103	98	99	99	96	97	97	97	99		
D4-1,2-Dichloroethane		%	-	-	-	-	93	95	74	77	98	77	77	77	94	94	92	89	95	97	96	93	91	94	93	91	92	93		
D8-Toluene		%	-	-	-	-	101	102	102	97	100	101	103	103	99	100	97	97	96	98	99	99	100	99	99	100	98	99		
Microbiological																														
Background	10	CFU/100mL	-	-	-	-	<10	320.00	440.00	680.00	200.00	190.00	420.00	440.00	1200	840	680	440	310.00	360	620	420	2600	3100	2200	2100	2600	38000		
Fecal coliform	10	CFU/100mL	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	10.00	10	<10	20	<10	10.00	<10	<10	<10	10	20	<10	10	10	780		
Total Coliforms	10	CFU/100mL	-	-	-	10	<10	<10	520	30	30	20	20	10	510	10	140	10	50	40	60	<10	940	3400	1500	30	70	14000		
Escherichia coli	10	CFU/100mL	-	100	-	10	<10	<10	<10	<10	<10	<10	<10	10	<10	<10	<10	<10	10	<10	<10	<10	<10	20	10	<10	<10	480		
Radionuclides																														
H-3	14	Bq/kg	-	7000	-	7000	-5.27	15.9	31.7	21.2	0	15.9	26.5	15.8	5.3	0	5.3	5.31	5.31	5.28	5.3	0	31.8	37.1	31.8	37	31.8	31.6		
C-14	0.027	Bq/g	-	-	-	-	-0.0498	-0.0472	-0.0371	-0.0341	-0.0451	-0.0458	-0.0312	-0.0407	-0.0426	-0.0421	-0.0432	-0.0535	-0.0389	-0.0447	-0.0444	-0.0375	-0.0313	-0.0271	-0.0327	-0.036	-0.037	-0.0455		
Co-60	0.73	Bq/kg	-	-	-	-	-0.352	0.513	-0.197	0.0501	0.298	-0.253	0.163	0.0538	0.0534	0.149	-0.0672	-0.079	0.0363	0.389	-0.182	0.0688	0.0797	-0.147	-0.0869	-0.17	-0.133	-0.0857		
Cs-134	0.75	Bq/g	-	-	-	-	0.145	-0.11	-0.0795	-0.07	-0.226	0.199	-0.0844	0.309	-0.11	-0.232	0.373	0.231	0.111	0.173	0.211	-0.151	0.129	-0.127	-0.281	0.121	0.146	-0.0704		
Cs-137	0.6	Bq/kg	-	50	-	10	0.275	-0.214	0.353	0.0574	0.0421	0.306	-0.506	0.19	-0.11	0.258	-0.361	0.174	0.129	-0.0437	0.271	0.209	-0.653	-0.369	0.314	-0.464	0.196	0.105		
I-131	1.2	Bq/kg	-	10	-	6	0.198	0.0293	1.08	0.719	-0.332	-1.03	0.73	-0.938	0.0647	0.0511	-0.85	0.428	-0.0426	-0.986	-0.0026	-0.517	0.373	-0.291	0.333	0.58	-0.334	0.29		
K-40	7.1	Bq/g	-	-	-	-	2.67	-0.125	2.76	1.52	-3.4	3.09	0.999	2.82	2.49	4.96	-0.924	0.00429	-0.757	1.09	2.41	8.37	0.96	-1.71	5.8	22.3	-2.07	-4.05		
Th-Series	1.8	Bq/kg	-	-	-	-	-2.04	-0.468																						

Parameter	Detection Limit	Units	CCME (1)	PWQO (2)	Interim PWQO (2)	Health Canada (3)	Station																					
							Lake Ontario																Frenchman's Bay					
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9
1,1-Dimethylhydrazine	0.25	ug/L	-	-	-	-	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	
Chlorophyll a	1.3	ug/L	-	-	-	-	1.400	0.019	2.000	1.500	2.400	2.300	2.200	4.100	1.241	2.200	1.300	1.600	1.232	1.300	1.500	1.600	27.000	24.000	27.000	24.000	31.000	27.000
Morpholine	4	ug/L	-	-	4	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Dissolved Methyl Mercury	0.050	ng/L	-	-	-	-	0.066	0.048	0.030	0.022	0.021	0.011	0.010	0.010	0.031	0.013	0.014	0.016	0.039	0.024	0.025	0.017	0.027	0.012	0.024	0.060	0.015	0.014
Total Methyl Mercury	0.050	ng/L	4	-	-	-	0.032	0.012	0.013	0.019	0.032	0.053	0.022	0.016	0.018	0.015	0.014	0.008	0.014	0.070	0.012	0.001	0.005	0.001	0.001	0.026	0.022	0.011

Notes:

- Bold
- Exceeded Interim PWQO
-
- Bold
- Exceeded PWQO
-
- Bold
- Exceeded CCME
-
- Bold
- Exceeded Health Canada Guidelines
-
- Bold
- Exceeded more than one guideline

Surface water samples from Lake Ontario were collected at a depth of 0.5 meters (denoted by "S" in the sample name), while bottom samples were taken 0.5 meters above the lakebed (denoted by "B"). Mid-depth samples were collected in Frenchman’s Bay, as thermal stratification is unlikely in the shallow depths observed in this area. Sampling locations presented in Figure 4-3 and Figure 4-4.

* Only censored results provided by lab.

** Calculated values. The value for Hardness (as CaCO3) dissolved was used to estimate hardness-dependent guidelines.

a – Total Ammonia guideline (Long Term Concentration (mg/L) Table): Retrieved from: https://ccme.ca/en/chemical/5#_aqf_fresh_concentration

b – Dissolved Aluminum guideline: The Interim PWQO is 15 µg/L between pH 4.5 to 5.5, and 75 µg/L between pH 6.5 to 9.0. Between pH 5.5 - 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters representative of that geological area of the Province that are unaffected by man-made inputs.

c – Total Aluminum guideline (Long Term Concentration (µg/L) Variable): If pH < 6.5, the CWQG is 5 µg/L. If pH ≥ 6.5, the guideline is 100 µg/L.

d – Total Beryllium guideline (µg/L): If Hardness < 75 mg/L, the PWQO is 11 µg/L. If Hardness > 75 mg/L, then the PWQO is 1100 µg/L.

e – Total Cadmium guideline (Long Term concentration (µg/L) equation): When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L. At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated as 10{0.83(log[hardness]) – 2.46}. At hardness > CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46} At hardness > 280 mg/L, the guideline is 0.37 µg/L.

f – Total Cadmium guideline (µg/L): If Hardness 0-100 mg/L, the Interim PWQO is 0.1 µg/L. If Hardness > 100 mg/L, then the Interim PWQO is 0.5 µg/L.

g – Total Copper guideline (Long Term concentration (µg/L) equation): When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L. At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: 0.2 * e{0.8545[ln(hardness)]-1.465}. At hardness >180 mg/L, the CWQG is 4 µg/L.

h - Total Copper guideline (µg/L): If Hardness 0-20 mg/L, the Interim PWQO is 1 µg/L. If Hardness > 20 mg/L, then the Interim PWQO is 5 µg/L.

i – Total Lead guideline (Long Term concentration (µg/L) equation): When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L. At hardness >60 to ≤ 180 mg/L the CWQG is calculated as e{1.273[ln(hardness)]-4.705}. At hardness >180 mg/L, the CWQG is 7 µg/L. At hardness >180 mg/L, the CWQG is 7 µg/L.

j – Total Lead guideline: If Hardness is 30-80 mg/L, then the Interim PWQO is 3 µg/L. If Hardness is > 80 mg/L, then the Interim PWQO is 5 µg/L.

k – Dissolved Manganese concentration (Long Term concentration (µg/L) equation): Calculated using the CWQG calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese. Retrieved from: <https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fccme.ca%2Fen%2Fres%2F2019-manganese-cwqg-scd-appendix-b-en.xlsx&wdOrigin=BROWSELINK>

l – Total Nickel guideline (Long Term concentration (µg/L) equation): When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L. At hardness > 60 to ≤ 180 mg/L the CWQG is calculated as e{0.76[ln(hardness)]+1.06}. At hardness >180 mg/L, the CWQG is 150 µg/L.

m – Dissolved Zinc guideline (Long Term concentration (µg/L) equation): The CWQG is calculated as exp(0.947[ln(hardness mg·L-1)] - 0.815[pH] + 0.398[ln(DOC mg·L-1)] + 4.625).

This equation is valid between hardness 23.4 and 399 mg CaCO3·L–1, pH 6.5 and 8.13 and DOC 0.3 to 22.9 mg·L–1, which is the range of data used to derive the hardness, pH and DOC slopes.

n – Radionuclides are not screened as their levels should be as low as reasonably achievable (ALARA).

References:

1. CCME. n.d. Canadian Water Quality Guidelines for Protection of Aquatic Life. Accessed in September 2024.
2. Ministry of Environment and Climate Change. MOECC. 1994. Water management: policies, guidelines, provincial water quality objectives.
3. Health Canada. 2019. Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

Table A-2: Screening of Surface Water Quality Parameters in Summer 2024 samples

Parameter	Detection Limit	Units	CCME (1)	PWQG (2)	Interim PWQO (2)	Health Canada (3)	Station																					
							Lake Ontario																Frenchman's Bay					
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9
Field Measurements																												
Temperature	N/A	Celsius	-	-	-	-	18.1	13.3	27.2	29.4	17.8	27.7	20.5	17.1	22.8	15.6	22.8	15.6	24.4	16.6	23.6	15.4	24.9	24.5	24	25.1	23.6	23.2
pH	N/A	pH	6.5-9.0	6.5-8.5	-	-	8.32	8.21	8.17	8.54	8.63	8.36	8.31	8.34	8.51	8.1	8.51	8.1	8.36	7.94	8.48	8.12	8.13	8.06	7.69	8.3	7.99	7.91
Specific Conductivity	N/A	µs/cm	-	-	-	-	261.8	235.2	317.6	312.5	308.8	311.4	301.6	304	307.7	306.1	306.2	307.2	309.5	307.3	307.5	304.5	462.5	471.5	562	455.4	394.4	395.7
Conductivity	N/A	µs/cm	-	-	-	-	301.6	302.3	325.9	339.6	259.3	327.4	275.5	257.2	294.3	251.8	287.5	253.7	306.1	254.6	299.3	252.1	461.1	468.2	582	294.3	382.6	378.1
DO	N/A	%	-	-	-	-	104.5	96.6	119.9	129.4	117.6	124.6	117.8	102.7	120.9	90.7	123.2	94.9	122.1	96.8	122.3	94.2	89.1	87	72.5	95.6	99.3	96.6
DO	N/A	mg/L	-	-	-	-	9.86	10.09	9.64	9.94	11.15	9.86	10.62	9.85	10.43	9.03	10.72	9.37	10.17	9.55	10.3	9.26	7.36	7.14	6.04	7.89	8.44	8.25
Turbidity	N/A	NTU	-	-	-	-	-0.44	-0.16	-0.13	-0.27	-0.22	-0.13	-0.23	0.48	-0.39	-0.17	-0.39	-0.1	-0.38	-0.27	-0.39	-0.37	5.77	7.15	9.71	5.65	1.32	1.95
Calculated Parameters																												
Dissolved Hardness (CaCO3)	0.50	mg/L	-	-	-	-	112	113	104	104	114	104	111	111	111	112	110	114	113	108	112	110	132	131	136	135	106	125
Total Un-ionized Ammonia	0.0015	mg/L	0.019	0.02	-	-	0.0074	0.0083	0.021	0.048	0.022	0.012	0.038	0.004	0.031	0.005	0.044	0.0054	0.012	0.048	0.029	0.0084	0.018	0.027	0.0091	0.038	0.003	0.005
Chromium (+3)	0.5	ug/L	8.9	8.9	-	-	0.103	0.147	0.000	0.181	0.138	0.130	0.000	0.104	0.118	0.000	0.178	0.102	0.200	0.000	0.000	0.105	0.000	0.170	0.174	0.108	0.156	0.145
Unfiltered Chromium (+3)	0.99	ug/L	-	-	-	-	0.00	0.11	0.11	0.12	0.10	0.00	0.00	0.13	0.00	0.11	0.00	0.00	0.11	0.00	0.11	0.00	0.28	0.54	0.37	0.25	0.10	0.14
Total Hardness (CaCO3)	0.50	mg/L	-	-	-	-	115	118	95	108	113	101	95	106	106	107	110	104	107	110	108	110	127	118	128	120	97	100
Inorganics																												
Total Ammonia-N	0.050	mg/L	0.077-0.888**	-	-	-	0.090	0.180	0.190	0.190	0.150	0.072	0.410	0.055	0.190	0.120	0.270	0.130	0.090	1.500	0.180	0.190	0.210	0.370	0.300	0.300	0.051	0.100
Total Biochemical Oxygen Demand (BOD)	2	mg/L	-	-	-	-	0	0	0	0	0	4	5	4	0	0	0	2	0	0	3	0	3	4	11	3	3	6
Total Chemical Oxygen Demand (COD)	4.0	mg/L	-	-	-	-	4.7	7.2	-3.4112	-3.1907	2.7996	-3.0262	-3.3897	-2.545	-1.1185	-3.4114	-1.4873	-3.0301	-1.0387	-3.5615	-3.5951	-2.7451	-3.5789	-3.2805	0.8863	-0.6195	-3.001	-2.636
Conductivity	1.0	umho/cm	-	-	-	-	300	310	310	310	310	300	300	300	310	310	310	310	310	310	310	310	460	460	550	450	390	400
Total Kjeldahl Nitrogen (TKN)	0.10	mg/L	-	-	-	-	0.17	0.23	0.22	0.23	0.17	0.18	0.64	0.18	0.2	0.27	0.87	0.35	0.18	1.3	0.37	0.18	0.94	0.55	0.56	0.33	0.29	0.36
Dissolved Organic Carbon	0.40	mg/L	-	-	-	-	2	1.9	2.1	2.1	2.1	2.1	2	2.1	2	2.1	2	2.1	1.9	2	2	2.1	3.4	3.4	4.4	3.3	2.9	3
Orthophosphate (P)	0.010	mg/L	-	-	-	-	0.0008	0.0005	0.0001	0.0001	0	0.0002	0.0001	-0.0001	0.0001	0.0006	0.0005	0.0001	-0.0001	-0.0001	0.0005	-0.0001	0.0012	0.0011	0.003	0.0021	0.0021	0.005
pH		pH	-	-	-	-	8.28	8.06	8.22	8.32	8.29	8.06	8.34	8.35	8.35	7.97	8.37	8.19	8.33	8.18	8.33	8.16	8.19	8.11	8.01	8.24	8.19	8.14
Total Phosphorus	0.020	mg/L	0.02-0.03	-	0.02	-	0.0122	0.005	0.002	0.004	0.0101	0.0058	0.0023	0.0037	0.0008	0.006	0.0015	0.0021	0.0034	0.0099	-0.0027	0.004	0.026	0.036	0.045	0.03	0.0194	0.034
Total Residual Chlorine	0.003	mg/L	0.0005	0.002	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Suspended Solids	1	mg/L	-	-	-	-	0.4	0.8	2	0.8	1	2	1	2	0.8	1	0.6	2	0.8	1	0.4	3	11	12	14	9	5	4
Turbidity	0.1	NTU	-	-	-	-	0.3	0.3	0.6	1.5	0.4	0.5	0.4	0.7	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.3	6.7	11	10	6.1	2.4	2.6
Alkalinity (Total as CaCO3)	1.0	mg/L	-	-	-	-	98	98	96	99	99	95	97	100	96	94	98	99	110	97	99	96	120	120	120	120	110	110
Nitrite (N)	0.01	mg/L	0.197	-	-	1	0.0003	0.0000	0.0033	0.0025	0.0051	0.0026	0.0022	0.0026	0.0028	0.0059	0.0025	0.0027	0.0024	0.0019	0.0025	-0.0063	0.0075	0.0110	0.0099	0.0054	0.0079	0.0072
Nitrate (N)	0.1	mg/L	13	-	-	10	0.18	0.22	0.34	0.17	0.16	0.28	0.17	0.15	0.17	0.26	0.16	0.28	0.19	0.29	0.18	0.21	0	0	0.1	0	0	0
Nitrate + Nitrite (N)	0.1	mg/L	-	-	-	-	0.18	0.22	0.34	0.17	0.16	0.28	0.17	0.15	0.17	0.26	0.16	0.28	0.19	0.29	0.18	0.21	0.0379	0.0831	0.1	0.0292	0.074	0.0758
Metals																												
Total Hexavalent Chromium (Cr 6+)	0.99	µg/L	-	-	-	50	0.21	0.02	-0.49	-0.6	-0.26	0.89	0.18	0.23	-0.41	-0.09	-0.7	-0.36	-1.2	-0.37	-0.6	-0.21	-0.03	0.28	2.65	1.8	-0.5	-1.4
Dissolved Aluminum (Al)	0.5	µg/L	-	75**	-	-	1.39	1.27	42	22.3	2.22	34.1	1.95	2.8	8.33	1.98	9.04	5.38	2.34	8.53	8.53	5.15	10.1	7.44	51.4	5.63	55.3	4.79
Total Aluminum (Al)	0.5	µg/L	100**	-	-	2900	4.28	4.28	54.2	12.1	3.55	33.4	26.9	9.5	21.6	10.1	6.88	8.95	21.4	4.56	6.82	6.11	93.3	204	136	94.1	27.5	26.5
Dissolved Antimony (Sb)	0.02	µg/L	-	-	-	-	0.13	0.119	0.111	0.122	0.122	0.123	0.127	0.124	0.13	0.127	0.133	0.122	0.12	0.127	0.129	0.119	0.191	0.19	0.216	0.203	0.152	0.172
Total Antimony (Sb)	0.02	µg/L	-	-	20	6	0.122	0.119	0.111	0.122	0.128	0.119	0.106	0.117	0.121	0.12	0.124	0.121	0.124	0.12	0.121	0.125	0.194	0.196	0.224	0.173	0.139	0.135
Dissolved Arsenic (As)	0.02	µg/L	-	-	-	-	0.73	0.692	0.665	0.675	0.707	0.678	0.723	0.739	0.697	0.737	0.726	0.755	0.727	0.729	0.74	0.736	0.879	0.86	0.813	0.891	0.737	0.875
Total Arsenic (As)	0.02	µg/L	5	100	5	10	0.689	0.728	0.639	0.768	0.741	0.675	0.632	0.72	0.711	0.76	0.746	0.774	0.735	0.774	0.737	0.783	0.922	0.844	0.923	0.867	0.715	0.729
Dissolved Barium (Ba)	0.02	µg/L	-	-	-	-	18.7	19.2	18.8	19.5	20	19.3	20.4	20.7	21	21.7	20.4	22.3	20.5	21.1	21.1	21.7	26.7	26.6	28.2	26.8	21.6	24.9
Total Barium (Ba)	0.02	µg/L	-	-	-																							

Parameter	Detection Limit	Units	CCME (1)	PWQG (2)	Interim PWQO (2)	Health Canada (3)	Station																							
							Lake Ontario																		Frenchman's Bay					
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9		
Total Cadmium (Cd)	0.005	µg/L	0.16-0.20**	0.2	0.5**	7	0.0029	0.0036	0.0056	0.0028	0.0027	0.0054	0.0041	0.0039	0.0028	0.004	0.0023	0.0035	0.0027	0.0037	0.0023	0.004	0.0056	0.0078	0.0054	0.0064	0.0025	0.0024		
Dissolved Chromium (Cr)	0.1	µg/L	-	-	-	-	0.1	0.15	0.0817	0.18	0.14	0.13	0.0831	0.1	0.12	0.072	0.18	0.1	0.2	0.0732	0.0919	0.1	0.0757	0.17	0.17	0.11	0.16	0.15		
Total Chromium (Cr)	0.1	µg/L	-	-	-	50	0.0461	0.11	0.11	0.12	0.1	0.0902	0.0854	0.13	0.0885	0.11	0.0695	0.0785	0.11	0.0856	0.11	0.0748	0.28	0.54	0.37	0.25	0.1	0.14		
Dissolved Cobalt (Co)	0.005	µg/L	-	-	-	-	0.01	0.008	0.0181	0.0184	0.0097	0.014	0.0091	0.0121	0.0126	0.0121	0.0112	0.0123	0.0102	0.0162	0.0113	0.0108	0.0346	0.0321	0.0419	0.0299	0.0198	0.024		
Total Cobalt (Co)	0.005	µg/L	-	-	0.9	-	0.0086	0.01	0.022	0.014	0.0106	0.019	0.013	0.016	0.0145	0.0184	0.0105	0.0177	0.0259	0.0143	0.013	0.0146	0.075	0.148	0.111	0.071	0.026	0.03		
Dissolved Copper (Cu)	0.05	µg/L	-	-	-	-	0.591	0.57	0.856	0.974	0.585	0.88	0.594	0.622	0.704	0.629	0.679	0.642	0.696	0.813	0.723	0.677	0.867	0.816	0.98	0.826	1.46	1.24		
Total Copper (Cu)	0.05	µg/L	2.4-3.1**	5	5.0**	2000	0.679	0.655	1.1	0.782	0.651	0.91	0.73	0.64	0.74	0.715	0.645	0.718	0.83	0.694	0.704	0.661	1.36	1.65	1.45	1.17	1.31	1.4		
Dissolved Iron (Fe)	1	µg/L	-	-	-	-	1.5	1.9	2.3	7.8	2.5	3.1	0.7153	2.6	4.6	1.4	3.5	2.6	2.6	2.9	2.7	2.8	17.2	18.5	29.9	20.6	8.8	13		
Total Iron (Fe)	1	µg/L	300	300	-	-	2.2	4.8	10.6	10	4.5	9.6	7.8	17.5	6	9.9	3.8	8.2	18.4	5.3	5.5	9.4	207	393	349	189	75.4	78.5		
Dissolved Lead (Pb)	0.005	µg/L	-	-	-	-	0.004	0.012	0.0506	0.137	0.0036	0.0881	0.0062	0.0157	0.02	0.0068	0.0412	0.0182	0.0052	0.0795	0.034	0.0363	0.0559	0.0312	0.112	0.0489	0.0854	0.0321		
Total Lead (Pb)	0.005	µg/L	3.4-4.7**	25	5.0**	5	0.0137	0.0146	0.091	0.0372	0.0091	0.074	0.054	0.034	0.0352	0.0339	0.0141	0.0227	0.0387	0.0125	0.0159	0.0181	0.406	0.553	0.463	0.325	0.12	0.127		
Dissolved Lithium (Li)	0.5	µg/L	-	-	-	-	1.64	1.73	1.78	1.71	1.75	1.79	1.62	1.71	1.65	1.71	1.7	1.75	1.69	1.7	1.77	1.69	2.02	1.85	2.13	1.89	1.76	1.76		
Total Lithium (Li)	0.5	µg/L	-	-	-	-	1.72	1.71	1.74	1.66	1.65	1.79	1.61	1.67	1.55	1.56	1.59	1.58	1.7	1.58	1.62	1.63	2.07	1.9	2.06	1.82	1.55	1.64		
Dissolved Manganese (Mn)	0.05	µg/L	170-570**	-	-	-	0.193	0.279	1.19	1.39	0.334	1.39	0.457	1.82	0.384	0.761	0.408	0.972	0.253	1.06	0.437	1.47	10.4	11.6	36.2	10	6.57	8.84		
Total Manganese (Mn)	0.05	µg/L	-	-	-	120	0.461	0.65	2.74	2.01	1.52	2.56	2.45	5.17	1.17	2.37	0.762	2.71	1.43	1.67	1.05	2.58	47.4	55.3	66	41.4	22.7	21.9		
Dissolved Molybdenum (Mo)	0.05	µg/L	-	-	-	-	1.07	1.03	1.27	1.25	1.12	1.44	1.06	1.13	1.14	1.14	1.15	1.14	1.13	1.16	1.14	1.12	2.57	2.56	1.16	1.19	1.53	1.18		
Total Molybdenum (Mo)	0.05	µg/L	73	-	40	-	1.08	1.05	1.27	1.15	1.14	1.29	1.14	1.09	1.13	1.17	1.16	1.16	1.22	1.16	1.17	1.1	1.1	0.929	0.919	1.03	0.89	0.907		
Dissolved Nickel (Ni)	0.02	µg/L	-	-	-	-	0.462	0.491	0.551	0.628	0.468	0.554	0.468	0.434	0.554	0.507	0.515	0.511	0.503	0.59	0.529	0.559	0.845	0.484	0.491	0.497	0.49	0.466		
Total Nickel (Ni)	0.02	µg/L	98-121**	25	-	-	0.504	0.525	0.55	0.533	0.479	0.55	0.46	0.48	0.546	0.577	0.507	0.56	0.609	0.565	0.512	0.528	0.56	0.7	0.62	0.58	0.44	1.28		
Dissolved Selenium (Se)	0.04	µg/L	-	-	-	-	0.111	0.121	0.11	0.108	0.114	0.109	0.11	0.126	0.113	0.119	0.117	0.132	0.112	0.109	0.121	0.106	0.129	0.129	0.095	0.121	0.114	0.111		
Total Selenium (Se)	0.04	µg/L	1	100	-	50	0.11	0.115	0.121	0.11	0.128	0.098	0.098	0.112	0.108	0.123	0.124	0.116	0.121	0.129	0.122	0.123	0.113	0.104	0.105	0.12	0.087	0.094		
Total Silicon (Si)	50	µg/L	-	-	-	-	161	261	113	106	86	111	82	119	82	198	68	203	133	176	87	221	1820	1820	1690	1760	798	791		
Dissolved Silicon (Si)	50	µg/L	-	-	-	-	146	240	112	99	85	105	75	107	76	188	64	213	86	169	82	210	1820	1810	1710	1820	803	1040		
Dissolved Silver (Ag)	0.005	µg/L	-	-	-	-	0.004	-0.001	0.0001	0.0044	0.0004	0.001	0.0011	0.0005	0.0008	0.0004	0.0007	0.0015	0.0004	0.0018	0.0002	0.0011	0	0.0009	0	0.0005	0.0015	0.0006		
Total Silver (Ag)	0.005	µg/L	0.25	0.1	-	-	-0.0007	0.0007	0.0029	0.0009	0.0007	0.0033	0.0012	0.0002	0.0009	0.0012	0.0008	0.0008	0.0005	0.0002	0.0005	0.0011	0.0023	0.0025	0.0018	0.002	0.0007	0.0005		
Dissolved Strontium (Sr)	0.050	µg/L	-	-	-	-	156	157	152	156	191	154	166	169	184	189	180	189	189	170	188	181	221	217	222	221	159	207		
Total Strontium (Sr)	0.050	µg/L	-	-	-	7000	182	184	160	172	170	169	158	180	172	172	176	174	173	176	176	171	212	194	214	202	165	171		
Dissolved Thallium (Tl)	0.002	µg/L	-	-	-	-	0.005	0.005	0.0058	0.0057	0.0053	0.006	0.007	0.0069	0.0063	0.0063	0.0062	0.0065	0.0071	0.0055	0.0062	0.0058	0.0016	0.0018	0.0017	0.0016	0.0026	0.0026		
Total Thallium (Tl)	0.002	µg/L	0.8	-	0.3	-	0.0062	0.0058	0.0047	0.0072	0.0069	0.0062	0.005	0.0059	0.007	0.007	0.0064	0.0079	0.0073	0.0072	0.006	0.0074	0.0032	0.0054	0.0043	0.0034	0.0028	0.0027		
Dissolved Tin (Sn)	0.2	µg/L	-	-	-	-	0.027	0.019	0.0683	2.23	0.0216	0.0604	0.0066	0.0134	0.0285	0.0117	0.0456	0.0178	0.0081	0.0992	0.0368	0.0936	0.0172	0.014	0.0407	0.012	0.1121	0.0152		
Total Tin (Sn)	0.2	µg/L	-	-	-	-																								

Parameter	Detection Limit	Units	CCME (1)	PWQG (2)	Interim PWQO (2)	Health Canada (3)	Station																											
							Lake Ontario																				Frenchman's Bay							
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9						
Total Sodium (Na)	10	µg/L	-	-	-	-	12800	12700	12000	13500	12900	12300	11100	12500	13000	13200	12900	13600	13500	13500	13000	12900	31900	34200	44400	29600	20700	20300						
Dissolved Thorium (Th)	0.05	µg/L	-	-	-	-	-0.001	-0.001	0.004	0.0048	0.0044	0.007	0.0036	-0.0006	0.0004	0.0029	0.0052	0.0019	0.0018	0.0019	0.0028	0.003	0.0072	0.0071	0.0018	0.0077	0.0037	0.0076						
Total Thorium (Th)	0.05	µg/L	-	-	-	-	0.0028	0.0062	0.0008	0.0035	0.001	0.0059	0.0038	0.003	0.0053	-0.0012	0.0002	0.0028	0.0013	-0.0002	0.0006	0.0029	0.0147	0.0193	0.0181	0.012	0.0073	0.0074						
Dissolved Tungsten (W)	0.01	µg/L	-	-	-	-	0.065	0.06	0.086	0.077	0.073	0.098	0.066	0.073	0.071	0.074	0.077	0.078	0.071	0.074	0.076	0.068	0.075	0.077	0.077	0.069	0.092	0.082						
Total Tungsten (W)	0.01	µg/L	-	-	30	-	0.073	0.071	0.078	0.075	0.076	0.075	0.072	0.063	0.074	0.075	0.073	0.074	0.075	0.074	0.075	0.072	0.07	0.064	0.172	0.071	0.06	0.065						
Chromium (VI)	0.50	ug/L	1	1	-	50	0.0034	0	0	0.0018	0	0	0	0	0	0	0	0	0	0	0	0.0081	0	0.0079	0	0	0	0						
Mercury (Hg)	0.01	ug/L	0.026	-	-	1	0.0014	-0.0002	0.0009	0.0011	0.0013	0.0007	0.0004	-0.0001	0.0001	0.0004	-0.0001	0.0009	0.0015	0.0008	0.0008	0.0011	0.0012	0.0015	0.0029	0.0017	0.0014	0.0002						
Dissolved Mercury (Hg)	0.01	ug/L	-	0.2	-	-	-0.0003	0.0003	0.0009	0.0013	0.001	0.0006	0.0009	0.0006	0.0009	0.001	0.0004	0.0006	0.0012	0.0011	0.0005	0.0005	0.0012	0.0009	0.001	0.0003	0.0011	0.0003						
Volatile Organics																																		
Benzene	0.10	ug/L	370	-	100	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Bromodichloromethane	0.10	ug/L	-	-	200	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Bromoform	0.20	ug/L	-	-	60	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Chloroform	0.10	ug/L	1.8	-	-	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Ethylbenzene	0.10	ug/L	90	-	8	140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Hydrocarbons																																		
F1 (C6-C10)	25	ug/L	167	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
F1 (C6-C10) - BTEX	25	ug/L	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
F2 (C10-C16 Hydrocarbons)	100	ug/L	42	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
F3 (C16-C34 Hydrocarbons)	200	ug/L	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
F4 (C34-C50 Hydrocarbons)	200	ug/L	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Reached Baseline at C50		ug/L	-	-	-	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes						
Surrogate Recovery (%)																																		
1,4-Difluorobenzene		%	-	-	-	-	100	105	99	103	112	100	101	100	105	105	108	106	112	112	105	110	102	99	100	99	101	101						
4-Bromofluorobenzene		%	-	-	-	-	86	90	97	95	89	98	96	91	91	90	91	95	80	93	97	85	89	95	94	93	93	96						
D10-o-Xylene		%	-	-	-	-	96	99	87	98	103	92	89	87	101	99	102	100	105	102	101	100	95	97	96	91	93	90						
D4-1,2-Dichloroethane		%	-	-	-	-	97	101	104	107	97	104	104	108	104	102	100	103	99	116	106	110	106	109	104	106	106	110						
o-Terphenyl		%	-	-	-	-	102	101	93	92	92	93	93	91	93	94	94	94	92	95	96	94	94	92	93	93	94	95						
4-Bromofluorobenzene		%	-	-	-	-	95	95	99	100	100	100	99	99	101	101	100	101	100	100	102	100	101	100	100	100	101	102						
D4-1,2-Dichloroethane		%	-	-	-	-	96	96	105	106	105	103	106	105	104	105	106	107	105	107	108	105	106	105	105	105	105	104						
D8-Toluene		%	-	-	-	-	101	102	97	97	97	97	97	98	96	98	97	97	96	97	96	97	97	97	96	96	97	97						
Microbiological																																		
Background	10	CFU/100mL	-	-	-	-	260	970	48000	16000	2100	53000	5000	2800	240	760	380	1300	160	820	920	680	120000	63000	29000	8400	5100	16000						
Fecal coliform	10	CFU/100mL	-	-	-	-	<10	<10	20	10	<10	10	10	10	<10	<10	<10	<10	<10	<10	<10	13000	560	2700	<10	90	240							
Total Coliforms	10	CFU/100mL	-	-	-	10	250	2200	2500	50	410	640	80	80	10	460	60	740	<10	880	80	640	85000	11000	2900	<10	280	2600						
Escherichia coli	10	CFU/100mL	-	100	-	10	<10	<10	20	10	<10	10	10	10	<10	<10	<10	<10	<10	<10	<10	6100	560	120	<10	50	60							
Radionuclides																																		
H-3	14	Bq/kg	-	7000	-	7000	5.25	5.27	42.4	106	5.3	47.8	21.2	5.31	10.6	0	0	10.5	21.2	0	10.6	-5.33	26.4	15.9	21.1	20.9	21.2	21.4						
C-14	0.027	Bq/g	-	-	-	-	-0.0512	-0.0205	-0.0225	0.0115	-0.0302	0.059	0.241	0.0394	-0.0199	-0.0397	-0.045	-0.0466	-0.0241	-0.0326	-0.0303	-0.0403	-0.0289	-0.0228	0.79	-0.0217	-0.018	-0.0281						
Co-60	0.73	Bq/kg	-	-	-	-	0.16	-0.0244	0.455	0.497	0.0614	0.147	-0.146	0.0696	0.0324	0.0915	0.657	0.171	0.149	0.556	-0.162	0.0514	0.289	0.316	0.0916	0.191	-0.481	0.0691						
Cs-134	0.75	Bq/g	-	-	-	-	0.48	0.119	0.244	0.0292	0.117	-0.101	0.128	-0.0169	0.293	0.292	0.0249	-0.0581	0.111	0.126	0.12	-0.043	-0.157	0.143	0.0167	-0.207	0.106	-0.124						
Cs-137	0.6	Bq/kg	-	50	-	10	0.297	0.249	-0.228	0.102	-0.0569	0.281	0.0631	0.505	-0.0462	0.0572	-0.0678	-0.236	-0.21	0.294	-0.0213	0.0254	-0.0251	0.418	0.0966	-0.0266	0.0542	-0.0355						
I-131	1.2	Bq/kg	-	10	-	6	0.022	0.212	0.222	1.12	0.485	-0.679	0.882	-0.909	0.351	-0.143	-1.33	0.0523	-0.278	-0.565	0.27	0.591	0.0767	-0.206	2.66	-1.08	-0.819	0.661						
K-40	7.1	Bq/g	-	-	-	-	1.75	0.525	-0.208	0.568	-0.32	-0.392	-1.03	-0.459	2.64	-0.946	2.24	-0.172	-0.174	1.37	0.127	0.241	2.87	-2.5	0.484	0.242	1.71	0.746						
Th-Series	1.8	Bq/kg	-	-	-	-	0.452	-1.09	0.332	0.459	-0.57	0.355	-0.329	-0.435	1.17	0.367	-1.42	-0.132	0.245	1.09	0.285	-0.0449	0.482	0.434	0.392	0.851	-0.416	0.125						
U-Series	1.5	Bq/kg	-	-	-	-	-0.204	0.116	0.575	-0.275	0.671	-0.015	-0.024	-0.0357	-0.0785	0.702	-0.246	-0.00287	0.336	0.564	-0.0708	-0.285	-0.0693	0.421	-0.0261	0.159	-0.328	0.242						
Miscellaneous Parameters																																		
Hydrazine	0.1	ug/L	2.6	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Monomethyl Hydrazine	0.25	ug/L	-	-	-	-	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25						
1,1-Dimethylhydrazine	0.25	ug/L		-	-	-	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25						
Chlorophyll a	1.3	ug/L	-	-	-	-	2.8	1.8	3.2	2.5	4.3	3.5	3.5	4.8	1.9	2.5	2.3	2.3	1.9	2.9	2.4	1.1	11.0	10.0	13.0	9.0	6.0	8.0						

Parameter	Detection Limit	Units	CCME (1)	PWQG (2)	Interim PWQO (2)	Health Canada (3)	Station																					
							Lake Ontario														Frenchman's Bay							
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9
Morpholine	4	ug/L	-	-	4	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dissolved Methyl Mercury	0.050	ng/L	-	-	-	-	0.05500	0.01880	0.01589	0.01879	0.02088	0.01363	0.00912	0.01436	0.02081	0.01949	0.01484	0.01320	0.01974	0.03052	0.03019	0.01931	0.00158	0.00049	0.01654	0.01000	0.01858	0.02449
Total Methyl Mercury	0.050	ng/L	4	-	-	-	0.01146	0.01372	0.01037	0.01677	0.01335	0.01973	0.00080	0.01856	0.03742	0.01432	0.00795	0.01380	0.01599	0.02288	0.03742	0.03517	0.03797	0.01436	0.05100	0.03267	0.03253	0.05300

Notes:

- Bold**
- Exceeded Interim PWQO
-
- Bold**
- Exceeded PWQO
-
- Bold**
- Exceeded CCME
-
- Bold**
- Exceeded Health Canada Guidelines
-
- Bold**
- Exceeded more than one guideline

Surface water samples from Lake Ontario were collected at a depth of 0.5 meters (denoted by "S" in the sample name), while bottom samples were taken 0.5 meters above the lakebed (denoted by "B"). Mid-depth samples were collected in Frenchman’s Bay, as thermal stratification is unlikely in the shallow depths observed in this area. Sampling locations presented in Figure 4-3 and Figure 4-4.

* Only censored results provided by lab.

** Calculated values. The value for Hardness (as CaCO3) dissolved was used to estimate hardness-dependent guidelines.

a – Total Ammonia guideline (Long Term Concentration (mg/L) Table): Retrieved from: https://ccme.ca/en/chemical/5#_aqf_fresh_concentration

b – Dissolved Aluminum guideline: The Interim PWQO is 15 µg/L between pH 4.5 to 5.5, and 75 µg/L between pH 6.5 to 9.0. Between pH 5.5 - 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters representative of that geological area of the Province that are unaffected by man-made inputs.

c – Total Aluminum guideline (Long Term Concentration (µg/L) Variable): If pH < 6.5, the CWQG is 5 µg/L. If pH ≥ 6.5, the guideline is 100 µg/L.

d – Total Beryllium guideline (µg/L): If Hardness < 75 mg/L, the PWQO is 11 µg/L. If Hardness > 75 mg/L, then the PWQO is 1100 µg/L.

e – Total Cadmium guideline (Long Term concentration (µg/L) equation): When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L. At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated as 10{0.83(log[hardness]) – 2.46}. At hardness > CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46} At hardness > 280 mg/L, the guideline is 0.37 µg/L.

f – Total Cadmium guideline (µg/L): If Hardness 0-100 mg/L, the Interim PWQO is 0.1 µg/L. If Hardness > 100 mg/L, then the Interim PWQO is 0.5 µg/L.

g – Total Copper guideline (Long Term concentration (µg/L) equation): When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L. At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: 0.2 * e{0.8545[ln(hardness)]-1.465}. At hardness >180 mg/L, the CWQG is 4 µg/L.

h - Total Copper guideline (µg/L): If Hardness 0-20 mg/L, the Interim PWQO is 1 µg/L. If Hardness > 20 mg/L, then the Interim PWQO is 5 µg/L.

i – Total Lead guideline (Long Term concentration (µg/L) equation): When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L. At hardness >60 to ≤ 180 mg/L the CWQG is calculated as e{1.273[ln(hardness)]-4.705}. At hardness >180 mg/L, the CWQG is 7 µg/L. At hardness >180 mg/L, the CWQG is 7 µg/L.

j – Total Lead guideline: If Hardness is 30-80 mg/L, then the Interim PWQO is 3 µg/L. If Hardness is > 80 mg/L, then the Interim PWQO is 5 µg/L.

k – Dissolved Manganese concentration (Long Term concentration (µg/L) equation): Calculated using the CWQG calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese. Retrieved from:

<https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fccme.ca%2Fen%2Fres%2F2019-manganese-cwqg-scd-appendix-b-en.xlsx&wdOrigin=BROWSELINK>

l – Total Nickel guideline (Long Term concentration (µg/L) equation): When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L. At hardness > 60 to ≤ 180 mg/L the CWQG is calculated as e{0.76[ln(hardness)]+1.06}. At hardness >180 mg/L, the CWQG is 150 µg/L.

m – Dissolved Zinc guideline (Long Term concentration (µg/L) equation): The CWQG is calculated as exp(0.947[ln(hardness mg-L-1)] - 0.815[pH] + 0.398[ln(DOC mg-L-1)] + 4.625).

This equation is valid between hardness 23.4 and 399 mg CaCO3-L–1, pH 6.5 and 8.13 and DOC 0.3 to 22.9 mg-L–1, which is the range of data used to derive the hardness, pH and DOC slopes.

n – Radionuclides are not screened as their levels should be as low as reasonably achievable (ALARA).

References:

4. CCME. n.d. Canadian Water Quality Guidelines for Protection of Aquatic Life. Accessed in September 2024.
5. Ministry of Environment and Climate Change. MOECC. 1994. Water management: policies, guidelines, provincial water quality objectives.
6. Health Canada. 2019. Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

Table A-3: Screening of Surface Water Quality Parameters in Fall 2024 samples

Parameter	Detection Limit	Units	CCME (1)	PWQG (2)	Interim PWQO (2)	Health Canada (3)	Station																					
							Lake Ontario																Frenchman's Bay					
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9
Field Measurements																												
Temperature	N/A	Celsius	-	-	-	-	7.5	6.2	31.6	15	9	18.6	18.1	17.8	13.9	9.6	13.6	9.4	14.3	9.7	12.9	9.6	16.9	13.8	12.2	14.7	12.6	12.5
pH	N/A	pH	6.5-9.0	6.5-8.5	-	-	7.42	7.54	8.12	7.87	7.6	7.61	7.82	7.67	7.6	7.62	7.68	7.69	7.83	7.8	7.69	7.65	8.17	8.25	7.56	8.13	8.15	7.97
Specific Conductivity	N/A	µs/cm	-	-	-	-	203.1	305.5	308.7	308	307.1	311.4	309.1	313.5	306.9	304.6	307.2	303.8	306.6	303.9	305.9	304.6	494.7	518	792	473.8	460.5	469.6
Conductivity	N/A	µs/cm	-	-	-	-	-	-	-	249.1	214.4	273	268.1	268.2	-	-	-	-	-	-	-	-	418.5	407.5	598	396.2	-	-
DO	N/A	%	-	-	-	-	83.7	81.4	102.7	92.8	85	92.6	97.8	95.7	103	94.9	102.3	91.6	103.80	94	103	94.7	95.8	97.3	83	94.7	102.4	99.3
DO	N/A	mg/L	-	-	-	-	10.03	10.09	7.54	9.35	9.75	9.34	9.2	9.1	10.61	10.79	10.62	10.49	10.56	10.71	10.72	10.75	9.24	10.05	8.85	9.8	10.93	10.58
Turbidity	N/A	NTU	-	-	-	-	-0.38	-0.43	0.68	754	754	754	753.6	753.3	-0.39	0.1	-0.42	-0.05	-0.39	NA	-0.41	-0.24	753.5	758.3	754.7	754.3	2.58	2.37
Calculated Parameters																												
Dissolved Hardness (CaCO3)	0.50	mg/L	-	-	-	-	112	108	106	115	114	113	115	114	119	114	117	116	117	114	117	115	147	142	166	138	130	134
Total Un-ionized Ammonia	0.0015	mg/L	0.019	0.02	-	-	0.0008	0.0015	0.0083	0.0013	0.0011	0.0000	0.0045	0.0033	0.0000	0.0000	0.0010	0.0011	0.0000	0.0015	0.0014	0.0007	0.0370	0.0220	0.0051	0.0210	0.0130	0.0081
Chromium (+3)	0.5	ug/L	8.9	8.9	-	-	0.252	0.000	0.000	0.174	0.000	0.000	0.118	0.135	0.149	0.185	0.165	0.109	0.173	0.115	0.146	0.171	0.159	0.000	0.000	0.000	0.108	
Unfiltered Chromium (+3)	0.99	ug/L	-	-	-	-	0.00	0.12	0.18	0.00	-1.24	0.00	0.21	0.00	0.00	-1.18	0.11	0.12	0.12	0.00	0.13	-1.45	0.00	0.28	0.16	0.18	0.00	0.14
Total Hardness (CaCO3)	0.50	mg/L	-	-	-	-	117	117	99	114	105	92	111	112	116	115	116	116	117	130	116	114	140	138	137	141	140	141
Inorganics																												
Total Ammonia-N	0.050	mg/L	0.196-3.98**	-	-	-	0.1500	0.2600	0.0650	0.0550	0.1400	0.0249	0.1600	0.1700	0.0481	0.0154	0.0670	0.1100	0.0453	0.1100	0.0990	0.0740	0.6700	0.4200	0.5300	0.4900	0.3500	0.3200
Total Biochemical Oxygen Demand (BOD)	2	mg/L	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Total Chemical Oxygen Demand (COD)	4.0	mg/L	-	-	-	-	5.5	6.2	14	0.43	0.77	-0.6	4.6	3.18	6.2	3.34	5.5	1.56	5.1	3.69	6.2	5.8	6.6	10	18	4.5	12	6.5
Conductivity	1.0	umho/cm	-	-	-	-	310	300	300	320	320	320	310	320	320	320	320	310	310	310	320	320	500	540	820	510	460	480
Total Kjeldahl Nitrogen (TKN)	0.10	mg/L	-	-	-	-	0.42	0.43	0.3	0.38	0.33	0.32	0.39	0.27	0.16	0.22	0.27	0.18	0.23	0.16	0.24	0.33	0.72	0.86	0.83	0.57	0.89	0.65
Dissolved Organic Carbon	0.40	mg/L	-	-	-	-	1.9	1.9	2.3	2.1	2	2	2.2	2.2	2.1	1.9	2	1.9	2.1	1.9	2.1	1.9	3.7	3.9	5.2	3.7	3.3	4.5
Orthophosphate (P)	0.010	mg/L	-	-	-	-	0.0012	0.0009	0.0032	0.0005	0.0006	0.0012	-0.0017	-0.0015	-0.0016	0.0002	-0.0007	-0.0017	-0.0014	-0.0016	-0.0017	-0.0016	-0.0033	-0.0005	0.0029	0.0003	-0.0002	0.0011
pH		pH	-	-	-	-	8.11	8.13	8.13	8.15	8.09	8.1	8.16	8.09	8.1	8.13	8.06	8.15	8.1	8.12	7.85	8.15	8.12	8.2	8	8.21	8.16	8.06
Total Phosphorus	0.020	mg/L	0.02-0.03	-	0.02	-	0.0009	0.0003	0.0173	-0.0038	0.0014	0.0029	0.0096	0.005	0.007	0.0015	0.0056	-0.0003	0.0017	-0.0022	0.0014	-0.0004	0.027	0.023	0.024	0.024	0.0164	0.019
Total Residual Chlorine	0.003	mg/L	0.0005	0.002	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Suspended Solids	1	mg/L	-	-	-	-	0.2	0.2	1	0.6	0.8	1	1	33	0.4	0.4	1	5	0.2	0.4	0	0.4	35	11	4	9	4	5
Turbidity	0.1	NTU	-	-	-	-	0.1	0.1	0.9	0.3	0.3	0.2	0.4	0.5	0.2	0.2	0.2	0.2	0.2	0.1	0.3	0.1	9.5	8.3	3.4	6.2	3	2.9
Alkalinity (Total as CaCO3)	1.0	mg/L	-	-	-	-	98	100	98	98	99	99	98	96	96	96	95	92	96	96	95	96	120	130	150	120	120	120
Nitrite (N)	0.01	mg/L	0.197	-	-	1	0.0054	0.0035	0.0044	0.01	0.007	0.0063	0.017	0.013	0.0013	0.00036514	0.0012	-0.0003025	-0.0124	0.0025	0.0018	-0.0000963	0.00097002	-0.0000649	0.0091	0.0028	0.0029	0.0056
Nitrate (N)	0.1	mg/L	13	-	-	10	0.34	0.34	0.19	0.23	0.3	0.3	0.17	0.17	0.3	0.3	0.31	0.28	0.3	0.3	0.3	0.28	0	0	0	0	0	0
Nitrate + Nitrite (N)	0.1	mg/L	-	-	-	-	0.34	0.34	0.19	0.24	0.3	0.3	0.19	0.18	0.3	0.3	0.31	0.28	0.3	0.3	0.3	0.28	0.02	0.0141	0.0944	0.0181	0.0969	0.0956
Metals																												
Total Hexavalent Chromium (Cr 6+)	0.99	µg/L	-	-	-	50	0.59	0.7	0.79	0.62	1.2	0.79	0.77	0.81	0.46	1.3	0.34	0.57	0.53	0.62	0.65	1.5	0.36	0.83	2.89	3.18	1.15	0.67
Dissolved Aluminum (Al)	0.5	µg/L	-	75**	-	-	4.23	5.69	11.5	10.5	2.42	12.1	13.8	11.5	7.3	3.49	24.2	2.89	4.18	3.99	11.9	2.38	98.8	6.52	6.25	5.24	5.02	14.4
Total Aluminum (Al)	0.5	µg/L	100**	-	-	2900	6.76	7.8	20.5	8.6	7.8	8.1	6.03	3.41	12.1	21.7	7.77	24.4	7.82	3.96	5.83	2.94	4.47	128	34.8	54.1	27.4	33
Dissolved Antimony (Sb)	0.02	µg/L	-	-	-	-	0.128	0.124	0.216	0.139	0.134	0.133	0.133	0.128	0.129	0.127	0.143	0.135	0.128	0.127	0.125	0.128	0.203	0.203	0.282	0.195	0.171	0.19
Total Antimony (Sb)	0.02	µg/L	-	-	20	6	0.126	0.126	0.194	0.129	0.123	0.102	0.128	0.128	0.133	0.131	0.128	0.132	0.135	0.132	0.141	0.13	0.177	0.193	0.229	0.188	0.176	0.184
Dissolved Arsenic (As)	0.02	µg/L	-	-	-	-	0.783	0.778	0.782	0.781	0.768	0.769	0.783	0.799	0.719	0.718	0.746	0.731	0.73	0.709	0.728	0.743	0.852	0.72	0.668	0.714	0.712	0.742
Total Arsenic (As)	0.02	µg/L	5	100	5	10	0.797	0.795	0.728	0.756	0.899	0.623	0.702	0.706	0.756	0.79	0.738	0.764	0.734	0.734	0.742	0.723	0.649	0.773	0.59	0.798	0.744	0.741
Dissolved Barium (Ba)	0.02	µg/L	-	-	-	-	19.7	19.4	20.6	19.8	19.7	19.7	21.4	21.2	21.1	20.7	20.8	20.6	20.5	20.3	20.6	20.3	32.6	18.6	20	20.7	21	23.4
Total Barium (Ba)	0.02	µg/L	-	-	-	2000	22.9	22.2	19	21.4	20.2	16.1	19.9	20.4	21.3	20.8	21	20.9	21.3	20.9	20.9	21	20.4	25.6	17.4	27.8	27.4	29.2
Dissolved Beryllium (Bery																												

Parameter	Detection Limit	Units	CCME (1)	PWQG (2)	Interim PWQO (2)	Health Canada (3)	Station																					
							Lake Ontario														Frenchman's Bay							
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9
Total Cadmium (Cd)	0.005	µg/L	0.16-0.24**	0.2	0.5**	7	0.0062	0.0058	0.001	0.0023	0.0048	0.0031	-0.0086	-0.0091	0.0125	0.0625	0.0035	0.0082	0.004	0.0038	0.004	0.0038	-0.0098	0.0107	0.0026	0.0027	0.0023	0.0028
Dissolved Chromium (Cr)	0.1	µg/L	-	-	-	-	0.25	0.0988	0.084	0.17	0.0916	0.074	0.12	0.13	0.15	0.19	0.17	0.11	0.17	0.11	0.15	0.17	0.16	0.0468	0.0694	0.0595	0.0514	0.11
Total Chromium (Cr)	0.1	µg/L	-	-	-	50	0.0936	0.12	0.18	0.087	0.0998	0.072	0.21	0.0567	0.0968	0.11	0.11	0.12	0.12	0.0731	0.13	0.0773	0.0593	0.28	0.16	0.18	0.0871	0.14
Dissolved Cobalt (Co)	0.005	µg/L	-	-	-	-	0.0094	0.0096	0.0153	0.0157	0.0106	0.0078	0.0175	0.017	0.0165	0.0128	0.025	0.0128	0.0144	0.0121	0.0177	0.0113	0.0846	0.0303	0.0485	0.0269	0.0231	0.0286
Total Cobalt (Co)	0.005	µg/L	-	-	0.9	-	0.011	0.0074	0.026	0.013	4.14	0.012	0.0135	0.0114	0.0186	0.0403	0.0144	0.0238	0.0139	0.0099	0.0124	0.0102	0.0283	0.102	0.054	0.058	0.0366	0.0407
Dissolved Copper (Cu)	0.05	µg/L	-	-	-	-	0.926	0.616	1.03	0.621	0.59	0.601	0.638	0.698	0.892	0.602	1.9	0.642	0.734	0.64	0.787	0.615	1.04	0.678	0.55	0.606	1.05	2.16
Total Copper (Cu)	0.05	µg/L	2.5-3.7**	5	5.0**	2000	1.47	0.72	1.09	0.78	24	0.8	0.978	0.623	0.861	0.799	0.996	0.937	0.865	0.684	0.802	0.638	0.8	1.21	0.8	1.55	0.875	1.72
Dissolved Iron (Fe)	1	µg/L	-	-	-	-	6.5	6.1	4	11.1	1.7	1.2	18.4	19.7	6.2	3.9	16.1	2.9	3.6	5	3.3	3.4	262	15.3	21.2	9.2	10.2	15.8
Total Iron (Fe)	1	µg/L	300	300	-	-	7.5	8.1	27.8	8.6	10.9	10.8	6.3	1.4	14.1	58.1	9.4	35.3	7.6	6.7	6	2.5	10.6	297	165	170	110	118
Dissolved Lead (Pb)	0.005	µg/L	-	-	-	-	0.0221	0.0145	0.0368	0.0847	0.0082	0.004	0.0249	0.0306	0.0458	0.0474	0.367	0.0144	0.0183	0.0229	0.037	0.0082	0.44	0.019	0.0171	0.0249	0.0191	0.0714
Total Lead (Pb)	0.005	µg/L	3.4-6.1**	25	5.0**	5	0.0467	0.018	0.108	0.027	0.027	0.03	0.0517	0.0091	0.0637	0.127	0.0299	0.103	0.0206	0.0143	0.0207	0.0073	0.0296	0.49	0.205	0.389	0.2	0.213
Dissolved Lithium (Li)	0.5	µg/L	-	-	-	-	1.8	1.87	1.5	1.73	1.68	1.74	1.68	1.7	1.76	1.73	1.74	1.68	1.73	1.72	1.73	1.75	2.07	2.19	2.9	2.14	2.16	2.42
Total Lithium (Li)	0.5	µg/L	-	-	-	-	1.74	1.74	1.4	1.89	1.82	1.52	1.49	1.48	1.7	1.7	1.71	1.72	1.73	1.69	1.77	1.7	1.87	2.4	2.57	2.51	2.16	2.23
Dissolved Manganese (Mn)	0.05	µg/L	250-530**	-	-	-	0.505	0.341	3.08	1.61	0.767	0.908	2.29	2.77	0.89	0.483	3.19	0.435	0.669	0.872	0.747	0.407	102	6.11	49.7	1.08	2.61	4.58
Total Manganese (Mn)	0.05	µg/L	-	-	-	120	0.75	0.519	4.63	1.61	4.72	1.44	0.915	0.686	1.61	2.12	1.17	3.57	0.847	0.545	0.781	0.552	2.01	86	52.5	81.9	52.4	43.6
Dissolved Molybdenum (Mo)	0.05	µg/L	-	-	-	-	1.16	1.15	1.13	1.18	1.15	1.18	1.17	1.16	1.18	1.14	1.27	1.18	1.18	1.12	1.22	1.13	1.1	1.09	1.1	1.12	1.13	1.12
Total Molybdenum (Mo)	0.05	µg/L	73	-	40	-	1.13	1.17	1.08	1.05	1.04	0.935	1.14	1.11	1.22	1.13	1.21	1.12	1.17	1.15	1.23	1.12	1.06	0.892	0.886	1.02	1.06	1.12
Dissolved Nickel (Ni)	0.02	µg/L	-	-	-	-	1.14	1.48	0.804	0.622	0.588	0.604	0.49	1.57	0.832	0.85	1.67	1.26	0.701	0.791	0.876	1.6	0.635	0.464	0.53	0.53	0.889	0.602
Total Nickel (Ni)	0.02	µg/L	99-140**	25	-	-	1.88	0.612	0.62	0.64	12	0.84	0.922	0.65	6.41	1.16	0.81	0.822	0.73	2.25	0.565	0.488	0.557	0.75	0.69	0.74	0.531	0.658
Dissolved Selenium (Se)	0.04	µg/L	-	-	-	-	0.123	0.13	0.115	0.109	0.117	0.131	0.128	0.119	0.126	0.133	0.141	0.127	0.133	0.132	0.134	0.129	0.109	0.103	0.1	0.097	0.1	0.106
Total Selenium (Se)	0.04	µg/L	1	100	-	50	0.118	0.136	0.114	0.132	0.197	0.108	0.116	0.105	0.135	0.124	0.141	0.131	0.125	0.155	0.133	0.135	0.092	0.113	0.093	0.105	0.114	0.102
Total Silicon (Si)	50	µg/L	-	-	-	-	561	573	272	350	412	377	238	265	371	400	360	436	363	471	366	398	2550	2630	2330	2520	1940	1710
Dissolved Silicon (Si)	50	µg/L	-	-	-	-	561	570	258	353	450	449	270	294	409	394	359	412	359	388	354	397	2890	2480	2660	2380	1800	1620
Dissolved Silver (Ag)	0.005	µg/L	-	-	-	-	0.0003	0.0011	0.0014	0.0003	0.0005	0.0004	0.0019	0.0005	0.001	0.0006	0.0011	0.0012	0	0.001	0.0009	0.0001	0.0023	-0.0002	0	0.0006	0.0003	0.0011
Total Silver (Ag)	0.005	µg/L	0.25	0.1	-	-	0.0016	0.0003	0.005	0.001	0.448	0.0004	0.0007	0.0003	0	0.0068	0.0012	0.0014	0.0012	0.0009	0.0008	0.0004	0.0008	0.0016	0.0014	0.002	0.0007	0.0019
Dissolved Strontium (Sr)	0.050	µg/L	-	-	-	-	164	164	165	169	172	170	178	178	173	164	171	172	172	164	170	169	225	217	257	216	205	226
Total Strontium (Sr)	0.050	µg/L	-	-	-	7000	179	173	145	177	158	134	163	162	174	172	174	169	174	172	178	171	208	215	210	218	210	235
Dissolved Thallium (Tl)	0.002	µg/L	-	-	-	-	0.0066	0.0067	0.0062	0.0066	0.0069	0.0064	0.0065	0.0065	0.0065	0.0075	0.009	0.0069	0.0069	0.0071	0.0073	0.0078	0.0021	0.0008	0.0007	0.0011	0.0022	0.0019
Total Thallium (Tl)	0.002	µg/L	0.8	-	0.3	-	0.007	0.0072	0.006	0.0065	0.0066	0.0052	0.0071	0.0067	0.0076	0.0149	0.0077	0.0061	0.0066	0.0065	0.0066	0.0078	0.0011	0.0021	0.001	0.0016	0.0025	0.0021
Dissolved Tin (Sn)	0.2	µg/L	-	-	-	-	0.0858	0.0393	0.0493	0.0275	0.0252	0.0135	0.0119	0.0171	0.0332	0.0242	0.1092	0.0196	0.0199	0.0312	0.0237	0.1058	0.0329	0.0093	0.0141	0.0218	0.0518	0.0867
Total Tin (Sn)	0.2</																											

[illegible]

Parameter	Detection Limit	Units	CCME (1)	PWQG (2)	Interim PWQO (2)	Health Canada (3)	Station																					
							Lake Ontario														Frenchman's Bay							
							LWC1-S	LWC1-B	LW21-M	LW9-S	LW9-B	LW10	FB1-S	FB1-B	LW2401-S	LW2401-B	LW2402-S	LW2402-B	LW2403-S	LW2403-B	LW2404-S	LW2404-B	LOC1	LOC2	LOC3	PN5-1	PN10	PN9
Morpholine	4	ug/L	-	-	4	-	0	0	2.53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dissolved Methyl Mercury	0.050	ng/L	-	-	-	-	0.02173	0.01839	0.06600	0.01959	0.01620	0.00609	0.03136	0.00692	0.10000	0.08300	0.38000	0.08800	0.04275	0.06700	0.05100	0.07000	0.01149	0.00422	0.01149	0.00568	0.01901	0.02700
Total Methyl Mercury	0.050	ng/L	4	-	-	-	0.02880	0.02753	0.10000	0.06200	0.04105	0.03774	0.02641	0.01135	0.06200	0.02387	0.11000	0.02317	0.02317	0.01911	0.06700	0.05800	0.01735	0.23000	0.01735	0.03906	0.02638	0.05400

Notes:

- Bold**
- Exceeded Interim PWQO
- Bold**
- Exceeded PWQO
- Bold**
- Exceeded CCME
- Bold**
- Exceeded Health Canada Guidelines
- Bold**
- Exceeded more than one guideline

Surface water samples from Lake Ontario were collected at a depth of 0.5 meters (denoted by "S" in the sample name), while bottom samples were taken 0.5 meters above the lakebed (denoted by "B"). Mid-depth samples were collected in Frenchman’s Bay, as thermal stratification is unlikely in the shallow depths observed in this area. Sampling locations presented in Figure 4-3 and Figure 4-4.

* Only censored results provided by lab.

** Calculated values. The value for Hardness (as CaCO3) dissolved was used to estimate hardness-dependent guidelines.

a – Total Ammonia guideline (Long Term Concentration (mg/L) Table): Retrieved from: https://ccme.ca/en/chemical/5#_aqL_fresh_concentration

b – Dissolved Aluminum guideline: The Interim PWQO is 15 µg/L between pH 4.5 to 5.5, and 75 µg/L between pH 6.5 to 9.0. Between pH 5.5 - 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters representative of that geological area of the Province that are unaffected by man-made inputs.

c – Total Aluminum guideline (Long Term Concentration (µg/L) Variable): If pH < 6.5, the CWQG is 5 µg/L. If pH ≥ 6.5, the guideline is 100 µg/L.

d – Total Beryllium guideline (µg/L): If Hardness < 75 mg/L, the PWQO is 11 µg/L. If Hardness > 75 mg/L, then the PWQO is 1100 µg/L.

e – Total Cadmium guideline (Long Term concentration (µg/L) equation): When the water hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L. At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated as 10{0.83(log[hardness]) – 2.46}. At hardness > CWQG (µg/L) = 10{0.83(log[hardness]) – 2.46} At hardness > 280 mg/L, the guideline is 0.37 µg/L.

f – Total Cadmium guideline (µg/L): If Hardness 0-100 mg/L, the Interim PWQO is 0.1 µg/L. If Hardness > 100 mg/L, then the Interim PWQO is 0.5 µg/L.

g – Total Copper guideline (Long Term concentration (µg/L) equation): When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L. At hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: 0.2 * e{0.8545[ln(hardness)]-1.465}. At hardness >180 mg/L, the CWQG is 4 µg/L.

h - Total Copper guideline (µg/L): If Hardness 0-20 mg/L, the Interim PWQO is 1 µg/L. If Hardness > 20 mg/L, then the Interim PWQO is 5 µg/L.

i – Total Lead guideline (Long Term concentration (µg/L) equation): When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L. At hardness >60 to ≤ 180 mg/L the CWQG is calculated as e{1.273[ln(hardness)]-4.705}. At hardness >180 mg/L, the CWQG is 7 µg/L. At hardness >180 mg/L, the CWQG is 7 µg/L.

j – Total Lead guideline: If Hardness is 30-80 mg/L, then the Interim PWQO is 3 µg/L. If Hardness is > 80 mg/L, then the Interim PWQO is 5 µg/L.

k – Dissolved Manganese concentration (Long Term concentration (µg/L) equation): Calculated using the CWQG calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese. Retrieved from: <https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fccme.ca%2Fen%2Fres%2F2019-manganese-cwqg-scd-appendix-b-en.xlsx&wdOrigin=BROWSELINK>

l – Total Nickel guideline (Long Term concentration (µg/L) equation): When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L. At hardness > 60 to ≤ 180 mg/L the CWQG is calculated as e{0.76[ln(hardness)]+1.06}. At hardness >180 mg/L, the CWQG is 150 µg/L.

m – Dissolved Zinc guideline (Long Term concentration (µg/L) equation): The CWQG is calculated as exp(0.947[ln(hardness mg-L-1)] - 0.815[pH] + 0.398[ln(DOC mg-L-1)] + 4.625).

This equation is valid between hardness 23.4 and 399 mg CaCO3·L–1, pH 6.5 and 8.13 and DOC 0.3 to 22.9 mg·L–1, which is the range of data used to derive the hardness, pH and DOC slopes.

n – Radionuclides are not screened as their levels should be as low as reasonably achievable (ALARA).

References:

7. CCME. n.d. Canadian Water Quality Guidelines for Protection of Aquatic Life. Accessed in September 2024.
8. Ministry of Environment and Climate Change. MOECC. 1994. Water management: policies, guidelines, provincial water quality objectives.
9. Health Canada. 2019. Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

A.2 Sediment

Table A-4: Screening of Sediment Quality Parameters in 2024 samples

Parameter	Detection Limit	Units	PSQG - LELs (1)	PSQG - SELs (1)	CCME SQG - ISQG (2)	CCME SQG - PEL (2)	Guideline from Other Sources (3-6, 9)		Background Concentration (Dragun & Chiasson, 1991) (7)	Station																			Infill area						
										Frenchman's Bay																									
							Value	Source	FB-2	Location 3	FB-4	FB-5	FB-7	FB-8	FB-9	FB-10	PN-1-1	PN-2-1	PN-5-1	PN-6-1	PN-7-1	PN-8-1	PN-9-1	PN-10-1	INFILL-01	INFILL-02	INFILL-03	INFILL-04	INFILL-05	INFILL-06	INFILL-07				
Calculated Parameters																																			
Total (Dry Wt) Methyl Mercury	0.084 - 0.24	ng/g	-	-	-	-	-	-	-	-	-	0.350	0.000	-	0.000	-	-	-	-	0.170	-	0.000	0.000	-	-	-	-	0.200	0.000	0.000	0.000	0.000	0.000	0.000	
Total (Wet Wt) Methyl Mercury	0.05	ng/g	-	-	-	-	-	-	-	-	-	0.072	0.031	-	0.011	-	-	-	-	0.064	-	0.013	0.043	-	-	-	-	0.160	0.047	0.046	0.024	0.029	0.046	0.033	
Inorganics																																			
Moisture	1	%	-	-	-	-	-	-	-	-	44.000	80.000	40.000	74.000	77.000	78.000	77.000	61.000	59.000	77.000	78.000	48.000	67.000	48.000	72.000	56.000	-	-	-	-	-	-	-	-	
Nitrogen (N)	0.01	%	-	-	-	-	-	-	-	-	0.170	0.890	0.180	0.630	0.780	0.810	0.740	0.410	0.310	0.670	0.660	0.180	0.400	0.160	0.550	0.290	-	-	-	-	-	-	-	-	
Total Organic Carbon	500	mg/kg	10000 ^a	100000 ^a	-	-	-	-	-	-	14000.000	94000.000	19000.000	76000.000	75000.000	100000.000	86000.000	46000.000	24000.000	66000.000	60000.000	14000.000	36000.000	13000.000	53000.000	26000.000	2500.000	459.000	1100.000	483.000	670.000	860.000	630.000		
Calculated Total Kjeldahl Nitrogen	100	µg/g	550	4800	-	-	-	-	-	-	1700.000	8900.000	1800.000	6300.000	7800.000	8100.000	7400.000	4100.000	3100.000	6700.000	6600.000	1800.000	4000.000	1600.000	5500.000	2900.000	-	-	-	-	-	-	-		
Total Phosphorus (P)	10.00	mg/kg	600	2000	-	-	-	-	-	-	787.000	869.000	782.000	1000.000	884.000	875.000	1050.000	1040.000	800.000	951.000	935.000	604.000	870.000	597.000	1110.000	808.000	986.000	528.000	619.000	459.000	429.000	979.000	491.000		
Nitrite (N)	0.5	µg/g	-	-	-	-	-	-	-	-	0.016	0.091	0.005	0.035	0.066	0.069	0.003	0.038	0.361	0.165	0.053	0.024	0.044	0.006	0.034	0.014	-	-	-	-	-	-	-		
Nitrate (N)	2	µg/g	-	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-		
Nitrate + Nitrite (N)	3	µg/g	-	-	-	-	-	-	-	-	0.283	0.462	0.173	0.112	0.414	0.341	0.275	0.149	1.609	0.477	0.346	0.361	0.361	0.245	0.357	0.262	-	-	-	-	-	-	-		
Metals																																			
Total Aluminum (Al)	100.00	mg/kg	-	-	-	-	58030	(3)	-	-	4210.000	9220.000	5740.000	12300.000	10100.000	9720.000	11300.000	10100.000	6260.000	10600.000	11600.000	3620.000	7000.000	4110.000	11400.000	6170.000	1760.000	1070.000	1240.000	992.000	1160.000	1460.000	1120.000		
Total Antimony (Sb)	0.10	mg/kg	-	-	-	-	2	(6)	-	-	0.260	0.780	0.420	0.930	0.630	0.710	0.640	0.840	0.240	0.490	0.460	0.160	0.330	0.170	0.530	0.230	0.038	0.024	0.028	0.026	0.035	0.041	0.023		
Total Arsenic (As)	0.20	mg/kg	6	33	5.9	17	-	-	-	-	1.220	2.610	1.610	3.050	3.670	3.170	2.440	2.610	2.720	4.070	3.830	2.200	2.970	2.370	4.150	2.880	1.500	1.370	1.340	1.290	1.390	2.630	1.410		
Total Barium (Ba)	0.10	mg/kg	-	-	-	-	-	-	10 - 5000	-	32.000	71.700	37.700	93.100	92.300	80.000	97.300	74.100	50.600	93.400	106.000	28.300	63.800	30.400	95.200	43.800	10.400	6.110	6.260	6.130	6.400	7.350	6.170		
Total Beryllium (Be)	0.20	mg/kg	-	-	-	-	-	-	<1.0 - 15	-	0.195	0.440	0.300	0.520	0.440	0.450	0.500	0.430	0.320	0.450	0.490	0.193	0.370	0.210	0.510	0.300	0.125	0.068	0.158	0.102	0.103	0.120	0.115		
Total Bismuth (Bi)	0.10	mg/kg	-	-	-	-	-	-	<10 - 15	-	0.100	0.160	0.110	0.230	0.160	0.150	0.190	0.220	0.079	0.150	0.150	0.044	0.110	0.054	0.180	0.071	0.025	0.012	0.015	0.012	0.015	0.017	0.014		
Total Boron (B)	1.00	mg/kg	-	-	-	-	-	-	<20 - 300	-	4.500	11.100	6.300	10.200	8.200	10.000	9.000	9.000	6.400	9.000	7.400	3.900	6.000	4.400	9.400	6.000	3.300	2.100	3.700	3.100	2.700	2.900	2.600		
Hot Water Ext. Boron (B)	0.05	µg/g	-	-	-	-	0.5	(8)	-	-	0.350	0.310	0.410	0.610	0.220	0.200	0.350	0.350	0.300	0.260	0.240	0.230	0.330	0.290	0.320	0.310	0.270	0.060	0.079	0.045	0.053	0.053	0.043		
Total Cadmium (Cd)	0.05	mg/kg	0.6	10	0.6	3.5	-	-	-	-	0.153	0.388	0.212	0.526	0.472	0.386	0.444	0.601	0.363	0.604	0.610	0.171	0.328	0.235	0.556	0.293	0.037	0.019	0.041	0.029	0.038	0.049	0.019		
Total Calcium (Ca)	100.00	mg/kg	-	-	-	-	-	-	100 - 320,000	-	56200.000	71000.000	72400.000	92900.000	118000.000	87500.000	97000.000	97100.000	104000.000	122000.000	134000.000	91000.000	106000.000	92100.000	115000.000	94400.000	79100.000	76100.000	79900.000	76000.000	81000.000	83000.000	81500.000		
Total Cesium (Cs)	1.00	mg/kg	-	-	-	-	-	-	0.25 - 25	-	0.286	0.605	0.463	0.822	0.665	0.620	0.653	0.635	0.460	0.619	0.645	0.319	0.529	0.357	0.735	0.457	0.143	0.066	0.084	0.082	0.097	0.097	0.099		
Total Chromium (Cr)	0.50	mg/kg	26	110	37.3	90	-	-	-	-	11.200	20.400	16.100	29.800	23.600	22.800	25.200	30.100	15.400	25.200	25.300	9.150	17.600	9.710	27.400	14.800	8.320	3.640	4.110	4.040	3.410	6.950	3.850		
Total Cobalt (Co)	0.10	mg/kg	-	-	-	-	50	(4)	-	-	3.240	5.780	5.710	7.910	6.820	6.160	6.750	7.860	5.690	7.180	7.670	4.290	5.690	4.460	8.680	5.560	2.240	1.170	1.400	1.270	1.310	1.870	1.370		
Total Copper (Cu)	0.50	mg/kg	16	110	35.7	197	-	-	-	-	15.300	38.600	24.300	54.100	45.200	41.400	48.500	57.100	35.800	60.400	56.000	16.100	38.600	16.600	73.900	31.800	3.270	1.650	1.700	1.530	1.830	2.460	1.560		
Total Iron (Fe)	100.00	mg/kg	20000 ^a	40000 ^a	-	-	-	-	-	-	8660.000	15000.000	12300.000	19800.000	17300.000	16300.000	18800.000	18000.000	13100.000	17900.000	19700.000	8350.000	14100.000	9090.000	19200.000	12000.000	13200.000	5470.000	6880.000	7400.000	5440.000	12000.000	6710.000		
Total Lead (Pb)	0.10	mg/kg	31	250	35	91.3	-	-	-	-	9.020	24.900	14.600	33.600	30.000	25.900	28.300	31.800	17.500	34.600	35.200	10.100	17.900	9.720	31.900	17.400	2.520	1.850	1.910	1.800	2.140	2.230	1.980		
Total Lithium (Li)	0.50	mg/kg	-	-	-	-	-	-	<5.0 - 140	-	4.930	10.300	8.060	14.600	11.600	10.800	13.000	11.800	8.510	12.200	13.000	5.520	9.240	6.270	13.700	8.170	2.530	1.670	1.960	1.810	2.140	2.210	1.870		
Total Magnesium (Mg)	100.00	mg/kg	-	-	-	-	-	-	50 - >100,000	-	4650.000	5730.000	5940.000	8120.000	6870.000	7150.000	7550.000	9080.000	7710.000	8280.000	8580.000	5320.000	8310.000	5520.000	9920.000	6850.000	4320.000	3280.000	3340.000	2670.000	2790.000	3740.000	2820.000		
Total Manganese (Mn)	0.20	mg/kg	460	1100	-	-	-	-	-	-	214.000	369.000	261.000	522.000	538.000	436.000	534.000	463																	

Parameter	Detection Limit	Units	PSQG - LELs (1)	PSQG - SELs (1)	CCME SQG - ISQG (2)	CCME SQG - PEL (2)	Guideline from Other Sources (3-6, 9)		Background Concentration (Dragun & Chiasson, 1991) (7)	Station																							
										Frenchman's Bay																	Infill area						
							Value	Source		FB-2	Location 3	FB-4	FB-5	FB-7	FB-8	FB-9	FB-10	PN-1-1	PN-2-1	PN-5-1	PN-6-1	PN-7-1	PN-8-1	PN-9-1	PN-10-1	INFILL-01	INFILL-02	INFILL-03	INFILL-04	INFILL-05	INFILL-06	INFILL-07	
Total Zinc (Zn)	1.00	mg/kg	120	820	123	315	-	-	-	81.600	161.000	119.000	240.000	171.000	170.000	211.000	271.000	104.000	156.000	162.000	51.900	105.000	60.100	177.000	82.700	16.800	9.400	10.300	8.800	11.700	13.300	10.300	
Total Zirconium (Zr)	0.50	mg/kg	-	-	-	-	-	-	<20 - 2000	0.730	2.150	0.920	1.930	1.800	2.050	2.120	2.000	1.420	2.200	1.910	1.020	1.410	0.770	2.150	1.390	1.360	0.960	1.240	0.990	1.050	1.510	1.060	
PCBs																																	
Aroclor 1016	0.02	µg/g	0.007	53	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Aroclor 1221	0.02	µg/g	-	-	-	-	0.12	(3)	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Aroclor 1232	0.02	µg/g	-	-	-	-	0.6	(3)	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Aroclor 1242	0.02	µg/g	-	-	-	-	0.17	(3)	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Aroclor 1248	0.02	µg/g	0.03	150	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Aroclor 1254	0.02	µg/g	0.06	34	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.011	0.000	0.017	0.000	-	-	-	-	-	-	-	
Aroclor 1260	0.02	µg/g	0.005	24	-	-	-	-	-	0.003	0.012	0.000	0.024	0.019	0.013	0.019	0.016	0.000	0.019	0.036	0.009	0.010	0.006	0.016	0.000	-	-	-	-	-	-	-	
Aroclor 1262	0.02	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Aroclor 1268	0.02	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Total PCB	0.02	µg/g	0.07	530	-	-	-	-	-	0.000	0.012	0.000	0.024	0.019	0.013	0.020	0.016	0.000	0.019	0.036	0.018	0.011	0.000	0.033	0.000	-	-	-	-	-	-	-	
Polyaromatic Hydrocarbons																																	
Anthracene	0.01	µg/g	0.22	370	0.0469	0.245	-	-	-	0.040	0.022	0.029	0.034	0.029	0.030	0.033	0.019	0.021	0.024	0.028	0.016	0.027	0.008	0.022	0.018	-	-	-	-	-	-	-	
Benzo(a)anthracene	0.01	µg/g	0.32	1480	0.0317	0.385	-	-	-	0.150	0.088	0.190	0.170	0.130	0.150	0.140	0.140	0.074	0.073	0.078	0.050	0.081	0.022	0.077	0.048	-	-	-	-	-	-	-	
Benzo(a)pyrene	0.01	µg/g	0.37	1440	0.0319	0.782	-	-	-	0.210	0.150	0.260	0.300	0.230	0.260	0.240	0.210	0.093	0.110	0.140	0.065	0.110	0.030	0.110	0.062	-	-	-	-	-	-	-	
Benzo(g,h,i)perylene	0.01	µg/g	0.17	320	-	-	-	-	-	0.180	0.160	0.210	0.290	0.220	0.230	0.230	0.190	0.076	0.110	0.150	0.046	0.089	0.027	0.096	0.050	-	-	-	-	-	-	-	
Benzo(k)fluoranthene	0.01	µg/g	0.24	1340	-	-	-	-	-	0.120	0.089	0.140	0.180	0.130	0.150	0.130	0.120	0.055	0.065	0.091	0.042	0.065	0.017	0.070	0.035	-	-	-	-	-	-	-	
Chrysene	0.01	µg/g	0.34	460	0.0571	0.862	-	-	-	0.210	0.140	0.280	0.290	0.210	0.220	0.240	0.210	0.093	0.093	0.120	0.093	0.110	0.030	0.110	0.065	-	-	-	-	-	-	-	
Dibenzo(a,h)anthracene	0.01	µg/g	0.06	130	0.00622	0.135	-	-	-	0.035	0.026	0.044	0.045	0.036	0.037	0.040	0.035	0.016	0.020	0.024	0.010	0.017	0.000	0.017	0.009	-	-	-	-	-	-	-	
Fluoranthene	0.01	µg/g	0.75	1020	0.111	2.355	-	-	-	0.460	0.300	0.580	0.580	0.430	0.510	0.470	0.460	0.200	0.220	0.240	0.220	0.230	0.066	0.220	0.140	-	-	-	-	-	-	-	
Fluorene	0.01	µg/g	0.19	160	0.0212	0.144	-	-	-	0.064	0.015	0.026	0.015	0.017	0.019	0.016	0.011	0.009	0.000	0.010	0.011	0.010	0.004	0.009	0.007	-	-	-	-	-	-	-	
Indeno(1,2,3-cd)pyrene	0.01	µg/g	0.2	320	-	-	-	-	-	0.180	0.150	0.210	0.270	0.220	0.220	0.220	0.180	0.077	0.110	0.150	0.047	0.089	0.027	0.090	0.051	-	-	-	-	-	-	-	
Phenanthrene	0.01	µg/g	0.56	950	0.0419	0.515	-	-	-	0.230	0.073	0.220	0.140	0.110	0.130	0.140	0.130	0.064	0.054	0.060	0.190	0.084	0.018	0.065	0.047	-	-	-	-	-	-	-	
Pyrene	0.01	µg/g	0.49	850	0.053	0.875	-	-	-	0.360	0.260	0.480	0.510	0.380	0.420	0.410	0.390	0.180	0.200	0.220	0.180	0.210	0.063	0.210	0.130	-	-	-	-	-	-	-	
BTEx & F1 Hydrocarbons																																	
Benzene	0.02	µg/g	-	-	-	-	1.24	(9)	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Toluene	0.02	µg/g	-	-	-	-	1.4	(9)	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.052	0.000	0.000	0.000	-	-	-	-	-	-	-	
Ethylbenzene	0.02	µg/g	-	-	-	-	1.16	(9)	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
o-Xylene	0.02	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
p+m-Xylene	0.04	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Total Xylenes	0.04	µg/g	-	-	-	-	1.28	(9)	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
F1 (C6-C10)*	10	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Aliphatic C6-C8	-	-	-	-	-	-	14	(9)	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Aliphatic C>8-C10	-	-	-	-	-	-	10.5	(9)	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-				

Parameter	Detection Limit	Units	PSQG - LELs (1)	PSQG - SELs (1)	CCME SQG - ISQG (2)	CCME SQG - PEL (2)	Guideline from Other Sources (3-6, 9)		Background Concentration (Dragun & Chiasson, 1991) (7)	Station																	Infill area							
										Frenchman's Bay																								
							Value	Source		FB-2	Location 3	FB-4	FB-5	FB-7	FB-8	FB-9	FB-10	PN-1-1	PN-2-1	PN-5-1	PN-6-1	PN-7-1	PN-8-1	PN-9-1	PN-10-1	INFILL-01	INFILL-02	INFILL-03	INFILL-04	INFILL-05	INFILL-06	INFILL-07		
Aliphatic C>34	-	µg/g	-	-	-	-	98.8 ^c	(9)	-	88.000	78.400	232.000	216.000	96.000	0.000	128.000	336.000	65.600	0.000	0.000	0.000	48.800	0.000	128.000	60.800	-	-	-	-	-	-	-		
Aromatic C>34	-	µg/g	-	-	-	-	0.4 ^c	(9)	-	22.000	19.600	58.000	54.000	24.000	0.000	32.000	84.000	16.400	0.000	0.000	0.000	12.200	0.000	32.000	15.200	-	-	-	-	-	-	-		
Calculated Parameters																																		
Aldrin + Dieldrin	0.00	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Chlordane (Total)	0.00	µg/g	0.007	6	0.0045	0.00887	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Heptachlor + Heptachlor epoxide	0.00	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
o,p-DDT + p,p-DDT	0.00	µg/g	0.008	71	0.00119	0.00477	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Pesticides & Herbicides																																		
Aldrin	0.00	µg/g	0.002	8	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
a-Chlordane	0.00	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
g-Chlordane	0.00	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
o,p-DDT	0.00	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
p,p-DDT	0.00	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	-	-	-	-	-	-	-
Dieldrin	0.00	µg/g	0.002	91	0.0029	0.00667	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Lindane	0.00	µg/g	-	-	0.0009	0.00138	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Endrin	0.00	µg/g	0.003	130	0.0027	0.0624	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Heptachlor	0.00	µg/g	-	-	0.0006	0.00274	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Heptachlor epoxide	0.00	µg/g	0.005	5	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
alpha-BHC	0.00	µg/g	0.006	10	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
beta-BHC	0.00	µg/g	0.005	21	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
delta-BHC	0.00	µg/g	-	-	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Mirex	0.00	µg/g	0.007	130	-	-	-	-	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-	
Radionuclides ^d																																		
Co-60	0.09	Bq/kg	-	-	-	-	-	-	-	0.050	0.527	0.171	0.622	0.586	0.146	0.076	0.158	0.211	0.447	0.728	-0.022	-0.029	0.415	0.082	-0.192	-	-	-	-	-	-	-	-	
Cs-134	0.18	Bq/kg	-	-	-	-	-	-	-	0.155	-0.029	0.209	-0.381	0.009	0.128	0.176	0.252	-0.051	0.073	0.265	0.089	0.076	-0.090	0.344	-0.126	-	-	-	-	-	-	-	-	
Cs-137	0.16	Bq/kg	-	-	-	-	-	-	-	0.625	0.563	0.823	1.470	1.450	1.130	0.967	0.731	2.200	1.890	2.420	1.240	2.230	1.550	2.190	1.270	-	-	-	-	-	-	-	-	
I-131	2.70	Bq/kg	-	-	-	-	-	-	-	-0.785	-1.850	3.310	-0.337	-0.426	3.390	3.070	-1.630	1.040	0.479	-0.850	1.100	0.773	0.790	-0.797	0.362	-	-	-	-	-	-	-	-	
K-40	1.30	Bq/kg	-	-	-	-	-	-	-	353.000	105.000	106.000	138.000	106.000	104.000	117.000	207.000	202.000	110.000	117.000	236.000	192.000	237.000	152.000	235.000	-	-	-	-	-	-	-	-	
Th-Series	0.51	Bq/kg	-	-	-	-	-	-	-	7.720	-0.366	4.560	0.256	-3.670	0.677	5.230	-0.561	5.620	4.830	4.840	1.250	5.750	4.800	6.000	6.780	-	-	-	-	-	-	-	-	
U-Series	0.33	Bq/kg	-	-	-	-	-	-	-	8.740	3.810	4.200	6.680	4.850	3.350	5.530	7.340	5.670	4.510	6.310	5.860	7.030	5.330	5.330	6.350	-	-	-	-	-	-	-	-	
H-3	24.00	Bq/kg	-	-	-	-	-	-	-	227.000	99.500	94.800	177.000	28.500	20.500	20.600	68.600	22.300	19.600	30.400	20.700	29.000	28.800	26.800	30.500	-	-	-	-	-	-	-	-	
C-14	0.010	Bq/g	-	-	-	-	-	-	-	0.008	-0.016	-0.003	0.002	-0.013	0.012	-0.011	-0.003	-0.009	0.002	-0.002	-0.003	-0.009	-0.008	-0.001	0.003	-	-	-	-	-	-	-	-	

- Notes:
- Bold** Exceeded PSQG - LEL
 - Bold** Exceeded PSQG - SEL
 - Bold** Exceeded CCME SQG - ISQG
 - Bold** Exceeded CCME SQG - PEL
 - Bold** Exceeded guidelines from other sources
 - Bold** Exceeded background concentration
 - Bold** Exceeded more than one guideline

Sampling locations presented in Figure 4-5 and Figure 4-6.

The symbol '-' denotes no value was determined and/or required.

* The concentrations of PHC subfractions were obtained by dividing the concentration of total fraction (F1-F4) by the ratios of the subfractions provided in CCME (2008). The concentrations of the subfractions were then compared to their equivalent guidelines from Atlantic PIRI (2012).

a – Converted from % to mg/kg.

b – ">1000" indicates that the sediment criteria could not be calculated based on a toxic endpoint to aquatic species due to the low solubility of the fraction in water.

- Notes:
- c – based on the Chronic benchmarks for aliphatic C19-C36 and aromatic C16-C36 calculated by Atlantic PIRI (2012) using the model developed by DiToro and McGrath (2000) using the benchmarks from Batelle (2007).
- d – Radionuclides are not screened as their levels should be as low as reasonably achievable (ALARA).
- LEL – Lowest Effect Level
- SEL – Severe Effect Level
- ISQG – Interim Sediment Quality Guideline
- PEL – Probable Effects Level

References:

1. MECP (2008). Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario. Queen’s Printer for Ontario.
2. CCME (1999). Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. Updated 2001.
3. Jones, Suter, (1997). Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment - Associated Biota: 1997 Revision. The probable effect concentration was adopted.
4. MECP (1993). Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Benchmarks were carried forward from the Open Water Disposal Guideline published in 1976.
5. P. A. Thompson, J. Kurias and S. Mihok (2005). Derivation and use of sediment quality guidelines for ecological risk assessment of metals and radionuclides released to the environment from uranium mining and milling activities in Canada. Environmental Monitoring and Assessment (110): 71-85. Weighted method was adopted in the table.
6. Long, E. R. and Morgan L. G. (1991), The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program. NOAA. August.
7. Dragun, J. & Chiasson, A.D. (1991). Elements in North American Soils.
8. MECP (2011). Background Concentration of Hot Water Soluble Boron in Soil. Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario. Standards Development Branch. April.
9. Atlantic PIRI (2012). ATLANTIC RBCA (Risk-Based Corrective Action) Version 3 Ecological Screening Protocol for Petroleum Impacted Sites in Atlantic Canada, Scientific Rationale to support the Adoption/Development of Tier 1 Ecological Screening Levels for Soil, Surface Water, Groundwater and Sediment. July 2012. http://www.atlanticrbca.com/wp-content/files_mf/1398280422EcoRBCA_Scientific_Rationale_Aug_1.pdf
10. DiToro, D.M. and J.A. McGrath (2000). Technical basis for narcotic chemicals and polycyclic aromatic hydrocarbon criteria. II. Mixtures and sediments. Environ. Toxicol. Chem. 19: 1971-1982.
11. Battelle (2007). Sediment Toxicity of Petroleum Hydrocarbon Fractions. Prepared for Massachusetts Department of Environmental Protection Office of Research and Standards, 1 Winter Street 8th Floor Boston, MA 02108. September 2007. <https://www.mass.gov/doc/sediment-toxicity-of-petroleum-hydrocarbon-fractions/download>
12. CCME. (2008). Canada-wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale: Supporting Technical Document. Canadian Council of Ministers of the Environment.

A.3 Soil

Table A-5: Screening of Soil Quality Parameters in 2024 samples

Parameter	Detection Limit	Units	Table 3 ICC Coarse (1)	Table 9 RPIICC (1)	CCME Soil Agri Coarse Surface 10NV5 (2)	Station																	
						GMS-28-1	GMS-28-2	GMS-28-3	GMS-31-1	GMS-31-2	GMS-31-3	GMS - 26	GMS - 38	SITE 14-SS5-1	SITE 14-SS5-2	SITE 14-SS5-3	SITE 14-SS6-1	SITE 14-SS6-2	SITE 14-SS6-3	SITE 15-1	SITE 15-2	SITE 15-3	SITE 7 - SS4
Metals																							
Aluminum	50	µg/g	NV	NV	NV	2200	3200	3200	3000	6200	16000	19000	18000	3900	3900	2900	2400	3200	2900	4100	7900	6100	7600
Antimony	0.2	µg/g	40	1.3	20	0.117113	0.55	0.36	0.195417	0.29	0.192684	0.148608	0.17626	0.27	0.9	0.3	0.48	1.1	0.48	0.180305	0.59	0.53	0.185422
Arsenic	1	µg/g	18	18	12	1	1.7	1.3	1.7	2.3	2.6	2.2	2.4	1.9	5.3	1.7	2.2	5.1	2.2	1.2	3.6	3.6	1.9
Barium	0.5	µg/g	670	220	750	13	19	23	18	40	84	130	110	30	88	19	24	51	44	25	42	42	48
Beryllium	0.2	µg/g	8	2.5	4	0.118876	0.156072	0.15845	0.151433	0.28	0.65	0.69	0.69	0.199574	0.196886	0.12982	0.121457	0.163851	0.147049	0.195197	0.31	0.25	0.32
Bismuth	1	µg/g	NV	NV	NV	0.029566	0.047217	0.0303	0.0455	0.06049	0.104254	0.098957	0.096984	0.062868	0.07582	0.029529	0.053377	0.064478	0.036806	0.047591	0.095557	0.237605	0.078156
Boron	5	µg/g	120	36	NV	2.229387	6	6.7	3.806344	4.862406	5.1	4.580761	6.8	8.3	7.4	3.860754	4.265377	5.2	4.512741	7.2	8.6	6.1	5.7
Cadmium	0.1	µg/g	1.9	1.2	1.4	0.036642	0.066484	0.052764	0.084144	0.81	0.23	0.18	0.23	0.1	0.22	0.093704	0.12	0.24	0.14	0.066416	0.22	0.15	0.11
Calcium	50	µg/g	NV	NV	NV	140000	140000	160000	130000	110000	20000	9600	24000	260000	240000	170000	200000	150000	140000	130000	120000	130000	110000
Chromium	1	µg/g	160	70	64	7.2	10	8.8	13	19	21	26	28	29	18	8.9	29	23	11	8.4	30	17	18
Cobalt	0.1	µg/g	80	22	40	1.8	2.4	2.6	2.6	5.3	7.2	8.5	8.8	2.6	6.5	3.1	2.9	6.4	3.5	4.3	7.1	5.9	5.3
Copper	0.5	µg/g	230	92	63	5.7	11	8.1	9.1	21	16	19	19	13	62	22	25	69	29	26	52	39	14
Iron	50	µg/g	NV	NV	NV	8700	11000	9700	9000	15000	21000	24000	23000	9400	11000	9300	9800	15000	11000	8400	16000	14000	15000
Lead	1	µg/g	120	120	70	2.4	6.8	6.4	5.4	10	15	12	16	11	24	9.5	11	32	17	6.8	40	20	12
Lithium	1	µg/g	NV	NV	NV	2.9	4.7	4.9	4.3	7.6	14	17	16	6.4	6	3.9	3.4	4.3	4.1	5.6	9.5	7.4	9.2
Magnesium	50	µg/g	NV	NV	NV	5300	11000	13000	7400	9400	4800	5400	6200	8900	11000	6200	8700	7000	7700	12000	11000	11000	8700
Manganese	1	µg/g	NV	NV	NV	200	240	290	260	360	360	420	560	390	370	210	310	280	240	240	370	340	330
Molybdenum	0.5	µg/g	40	2	5	0.224903	0.312862	0.298907	0.33666	0.74	0.446075	0.387123	0.421086	0.61	1.3	0.36203	1.3	3	0.71	0.296694	0.77	0.74	0.51
Nickel	0.5	µg/g	270	82	45	3.4	6	6.1	6.6	14	17	19	19	7.5	7.6	5.4	12	13	6.6	47	23	15	12
Phosphorous	50	µg/g	NV	NV	NV	670	660	540	590	1300	730	790	1000	500	510	600	510	600	540	680	930	760	820
Potassium	200	µg/g	NV	NV	NV	430	810	990	590	1300	1800	2300	3000	1100	970	660	490	720	720	840	1600	1200	1500
Selenium	0.5	µg/g	5.5	1.5	1	0.030076	0.075979	0.046236	0.13598	0.136815	0.281947	0.285436	0.299313	0.073868	0.205447	0.068279	0.063427	0.174247	0.090472	0.155839	0.281874	0.214031	0.130775
Silver	0.2	µg/g	40	0.5	20	0.016615	0.023471	0.017109	0.029158	0.028906	0.047931	0.06628	0.063013	0.035736	0.066383	0.027501	0.047872	0.103955	0.051165	0.032194	0.073614	0.050657	0.028835
Sodium	50	µg/g	NV	NV	NV	99	150	120	790	140	130	150	570	970	1100	250	920	160	220	160	160	170	170
Strontium	1	µg/g	NV	NV	NV	180	180	210	180	150	37	25	48	340	360	220	270	200	190	170	170	170	150
Thallium	0.05	µg/g	3.3	1	1	0.030258	0.058	0.07	0.05	0.11	0.15	0.16	0.16	0.086	0.066	0.055	0.031143	0.063	0.055	0.056	0.11	0.086	0.12
Tin	1	µg/g	NV	NV	5	0.479391	0.638702	0.401801	0.593036	0.136815	0.936885	0.825836	0.867254	0.715216	3.3	1.2	1.5	3.4	1.4	0.747311	2.3	2	4
Titanium	5	µg/g	NV	NV	NV	260	240	230	230	320	400	680	660	98	120	230	210	250	220	190	280	280	350
Uranium	0.05	µg/g	33	2.5	23	0.33	0.52	0.3	0.64	0.4	0.53	0.67	0.59	0.37	0.44	0.34	0.34	0.35	0.31	0.49	0.53	0.43	0.48
Vanadium	5	µg/g	86	86	130	15	18	15	14	20	33	38	38	13	12	16	13	18	15	13	22	20	22
Zinc	5	µg/g	340	290	250	28	56	41	39	67	110	66	70	73	270	85	110	350	130	46	200	160	140
Inorganics																							
Hexavalent Chromium	0.18	µg/g	8	0.66	0.4	0.03503	0.02075	0.01362	0.03755	0	0	0	0	0.1798	0.07478	0.03997	0.12166	0.05638	0.04933	0	0	0.01845	0
Mercury	0.05	µg/g	3.9	0.27	6.6	0.003749	0.015629	0.00097	0.014912	0.012471	0.030845	0.042643	0.025467	0.000427	0.004109	0.002183	0.02384	0.006822	0.00806	0.02166	0.03078	0.010828	0.013969
pH	0	pH units	NV	5 - 9	6 - 8	7.78	7.64	7.67	7.94	7.59	7.19	7.34	7.4	8.06	8.02	7.66	8.27	7.78	7.87	7.4	7.39	7.58	7.49
Sodium Adsorption Ratio	N/A	Ratio	12	5	5	0.38	0.31	0.3	13	0.27	0.24	0.22	3.7	4	7.8	2.5	31	0.38	2.2	0.33	0.21	0.26	0.22
Electrical Conductivity	0.002	mS/cm	1.4	0.7	2	0.075	0.13	0.13	1.2	0.13	0.28	0.19	0.31	2.6	2.3	0.42	1.5	0.091	0.24	0.29	0.26	0.15	0.23
Boron, Hot Water Soluble	0.05	µg/g	2	1.5	2	0.069	0.18	0.19	0.55	0.36	0.39	0.19	0.28	0.45	0.51	0.19	0.42	0.25	0.21	0.56	0.7	0.31	0.28
Cyanide (WAD)	0.01	µg/g	0.051	0.051	0.9	0.00104	0.00108	0.00203	0.00323	0.00106	0	0	0	0.00093	0.00108	0.00111	0.00219	0.00184	0.00105	0.00228	0.00116	0	0
PHCs & BTEX																							
Petroleum Hydrocarbons - F1 (C6-C10)-BTEX	10	µg/g	55	25	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Hydrocarbons - F1 (C6-C10)	10	µg/g	55	25	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petroleum Hydrocarbons - F2 (C10-C16)	7	µg/g	230	10	150	0	0	8.5	7	0	0	0	0	0	0	0	0	0	0	0	0	0	9.8
Petroleum Hydrocarbons - F3 (C16-C34)	50	µg/g	1700	240	300	0	53	68	110	70	53	0	55	150	79	200	300	89	78	77	85	83	120
Petroleum Hydrocarbons - F4 (C34-C50)	50	µg/g	3300	120	2800	0	0	0	130	51	0	0	0	400	140	540	660	170	110	79	97	100	110
Reached Baseline at C50	0	None	NV	NV	NV	YES	YES	YES	NO	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	YES	YES	NO	YES

Parameter	Detection Limit	Units	Table 3 ICC Coarse (1)	Table 9 RPIICC (1)	CCME Soil Agri Coarse Surface 10NV5 (2)	Station																	
						GMS-28-1	GMS-28-2	GMS-28-3	GMS-31-1	GMS-31-2	GMS-31-3	GMS - 26	GMS - 38	SITE 14-SS5-1	SITE 14-SS5-2	SITE 14-SS5-3	SITE 14-SS6-1	SITE 14-SS6-2	SITE 14-SS6-3	SITE 15-1	SITE 15-2	SITE 15-3	SITE 7 - SS4
Benzene	0.006	µg/g	0.32	0.02	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethylbenzene	0.01	µg/g	9.5	0.05	0.082	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
m,p-Xylenes	0.02	µg/g	NV	NV	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
o-Xylene	0.02	µg/g	NV	NV	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Toluene	0.02	µg/g	68	0.2	0.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xylenes, Total	0.02	µg/g	26	0.05	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VOCs																							
1,1,1,2-Tetrachloroethane	0.04	µg/g	0.087	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,1-Trichloroethane	0.04	µg/g	6.1	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,2,2-Tetrachloroethane	0.04	µg/g	0.05	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,2-Trichloroethane	0.04	µg/g	0.05	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1-Dichloroethane	0.04	µg/g	17	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1-Dichloroethene	0.04	µg/g	0.064	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-Dibromoethane	0.04	µg/g	0.05	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-Dichlorobenzene	0.04	µg/g	6.8	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-Dichloroethane	0.049	µg/g	0.05	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-Dichloropropane	0.04	µg/g	0.16	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,3-Dichlorobenzene	0.04	µg/g	9.6	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,3-Dichloropropene, Total	0.05	µg/g	0.18	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,4-Dichlorobenzene	0.04	µg/g	0.2	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl Ethyl Ketone	0.4	µg/g	70	0.5	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl Isobutyl Ketone	0.4	µg/g	31	0.5	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acetone	0.49	µg/g	16	0.5	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzene	0.006	µg/g	0.32	0.02	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromodichloromethane	0.04	µg/g	18	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromoform	0.04	µg/g	0.61	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromomethane	0.04	µg/g	0.05	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carbon Tetrachloride	0.04	µg/g	0.21	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chlorobenzene	0.04	µg/g	2.4	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloroform	0.04	µg/g	0.47	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-1,2-Dichloroethene	0.04	µg/g	55	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-1,3-Dichloropropene	0.03	µg/g	NV	NV	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dibromochloromethane	0.04	µg/g	13	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichlorodifluoromethane	0.04	µg/g	16	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethylbenzene	0.01	µg/g	9.5	0.05	0.082	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
m,p-Xylenes	0.02	µg/g	NV	NV	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl tert-Butyl Ether	0.04	µg/g	11	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methylene Chloride	0.049	µg/g	1.6	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
n-Hexane	0.04	µg/g	46	0.05	0.49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
o-Xylene	0.02	µg/g	NV	NV	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Styrene	0.04	µg/g	34	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetrachloroethene	0.04	µg/g	4.5	0.05	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Toluene	0.02	µg/g	68	0.2	0.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-1,2-Dichloroethene	0.04	µg/g	1.3	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
trans-1,3-Dichloropropene	0.04	µg/g	NV	NV	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichloroethene	0.01	µg/g	0.91	0.05	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichlorofluoromethane	0.04	µg/g	4	0.25	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vinyl Chloride	0.019	µg/g	0.032	0.02	NV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xylenes, Total	0.02	µg/g	26	0.05	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Parameter	Detection Limit	Units	Table 3 ICC Coarse (1)	Table 9 RPIICC (1)	CCME Soil Agri Coarse Surface 10NV5 (2)	Station																	
						GMS-28-1	GMS-28-2	GMS-28-3	GMS-31-1	GMS-31-2	GMS-31-3	GMS - 26	GMS - 38	SITE 14-SS5-1	SITE 14-SS5-2	SITE 14-SS5-3	SITE 14-SS6-1	SITE 14-SS6-2	SITE 14-SS6-3	SITE 15-1	SITE 15-2	SITE 15-3	SITE 7 - SS4
Radionuclides																							
Carbon-14	0	Bq/g	NA	NA	NA	NV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Carbon-14	106	Bq/kg-C	NA	NA	NA	< 157	< 200	< 161	< 229	< 170	< 232	1193	904	< 108	< 165	< 182	< 155	< 228	< 175	< 106	215	< 145	258
Cesium-134	0.42	Bq/kg	NA	NA	NA	0.35	0.299	0.197	0.218	0.465	0.801	0.225	0.579	0.284	0.0635	0.0486	0.191	0.126	0.149	0.374	0.3	0.152	0.37
Cesium-137	0.37	Bq/kg	NA	NA	NA	-0.0689	0.231	0.0526	1.27	0.111	2.25	2.95	1.66	0.116	0.702	0.471	0.144	0.321	0.0154	0.13	0.773	0.556	0.671
Cobalt-60	0.44	Bq/kg	NA	NA	NA	0.193	0.876	0.133	0.308	0.299	0.428	0.371	0.455	0.382	0.65	0.0239	0.34	0.162	0.508	1.34	0.0356	0.926	0.0282
Iodine-131	1.9	Bq/kg	NA	NA	NA	-0.528	1.94	1.03	0.26	2.6	0.785	0.865	2.56	1.22	2.38	3.15	0.289	1.43	2.05	0.686	0.905	0.346	0.791
Potassium-40	3.4	Bq/kg	NA	NA	NA	293	286	304	368	447	657	674	682	273	175	236	190	253	236	268	305	310	493
Thorium - Series	1.1	Bq/kg	NA	NA	NA	6.75	8.13	5.52	1.2	13.6	25.2	25.4	24.9	3.8	5.78	5.96	4.5	8.56	4.61	5.03	9.62	11.2	15.5
Tritium (Hydrogen-3)	14	Bq/kg	NA	NA	NA	11.8	17.4	16.1	11.1	19.7	32.8	154	140	57.7	30.3	103	133	10.1	9.97	42.3	40.4	30.4	31
Uranium - Series	0.63	Bq/kg	NA	NA	NA	8	9.48	7.77	9.22	15.8	23	22.8	22.9	11	7.38	7.39	5.11	7.08	6.82	8.9	10.3	12.2	16
Other parameters																							
Total Carbon	0.5	mg/kg	NA	NA	NA	42000	55000	57000	42000	53000	41000	41000	45000	76000	79000	50000	71000	57000	57000	72000	68000	60000	59000
Total Organic Carbon	0.5	mg/kg	NA	NA	NA	5600	10000	9300	6800	21000	33000	26000	40000	7200	8700	11000	11000	10000	10000	28000	34000	22000	24000

- Notes:
- Bold**

Exceeded Table 3 ICC Coarse Standards
- Bold**

Exceeded Table 9 Soil Standards
- Bold**

Exceeded CCME Soil Agricultural Coarse Surface 10-5 Standards
- Bold**

Exceeded more than one guideline

Samples were taken at a depth of 0.2 mbgs (metres below ground surface). Sampling locations presented in Figure 4-20.

5 - 9 (5 - 11) = standards for pH: 5 to 9 for surface soil, defined as soil from ground surface and 1.5 mbgs; 5 to 11 for subsurface soil, defined as soil from depths deeper than 1.5 mbgs

NV = no value

- = not analyzed

NA = not applicable

References:

1. Ontario Ministry of the Environment (MOE). 2011. Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario. Standards Development Branch. April.

2. CCME. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Accessed July 2021.

Appendix B Results of 2024 Aquatic Studies

B.1 Deepwater Fish Community Studies Results

Table B-1: Morphometrics of Fish Caught during 2024 Deepwater Fish Community Study

Sampling Event	Parameter	Species	Count	Measured	Mean	Standard Deviation	Minimum	Maximum
Spring	Total Length (cm)	Alewife	161.0	32.0	17.1	1.4	13.6	20.8
		Lake Trout	12.0	12.0	50.5	8.7	41.9	71.0
		Round Whitefish	1.0	1.0	50.8	-	50.8	50.8
	Weight (g)	Alewife	161.0	32.0	33.9	7.7	16.0	60.0
		Lake Trout	12.0	12.0	1434.2	1017.7	779.0	4155.0
		Round Whitefish	1.0	1.0	1185.0	-	1185.0	1185.0
Summer	Total Length (cm)	Alewife	392.0	30.0	16.5	0.7	14.3	17.6
		Brown Trout	1.0	1.0	50.5	-	50.5	50.5
		Burbot	1.0	1.0	81.1	-	81.1	81.1
		Lake Trout	2.0	2.0	23.0	6.0	18.7	27.2
		Round Goby	7.0	7.0	13.5	1.0	11.5	14.8
		Round Whitefish	1.0	1.0	38.2	-	38.2	38.2
		White Sucker	1.0	1.0	24.9	-	24.9	24.9
	Weight (g)	Alewife	392.0	30.0	30.0	3.1	23.0	34.0
		Brown Trout	1.0	1.0	1925.0	-	1925.0	1925.0
		Burbot	1.0	1.0	4525.0	-	4525.0	4525.0
		Lake Trout	2.0	2.0	2502.5	2188.5	955.0	4050.0
		Round Goby	7.0	7.0	36.4	7.2	21.5	43.0
		Round Whitefish	1.0	1.0	510.0	-	510.0	510.0
Fall	Total Length (cm)	White Sucker	1.0	1.0	175.0	-	175.0	175.0
		Lake Sturgeon	1.0	- ¹	-	-	-	-
		Lake Trout	64.0	32.0	63.4	10.1	48.2	87.5
		Lake Whitefish	57.0	39.0	73.3	90.1	41.5	546.0
		Rainbow Smelt	2.0	1.0	15.3	-	15.3	15.3
		Rock Bass	4.0	4.0	18.8	5.4	12.4	24.0
		Round Goby	3.0	3.0	13.8	1.0	13.0	14.9
		Round Whitefish	7.0	7.0	49.6	3.9	43.3	53.4
		Sea Lamprey	1.0	1.0	62.0	-	62.0	62.0
	Weight (g)	Walleye	2.0	2.0	55.4	4.1	52.5	58.3
		Lake Sturgeon	1.0	1.0	31751.5	-	31751.5	31751.5
		Lake Trout	64.0	32.0	2750.1	2243.3	1.0	8900.0
		Lake Whitefish	57.0	39.0	1367.8	525.2	1.3	2240.0
		Rainbow Smelt	2.0	1.0	20.0	-	20.0	20.0
		Rock Bass	4.0	4.0	197.5	143.6	45.0	325.0
		Round Goby	3.0	3.0	42.7	10.0	35.0	54.0
		Round Whitefish	7.0	7.0	896.6	463.6	1.4	1345.0
		Sea Lamprey	1.0	1.0	45.0	-	45.0	45.0
		Walleye	2.0	2.0	1260.9	1780.6	1.9	2520.0

Notes:
Sampling locations are presented in Figure 4-7.
Individual fish not measured in the field were assigned average species weight values for BPUE calculations.
1 - To prevent undo harm, the Lake Sturgeon was removed from the gillnet and returned to the water without measurement and the size was estimated.

Table B-2: Mean CPUE (fish/24-hr) by Sampling Location of Fish Caught during 2024 Deepwater Fish Community Study

Spring											
Fish Species	Grid 2	Grid 3	Grid 3 Dup	Grid 4	Grid 4 Dup	Grid 5	Grid 7	Grid 8	Grid 9	Total	Mean
Alewife	118.6	127.6	47.8	87.5	52.9	22.1	4.3	53.5	13.5	527.8	58.6
Lake Trout	0	0	0	0	0	1.1	3	3.1	5.1	12.3	1.4
Round Whitefish	0	0	0	1.1	0	0	0	0	0	1.1	0.1
Total	118.6	127.6	47.8	88.6	52.9	23.2	7.3	56.6	18.5	541.1	60.1
Summer											
Fish Species	Grid 1	Grid 1 Dup	Grid 2	Grid 4	Grid 5	Grid 6	Grid 6 Dup	Grid 7	Grid 8	Total	Mean
Alewife	46.9	61.1	77.8	36.3	61.1	41.5	78.7	32.8	32.4	468.6	52.1
Brown Trout	1.3	0	0	0	0	0	0	0	0	1.3	0.1
Burbot	0	0	0	0	0	0	1.1	0	0	1.1	0.1
Lake Trout	0	0	0	0	0	0	0	0	2	2	0.2
Round Goby	1.3	1.1	3.8	0	0	0	2.2	0	0	8.4	0.9
Round Whitefish	0	0	0	0	1.2	0	0	0	0	1.2	0.1
White Sucker	0	0	0	0	0	0	3.6	0	0	3.6	0.4
Total	49.4	62.2	81.5	36.3	62.3	41.5	85.7	32.8	34.4	486.1	54
Fall											
Grid	Grid 1	Grid 2	Grid 2 Dup	Grid 4	Grid 4 Dup	Grid 6	Grid 8	Grid 9	Grid 9 Dup	Total	Mean
Lake Sturgeon	0	0	0	0	0	0	1.1	0	0	1.1	0.1
Lake Trout	0	4	6	5.3	0	16	17.6	15.6	1.2	65.7	7.3
Lake Whitefish	5.5	0	3	5.3	2	18.1	5.5	10.1	9.2	58.7	6.5
Rainbow Smelt	0	0	0	0	0	0	1.1	0.9	0	2	0.2
Rock Bass	0	0	1	0	0	3.2	0	0	0	4.2	0.5
Round Goby	0	0	0	0	0	5.7	0	0	0	5.7	0.6
Round Whitefish	0	2	0	2.1	0	0	2.2	0.9	0	7.2	0.8
Sea Lamprey	0	0	1	0	0	0	0	0	0	1	0.1
Walleye	0	1	0	0	0	1.1	0	0	0	2.1	0.2
Total	5.5	7	10.9	12.7	2	44.1	27.5	27.6	10.4	147.7	16.4

Notes:
Sampling locations are presented in Figure 4-7.
Standardized fish counts are based on an extrapolated catch from the 15 m 1 ½” mesh panel to the standard 50 m length and therefore fish counts can result in partial numbers.

Table B-3: BPUE (grams/24-hr) by Sampling Location of Fish Caught during 2024 Deepwater Fish Community Study

Spring											
Fish Species	Grid 2	Grid 3	Grid 3 Dup	Grid 4	Grid 4 Dup	Grid 5	Grid 7	Grid 8	Grid 9	Total	Mean
Alewife	4030.0	4339.9	1624.1	3005.2	1798.2	754.5	148.2	1796.1	457.3	17953.5	1994.8
Lake Trout	0.0	0.0	0.0	0.0	0.0	977.7	3051.0	8080.7	5592.1	17701.5	1966.8
Round Whitefish	0.0	0.0	0.0	1260.3	0.0	0.0	0.0	0.0	0.0	1260.3	140.0
Total	4030.0	4339.9	1624.1	4265.5	1798.2	1732.2	3199.2	9876.8	6049.4	36915.3	4101.7
Summer											
Fish Species	Grid 2	Grid 3	Grid 3 Dup	Grid 4	Grid 4 Dup	Grid 5	Grid 7	Grid 8	Grid 9	Total	Mean
Alewife	1421.4	1830.1	2329.5	1086.2	1902.8	1241.9	2359.8	983.0	971.1	14125.8	1569.5
Brown Trout	2464.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2464.0	273.8
Burbot	0.0	0.0	0.0	0.0	0.0	0.0	4955.1	0.0	0.0	4955.1	550.6
Lake Trout	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5129.7	5129.7	570.0
Round Goby	53.8	38.7	122.9	0.0	0.0	0.0	86.5	0.0	0.0	301.9	33.5
Round Whitefish	0.0	0.0	0.0	0.0	597.1	0.0	0.0	0.0	0.0	597.1	66.3
White Sucker	0.0	0.0	0.0	0.0	0.0	0.0	633.2	0.0	0.0	633.2	70.4
Total	3939.2	1868.8	2452.4	1086.2	2499.9	1241.9	8034.7	983.0	6100.8	28206.8	3134.1
Fall											
Fish Species	Grid 1	Grid 2	Grid 2 Dup	Grid 4	Grid 4 Dup	Grid 6	Grid 8	Grid 9	Grid 9 Dup	Total	Mean
Lake Sturgeon	0.0	0.0	0.0	0.0	0.0	0.0	34902.4	0.0	0.0	34902.4	3878.0
Lake Trout	0.0	11674.8	15395.6	21105.4	0.0	47299.5	43490.0	31611.4	2384.6	172961.3	19217.9
Lake Whitefish	8018.0	0.0	2104.4	7897.8	2754.6	24363.0	8288.2	12712.7	12408.2	78546.9	8727.4
Rainbow Smelt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.4	0.0	18.4	2.0
Rock Bass	0.0	0.0	44.7	0.0	0.0	794.7	0.0	0.0	0.0	839.4	93.3
Round Goby	0.0	0.0	0.0	0.0	0.0	232.4	0.0	0.0	0.0	232.4	25.8
Round Whitefish	0.0	1937.1	0.0	2685.5	0.0	0.0	990.8	837.3	0.0	6450.7	716.7
Sea Lamprey	0.0	0.0	44.7	0.0	0.0	0.0	0.0	0.0	0.0	44.7	5.0
Walleye	0.0	1.9	0.0	0.0	0.0	2688.0	0.0	0.0	0.0	2689.9	298.9
Total	8018.0	13613.8	17589.4	31688.6	2754.6	75377.6	87671.4	45179.8	14792.8	296686.0	32965.1

Notes:
Sampling locations are presented in Figure 4-7.

Table B-4: Summary of GLM modelling results for 2024 Deepwater Fish Community Study

Parameter	R ² for Model	Effect	P-value	Significant Effect	Estimates				Comparison		P-value	Interpretation
					Season	Mean	Lower Confidence Limit	Upper Confidence Limit				
Richness	0.19	Depth	0.387	No	Spring	1.5	0.9	2.6	-	-	-	-
		Season	0.080	No	Summer	2.0	1.3	3.2	-	-		
					Fall	3.1	2.1	4.5	-	-		
CPUE - log ₁₀ (x + 1)	0.45	Depth	0.688	No	Spring	44.4	26.0	75.6	Spring	Summer	0.926	(Spring = Summer) > Fall
		Season	<0.001	Yes	Summer	50.9	29.8	86.5	Spring	Fall	0.005	
					Fall	12.0	6.7	20.9	Summer	Fall	0.002	
BPUE - log ₁₀ (x+1)	0.76	Depth	0.065	No	Spring	3451.9	1974.1	6035.4	Spring	Summer	0.630	Fall > (Summer = Spring)
		Season	<0.001	Yes	Summer	2423.9	1386.1	4238.1	Spring	Fall	<0.001	
					Fall	20959.8	11988.6	36643.7	Summer	Fall	<0.001	
Diversity - Shannon, log ₁₀ (x+1)	0.46	Depth	0.114	No	Spring	0.168	0.001	0.363	Spring	Summer	0.936	Fall > (Summer = Spring)
		Season	<0.001	Yes	Summer	0.126	-0.035	0.314	Spring	Fall	0.007	
					Fall	0.675	0.435	0.955	Summer	Fall	0.003	
CPUE_SB - log ₁₀ (x+1)	0.87	Depth	0.075	No	Spring	40.4	24.4	66.4	Spring	Summer	0.805	(Spring = Summer) > Fall
		Season	<0.001	Yes	Summer	50.1	30.4	82.1	Spring	Fall	<0.001	
					Fall	0.2	-0.2	1.0	Summer	Fall	<0.001	
BPUE_SB - log ₁₀ (x+1)	0.88	Depth	0.396	No	Spring	1346.6	566.7	3197.6	Spring	Summer	0.979	(Spring = Summer) > Fall
		Season	<0.001	Yes	Summer	1510.8	636.0	3587.5	Spring	Fall	<0.001	
					Fall	0.8	-0.2	3.3	Summer	Fall	<0.001	

Notes:
Shaded cells indicates p-value < 0.05, which was considered significant.
CPUE – Catch-per-unit effort, BPUE – biomass-per-unit effort, SB – small-bodied. These comparisons are shown in Figure 4-.
Depending on the metric, a different error distribution family of GLM was used appropriate to the data and model fit (richness: Poisson; diversity, BPUE, and CPUE: Gaussian with log₁₀(x+1)). Residual plots were examined to assess model fit. Analysis of Deviance (analysis to ANOVA in classic regression) tables were used to determine overall effects of depth and season at the p = 0.05 statistical significance level. Post-hoc Tukey multiple comparisons were used to determine if and how seasons were statistically different. For consistency across model types, the Cox and Snell pseudo-R² GLMs used as an assessment of the proportion of variation explained by the depth and season effects. For non-gaussian GLMs, although pseudo R² are analogous to R² in regression, they are not directly interpretable as the proportion of explained variance. GLMs for CPUE and BPUE were run on a small-bodied fish species (i.e., here, only Alewife and Round Goby) using the same approach above as it is anticipated they may be more susceptible to impingement.

B.2 Nearshore Fish Community Studies Results

Table B-5: Morphometric Summary Statistics for all Fish Caught in Broadscale Monitoring (BSM) Nets during the 2024 Nearshore Fish Community Study

Sampling Event	Fish Species		Alewife	Brown Bullhead	Chinook Salmon	Coho Salmon	Largemouth Bass	Log Perch	Longnose Sucker	Rainbow Smelt	Rock Bass	Round Goby	Sculpin	Threespine Stickleback	Yellow Perch
Spring	Count		36.0	-	1.0	-	-	-	-	-	-	88.0	-	1.0	-
	Total Length (cm)	Mean	16.4	-	8.6	-	-	-	-	-	-	8.2	-	5.7	-
		Standard deviation	0.9	-	-	-	-	-	-	-	-	1.3	-	-	-
		Maximum	17.9	-	8.6	-	-	-	-	-	-	13.2	-	5.7	-
		Minimum	14.7	-	8.6	-	-	-	-	-	-	5.6	-	5.7	-
	Weight (g)	Mean	30.6	-	6.0	-	-	-	-	-	-	9.1	-	1.5	-
		Standard deviation	5.7	-	-	-	-	-	-	-	-	5.0	-	-	-
		Maximum	45.0	-	6.0	-	-	-	-	-	-	34.0	-	1.5	-
		Minimum	19.0	-	6.0	-	-	-	-	-	-	1.0	-	1.5	-
Summer	Count		134.0	1.0	-	1.0	-	-	-	-	-	81.0	-	-	-
	Total Length (cm)	Mean	15.7	26.4	-	8.9	-	-	-	-	-	7.7	-	-	-
		Standard deviation	1.0	-	-	-	-	-	-	-	-	1.6	-	-	-
		Maximum	19.3	26.4	-	8.9	-	-	-	-	-	12.4	-	-	-
		Minimum	13.2	26.4	-	8.9	-	-	-	-	-	5.0	-	-	-
	Weight (g)	Mean	28.5	230.0	-	-	-	-	-	-	-	7.7	-	-	-
		Standard deviation	5.0	-	-	-	-	-	-	-	-	4.9	-	-	-
		Maximum	45.0	230.0	-	-	-	-	-	-	-	30.0	-	-	-
		Minimum	16.0	230.0	-	-	-	-	-	-	-	1.0	-	-	-
Fall	Count		3.0	1.0	-	-	1.0	1.0	2.0	1.0	2.0	27.0	3.0	-	1.0
	Total Length (cm)	Mean	11.2	16.9	-	-	10.1	7.6	11.5	11.7	11.9	10.0	7.1	-	9.2
		Standard deviation	4.2	-	-	-	-	-	0.5	-	4.5	2.9	0.8	-	-
		Maximum	14.6	169.0	-	-	10.1	7.6	11.8	11.7	150.0	15.4	8.0	-	9.2
		Minimum	6.5	16.9	-	-	10.1	7.6	11.1	11.7	8.7	5.2	6.4	-	9.2
	Weight (g)	Mean	14.8	53.0	-	-	11.0	2.0	15.5	36.0	12.0	18.7	4.8	-	8.0
		Standard deviation	12.4	-	-	-	-	-	0.7	-	0.0	13.7	1.8	-	-
		Maximum	26.0	53.0	-	-	11.0	2.0	16.0	36.0	12.0	51.0	6.5	-	8.0
		Minimum	1.5	53.0	-	-	11.0	2.0	15.0	36.0	12.0	1.0	3.0	-	8.0

Notes:
Sampling locations are presented in Figure 4-10.

Table B-6: Morphometric Summary Statistics for all Fish Caught in Experimental (EXP) Nets Across during the 2024 Nearshore Fish Community Study

Sampling Event	Fish Species		Atlantic Salmon	Alewife	Brown Bullhead	Brown Trout	Common Carp	Pumpkinseed	Rainbow Trout	Rock Bass	Round Goby	Walleye	White Sucker
Spring	Count		2.0	98.0	-	2.0	-	-	2.0	-	10.0	-	-
	Total Length (cm)	Mean	47.6	16.8	-	54.8	-	-	46.1	-	9.0	-	-
		Standard deviation	2.5	0.6	-	3.5	-	-	1.9	-	0.3	-	-
		Maximum	49.4	17.8	-	57.3	-	-	47.4	-	9.1	-	-
		Minimum	45.8	12.3	-	52.3	-	-	44.7	-	8.2	-	-
	Weight (g)	Mean	1437.5	34.0	-	2573.5	-	-	1075.0	-	11.8	-	-
		Standard deviation	647.0	24.0	-	1666.7	-	-	212.1	-	1.0	-	-
		Maximum	1895.0	44.0	-	3752.0	-	-	1225.0	-	12.1	-	-
		Minimum	980.0	14.0	-	1395.0	-	-	925.0	-	9.0	-	-
Summer	Count		-	48.0	-	-	-	-	-	1.0	11.0	-	-
	Total Length (cm)	Mean	-	16.7	-	-	-	-	-	22.6	9.3	-	-
		Standard deviation	-	0.3	-	-	-	-	-	-	0.2	-	-
		Maximum	-	18.3	-	-	-	-	-	22.6	9.9	-	-
		Minimum	-	15.8	-	-	-	-	-	22.6	9.0	-	-
	Weight (g)	Mean	-	34.3	-	-	-	-	-	245.0	13.4	-	-
		Standard deviation	-	1.3	-	-	-	-	-	-	1.1	-	-
		Maximum	-	41.0	-	-	-	-	-	245.0	15.0	-	-
		Minimum	-	31.0	-	-	-	-	-	245.0	11.0	-	-
Fall	Count		-	-	2.0	1.0	1.0	1.0	-	-	4.0	3.0	2.0
	Total Length (cm)	Mean	-	-	27.2	47.3	65.1	12.2	-	-	9.9	57.5	32.4
		Standard deviation	-	-	0.7	-	-	-	-	-	0.4	9.5	11.8
		Maximum	-	-	27.7	47.3	65.1	12.2	-	-	10.4	64.3	40.7
		Minimum	-	-	26.7	47.3	65.1	12.2	-	-	9.4	46.6	24.0
	Weight (g)	Mean	-	-	262.0	1345.0	4680.0	43.0	-	-	9.8	2355.0	445.0
		Standard deviation	-	-	2.8	-	-	-	-	-	3.9	1248.5	360.6
		Maximum	-	-	264.0	1345.0	4680.0	43.0	-	-	13.0	3135.0	700.0
		Minimum	-	-	260.0	1345.0	4680.0	43.0	-	-	5.0	915.0	190.0

Notes:
Sampling locations are presented in Figure 4-10.

Table B-7: CPUE (fish/24-hr) of Fish Collected from Experimental (EXP) and Broadscale Monitoring (BSM) Nets during the 2024 Nearshore Fish Community Study

Sampling Event	Fish Species	EXP Nets				BSM Nets			
		West Infill Area	Shoreline Erosion Mitigation Area	Total ¹	Mean ¹	West Infill Area	Shoreline Erosion Mitigation Area	Total ¹	Mean ¹
Spring	Atlantic Salmon	2.8	-	2.8	2.8	-	-	-	-
	Alewife	133.6	3	136.5	68.3	19.2	5.8	25	12.5
	Brown Trout	-	3	3	3	-	-	-	-
	Chinook Salmon	-	-	-	-	0.7	-	0.7	0.7
	Rainbow Trout	1.4	1.5	2.9	1.4	-	-	-	-
	Round Goby	12.5	1.5	14	7	33.6	28.1	61.7	30.8
	Threespine Stickleback	-	-	-	-	0.7	-	0.7	0.7
	Total	150.3	8.9	159.2	79.6	54.2	33.8	88	44
Summer	Alewife	-	55.1	55.1	55.1	11	66.5	77.3	38.7
	Brown Bullhead	-	-	-	-	-	0.6	0.6	0.6
	Coho Salmon	-	-	-	-	-	0.6	0.6	0.6
	Rock Bass	-	1.1	1.1	1.1	-	-	-	-
	Round Goby	1.1	11.5	12.5	6.3	12	34.4	46.4	23.2
	Total	1.1	67.7	68.8	34.4	22.8	102	124.9	62.4
Fall	Alewife	-	-	-	-	1.6	-	1.6	1.6
	Brown Bullhead	-	2.1	2.1	2.1	0.5	-	0.5	0.5
	Brown Trout	1.1	-	1.1	1.1	-	-	-	-
	Common Carp	-	1.1	1.1	1.1	-	-	-	-
	Largemouth Bass	-	-	-	-	0.5	-	0.5	0.5
	Log Perch	-	-	-	-	0.5	-	0.5	0.5
	Longnose Sucker	1.1		1.1	1.1	1.1	-	1.1	1.1
	Pumpkinseed	-	1.1	1.1	-	-	-	-	-
	Rainbow Trout	-	-	-	-	-	0.5	0.5	0.5
	Rock Bass	-	-	-	-	0.5	0.5	1	0.5
	Round Goby	-	4.3	4.3	4.3	8	6.2	14.2	7.1
	Sculpin	-	-	-	-	1.6	-	1.6	1.6
	Walleye	1.1	2.1	3.2	1.6	-	-	-	-
	White Sucker	1.1	1.1	2.2	1.1	-	-	-	-
	Yellow Perch	-	-	-	-	0.5	-	0.5	0.5
	Total	4.4	9.7	14.1	7.1	14.8	7.2	22	11

Note:
CPUE calculated using individual net set duration.
Sampling locations are presented in Figure 4-10.
Total and mean CPUE are derived from the combined totals of both nearshore study areas for each net type.

B.3 Fish Tissue

Table B-8: Fish Tissue Analysis Results, 2024

Parameter	Units	Detection Limit	Nearshore Lake Ontario								Deepwater Intake Area														
			Rainbow Trout		Atlantic Salmon	Walleye					Lake Trout								Alewife						
			RT-1	RT-2	AS-1	WE-1	WE-2	WE-3	WE-4	WE-5	LT-1	LT-2	LT-3	LT-4	LT-5	LT-6	LT-7	LT-8	LWF-1	LWF-2	LWF-3	LWF-4	LWF-5	LWF-6	
Metals																									
Aluminum (Al)	mg/kg (wt)	0.2	0.38	0.17665	0.25	0.33	0.27	0.33	0.3	0.12735	0.4	0.14252	0.31	0.26	4.17	0.22	0.19308	0.15673	0.33	0.18528	0.38	0.18974	0.16808	0.12048	
Antimony (Sb)	mg/kg (wt)	0.001	0.0002	0.00014	0.00025	0.00024	0.00031	0.00037	0.00033	0.00011	0.00026	0.00025	0.00027	0.00032	0.00045	0.00031	0.00066	0.0018	0.00069	0.00039	0.00036	0.00036	-0.00025	-0.0004	
Arsenic (As)	mg/kg (wt)	0.004	0.0592	0.0503	0.144	0.095	0.097	0.127	0.132	0.197	0.0802	0.187	0.216	0.176	0.124	0.0991	0.119	0.312	0.145	0.0754	0.114	0.114	0.13	0.0884	
Barium (Ba)	mg/kg (wt)	0.01	0.018	0.0087	0.012	0.00429	0.00242	0.00329	0.01	0.00223	0.014	0.00297	0.016	0.018	0.013	0.00486	0.00481	0.00696	0.011	0.00919	0.0095	0.00603	0.01	0.00926	
Beryllium (Be)	mg/kg (wt)	0.001	-0.00022	-0.00018	-0.00016	-0.00018	-0.00013	-0.00018	-0.00012	-0.00021	-0.00015	-0.00016	-0.0002	-0.00016	-0.00017	-0.00018	-0.00017	-0.00019	-0.00024	-0.00024	-0.00016	-0.00024	-0.00039	-0.00046	
Bismuth (Bi)	mg/kg (wt)	0.001	0.00046	0.00026	0.00028	0.00054	0.00068	0.00056	0.00014	0.00026	0.00021	0.00011	0.00024	0.00039	0.00058	0.00042	0.00049	0.00007	0.0044	0.0018	0.0024	0.0015	0.0015	0.0016	
Boron (B)	mg/kg (wt)	0.2	-0.00767	-0.01545	-0.00183	-0.02175	-0.02727	-0.02075	-0.00947	-0.01585	-0.0255	-0.0248	-0.02382	-0.02199	-0.0211	-0.02474	0.13142	-0.02435	-0.02502	-0.02006	0.25	-0.01441	-0.01259	-0.03474	
Cadmium (Cd)	mg/kg (wt)	0.001	0.00057	0.00009	0.00033	0.0001	0.00005	0.00066	0.0011	0.00009	0.00011	-0.00003	0.00006	0.00031	0.00015	-0.00001	-0.00005	0.00002	0.00002	0	0.00011	0.0001	-0.00005	-0.00017	
Calcium (Ca)	mg/kg (wt)	2	180	138	82.3	116	115	106	209	115	243	71.3	169	173	121	75.9	203	63.6	188	132	181	97.4	122	80.7	
Chromium (Cr)	mg/kg (wt)	0.01	0.00663	0.00443	0.00884	0.00744	0.00622	0.0081	0.0078	0.00657	0.00592	0.00784	0.00523	0.011	0.0072	0.00466	0.00495	0.0055	0.00934	0.00716	0.012	0.00796	0.00275	0.00358	
Cobalt (Co)	mg/kg (wt)	0.0013	0.0045	0.004	0.0018	0.00052	0.00027	0.00039	0.00051	0.00051	0.002	0.0013	0.0021	0.0021	0.0023	0.0017	0.0019	0.0015	0.0029	0.0133	0.0044	0.0065	0.0057	0.002	
Copper (Cu)	mg/kg (wt)	0.01	0.188	0.206	0.297	0.113	0.118	0.133	0.217	0.294	0.23	0.238	0.355	0.293	0.242	0.353	0.264	0.284	0.201	0.192	0.271	0.423		0.234	
Iron (Fe)	mg/kg (wt)	0.25	3.5	2.53	2.58	1.08	0.78	1.09	1.82	2.13	2.14	1.81	3.23	3.4	2.43	2.29	1.71	2.54	2.71	3.54	3.46	6.68	2.83	5.76	
Lead (Pb)	mg/kg (wt)	0.001	0.006	0.0014	0.0026	0.00047	0.00016	0.00017	0.00042	0.0011	0.00093	0.00049	0.0021	0.002	0.0066	0.0011	0.00055	0.00076	0.0028	0.001	0.0018	0.00072	0.0012	0.0019	
Magnesium (Mg)	mg/kg (wt)	0.4	303	306	305	324	345	348	306	318	280	282	282	281	286	237	272	215	263	276	250	263	222	247	
Manganese (Mn)	mg/kg (wt)	0.01	0.109	0.081	0.091	0.087	0.091	0.103	0.081	0.069	0.108	0.077	0.098	0.113	0.095	0.072	0.091	0.067	0.127	0.12	0.131	0.126	0.138	0.118	
Mercury (Hg)	mg/kg (wt)	0.002	0.0378	0.0348	0.0509	0.0983	0.156	0.353	0.167	0.267	0.11	0.0853	0.0777	0.0677	0.095	0.119	0.116	0.191	0.0224	0.0559	0.0196	0.0371	0.0471	0.0397	
Molybdenum (Mo)	mg/kg (wt)	0.004	0.00196	0.00155	0.0018	0.00073	0.00102	0.0009	0.00078	0.00062	0.00081	0.00068	0.00089	0.00097	0.00066	0.00131	0.00117	0.00223	0.00097	0.00043	0.00103	0.00101	0.00175	0.00059	
Nickel (Ni)	mg/kg (wt)	0.01	0.00944	0.00637	0.00775	0.0056	0.00312	0.00343	0.00528	0.00317	0.00521	0.00788	0.022	0.00545	0.00627	0.0048	0.00461	0.00601	0.00693	0.01	0.00645	0.00577	0.00551	0.00545	
Phosphorus (P)	mg/kg (wt)	2	2830	2940	2860	2580	2770	2630	2560	2530	2670	2590	2740	2700	2740	2340	2520	2090	2570	2430	2520	2560	2070	2300	
Potassium (K)	mg/kg (wt)	2	4680	4990	4690	4790	5060	4760	4430	4520	4220	4070	4160	4080	4650	3920	4090	3420	4080	4000	4170	4260	3660	4150	
Selenium (Se)	mg/kg (wt)	0.01	0.353	0.502	0.348	0.39	0.459	0.526	0.42	0.395	0.629	0.544	0.416	0.524	0.549	0.33	0.437	0.344	0.636	0.61	0.594	0.62	0.485	0.546	
Silver (Ag)	mg/kg (wt)	0.001	0.00003	0.00009	0.00005	0.0001	0	0.00009	0.00004	-0.00005	0.00005	0.00012	0.00006	0.00007	0.00007	0.00012	0.00021	0.00012	0.0002	0.00005	0.00018	0.00003	0.00013	0.00011	
Sodium (Na)	mg/kg (wt)	2	250	240	260	501	350	373	401	413	260	210	263	215	326	418	440	354	392	397	344	430	522	338	
Strontium (Sr)	mg/kg (wt)	0.01	0.216	0.127	0.057	0.051	0.054	0.042	0.117	0.052	0.214	0.042	0.149	0.177	0.083	0.063	0.197	0.055	0.285	0.168	0.313	0.123	0.176	0.105	
Thallium (Tl)	mg/kg (wt)	0.0004	0.00818	0.0101	0.0187	0.0106	0.0145	0.0183	0.0146	0.0118	0.0389	0.0228	0.027	0.0203	0.0213	0.0107	0.0149	0.012	0.00046	0.00066	0.00106	0.00484	0.00118	0.00222	
Tin (Sn)	mg/kg (wt)	0.02	0.00752	0.00247	0.00428	0.00437	0.00365	0.0047	0.00564	0.00122	0.00223	0.00158	0.00301	0.0035	0.00171	0.00169	0.00264	0.0038	0.00104	0.00198	0.00278	0.00273	-0.00172	-0.00264	
Titanium (Ti)	mg/kg (wt)	0.02	0.296	0.299	0.301	0.294	0.305	0.285	0.265	0.277	0.284	0.269	0.297	0.273	0.309	0.266	0.259	0.243	0.268	0.27	0.272	0.274	0.235	0.237	
Uranium (U)	mg/kg (wt)	0.0004	-0.00013	-0.00018	-0.00017	-0.00022	-0.00022	-0.00017	-0.0002	-0.00019	-0.0002	-0.00021	-0.00019	-0.00018	-0.00017	-0.00021	-0.00019	-0.00018	-0.00016	-0.00021	-0.00017	-0.0002	-0.00042	-0.00047	
Vanadium (V)	mg/kg (wt)	0.02	-0.00059	-0.00169	-0.00139	0.00067	0.00008	0.00076	0.00188	0.00114	-0.00094	-0.00026	0.00062	-0.00044	-0.00005	0.00003	0.00069	0.00081	0.00147	0.00179	0.00443	0.00354	-0.00141	0.00034	
Zinc (Zn)	mg/kg (wt)	0.04	4.08	3.92	3.77	4.13	3.66	4.22	4.17	3.47	3.48	3.19	3.56	4	3.17	2.89	3.45	2.84	3.31	3.59	3.85	3.65	3.1	3.28	
Physical Properties																									
Moisture	%	0.3	74	74	72	76	76	76	75	75	77	75	74	76	77	78	78	70	76	68	76	71	74	74	
Elements																									
Methyl Mercury	ng/g (wt)	10	0.7056777	0.8507743	1.05713	81	150	350	110	270	120	66	79	66	80	160	100	210	16	39	16	29	38	33	
Radionuclides																									
C-14	Bq/kg	0	53.6	55.4	41.1	<31	80.8	44.6	50.8	33	<33	<32	<33	<41	<31	<33	42.5	<49	<41	<36	<60	<33	<38	242.3	
Co-60	Bq/kg	0	0.692	-2.03	0.296	-0.127	0.199	-1.1	-37.1	0.784	-0.25	-0.348	-1.11	-1											

Sampling locations are presented in Figure 4-7 and Figure 4-10. Negative values indicate uncensored values that are less than the detection limit.

- Highlighted values indicate the sample exceeded the 33 ng/g ww guideline for methylmercury (CCME, 2000)
- Highlighted values indicate the sample exceeded the 3.5 mg/kg dw guideline for arsenic (Health Canada, 2024)
- Highlighted values indicate the sample exceeded the 6.7 mg/kg dw guideline for selenium (ECCC, 2022)

B.4 Benthic Macroinvertebrate Community Study Results

Table B-9: Raw Benthic Invertebrate Community Data at the Lowest Practical Level, Fall 2024

Phylum	Class	Subclass	Order	Family	Subfamily	Species	Deepwater				Nearshore Area									
							SED-1	SED-2	SED-3	SED-4	1	2	3	4	5	6	7	8	9	10
ROUNDWORMS																				
P. Nemata	-	-	-	-	-	-	344	663	408	153	38	6	51	19	0	0	13	0	77	6
ANNELIDS																				
WORMS																				
P. Annelida	Cl. Oligochaeta	-	-	F. Enchytraeidae	-	-	0	0	13	0	13	0	0	0	0	0	6	0	26	0
P. Annelida	-	-	-	F. Naididae	S.F. Naidinae	<i>Dero</i>	0	0	0	0	0	0	26	0	0	0	0	0	0	0
P. Annelida	-	-	-	F. Naididae	S.F. Naidinae	<i>Nais bretscheri</i>	0	0	0	0	0	0	0	0	0	0	0	0	70	0
P. Annelida	-	-	-	F. Naididae	S.F. Naidinae	<i>Nais pardalis</i>	0	0	0	0	0	0	0	0	0	0	26	0	13	0
P. Annelida	-	-	-	F. Naididae	S.F. Naidinae	<i>Nais variabilis</i>	0	0	0	0	0	0	0	6	0	0	0	0	0	0
P. Annelida	-	-	-	F. Naididae	S.F. Tubificinae	<i>Limnodrilus hoffmeisteri</i>	0	0	0	0	0	0	77	0	0	0	0	0	0	0
P. Annelida	-	-	-	F. Naididae	S.F. Tubificinae	<i>Limnodrilus udekemianus</i>	19	0	57	0	0	0	26	0	0	0	0	0	6	0
P. Annelida	-	-	-	F. Naididae	S.F. Tubificinae	<i>Psammoryctides barbatus</i>	0	1021	0	657	0	0	0	0	0	0	0	0	6	0
P. Annelida	-	-	-	F. Naididae	S.F. Tubificinae	<i>Potamothrix moldaviensis</i>	6	0	0	147	332	319	51	0	0	0	0	0	0	0
P. Annelida	-	-	-	F. Naididae	S.F. Tubificinae	immatures with hair chaetae	38	51	364	293	13	0	0	0	0	0	0	0	0	0
P. Annelida	-	-	-	F. Naididae	S.F. Tubificinae	immatures without hair chaetae	19	51	57	587	1493	772	230	389	0	19	26	0	64	0
P. Annelida	-	-	-	F. Naididae	S.F. Rhyacodrilinae	<i>Bothrioneurum vej dovskyanum</i>	0	102	32	0	0	0	0	19	0	0	0	0	26	0
P. Annelida	-	-	-	F. Lumbriculidae	-	<i>Stylodrilus heringianus</i>	6	0	0	0	0	0	0	0	0	0	0	0	0	6
ARTHROPODS																				
MITES																				
P. Arthropoda	Cl. Arachnida	Subcl. Acari immature	-	-	-	-	0	0	0	0	0	0	0	0	6	0	0	0	0	6
P. Arthropoda	Cl. Arachnida	Subcl. Acari immature	O. Trombidiformes	F. Hygrobatidae	-	<i>Hygrobates</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	13
P. Arthropoda	Cl. Arachnida	Subcl. Acari immature	O. Trombidiformes	F. Lebertiidae	-	<i>Lebertia</i>	0	0	0	0	0	6	0	0	0	0	6	0	0	0
P. Arthropoda	Cl. Arachnida	Subcl. Acari	O. Trombidiformes	F. Limnesiidae	-	<i>Limnesia</i>	57	255	13	26	0	0	0	0	19	13	0	6	13	45
P. Arthropoda	Cl. Arachnida	Subcl. Acari	O. Trombidiformes	F. Pionidae	-	indeterminate	0	51	0	0	-	-	-	-	-	-	-	-	-	-
HARPACTICIDS																				
P. Arthropoda	-	-	O. Harpacticoida	-	-	-	1524	3215	1378	1021	0	0	0	0	0	0	0	0	0	0
SEED SHRIMPS																				
P. Arthropoda	Cl. Ostracoda	-	-	-	-	-	96	714	13	306	0	0	102	13	13	0	0	0	0	0
WATER SCUDS																				
P. Arthropoda	Cl. Ostracoda	-	O. Amphipoda	F. Gammaridae	-	<i>Gammarus</i>	0	0	0	0	0	0	0	6	0	0	0	0	0	0
SPRINGTAILS																				
P. Arthropoda	Cl. Entognatha	-	O. Collembola	-	-	-	0	0	13	0	0	0	0	0	0	0	6	0	0	0
INSECTS																				
TRUE FLIES																				
MIDGES																				
Cl. Insecta	O. Diptera	-	-	F. Chironomidae		chironomid pupae	0	0	0	0	13	0	0	0	0	0	0	0	0	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Chironomus</i>	51	0	255	51	13	13	0	0	0	51	0	0	13	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Cryptochironomus</i>	0	0	0	0	0	0	0	0	0	0	0	6	0	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Dicrotendipes</i>	6	0	13	0	13	0	26	6	0	13	89	0	77	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Micropsectra</i>	26	153	38	204	0	0	0	0	0	0	0	0	0	0

Phylum	Class	Subclass	Order	Family	Subfamily	Species	Deepwater				Nearshore Area									
							SED-1	SED-2	SED-3	SED-4	1	2	3	4	5	6	7	8	9	10
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Paratanytarsus</i>	0	0	0	0	0	0	26	0	0	0	0	0	6	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Polypedilum halterale</i>	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Polypedilum scalaenum</i>	0	0	0	26	0	0	0	0	0	0	0	0	6	6
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Rheotanytarsus</i>	0	0	0	0	0	0	77	0	0	0	0	0	51	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Saetheria</i>	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Sergentia</i>	32	51	0	0	0	0	0	0	0	0	0	0	0	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Stictochironomus</i>	6	0	38	51	13	6	0	26	0	13	0	0	32	6
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Chironominae	<i>Tanytarsus</i>	6	0	13	0	0	0	0	0	0	0	0	0	0	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Diamesinae	<i>Potthastia</i>	0	0	38	26	0	0	0	0	0	0	0	0	0	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Orthoclaadiinae	<i>Cricotopus</i>	0	0	0	0	0	0	0	0	0	0	32	0	6	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Orthoclaadiinae	<i>Cricotopus/Orthocladius</i>	6	0	0	0	0	0	0	0	0	0	13	0	0	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Orthoclaadiinae	<i>Heterotrissocladius</i>	32	255	38	77	0	0	0	0	0	0	0	0	0	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Orthoclaadiinae	<i>Parakiefferiella</i>	0	0	0	0	0	0	0	0	0	0	0	0	6	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Orthoclaadiinae	indeterminate	13	0	0	0	0	0	0	0	0	0	0	0	0	0
Cl. Insecta	O. Diptera	-	-	F. Chironomidae	S.F. Prodiamesinae	<i>Monodiamesa</i>	13	0	0	0	13	0	0	0	0	0	0	0	0	0
MOLLUSCS																				
SNAILS																				
P. Mollusca	Cl. Gastropoda	-	-	F. Hydrobiidae	-	<i>Potamopyrgus antipodarum</i>	13	0	0	0	-	-	-	-	-	-	-	-	-	-
CLAMS																				
P. Mollusca	Cl. Bivalvia	-	-	F. Dreissenidae	-	<i>Dreissena bugensis</i>	147	970	140	0	0	0	51	0	0	13	0	0	19	19
P. Mollusca	Cl. Bivalvia	-	-	F. Dreissenidae	-	<i>Dreissena</i> immature	0	0	0	0	38	6	561	6	0	32	32	6	19	70
TOTAL DENSITY (org/m²)							2462	7552	2921	3623	1990	1129	1301	491	38	153	249	19	549	179
TOTAL NUMBER OF TAXA							21	13	18	14	10	7	12	9	2	6	10	3	20	7

Notes:
Sampling locations are presented in Figure 4-6 and Figure 4-7.

B.5 Macrozooplankton Community Study Results

Table B-10: Macrozooplankton Community Composition from samples collected in 2024

Spring								
Major Group	Family	Taxon	Grid 3	Grid 2	Grid 5	Grid 4	Grid 7	Grid 9
Station Depth (m)			12.4	14.5	16.9	17.4	19.3	19.4
Cladocera	Bosminidae	Bosminidae indet. ¹						X
	Bosminidae	Eubosmina sp.	X	X	X	X	X	
	Cercopagididae	Cercopagis sp.	X	X	X	X	X	X
	Daphniidae	Daphnia sp.	X	X	X	X	X	X
	Leptodoridae	Leptodora sp.	X	X	X	X	X	X
	Polyphemidae	Polyphemus pediculus			X		X	X
	Total Cladocera		4	4	5	4	5	4
Copepoda Calanoida	Centropagidae	Limnocalanus macrurus		X	X	X	X	X
	Diaptomidae	Diaptomidae indet. ¹	X	X	X	X	X	X
	Diaptomidae	Leptodiaptomus sicilis	X	X	X	X	X	X
	Total Calanoida		1	2	2	2	2	2
Copepoda Cyclopoida	Cyclopidae	Acanthocyclops sp.			X		X	
	Cyclopidae	Diacyclops sp.		X	X	X	X	X
	Cyclopidae	Mesocyclops edax			X		X	
	Total Cyclopoida		0	1	3	1	3	1
Mysida	Mysidae	Mysidae indet.				X	X	
	Total Mysida		0	0	0	1	1	0
Taxa Richness			5	7	10	8	11	7
Overall Richness			10					
Summer								
Major Group	Family	Taxon	Grid 3	Grid 2	Grid 6	Grid 4	Grid 8	Grid 9
Station Depth (m)			11.4	12.5	16.4	16.6	19	20
Cladocera	Bosminidae	Bosmina longirostris					X	
	Bosminidae	Eubosmina coregoni	X	X	X	X	X	X
	Bosminidae	Eubosmina longispina				X	X	
	Cercopagididae	Bythotrephes sp.	X		X		X	X
	Cercopagididae	Cercopagis sp.	X	X	X	X	X	X
	Chydoridae	Acroperus sp.			X			
	Chydoridae	Camptocercus sp.	X	X	X			X
	Chydoridae	Eurycercus sp.	X	X	X	X	X	X
	Chydoridae	Oxyurella sp.	X		X	X	X	X
	Daphniidae	Ceriodaphnia sp.	X	X	X		X	
	Daphniidae	Daphnia sp.	X	X	X	X	X	X
	Holopediidae	Holopedium gibberum	X	X	X	X	X	X
	Leptodoridae	Leptodora sp.	X	X	X	X	X	X
	Polyphemidae	Polyphemus pediculus	X	X	X	X	X	X

Summer								
Major Group	Family	Taxon	Grid 3	Grid 2	Grid 6	Grid 4	Grid 8	Grid 9
Station Depth (m)			11.4	12.5	16.4	16.6	19	20
Cladocera	Sididae	Sida crystallina					X	
	Total Cladocera		11	9	12	9	13	10
Copepoda Calanoida	Diaptomidae	Diaptomidae indet. ¹					X	X
	Diaptomidae	Leptodiaptomus minutus	X		X	X		
	Diaptomidae	Skistodiaptomus oregonensis				X		
	Temoridae	Epischura sp.	X	X	X	X	X	X
		Calanoida indet. ¹				X		
	Total Calanoida		2	1	2	3	1	1
Summer								
Major Group	Family	Taxon	Grid 3	Grid 2	Grid 6	Grid 4	Grid 8	Grid 9
Copepoda Cyclopoida	Cyclopidae	Acanthocyclops sp.	X					X
	Cyclopidae	Diacyclops sp.		X			X	X
	Cyclopidae	Eucyclops sp.			X			
		Cyclopoida indet. ¹	X					X
	Total Cyclopoida		1	1	1	0	1	2
Taxa Richness			14	11	15	12	15	13
Overall Richness			21					
Fall								
Major Group	Family	Taxon	Grid 3	Grid 1	Grid 5	Grid 4	Grid 8	Grid 9
Station Depth (m)			10.5	10.6	15	16.8	18.7	19.7
Cladocera	Bosminidae	Eubosmina coregoni		X	X			
	Cercopagididae	Bythotrephes sp.	X	X	X	X	X	X
	Daphniidae	Daphnia sp.			X			
	Total Cladocera		1	2	3	1	1	1
Copepoda Calanoida	Centropagidae	Limnocalanus macrurus				X		X
	Diaptomidae	Diaptomidae indet. ¹	X		X	X	X	X
	Diaptomidae	Leptodiaptomus sicilis	X	X	X	X	X	X
	Diaptomidae	Skistodiaptomus oregonensis		X				
	Temoridae	Epischura sp.	X	X	X	X	X	X
		Calanoida indet. ¹	X	X	X		X	X
	Total Calanoida		2	3	2	3	2	3
Total Zooplankton (excluding algae)			3	5	5	4	3	4
Total Unique Taxa			7					

Notes:

¹ Indet = indeterminant. As there was uncertainty over the identification of these organisms, they were excluded from the richness count.

Sampling locations are presented in Figure 4-7.

X – indicates taxon was present in the sample, “-” indicates taxon was not present in the sample. Taxa Richness is calculated for each station individually based on the sum of all the taxa (excluding indets.) present in the column, whereas Overall Richness is the sum of all taxa (excluding indets) across stations.

Table B-11: Summary of GLM Modelling Results to identify effects of season and depth on Macrozooplankton Community Parameters

Parameter		R ² for Model	Effect	P-value	Significant Effect	Estimates				Comparison		P-value	Interpretation
						Season	Mean	Lower Confidence Limit	Upper Confidence Limit				
Richness - LPL		0.77	Depth	0.48	No	Spring	7.9	5.9	10.5	Spring	Summer	0.012	Summer > Spring > Fall
			Season	<0.001	Yes	Summer	13.3	10.6	16.5	Spring	Fall	0.027	
						Fall	4.1	2.7	6.1	Summer	Fall	<0.001	
Richness - Family		0.61	Depth	0.458	No	Spring	7.3	5.5	9.9	Spring	Summer	0.324	Summer = Spring > Fall
			Season	<0.001	Yes	Summer	9.8	7.6	12.6	Spring	Fall	0.043	
						Fall	3.9	2.6	5.9	Summer	Fall	<0.001	
Algae excluded	Diversity - Family	0.9	Depth	0.053	No	Spring	1.024	0.887	1.161	Spring	Summer	<0.001	Summer > Spring = Fall
			Season	<0.001	Yes	Summer	1.742	1.607	1.878	Spring	Fall	0.116	
						Fall	0.826	0.688	0.964	Summer	Fall	<0.001	
	Density	0.58	Depth	0.651	No	Spring	0.047	0.028	0.15	Spring	Summer	0.104	Summer = Spring = Fall
			Season	0.002	Yes	Summer	0.176	0.105	0.554	Spring	Fall	0.063	
						Fall	0.252	0.147	0.882	Summer	Fall	0.725	
	Biomass	0.9	Depth	0.264	No	Spring	0.0003	0.0002	0.0009	Spring	Summer	0.045	Fall > Summer > Spring
			Season	<0.001	Yes	Summer	0.0016	0.001	0.0042	Spring	Fall	0.012	
						Fall	0.017	0.01	0.0554	Summer	Fall	0.02	
Algae included	Diversity - Family	0.8	Depth	0.006	Yes	Spring	1.014	0.869	1.158	Spring	Summer	0.001	Summer > Spring = Fall
			Season	<0.001	Yes	Summer	1.446	1.304	1.589	Spring	Fall	0.207	
						Fall	0.839	0.693	0.985	Summer	Fall	<0.001	
	Density	0.65	Depth	0.412	No	Spring	0.047	0.028	0.143	Spring	Summer	0.045	Summer > Spring Fall > Spring Fall = Summer
			Season	<0.001	Yes	Summer	0.306	0.184	0.89	Spring	Fall	0.058	
						Fall	0.245	0.147	0.733	Summer	Fall	0.862	
	Biomass	0.88	Depth	0.234	No	Spring	0.0003	0.0002	0.0009	Spring	Summer	0.025	Fall > Summer > Spring
			Season	<0.001	Yes	Summer	0.0026	0.0016	0.007	Spring	Fall	0.012	
						Fall	0.0167	0.0098	0.0552	Summer	Fall	0.032	
			Depth*	0.034	0.01	0.0587	-	-	-				

Notes:
Shaded cells indicates p-value < 0.05, which was considered significant.

B.6 Aquatic Habitat Characterization

Table B-12: Results of Underwater Video Substrate Analysis for transects in Shoreline Erosion Mitigation Area and West Infill Areas

Infill Area	Transect Number	Transect	Video Title	Image	Direction Travelled	Timestamp (mm:ss)	Distance (m)	Substrate	Substrate Coverage Type	Veg Coverage (%)	Veg Coverage Value	Mussel Coverage (%)	Mussel Coverage Value	Fish Presence (Y/N)
SHORELINE EROSION MITIGATION AREA	1	SHORELINE_EROSION_MITIGATION_AREA__EASTWRD1	GX010002	0	East	00:06	0	Sand	2	0	0	0	0	N
				1		00:51	76.72	Sand	2	0	0	0	0	N
				2		01:42	153.44	Sand	2	35	3	0	0	N
				3		02:33	230.16	Sand	2	0	0	0	0	N
				4		03:25	306.88	Sand	2	25	2	0	0	N
				5		04:16	383.6	Sand	2	25	2	0	0	N
				6		05:07	460.32	Sand	2	35	3	0	0	N
				7		05:58	537.04	Sand	2	50	5	0	0	N
				8		06:49	613.76	Sand, Cobbles	3	45	5	0	0	N
				9		07:40	690.48	Sand	2	30	3	0	0	N
				10		08:31	767.2	Cobbles	4	70	7	0	0	N
	2	SHORELINE_EROSION_MITIGATION_AREA__WESTWRD1	GX010003	0	West	00:02	0	Sand, Boulders	5	100	10	0	0	N
				1		00:46	83.29	Gravel, Boulders	5	100	10	0	0	N
				2		01:34	166.58	Sand, Gravel, Boulders	4	90	9	0	0	N
				3		02:20	249.87	Sand, Boulders	5	100	10	0	0	N
				4		03:07	333.16	Cobbles	3	100	10	0	0	N
				5		03:54	416.45	Boulders, Sand, Cobbles	4	100	10	0	0	N
				6		04:41	499.74	Boulders, Sand, Cobbles	4	100	10	0	0	N
				7		05:28	583.03	Sand, Boulders	5	30	3	0	0	N
				8		06:14	666.32	Sand, Boulders	5	40	4	0	0	N
				9		07:01	749.61	Sand	2	10	1	0	0	N
				10		07:48	832.90	Sand, Boulders	5	20	2	0	0	N
	3	SHORELINE_EROSION_MITIGATION_AREA__EASTWRD2	GX010004	0	East	00:03	0.00	Boulders, Cobbles	6	100	100	5	1	N
				1		00:43	88.19	Sand	2	80	8	0	0	N
				2		01:27	176.38	Boulders, Cobbles	6	100	10	0	0	N
				3		02:10	264.57	Boulders, Cobbles	6	100	10	0	0	N
				4		02:54	352.76	Boulders, Cobbles	6	80	8	20	2	N
SHORELINE EROSION MITIGATION AREA	3	SHORELINE_EROSION_MITIGATION_AREA__EASTWRD2	GX010004	5	East	03:37	440.95	Boulders, Cobbles	5	90	9	10	1	N
				6		04:21	529.14	Boulders, Cobbles	5	90	9	10	1	N
				7		05:04	617.33	Boulders, Cobbles	5	80	8	5	1	N
				8		05:48	705.52	Boulders, Cobbles	6	80	8	20	2	N
				9		06:31	793.71	Boulders, Cobbles	6	90	9	20	2	N
				10		07:14	881.90	Boulders, Cobbles, Gravel	5	30	3	0	0	N
	4	SHORELINE_EROSION_MITIGATION_AREA__WESTWRD2	GX010005	0	West	00:03	0.00	Cobbles, Boulders	3	100	10	10	1	N
				1		00:52	88.71	Sand, Boulders	2	5	1	0	0	N
				2		01:45	177.42	Cobbles, Boulders	3	100	10	10	1	N
				3		02:37	266.13	Sand	2	5	1	0	0	N
				4		03:30	354.84	Cobbles, Boulders	6	90	9	0	0	N

Infill Area	Transect Number	Transect	Video Title	Image	Direction Travelled	Timestamp (mm:ss)	Distance (m)	Substrate	Substrate Coverage Type	Veg Coverage (%)	Veg Coverage Value	Mussel Coverage (%)	Mussel Coverage Value	Fish Presence (Y/N)
				5		04:22	443.55	Cobbles, Boulders	6	100	10	30	3	N
				6		05:15	532.26	Cobbles, Boulders	6	80	8	0	0	N
				7		06:07	620.97	Sand, Cobbles, Boulders	6 and 2	50	5	0	0	N
				8		07:00	709.68	Boulders, Cobbles	5	90	9	40	4	N
				9		07:52	798.39	Sand	2	0	0	0	0	N
				10		08:45	887.10	Boulders, Cobbles	6	100	10	20	2	N
	5	SHORELINE_EROSION_MITIGATION_AREA__EASTWRD3	GX010006	0	East	00:04	0.00	Boulders, Cobbles, Gravel	4	80	8	50	5	N
				1		00:48	90.44	Boulders, Cobbles, Gravel	4	30	3	0	0	N
				2		01:35	180.88	Sand	2	0	0	0	0	N
				3		02:23	271.32	Sand, Cobbles, Boulders	4	20	2	0	0	N
				4		03:10	361.76	Sand, Cobbles, Boulders	4	10	1	0	0	N
				5		03:58	452.2	Cobbles, Boulders	6	90	9	40	4	N
				6		04:46	542.64	Sand	2	0	0	0	0	N
				7		05:33	633.08	Cobbles, Boulders	6	35	4	15	2	N
				8		06:21	723.52	Boulders, Cobbles	6	70	7	60	6	N
				9		07:08	813.96	Boulders, Cobbles	6	40	4	10	1	N
				10		07:56	904.4	Sand, Boulders	5	5	1	0	0	N
INFILL WEST	1	INFILL_WEST_WESTWRD1	GX010007	0	West	00:09	0	Sand	2	0	0	0	0	N
				1		00:39	64.04	Sand	2	0	0	0	0	N
				2		01:18	128.08	Sand	2	0	0	0	0	N
				3		01:57	192.12	Sand	2	0	0	0	0	N
				4		02:36	256.16	Sand	2	0	0	0	0	N
				5		03:15	320.20	Sand	2	0	0	0	0	N
				6		03:54	384.24	Sand	2	0	0	0	0	N
				7		04:33	448.28	Sand	2	0	0	0	0	N
				8		05:12	512.32	Sand	2	0	0	0	0	N
				9		05:51	576.36	Sand	2	0	0	0	0	N
				10		06:30	640.40	Sand	2	0	0	0	0	N
	2	INFILL_WEST_EASTWRD1	GX010008	0	East	00:09	0.00	Sand	2	0	0	5	0	N
				1		00:37	65.00	Sand	2	0	0	0	0	N
				2		01:14	130.00	Sand	2	0	0	0	0	N
				3		01:51	195.00	Sand	2	0	0	0	0	N
				4		02:29	260.00	Cobbles, Boulders, Gavel, Sand	5	5	1	0	0	N
				5		03:06	325.00	Sand	2	5	1	0	0	N
				6		03:43	390.00	Cobbles, Boulders	6	70	7	20	2	N
				7		04:20	455.00	Boulders, Sand	5	15	2	5	1	N
				8		04:57	520.00	Sand, Boulders	5	0	0	0	0	N
				9		05:34	585.00	Sand	2	5	1	0	0	N
				10		06:11	650.00	Boulders, Sand	5	70	7	10	1	N
	3	INFILL_WEST_WESTWRD2	GX010009	0	West	00:04	0.00	Boulders, Cobbles, Sand	5	80	8	40	4	N

Infill Area	Transect Number	Transect	Video Title	Image	Direction Travelled	Timestamp (mm:ss)	Distance (m)	Substrate	Substrate Coverage Type	Veg Coverage (%)	Veg Coverage Value	Mussel Coverage (%)	Mussel Coverage Value	Fish Presence (Y/N)
				1		00:40	69.67	Boulders, Cobbles, Sand	5	90	9	5	1	N
				2		01:20	139.34	Sand	2	0	0	0	0	N
				3		01:59	209.01	Boulders, Cobbles, Sand	5	30	3	10	1	N
				4		02:39	278.68	Boulders, Cobbles	6	100	10	60	6	N
				5		03:19	348.35	Boulders, Cobbles, Sand	5	40	4	20	2	N
	3	INFILL_WEST_WESTWRD2	GX010009	6	West	03:59	418.02	Sand	2	0	0	0	0	N
				7		04:39	487.69	Boulders, Cobbles, Sand	5	0	0	0	0	N
				8		05:18	557.36	Sand	2	0	0	0	0	N
				9		05:58	627.03	Sand	2	0	0	0	0	N
				10		06:38	696.70	Sand	2	0	0	0	0	N
	4	INFILL_WEST_EASTWRD2	GX010010	0	East	00:03	0.00	sand	2	0	0	0	0	N
				1		00:38	67.00	Sand	2	0	0	0	0	N
				2		01:15	134.00	Sand	2	0	0	0	0	N
				3		01:53	201.00	Sand	2	0	0	0	0	N
				4		02:31	268.00	Sand	2	0	0	0	0	N
				5		03:08	335.00	Sand	2	0	0	0	0	N
				6		03:46	402.00	Boulders, Cobble, Sand	5	90	9	70	7	N
				7		04:23	469.00	Sand	2	10	1	0	0	N
				8		05:01	536.00	Sand	2	10	1	0	0	N
				9		05:39	603.00	Boulders, Cobbles, Sand	5	90	9	50	5	N
				10		06:16	670.00	Boulders, Cobbles, Sand	5	70	7	40	4	N
	5	INFILL_WEST_WESTWRD3	GX010011	0	West	00:01	0.00	Boulders, Cobbles, Sand	5	80	8	20	2	N
				1		00:02	62.67	Boulders, Sand	5	80	8	10	1	N
				2		00:04	125.34	Boulders, Sand	5	90	9	10	1	N
				3		00:06	188.01	Boulders, Sand	5	90	9	10	1	N
				4		00:08	250.68	Boulders, Cobbles, Sand	5	95	9	10	1	N
				5		00:10	313.35	Boulders, Cobbles, Sand	5	95	9	10	1	N
				6		00:12	376.02	Sand	2	0	0	0	0	N
				7		00:14	438.69	Sand	2	0	0	0	0	N
				8		00:16	501.36	Sand	2	0	0	0	0	N
				9		00:18	564.03	Sand	2	0	0	0	0	N
				10		00:20	626.70	Sand	2	0	0	0	0	N

Notes:
Sampling area presented in Figure 4-18.

Appendix C Predicted Radiation Dose to Human Receptors

Table C-1: Estimated Radiation Dose by Pathway to Human Receptors

Human Receptor	COPC	Radiological Dose by Pathway during Project Phases (uSv/a)												
		Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total by COPC
Farm NE - Adult	C-14	4.97E-06	5.71E-09	1.31E-06	1.33E-10	8.36E-14	3.78E-12	5.22E-10	2.78E-10	0.00E+00	4.27E-04	8.23E-04	3.39E-04	1.60E-03
	Cs-134	0.00E+00	0.00E+00	6.96E-05	1.40E-05	1.80E-10	5.22E-05	6.50E-06	1.55E-02	0.00E+00	1.29E-02	1.10E-05	1.16E-07	2.85E-02
	HTO	7.39E-02	0.00E+00	2.66E-02	8.74E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.26E-05	5.17E-02	4.08E-03	1.57E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-05	6.76E-03	6.62E-04	7.44E-03
	Total by pathway	7.39E-02	5.71E-09	2.67E-02	8.88E-04	1.80E-10	5.22E-05	6.50E-06	1.55E-02	0.00E+00	1.34E-02	5.93E-02	5.08E-03	1.95E-01
Farm NE - Child 10y	C-14	7.09E-06	5.71E-09	7.21E-07	1.33E-10	1.58E-12	3.78E-12	9.90E-09	2.78E-10	0.00E+00	4.14E-04	8.01E-04	2.57E-04	1.48E-03
	Cs-134	0.00E+00	0.00E+00	2.04E-05	1.40E-05	1.83E-09	5.22E-05	6.58E-05	1.55E-02	0.00E+00	6.67E-03	5.40E-06	4.63E-08	2.23E-02
	HTO	8.78E-02	0.00E+00	1.32E-02	7.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-05	4.39E-02	2.80E-03	1.49E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-05	6.53E-03	5.01E-04	7.05E-03
	Total by pathway	8.78E-02	5.71E-09	1.32E-02	7.42E-04	1.83E-09	5.22E-05	6.58E-05	1.55E-02	0.00E+00	7.14E-03	5.12E-02	3.56E-03	1.79E-01
Farm NE - Infant 1y	C-14	4.84E-06	5.71E-09	0.00E+00	5.42E-12	3.52E-12	3.78E-12	2.20E-08	2.78E-10	0.00E+00	2.89E-04	6.78E-04	1.72E-04	1.14E-03
	Cs-134	0.00E+00	0.00E+00	0.00E+00	5.94E-07	2.31E-09	6.79E-05	8.34E-05	2.02E-02	0.00E+00	2.66E-03	2.81E-06	1.71E-08	2.30E-02
	HTO	6.06E-02	0.00E+00	0.00E+00	3.41E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-05	4.14E-02	2.14E-03	1.04E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-05	5.71E-03	3.90E-04	6.11E-03
	Total by pathway	6.06E-02	5.71E-09	0.00E+00	3.41E-04	2.32E-09	6.79E-05	8.35E-05	2.02E-02	0.00E+00	2.99E-03	4.78E-02	2.70E-03	1.35E-01
Dairy Farm - Adult	C-14	2.11E-06	2.43E-09	1.80E-07	1.28E-10	0.00E+00	0.00E+00	5.22E-10	2.78E-10	0.00E+00	0.00E+00	3.08E-04	7.46E-04	1.06E-03
	Cs-134	0.00E+00	0.00E+00	8.65E-06	1.35E-05	0.00E+00	0.00E+00	6.50E-06	1.55E-02	0.00E+00	0.00E+00	0.00E+00	1.70E-09	1.55E-02
	HTO	3.17E-02	0.00E+00	9.18E-03	5.09E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-02	1.51E-02	6.72E-02
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-03	1.02E-03	2.51E-03
	Total by pathway	3.17E-02	2.43E-09	9.19E-03	5.22E-04	0.00E+00	0.00E+00	6.50E-06	1.55E-02	0.00E+00	0.00E+00	1.25E-02	1.69E-02	8.63E-02
Dairy Farm - Child 10y	C-14	3.02E-06	2.43E-09	9.88E-08	1.28E-10	0.00E+00	0.00E+00	9.90E-09	2.78E-10	0.00E+00	0.00E+00	3.00E-04	8.30E-04	1.13E-03
	Cs-134	0.00E+00	0.00E+00	2.54E-06	1.35E-05	0.00E+00	0.00E+00	6.58E-05	1.55E-02	0.00E+00	0.00E+00	0.00E+00	5.94E-10	1.56E-02
	HTO	3.77E-02	0.00E+00	4.57E-03	4.24E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.03E-03	2.02E-02	7.19E-02
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-03	1.00E-03	2.44E-03
	Total by pathway	3.77E-02	2.43E-09	4.57E-03	4.37E-04	0.00E+00	0.00E+00	6.58E-05	1.55E-02	0.00E+00	0.00E+00	1.08E-02	2.21E-02	9.11E-02
Dairy Farm - Infant 1y	C-14	2.06E-06	2.43E-09	0.00E+00	1.36E-13	0.00E+00	0.00E+00	2.20E-08	2.78E-10	0.00E+00	0.00E+00	2.23E-04	1.16E-03	1.38E-03
	Cs-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.34E-05	2.02E-02	0.00E+00	0.00E+00	0.00E+00	4.35E-10	2.02E-02
	HTO	2.60E-02	0.00E+00	0.00E+00	1.36E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.20E-03	3.81E-02	7.14E-02
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-03	1.31E-03	2.41E-03
	Total by pathway	2.60E-02	2.43E-09	0.00E+00	1.36E-04	0.00E+00	0.00E+00	8.35E-05	2.02E-02	0.00E+00	0.00E+00	8.53E-03	4.05E-02	9.54E-02
FSHR - Adult	C-14	4.46E-06	5.13E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.07E-03	0.00E+00	0.00E+00	9.08E-03
	Cs-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-01	0.00E+00	0.00E+00	2.74E-01
	HTO	6.74E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.03E-04	0.00E+00	0.00E+00	6.83E-02
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E-04	0.00E+00	0.00E+00	3.88E-04
	Total by pathway	6.74E-02	5.13E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.84E-01	0.00E+00	0.00E+00	3.51E-01
FSHR - Child 10y	C-14	6.36E-06	5.13E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.79E-03	0.00E+00	0.00E+00	8.80E-03
	Cs-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-01	0.00E+00	0.00E+00	1.42E-01
	HTO	8.01E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.93E-04	0.00E+00	0.00E+00	8.09E-02
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.73E-04	0.00E+00	0.00E+00	3.73E-04

Human Receptor	COPC	Radiological Dose by Pathway during Project Phases (uSv/a)												
		Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total by COPC
FSHR - Infant 1y	Total by pathway	8.01E-02	5.13E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-01	0.00E+00	0.00E+00	2.32E-01
	C-14	4.34E-06	5.13E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-03	0.00E+00	0.00E+00	6.13E-03
	Cs-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E-02	0.00E+00	0.00E+00	5.64E-02
	HTO	5.53E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.86E-04	0.00E+00	0.00E+00	5.59E-02
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.68E-04	0.00E+00	0.00E+00	2.68E-04
	Total by pathway	5.53E-02	5.13E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.34E-02	0.00E+00	0.00E+00	1.19E-01
Urban Resident WNW - Adult	C-14	5.44E-05	6.26E-08	5.49E-06	2.30E-10	9.19E-13	4.16E-11	5.22E-10	2.78E-10	0.00E+00	6.35E-06	7.22E-04	6.57E-08	7.89E-04
	Cs-134	0.00E+00	0.00E+00	2.99E-04	2.26E-05	1.98E-09	5.74E-04	6.50E-06	1.55E-02	0.00E+00	1.92E-04	8.97E-06	5.05E-12	1.66E-02
	HTO	7.99E-01	0.00E+00	1.11E-02	5.44E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.32E-07	2.65E-02	1.84E-06	8.37E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-07	3.57E-03	4.14E-07	3.57E-03
	Total by pathway	7.99E-01	6.26E-08	1.14E-02	5.67E-04	1.98E-09	5.74E-04	6.50E-06	1.55E-02	0.00E+00	1.99E-04	3.08E-02	2.32E-06	8.58E-01
Urban Resident WNW - Child 10y	C-14	7.76E-05	6.26E-08	3.01E-06	2.30E-10	1.74E-11	4.16E-11	9.90E-09	2.78E-10	0.00E+00	6.15E-06	7.05E-04	6.97E-08	7.92E-04
	Cs-134	0.00E+00	0.00E+00	8.78E-05	2.26E-05	2.01E-08	5.74E-04	6.58E-05	1.55E-02	0.00E+00	9.92E-05	4.36E-06	2.19E-12	1.64E-02
	HTO	9.50E-01	0.00E+00	5.52E-03	4.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.55E-07	2.24E-02	1.65E-06	9.78E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-07	3.46E-03	4.08E-07	3.46E-03
	Total by pathway	9.50E-01	6.26E-08	5.61E-03	4.76E-04	2.01E-08	5.74E-04	6.58E-05	1.55E-02	0.00E+00	1.06E-04	2.65E-02	2.13E-06	9.99E-01
Urban Resident WNW - Infant 1y	C-14	5.30E-05	6.26E-08	0.00E+00	2.62E-11	3.87E-11	4.16E-11	2.20E-08	2.78E-10	0.00E+00	4.29E-06	5.52E-04	9.87E-08	6.09E-04
	Cs-134	0.00E+00	0.00E+00	0.00E+00	3.01E-06	2.55E-08	7.47E-04	8.34E-05	2.02E-02	0.00E+00	3.95E-05	2.05E-06	1.26E-12	2.10E-02
	HTO	6.55E-01	0.00E+00	0.00E+00	2.08E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-07	1.93E-02	2.32E-06	6.75E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-07	2.81E-03	5.57E-07	2.81E-03
	Total by pathway	6.55E-01	6.26E-08	0.00E+00	2.11E-04	2.55E-08	7.47E-04	8.35E-05	2.02E-02	0.00E+00	4.44E-05	2.27E-02	2.97E-06	6.99E-01
Harvester -Adult	C-14	6.29E-05	7.23E-08	5.49E-06	2.30E-10	9.19E-13	4.16E-11	5.22E-10	2.78E-10	0.00E+00	5.00E-03	6.16E-04	5.08E-03	1.08E-02
	Cs-134	0.00E+00	0.00E+00	2.99E-04	2.26E-05	1.98E-09	5.74E-04	6.50E-06	1.55E-02	0.00E+00	1.51E-01	1.16E-05	4.92E-04	1.68E-01
	HTO	9.21E-01	0.00E+00	1.21E-02	5.74E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.98E-04	2.95E-02	1.98E-02	9.84E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.14E-04	2.95E-03	3.11E-03	6.28E-03
	Total by pathway	9.21E-01	7.23E-08	1.24E-02	5.97E-04	1.98E-09	5.74E-04	6.50E-06	1.55E-02	0.00E+00	1.56E-01	3.31E-02	2.85E-02	1.17E+00
Harvester - Child 10y	C-14	8.97E-05	7.23E-08	3.01E-06	2.30E-10	1.74E-11	4.16E-11	9.90E-09	2.78E-10	0.00E+00	4.84E-03	4.61E-04	3.49E-03	8.88E-03
	Cs-134	0.00E+00	0.00E+00	8.78E-05	2.26E-05	2.01E-08	5.74E-04	6.58E-05	1.55E-02	0.00E+00	7.80E-02	4.64E-06	2.02E-04	9.44E-02
	HTO	1.10E+00	0.00E+00	6.02E-03	4.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.37E-04	2.00E-02	1.09E-02	1.13E+00
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-04	2.20E-03	1.87E-03	4.27E-03
	Total by pathway	1.10E+00	7.23E-08	6.11E-03	5.01E-04	2.01E-08	5.74E-04	6.58E-05	1.55E-02	0.00E+00	8.35E-02	2.27E-02	1.65E-02	1.24E+00
Harvester - Infant 1y	C-14	6.12E-05	7.23E-08	0.00E+00	2.63E-11	3.87E-11	4.16E-11	2.20E-08	2.78E-10	0.00E+00	3.37E-03	3.36E-05	2.52E-03	5.99E-03
	Cs-134	0.00E+00	0.00E+00	0.00E+00	3.01E-06	2.55E-08	7.47E-04	8.34E-05	2.02E-02	0.00E+00	3.11E-02	1.93E-07	8.46E-05	5.21E-02
	HTO	7.55E-01	0.00E+00	0.00E+00	2.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.23E-04	1.54E-03	8.18E-03	7.66E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-04	1.65E-04	1.36E-03	1.67E-03
	Total by pathway	7.56E-01	7.23E-08	0.00E+00	2.37E-04	2.55E-08	7.47E-04	8.35E-05	2.02E-02	0.00E+00	3.49E-02	1.74E-03	1.21E-02	8.26E-01
Industrial - Adult	C-14	2.05E-05	2.36E-08	1.52E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-05
	Cs-134	0.00E+00	0.00E+00	8.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.29E-05
	HTO	3.03E-01	0.00E+00	1.24E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total by pathway	3.03E-01	0.00E+00	1.24E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-01

Human Receptor	COPC	Radiological Dose by Pathway during Project Phases (uSv/a)												
		Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total by COPC
C2 - Adult	Total by pathway	3.03E-01	2.36E-08	1.32E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-01
	C-14	1.59E-05	1.82E-08	6.61E-06	2.67E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-05
	Cs-134	0.00E+00	0.00E+00	3.61E-04	2.37E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.63E-04
	HTO	2.37E-01	0.00E+00	5.39E-03	4.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total by pathway	2.37E-01	1.82E-08	5.76E-03	4.81E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-01
C2 - Child 10y	C-14	2.26E-05	1.82E-08	3.63E-06	2.67E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.63E-05
	Cs-134	0.00E+00	0.00E+00	1.06E-04	2.37E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-04
	HTO	2.81E-01	0.00E+00	2.68E-03	3.81E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.84E-01
	OBT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total by pathway	2.81E-01	1.82E-08	2.79E-03	4.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.84E-01

Table C-2: Concentrations of Radionuclides in Environmental Media

Environmental Media	Location	Unit	Estimated Point Concentrations of Radionuclides			
			C-14	Cs-134	HTO	OBT
Outdoor air	Farm NE	Bq/m ³	6.96E-05	0.00E+00	4.14E-01	0.00E+00
	Dairy Farm	Bq/m ³	2.96E-05	0.00E+00	1.77E-01	0.00E+00
	Sport Fisher	Bq/m ³	6.24E-03	0.00E+00	3.78E+01	0.00E+00
	Urban Resident WNW	Bq/m ³	7.62E-04	0.00E+00	4.47E+00	0.00E+00
	Harvester	Bq/m ³	8.80E-04	0.00E+00	5.16E+00	0.00E+00
	Industrial	Bq/m ³	1.25E-03	0.00E+00	7.39E+00	0.00E+00
	C2	Bq/m ³	2.22E-04	0.00E+00	1.33E+00	0.00E+00
Loam	Farm NE	Bq/kg(dw)	2.67E-07	1.76E-05	0.00E+00	0.00E+00
	Dairy Farm	Bq/kg(dw)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Urban Resident WNW	Bq/kg(dw)	2.93E-06	1.93E-04	0.00E+00	0.00E+00
	Harvester	Bq/kg(dw)	2.93E-06	1.93E-04	0.00E+00	0.00E+00
	C2	Bq/kg(dw)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Deep Well	Well (11.3) in Farm NE	Bq/L	3.76E-07	0.00E+00	9.55E+00	0.00E+00
	Well (22.2) in Farm NE	Bq/L	3.56E-07	0.00E+00	4.96E+00	0.00E+00
	Well (25.1) in Farm NE	Bq/L	3.51E-07	0.00E+00	4.17E+00	0.00E+00
	Well (40.6) in Farm NE	Bq/L	3.25E-07	0.00E+00	1.64E+00	0.00E+00
Loam PoreWater	Dairy Farm	Bq/L	1.69E-07	0.00E+00	8.06E+00	0.00E+00
Deep Well	Well (21.6) in Dairy Farm	Bq/L	1.52E-07	0.00E+00	2.21E+00	0.00E+00
	Well (22.1) in Dairy Farm	Bq/L	1.51E-07	0.00E+00	2.14E+00	0.00E+00
	Well (24.7) in Dairy Farm	Bq/L	1.50E-07	0.00E+00	1.83E+00	0.00E+00
LakeShore Water	Outfall	Bq/L	4.00E-04	6.00E-04	8.78E+00	0.00E+00
Lake Sediment	Outfall	Bq/kg(dw)	2.00E-02	5.70E+00	0.00E+00	0.00E+00
LakeShore Water	A-WSP	Bq/L	3.00E-05	5.00E-05	7.10E-01	0.00E+00

Table C-3: Concentrations of Radionuclides in Food Items

Food Item	Location	Unit	Estimated Point Concentrations of Radionuclides in Food Items for Human Receptors			
			C-14	Cs-134	HTO	OBT
Beef(meat)	Farm NE	Bq/kg(fw)	6.61E-02	8.51E-07	2.39E+01	1.52E+00
Deer	Farm NE	Bq/kg(fw)	6.66E-02	4.82E-07	1.47E+01	1.01E+00
Poultry(egg)	Farm NE	Bq/kg(fw)	1.39E-02	4.94E-08	1.29E+01	1.26E+00
Poultry(meat)	Farm NE	Bq/kg(fw)	2.16E-02	3.33E-07	1.28E+01	1.51E+00
Fruits	Farm NE	Bq/kg(fw)	1.66E-02	9.75E-06	3.94E+01	1.72E+00
Potatoes	Farm NE	Bq/kg(fw)	3.48E-02	4.79E-06	3.46E+01	3.60E+00
Garden Vegetables	Farm NE	Bq/kg(fw)	1.66E-02	9.75E-06	3.94E+01	1.72E+00
Honey Bee	Farm NE	Bq/kg(fw)	1.66E-01	5.30E-08	1.02E+02	1.00E+01
Beef(meat)	Dairy Farm	Bq/kg(fw)	2.66E-02	0.00E+00	8.30E+00	4.37E-01
Poultry(egg)	Dairy Farm	Bq/kg(fw)	0.00E+00	0.00E+00	1.71E+00	1.49E-01
Poultry(meat)	Dairy Farm	Bq/kg(fw)	0.00E+00	0.00E+00	1.71E+00	1.88E-01
Cow(milk)	Dairy Farm	Bq/kg(fw)	8.60E-03	0.00E+00	1.01E+01	1.00E-01
Fruits	Dairy Farm	Bq/kg(fw)	7.05E-03	0.00E+00	9.87E+00	4.30E-01
Potatoes	Dairy Farm	Bq/kg(fw)	1.48E-02	0.00E+00	8.66E+00	9.03E-01
Garden Vegetables	Dairy Farm	Bq/kg(fw)	7.05E-03	0.00E+00	9.87E+00	4.30E-01
Fruits	Urban Resident WNW	Bq/kg(fw)	1.81E-01	1.04E-04	2.52E+02	1.10E+01
Potatoes	Urban Resident WNW	Bq/kg(fw)	3.81E-01	5.13E-05	2.21E+02	2.30E+01
Garden Vegetables	Urban Resident WNW	Bq/kg(fw)	1.81E-01	1.04E-04	2.52E+02	1.10E+01
Deer	Harvester	Bq/kg(fw)	8.43E-01	5.30E-06	1.83E+02	1.26E+01
Deer Organ	Harvester	Bq/kg(fw)	8.43E-01	4.80E-06	1.83E+02	1.26E+01
Canada Goose	Harvester	Bq/kg(fw)	1.02E+00	2.56E-06	1.85E+02	1.12E+01
Mallard	Harvester	Bq/kg(fw)	1.61E+01	1.00E-01	1.27E+01	8.10E-01
Rabbit	Harvester	Bq/kg(fw)	8.43E-01	5.06E-04	1.81E+02	1.35E+01
Freshwater plant	Outfall	Bq/kg(fw)	2.36E+00	1.32E-01	6.59E+00	9.66E-01
Freshwater Invertebrate	Outfall	Bq/kg(fw)	2.24E+00	5.94E-02	6.59E+00	1.23E+00
Walleye	Outfall	Bq/kg(fw)	2.28E+00	2.10E+00	6.59E+00	1.23E+00

1675 Montgomery Park Road, Pickering, Ontario L1V 2R5

PNGS Climate Resilience Assessment Summary

The effects of climate change are expected to impact many parts of Canadian society, including our energy infrastructure. To better understand these potential impacts, Ontario Power Generation's (OPG's) Pickering Nuclear Generating Station (PNGS) completed an assessment to demonstrate safe and efficient operation of the station for at least the next 30 years under changing climate parameters. This assessment focused on systems related to safety or those having significant economic importance.

The assessment concluded the nuclear safety analysis remains valid. In many cases, existing probabilistic safety assessments already account for worst-case scenarios from weather events, with the Severe Weather Emergency Preparedness Procedure mitigating impacts and ensuring safe operation during extreme weather. OPG is well prepared for extreme weather events, regardless of their cause.

In the longer term, current climate science indicates there is sufficient time to adapt to changing environmental conditions. Analysis of climate projection data for the next ten years provides confidence that any exceedances in operating limits will result in reduced component efficiency or lifespan through accelerated aging, rather than sudden failure. OPG has robust aging management, preventative maintenance and surveillance programs already in place that can accommodate such gradual changes within the anticipated timeframe.

To conduct this analysis, OPG developed a first-of-a-kind industry methodology that aligns with guidance from the Electric Power Research Institute (EPRI) and the Institute of Nuclear Power Operators (INPO). This methodology progresses through four stages:

1. **Climate Hazard Identification and Projections:** Working with climate scientists to understand historical and projected climate risks, including those from Gradual Climate Change (GCC), Extreme Weather Events (EWEs), and Other Natural External Events (ONEEs).
2. **Exposure Assessment:** Determining exposure to climate hazards for high-value or critical Systems, Structures and Components (SSCs).
3. **Vulnerability Assessment:** Evaluating exposed SSCs for potential performance impacts.
4. **Adaptation Options Strategy:** Developing potential adaptation options for identified SSCs.

Further detailed analysis is being planned that incorporates system and site-specific climate projections prior to determining appropriate treatment plans and associated timeframes, while leveraging existing systems and processes wherever feasible. OPG's resilience strategy combines the site's proven ability to manage extreme conditions with a graded approach to risk management.

REPORT



PICKERING NGS UNITS 5-8: CLIMATE SUSCEPTIBILITY AND ADAPTATION SUMMARY REPORT


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Ontario Power Generation

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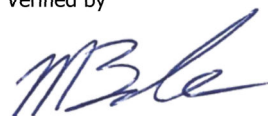
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Name: Adi Walke	
Dept: Engineering Strategy	
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Notes: N/A	

Prepared by



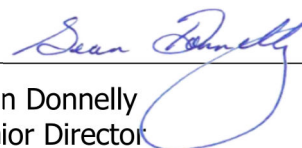
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Revision Summary

Rev	Date	Author	Comments
00	02 Jan 2025	L. Moss crop	Issued for Review and Comment
01	30 Jan 2025	L. Moss crop	Issued as Final
02	20 Mar 2025	L. Moss crop	Issued with Revisions as Requested by PNGS
03	31 Mar 2025	L. Moss crop	Issued as Final

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EXECUTIVE SUMMARY

Ontario Power Generation's (OPG) Pickering Nuclear Generating Station is located on Williams Treaties First Nations traditional and Treaty Territory, situated on the north shore of Lake Ontario, within the City of Pickering, in the Regional municipality of Durham, Ontario. OPG values the relationship it holds with the Williams Treaties First Nations and remains committed to meaningful engagement with them, including in the areas of environmental stewardship and climate change.

OPG developed an industry first of a kind methodology to generally align with the nuclear industry accepted Electric Power Research Institute (EPRI) "*Climate Vulnerability Assessment Guidance for Nuclear Power Plants*" Technical Report # 3002023814 which is available to public online at https://www.epri.com/research/programs/061177/results/30_02023814. The climate resilience assessment at OPG involved a sequence of evaluations including: climate hazard identification and projections, exposure assessment, vulnerability assessment followed by identification of adaptation options.

Analysis of recent data from 2010 through 2020 shows that extreme events have an essentially negligible impact on nuclear generation capacity factors (the percentage of the time the nuclear power plant (NPP) is running at full power and providing electricity to the grid), which are by far the highest of any carbon-free source of generation.

Climate-related hazards may negatively impact operation of Pickering 5- 8. These hazards may come in the form of gradual climate change (GCC), extreme weather events (EWEs), or other natural external events (ONEEs). Modifications to safety-related and economically important equipment and other adaptive measures may be required to ensure the continued safe operation of the plant and in turn would help alleviate effects from climate-related hazards.

A project was initiated by OPG to identify and assess the climate vulnerability of high value, either safety-related or economically important, systems. A screening assessment was performed to narrow down the list of systems, structures and components (SSCs) to those that were considered safety-related or high value and that were potentially impacted by climate change hazards. A vulnerability assessment (summarized in Section 3.0) was performed for 39 systems and 17 hazards. Systems which were determined to have one or more components that are impacted by climate change were concluded to be potentially susceptible to climate change. SSCs which were not determined to be impacted by a climate change hazard but are expected to have reduced, or encroached upon, margins for operation were also identified.

Adaptation options were presented in a graded approach to take advantage of improvements to existing programs/procedures first, followed by adaptations by the site which increase in complexity to potentially replace infrastructure to improve PNGS resilience to climate change. With the implementation of updates to many of OPGs programs and plans, many of the climate-related hazards would be addressed; however, OPG will need to implement design changes or updates to systems for longer term adaptation.

Climate change is seen as a gradual change which is likely to increase the severity of hazards already evaluated and screened routinely. Routine preventative maintenance programs and measures to monitor the daily operation of the plant are seen as sufficient to discover changes being brought on to PNGS by climate change.

An important procedure for adapting to climate change is the Severe Weather Emergency Preparedness procedure (N-PROC-RA-0095) as it addresses responses to storms and more severe weather events anticipated with climate change. This procedure also helps to mitigate climate hazards where there is low confidence in available climate projection data. Additionally, the winterization and summarization procedure (NK30-ESI-01510-00001 R001) addresses many climate-related impacts, although it is expected that this procedure will need to be revised as climate shifts. These procedures will help adapt to climate hazards, especially those where there is low confidence on climate projections data.

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY.....	3
1.0 INTRODUCTION	8
1.1 Objectives.....	9
1.2 Acronyms	9
2.0 CLIMATE HAZARDS	10
2.1 Climate Projections.....	14
3.0 CLIMATE EXPOSURE AND VULNERABILITY ASSESSMENT	15
3.1 Summary	15
3.2 Methodology	15
3.3 Exposure Assessment	16
3.3.1 Screening Criteria	16
3.4 Vulnerability Assessment	17
4.0 CLIMATE RISK ADAPTATION STRATEGIES	20
4.1 Summary	20
4.2 Methodology	21
4.3 Adaptation Strategies.....	21
4.3.1 Existing Programs/Initiatives	21
4.3.2 Climate Change Adaptations	22
5.0 CONCLUSION	28
6.0 BIBLIOGRAPHY	29
APPENDIX A : CLIMATE PROJECTIONS.....	32
APPENDIX B : EQUIPMENT IMPACTED BY CLIMATE HAZARDS	37

LIST OF TABLES

Table 1: List of Climate Change-Related Hazards Grouped by Priority.....	11
Table 2. Summary of PNGS Climate Hazards Bounding Analysis Results.....	12
Table 3. Safety or Economically Important Systems Exposed to Climate Hazards	16
Table 4. Summary of SSC Status.....	18
Table 5. Adaptation Measures Specific to Equipment.....	23
Table 6. Equipment Impacted by Climate Hazards.....	37

LIST OF FIGURES

Figure 1. Categorization of Adaptation Options.....	29
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1.0 INTRODUCTION

Ontario Power Generation's (OPG) Pickering Nuclear Generating Station (PNGS) is located on Williams Treaties First Nations traditional and Treaty Territory, situated on the north shore of Lake Ontario, within the City of Pickering, in the Regional municipality of Durham, Ontario. OPG values the relationship it holds with the Williams Treaties First Nations and remains committed to meaningful engagement with them, including in the areas of environmental stewardship and climate change. OPG plans to share this report with First Nations rights holders and welcomes feedback and perspectives to inform future revisions.

As a climate change leader, one of the guiding principles from the OPG Climate Change Plan¹ includes engaging Indigenous Nations and communities and reaffirms OPG's commitment to grow long-term, mutually beneficial working relationships with Indigenous Nations and communities near our current and future operations. The Plan highlights OPG's climate goals, including the value of nuclear refurbishment and continued operations, as well as an action plan. Additionally, OPG's Reconciliation Action Plan² includes a key pillar of Environmental Stewardship, and specifically for climate change, identifies opportunities to work towards seeking to incorporate Indigenous values and priorities within climate assessments, and to work with Indigenous Nations and communities to gather and share perspectives about climate change.

OPG developed an industry first of a kind methodology to generally align with the nuclear industry accepted Electric Power Research Institute (EPRI) "*Climate Vulnerability Assessment Guidance for Nuclear Power Plants*". The climate resilience assessment at OPG involved a sequence of evaluations:

1. **Climate Hazard Identification and Projections:** Climate hazards identification and characterization constitute a critical step in performing a site climate change resilience assessment. OPG collaborated with multiple climate scientists to identify various climate-related hazards, including gradual climate change (GCC), extreme weather events (EWEs), and other natural external events (ONEEs). OPG completed a customized assessment of physical climate hazards at PNGS nuclear to better understand historical and projected climate-related risks.
2. **Exposure Assessment:** A screening assessment was performed to evaluate a list of Systems Structures and Components (SSC) and determined if they met criteria for being high value or critical components and determined if they are exposed to climate hazards.
 - a) **Climate Hazard Identification and Projections:** Climate hazards identification and characterization constitute a critical step in performing a site climate change resilience assessment. OPG collaborated with multiple climate scientists to identify various climate-related hazards, including gradual climate change (GCC), extreme weather events (EWEs), and other natural external events (ONEEs). OPG completed a customized assessment

¹ OPG's Climate Change plan outlines the goals that will guide OPG's actions to address climate change. <https://www.opg.com/documents/opg-climate-change-plan-2020/>

² OPG's Reconciliation Action Plan is the roadmap for partnership with Indigenous communities, businesses, and organizations. <https://www.opg.com/documents/reconciliation-action-plan-pdf/>

of physical climate hazards at PNGS nuclear to better understand historical and projected climate-related risks.

- b) **Exposure Assessment:** A screening assessment was performed to evaluate a list of Systems Structures and Components (SSC) and determined if they met criteria for being high value or critical to safety components and determined if they are exposed to climate hazards.

3. **Vulnerability Assessment:** Assess the possible impact of climate on identified SSC. This involved comparing the climate data against the SSC design requirements to assess the impact of climate on the system. Existing margins to key parameters were identified and compared with projected future changes to environmental/climate indicators to identify systems which may be subject to climate change effects.

This document provides a summary of the reports, presenting first the exposure and vulnerability assessment followed by the adaptation measures identified. This document is intended to provide an accessible, yet complete, summary of the evaluation.

1.1 Objectives

The objective of the project was to:

- Determine the systems, structures and components that are important for nuclear safety, or which have economic importance to the station and may be impacted by climate change. These results are in [1] and [2].
- Evaluate the effect of climate change on the list of SSCs determined, based on projected changes to environmental parameters, and identify which environmental/climate parameters will impact the equipment, as well as where limits may be exceeded for each SSC identified in the exposure assessment. These results are in [3] and [4].
- Identify possible adaptation measures to address the risks associated with climate change. This strategy in full is [5].

1.2 Acronyms

ACU	Air Condition Unit
CCW	Component Cooling Water
CER	Control Equipment Room
CERC	Control Equipment Room Cooling
DAWR	Design/Analysis Work Require
DWI	Deep Water Intake
ECI	Emergency Coolant Injection
EPG	Emergency Power Generator
EPRI	Electric Power Research Institute
EWE	Extreme Weather Event
EWS	Emergency Water Supply
EWPSB	Emergency Water and Power Supply Building
FADS	Filtered Air Discharge System

GCC	Gradual climate change
GHG	Greenhouse gas
HX	Heat exchanger
HVAC	Heating, Ventilation and Air Conditioning
IPCC	Intergovernmental Panel on climate change
MPO	Main Power Output
ONEE	Other Natural External Events
OPEX	Operating Experience
OPG	Ontario Power Generation
PEVS	Powerhouse emergency venting
PNGS	Pickering Nuclear Generating Station
RCP	Regional climate projection
RMP	Risk monitoring plan
SIS	Systems important to safety
SG	Standby Generator
SSC	systems, structures and components

2.0 CLIMATE HAZARDS

The changing climate poses potential threats and uncertainties to existing and planned infrastructure. Widespread and rapid changes in the atmosphere, ocean, cryosphere, and biosphere have occurred. Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. Due to the changes both globally and regionally, design parameters based on historical weather and climate information might no longer be sufficient and may need to be revised to consider local climate change. Analysis of recent data from 2010 through 2020 shows that extreme events have an essentially negligible impact on nuclear generation capacity factors (the percentage of the time the nuclear power plant (NPP) is running at full power and providing electricity to the grid), which are by far the highest of any carbon-free source of generation [6].

Climate change is caused by anthropogenic emissions of greenhouse gases (GHGs) arising from unsustainable energy use; the large-scale transformation of land use, primarily urbanization and deforestation; and lifestyles and patterns of consumption and production across regions. Historical GHG emissions have led to an increase of the global mean temperature of about 1.1°C in 2011-2020 compared to 1850-1900. GHG emissions in 2030 implied by nationally determined contributions make it likely that warming will exceed 1.5°C during the 21st century and make it harder to limit warming below 2°C. Depending on the future emissions of GHGs, the global mean temperature could increase by up to 3.3°C by 2100 [7].

Based on the site location, the climate change-related hazards identified in Table 1 were determined by OPG, and subsequently prioritized based on assessment of climate bounded data [8].

Table 1: List of Climate Change-Related Hazards Grouped by Priority

High Priority	Medium Priority	Low Priority
Gradual Climate Change (GCC)		
Increasing ambient temperature	Low lake/river-level and hydrological drought	Air quality (pollution)
Increasing water temperature	Acidification (of the ocean or lake)	Humidity
Total precipitation	-	-
Extreme Weather Events (EWEs)		
Extreme high water temperature	Blizzard/snowstorm	Extreme soil temperature
Extreme low water temperature	Cold spell	Extreme air pressure
Flooding due to rising lake water level	Downburst/derecho	Flash freeze
Flooding due to runoff, riverine flooding, local site area flooding (including snow melt)	Extra-tropical storm	-
Flooding due to waves, storm surges, seiche, meteotsunami, waterspout, and tsunami	Extreme snowfall	-
Extreme high air temperature	Extreme snowpack/snow accumulation	-
Extreme low air temperature	Heat wave	-
Extreme rainfall (probable maximum precipitation)	Hurricane/typhoon	-
Tornado	Ice storm/freezing rain/sleet	-
Other Natural External Events (ONEEs)		
Flooding due to high groundwater	-	Landslide/slope instability
Flooding due to sudden release of water from natural or artificial storage	-	Soil frost
Flooding due to upstream obstruction upstream of river channels (by landslides, ice jams, logs, debris, or volcanic materials)	-	Coastal erosion (erosion by water)
-	-	Frazil ice/ice barrier/surface ice (on river or lake)
-	-	Biofouling

The assessments in this project are evaluated only against the high and medium priority climate hazards.

The PNGS Climate Change Bounding Analysis memo [8] provides the bounding/threshold values for each climate change-related hazard selected, their source, climate projections associated under the Intergovernmental Panel on Climate

Change's (IPCC) Regional Climate Projection (RCP) 8.5 and RCP 4.5³ scenarios, and justification for their selection. Where a bounding/threshold value could not be identified, a rationale was provided. The bounding/threshold values for RCP 4.5 and RCP 8.5 were used to assess the impact of the climate change-related hazards on the exposed SSCs.

A summary of the results of the PNGS Climate Change Bounding Analysis memo [8] can be found in Table 2 for both RCP4.5 and RCP8.5. Based on the results of this memo, some climate change-related hazards were not assessed further as their projections indicated that future climate-related hazards are expected to be bounded by historic conditions.

Table 2. Summary of PNGS Climate Hazards Bounding Analysis Results

Hazard			Assessed (Y/N)	
			RCP4.5	RCP8.5
Gradual Climate Change (GCC)	Increasing ambient temperature		Y	Y
	Increasing water temperature		Y	Y
	Total precipitation		Y	Y
	Low lake/ river-level and hydrological drought		Y	Y
	Acidification (of the ocean or lake)		N	Y
Extreme Weather	Water Temp	Extreme high	Y	Y

³ The IPCC has defined four RCPs which describe different 21st century pathways of GHG emissions and atmospheric concentrations, air pollutant emissions, and land use leading to specific radiative forcing characteristics extending up to the year 2100. The RCPs are used for making projections based on the factors which primarily drive anthropogenic GHG emissions: population size, economic activity, lifestyle, energy use, land use patterns, technology, and climate policy. The RCPs include a stringent mitigation scenario (RCP2.6), two intermediate scenarios (RCP4.5 and RCP6.0) and one scenario with very high GHG emissions (RCP8.5) [6].

Hazard			Result	Assessed (Y/N)	
				RCP4.5	RCP8.5
Events (EWEs)		Extreme low	The measured extreme low water temperatures will be higher than historical temperatures under the influence of either emissions scenario. While the water temperature extreme will increase by 0.6 °C in the RCP4.5 scenario, it is projected to increase by 1.4 °C in the high emission scenario. Therefore, the extreme low water temperature that SSCs will be subjected to will be higher than what they have been subjected to in the past. This hazard will not be assessed further as it represents a less extreme low temperature than previously experienced.	N	N
	Flooding	Rising lake water level	An increase in the annual lake level maximum is projected for both emission scenarios.	Y	Y
		Runoff, riverine flooding, local site area flooding	Extreme rainfall events can lead to flooding when either the design limits of the storm sewer systems are exceeded or when the soils cannot absorb the rainfall fast enough. Extreme rainfall events are expected to increase, and therefore incidents of flooding due to runoff can be expected to increase.	Y	Y
		Waves, storm surges, seiche, meteotsunami, waterspout, and tsunami	The historical absolute maximum wave height 3.1 m will not be reached as the projected highest wave of all storms will likely be 2.8 m. However, on average, the projected wave height is 2.2 m compared to the historical one of 2.1 m. Hence, no significant trend in wave height and consequent flooding is projected for PNGS. Therefore, this will not be assessed further.	N	N
	Air Temp	Extreme high	There is expected to be an increase in extreme high air temperatures for PNGS.	Y	Y
		Extreme low	There is expected to be an increase in extreme low air temperatures for PNGS. Therefore, the extreme low air temperature that SSCs will be subjected to will be higher than what they have been subjected to in the past. This hazard will not be assessed further as it represents a less extreme low temperature than previously experienced.	N	N
	Extreme rainfall		The 10-year event of annual maximum of the daily rainfall is projected to increase under both emissions scenarios.	Y	Y
	Tornado		The frequency, intensity, and areal extent of thunderstorms and their associated features such as tornados in relation to climate change is difficult to assess. The occurrence of more and more severe thunderstorms and tornados with progressive warming is possible in southern Ontario. However, a conclusive statement about the change in frequency or intensity of tornados with climate change is not possible due to the limited predictability of these features.	Y	Y
	Blizzard/ snowstorm		For the end of the century, the frequency of snowstorms north of Lake Ontario is projected to decrease by 20 to 30% in the RCP8.5 scenario as more winter precipitation will shift to rainfall. Due to limited predictability, it is currently not possible to provide projections regarding changing in intensity of blizzards and snowstorms with climate change.	Y	Y
	Cold spell		Cold spells, defined as at least 3 consecutive days with daily minimum temperatures below -20 °C are unlikely to be a significant climate hazard at PNGS. Although, the probability of cold spells will likely	N	N

Hazard		Result	Assessed (Y/N)	
			RCP4.5	RCP8.5
		increase over the mid-term, it will remain very low. Therefore, this hazard will not be assessed further.		
	Downburst/ derecho	The impact of climate change on the 'ingredients' for derechos points towards the potential of more frequent and/or more intense derechos, no scientific consensus has been reached. However, as the jet stream shifts further poleward with climate change due to the faster warming of the Arctic, the favorable conditions for derechos will also shift further north. This could increase the frequency of derechos in southern Ontario.	Y	Y
	Extra-tropical storm	With a warmer Arctic, the jet stream will likely shift further north in winter, potentially bringing PNGS into the path of the jet stream and extra-tropical cyclones. No scientific consensus on the impact of climate change on the path, strength, and frequency of extra-tropical cyclones has been reached and future changes to these storms remain uncertain.	Y	Y
	Extreme snowfall	Overall, the trend in extreme snowfall amounts is weak likely due to offsetting effects of increased winter precipitation and warmer winter temperatures. There is projected to be a small decrease in extreme snowfall for PNGS. Therefore, this hazard will not be further assessed as it is projected to be less extreme than previously experienced.	N	N
	Extreme snowpack/ snow accumulation	There is projected to be an increase in extreme snowpack for PNGS for the intermediate-emission scenario (RCP4.5) and in decrease for the high-emission RCP8.5. Therefore, this will not be assessed for RCP8.5.	Y	N
	Heat wave	Heatwaves, defined as at least 3 consecutive days with daily maximum temperatures above 30 °C are likely to increase in frequency, length, and intensity at PNGS.	Y	Y
	Hurricane/ typhoon	The wind speed and rainfall associated with tropical cyclones are projected to increase as a result of climate change.	Y	Y
	Ice storm/ freezing rain/ sleet	Freezing rain is projected to decrease under the RCP8.5 scenario as winter temperature will increase and precipitation will shift to rainfall. No projection was provided for the RCP4.5 scenario; it is assumed to remain unchanged. Therefore, this hazard will not be assessed further as it is not projected to be more extreme than previously experienced.	N	N
Other Natural External Events (ONEEs)	Flooding due to high groundwater	These hazards are bounded by Extreme Rainfall and High Lake Water Levels.	N	N

2.1 Climate Projections

All climate projections used in this project are shown in Appendix A.

3.0 CLIMATE EXPOSURE AND VULNERABILITY ASSESSMENT

3.1 Summary

The exposure assessment evaluated a list of SSCs and determined if they met criteria for being high value or critical components and then if they were possibly impacted by climate hazards. This exposure assessment limited the SSCs to those at potential risk of exposure to climate change-related hazards, in addition to several systems that were added by OPG as high value. The next phase was to take the equipment from the climate exposure assessment, and to identify which environmental/climate parameters were expected to impact the equipment, as well as where limits may be exceeded for each of the critical SSCs identified in the memo. This assessment also evaluated potential consequences of a changing climate and provided options for responding or adapting to manage the exposure.

The vulnerability assessment was performed for 39 systems and 17 hazards. Two hazard combinations of concurrent hazards which may result in increased impact to the SSCs were also assessed. Systems which were determined to have one or more components that are impacted by climate change were concluded to be susceptible to climate change. SSCs which were not determined to be impacted by a climate change hazard but are expected to see their margins for operation encroached on were also identified.

In total, 31 systems were identified as susceptible to climate change-related hazards or having their margins encroached on as a result of climate change. No systems were identified to be impacted by low lake/river level and hydrogeological drought. Although a number of systems were determined to be potentially impacted by high wind-related hazards, climate change projections are not currently available for these hazards. This susceptibility was not new with climate change impacts as they are assessed in high wind-specific assessments.

3.2 Methodology

Evaluating and managing the risk of climate change consists of a sequence of assessments. It begins with an assessment of the climate related hazards, evaluating potential changes in physical climate conditions (e.g., increase in lake temperature or ambient temperature) and is followed by evaluating the impact on the exposed systems [9]. The exposure assessment evaluated which SSCs might be in harm's way while the vulnerability assessment evaluated the potential consequences of exposure to a changing climate and provided preliminary options for responding or adapting to manage the impact.

The climate exposure assessment used a list of systems provided by OPG for consideration and the list of climate hazards listed in Table 1 as input and performed a screening assessment as follows:

1. Screened the list of systems for critical and high-value components / equipment among impacted assets to avoid redundant screening. Critical and high-value components and equipment included those important for nuclear safety and those which are economically important. Equipment important to nuclear safety was identified by searching through Operational Safety Requirements and other related documents, while economically important equipment was identified by having experienced operations staff review system design and operating documents and apply judgement. This screening of systems is described further in [1].

2. Of the critical components and equipment that were screened in during the previous step, screening was performed for susceptibility to climate-related impacts to determine SSCs which may be exposed to climate change-related hazards. The existing list of climate hazards includes external hazards resulting from GCC, EWEs, and ONEEs. Only the hazards identified as high- and medium-priority were considered in this assessment.

3. For SSCs which were screened in during step 2, key components were identified.

Subsequently, these identified SSCs were further evaluated to assess the susceptibility of these systems to the impacts of climate change, based on projected environmental values. This assessment was performed as follows for each identified asset:

4. Impacting climate variables (e.g., lake water/ ambient air temperatures) were identified. Indicators were selected to represent these variables.
5. Key limits and operational constraints for the equipment were identified.
6. Existing margins to key parameters were identified and compared with projected future changes to environmental/climate indicators to identify systems which may be subject to climate change effects. Impacts under different scenarios and concurrent hazards (i.e., hazard combinations) were considered.

To propose initial adaptation measures, existing programs were identified which are in use currently and can be adapted to consider impacts from climate change.

3.3 Exposure Assessment

3.3.1 Screening Criteria

Systems Important to Safety (SIS) include those structures and systems of the power plant which contribute significantly to the initiation, prevention, detection or mitigation of any failure sequence which could lead to damage of fuel or associated release of radionuclide or both [10].

The list of systems provided was screened to determine critical and high-value systems and components, which included those important for nuclear safety and those which are economically important. The screening was performed sequentially, with items screened first for safety and then for economics if not screened in for safety. The systems which were screened IN for safety or economic importance were then screened to determine their exposure to climate change-related hazards. The systems which were determined to be important and potentially susceptible to climate change-related are listed in Table 3. OPG requested several additional systems be included for consideration; these included:

- High value and critical heat exchangers such as moderator heat exchangers, shutdown cooling heat exchangers, and irradiated fuel bay heat exchangers.
- Rooms that contain batteries or other critical control equipment.
- Other equipment which may provide cooling.

Table 3. Safety or Economically Important Systems Exposed to Climate Hazards

Systems	
Air Systems	Irradiated Fuel Storage Bay Cooling

Systems	
Annulus Gas	Liquid Zone Control
Boiler Feedwater	Main Power Output
Buried Piping	Main Steam/Boiler Blowdown
Class I/II Battery Rooms	Moderator System
Class III	Powerhouse Emergency Venting
Class IV	Powerhouse Ventilation
Condenser Cooling Water	RAB Chilled Glycol System
Control Equipment Room Cooling	RB Ventilation and Vapour Recovery
Cover Gas	Reactor Building Cooling
Emergency Coolant Injection	Recirculating Cooling Water
Emergency Power Generator Cooling	Screenhouse
Emergency Power Supply	Service Water
Emergency Water Supply	Shutdown Cooling
End Shield Cooling	Standby Generators
Filtered Air Discharge System	Standby Generator Cooling
Fire Systems	Structures
Generator	Turbine
Generator/Turbine Cooling	Vacuum Building
Heating, Ventilation, and Air Conditioning	-

3.4 Vulnerability Assessment

The screened in systems were then assessed against the climate hazards presented in Section 2.0. In the context of this report, “susceptibility” to climate change-related hazards is defined as a projected hazard condition which may exceed operational parameters of the SSC at some point during the life of the station brought on by the long-term effects of climate change. It is also possible that the design and operational parameters for key SSCs will not be exceeded, but the projected hazard condition brought on by climate change may encroach on the margin for operation; in this case, an SSC has not been designated as being “susceptible”, but it has been noted that the margin for operation may be reduced.

A summary of the SSCs susceptibility to climate hazards is presented in Table 4. Systems which were determined to have one or more components that are susceptible to climate change are marked with “S”. SSCs which were not determined to be susceptible to a climate change hazard, but which may see a reduced margin for operation are marked with “M”. Hazards for which climate change projections are not available are marked with “P”.

Table 4. Summary of SSC Status

System/Climate Hazard	Gradual Climate Change (GCC)				Extreme Weather Events (EWEs)										Combined Hazards				
	Incr. ambient temp	Incr. water temp	Total precip.	Low lake/river-level and hydrological drought	Acidification (of the ocean or lake)	Water Temp: Extreme high	Flooding		Air Temp: Extreme high	Extreme rainfall	High Winds			Blizzard/snow storm	Extreme snowpack/snow accumulation	Heat wave	Hurricane/typhoon	Precipitation and	
							Rising lake water level	Runoff, riverine flooding, local site flooding			Tornado	Extra-tropical storm	Down burst/derecho					Flood	High Wind
Air Systems	S	-	-	-	-	-	-	-	S	-	P	P	P	-	-	S	S	-	P
Annulus Gas	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	-	S	-	P
Boiler Feedwater	-	M	-	-	S	M	-	-	-	-	-	-	-	-	-	-	-	-	-
Buried Piping	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Class I/II Battery Rooms	S	-	-	-	-	-	-	S	-	-	P	P	P	-	-	S	-	-	P
Class III	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Class IV	M	-	S	-	-	-	S	M	M	S	P	P	P	S	S	M	S	-	P
Condenser Cooling Water	-	M	-	-	S	M	-	-	-	-	-	-	-	-	-	-	S	-	-
Control Equipment Room Cooling	M	-	-	-	-	-	-	M	-	-	P	P	P	S	-	M	-	-	P
Cover Gas	-	S	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-
Emergency Coolant Injection	-	-	-	-	-	-	-	-	-	S	P	P	P	-	-	-	-	S	P
Emergency Power Generator Cooling	S	-	-	-	-	-	-	S	-	-	P	P	P	S	-	S	-	-	P
Emergency Power Supply	S	-	S	-	-	-	S	S	S	S	P	P	P	-	-	S	-	S	P
Emergency Water Supply	-	S	-	-	S	S	M	-	-	-	P	P	P	-	-	-	-	S	P
End Shield Cooling	-	S	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-
Filtered Air Discharge System	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	-	-	-	P
Fire Systems	-	-	-	-	-	-	-	-	-	-	P	P	P	S	S	-	-	-	P
Generator	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Generator/Turbine Cooling	-	S	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-
Heating, Ventilation, and Air Conditioning	M	-	-	-	-	-	-	M	-	-	P	P	P	S	-	M	-	-	P
Irradiated Fuel Storage Bay Cooling	-	S	-	-	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-
Liquid Zone Control	-	M	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-
Main Power Output	M	-	S	-	-	-	-	S	M	S	P	P	P	S	S	M	S	-	P
Main Steam/Boiler Blowdown	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	-	-	-	P
Moderator System	-	S	-	-	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-
Powerhouse Emergency Venting	-	-	-	-	-	-	-	-	-	-	P	P	P	S	S	-	-	-	P
Powerhouse Ventilation	M	-	-	-	-	-	-	-	M	-	P	P	P	S	-	M	-	-	P
RAB Chilled Glycol System	M	-	-	-	-	-	-	-	M	-	P	P	P	-	-	M	S	-	P
RB Ventilation and Vapour Recovery	M	-	-	-	-	-	-	-	M	-	P	P	P	S	-	M	-	-	P
Reactor Building Cooling	-	S	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-
Recirculating Cooling Water	-	M	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-

System/Climate Hazard	Gradual Climate Change (GCC)					Extreme Weather Events (EWEs)										Combined Hazards			
	Incr. ambient temp	Incr. water temp	Total precip.	Low lake/river-level and hydrological drought	Acidification (of the ocean or lake)	Water Temp: Extreme high	Flooding		Air Temp: Extreme high	Extreme rainfall	High Winds			Blizzard/snow storm	Extreme snowpack/snow accumulation	Heat wave	Hurricane/typhoon	Precipitation and	
							Rising lake water level	Runoff, riverine flooding, local site flooding			Tornado	Extra-tropical storm	Down burst/derecho					Flood	High Wind
Screenhouse	-	-	-	-	S	-	S	S	-	S	-	-	-	-	-	-	S	-	-
Service Water	-	S	-	-	S	S	-	-	-	-	-	-	-	-	-	-	S	-	-
Shutdown Cooling	-	S	-	-	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-
Standby Generator Cooling	S	-	-	-	-	-	-	S	S	-	P	P	P	-	S	S	-	-	P
Standby Generators	S	-	S	-	-	-	-	S	S	S	P	P	P	-	-	S	-	-	P
Structures	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	-	-	-	P
Turbine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Building	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	-	-	-	P

S – SSC is susceptible to the hazard

M – SSC is not considered susceptible but may see reduced margin for operation.

P – Climate change projections are not currently available

“-” – No climate change hazard susceptibility anticipated

4.0 CLIMATE RISK ADAPTATION STRATEGIES

4.1 Summary

This section summarizes the potential adaptation options for SSCs which may be impacted by climate change-related hazards.

Adaptation options were provided for the SSCs identified for the impacted systems listed in Table 4, with the following exceptions:

- Systems that were determined to have no impact from climate change-related hazards:
 - Buried piping.
 - Class III.
 - Generator (Main Generator, 41000-TURBINE GEN).
 - Turbine (High-Pressure Turbine (41110-HP) and the Low-Pressure Turbines (41110-LP1/2/3).
- Systems that were only impacted by high wind hazards, as suitable recommendations are made for these hazards in existing assessments and no additional climate change adaptation will be required:
 - Filtered Air Discharge System (FADS).
 - Main Steam/Boiler Blowdown.
 - Structures.
 - Vacuum Building.

For the remaining systems, adaptation options were provided for 90 pieces of equipment, divided into different equipment types. The adaptation options are provided for each equipment type, with options presented for specific equipment as applicable in Table 5.

The adaptation options presented fall under five general categories, as shown in Figure 1:

- Design/Analysis Work Required (DAWR).
- Risk Monitoring Plan Required (RMP).
- Update to OPG governance/procedure required.
- No risk treatment required.

The majority of adaptation options are for design or analysis work, but options also include updates to OPG governance and procedures, and risk monitoring plans. Items that fall under “No risk treatment required” include existing programs, procedures, and the flood protection system, for which updates are not currently required but which can be leveraged to adapt to the risks of climate change. Many risks which are within the near-term can be adapted to through, or with minor revisions to, current OPG processes, programs or procedures.

4.2 Methodology

Adaptation and climate change response options were identified for each of the SSCs identified as susceptible to climate change-related hazards. These adaptation and risks response options consider a graded approach to take advantage of improvements to existing programs/procedures first, followed by adaptations by the site which will increase in complexity and cost up to eventual consideration of capital expenditures to upgrade under-performing infrastructure.

4.3 Adaptation Strategies

4.3.1 Existing Programs/Initiatives

There are several general programs currently in place which can be leveraged or updated to accommodate the potential changing conditions to which the SSCs will be exposed. Outlined below are the inspection and maintenance programs in place to mitigate for corrosion, wear, aging, and damage of safety-related equipment:

- Equipment Reliability [11].
- Component And Equipment Surveillance [12].
- Integrated Aging Management [13].
- Equipment Strategy Manuals.
- PNGS Component Surveillance and Maintenance Requirements-Winterization/Summerization Program [14].
- System Performance Monitoring Plans, system based.

The measures mentioned above are applicable to climate hazards such as acidification of the lake, elevated temperatures of air and the lake, and flooding. Mitigation of corrosion to various equipment from acidification of the lake can be achieved through these existing programs.

The flood protection system at Pickering Units 5-8, which consists of the shoreline breakwater works, Catch Basins, and storm sewers [15], and in the Switchyard, which has subsurface drainage [16] acts as a mitigation for many of the flood related hazards. Other mitigating actions for severe weather events such as heavy rain, flooding events, high heat, blizzards and other winter storms, and high winds, are outlined in the Severe Weather Emergency Preparedness procedure [17]. This procedure has been successfully implemented at PNGS for severe weather events, with no production losses. The procedure includes actions which vary for each weather event but include actions such as monitoring plant areas for ingress of water, a review of equipment affected by high heat, and clearing snow and ice from around high voltage outdoor transformers.

The Pickering Snow Removal and Winterization program is in place October to April. The Snow Removal procedure specifies the requirements to assess the needs for snow removal or salting and to monitor weather conditions to anticipate changes [18]. Additionally, the Winterization/Summerization Program strategy instruction [19] and program [14] outline the seasonal hazards and the process for preparing the station for winter and summer conditions. However, these documents focus on the hazards of cold weather and the requirements for winter weather conditions. These programs should be expanded as follows:

- Additional hazards associated with increasing temperatures should be considered. The average ambient temperature is expected to increase year-round, but additional actions should be considered for increasing summer temperatures.
- The dates for winter and summer conditions (November 1 and May 15, respectively) should be periodically reviewed to ensure they remain reflective of the change in seasonal conditions.
- When preparing the scope for the following season, challenge any existing station seasonal checklist or scope for robustness, considering industry best practices.
- Snow removal is currently limited to areas of site, additional areas such as transformers, rooftops, and vents (where accessible) should be added.

There are several design changes which will also address several climate hazards:

- Find a replacement SG: The logic of the SGs will bypass the intake air temperature trips under emergency conditions and run the machines to failure. The potential impacts of changes in ambient climate will need to be considered during the design phase of the new machines.
- Deep Water Intake (DWI): Installation of a DWI has been proposed at Pickering Units 5-8. Design and environmental work have already begun on this initiative. A DWI supplying LPSW at a cooler temperature may mitigate against the impacts of increasing ambient air temperatures. A DWI may protect the margins on equipment that would otherwise be encroached on by increasing lake temperature in addition to a reduction of debris or other foreign material.
- Perform equipment redesign and replacement as recommended.
- CCW/ Service Water: Clean the CCW intake duct and Service Water suction pits. Accumulated debris (zebra mussels, sild, etc.) can have an adverse effect on CCW pumps and/or downstream equipment. Zebra mussels and other biofouling conditions may change under climate change conditions. Overhaul the CCW pumps.
- Inspection of various components, and repairs based on these inspections.

4.3.2 Climate Change Adaptations

The following options for climate change adaptation are consistent across systems and have been presented in order of increasing complexity and cost:

- Routine monitoring of climate conditions and OPEX to:
 - Determine if climate projections match actual climate data.
 - Learn from industry partners.
- Update operational and safety limits for the equipment:
 - Perform assessments to determine if margins on existing equipment can be updated given climate projections.
 - Determine the adaptive capacity of existing equipment.
 - If limits are not available, determine if there are specific conditions under which equipment becomes unavailable.

- Increase inspection and maintenance frequency on equipment to ensure it is not experiencing accelerated degradation due to increased temperatures, and extreme weather events.
- Update site safety analysis and meteorological limits as scheduled and required.

Additional adaptation measures by equipment are in Table 5.

Table 5. Adaptation Measures Specific to Equipment

Equipment and System(s)	Specific Adaptation Options
Air Compressors <ul style="list-style-type: none"> - Air Systems 	<ul style="list-style-type: none"> • Rotating Equipment Strategy [20] • Improve performance of existing air compressors: <ul style="list-style-type: none"> - Increase cooling water flow rate to intercooler and aftercooler - Install more efficient aftercooler • Install additional intercooler and aftercooler components to improve performance.
Electrical Equipment <ul style="list-style-type: none"> - Class IV - Main Power Output (MPO) - Powerhouse Emergency Venting (PEVS) - Standby Generators - Control Equipment Room Cooling (CERC) 	<ul style="list-style-type: none"> • Cable Surveillance Program and equipment strategy instruction • Create a procedure that outlines responsibilities between OPG and Hydro One for snow removal from the Switchyard and related infrastructure • Install additional intercooler and aftercooler components to improve performance. • Develop flooding protection for equipment location outside or at building elevations below the design flood level • Ensure circuit breakers and protection relays for both line and bus that are near end of service life are replaced • Determine if the DCCs can produce less heat while in service, and add additional cooling sources to the DCCs to lessen their impact on room temperatures • Replace equipment with ratings for use at higher maximum air temperatures, while maintaining the low air temperature limits
Fan <ul style="list-style-type: none"> - Emergency Power Generator (EPG) cooling - Powerhouse Ventilation - Reactor Building Ventilation and Vapour Recovery - Standby Generator (SG) Cooling 	<ul style="list-style-type: none"> • Rotating Equipment Strategy [20] • Purchase two spare SG lube oil fans • Add inspection and lubrication of SG cooling fans to outage field work instructions • Place standby fans on manual mode to improve ventilation in associated spaces • Bring in auxiliary fans for additional cooling capacity • When equipment is scheduled for replacement, replace with fans that are designed with a higher air movement capacity • Determine if additional cooling is required for rooms primarily cooled by fans. Consider including a glycol air

Equipment and System(s)	Specific Adaptation Options
	cooling circuit on the air intake for EPG cooling should the increased air temperature be a consistent challenge
Filter <ul style="list-style-type: none"> - Air Systems - Annulus Gas 	<ul style="list-style-type: none"> • When replacing existing air filter units, replace with units with higher maximum operating temperatures • Determine if filters require additional cooling, and provide if required
Generator <ul style="list-style-type: none"> - Emergency Power Supply (EPS) - Standby Generators (SG) 	<ul style="list-style-type: none"> • Resolve documentation and jurisdictional issues with generator rental company to reinstate regular maintenance of EPG, as recommended [21] • Develop flooding protection for equipment located outside or at building elevations below the design flood level • Determine if additional cooling is required for rooms primarily cooled by fans. Consider including a glycol air cooling circuit on the air intake for EPG cooling should the increased air temperature be a consistent challenge • Purchase replacement EPG3 generator to ensure proper maintenance and reduce long-term costs and with generators that can maintain capacity at higher ambient temperatures, as recommended [21]

Equipment and System(s)	Specific Adaptation Options
<p>Heat Exchangers</p> <ul style="list-style-type: none"> - Annulus Gas - Class I/II Battery Rooms - Control Equipment Room Cooling - RAB Chilled Glycol Systems - RB Ventilation and Vapour Recovery - Cover Gas - Generator/Turbine Cooling - Reactor Building Cooling - Emergency Coolant Injection (ECI) - End Shield Cooling - Irradiated Fuel Storage Bay Cooling - Liquid Zone Control - Moderator System - Recirculating Cooling Water - Shutdown Cooling 	<ul style="list-style-type: none"> • Heat Exchanger Program Requirements and strategy manual • For accessible rooms, bring in mobile chillers for supplemental room cooling capacity • Study the impact to habitability, equipment reliability, and degradation rates by increasing temperatures and resultant reductions to humidity in conditioned spaces. During walkdowns and inspections of equipment during period of high air temperatures, note equipment condition, exterior air temperature, and room temperature for trending. If increased equipment degradation or reduced reliability is found with increasing temperature, additional means of cooling the equipment rooms should be considered. • Acidification of the lake should be monitored and included in the chemistry control manuals to be measured on a routine basis. If acidification occurs, then inline processing of lake water will need to be considered. • Improve performance of existing equipment: increase coolant flow rate without modification or modify the equipment to allow for increased coolant flow • Replace the coolers with the consideration for a larger capacity for cooling • Purchase a spare HX to avoid extended outages • Replace the HXs with the consideration for a larger capacity for cooling • Increase cooling capacity of the HXs through either adding additional HXs to the system or relocate the HX to a cooler environment • Proactive ACU coil replacements • Update HX design requirements with the requirement that when HXs are chosen for new systems, or existing HXs are replaced, components that interface with the service water should be made of corrosion-resistant material
<p>Motor</p> <ul style="list-style-type: none"> - Emergency Water Supply (EWS) - Service Water - SG Cooling 	<ul style="list-style-type: none"> • Rotating Equipment Strategy [20] • Motor Strategies • The main LPSW pumps will need to be shipped offsite for complete refurbishment within 30 years [22] • Install triaxial vibration sensors for additional monitoring for reliability and ESA on all 4 kV motors for improved reliability [23] • Develop flooding protection for pumps and pump motors located at building elevations below the design flood level • Improve performance of existing pumps and pump motors

Equipment and System(s)	Specific Adaptation Options
	<ul style="list-style-type: none"> • Consider additional means of reducing the ambient air in the pump motor location, such as installing or improving the ACU • Replace pump motors with consideration for use at a higher maximum air temperature, while maintaining the low air temperature limit, as well as improving energy efficiency
<p>Pump</p> <ul style="list-style-type: none"> - Emergency Power Supply - Standby Generators (SG) - Boiler feedwater - Condenser Cooling Water (CCW) - Emergency Coolant Injection (ECI) - Emergency Water Supply (EWS) - Fire Systems - Screenhouse - Service Water 	<ul style="list-style-type: none"> • Rotating Equipment Strategy [20] • Pump Strategy • Develop flooding protection for pumps located at building elevations below the design flood level • Acidification of the lake should be monitored and included in the chemistry control manuals to be measured on a routine basis. If acidification occurs, then inline processing of lake water should be considered. • Improve performance of existing pumps, such as as-needed replacement of pump components with improve components or adding a variable-speed drive on existing motors to improve pump efficiency • Consider additional means of reducing the ambient air in the pump location, such as installing or improving the ACU • Modification of the system for online pump testing will improve outage duration, execution, and licensing requirement compliance. • Apply corrosion protection to pumps with components located in the forebay and exposed directly to lake water • Consider alternative supply sources for the service water to increase water volume and reduce water temperature. This could include the DWI or adding additional pumps • Replace pumps with the following considerations: larger capacity for water intake to provide cooling water to the station, corrosion-resistant materials, improved-energy efficiency
<p>Screens and Strainers</p> <ul style="list-style-type: none"> - Emergency Water Supply - Fire Systems - Screenhouse - Service Water 	<ul style="list-style-type: none"> • Consideration for adding anti-corrosion coatings on the screens and strainers to fortify equipment against long term changes brought on by climate change, alternatively replace screens and strainers with corrosion resistant materials • Develop flooding protection for screens, strainers, and associated equipment, such as motors, located at building elevations below the design flood level • Acidification of the lake should be monitored and included in the chemistry control manuals to be measured on a routine basis. If acidification occurs, then inline processing of lake water will need to be considered. • Consider alternative supply sources for the service water to increase water volume and reduce water temperature, this could include the DWI. Consider including a submerged intake structure similar to those used at

Equipment and System(s)	Specific Adaptation Options
	Darlington, Bruce Power, or Nanticoke as part of DWI construction.
Tank <ul style="list-style-type: none"> - Emergency Coolant Injection - Emergency Power Supply 	<ul style="list-style-type: none"> • Replace tanks as per industry best practices [24]
Transformer <ul style="list-style-type: none"> - Class IV - Emergency Power Supply - Main Power Output - Standby Generators 	<ul style="list-style-type: none"> • Paint transformer cabinet bright white to reflect some heat. • Perform a one-time inspection on SG power transformers (PT1 to PT4 for each SG) to assess degradation and remaining life, as these components have not been previously inspected [25] • Develop flooding protection for equipment located outside or at building elevations below the design flood level. • Add auxiliary cooling equipment, such as fans or water spray equipment, to improve transformer performance. • Replace transformers with higher ratings or increased temperature margin
Turbine <ul style="list-style-type: none"> - Emergency Power Supply (EPS) 	<ul style="list-style-type: none"> • Resolve documentation and jurisdictional issues with generator rental company to reinstate regular maintenance of EPG • Develop flooding protection for equipment located outside or at building elevations below the design flood level • Determine if additional cooling is required for rooms primarily cooled by fans. Consider including a glycol air cooling circuit on the air intake for EPG cooling should the increased air temperature be a consistent challenge • Purchase replacement EPG3 generator/turbine set to ensure proper maintenance and reduce long-term costs • Purchase replacement EPG3 generator/turbine set to ensure proper maintenance and reduce long-term costs
Vent <ul style="list-style-type: none"> - Heating, Ventilation and Air Conditioning (HVAC) - Powerhouse Emergency Venting (PEVS) - Reactor Building Ventilation and Vapour Recovery 	<ul style="list-style-type: none"> • As permitted by facility procedures, block open doors, hatches, fire dampers, or re-align pipe/duct conveyances to improve airflow to reduce load on ventilation cooling system during hot weather or if vents blocked by snow. • Weatherize vents and louvres to ensure they can withstand winter weather conditions, such as protection from snow or ice buildup.

5.0 CONCLUSION

Analysis of recent data from 2010 through 2020 shows that extreme events have an essentially negligible impact on nuclear generation capacity factors (the percentage of the time the nuclear power plant (NPP) is running at full power and providing electricity to the grid), which are by far the highest of any carbon-free source of generation [6].

As a crucial part of the adaptation strategy, OPG has implemented a severe weather emergency preparedness procedure. The severe weather emergency preparedness procedure is important to ensuring the safe operation of the power plant during extreme weather events. This procedure includes actions like monitoring plant areas for water ingress, reviewing equipment affected by high heat, and clearing snow and ice from critical areas. It helps mitigate climate hazards, especially where there is low confidence in available climate projection data, such as high wind scenarios.

Additionally, the winterization and summarization procedure [19] addresses many climate-related impacts, although it is expected that this procedure will need to be revised as climate shifts. These procedures will help mitigate climate hazards, especially those where there is low confidence on climate projections data.

Climate change is seen as a gradual change which is likely to increase the severity of hazards already evaluated and screened routinely. Routine preventative maintenance programs and measures to monitor the daily operation of the plant are seen as sufficient to discover changes being brought on to PNGS by climate change.

Adaptation options were presented for the SSCs that were determined to be potentially susceptible to, or have margins eroded by, climate change-related hazards.

Condition assessments for the SSCs were reviewed to determine the existing condition of the equipment, the inspection and maintenance performed on the equipment, and any actions that may have been previously recommended. Climate hazards in the short-term may be addressed through the implementation of and improvements to existing processes and programs and implement adaptation options for consideration based on conditions assessments.

The adaptation options presented fall under four general categories and have been categorized and presented in Figure 1. The majority of adaptation options are for design or analysis work, but options also include updates to OPG governance and procedures, and risk monitoring plans. Items that fall under “No risk treatment required” include existing programs, procedures, and the flood protection system, for which updates are not currently required but which can be leveraged to mitigate the risks of climate change.

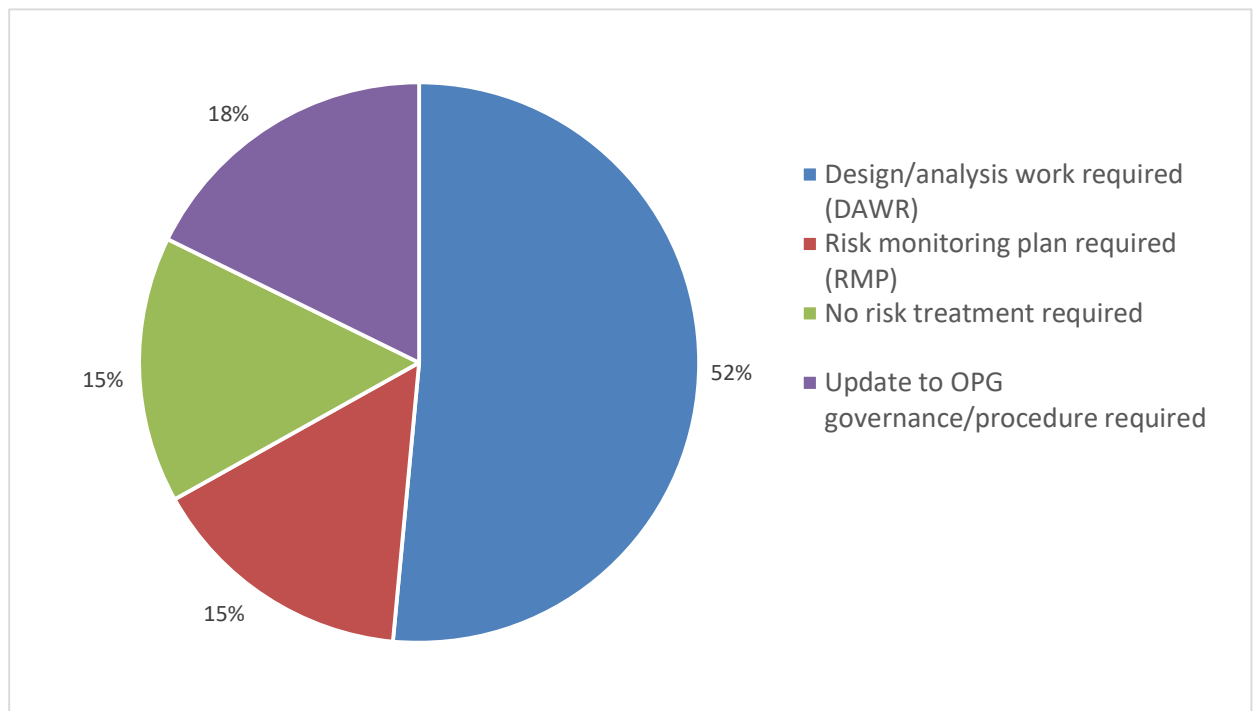


Figure 1. Categorization of Adaptation Options

Given the adaptation strategies available and identified, nearly half of adaptations options require little additional investment by OPG. However, there are many adaptations options which would require design or analysis work to address the climate susceptible SSCs. A strategy and tracking mechanism should be developed to ensure that all systems identified are appropriately addressed to meet climate hazards.

6.0 BIBLIOGRAPHY

- [1] Kinectrics, "PNGS Climate Change Risk Assessment- Exposure Assessment," PV188/TM/0001 R01.
- [2] Kinectrics, "PNGS Climate Change Exposure Assessment Addendum," PV273/TM/0001 R00.
- [3] Kinectrics, "PNGS Climate Change Assessment," PV188/RP/0001 R02.
- [4] Kinectrics, "PNGS Climate Change Assessment Addendum," PV273/TM/0002 R00.
- [5] Kinectrics, "Pickering Climate Change Adaptation Strategy," PV273/RP/0001 R02.
- [6] EPRI, "Nuclear Plant Resilience to Weather-Related Events Between 2011 to 2020.," Palo Alto, 2022.

- [7] IPCC [Core Writing Team, H.Lee and J. Romero (eds.)], "Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II, and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change," IPCC, Geneva, Switzerland, 2023.
- [8] AECOM, "Climate Change Bounding Analysis for PNGS," NK30-CORR-07007-1235347.
- [9] EPRI, "Climate Vulnerability Assessment Guidance for Nuclear Power Plants," 3002023814, Palo Alto, CA, 2022.
- [10] CNSC, "REGDOC-2.6.1 Reliability Programs for Nuclear Power Plants," Canadian Nuclear Safety Commission, Ottawa, 2017.
- [11] OPG, "Equipment Reliability," N-PROG-MA-0026 R004.
- [12] OPG, "Component and Equipment Surveillance," N-PROG-MA-0017 R010.
- [13] OPG, "Integrated Aging Management," N-PROG-MP-0008 R008.
- [14] OPG, "PNGS Component Surveillance and Maintenance Requirements- Winterization/Summerization Program," P-PLAN-01510-00001 R001.
- [15] OPG, "Pickering B Safety Report- Part 2," NK30-SR-01320-00002 R006.
- [16] OPG, "Site 230kV Switchyard Area Subsurface Drainage General Arrangement," NK30-DFH-15210-1002 R005.
- [17] OPG, "Severe Weather Emergency Preparedness," N-PROC-RA-0095 R013.
- [18] OPG, "Pickering Site Evaluation Report on Severe Weather Preparedness," P-EVAL-03490-00001 R0000.
- [19] OPG, "PB Winterization/Summerization Equipment Strategy Instruction," NK30-ESI-01510-00001 R001.
- [20] OPG, "Rotating Equipment Strategy," NK30-ESI-04610-00001 R001.
- [21] OPG, "Refurbishment and Life Extension System Condition Assessment- Emergency Power Supply," NK30-REP-54300-00007 R00.
- [22] OPG, "Refurbishment & Life Extension System Condition Assessment- Service Water System and Chlorination System," NK30-REP-71300-00009 R001.
- [23] OPG, "Refurbishment and Life Extension System Condition Assessment- Continuous On-Line Monitoring," NK30-REP-61001-10003 R001.

- [24] OPG, "Pickering (amalgamated) Nuclear – Aging Management Program Component Condition Assessment (CCA): Vessels-PV's, Tanks, Drums, etc.-CAT1&2," NK30-REP-54800-00091 R000.
- [25] OPG, "Refurbishment & Life Extension System Condition Assessment – Standby Generators," NK30-REP-54600-00171 R001.
- [26] OPG, "Pickering Site- Work to be executed between 2025-2026 that have undergone Regulatory Assessment," P-CORR-00120-00001 DRAFT.

Appendix A: Climate Projections

A.1 CLIMATE PROJECTIONS

A.1.1 Increasing Ambient Temperature

The ambient temperature includes the averages of the annual ambient minimum, mean, and maximum temperatures averaged over each time horizon using the median of the climate simulations.

Annual Average Temp (°C)	1981-2010	2021-2050		2051-2080	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
Minimum	4.1	5.0	5.3	6.0	7.4
Mean	8.2	9.7	9.9	10.6	11.9
Maximum	12.2	14.3	14.4	15.1	16.5

A.1.2 Water Temperature

The annual mean water temperature is based on the projected air temperatures; the average of the annual mean water temperature for each time period are given.

Annual Mean Temp (°C)	2017-2022	2021-2050	2051-2080
RCP4.5	10.4	11.1	11.8
RCP8.5		11.6	13.5

A.1.3 Total Precipitation

The total precipitation is the average of the annual precipitation sums for each time period using the median of the climate simulations.

Average annual precipitation	1981-2010	2021-2050		2051-2080	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
Precipitation (mm)	862	853	871	892	890
Rainfall (mm)	758	736	760	789	804
Snowfall (cm)	103	115	113	101	82

A.1.4 Low Lake/River Level and Hydrological Drought

The lowest annual lake levels and the probability of a dry period (with less than 0.1 mm of precipitation) of at least 10 days for the future time periods were determined.

	1981-2010	2021-2050	2051-2080
Lowest annual lake level (m)			
RCP4.5	74.3	74.1	74.4
RCP8.5		74.0	74.4
Probability of dry periods of at least 10 days (%)			
RCP4.5	82	83	81
RCP8.5		82	84

A.1.5 Acidification

The projected mean annual pH for the Great Lakes under the high-emissions scenario was determined.

Mean pH	1981-2010	2021-2050	2051-2080
RCP4.5	8.44	-	-
RCP8.5		8.33	8.20

A.1.6 Water Temperature Extreme High

The extreme high water temperature is the bias-corrected 99th percentile high water temperature projected for the period.

Temp (°C)	2017-2022	2021-2050	2051-2080
RCP4.5	24.3	24.9	25.5
RCP8.5		25.6	27.4

A.1.7 Flooding: Rising Lake Water Level

The highest annual lake level for each time period was determined.

Highest lake level (m)	1981-2010	2021-2050	2051-2080
RCP4.5	75.3	75.8	76.4
RCP8.5		76.0	76.3

Flooding caused by runoff, riverine flooding, local site area flooding and other types of precipitation related flooding has no projections and qualitative assessments were performed.

A.1.8 Air Temperature: Extreme High

The extreme high air temperature is the averaged return values for annual maximum air temperature for the 10-year return period for the stated time period.

Temp (°C)	1981-2010	2021-2050	2051-2080
RCP4.5	35.9	37.2	38.2
RCP8.5			40.1

A.1.9 Extreme Rainfall

The extreme rainfall is the annual maximum of the daily rainfall for the 10-year period.

Annual Maximum Daily Rainfall (mm)	1981-2010	2021-2050	2051-2080
RCP4.5	64.1	75.1	80.0
RCP8.5		73.2	84.9

A.1.10 Extreme Weather Events

No projections are available, qualitative assessments were performed. This includes tornado, blizzards/snowstorms, downbursts/derecho, and extra-tropical storms

The occurrence of more and more severe thunderstorms and tornadoes with progressive warming is possible in southern Ontario. However, a conclusive statement about the change in frequency or intensity of tornados with climate change is not possible due to the limited predictability of these features.

The frequency of snowstorms north of Lake Ontario is projected to decrease by 20 to 30% in the RCP8.5 scenario as more winter precipitation will shift to rainfall. Due to limited predictability, it is currently not possible to provide projections regarding changing in intensity of blizzards and snowstorms with climate change.

Downbursts are high wind events that involve a powerful wind which descends from a thunderstorm and spreads out quickly once they hit the ground. Downbursts involve high winds and heavy rains. Derecho are a straight-line wind storm event that occur as part of a severe thunderstorm event and can involve high winds, heavy rains, and flash floods.

The impact of climate change on the 'ingredients' for derechos points towards the potential of more frequent and/or more intense derechos, no scientific consensus has been reached. However, as the jet stream shifts further poleward with climate change due to the faster warming of the Arctic, the favorable conditions for derechos will also shift further north. This could increase the frequency of derechos in southern Ontario.

The impact of climate change on the path, strength, and frequency of extra-tropical cyclones remains uncertain.

A.1.11 Extreme Snowpack or snow accumulation

The extreme snowpack is the maximum snow on the ground for the time period.

Maximum snow on ground (cm)	1981-2010	2021-2050	2051-2080
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RCP4.5	51.0	87.6	66.4
RCP8.5 (not assessed)		46.5	42.7

A.1.12 Heatwave

Described as at least 3 consecutive days with maximum temperatures above 30°C.

Number of heatwaves	1981-2010	2021-2050	2051-2080
RCP4.5	0.4	2.6	3.5
RCP8.5		2.8	5.2

A.1.13 Hurricane/Typhoon

The wind speed and rainfall associated with tropical cyclones are projected to increase as a result of climate change. The data below applies to a 2°C warmer threshold which applies to the time horizon 2051-2080 for the RCP4.5 emission scenario or the climate for the 2021-2050 periods in the RCP8.5 scenario.

	Historical		2°C Warmer World	
	Wind speed (km/h)	Rainfall (mm)	Wind speed (km/h)	Rainfall (mm)
Tropical cyclones	51.8	51.1	52.3-57.0	56.2-58.8
Extra-tropical cyclones	66.1	46.6	66.7-72.7	51.3-53.6

Appendix B: Equipment Impacted by Climate Hazards

The following equipment was determined to be impacted by climate-related hazards.

Table 6. Equipment Impacted by Climate Hazards

System	Equipment
Air Systems	Compressors (5/6/7/8-75120-CP1, CP2, CP3 and CP4)
	Filter Assembly (058-75120-FR1, FR2, FR3, FR4)
Annulus Gas	Annulus Gas CO2 & Air Cooler (5/6/7/8-34980-HX1)
	Annulus Gas Compressor Intake Filter (5/6/7/8-34980-FR1 to FR3)
Boiler Feedwater	Main Boiler Feed Pumps (5/6/7/8-43230-P6 to -P8)
	CL3 Aux Boiler Feedwater Pump (5/6/7/8-43230-P5)
Class I/II Battery Rooms	Class I: 55100-BY1, BY2 in 317 TAB Battery Room
	Class II: 54230-BY1A, -BY1B, TAB EL 316'6"
	Glycol cooler on roof (5/6/7/8-73230-CD1 to -CD6)
Class IV	Station service transformer: Generator and System Service Transformers, including all CLIV transformers
	Electrical components
Condenser Cooling Water (CCW)	CCW pumps (5/6/7/8-71210-P1, P2)
	Condenser (5/6/7/8-71200-CD1/2/3)
Control Equipment Room Cooling	Air coolers (8-73160-ACU1, 7-73160-ACU2, 6-73160-ACU3, 5-73160-ACU4, 058-73160-ACU5)
	DCCs (5/6/7/8-66400-DCCX and -DCCY)
Cover Gas	Cover gas system cooling jackets (5/6/7/8-32310-Y7 and Y8)
Emergency Coolant Injection (ECI)	ECI Water storage tank (058-33350-TK1)
	HP Pumps (058-33350-P5 to P7)
	Recovery Pumps (056/078-33350-P1 to P3)
	Recovery HX (056/078-33350-HX1)
Emergency Power Generator Cooling	EWS pumphouse fans (058-73990-VE1, -VE2)
	Electrical equipment room fans (058-73990-VE3, -VE4)
	Turbine room fans (058-73990-F1, -F2)
Emergency Power Supply (EPS)	Generators (058-54800-EPG1, EPG2, EPG3)
	Emergency Power Generator (EPG) Auxiliary Power Transformers (058-54800-EPG1/2-T1)
	EPG Lube Oil Tank (058-54800-EPG1/2-TK1)
	EPG Fuel Tank (058-54800-EPG1/2-TK2)
	EPG Turbines (058-54800-EPG1/2-TU1)
	EPG Oil Pumps (058-54800-EPG1/2-P1 to P5)
	Common EPS 4.16 kV/600 V transformers (058-54330-T1, T2)
	Fuel Oil Storage Tank (058-54860-TK1 and TK2)
	EPG Fuel Forwarding Pumps (058-54860-P3 to P6)
Emergency Water Supply (EWS)	Main EWS pumps (058-71380-P1, P2, P3)
	EWS Pump Motor (058-71380-PM1 to PM3)
	CLIII/EPG Recovery Pump (056/078-71380-P1)
	Strainers (058-71380-STR1, STR2)

System	Equipment
	Travelling Screens (058-71380-SC1 and SC2)
End Shield Cooling	End Shield Cooling (5/6/7/8-34110-HX1 and HX2)
Fire Systems	Excess Pressure Pumps (5/6/7/8-71410-P2030, P2035)
	Strainer (5/6/7/8-71410-STR2023)
Generator/Turbine Cooling	Hydrogen gas coolers (5/6/7/8-41230-HX1 to -HX4)
Heating, Ventilation, and Air Conditioning (HVAC)	Louvres
	Roof ventilators (5/6/7/8-73220-VE1 to VE4)
Irradiated Fuel Storage Bay Cooling	Irradiated fuel storage bay cooling (058-34410-HX1 and HX2)
	Irradiated fuel storage bay cooling (058-34410-HX3)
	Irradiated fuel storage bay cooling (0-34410-HX1 to -HX3)
Liquid Zone Control	Liquid zone control cooling (5/6/7/8-34810-HX1)
Main Power Output	23 kV Isolated Phase Bus (IPB) (5/6/7/8-51150-IPB)
	Main Output Transformer (MOT) (5/6/7/8-51200-TM1)
	230 kV switchyard
Moderator System	Moderator system heat exchangers (5/6/7/8-32110-HX1, HX2)
Powerhouse Emergency Venting (PEVS)	Venting Panels
	PEVS Electrical Components
Powerhouse ventilation	Powerhouse Main Supply Fan (5/6/7/8-73220-F1)
RAB Chilled Glycol System	Glycol Chillers (058-73180-RFU4 to -RFU6)
Reactor Building Ventilation and Vapour Recovery	Louvres
	Intake Air Conditioning Unit (ACU) (5/6/7/8-73130-ACU1)
	Exhaust Fans (5/6/7/8-73130-F501, F502)
Reactor Building Cooling	Boiler room coolers (5/6/7/8-73110-ACU1 to ACU6)
	Fuelling machine vault coolers, R208 and R209 (5/6/7/8-73110-ACU7 to ACU14)
	Reactor building south access area coolers, R103 (5/6/7/8-73110-ACU15 to ACU20)
	Fuelling machine service and access rooms (5/6/7/8-73110-ACU21 to -ACU24)
	Fuelling machine auxiliary rooms R112 and R113 coolers (5/6/7/8-73110-ACU25 and ACU26)
	Moderator auxiliary rooms R104 and R105 (5/6/7/8-73110-ACU27 and ACU28)
	Moderator room R101 coolers (5/6/7/8-73110-ACU29 to ACU31)
	Heat transport auxiliaries room coolers (5/6/7/8-73110-ACU32)
	Heat transport auxiliaries room coolers (5/6/7/8-73110-ACU33)
	RB Coolers (5/6/7/8-73110-ACU34 and ACU35)
	Reactor Building Mezzanine coolers, R308 and R309 (5/6/7/8-73110-ACU36 and ACU37)
Recirculating Cooling Water	Recirculating cooling water heat exchanger (5/6/7/8-71320-HX501 and HX502)
Screenhouse	Bar screens (056-71110-SC7 to SC12, 078-7111-SC7 to SC12)
	Travelling water screens (056-71110-SC1 to SC6, 078-71110-SC1 to SC6)
	Screen Wash Pumps (056-71110-P1 to P3 and 078-71110- P1 to P3)
	Trash Sump Pumps (056-71120-P1 and P2, 078-71120-P1 and P2)
Service Water	High Pressure Service Water (HPSW) Pumps (5/6/7/8-71340-P1 to P4)

System	Equipment
	HPSW Pump Motor (5/6/7/8-71340-PM1 to PM4)
	Emergency LPSW Pumps (5/6/7/8-71310-P1 to P4)
	Low Pressure Service Water (LPSW) Pumps (5/6/7/8-71310-P5 to P7)
	LPSW Strainer (5/6/7/8-71310-STR1)
	LPSW Pump Motor (5/6/7/8-71310-PM1 to PM4)
Shutdown Cooling	Heat transport shutdown coolers (5/6/7/8-33410-HX1 to HX4)
Standby Generator Cooling	SG Lube Oil Cooling Fan (056/078-54600-F11, -F12, -F21, -F22, -F31, -F32)
	Motors with fans for SG ventilation (056/078-54600-SG1-FM1 to -FM3 to -SG3-FM1 to -FM3)
Standby Generators (SGs)	Standby Generator (056/078-54600-SG1 to SG3)
	SG Power Transformers (056/078-54600-SG1/2/3-PT1 to PT4)
	SG Electrical Equipment
	SG Fuel Oil Equipment
	Fuel Oil Pump (056/078-54600-SG1/2/3-P2073)
	SG Lube Oil Equipment
	Lube Oil Pumps (056/078-54600-P13- P18, -P23-P28, -P33-P38, -P113, -P114, -P213, -P214, -P313, -P314)

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

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The Program Management Plans outline the specific requirements and procedures related to each function of a project, with the aim of communicating how the staff will carry out their tasks while aligning with the objectives of the current OPG Project Management Standard.

General Program Information

Program Name:	Pickering Refurbishment Program	Facility/Site:	NK30/ Pickering B
Program Manager:	Luca Ceccato VP Pickering Refurbishment Execution	Executing Org:	Refurbishment Project Controls
		Sponsor:	Subo Sinnathamby

Prepared by:

Joanne Mercieca 31Mar25
Joanne Mercieca, Project Specialist / Date

Reviewed by:

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Kevin Tse, Sr Manager Project Controls /Date

Approved by:

Vijay S 03Apr25
Vijay Santhanam, Director Refurbishment Project Controls /Date

Approved by:

Luca Ceccato 12Apr25
Luca Ceccato VP Pickering Refurbishment Execution /Date

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00002	
Revision: R00	Page: 2 of 17
Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN	

Revision Summary

Revision Number	Date	Comments
R0	2024-05-03	Initial Issue
R1	2025-04-01	Section 3 Scope of work updated, Appendix A Release Strategy updated to align with Program schedule A1.

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00002	
Revision: R00	Page: 3 of 17
Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN	

Table of Contents

	Page
Revision Summary	2
1.0 PURPOSE.....	4
2.0 PROGRAM OVERVIEW AND REQUIREMENTS	4
3.0 PROGRAM SCOPE.....	4
3.1 Pickering Refurbishment Program Phases	6
4.0 PROGRAM GOVERNANCE STRUCTURE AND PLANNING:.....	7
4.1 Pickering Refurbishment Program Management Plans (PgMP)	7
4.2 Pickering Refurbishment Project Management Plans	10
4.3 Revision Cycle Requirements	10
5.0 PROGRAM DECISIONS AND CHANGES	11
6.0 ROLES AND ACCOUNTABILITIES.....	11
7.0 ACRONYMS	13
8.0 REFERENCES.....	13
Appendix A Program Gating Strategy and Schedule	14
Appendix B Tiered Governance Structure	15
Appendix C Program Management Plan Section Requirements	16

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00002	
Revision: R00	Page: 4 of 17

Title:
PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

1.0 PURPOSE

This top-level Program Management Plan provides an overview of the Pickering Refurbishment Program, and the framework and guidance on requirements for the supporting Program plans.

2.0 PROGRAM OVERVIEW AND REQUIREMENTS

This plan obtains its authority from the Pickering Refurbishment Charter NK30-CHAR-09701-00001. [R1]

The Refurbishment program covers the planning, preparation and execution of activities required to complete the Refurbishment of Pickering Units 5 to 8 and bring the units back to service.

This document provides an overview of the Refurbishment program, applicable governance, and the requirements for Program-specific Management Plans. The Refurbishment programs will leverage OPG's mature and effective Management System established via charter N-CHAR-AS-0002, Nuclear Management System.

The Pickering Refurbishment Program (PRP) will be managed in accordance with OPG/OPGN Implementing Procedures, Standards, and governance support documents. A tiered governance structure will be implemented for the program, with the first tier being the program charter.

The second tier consists of the PRP Program Management Plans (PgMP) and individual PRP Project Management Plans (PMP). Project teams are accountable for the development and maintenance of project-specific PMPs, and execution of projects to PgMP requirements.

The third tier includes documents such as manuals, guides, instructions, plans, contractor/owner interface requirements (COIRs), and forms, which are considered process support controlled documents. These documents will be referenced in the applicable PMP

The structure is outlined in Appendix B.

3.0 PROGRAM SCOPE

The scope of the PRP will be defined and controlled in accordance with the OPG-MAN-00120-0011 Project Scope Management manual.

Major Scope is defined and controlled through the Pickering EBX Scope database in accordance with NK30-PLAN-09701-10004 Pickering Refurbishment - Program Scope Review Board Terms of Reference [R2] and NK30-INS-09701-10001 Pickering Nuclear Refurbishment Program Scope Control [R3].

At a high level, the scope of the Pickering Refurbishment Program consists of all the work required to plan, design, procure, construct, commission the structures and components required to refurbish the Pickering units. Additionally, work is required to ensure successful start-up and operation, which is included in the project scope documents. The scope is broken down into bundles of work that include the projects and activities required for successful execution of the program.

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00002

Revision:

R00

Page:

5 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

The following information is not inclusive but outlines the high-level scope elements:

Bundle	Scope Overview
Facility & Infrastructure	<ul style="list-style-type: none">Establish temporary facility to support Project Related workTraffic Management (Municipal, Onsite)Constructing New Support BuildingsUpgrading Existing InfrastructureOffice Space OptimizationEnhancing Site Logistics
Turbine Generators	<ul style="list-style-type: none">Removal and replacement of major components including the installation of new High Pressure/Low Pressure spindles, upgrades to the Turbine Control System, and Generator Rotor and Stator rewinds.
Balance of Plant	<p>The scope of work includes opportunities to modify, replace, and/or upgrade SSCs for the purpose of safety and reliability improvements. These modifications include, but are not limited to:</p> <ul style="list-style-type: none">Inspection and Replacement of ECI componentsInspection and Replacement of SDS/RRS componentsInspection and Replacement of Moderator componentsInspection and Replacements of PHT componentsFuel Handling Reliability scopeFire Protection System Replacements and UpgradesElectrical Distribution/Switchyard/Main Output Transformers upgradesMain Steam and Boiler Blowdown scopeAir System Replacements and UpgradesCivil structures inspections and repairs
Calandria Retube and Feeder Replacement	<ul style="list-style-type: none">Removal and replacement of fuel channel components including pressure tubes, calandria tubes, feeders, and annulus spacers.
Boiler Replacement	<ul style="list-style-type: none">Removal and replacement of the existing 48 boilers (12 boilers per unit). The replacement method will require the use of cranes for the removal and installation of the new boilers.
Deep Water Intake	<ul style="list-style-type: none">Modify the intake channel to construct a new intake structure to enable deep-water supply.
Functional Support	<ul style="list-style-type: none">EA and Licensing FeesInspections – Feedwater flow, H-Piles,Security Modification Program

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00002

Revision:

R00

Page:

6 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

3.1 Pickering Refurbishment Program Phases

The refurbishment program will be managed in the following phased structure:

Phase	Pre-requisite Gate Deliverables	Gate / Program Release	Scope	Target Date
Initiation	<p>Program:</p> <ul style="list-style-type: none">• Feasibility Program Charter• Overall Feasibility Estimate• Feasibility Level BCS and cashflow	Gate 0		Complete Aug23
Development	<p><u>Program:</u></p> <ul style="list-style-type: none">• Feasibility Report prepared• Program Charter issued• Overall Preliminary Cost prepared• Overall Preliminary Roadmap prepared• BCS Cost & Schedule prepared <p><u>Pre-req for G1 Project(s) Scope:</u></p> <ul style="list-style-type: none">• Project Schedule prepared – Level 1 (overall plan), Level 3 (for requested release)• Project Cashflow prepared (for requested release)• Project Estimate prepared – Class 5 (feasibility estimate or better),• Detailed Estimate (for requested release)• Project Gate 1 Package prepared	Gate 1 Release 1A-1	<ul style="list-style-type: none">• Procurement of Major Long Lead Materials for U5/U6• Completion of Scope Refinement• Advancement of Preliminary Engineering	April 2024
Detailed Planning / Definition	<p><u>Program:</u></p> <ul style="list-style-type: none">• Preliminary Engineering Report prepared• Program Planning Scope of Work prepared• Program Management Plan issued• Overall Cost Estimate Roadmap prepared• BCS Cost & Schedule updated <p><u>Project(s) Scope:</u></p> <ul style="list-style-type: none">• Project Management Plans issued• Overall Project Scope of Work prepared• Project Schedule refined – Level 2 (overall plan), Level 3 (for requested release)• Project Cashflow refined (for requested release)• Project Estimate refined – Class 4 (overall plan), Detailed Estimate (for requested release)• Quantitative Based Risk Assessment prepared• Project Gate 2 Package prepared	Gate 2 Release 1A-2	<ul style="list-style-type: none">• Procurement of materials for U5 to U8• Completion of Detailed Design	November 2024

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00002	
Revision: R00	Page: 7 of 17
Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN	

Phase	Pre-requisite Gate Deliverables	Gate / Program Release	Scope	Target Date
Detailed Planning / Definition	Project Schedule refined – Level 3 (overall plan) • Project Estimate refined – Class 3 (overall plan), Detailed Estimate	Gate 2 Release 1B Release Quality Estimate (RQE)	Bundle Gate 2/3 • Completion of Installation/Work Planning • Execution of Facilities, Defueling, U5/U6 Layup, and selected common work	November 2025
Execution Units 5, 6, 7 & 8	<u>Program:</u> • Program Delivery Scope of Work prepared • Detailed Design Report prepared <u>Project(s) Scope:</u> • Project Management Plans issued • Overall Project Scope of Work finalized • Project Schedule refined – Level 3 • Project Cashflow refined (for requested release) • Project Estimate refined – Class 3 • Quantitative Based Risk Assessment refined • Project Gate 3 Package prepared	Release 2- RQE Check Gate 3 U5, 6, 7 & 8	All Bundles Gate 3 approved • Full execution and close out of U5, 6, 7 & 8 (TG, BOP, RFBR, SGs)	November 2026

An overview of the program schedule is included as Appendix A.

4.0 PROGRAM GOVERNANCE STRUCTURE AND PLANNING:

4.1 Pickering Refurbishment Program Management Plans (PgMP)

The second tier Program Management Plans will describe how the intent of OPG's Nuclear Management System will be met while establishing program-specific requirements.

The program management plans are established to provide assurance that all aspects of the programs will be conducted in accordance with the requirements of

- 1 Canadian Standards Association - Standard N286-12, Management System Requirements for Nuclear Facilities [R4].
- 2 N-CHAR-AS-0002, Nuclear Management System [R5]
- 3 OPG Corporate and Nuclear governance.

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00002	
Revision: R00	Page: 8 of 17

Title:
PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

In cases where no specific Pickering Refurbishment program requirements apply, default will be the program documents under N-CHAR-AS-0002, Nuclear Management System. [R5]

The following table provides the listing of PgMPs prepared for the PRP with a brief description of the content/purpose

Plan Number	Title	Description
NK30-PLAN-00120-00002	Pickering B Refurbishment PgMP	The Program Management Plan provides an overview of the Pickering Refurbishment Program, the framework and guidance on the requirements for the supporting Program plans
NK30-PLAN-00120-00003	Planning and Controls PgMP	Specific aspects of Project Controls and Work Management are detailed in this Plan. This includes management of scope, schedule, cost, change control, reporting, risk, and lessons learned.
NK30-PLAN-00120-00004	Environmental PgMP	The Environmental Program Management Plan describes environmental management practices for PNR in accordance with OPG's Environmental Policy, and Environment Health and Safety Managed Systems.
NK30-PLAN-00120-00005	Health & Safety PgMP	The Health and Safety Program Management Plan describes how OPG and Contractors will manage the health and safety of all workers involved in the PRP. It establishes an integrated framework for the management of worker health and safety in accordance with defined health and safety values, goals, objectives, and expectations for PRP.
NK30-PLAN-00120-00006	Chemistry PgMP	The purpose of this program is to specify processes, requirements, and staff accountabilities to ensure effective control of plant chemistry, including provision of analytical services.
NK30-PLAN-00120-00007	Licensing PgMP	The purpose of this document is to establish the program requirements, roles and accountabilities for ensuring understanding of the regulatory requirements of the PRP with respect to the Nuclear Safety and Control Act and Regulations, and the management of the regulatory interface with the Canadian Nuclear Safety Commission (CNSC).
NK30-PLAN-00120-00008	Engineering PgMP	The Engineering Program Management Plan describes how Nuclear Refurbishment Engineering will manage the engineering work in the Pickering Refurbishment project. It establishes a framework for the management of engineering work by OPG Engineering and Contractors in accordance with expectations set out by the Chief Nuclear Engineer (CNE).

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00002

Revision:

R00

Page:

9 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

Plan Number	Title	Description
NK30-PLAN-00120-00009	Maintenance PgMP	Maintenance Program Management Plan details how PRP maintenance activities will be managed under the Maintenance program.
NK30-PLAN-00120-00010	Program Assurance PgMP	The Program Assurance Plan, describes the program assurance model for PRP
NK30-PLAN-00120-00011	Construction PgMP	This plan provides a description of how the PRP Construction program will be managed
NK30-PLAN-00120-00012	Contract PgMP	The purpose of this Program Management Plan is to define how the major Contracts within Refurbishment will be defined, managed, and controlled.
NK30-PLAN-00120-00013	Communications & Stakeholder Relations PgMP	The purpose of this plan is to ensure that all Refurbishment Program information is managed such that it is communicated to the right people at the right time, ensuring the information is current and correct.
NK30-PLAN-00120-00014	Supply Chain PgMP	This Program Management Plan defines the Program requirements and roles and accountabilities for Supply Chain during design, construction and commissioning of the PRP
NK30-PLAN-00120-00015	Program Resource Management/ Staffing Plan PgMP	The Plan identifies how the staffing and resourcing needs will be met for the duration of the PRP. OPG resource management and planning is reviewed and reconfirmed on an annual basis as part of the business planning process.
NK30-PLAN-00120-00016	Operations PgMP	Operations Program Management Plan details how PRP Operations activities will be managed under the Operations program.
NK30-PLAN-00120-00017	Radiation Protection PgMP	This Program Management Plan defines radiation protection requirements and processes for employees working within the PRP to meet the intent of the existing the OPG Management System, specifically N-PROG-RA-0013
NK30-PLAN-00120-00018	Training PgMP	Training requirements as defined in the Training PgMP are to be consistent with that of OPG's Project and Engineering organizations.
NK30-PLAN-00120-00019	Quality PgMP	This document provides details and guidance related to the PRP as well as the activities of the OPG construction and quality oversight team engaged in the planning and execution of the program.
NK30-PLAN-00120-00020	Human Performance PgMP	This plan details and documents the strategy, initiatives and processes the Program will use to monitor, manage, and continuously improve Hu over the project lifecycle. Execution of this plan, and the effective implementation of barriers and defences, will help towards ensuring that human error has minimal impact on the achievement of project goals.

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00002	
Revision: R00	Page: 10 of 17

Title:
PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

Plan Number	Title	Description
NK30-PLAN-00120-00022	Return To Service PgMP	This Plan describes the processes, procedures and organization that will be used during the Pickering Refurbishment Project to manage the modification commissioning and restart activities.
NK30-PLAN-00120-00023	Nuclear Waste PgMP	NSS programs for the management and transportation of radioactive waste are mature and effective. These programs describe the organizational responsibilities, interfaces, and key program elements to ensure activities are carried out safely and effectively by qualified personnel in accordance with N-CHAR-AS-0002, Nuclear Management System.
NK30-PLAN-00120-00024	Integration PgMP	This plan will define the structure of integration between Refurbishment, the Safe Storage project, and Pickering site modifications and Decommissioning.
TBD	Indigenous Engagement Plan	The Indigenous Engagement Plan for Pickering NGS meets the spirit of a renewed relationship. It supports OPG's Reconciliation Action Plan by setting a path for engagement with Indigenous Nations as valued partners. The PRP team will make every attempt to reach Nations and communities how and where they wish to be reached, with information that is customized to meet their needs, while ensuring they are given the opportunity to contribute in a meaningful way.

4.2 Pickering Refurbishment Project Management Plans

Project Management Plans (PMP) will be developed at the bundle level for projects included in the scope of the Refurbishment program. The PMPs will describe the specific objectives that the projects will accomplish. They describe how the projects in PRP will be planned, executed, monitored and controlled, and closed.

For specific requirements, such as scope, cost, schedule, contract strategy, stakeholder management etc. the PMPs are to align with the guidelines described within the applicable Program Management Plans. PMPs should reference relevant sections from the applicable PgMPs (information should not be duplicated).

PMPs follow the requirements of OPG-PROG-0039, Project Management [R9], OPG-STD-0148, Project Management Standard [R10], and the associated governance.

4.3 Revision Cycle Requirements

Program owners shall review their PgMPs annually and revise as required.

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00002	
Revision: R00	Page: 11 of 17

Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN
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PMPs are reviewed and revised as required and as projects progress through approval gates.

Revisions may be required to support business planning or significant project milestones.

5.0 PROGRAM DECISIONS AND CHANGES

For the PRP, the Decision Record and Analysis Summary (DRAS) form will be used to initiate the process to analyze and approve or reject new concepts. Decisions are to be documented and administered through the DRAS - Decisions Module within Enterprise Project Management Extensions (ePMX).

The guiding principles identified in OPG-MAN-00120-0016, Project Integrated Change Control [R11] will be used to develop any PRP program/project specific change requirements.

Direction for managing decisions and changes is provided in NK30-PLAN-00120-00003 Pickering Refurbishment Project Controls Program Management Plan [R12].

6.0 ROLES AND ACCOUNTABILITIES

Key program personnel:

Role	Role Description
VP Refurbishment Execution	Overall accountability for successful execution of the Pickering Refurbishment Program.
Project Directors - <ul style="list-style-type: none">• Facility & Infrastructure• Retube & Feeder Replacement• Turbine/Generator• Balance of Plant• Steam Generators (Boilers)• Functional Support	Accountability for successful execution of their respective program scope. Primary responsibility for Scope/Schedule/Quality, Cost development, project reporting, risk management, contract management, decisions related to strategic direction, resourcing, stakeholder relations, and management of program contingency within given authority.

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00002	
Revision: R00	Page: 12 of 17

Title:
PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

Role	Role Description
Project Director – Pickering Refurb Ops & Maintenance	<p>Overall accountability for Operations & Maintenance programs as they apply to Pickering Refurbishment through the program lifecycle. This includes design reviews for operability and maintainability, oversight of training, operations and maintenance staffing. As the senior license owner of the operating plant, accepts turnover from construction and accountable for ensuring the systems and processes are in place to safely operate the plant.</p> <p>Accountable for successful execution of Balance of Plant Project scope by Maintenance staff and to ensure Project Management requirements as described in the Project Controls PgMP are adhered to.</p>
Director - Project Controls	<p>Overall accountability for Project Controls, including cost, risk, estimating, gating, change control, schedule management, and reporting. Ensure the enterprise project management systems are updated with quality for PRP to meet the requirements of the Project Management Program.</p> <p>Responsible for integrating Work Management processes and tools into the Project Controls group to streamline program planning.</p>
Director – Design Engineering	<p>Responsible to ensure adequate qualified resources for OPG design and engineering support activities. Responsible to ensure all design-related regulatory requirements, applicable design standards, and OPG policies and procedures are met.</p>
Manager, Environmental, Regulatory Affairs and Licensing	<p>Accountable to ensure licence and other regulatory requirements are met. Strategic planning and advice to strengthen relationships with the CNSC and manage issues related to regulatory concerns. Overall accountability for communications with CNSC related to PRP</p>
Construction Director/ Construction Manager	<p>Overall accountability for Construction programs and execution oversight for the project.</p> <p>Accountable for the implementation of the PRP Program with respect to Construction, ensuring that the PRP work program is executed in accordance with expectations for safety, quality, cost and schedule.</p>
Corporate Relations Senior Manager	<p>Provide strategic advice to maintain relationships with the public and local government (Host Communities). Accountable to ensure regulatory requirements with respect to public information are met. Responsible to develop public and stakeholder management plans. Leads public and OPG messaging for PRP. Supports Indigenous community relations planning and activities</p>
Supply Chain/ Enterprise Commercial Management Senior Manager	<p>Overall accountability to develop contracting strategies for partnerships and vendor services, negotiating contracts, providing project with advice for managing contracts, and leading contract disputes. This position works closely with Law and Supply Chain on behalf of projects for major contract awards.</p>

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00002	
Revision: R00	Page: 13 of 17

Title:
PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

7.0 ACRONYMS

ACU	Air Conditioning Units
BCS	Business Case Summary
CCW	Circulating Cooling Water
EA	Environmental Assessment
ECI	Emergency Core Injection
EWS	Emergency Water Supply
FC	Fuel Channel
MCR	Main Control Room
NPC/FADS	Negative Pressure Containment/Filtered Air Discharge System
PA	Pickering A (Units 1-4)
PgMP	Program Management Plans
PHT	Primary Heat Transport
PMP	Project Management Plan
PRP	Pickering Refurbishment Program
RB	Reactor Building
RQE	Release Quality Estimate
SDS/RRS	Shut down System/Reactor Regulating System
UPP	Uninterruptible Power Supply

8.0 REFERENCES

[R01]	NK30-CHAR-09701-00001 Pickering Refurbishment Charter
[R02]	NK30-PLAN-09701-10004 Pickering Refurbishment - Program Scope Review Board Terms of Reference
[R03]	NK30-INS-09701-10001 Pickering Nuclear Refurbishment Program Scope Control
[R04]	N286-12, Management System Requirements for Nuclear Facilities
[R05]	N-CHAR-AS-0002, Nuclear Management System
[R06]	OPG-GUID-00120-0009 Front End Planning for Programs and Strategic Projects
[R07]	OPG-STD-0001, Requirements for Administrative Governance Documents
[R08]	NK30-PLAN-00120-00015 Resource Management and Staffing Program Mgmt Plan
[R09]	OPG-PROG-0039, Project Management
[R10]	OPG-STD-0148, Project Management Standard
[R11]	OPG-MAN-00120-0016, Project Integrated Change Control
[R12]	NK30-PLAN-00120-00003 Pickering Refurbishment Project Controls Program Management Plan

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00002

Revision:

R00

Page:

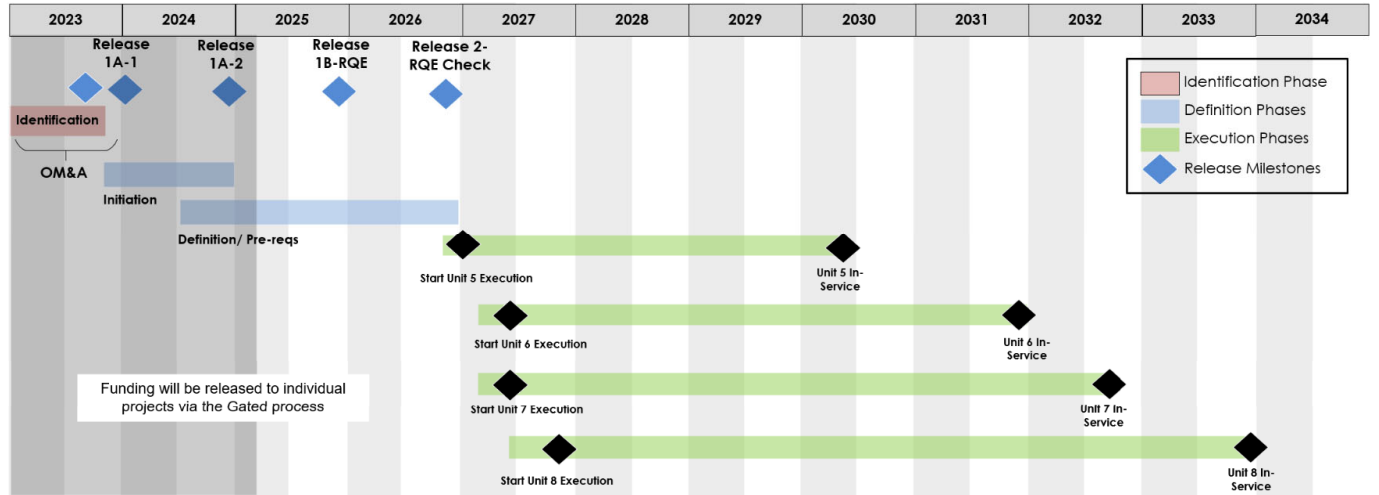
14 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

Appendix A Program Gating Strategy and Schedule

Release Strategy Timeline



Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00002

Revision:

R00

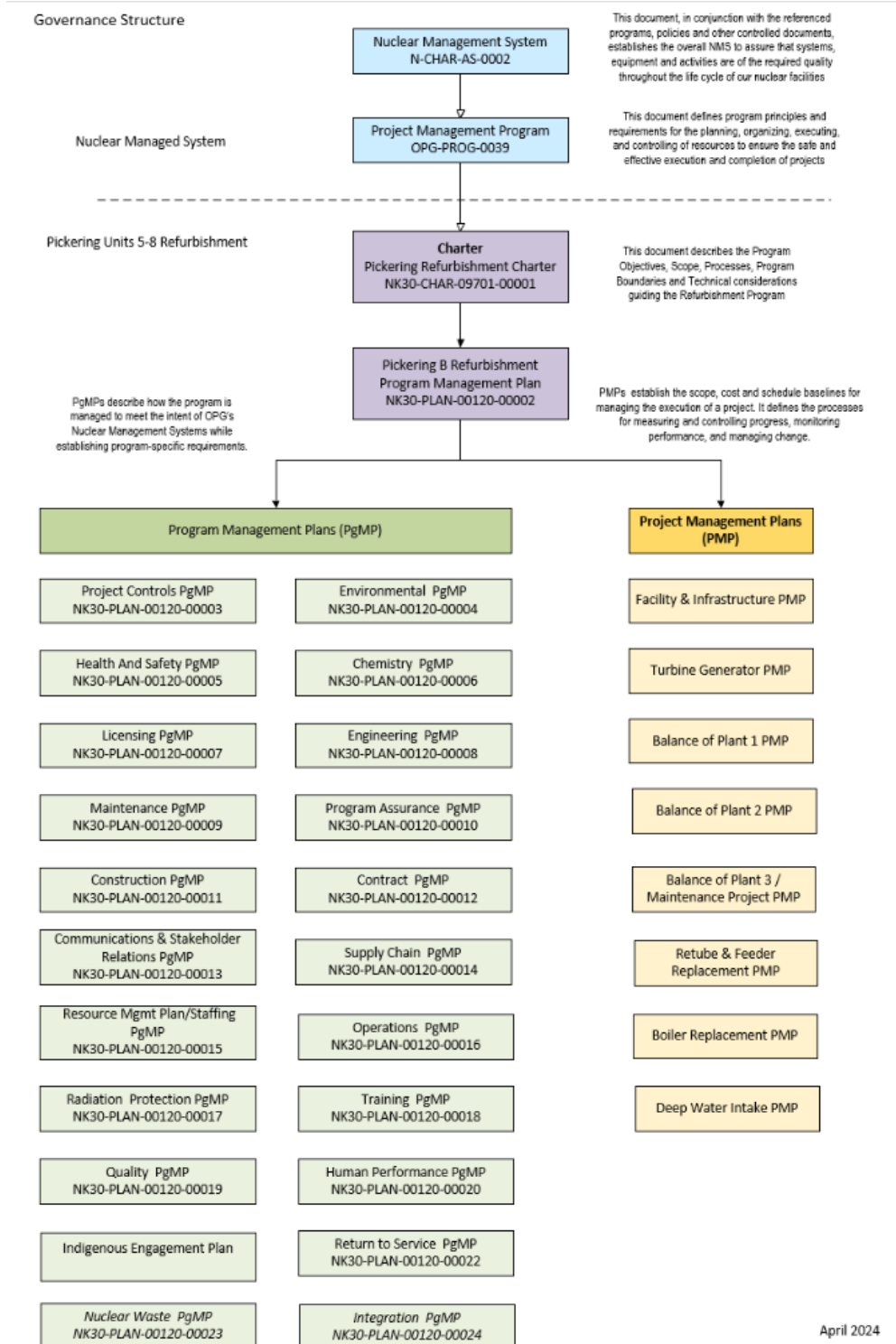
Page:

15 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

Appendix B Tiered Governance Structure



Internal Use Only	
Document Number: NK30-PLAN-00120-00002	
Revision: R00	Page: 16 of 17
Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN	

Appendix C Program Management Plan Section Requirements

The PgMPs prescribe the function-specific requirements and processes for PRP project execution and are meant to convey how staff will perform their work while meeting the intent of the existing OPG Management System. They articulate how business objectives, requirements (licensing, legal, regulatory, Quality Assurance), and commitments are fulfilled.

PgMPs are to be written in accordance with the standards outlined in OPG-GUID-00120-0009 Front End Planning for Programs and Strategic Projects [R6], and OPG-STD-0001 Requirements for Administrative Governance Documents. [R7]

The structure and minimum content requirements for PgMPs are as follows:

Section 1.0, Purpose

Provide a clear and concise description of the fundamental intent or focus of the PgMP.

- Outline high-level rationale, background and process details.

Section 2.0, Program Requirements

This section provides a “roadmap” that conveys how the program will meet PRP requirements.

- Briefly describe any nuclear, corporate, or other business unit governance, governance support, and non-governance documents that provide implementing details for requirements, activities, and processes described by the PgMP.
- State requirements that have been mandated by functions for projects to follow as part of contract development and project execution.
- Illustrate (through figures or flowcharts) the PgMP framework, implementing and interfacing documents. (see Figure 1 below)
- Metrics/Reporting Requirements Specify the performance indicators or monitoring activities that are necessary to ensure the overall PgMP requirements are met.

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00002

Revision:

R00

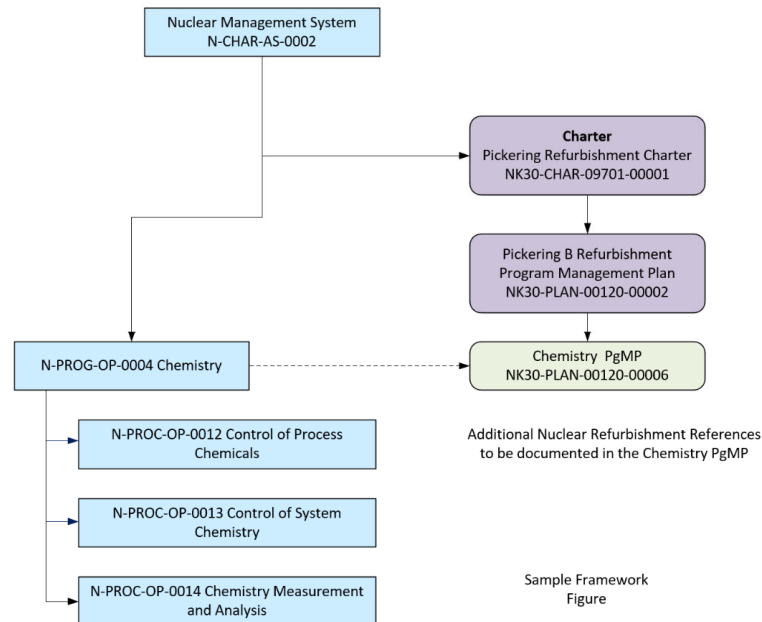
Page:

17 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN

Figure 1: Governance Framework Sample for Program Management Plans



Section 3.0, Resources, Roles and Accountabilities

Resource Management and Staffing Program Management Plan NK30-PLAN-00120-00015 [R8] defines the processes to be followed to obtain staff for the PRP.

Each PgMP should describe the Resource strategy to be used by the associated Program.

Provide a high-level summary of accountabilities for positions or roles regarding the accomplishment of activities related to the implementation of the document.

Specify the performance indicators or monitoring activities that are necessary to ensure overall Program requirements are met.

Section 4.0, Definitions and Acronyms

List definitions and acronyms in accordance with the standards outlined in OPG-STD-0001. [R7]

It is not necessary to add commonly known terms to the abbreviations and acronyms list, e.g., OPG.

Section 5.0, References

List the documents required to be used in conjunction with the PgMP. Identify each document in accordance with the standards outlined in OPG-STD-0001. [R7]

Ensure documents listed as performance or developmental references are available ie are retrievable in PowerSearch

March 30, 2026

CD# P-CORR-00531-24279 P

MR. R. RICHARDSON

Director,
Pickering Regulatory Program Division
Canadian Nuclear Safety Commission
P.O. Box 1046
280 Slater Street
Ottawa, Ontario, K1P 5S9

Dear Mr. Richardson:

Pickering NGS – OPG Responses to CNSC Staff Requests on the Proposed Deep Water Intake, Action Item 2026-48-39109

The purpose of this letter is to provide CNSC staff responses to the requests received in Reference 1 on OPG's submission of the licence renewal application for Pickering NGS Power Reactor Operating Licence (PROL), PROL 48.04/2028 and Pickering Waste Facility Operating Licence (WFOL), WFOL-W4-350.02/2028 (Reference 2), and to request closure of Action Item 2026-48-39109.

In Reference 1, CNSC staff have requested further information on the proposed Deep Water Intake presented in Reference 2. Attachment 1 provides responses to the CNSC staff requests received in Reference 1. A Regulatory Management Action Request will be initiated to provide the following documents to CNSC staff, as detailed in Attachment 1.

- Geotechnical Assessment Report by July 21, 2026 (supporting Item 2 (d) of the response)
- Spoils Management Plan by August 20, 2026 (supporting Item 2 (e) of the response)

Based on the information presented in this submission, OPG requests closure of Action Item 2026-48-39109.

Mr. Richardson

OPG Proprietary

CD# P-CORR-00531-24279 P

If you have any further questions, please contact Aditi Bhardwaj, Senior Manager, Nuclear Regulatory Affairs at aditi.bhardwaj@opg.com.

Sincerely,



Luca Ceccato
Senior Vice President
Pickering Projects
Ontario Power Generation Inc.



David Rogers
Senior Vice President
Pickering Nuclear
Ontario Power Generation Inc.

Attach.

cc: CNSC Site Supervisor
forms-formulaires@cnscccsn.gc.ca

- References:
1. CNSC Letter, R. Richardson to D. Rogers and L. Ceccato, "Pickering NGS – Ontario Power Generation Licence Application, including the Proposed Deep-Water Intake, New Action Item 2026-48-39109", March 4, 2026, CD# P-CORR-00531-24278, e-Doc 7642058.
 2. OPG Letter, P. Seguin, K. Aggarwal, and L. Ceccato to R. Richardson, "Renewal Application for Pickering Nuclear Generating Station Power Reactor Operating Licence and Pickering Waste Facility Operating Licence", June 27, 2025, CD# P-CORR-00531-23980, e-Doc 7542953.

ATTACHMENT 1

OPG Letter, L. Ceccato and D. Rogers to R. Richardson, "Pickering NGS – OPG Responses to CNSC Staff Requests on the Proposed Deep Water Intake, Action Item 2026-48-39109".

CD# P-CORR-00531-24279 P

OPG Responses to the CNSC Staff Requests on the Proposed Deep Water Intake

Prepared By: P. Sambavalingam

Checked By: T. Dhekney

ATTACHMENT 1

OPG Responses to the CNSC Staff Requests on the Proposed Deep Water Intake

Item #	CNSC Staff Request [A1-1]	OPG Response
1.	Information on DWI design, including: a. Design description, requirements, codes, and standards relevant to the design and construction of the DWI.	<p><u>Deep Water Intake (DWI):</u></p> <p>The DWI project aims to enhance operational efficiency, reduce environmental impacts, and improve resilience to climate-related challenges. The DWI system will draw deeper cooler water from Lake Ontario, which is expected to improve thermal efficiency, reduce biofouling events, decrease fish impingement and entrainment, increase electrical power output, and enhance resilience to climate change. DWI structure will consist of an intake structure, intake shaft, tunnel, and an up-shaft to connect to the existing Pickering Nuclear Generating Station (NGS) forebay. As part of the DWI project, a temporary infill of a portion of the forebay is required to provide access for construction of the permanent up-shaft and a temporary launch shaft is required for the tunnel boring machine (TBM) installation.</p> <p>The design requirements for the DWI include:</p> <ul style="list-style-type: none">• a minimum 50 year operational design life,• provide a flow capacity of 136.1 m³/s, and• total head loss equal to or less than 1.0 meter under normal operating conditions. <p>The DWI tunnel and associated structures will be designed and constructed to International Organization for Standardization (ISO) 9001 standards in compliance with National Building Code of Canada (NBCC) and Canadian / Canadian Standards Association (CAN/CSA) Standards. Other codes or standards such as references published by American Concrete Institute may be utilized for the subject when the Canadian Codes are not applicable nor available.</p> <p><u>Cut-off wall:</u></p> <p>In conjunction with DWI, it is necessary to have a structure at the forebay intake channel which separates the forebay from the lake, referred to as the “cut-off wall”. The cut-off wall is planned to be designed to provide a permanent passive water supply, which helps ensure that the required water flow for the Emergency Water Supply (EWS) pumps is available during a seismic event. This wall also ensures that the ingress of debris, silt, fish, and algae through the permanent opening are sufficiently mitigated.</p> <p>The cut-off wall structure comprises of three different sections:</p> <p>Section 1: This section is considered a safety related structure and is seismically qualified.</p> <p>Section 2: This section is considered a conventional structure, designed and built to the NBCC and is planned to provide the required flow for Pickering NGS 014 Safe storage phase and Pickering NGS 058 during the DWI construction.</p> <p>Section 3 (Backfill): This section is planned to be blocked off after the cut-off wall commissioning and before DWI tunnel AFS and provides separation between Lake Ontario and the Pickering NGS forebay.</p> <p>The design requirements for the cut-off wall include:</p> <ul style="list-style-type: none">• a minimum 50 year service-life,• provide a nominal flow of 600 kg/s for operation of two emergency pumps that will satisfy a flow of 482.1 kg/s for nuclear safety requirements following a seismic event,• 1 meter differential water level between the forebay and the lake. <p>The wall is planned to facilitate the supply of EWS water (Section 1) and is planned to be designed and constructed to CSA N289/N291 standards. The remainder (Sections 2 and 3) of the cut-off wall are planned to be designed and constructed to ISO standards in order to achieve the required separation between the Pickering NGS forebay and Lake Ontario in compliance with NBCC, and the applicable CAN/CSA Standards.</p>

Item #	CNSC Staff Request [A1-1]	OPG Response
	b. <i>Final or near-final location and footprint.</i>	Preliminary layout of the location and footprint for the DWI structures are provided in Appendix A. The DWI structure consists of an intake tunnel which is connected to the existing Pickering NGS forebay with a new structure referred to as the “up-shaft”. The up-shaft structure will be located in the south-east corner of the forebay. A temporary launch shaft will be situated directly south of the up-shaft to allow for the TBM assembly. This temporary launch shaft will be backfilled upon completion of tunnel construction. The intake tunnel is connected to Lake Ontario with an intake shaft and intake cap structure situated on the lakebed approximately 1.5 km offshore. The exact location of the up-shaft, temporary launch shaft, tunnel and intake structure is subject to change, pending completion of detailed design.
	c. <i>Description of any associated shoreline work, including infilling.</i>	While there is proposed work onshore near the Pickering NGS along Dike Road to support DWI tunnel enabling works, there are no current plans for any permanent lake infilling. The near shoreline works to support the DWI project includes the following: 1) Upgrades to the perimeter Dike Road to allow for heavy construction traffic to reach the location of the tunnel launch shaft. 2) Foundation abutments for a proposed bridge structure crossing the existing discharge outlet channel. 3) A temporary infill of approximately 2,000 m ² within the forebay to support shaft construction and construction of a new permanent retaining wall at the shaft location next to the existing forebay. While the exact details are subject to change based on final detailed design, it is not anticipated that there will be any fill placement along the southern side of Dike Road or within the bridge abutment area within the Lake Ontario high water level. 4) OPG is exploring shoreline enhancements as part of the <i>Fisheries Act</i> authorization process to increase habitat diversity. Enhancements would range from 2 m to 100 m offshore.
	d. <i>Potential modifications to shoreline protections due to DWI construction.</i>	There are no current plans for modifications to any shoreline protection due to DWI construction.
	e. <i>Any impacts to assumptions of existing safety analyses due to the closure of the current surface water intake to the forebay.</i>	<p>The intent is to have no impact on the existing safety analysis assumptions. Consistent with the Engineering Change Control (ECC) process, the impacts to safety analysis were considered at the onset of the project by forming nuclear safety constraints. The formulation of the nuclear safety constraints was to ensure that there is no negative impact on the Safe Operating Envelope (SOE) and thus conforming to the implicit assumptions in the Safety Report, which upholds the conclusion of the Safety Report accidents. Additionally, the avoidance of the potential negative impacts to Probabilistic Safety Analyses (PSA) was considered.</p> <p>Of particular focus of nuclear safety constraints was to ensure the service water can function as designed to mitigate Safety Report accidents. Furthermore, nuclear safety constraints also maintain SOE margins. The service water of importance for accident mitigation are Emergency Low Pressure Service Water/ Emergency High Pressure Service Water (ELPSW/EHPSW) and Emergency Water System (EWS), both of which are Systems Important to Safety (SIS). The ELPSW/EHPSW is supplied by Class III power and whereas the EWS is supplied by Emergency Power System (EPS); the EWS and EPS are designed to mitigate common mode events such as seismic events. As for PSA, the major focus was to ensure that the event frequency of the collapse of the proposed structures (DWI tunnel structure and the cut-off wall opening), including following seismic events, should be low enough that it is not considered a major contributor to the severe core damage frequency.</p> <p>During detailed design, as per the ECC process, the design will have to demonstrate conformance to the SOE, as well as to ensure that there is no negative impact to PSA.</p>
	f. <i>Proposed preventative maintenance and measures to protect the completed DWI from potential effects of coastal flooding, coastal erosion, and other effects related to frazil ice and biological hazards (e.g. algae and muscles, etc.).</i>	<p>The proposed DWI is an offshore deepwater design which removes the potential threats of coastal flooding or coastal erosion associated with existing intake. It is expected that the DWI would significantly reduce the effects related to frazil ice. During the winter season, water drawn in through the DWI is expected to be slightly warmer (above 0°C and free of ice particles) than the current surface water intake. This effect has been demonstrated in a comparative study between existing Pickering NGS surface water intake and Darlington NGS deep water intake where recent operating experience from Darlington NGS shows that it has not been impacted by frazil ice formation during the past winter. As part of detailed design, hydraulic and thermal analysis will be ongoing to further evaluate the potential for frazil ice formation, and mitigating measures will be developed as required.</p> <p>The maintenance program is planned to be similar to the program used at Darlington NGS to manage algae accumulation and zebra mussel growth on the intake structure and inspection of the tunnel components. Various options for improving the maintenance system are also being considered.</p>

Item #	CNSC Staff Request [A1-1]	OPG Response																																																						
2.	Information on DWI construction, including the conduct of in-water-work: a. Estimated timing, sequencing, and duration.	<p>The table below reflects the current information available on estimated timing, sequencing and duration, pending any associated permit/review received, and is subject to change as the design, means and methods, and scheduling are refined.</p> <table><tr><th>Activity</th><th>Estimated Start</th><th>Estimated End</th></tr><tr><td colspan="3">Site Preparation Activities: The activities listed below are site preparation activities that are planned to be completed before commencement of DWI construction activities.</td></tr><tr><td>Dry Storage Module Relocation</td><td colspan="2">Complete</td></tr><tr><td>Protected Area Security Fence Relocation</td><td>March 2026</td><td>September 2026</td></tr><tr><td>Construction Power</td><td>May 2026</td><td>September 2026</td></tr><tr><td>Bridge Road Construction</td><td>May 2026</td><td>June 2027</td></tr><tr><td>Dike Road Widening</td><td>August 2026</td><td>January 2027</td></tr><tr><td>Construction Water (Draw and purify lake water for construction activities)</td><td>September 2026</td><td>September 2027</td></tr><tr><td>Facilities, Power and Services</td><td>September 2026</td><td>September 2027</td></tr><tr><td>Temporary Launch Shaft (which will support TBM installation)</td><td>October 2026</td><td>March 2028</td></tr><tr><td>Temporary Forebay Infill</td><td>October 2026</td><td>May 2027</td></tr><tr><td>Overhead Crane</td><td>January 2027</td><td>June 2027</td></tr><tr><td colspan="3">DWI Construction Activities: The activities listed below provide the construction activities for the DWI project. Note: The cut-off wall information is not included at this time and is planned to be reviewed as details are finalized.</td></tr><tr><td>Intake Tunnel</td><td>April 2028</td><td>October 2028</td></tr><tr><td>Forebay Up – Shaft, Temporary Support of Excavation</td><td>May 2027</td><td>March 2028</td></tr><tr><td>Intake Shaft and Structure – Dredging and Precast modules</td><td>March 2027</td><td>October 2029</td></tr><tr><td>Starter Tunnel and Connecting Tunnel</td><td>November 2027</td><td>March 2028</td></tr><tr><td>Site Reinstatement</td><td>August 2029</td><td>December 2029</td></tr></table>	Activity	Estimated Start	Estimated End	Site Preparation Activities: The activities listed below are site preparation activities that are planned to be completed before commencement of DWI construction activities.			Dry Storage Module Relocation	Complete		Protected Area Security Fence Relocation	March 2026	September 2026	Construction Power	May 2026	September 2026	Bridge Road Construction	May 2026	June 2027	Dike Road Widening	August 2026	January 2027	Construction Water (Draw and purify lake water for construction activities)	September 2026	September 2027	Facilities, Power and Services	September 2026	September 2027	Temporary Launch Shaft (which will support TBM installation)	October 2026	March 2028	Temporary Forebay Infill	October 2026	May 2027	Overhead Crane	January 2027	June 2027	DWI Construction Activities: The activities listed below provide the construction activities for the DWI project. Note: The cut-off wall information is not included at this time and is planned to be reviewed as details are finalized.			Intake Tunnel	April 2028	October 2028	Forebay Up – Shaft, Temporary Support of Excavation	May 2027	March 2028	Intake Shaft and Structure – Dredging and Precast modules	March 2027	October 2029	Starter Tunnel and Connecting Tunnel	November 2027	March 2028	Site Reinstatement	August 2029	December 2029
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Item #	CNSC Staff Request [A1-1]	OPG Response
	b. Confirmation that the DWI is anticipated to be finished prior to the return to service of any refurbished unit and details on OPG's contingency plans should it not.	<p>The DWI Tunnel is anticipated to be flooded prior to the Return to Service (RTS) of the first refurbishment unit (Pickering NGS Unit 5).</p> <p>OPG's contingency plan is to ensure that sufficient water will flow through the current surface water intake to operational units in the event that DWI is delayed prior to Pickering NGS Unit 5 RTS.</p>
	c. A list of necessary permits, and approvals from other regulatory agencies, as well as current status of any submissions, as noted in section 5.2 of the DWI project management plan (NK30-PMP-09701-00007).	<p>Appendix B of this document provides the list the necessary permits and approvals applicable for the DWI tunnel. Additionally, Appendix C of this document provides an update on the status of submissions mentioned in section 5.2 of NK30-PMP-09701-00007, "<i>Pickering Deep Water Intake (DWI) And Site Improvement Modifications Project Management Plan</i>". These lists reflect the anticipated permits required based on the current design concept and are subject to change as the design and means and methods get refined.</p>
	d. Description of construction and installation methods, including design of the launching shaft, supporting geotechnical and structural safety analysis, dredging, and blasting program for shaft excavation.	<p>Appendix D of this document provides the preliminary description of the construction and installation methods. The construction and installation methods are expected to be refined as the design and means and methods are finalized. There is no proposed drilling or blasting for DWI.</p> <p>A Regulatory Management Action Request (REGM) will be initiated to provide the geotechnical assessment report to CNSC staff by July 21, 2026.</p>
	e. Spoils management plans associated with material generated during excavation and tunnelling.	<p>The DWI Spoils Management Plan is currently being prepared through regular, ongoing engagement with Michi Saagiig First Nations, and refined through the definition phase of the project. Based on input and feedback from the Nations, several options are being considered including (but not limited to):</p> <ul style="list-style-type: none">• beneficial reuse if practical.• open aquatic disposal of intake shaft materials• trucking tunneling materials to an off-site disposal site• adding to an existing landfill on-site for spoils disposal <p>A REGM will be initiated to provide the first iteration of the Spoils Management Plan to CNSC staff by August 20, 2026. Based on ongoing engagement activities with the Nations and the options that are being pursued through the design of the project, further revisions to the Spoils Management Plan are expected.</p>
3.	The revised predictive environmental risk assessment (PERA), incorporating further detailed information on:	
	a. Validity of interactions, potential effects to relevant environmental receptors (including species at risk), and conclusions with respect to updated DWI design information and planned construction activities; including, sediment disturbance and associated changes to water and sediment quality, potential mobilization of contaminants, habitat disturbance,	<p>Section 5.2.2.2.1 of the PERA (Enclosure 1 of Reference A1-2) considers the temporary disturbance of sediment during dredging and subsequent relocation of the dredged spoils and takes into account the development of an erosion and sediment control plan focused on reducing sedimentation. Habitat removal and disturbance are considered in Section 6.2.2 of the PERA. In cases where dewatering is required, construction dewatering is considered temporary and is to be carried out with the necessary approvals and permits. Underwater blasting, which may have a noise or vibration impact, is not in scope for the project. The PERA has been shared with Michi Saagiig First Nations for review and comment.</p>

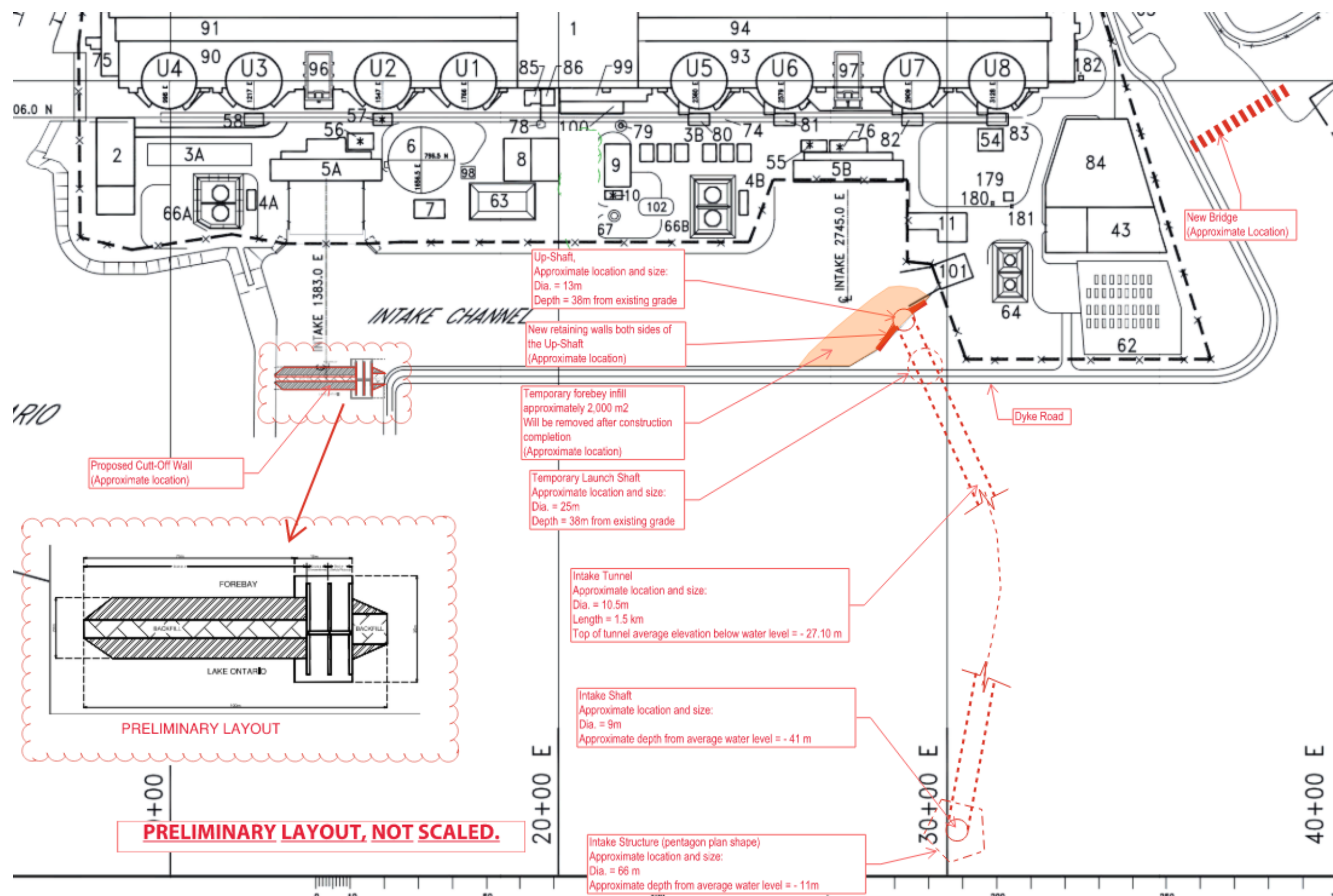
Item #	CNSC Staff Request [A1-1]	OPG Response
	<i>groundwater dewatering and pumping quantity, and physical stressors such as underwater noise or vibration.</i>	
	<i>b. Mitigation measures intended to prevent or minimize construction-related effects.</i>	General mitigation measures are included in the PERA, The PERA also refers to environmental plans that will be developed to support the execution of construction activities.
	<i>c. Site-specific environmental monitoring plan(s) and results associated with the DWI construction.</i>	<p>General mitigation measures are included in the PERA. Site specific environmental monitoring and management plans are documents that will be prepared to support the execution of construction activities. These plans are not intended to be contained in the PERA.</p> <p>The following is a list of Environmental control specifications that will be prepared for the overall DWI Program ahead of construction. These environmental control specifications are prepared by specialists with extensive knowledge of laws, regulations and operational implementation. Items 1, 2, 3, 10 and 11 from the list below are planned to be available by August 2026. The remaining items are planned to be available by September 2026. Reports will be shared with the Michi Saagiig First Nations for review.</p> <ol style="list-style-type: none">1. Spill prevention and response2. Vegetation and invasive species3. Terrestrial wildlife and species at risk4. Surface water quality and Erosion Sediment Control5. Groundwater quality and dewatering6. On-shore noise and vibration7. Aquatic resources8. Archeology9. Air quality and dust control10. Hazardous materials management11. General waste management12. Soil, muck and excavated materials Environmental Control Specification
	<i>d. Site-specific environmental management plan(s) that outline how contractor(s) meet OPG's commitments in the environmental management system and capture the implementation of mitigation measures.</i>	See response to 3c.

References:

A1-1. CNSC Letter, R. Richardson to D. Rogers and L. Ceccato, “Pickering NGS – Ontario Power Generation Licence Application, including the Proposed Deep-Water Intake, New Action Item 2026-48-39109”, March 4, 2026, CD# P-CORR-00531-24278, e-Doc 7642058.

A1-2. OPG Letter, L. Ceccato, P. Seguin and K. Aggarwal to R. Richardson, “Predictive Environmental Risk Assessment for Pickering Refurbishment, Decommissioning, and Continued Operations”, June 20, 2025, CD# P-CORR-00531-23947, e-Doc 7538981.

Appendix A – DWI Preliminary Layout



Appendix B – List of Permits for the DWI Tunnel Project

Regulatory Agency	Permit	Submission to Agency
Department of Fisheries and Oceans Canada (DFO)	DFO – Request for Review (RfR)/Letter of Advice (LOA) – In water activities advanced work for forebay infill	April 2026
Department of Fisheries and Oceans Canada (DFO)	DFO – Request for Review (RfR)/ - Main Scope	May 2026
Department of Fisheries and Oceans Canada (DFO)	DFO-Fisheries Act Authorization - Main Scope	September 2026
Department of Fisheries and Oceans Canada (DFO)	DFO-RfR/LOA - Borehole Program	March 2026
Toronto Regional Conversation Authority (TRCA)	TRCA Development Permit (Dike Road and Shoreline)	April 2026
Transport Canada (TC)	TC- Minor Works (CNWA) Forebay Infills	May 2026
Transport Canada (TC)	TC- Major Works (CNWA) Main Scope	September 2026
Transport Canada (TC)	TC Minister's Approval to protect DWI System / Works	July 2027
Transport Canada (TC)	No interference with Navigation	March 2026
Ministry of Citizenship and Multiculturalism (MCM)	Marine Archaeological Licence	June 2026
Ministry of Citizenship and Multiculturalism (MCM)	Marine Archaeological Licence	April 2026
Ministry of Natural Resources (MNR)	MNR-Scientific Collector Permits	May 2026
Ministry of Natural Resources (MNR)	MNR -Permit – Works on Crown Lands	June 2026
Ministry of Natural Resources (MNR)	Crown Land Work Permit – Tunnel and Shaft Installation (Main Scope)	June 2026
Ministry of Natural Resources (MNR)	Crown Land Work Permit – Borehole Program	Mar 2026
Ministry of Natural Resources (MNR)	MNR Crown Land Permit (Lakebed Easement)	July 2030
Ministry of Environment Conservation and Parks (MECP)	MECP Notice to RPRA Excess Soil Registry** Not a permit, but a Qualified Person Excess Soil Reporting Process currently tied to the launch shaft.	October 2026
OWRA - Ministry of Environment Conservation and Parks (MECP)	MECP ECA - Open Loop Cooling System	August 2026
OWRA - Ministry of Environment Conservation and Parks (MECP)	MECP Surface Water Permit-to-take-Water (PTTW)	July 2026
Ministry of Environment Conservation and Parks (MECP)	MECP ECA - DWI tunnel	August 2026

Note: This list above reflects the anticipated permits required based on the current design concept and is subject to change as the design and means and methods get refined. The cut-off wall contract has not been issued yet, and the associated permits are not included in Appendix B.

Appendix C – Status Update for Submissions Noted in the DWI Project Management Plan

#	Permit/Agency Description	Permit Submission Date
1	MECP- Notice to RPRA Excess Soil- DWI Tunnel	October 2026 Note: This is not a permit but a Qualified Person Excess Soil Reporting Process.
2	Pickering - Demolition Permit - DWI Tunnel	Cancelled – No longer demolishing buildings at Pickering NGS site.
3	MCM- Marine Archaeology -DWI Tunnel Boreholes	Permit was submitted in March 2024. Marine Archaeology Impact Assessment Report submission in April 2026. Ministry approval is anticipated in June 2026.
4	MNRF- Well License - Bridge Construction	Completed
5	DFO- Letter of Advice - Bridge Construction	Completed
6	TC- Ministers Approval (CNWA) - Bridge Construction	Completed
7	MNRF-Land Lease of Crown Land for Lakebed -Shoreline	July 2027
8	TRCA- Dev. Permit- Bridge Construction	Both TRCA development permits have been submitted.
9	TRCA -Dev. Permit - Green Ditch Slope	
10	MNRF- Ministers Approval (CNWA) - Bridge Construction	MNR does not have jurisdiction over CNWA. N/A
11	DFO – Request for Review, Fisheries Act Authorization for in-water Works – DWI Tunnel and Cut-Off Wall	September 2026
12	TC-Ministers Approval-Major works-In-Water Works	September 2026
13	DFO – Request for Review - Letter of Advice-In-Water Works (Bridge)	Completed
14	MECP- ECA for Industrial Sewage - DWI Tunnel	N/A
15	DFO - Review Request - FAA Construction-In-Water Works	Same as 11
16	DFO - Request for Review Fisheries Act Authorization	Same as 15
17	TRCA - Dev. Permit - In-Water Works (Dike Road and Shoreline)	April 2026
18	MNRF- Work Permit-In-Water Works * Opportunity scope exists in DWI, such east landfill	May 2026
19	TC - Ministers Approval for Disposal	September 2026
20	TC - Permit to Enter Prohibitive Zone- DWI Tunnel	See #12
21	MECP- Permit to Take Water- DWI Tunnel	July 2026
22	TC - Minsters Approval (CSA) - DWI Tunnel	September 2026
23	DFO - Fisheries Act Authorization Application – DWI Tunnel and Cut-Off Wall	Same as 15
24	TRCA Permits – Cut-Off Wall	Estimated Q3 2026
25	MNR Permits – Cut-Off Wall	Estimated Q3 2026

Note: This list above reflects the anticipated permits required based on the current design concept and is subject to change as the design and means and methods get refined. The schedule as noted represents the best available dates as of the time of PMP issuance in October 2025. The PMP is updated annually.

Appendix D – Preliminary Description of Construction and Installation Methods

The information presented below provides a preliminary description of the construction and installation methods. The construction and installation methods are expected to be refined/changed as the design and means and methods are finalized. There is no proposed drilling or blasting for DWI.

Design and Construction of the Launching Shaft, Forebay Up Shaft and Sequential Excavation Method (SEM) Tunnels

- The Deep Water Intake will connect to the existing Pickering NGS forebay by permanent up-shaft of a diameter to match the intake tunnel diameter.
- The Tunnel Boring Machine (TBM) will be launched from a large temporary shaft of approximately 24 m diameter, adjacent to the permanent up-shaft.
- Both shafts are designed, and will be constructed, with temporary support of excavation by secant bored piles which will incorporate a rock socket to enhance stability and manage seepage at the base of the overburden.
- Once the overburden excavation is completed, a ring beam will be installed at the bottom of the secant piles to provide stability during rock excavation.
- Below the piles, for rock support, support of excavation will be done with a combination of shotcrete, rock bolts, and wire mesh.
- As the shaft depth is limited to approximately 40 m depth, the geology does not require blasting to advance with the excavation.
- Two (2) SEM tunnels will be constructed at shafts bottom, a connecting tunnel between the two shafts and a starter tunnel in the direction of the lake, to allow for the TBM assembly and launching.
- Each SEM tunnel is about 16 m in length to provide an overall space for TBM assembly of approximately 60 m.

Design and Implementation of the supporting geotechnical and structural safety analysis program for shafts excavation.

Based on an extensive geological campaign, a comprehensive geotechnical assessment has been carried out. Structural calculations are planned to be completed to demonstrate that the DWI is in compliance with the design requirements and NBCC post-disaster requirements. Prior to construction, ground monitoring utilizing specialized instrumentation (settlement markers, convergence prisms, rod extensometers) are planned to be utilized to detect any potential excessive movement in its early stages.

Design and Construction of the Intake Tunnel

- The 1.5 km long intake tunnel will be excavated using a TBM.
- To mitigate any groundwater inflow the design and construction team selected a Slurry Mixshield TBM that has face pressure isolation capabilities with a bulkhead separating the confined excavation chamber from the free air tunnel.
- The TBM will be equipped with systems that will enable installation of precast tunnel lining behind excavation and annulus grouting to stabilize the excavated tunnel and prevent any ground water ingress.
- The methodology selected will enable hydraulic transportation of the excavated materials to a surface located separation and treatment plant. The separation and treatment plant is a temporary building to support processing of excavated material prior to off-site disposal. This building will be located in the East Complex at the Pickering NGS site.

Design and Construction of the Intake Shaft and Structure

- An intake shaft of approximately 9 m diameter and an intake structure are designed to facilitate water conveyance through the intake tunnel and up-shaft to the forebay.
- After the initial dredging campaign, the offshore intake drop shaft will be excavated using marine equipment.
- The shaft will be lined with steel and annular void between the liner and the ground injected with grout to ensure long term stability.
- The intake structure will consist of five (5) prefabricated modules. The modules will be loaded on a barge within the safe harbor protection. Once the weather window is confirmed, the barge supporting the modules to be installed for the day will be towed by tug to the destination, where modules will be sunk individually into position, supported with Remote Operated Vehicles (ROV) and divers, as necessary.
- The intake shaft will be further connected to the tunnel after the tunnel is completed and the TBM backup is removed.

**Summary of Regulatory Commitments, Regulatory Obligations and Regulatory
Management Actions Made/Concurrence Requested**

CD# P-CORR-00531-24279 P

Submission Title: **Pickering NGS – OPG Responses to CNSC Staff Requests on the
Proposed Deep Water Intake, Action Item 2026-48-39109**

Regulatory Commitments (REGC):

No.	Description	Date to be Completed
	None	

Regulatory Management Action (REGM):

No.	Description	Date to be Completed
1.	Provide the Geotechnical Assessment Report to CNSC staff.	July 21, 2026
2.	Provide the Spoils Management Plan to CNSC staff.	August 20, 2026

Regulatory Obligation Action (REGO):

No.	Description	Date to be Completed
	None	

**Concurrence
Requested:**

Based on the information presented in this submission, OPG requests the closure of Action Item 2026-48-39109.

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE





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The Program Management Plans outline the specific requirements and procedures related to each function of a project, with the aim of communicating how the staff will carry out their tasks while aligning with the objectives of the current OPG Project Management Standard.

General Program Information

Program Name:	Pickering Refurbishment Project	Facility/Site:	NK30
Program Manager:	Shawn David	Executing Org:	Director Operations & Maintenance, Pickering Refurbishment
Program Manager R2:	James Ronald	Sponsor:	Subo Sinnathamby

Program Management Plan Approval

<p>Prepared by:</p> <p>Sadia Pirzada Project Leader Pickering Refurbishment 2026-05-08</p> <p>Reviewed by:</p> <p>Richard Scrannage Section Manager Ready-For-Service Pickering Refurbishment 2026-05-08</p> <p>Reviewed by:</p> <p>Brandon Cormier Assistant Operations Senior Manager Pickering Refurbishment / Safe Storage 2026-05-08</p>	  
<p>Approved by:</p> <p>Kerry Jackson Director Operations Pickering Refurbishment 2026-05-08</p> <p>Business Unit Execution Line Approval Authority</p>	

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00022	
Revision: R003	Page: 2 of 17

Title:
PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE

Table of Contents

	Page
Revision Summary.....	3
1.0 PURPOSE.....	4
2.0 RETURN TO SERVICE PROGRAM REQUIREMENTS.....	4
2.1 Return to Service Phase Definition	4
2.2 Basis for Return to Service	5
2.2.1 Refurbishment Categories	5
2.2.2 Return to Service Elements	5
2.2.3 Restart Control Verification Points (RCVPs)	6
2.3 Return to Service Process and Procedures	7
2.3.1 Construction Completion Declaration.....	8
2.3.2 Commissioning and Modification Available for Service.....	8
2.3.3 System Available for Service	8
2.3.4 Unit Readiness for Service.....	8
2.3.5 Return to Service Performance Indicators	9
2.4 Restart Testing During Start-up	10
2.4.1 Safety Analysis.....	10
2.4.2 Operating Policies and Principles Strategy	10
2.4.3 Layup and Aging Management Reviews.....	11
2.4.4 Open Item Management	11
2.5 Return to Service Program Management Approach	12
2.5.1 Records Management.....	12
2.6 Regulatory Interface	12
2.6.1 Regulatory Commitments.....	12
2.6.2 Completion Assurance Documents	12
3.0 ROLES AND ACCOUNTABILITIES.....	13
3.1.1 Vice President, Plant Operations, Pickering Refurbishment	13
3.1.2 Director, Operations & Maintenance Projects, Pickering Refurbishment	13
3.1.3 Director, Operations Production, Pickering Refurbishment.....	13
4.0 DEFINITIONS AND ACRONYMS.....	14
4.1 Definitions	14
4.2 Acronyms	15
5.0 REFERENCES.....	16
Appendix A : Return to Service Process & Procedures	17

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00022

Revision:

R003

Page:

3 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE

Revision Summary

Revision Number	Date	Comments
R000	2024-05-27	Initial Issue
R001	2025-06-06	Update procedure references and Appendix B RTS summary of supporting documents in development
R002	2025-09-10	Removed references to documents in development from Section 2.2.3, 2.3, 2.3.1, 2.3.4 and 2.4. Updated Modification definition in section 4.1. Updated Appendix A, Return to Service Process & Procedures and removed Appendix B RTS summary of supporting documents in development.
R003	2026-05-06	Following changes have been incorporated: <ul style="list-style-type: none">Added RCPV4 naming and RCPV7 power level in Section 2.2.3.Updated RTS performance indicators in Section 2.3.5.Revised roles and responsibilities in Section 3.0 to align with the current organizational structure.Updated Section 5.0 to reference the latest supporting documents.Appendix A was revised to reflect the current RTS processes and milestones.

Internal Use Only	
Document Number: NK30-PLAN-00120-00022	
Revision: R003	Page: 4 of 17

Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE
--

1.0 PURPOSE

This Return to Service Program Management Plan describes the processes, procedures and organization that will be used during the Pickering Refurbishment Project (PRP) to manage the modification commissioning and restart activities of Pickering Units 5 to 8. The Return to Service Management Plan and Return to Service (RTS) process documents are compliant with the Canadian Standards Association (CSA) N286-12 Management System Requirements for Nuclear Facilities and other applicable codes, standards, and laws.

Safe state and long-term layup of Pickering Units 1 & 4 will be addressed separately and will not be included in this PRP Program Management Plan (PgMP).

2.0 RETURN TO SERVICE PROGRAM REQUIREMENTS

The RTS portion of the refurbishment outage covers the range of activities from completion of construction/installation work to reactor power at 100%, including modification commissioning and restart activities.

Additional information on mission, scope, strategies, and interfaces is in:

- Pickering B Refurbishment Operations Program Management Plan, NK30-PLAN-00120-00016
- Pickering B Refurbishment Maintenance Program Management Plan, NK30-PLAN-00120-00009
- Pickering B Refurbishment Engineering Program Management Plan, NK30-PLAN-00120-00008
- Pickering B Refurbishment Planning and Controls Program Management Plan, NK30-PLAN-00120-00003

2.1 Return to Service Phase Definition

The RTS activities will occur in 4 phases:

- 1) **Phase A:** Restart activities prior to fuel load.
- 2) **Phase B:** Fuel load and activities leading up to but not including guaranteed shutdown state (GSS) removal.
- 3) **Phase C:** OPGSS removal, Approach to Critical (ATC) and low power testing (<1% FP).
- 4) **Phase D:** High power testing (>65% FP) and power escalation to full power.

During these phases, a test program will integrate:

- a) Normal start-up testing
- b) Outstanding modification commissioning tests

Internal Use Only	
Document Number: NK30-PLAN-00120-00022	
Revision: R003	Page: 5 of 17

Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE
--

- c) Non-standard tests unique to a refurbishment outage. These may include the following:
 - (i) Fresh Core start-up activities
 - (ii) Fresh Core monitoring
 - (iii) Fresh Core testing
 - (iv) Testing of Reactivity Devices for commissioning and reactivity worth calculation.

2.2 Basis for Return to Service

2.2.1 Refurbishment Categories

The extent of return to service activities required for a System, Structure or Component (SSC) will be commensurate with the scope and duration of the refurbishment work. The following two categories, which are based on the scope of work performed during the refurbishment outage, will be used:

Category A – Maintained in normal configuration and operation or shutdown per procedure with continued system health surveillance and routine maintenance activities. Restart activities are limited to those checks and tests required to verify that these SSCs perform within normal operating parameters as expected and that the prescribed maintenance and system performance monitoring has been maintained.

Category B – Operated in a modified operating or modified shutdown/layup configuration including SSCs that have been disconnected or dismantled to provide access to perform work during the outage. Restart activities are defined and commensurate with SSC-specific refurbishment situations, to ensure operability of the SSCs and ensure design and safety analysis assumptions are still met.

Strategies have been developed for identification of islanded, shutdown/laid-up, and operating equipment in the field and may include physical barriers around the equipment, field tagging, equipment status logs and electronic status logs through ESM3.

2.2.2 Return to Service Elements

RTS activities are comprised of two elements that will be integrated into the restart logic:

- 1) Modification Commissioning – this is the testing of modified or new equipment, including temporary modifications to confirm their design basis and license requirements are met.
- 2) Restart – this is returning equipment and systems to normal operation at the end of the refurbishment. Generally, this equipment would have remained in operation or in lay-up during the refurbishment. Equipment specific functional tests and system level tests outlined per the System specific Overall System Specifications will confirm the normal operation of the system and ensure that the design basis had not changed from the original design and licensing requirements.

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00022

Revision:

R003

Page:

6 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE

2.2.3 Restart Control Verification Points (RCVPs)

Restart Control Verification Points (RCVPs) will be used to ensure prerequisites (i.e., Project Milestones and Maintenance Activities) are complete and OPG internal approvals are obtained prior to transitioning from one RCVP to another. These RCVPs will be controlled by the Director Operations Production, Pickering Refurbishment and will be identified in the schedule.

Select RCVPs have been identified as requiring regulatory review and approval from the CNSC of completion of the associated RCVPs prior to proceeding to the next phase of the project. These Regulatory Hold Points (RHPs) will be controlled by the Director Operations Production, Pickering Refurbishment and will be identified in the schedule.

The following table lists the RCVPs their associated phase and if they are constrained to a RHP review.

RTS Phase	Phase Description	RCVP	RCVP Description	Regulatory Hold Point?	RHP
Phase A	Restart activities prior to new fuel load	RCVP1	Prior to Moderator Fill	No	NA
		RCVP2	Prior to New Fuel Load	Yes	RHP1
Phase B	New Fuel Load and activities prior to Guaranteed Shutdown State (GSS) removal	RCVP3	Prior to Heat Transport System Fill	No	NA
		RCVP4	Prior to Unit Containment Restoration	No	NA
		RCVP5	Prior to GSS removal	Yes	RHP2
Phase C	Approach to Critical and low power (< 1% FP) testing	RCVP6	Prior to Exceeding 1% FP	Yes	RHP3
Phase D	High Power Testing and power escalations to full power	RCVP7	Prior to Exceeding 65% FP	Yes	RHP4
		RCVP8	Prior to Unit Declaration for Commercial Operation	No	NA

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00022	
Revision: R003	Page: 7 of 17

Title:
PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE

Criteria for release of a verification point are described in the Pickering Refurbishment Unit Readiness for Service Process, NK30-PLAN-00120-00030, and written confirmation for regulatory hold points will be provided to the CNSC identifying the following:

- All related project commitments tied to the verification point, as identified in the return to service plan have been completed.
- All required system functions for safe operation beyond the verification point are available.
- All specified operating procedures have been formally validated.
- Specified training has been completed and staff qualified.
- All non-conformances, station condition records, and unexpected results identified leading up to the end of the phase are addressed.
- All SSCs being returned to service meet the quality and completion requirements of N286-12 Clause 7.11 through completion of Construction Completion Declarations (CCDs), Modification Available for Service (MAFS) declarations, Systems Available for Service (SAFS) declarations.
- All CCD, MAFS, or SAFS Open Items tied to the verification point have been completed.
- Other information as appropriate

2.3 Return to Service Process and Procedures

The following existing OPG governance is to be used in the RTS process.

- Engineering Change Control Process, N-PROC-MP-0090

A suite of procedures has been issued to define the RTS requirements to ensure the activities are performed in a systematic sequence from pre-operational tests on individual pieces of equipment to integrated system testing and ultimately declaring the Unit in-service. The following documents were prepared for RTS of refurbished units:

- Nuclear Refurbishment Construction Completion Declaration, N-GUID-09701-10021.
- Pickering B Refurbishment System Available for Service Process, NK30-INS-00120-00003.
- Pickering Refurbishment Unit Readiness for Service Process, NK30-PLAN-00120-00030.

The process flow for RTS activities is shown in Appendix A.

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00022	
Revision: R003	Page: 8 of 17

Title:
PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE

NOTE: Documents referenced by this Pickering Refurbishment Program Management Plan - Return to Service, NK30-PLAN-00120-00022, should **not** contravene or supersede any engineering change control process governance requirements as found in Engineering Change Control (N-PROG-MP-0001), and Engineering Change Control Process (N-PROC-MP-0090) and its referenced governance or planned outage management governance (as found in N-PROC-MA-0013, Planned Outage Management).

Compliance with CSA N286-12 is demonstrated and documented in OPGN governance documents as per N-LIST-08130-10025, CSA N286-12 to OPGN Governance Cross Matrix. RTS documents are non-governing documents that add additional guidance and enhancements to Engineering Change Control, N-PROG-MP-0001, and Planned Outage Management Procedure, N-PROC-MA-0013, and align with CSA N286-12 clauses 7.7, 7.8, 7.11.1, and 7.11.2 and CNSC Regulatory Document REGDOC-2.3.3.

2.3.1 Construction Completion Declaration

The Pickering B Refurbishment Construction Program Management Plan (NK30-PLAN-00120-00011), Nuclear Refurbishment Construction Completion Declaration Process (NK30-GUID-09701-10021), and supporting processes will document the completion of modification installation work and non-modification work (such as inspections, maintenance, and repairs) to a system during a unit refurbishment outage window or when specified. Acceptance of CCDs is one of the prerequisites for allowing commissioning and system restart activities by Operations, where required, to proceed.

2.3.2 Commissioning and Modification Available for Service

Commissioning is the process during which SSC of a facility, having been constructed or modified, are made operational and verified to be in accordance with design specifications and to have met the performance criteria. Commissioning of new or modified equipment (including temporary equipment) is performed as per N-PROC-MP-0090, Engineering Change Control Process. The OPG Project Team then prepares a Turnover Declaration to document acceptance of the modification by the Operations Manager Refurbishment. The MAFS turnover declaration may refer to either an Available for Service (AFS) or an Operations Acceptance.

2.3.3 System Available for Service

The Pickering Refurbishment Project will use the Pickering B Nuclear Refurbishment System Available for Service Process as outlined in NK30-PLAN-00120-00003. A SAFS may be declared with open items tied to the same verification point (i.e., RCVP) as the SAFS. A SAFS Declaration followed by the completion of these open items (that are tied to the same verification point as the SAFS) means that the individual systems, or group of systems, can be credited to safely and reliably perform their design functions for continued operation.

2.3.4 Unit Readiness for Service

A Unit Readiness for Service (RFS) process will be used to document and control how the unit is restarted. Pickering Refurbishment Unit Readiness for Service Process, NK30-PLAN-00120-00030, will provide assurance at identified restart milestones that integrated system testing is complete and that systems, conditions and pre-requisites are acceptable to progress past the milestone.

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00022

Revision:

R003

Page:

9 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE

2.3.5 Return to Service Performance Indicators

RTS performance indicators are listed in the following table.

Process	Indicator	Measure(s)	Key Stakeholder(s)
Construction Completion Declarations	Remaining CCDs by RCVP	- Number of CCDs Completed vs. Plan	PNR Integration/ Project Bundles Refurbishment Performance Engineering Director
AFS/OPS Acceptance Declarations (Engineering Changes)	Remaining AFSs /OAs by RCVP	- Number of AFSs/OAs Completed vs. Plan	Refurbishment Operations Production Director Refurbishment Design Authority
System AFS	System AFS Completed by RCVP	- Number of System AFS Completed vs. Plan	Refurbishment Operations Production Director Refurbishment Performance Engineering Director
SAFS/RCVP Open Items	Open Items (from current SAFS) completed by RCVP Open Items (from previous SAFS/RCVPs) completed by RCVP	- Number of 'Current SAFS' Open Items Completed vs. Plan - Number of 'Previous SAFS/RCVP' Open Items Completed vs. Plan	Refurbishment Operations Production Director Refurbishment Performance Engineering Director

All the readiness coordination/integration required metrics, and reporting will be covered by the Readiness-For-Service team.

Internal Use Only	
Document Number: NK30-PLAN-00120-00022	
Revision: R003	Page: 10 of 17

Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE
--

2.4 Restart Testing During Start-up

A suite of restart tests will be executed through the return to service phases. The tests will consist of existing Station tests/procedures and a set of non-standard commissioning test and work plans used to prove the design basis and license requirements have been met.

Each system's comprehensive restart testing plan will be outlined in a System-Specific Restart Requirement Traceability Matrix documented within an Overall System Specification. Any outstanding modification commissioning tests will be integrated with the restart testing and scheduled for execution when the appropriate unit conditions are established. Additional restart testing guidance will be provided to document detailed processes for items such as non-conformances, contingency planning (e.g., emergency response, back-outs, etc.), control of work plan changes, design changes as a result from restart testing, training, re-test and impact to operating units. Restart testing activities are performed per unit and tracked on a per unit basis.

2.4.1 Safety Analysis

Safety analysis will be required to assist in validating design basis and the PNGS Safe Operating Envelope. It will also support PRP modifications to confirm safety, design and operating margins. OPG will develop a process for addressing any nonconformity between the safety analysis assumptions and the modification commissioning results. If required, OPG will update the Probabilistic Risk Assessment to incorporate any major changes to the plant configuration. Reliability models will be updated utilizing system baseline data obtained per Section 2.4.3.

2.4.2 Operating Policies and Principles Strategy

Operating Policies and Principles (OP&P) revisions will reflect the applicable boundaries of the Safe Operating Envelope. OP&P revisions are expected in three basic areas: Organization and Authority, Conduct of Operations (including Maintenance and Engineering), and Technical Specifications. The changes will be made to incorporate the expected roles and responsibilities of the PRP organization and its interface with the authorities of the operating plant, and to revise conduct requirements and technical specifications as appropriate with the various evolutions, configurations, and refurbishment states such as unit defueling evolution, unit defueled state, changes to the station containment envelope, non-irradiated fuel condition, pre-equilibrium core condition, and return to service activities as required. This work is being coordinated by Nuclear Safety, with input from Refurbishment Operations and Maintenance, Engineering, Licensing, Regulatory Affairs and Pickering Station.

Program Management Plan

Internal Use Only	
Document Number: NK30-PLAN-00120-00022	
Revision: R003	Page: 11 of 17
Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE	

2.4.3 Layup and Aging Management Reviews

The PRP will layup certain systems to maintain the asset during the Refurbishment outage work. Layup technical requirements will be prepared for each laid up system and these layup technical requirements will address aging management as per REGDOC 2.6.3, Fitness for Service: Aging Management.

Safe state and long-term layup of Pickering Units 1 & 4 will be addressed separately and will not be included in this PRP Program Management Plan (PgMP).

2.4.4 Open Item Management

During execution of the RTS processes, open items will be identified in the preparation and issuance of the RTS documentation (CCD, MAFS, SAFS, and RCVP). Rigorous tracking and completion of open items by their tied milestones is necessary to ensure the safe operation of the reactor following return to service. During preparation of each of the RTS documents open items are documented, evaluated and actioned or dispositioned appropriately prior to acceptance of the documents and prior to proceeding with operation of the SSCs. Oversight & Management of these open items is captured in the PNR Unit Readiness for Service Process, NK30-PLAN-00120-00030.

Internal Use Only	
Document Number: NK30-PLAN-00120-00022	
Revision: R003	Page: 12 of 17
Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE	

2.5 Return to Service Program Management Approach

2.5.1 Records Management

Records will be available so that staff can make accurate assessments of the readiness of the equipment and where applicable, support the release of hold points. Control of records will be administered using existing OPG Guidance and Processes.

2.6 Regulatory Interface

2.6.1 Regulatory Commitments

Refurbishment regulatory commitments that are not IIP related will be monitored and tracked in accordance with Regulatory Action Management, N-PROC-RA-0006.

Refurbishment regulatory commitments will be linked to Restart Control Verification Points (RCVP), where applicable.

Removal of Regulatory Hold Points will be contingent on having received CNSC approval following submission to the CNSC of the information required to demonstrate that all related regulatory commitments have been met up to that hold point. Timelines and expectations regarding the process to release these Regulatory Hold Points is to be outlined in a Unit-specific RTS Protocol, jointly created between the CNSC and OPG.

2.6.2 Completion Assurance Documents

A Completion Assurance Document (CAD) will be prepared and approved by OPG for each RCVP. CADs associated with a regulatory hold point will be submitted to the CNSC in support of a request to remove the regulatory hold point. This document presents the evidence that all project commitments, as stipulated within the CNSC/OPG Protocols are complete, or scheduled for completion prior to the release of the respective hold point. It also provides the evidence that all relevant design, construction, and commissioning completion assurance reports have been completed, and that the unit condition is such that the facility may proceed safely to the next phase of restart activities.

Internal Use Only	
Document Number: NK30-PLAN-00120-00022	
Revision: R003	Page: 13 of 17
Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE	

3.0 ROLES AND ACCOUNTABILITIES

3.1.1 Vice President, Plant Operations, Pickering Refurbishment

The Vice President, Plant Operations, Pickering Refurbishment is the document owner and is accountable for its definition and implementation.

As the Senior License representative, the Vice President, Plant Operations, Pickering Refurbishment will have control over the RCVPs and RHPs identified within the Pickering Refurbishment Project.

3.1.2 Director, Operations & Maintenance Projects, Pickering Refurbishment

The Director, Operations & Maintenance Projects, Pickering Refurbishment is responsible for planning, organizing, coordinating and maintaining status on all preparatory and ongoing requirements of the RTS schedule. They are responsible for monitoring the work being performed to completion as scheduled and managing and directing the resolution of all inter-group or inter-department issues via the Readiness-For-Service team.

3.1.3 Director, Operations Production, Pickering Refurbishment

As a Senior License holder for the PRP, the Refurbishment Operations Director shall provide assurance that SSCs are in a material condition acceptable for handoff to Operations. The SAFS Declaration process will be used to document the handoff of SSCs from Refurbishment, Maintenance and Projects & Modifications to Operational control.

Internal Use Only	
Document Number: NK30-PLAN-00120-00022	
Revision: R003	Page: 14 of 17
Title: PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE	

4.0 DEFINITIONS AND ACRONYMS

4.1 Definitions

Aging Management – The process of ensuring that SSC continue to function as per design given that, with time or use, their characteristics can change, or their performance can degrade.

Commissioning – The process during which SSC of a facility, having been modified, are made operational and verified to be in accordance with design specifications and to have met the performance criteria.

Modification – Temporary and permanent changes to any SSC in the plant, all modifications are performed as per Engineering Change Control Process, N-PROC-MP-0090.

Open Items – Items identified as required for completion of a completion assurance package (CCD, MAFS, SAFS, RFS) but have been evaluated and accepted as items that can be done later and tied to a future milestone. Open item management is a key process for return to service and open items need to be tracked and monitored with rigour to ensure that they do not impact safe operation of the unit.

Reactor Physics Plan – A detailed plan prepared to identify testing required for confirmation of reactor core configuration post-refurbishment, includes checks and tests to confirm reactor physics and neutronic instrumentation prior to and after approach to critical.

Restart – The process established for returning systems back to service after system layup or shutdown, in general normal station processes would be used to restart equipment however due to extended layup/shutdown additional testing may be required to confirm systems operate as designed. Specifications are prepared for each system requiring restart and restart testing plan is developed to meet the specifications.

Return to Service – The process of restarting the refurbished unit and covers the range of activities from completion of installation work by the contractor to reactor power at 100%, including modification commissioning and restart activities. The process also includes confirmation of physical work completed, configuration management confirmed, and safety analysis/assessments completed per N286-12.

System Testing – Integrated restart testing used to confirm operation of a system as per the restart specifications.

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00022

Revision:

R003

Page:

15 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE

4.2 Acronyms

AFS	Available for Service
ATC	Approach to Critical
CAD	Completion Assurance Document
CCD	Construction Completion Declaration
CNSC	Canadian Nuclear Safety Commission
GSS	Guaranteed Shutdown State
IIP	Integrated Implementation Plan
MAFS	Modification Available for Service
OPEX	Operating Experience
OP&P	Operating Policies and Principles
PRP	Pickering Refurbishment Project
PgMP	Program Management Plan
RFS	Readiness for Service
RCVP	Restart Control Verification Point
RHP	Regulatory Hold Point
RTS	Return to Service
SAFS	System Available for Service
SSC	System, Structure or Component

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00022

Revision:

R003

Page:

16 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE

5.0 REFERENCES

CNSC REGDOC 2.3.1	Conduct of Licensed Activities: Construction and Commissioning Programs
CNSC REGDOC 2.6.3	Fitness for Service: Aging Management
CSA N286-12	Management System Requirements for Nuclear Facilities
N-GUID-09701-10021	Nuclear Refurbishment Construction Completion Declaration
N-LIST-08130-10025	CSA N286-12 to OPGN Governance Cross Matrix
N-PROC-MA-0013	Planned Outage Management
N-PROC-MP-0090	Modification Process
N-PROC-RA-0006	Regulatory Action Management
N-PROG-MP-0001	Engineering Change Control
NK30-INS-00120-00003	Pickering B Nuclear Refurbishment System Available for Service Process
NK30-PLAN-00120-00030	Pickering B Refurbishment Unit Readiness for Service

Program Management Plan

Internal Use Only

Document Number:

NK30-PLAN-00120-00022

Revision:

R003

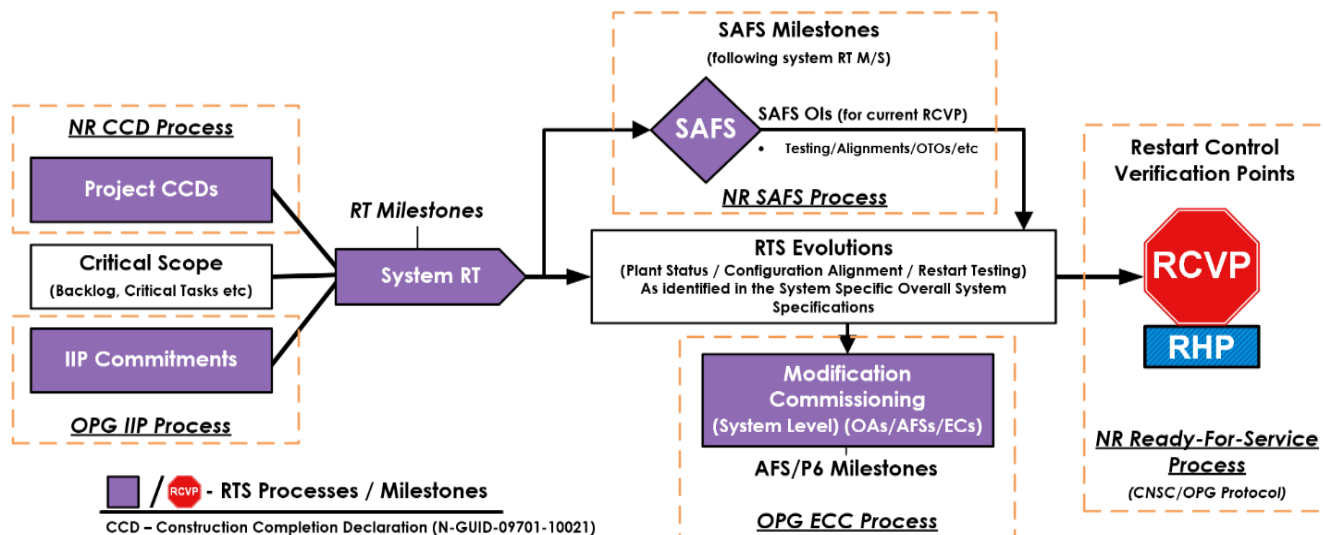
Page:

17 of 17

Title:

PICKERING REFURBISHMENT PROGRAM MANAGEMENT PLAN – RETURN TO SERVICE

Appendix A: Return to Service Process & Procedures



CCD – Construction Completion Declaration (N-GUID-09701-10021)

RT – Construction complete - on sub-system USI

SAFS – Systems Available for Service [Declaration] (NK30-INS-00120-00003)

OAs/AFSs – Operations Acceptance / [Modification] Available For Service (N-PROC-MP-0090)

ECs – Engineering Changes [EC status] (N-PROC-MP-0090)

RCVP – Restart Control Verification Point (NK30-PLAN-00120-00030)

OSS – Overall System Specifications (which summarize Restart Testing Requirements as well as shutdown and lay-up requirements (NK30-INS-00120-00001)

ATTACHMENT 1

Pickering NGS Units 5-8 Refurbishment Operations Certification Plan

Regulatory Constraints

REGDOC-2.2.3, *Personnel Certification, Volume III: Certification of Reactor Facility Workers, Version 2* requires certified staff to provide coverage on shift fulfilling their minimum complement roles per subsection 20.2.1:

“Each certified shift worker shall perform the mandated minimum employment as a member of the minimum staff complement, as opposed to in any back-up or supernumerary capacity, and, to the fullest extent possible, in relation to a fuelled and operating reactor or group of reactors”

This is not possible with the units defuelled and Minimum Shift Complement (MSC) removed. REGDOC-2.2.3 provides guidance that workers who are unable to perform sufficient shiftwork should be managed under the prolonged unemployment provisions specified in subsection 20.3:

“Any certified worker shall be formally removed from the duties of the pertinent designated position and assigned an inactive employment status who, for a period lasting 6 consecutive months or more, regardless of the rationale, is or will be unable to:

- *attend the scheduled continuing training*
- *meet an applicable quarterly minimum shift requirement”*

REGDOC-2.2.3 provides the requirements for active status to be reinstated in subsection 20.5. An overview of the process to move from active status to inactive status and back to active status is provided in Figure 1.

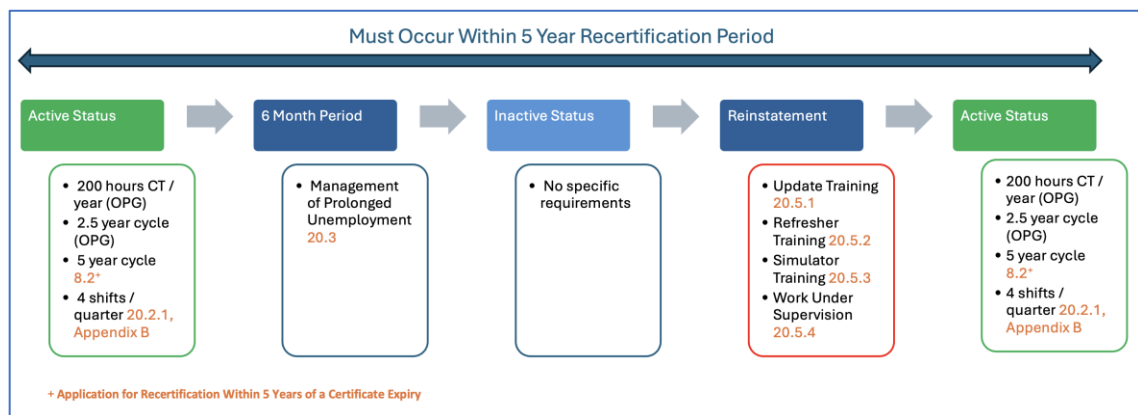


Figure 1 Overview of Moving from Active to Inactive and Back to Active Status

The first box shows how OPG maintains active status. Continuing Training (CT) is run on a 2.5 year cycle. Each week of CT (supernumery shift) contains classroom training, Full Scope Simulator (FSS) training, Written and FSS testing. Over the 2.5 year period, all Abnormal Incident Manuals (AIM) and many of the procedures for non-standard operating conditions (Operating Manuals, Section 5.0) are covered as required by the Systematic Approach to Training (SAT). These events are referred to as “core events”.

Since certified staff may never see one of these events in the plant, they are continually trained to ensure proficiency. This group of procedures is referred to as “selected core event training”. The five year CT plan is described in N-PLAN-08920-10001-R021, “*Continuing Training 5 Year Plan Pickering 5-8 Authorization Training Five Year Cycle 2026-2030*”. Over the five year certification period, each Authorized Nuclear Operator (ANO) practices each selected core event in both a lead role and an assisting role. This training is formally tracked and forms part of the individual’s application for re-certification every five years. Shift Managers (SMs) and Control Room Shift Supervisors (CRSSs) by default are exposed to selected core events twice in the five year period. Each cycle (week of training), Authorized Training adds additional training based on a range of parameters such as station OPEX, science and fundamental refresher training, and others. Refer to N-PLAN-08920-10001-R020 for a complete list of criteria. Overall, core and elective training amounts to approximately 200 hours of CT per year.

As required by REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants, Version 3*, the number of duty shifts covered is also tracked and reported to CNSC staff for each certified individual. Removal of the MSC requirement will require all certified staff to move to inactive status no later than six months after implementation of the revised MSC.

While in Inactive status, the certified staff are not required to perform duty shift coverage.

In order to return to active status, REGDOC-2.2.3 subsection 20.5 applies. Subsection 20.5.2 requires any “refresher training” or CT that was missed to be made up. At a meeting held October 7, 2024 with the Site Vice President and the Director of Operations and Maintenance, it was decided certified staff will continue to receive all CT and update training during the Refurbishment period. Thus, the requirements of subsections 20.5.1, 20.5.2 and 20.5.3 will be met to return the staff to active status once reassigned to minimum complement. A core team will be selected by Operations Management for the Unit 5 Startup. The core team will need to Work Under Supervision (WUS) in order to be reinstated to full active status.

The requirements of subsection 20.5.4 (WUS) needs to be defined for the Unit 5 restart as there will be no certified and active status staff to meet this requirement in a traditional manner.

The specific wording from subsection 20.5.4 is provided below:

“For operations personnel, the worker must have successfully performed the duties of the pertinent designated position under the supervision of a qualified worker certified for employment in the same designated position, and for a number of complete shifts deemed sufficient by the licensee to confirm that the worker can perform said duties competently and safely.”

Unit 5 Fuel Loading Milestone

Licensed minimum complement will be re-established just prior to fuel load as per P-REP-09100-1026971 R004 "*Basis for Minimum Complement Changes During Safe Store / Refurb Transition*". Two certified ANOs are required for U5 fuel load, two more for U6 fuel load and one additional for Units 7 and 8. Control room licence minimum complement for this includes the SM and CRSS. Prior to Unit 5 fuel load, all inactive certified staff will have completed all the regulatory requirements for license re-instatement with the exception of WUS as there are no active status staff for Unit 5 startup to provide the traditional "co-pilot" requirements. It is proposed to use the period from Over Poisoned Guaranteed Shutdown State (OPGSS) establishment until OPGSS surrender as the "WUS" period. Establishment of the OPGSS is the last step in unit State 3b and a pre-requisite to Regulatory Hold Point (RHP) 1 and State 4a. During this stage in the project, a Design Basis Accident (DBA) is not credible. The rationale for this statement is provided in P-REP-00990-10058 Rev 00, "*Safety Case Basis for P58 Refurbishment*" (Enclosure 1 of Reference [1-1]) with a summary provided below.

The Safety Case reviews applicability of all accident analysis throughout the Refurbishment period. Table is a summary of accident analysis applicability. Shading in light blue means the accident analysis is not applicable to that unit state or station state. If a letter appears in the cell, it means there is a qualifier to this statement in that modified controls are in effect.

	SR Section	Reactor State							
		1	2	3a	3b	Station State C	4a	4b	5
Control Failures (LOR)	3.1		a				a	a	f
HTS Failures	3.2								
HTS Pressure Control	3.2.1								
Small Break LOCA	3.2.2								f
Large Break LOCA	3.2.3							b	
HT Aux Failures	3.2.4								
Heat Removal Failures	3.3								
Steam Supply Failures	3.3.1							c	g
Loss of FW	3.3.2								
HTS Circ Failures	3.3.3								
SDC Failures	3.3.4								
MOD & Shield Tank	3.4								
Moderator Failures	3.4.2								
Shield Tank Failures	3.4.3								
FH Failures	3.5								
Off Reactor	3.5.1		d						
On Reactor	3.5.2		d						
TM	3.5.3		d						

	SR Section	Reactor State							
		1	2	3a	3b	Station State C	4a	4b	5
IFB	3.5.4		See Section 5.6 of P-REP-00990-10058						
Common Mode Failures	3.6								
Seismic	3.6.2		e						
Fire	3.6.3								
Wind	3.6.4								
Flood	3.6.5								
Service Water	3.6.6								
Instrument Air	3.6.7								

Table 1 Safety Report Summary

Legend

	Analysis Fully Applicable
x	Analysis Applies but Consequence Reduced – ‘x’ represents modified controls in place (see below)
x	Event not a Nuclear Safety Concern “x” represents modified controls in place (see below)
	IFB: See Section 5.6 of P-REP-00990-10058 Rev 00 for specifics.

Modified Controls Applicable to Table 1

- Protection is provided by Guaranteed Shutdown State (GSS) during defuel (Unit State 2) and OPGSS during fuel load and operations with new fuel (Unit States 4a & 4b)
- Although Loss of Coolant Accidents (LOCAs) are not a Nuclear Safety concern with new fuel, the Containment System including the Vacuum Building (VB) and dousing will be full restored to protect containment from over pressure should a LOCA occur during hot conditioning.
- A main steam line break is possible during hot conditioning, albeit with a much lower energy release. Although group 1 system failures are possible, this is not a Nuclear Safety concern in State 4b with new fuel. Protection for Shutdown System 2 neutronic instrumentation is provided by emergency power generators / emergency power system.
- While defuelling the VB will be depoised. The pressure relief duct and filtered air discharge system will be maintained available to bound fuel handling accidents while defuelling.
- While defuelling, Group 2 heat sinks provided by emergency water system will be available within recall times.

- f. Modified or amended neutron overpower and Incore LOCA analysis required for non-equilibrium fuel. Rod based GSS will be suspended until equilibrium core conditions are met.
- g. Steam doors will be returned to service consistent with the number of units brought back online.

From Table 1 it can be seen the only nuclear safety event of concern during the WUS period is a moderator poison precipitation event. This event is not a DBA but has occurred in the past with highly abnormal Moderator chemistry. One of the most significant events occurred on Unit 7 under highly unusual circumstances and is documented in Station Condition Record P-2008-09222. This event and others are summarized in PEL 69590, *GADOLINIUM DEPLETION EVENTS - CAL*. These events will be reviewed as part of the startup training for Unit 5. All events are traceable to abnormal moderator chemistry, underlining the importance of the Darlington NGS OPEX on moderator clean up. Gd precipitation events typically occur over several days, so there is plenty of time to react and ramp up organizational assistance. No immediate ANO actions are required.

The core team for Unit 5 startup will be exposed to a demanding workload consisting of many complex evolutions during the WUS period, with no credible possibility for a DBA occurring.

A review was done of major work listed on the Darlington NGS Unit 4 (D4) look ahead issued on September 16, 2025 immediately post new fuel load. The following is a summary of some examples of activities performed (this list is not all inclusive). The D4 ANOs, CRSS, and SM were supporting the following evolutions:

- Progressing seal replacement on all four main circ pumps (part of containment at DN)
- Progressing Emergency Coolant Injection Return to Service (RTS)
- Progressing Recirculated Cooling Water (RCW) RTS
- Progressing cable replacement and testing
- Returning Transfer Chamber (T/C) Doors to service (Airlocks (A/L) at Pickering)
- Progressing Feedwater (FW) and Condensate RTS
- Commissioning Aux Shutdown Cooling (unique to DN)
- Class IV 600V bus outage RTS
- Returning Vapour Recovery to service following above outage
- Commissioning Vault ACUs
- Commissioning the Turbine Generator

Five weeks later, the major work on the unit included:

- Restoration of the Reactor Vaults and progressing unit containment for reconnection to common containment (A/Ls and T/C doors)
- Progression of heat transport system fill including reading purification for service
- Progression of FW and Condensate RTS in preparation to warm up the deaerator to 70C
- Final Testing of RCW
- Liquid Relief Valve commissioning

- Liquid Injection Shutdown System isolator replacement
- Lube Oil inspection and RTS
- Replacement of Motor Starters for Reactor Vault Cooling fans

This type of experience is invaluable and only ever realized during a unit RTS or initial unit startup. There is plenty of opportunity for learning and for the core team to prove they can conduct all unit activities competently and safely. When combined with specific startup training for the approach to critical and subsequent startup, there will be plenty of opportunity to test the core team and for senior Operations Management to evaluate the ability of each individual on the core team to perform their duties competently and safely. As part of this evaluation, the senior Operations Managers will review the restart activities completed and team performance under OPG's observation program to ensure readiness to proceed with OPGSS removal.

From a regulatory standpoint, RHP1 (fuel load) requires CNSC approval. The submission will document OPG's intent to return the staff to active status for the purposes of progression to RHP2 (OPGSS surrender).

The WUS process described above is a three step process:

- Staff are reassigned to active status prior to fuel load with the OPGSS in effect.
- Staff progress all startup work required to progress the unit from new fuel load up until the point the unit is ready for OPGSS surrender. During this timeframe there is no credible DBA that can occur. Staff performance during this demanding work load period will be evaluated on a day to day basis by Ops Senior Management. Due to the demanding work load, no specialized process for evaluation is required.
- Based on their performance during the WUS period, staff are deemed competent for OPGSS surrender, ending the WUS process.

References: [1-1]. OPG letter, L. Ceccato and P. Seguin to R. Richardson, "Pickering NGS – Prior Written Notification of Changes to Pickering NGS-B Operating Policies and Principles in Support of Units 5-8 Refurbishment", October 23, 2025, e-Doc# 7591097, CD# NK30-CORR-00531-09089.