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Oral Presentation

Submission from Ontario Power Generation

In the Matter of the

**Mid-Term Report on Results of Compliance
Activities and Performance of Ontario
Power Generation's Darlington New
Nuclear Project**

Commission Meeting

December 13, 2018

Exposé oral

Mémoire d'Ontario Power Generation

À l'égard du

**Rapport de mi-parcours sur les résultats des
activités de conformité et le rendement du
nouveau projet nucléaire de Darlington
d'Ontario Power Generation**

Réunion de la Commission

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DARLINGTON NEW NUCLEAR PROJECT - SITE PREPARATION LICENCE MIDTERM REPORT

**Darlington New Nuclear Project - Site
Preparation Licence Midterm Report**

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Revision Summary

Revision Number	Date	Comments
R000	2018-Sept-14	Initial issue.

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Executive Summary

Ontario Power Generation Inc. (OPG) currently maintains a Nuclear Power Reactor Site Preparation Licence 18.00/2022 for its Darlington New Nuclear Project (DNNP). The licence is valid for a period of 10 years from August 17, 2012 to August 17, 2022.

Item 16 of the Canadian Nuclear Safety Commission's (CNSC) Records of Proceedings for the public hearing associated with this licence and environmental impact statement directed OPG to prepare a midterm report on the licensed activities carried out so far and status of commitments made by OPG during the public hearing and environmental assessment (EA).

The purpose of this midterm report is to fulfill the above direction.

Following the December 2013 direction by the Government of Ontario, deferring the construction of new nuclear units at the Darlington Nuclear site, OPG has focused on the responsible control and maintenance of the DNNP site. OPG has not commenced licensed activities but has continued to maintain the Site Preparation Licence in accordance with the licence conditions.

OPG's efforts have been focused on the collection of information to assist the site specific design activities that would be performed prior to site preparation, upon direction from the Government of Ontario to resume project activities. For example:

- OPG has completed the commitment to provide excavation reports for two sites identified on the DNNP land that required further archaeological consideration. The reports have been accepted by the Ministry of Tourism, Culture and Sport.
- OPG has completed a cost-benefit analysis and provided the CNSC a Condenser Cooling Water Option Assessment Report, demonstrating the once-through cooling option as the preferred cooling water system. CNSC and Department of Fisheries and Oceans (DFO) staff concurred that the submission was satisfactory and this commitment is complete.
- OPG has made progress on early work activities associated with other commitments, for example: bank swallow monitoring and mitigation; deep water aquatic characterization; improved fish entrainment study and support for CNSC activities to engage stakeholders in developing policy for land use around nuclear generating stations.

The DNNP Site Preparation Licence remains a significant asset for the Province of Ontario, to maintain a reliable source of base-load nuclear power within Ontario's energy supply mix. OPG is planning to apply to renew the licence for another 10 years to allow for the project to advance in accordance with OPG's current business planning assumptions for new nuclear capacity.

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1.0 INTRODUCTION

1.1 Background

Ontario Power Generation Inc. (OPG) currently maintains a Nuclear Power Reactor Site Preparation Licence 18.00/2022 for its Darlington New Nuclear Project (DNNP) located in the Municipality of Clarington, in the Region of Durham, approximately 70km east of the city of Toronto. Figure 1 and Figure 2 provide Satellite and Aerial Photographs of the DNNP site.

The licence is valid for a period of 10 years from August 17, 2012 to August 17, 2022. As outlined in Part IV (i) of the licence, for the future construction and operation of up to four Class 1A nuclear power reactors with a maximum combined net electrical output of 4800 megawatt electric (MWe), it allows OPG to conduct the following site preparation activities:

- 1) construction of access control measures;
- 2) clearing and grubbing of vegetation;
- 3) excavation and grading of the site;
- 4) installation of services and utilities;
- 5) construction of administrative and physical support facilities inside future protected area;
- 6) construction of environmental monitoring and mitigation systems; and
- 7) construction of flood protection and erosion control measures.

A public hearing was held from March 21, 2011 to April 08, 2011 to review OPG's Environmental Impact Statement and application for the issuance of a Licence to Prepare Site for the above mentioned project. Item 16 of the Canadian Nuclear Safety Commission's (CNSC) Records of Proceedings for this public hearing, directed OPG to prepare a midterm report on:

- a) the conduct of the licensed activities carried out during the first half of the licence term;
- b) the implementation status of commitments made by OPG during the environmental assessment;
- c) the midterm report should also take into account the findings of the CNSC Fukushima Task Force [R-1], where appropriate.

The purpose of this midterm report is to fulfill the above direction.

1.1.1 Highlights (Darlington New Nuclear Project (DNNP) Licence Background)

The history of the licencing process for DNNP is briefly described below. This information is to provide context on the status of the current DNNP Site Preparation Licence and Environmental Assessment (EA) for DNNP and to give the reader insight to public consultations, licencing process and durations involved.

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- In 2006, the Government of Ontario directed OPG to initiate the federal approvals process for new nuclear generating units in response to recommendations from the Ontario Power Authority's Integrated Power System Plan. The plan called for investment in new nuclear generation capacity in order to maintain Ontario's nuclear generating capacity at 14000 MWe; consistent with nuclear energy's share of the 2005 supply mix. OPG began work toward an application for the construction of new nuclear reactors with output up to 4800 MWe at the Darlington Nuclear site.
- As required by the *Canadian Environmental Assessment Act (1992)*, an EA of the proposed DNNP was conducted by the Joint Review Panel (JRP) in 2011.
- In May 2012, the JRP report on the EA decision with 67 recommendations was accepted by the Government of Canada.
- On August 17, 2012 the panel of the Commission announced its decision to issue a Site Preparation Licence to OPG for DNNP for a period of 10 years (from August 17, 2012 to August 17, 2022).
- Following the issue of a Site Preparation Licence in 2012 it was anticipated that the Government of Ontario would complete the process to select a reactor technology and an Engineering, Procurement and Construction Company (EPC Co.) to prepare the site and construct the new nuclear facility. OPG would enter into a contract with this EPC Co. for provision of work mentioned above.
- In December 2013, citing lower than planned power consumption growth combined with a strong supply situation, the Government of Ontario, through the 2013 Long-Term Energy Plan, directed OPG to defer the construction of new nuclear reactors at the Darlington Generating Station, however requested OPG maintain the Site Preparation Licence granted by the CNSC.
- Since 2012, OPG has continued to progress pre-requisite long lead time activities to maintain the DNNP Site Preparation Licence in accordance with the DNNP Commitments Report [R-4].
- No EPC Co. has been contracted to date to undertake the detailed site planning, site preparation activities and construction work. OPG's effort has been focused on the collection of information to assist the site specific design activities that would be performed prior to site preparation upon direction from the Government of Ontario to resume project activities to prepare the site and obtain a construction licence for new nuclear capacity.
- Some DNNP land areas have been used as a temporary staging area in support of ongoing operations and refurbishment of the existing Darlington Nuclear Generating Station (DNGS). These areas have been largely restored and returned to DNNP as the temporary work activities have been completed (See Section 2.4.1.1).

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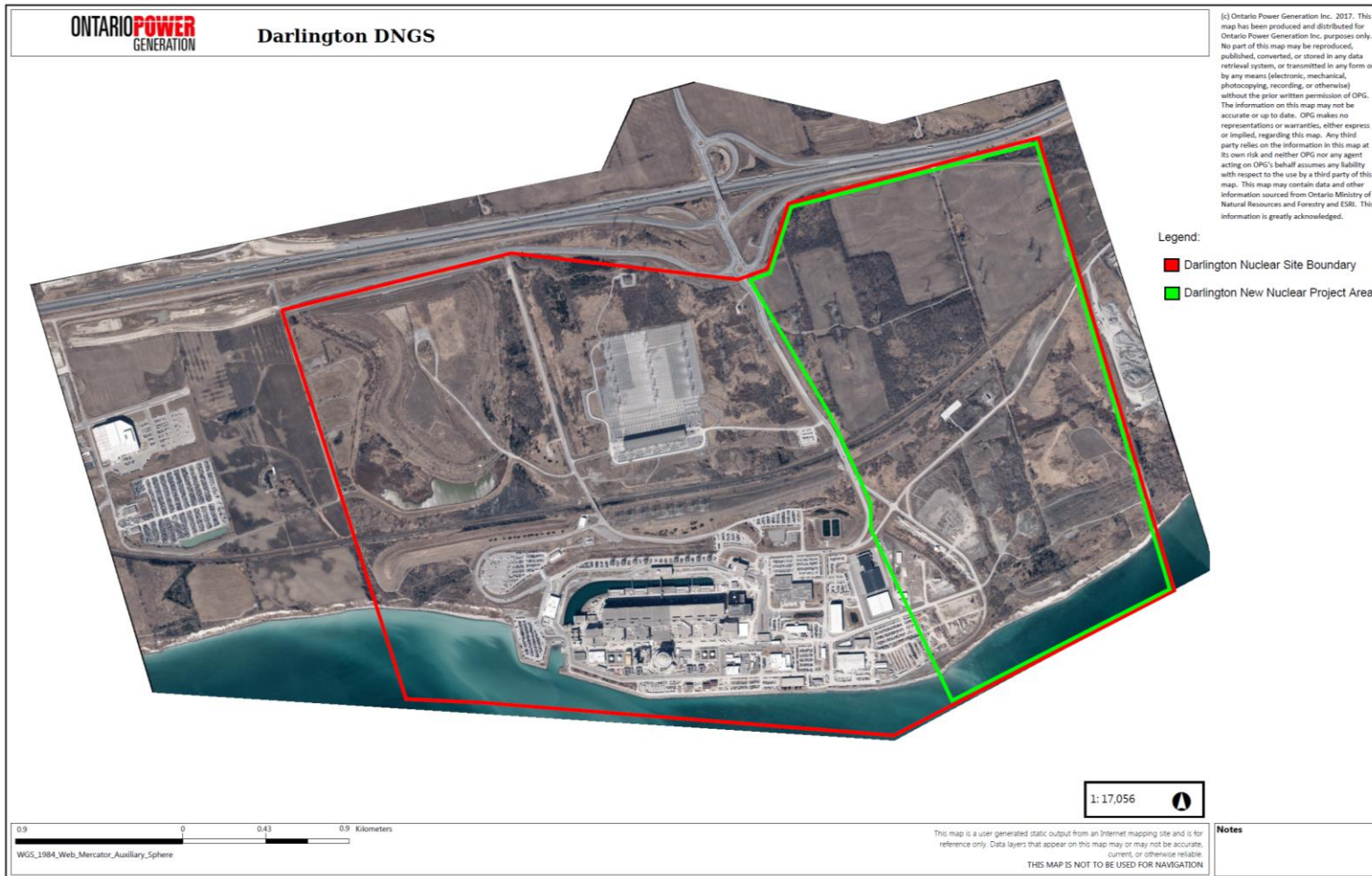


Figure 1: Satellite View of Darlington Nuclear Site (Red Border) and DNNP Project Site (Green Border)

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Figure 2: Aerial View of DNNP Project Site Looking North from Lake Ontario (circa 2008).

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Figure 3: Timeline of DNNP Site Preparation Licensing Milestones and Achievements

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2.0 ITEMS OF REGULATORY INTEREST

2.1 Status of Project and Future Plans

Following the December 2013 direction by the Government of Ontario, deferring the construction of new nuclear units at the Darlington Nuclear site, OPG has focused the DNNP organization on maintaining the Site Preparation Licence granted by the CNSC and working to address long lead time commitments, such as:

- Developed DNNP Commitments Report.
- Prepared and submitted six annual reports to the CNSC on the licenced activities.
- Completed the commitment to recover artifacts and features of two Euro-Canadian archeological resources that would experience total displacement from the site preparation.
- Moved forward with bank swallow mitigation measures and plans, completed an improved fish entrainment study and studies to support the siting of the cooling water intake and diffuser.
- Provided support for CNSC activities to engage stakeholders in developing policy for land use around nuclear generating stations.

The 2017 Long Term Energy Plan [R-2] did not reference new nuclear capacity at the Darlington Nuclear site and, to date, the Government of Ontario has not provided further direction on proceeding with procurement.

The DNNP Site Preparation Licence remains a significant asset for the Province of Ontario, to maintain a reliable source of base-load nuclear power within Ontario's energy supply mix. OPG is planning to apply to renew the licence for another 10 years to allow for the project scope to advance in accordance with OPG's current business planning assumptions for new nuclear capacity.

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2.2 Conduct of Licensed Activities

As of the writing of this report OPG has not undertaken any licensed activities on the DNNP site.

2.2.1 Documents Required for Site Preparation

Licence Condition 1.1 [R-3] requires OPG to have documents required for site preparation activities accepted by the CNSC prior to commencement of any licensed activities. No licensed site preparation activities have taken place or are currently planned and no EPC Co. has been contracted for site preparation. Therefore, the documents mentioned above have not required to be developed or submitted by OPG.

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2.3 DNNP Commitments Report

The JRP concluded that DNNP is not likely to cause significant adverse environmental effects, provided that the following items are implemented:

1. The mitigation measures proposed and commitments made by OPG through the Environmental Impact Statement, Licence to Prepare Site application and the subsequent JRP public review process, and applications to other federal regulatory agencies filed by OPG.
2. JRP's recommendations as accepted by the Government of Canada and applications filed to other federal regulatory agencies by OPG.

As a result, OPG is required to implement the above two items as outlined in Licence Conditions 10.1 and 10.2 of the Site Preparation Licence respectively.

To provide regulators, vendors and contractors, other stakeholders and OPG staff with a comprehensive account of items 1 and 2 described above, OPG has developed the DNNP Commitments Report [R-4] to integrate the above two items, group them into commitments and present them as clear and concise deliverables. Most key deliverables include sub-deliverables which must be completed to satisfy the key deliverables. This ensures that OPG has undertaken the expected work as committed when commitments are closed out.

To align with the general project phases and the CNSC licence phases of site preparation, construction and operation, the commitments that pertain to activities to be undertaken in a specific project phase are grouped into that phase. As shown in Table 1 of the DNNP Commitments Report, 17 commitments belong to the Site Preparation Phase, eight commitments in the Construction phase and four in the Operation phase.

In accordance with Licence Condition 1.1 of the Site Preparation Licence 18.00/2022 and its associated Licence Conditions Handbook [R-7], OPG has submitted the current revision of OPG's DNNP Commitments Report to the CNSC for review and acceptance [R-5], and has received the confirmation of the CNSC's acceptance of this report [R-6]. OPG plans to continue to report the status and closure of commitments listed in OPG's DNNP Commitments Report going forward through the submission of the DNNP annual report.

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2.4 Status of Commitments related to Site Preparation Licence

Although no site preparation licensed activities have taken place or are currently planned for the DNNP site, OPG continues to advance a number of pre-requisite long lead time deliverables of a number of commitments. Below is an overview of the status of the 17 commitments for the Site Preparation Phase. The status of commitments and their sub-deliverables are summarized in Table 1:

- One commitment was completed and closed with the CNSC acceptance for the closure as reported in Section 2.4.4.
- Four commitments are actively being worked on. These are discussed in Sections 2.4.5, 2.4.6, 2.4.7 and 2.4.8.
- Three commitments have some supporting work completed as discussed in Sections 2.4.1, 2.4.2 and 2.4.3.
- Nine commitments are currently not required and are pending technology and EPC Co. selection to allow for OPG to request authorization to commence licensed activities. These commitments include D-P-1, D-P-2, D-P-4 to D-P-8, D-P-16 and D-P-17.

Some additional commitments that are applicable beyond the Site Preparation Phase are discussed in Section 2.4.10. Commitments that pertain to activities required for the Construction or Operation phases of the project are not discussed in detail in this report because these commitments are beyond the scope of this report.

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Table 1: Summary of DNNP Commitments

Number	Key Deliverable / Sub-Deliverable	Status
Site Preparation Phase		
D-P-1	DNNP Management System and Implementing Documents	D-P-1-23 Active. Others not yet required.
D-P-2	EPC Occupational Health and Safety Plan	Not yet required.
D-P-3	EPC Environmental Management and Protection Plans	Not yet required, but some supporting work completed. See Section 2.4.1.
D-P-4	EPC Quality Management Plan	Not yet required.
D-P-5	Emergency Management and Fire Protection Plans	Not yet required.
D-P-6	Personnel Training Plan	Not yet required.
D-P-7	Site Security Plan	Not yet required.
D-P-8	EPC Level 1 and Level 2 Project Management Schedule	Not yet required.
D-P-9	Site Geotechnical and Seismic Hazard Investigation Program	Not yet required, but some supporting work completed. See Section 2.4.2.
D-P-10	EPC Traffic Management Plan	Not yet required, but some supporting work completed. See Section 2.4.3.
D-P-11	Archaeological Excavation Reports	Complete. See Section 2.4.4.
D-P-12	Environmental Monitoring and Environmental Assessment Follow-up	D-P-12.3, 12.4, 12.5, and 12.7 Active. See Section 2.4.5. Others not yet required.
D-P-13	Preliminary Decommissioning Plan and Financial Guarantee	Active. See Section 2.4.6.
D-P-14	Fish Habitat Offsetting (Compensation) Plan	Active. See Section 2.4.7.
D-P-15	Round Whitefish Action Plan	Active. See Section 2.4.8.
D-P-16	Lake Infill Design	Not yet required.
D-P-17	Communications, Consultation and Stakeholder Relations Program/ Plan	See Section 2.4.9.

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2.4.1 Environmental Management and Protection Plans (DNNP Commitment D-P-3)

The Environmental Management and Protection Plans commitment contains 12 sub-commitments. OPG has engaged in some long lead time supporting work towards the Hazardous Waste Management Plan/Procedure (sub-commitment D-P-3.6) as well as the Bank Swallow Mitigation Measures and Plans (sub-commitment D-P-3.8). The details are summarized in Sections 2.4.1.1 and 2.4.1.2 respectively.

2.4.1.1 Hazardous Waste Management Plan/Procedure (DNNP Sub-Commitment D-P-3.6)

Summary of Sub-Commitment:

OPG to provide to CNSC, for review and acceptance, no later than 3 months prior to commencement of site preparation licensed activities a Hazardous Waste Management Plan/Procedure. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

The completion of a comprehensive soils characterization program is a pre-requisite to the development of an overall Hazardous Waste Management Plan prior to site preparation earth moving/excavation activities.

No EPC Co. has been selected for site preparation activities at the time of this report. When an EPC Co. is selected, OPG requires, as part of the site preparation plan, the EPC Co. to conduct a comprehensive soils characterization program and develop an overall Hazardous Waste Management Plan for site preparation activities.

The soil characterization will ensure that the quality of the excavated materials meets the required standards and guidelines for the intended destination application (See Section 4.5 of [R-15]).

OPG continues to maintain and manage the DNNP site including addressing specific areas identified in the EIS as potentially contaminated with non-radioactive substances. OPG has made steady progress towards addressing these areas which include the soils disposal area, former DNGS concrete plant, and sandblast grit storage area. These areas are designated as zone “F1” in Figure 4. (Figure 4 shows how OPG has divided the DNNP site into zones in order to refer to specific areas throughout this report.)

In 2017, OPG completed the following activities in the F1 zone:

- removal and remediation of the soil in the “soil disposal area”,
- removal of all waste sandblast grit piles,
- remediation of the former concrete plant area, and
- demolition of the Emergency Vehicle Garage (Building #432).

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As part of these activities, OPG has conducted further characterization of this area.

The former concrete plant area (associated with the original DNGS construction) was remediated by excavating impacted soil to meet the applicable Ministry of Environment standards and back filling the excavated area with approximately 1,330 tonnes of clean fill.

The former concrete truck washing area was located near the former concrete plant area and used to receive wastewater from washing of the concrete trucks. A supplemental investigation and assessment of human health and ecological health risk that was conducted in 2010 concluded that no significant risk to human performing work in this location. OPG has identified risk mitigation with this area in its Contaminated Lands and Groundwater Management Procedure [R-29].

As part of the decommissioning of the temporary soil staging area in the F1 Zone, groundwater and soil in this area were sampled. The soil and groundwater sample results under the F1 pad/sumps and from stockpiled soil met the applicable standards as described in the decommissioning report [R-16]. These results indicate that the use of F1 as a soil staging area did not cause any significant environmental and human health impacts. No additional monitoring or investigation was recommended by environmental subject-matter experts. In June 2018, OPG informed the CNSC of the completion of the decommissioning of the temporary soil staging area, F1 [R-28].

In addition to the F1 zone, other zones such as F3 (See Figure 2), F5 North and South that were used for parts storage or staging areas have also been cleared.

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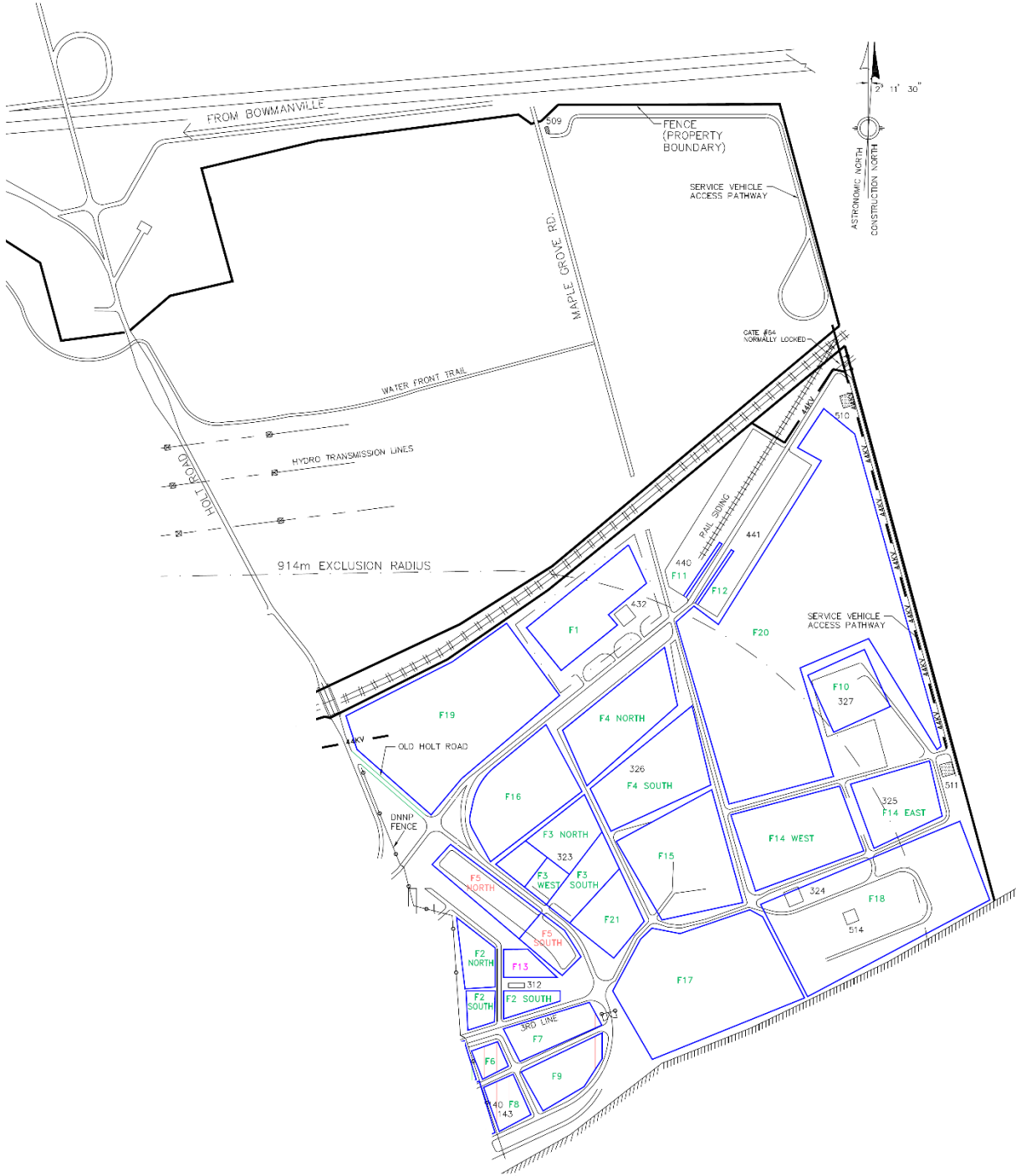


Figure 4: Sketch of DNNP Site Showing OPG's Zone Naming.

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Figure 5: 2017 Photographs of Remediated DNNP F1 Zone (Looking East) (Left) and the Adjacent F3 and F4 Zones to the South (Right)

2.4.1.2 Bank Swallow Mitigation Measures and Plans (DNNP Sub-Commitment D-P-3.8)

Summary of Sub-Commitment:

OPG committed that when the Project site is developed, every effort should be made to minimize the destruction of the natural bluff, using the best available technology economically achievable, to minimize the impact to the onsite bank swallow population.

OPG is to provide to CNSC, for review and acceptance, Bank Swallow Mitigation Measures and Plans no later than 3 months prior to any destruction of the bank swallow habitat. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

The baseline field studies to support the EA identified a series of bank swallow colonies on the bluffs along the north shore of Lake Ontario [R-12]. The potential removal of some or all of the shoreline bluffs during the site preparation would result in the removal a portion of the associated bank swallow nesting habitat. OPG has committed to monitor bank swallow colonies, develop a mitigation plan that includes provision of artificial bank swallow habitat, and undertake research into declining aerial foragers in Ontario with affected stakeholders.

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The protected status of the bank swallow has changed since the EA approval in 2012. In 2014, the Ontario Ministry of Natural Resources and Forestry (MNR) added the bank swallow as a Threatened species to the Species at Risk in Ontario list under the *Endangered Species Act*. In 2017, the bank swallow was listed as a Threatened species on Schedule 1 of the federal *Species at Risk Act*.

OPG has submitted to the CNSC annually the bank swallow monitoring studies including burrow counts and habitat observations since 2013 [R-13].

Annual bank swallow monitoring studies

Since the approval of the DNNP EA in 2012, OPG has continued long-term monitoring of bank swallow colonies at the Darlington Nuclear site and along a portion of the Lake Ontario shoreline which extends from Oshawa Creek to Wilmot Creek. This area is defined as the Bank Swallow Evaluation Area and is the same as the Bank Swallow Site Study Area used in the EA, to assess the level of environmental effect. The protocols used for the burrow counts in the EA were modified and a new reference location was added to the Bank Swallow Evaluation Area based on consultation with CNSC and Environment and Climate Change Canada (ECCC).

Annual burrow counts in the Bank Swallow Evaluation Area generally increased from 2007 (when the study started) until 2013 when the numbers began to decline. In 2017, the burrow numbers throughout the Bank Swallow Evaluation Area, the Darlington Nuclear site, and the reference location decreased significantly. This occurred at the same time as high water levels on Lake Ontario were substantially altering the bluff conditions (increased erosion and slumping events).

Burrow occupancy studies were completed in 2011, 2014 and 2015 [R-14] in the Bank Swallow Evaluation Area. Based on a statistical analysis, the results showed that occupancy rates of bank swallow colonies averaged 61% at the Darlington Nuclear site and did not significantly change in those three years.

Artificial bank swallow habitat

In 2012, design requirements were developed for an artificial nesting structure. This led to the design and construction of two artificial nesting structures (concrete buildings). The buildings, constructed for the 2012 breeding season (Figure 6), were situated in the southwest portion of the Darlington Nuclear site, and were operational in this location for the 2012 and 2013 breeding season. Despite the attraction efforts (taped calls from a bank swallow flock and feather placement in front of the structures), there were no nesting bank swallows at either concrete building structure in 2012 or 2013. The structures were subsequently removed after their trial period had ended.

An additional artificial nesting feature, an earthen mound, was constructed in the southeast portion of the Darlington Nuclear site in 2013 (Figure 7) where it currently remains. This feature was based on a design successfully implemented by the Royal Society for the Protection of Birds in the United Kingdom. Similar to the above nesting structure, no nesting of bank swallows was observed between 2013 and 2017.

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Neither of the artificial nesting structures tested to date have performed in a manner that was conducive to nesting. Key lessons learned from these structures were the need for consideration of proximity to natural bank swallow colonies and importance of multiple design components, including substrate penetrability and thermal conditions.

The monitoring results of the artificial nesting structures have been submitted to CNSC annually since 2014 [R-13].

In 2017, design requirements and structural and engineering drawings for a third artificial nesting structure - called a "fixed face earthen embankment" - were developed. These incorporated previous OPG design recommendations as well as design recommendations from consultation with the European land stewardship groups and researchers who have developed and constructed successful artificial habitat structures for bank swallows. Based on the key lessons

learned identified above, the location and siting of the fixed face earthen embankment are planned to be located further away from prime occupied colonies, to minimize the competition between the natural and artificial habitats. The advances in the knowledge of bank swallow ecology gained through participation in the Ontario Bank Swallow Working Group will also be considered.

OPG continues to pursue a suitable location for siting the fixed face earthen embankment.

Research: Decline of bank swallows in Ontario

OPG has committed to partner with other groups to research the decline in aerial foragers, specifically the bank swallow, given its listing as a species at risk both provincially and federally.



Figure 6: Artificial Concrete Bank Swallow Nesting Structures



Figure 7: Earthen Mound Bank Swallow Nesting Feature

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Since 2009, OPG has coordinated and participated in the Ontario Bank Swallow Working Group, which consists of researchers from Bird Studies Canada, ECCC, MNRF, Trent University, Nature Canada and other non-governmental organizations. OPG has assisted in facilitating collaborative efforts to share research advances in the study of bank swallow ecology to further the understanding of their Ontario population. OPG keeps abreast of initiatives and research that are occurring across the province and opportunities to collaborate in the research effort and participate in the identification of research questions to help focus the efforts of multiple groups across the province.



Figure 8: Bank Swallow (*Riparia riparia*).

OPG continues to engage government agencies in the development of environmental monitoring and EA follow-up programs. Workshops were held with CNSC, ECCC, MNRF, and Central Lake Ontario Conservation Authority to provide progress updates and to engage these agencies in discussions about adaptive management approaches for the development of mitigation measures and plans. Specific topics discussed included annual bank swallow burrow counts, occupancy studies, and artificial nest habitat structure development and monitoring.

2.4.2 Site Geotechnical and Seismic Hazard Investigation Program (DNNP Commitment D-P-9)

The Site Geotechnical and Seismic Hazard Investigation Program commitment contains four sub-commitments. OPG has engaged in some long lead time supporting work towards sub-commitment D-P-9.1. The details are summarized in Section 2.4.2.1.

2.4.2.1 Site Geotechnical and Seismic Investigation Program (DNNP Sub-Commitment D-P-9.1)

Summary of Sub-Commitment:

OPG committed to undertake a more detailed geotechnical and seismic investigation of the DNNP site during site preparation activities to validate the expected behaviour of the site presented in the EIS.

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OPG is to provide to the CNSC, for information, a site geotechnical and seismic investigation program prior to implementation of the program. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

OPG conducted a preliminary geotechnical investigation of the DNNP site from December 2012 to March 2013. This limited investigation was designed to obtain the required geotechnical data that a potential EPC Co. will need to develop their bids to design and construct the DNNP.

The 2013 geotechnical exploration consisted of drilling eight boreholes (Figure 9), soil and rock sampling, deviation survey and laboratory testing.

Further geotechnical investigation work is required for the DNNP site to fully address OPG's commitments but has not yet been planned.

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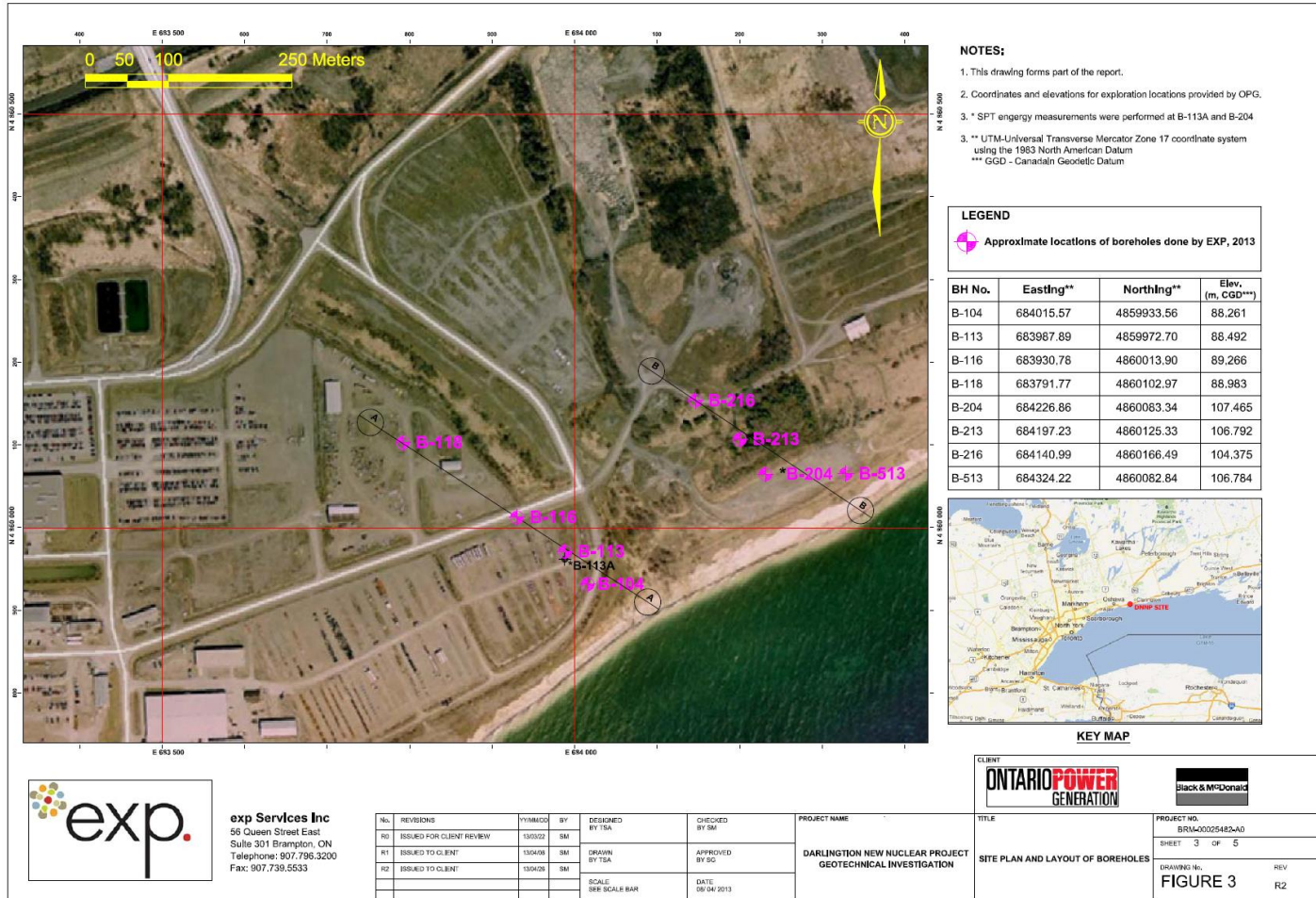


Figure 9: Location of Boreholes for Preliminary DNNP Site Geotechnical Investigation 2013.

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2.4.3 Traffic Management Plan (DNNP Commitment D-P-10)

The Traffic Management Plan commitment contains two sub-commitments. OPG has engaged in some long lead time supporting work towards sub-commitment D-P-10.1. The details are summarized in Section 2.4.3.1.

2.4.3.1 Traffic Management Plan (DNNP Sub-Commitment D-P-10.1)

Summary of Sub-Commitment:

A Traffic Management Plan is to be implemented with the objective of reducing disruption and maintaining safe traffic conditions during the Site Preparation and Construction phase.

Provide to CNSC, for information, no later than 60 days prior to commencement of site preparation licensed activities a Traffic Management Plan for Site Preparation Phase of the project. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

No EPC Co. has been selected for site preparation activities and therefore, no formal traffic management plan for site preparation activities has been developed at this time.

However, in accordance with DNNP Commitment D-P-10.1, in 2012, OPG formed a working group of key stakeholders including the Ministry of Transportation, the Region of Durham and the Municipality of Clarington to discuss planned transportation-related improvements and associated timing of provincial and municipal infrastructure improvement projects. The Ministry of Transportation provided updates on planned improvements to the Highway 407 East project, including the Durham East link to Highway 401, improvements to the Highway 401/Holt Road interchange, and future widening for Highway 401. Durham Region and the Municipality of Clarington provided information on capital budgeted improvements for regional and municipal roads in the vicinity of the DNNP.

Since 2012, several of the road improvement projects discussed in the EIS have been completed (e.g. 401/Holt Road Interchange) or have significantly progressed (407 East Project) as shown in Figure 10.

The working group continues to have quarterly meetings as set out in the Terms of Reference.

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Figure 10: Completed 401/Holt Road Interchange (Top) looking North Along Holt Road from the Darlington Nuclear Site, and East Link (418)/401 Interchange Construction Progress North and West of Darlington Nuclear Site (Bottom)

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2.4.4 Archaeological Excavation (DNNP Commitment D-P-11)

The Archaeological Excavation commitment contains five sub-commitments. OPG has completed all sub-commitments and the key commitment D-P-11 was closed in January 2013. The details are summarized as follows.

Summary of Commitment:

The archaeological evaluation of the DNNP property identified two Euro-Canadian sites, known as the Brady (AIGq-83) and Crumb (AIGq-86) sites. These two sites retained sufficient heritage value to warrant further archaeological consideration because artifacts from the mid-19th century were found. Site preparation and construction activities would result in the displacement of the Brady and Crumb sites. In keeping with OPG's commitments prior to site preparation, a Stage 4 mitigative excavation of the Brady and Crumb sites by qualified specialists was completed. The Stage 4 excavations were conducted in accordance with the terms of the Ministry of Tourism, Culture and Sport's (MTCS) standards and guidelines.

OPG committed to provide preliminary and final reports of the excavation of these sites to the MTCS and notify CNSC of the acceptance of these reports by MTCS prior to site preparation activities. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

Preliminary and Final Stage 4 Mitigative Excavation reports were prepared for the Brady and Crumb sites and submitted to the MTCS for their review and acceptance. These reports concluded that the sites were sufficiently excavated and documented and no further actions exist for these archaeological sites. The MTCS concurred that the provincial interest in the Brady and Crumb sites had been addressed and was satisfied that concerns for impacts to the archaeological site have been met. The letters of acceptance from MTCS have been transmitted to CNSC [R-22] in January 2013. This commitment was complete and closed.

In the event that archaeological remains are found during site preparation, construction activities in that area should cease and the Cultural Programs Unit of MTCS should be notified immediately in compliance with sec. 48 (1) of the *Ontario Heritage Act*.

2.4.5 Environmental Monitoring and Environmental Assessment (EA) Follow-up (DNNP Commitment D-P-12)

The Environmental Monitoring and Environmental Assessment Follow-up commitment contains nine sub-commitments. OPG is actively engaged in long lead time work associated with sub-commitments D-P-12.3, D-P-12.4, D-P-12.5 and D-P-12.7. The details are summarized in Sections 2.4.5.1, 2.4.5.2, 2.4.5.3 and 2.4.5.4 respectively.

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2.4.5.1 Environmental Monitoring Methodology Reports and EA Follow-Up for Surface Water Environment (DNNP Sub-Commitment D-P-12.3)

Summary of Sub-Commitment:

DNNP includes shoreline and marine construction work that would affect water quality, alter local currents and surface water conditions and affect transport of sediments. OPG concluded that the Project would not result in significant adverse effects on the surface water environment and has committed to undertake a Follow-up and Monitoring program to ensure that water and sediment quality in Lake Ontario is adequately protected during in-water construction work.

Provide to CNSC, for review and acceptance, no later than 3 months prior to commencement of site preparation licensed activities, Methodology Reports for Environmental Monitoring and EA Follow-Up for Surface Water Environment. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

In order to support the Follow-up and Monitoring program, OPG has collected additional water and sediment data for a comprehensive number of shoreline and off-shore locations within the general area of the planned lake infill, diffuser and intake for DNNP as well as the embayment area at the outlet of Darlington Creek. These additional studies include:

- 2012 Coastal Processes and Water Quality Program
- 2013 Deep Water Aquatic Habitat and Characterization Study [R-10]
- 2016 Benthic Invertebrate Community Study

Results of the Coastal Processes and Water Quality Program suggest that contaminant loading in Darlington Creek is likely from a combination of industrial and agricultural activities. Water from Darlington Creek mixes with lake water when it enters Lake Ontario, diluting the effects of contamination. The results of sediment sampling in August 2012 suggest that the substrate in the embayment area generally consists of rocky substrate (e.g., bedrock) and various grades of sand. Past bathymetric data, underwater video analysis and grain size analysis indicate similar findings. Overall, water and sediment sampling results are consistent with the findings presented in OPG's EIS for DNNP.

The Deep Water Aquatic Habitat and Characterization Study was conducted in support of the initial design of the DNNP intake and diffuser, including sediment and water sampling. A comprehensive number of water and sediment samples were taken in the off-shore area of DNNP intake and diffuser at depths varying between 10 and 30 m. In addition to the sediment sampling, a sonar survey was conducted to provide a detailed map of sediment. The nature of substrate varied throughout the study area with some areas sandy and others dominated by a mix of rocky substrates. The water and

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sediment data collected in this study would not only serve as a baseline but would also be used in the siting of the intake and diffuser.

The 2016 Benthic Invertebrate Community Study collected sediment and water quality data from the nearshore and compared the results to the EIS. The benthic invertebrate and sediment samples were collected using a sampling method that is considered more robust than its counterpart program conducted in 2008 in support of the DNNP EA. Despite the different sampling methods used, the 2016 surveys yielded similar results to that of the 2008 survey thereby confirming the conclusions of the DNNP EA with respect to benthic invertebrate assemblages that were used as a water and sediment quality indicator.

OPG continues to monitor water and sediment quality in support of DNNP and this work should feed into the final DNNP Commitments Report deliverable.

2.4.5.2 Environmental Monitoring Methodology Reports and EA Follow-Up for Aquatic Environment (DNNP Sub-Commitment D-P-12.4)

Summary of Sub-Commitment:

DNNP includes shoreline and marine construction work that would have an effect on the Aquatic Environment, OPG has committed to an adaptive management strategy that should address changes to the aquatic ecosystem over time.

Provide to CNSC, for review and acceptance, no later than 3 months prior to commencement of site preparation licensed activities, Methodology Reports for Environmental Monitoring and EA Follow-Up for Aquatic Environment. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

OPG completed an entrainment study at DNGS in 2015/2016 to address a component of commitment D-P-12.4. This entrainment study was an improved version of previous studies conducted in 2004 and 2006 and resulted in the collection of more accurate and reliable data, hence more accurate estimates of entrainment and improved ability to detect species of low abundance. In order to support an adaptive management strategy, additional entrainment sampling work at the existing DNGS was needed to better establish the current conditions. The 2004 and 2006 entrainment studies at DNGS reported fish larvae and observed few eggs. These studies were not considered robust enough to have adequately defined entrainment levels of all species since the sampling volume of water was too low to detect entrained organisms of low abundance. This is of particular importance for species such as round whitefish. They have been reported in field collections in the vicinity of the DNGS, but not in the 2004/2006 entrainment studies.

The improvements to the 2015/2016 entrainment study included an extension in the number of months of field survey, an increase in the number of samples and sampling frequency, longer sampling durations (i.e., 24-hour sampling consisting of approximate

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12-hour day and night periods), and larger sample volumes. The increase in sampling frequency, duration and volume sampled resulted in a higher probability of detecting species of lower abundance.

The 2015/2016 entrainment study focused specifically on sampling for round whitefish eggs and larvae during their spawning and larval development period. No round whitefish were captured at DNGS.

OPG's understanding of entrainment and impingement effects on aquatic biota continues to increase.

2.4.5.3 Environmental Monitoring Methodology Reports and EA Follow-Up for Terrestrial Environment (DNNP Sub-Commitment D-P-12.5)

Summary of Sub-Commitment:

Site preparation activities for DNNP would alter the terrestrial environment on the project site. As a result, OPG has committed to a follow-up program for confirming the EIS predictions on the terrestrial environment as well as monitoring the effectiveness of mitigation measures and post construction habitat restoration undertaken as part of the project for terrestrial species.

Provide to CNSC, for review and acceptance, no later than 3 months prior to commencement of site preparation licensed activities, Methodology Reports for Environmental Monitoring and EA Follow-Up for Terrestrial Environment. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

OPG continues to conduct the annual field inventories for breeding birds, amphibians, reptiles, and mammals at the Darlington Nuclear site¹ (including DNNP lands). These inventories include targeted surveys for species at risk that may be impacted by the proposed site preparation activities, such as the least bittern.

OPG has conducted more sampling to confirm the presence of least bittern prior to site preparation activities. Least bitterns have been observed on the Darlington Nuclear site in 2006, 2007 and 2012 over the sampling period between 2006 and 2017.

OPG has been using an adaptive management approach to create nesting habitat in the form of artificial nesting test structures of predetermined characteristics for bank swallows, monitor the performance of the test structures, and use lessons learned to further the mitigation strategy (See Section 2.4.1.2)

¹OPG maintains a comprehensive environmental monitoring program due to the ongoing operations at the existing DNGS facility. The environmental monitoring program for DNGS covers the Darlington Nuclear site including the DNNP lands.

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The Ecological Land Classification was updated in 2013. Information obtained from these inventories are useful for the re-baselining purposes and the development of future follow-up programs to verify the conclusion of the Terrestrial Environment component of the EA.

2.4.5.4 Environmental Monitoring Methodology Reports and EA Follow-Up for Land Use (DNNP Sub-Commitment D-P-12.7)

Summary of Sub-Commitment:

OPG has committed to a follow-up program for monitoring and participating in land use discussions and to review proposed land use changes in the vicinity of the DNNP site to determine if there is an impact on emergency plans.

Provide to CNSC, for review and acceptance, no later than 3 months prior to commencement of site preparation licensed activities, Methodology Reports for Environmental Monitoring and EA Follow-Up for Land Use. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

The Government of Canada tasked the Government of Ontario and Municipality of Clarington to evaluate and define buffer zones around nuclear facilities in Canada, taking into consideration the lessons learned from the Fukushima Daiichi nuclear accident to avoid having new residential areas located within 3 kilometres of a nuclear site.

OPG has undertaken annual monitoring of land use policies and activities around the Darlington Nuclear site since 2012. This monitoring includes a review of applications proposing a change in land use and proposed developments near the Darlington Nuclear site.

In June 2013, OPG participated in a land use planning workshop with provincial, regional and municipal stakeholders organized by the CNSC, and reviewed the subsequent summary of the workshop results.

The results indicated that municipalities have existing planning controls to actively monitor and control land use and proposed land use changes around the station sites. These control mechanisms mitigate the risks of any proposed new sensitive land uses from locating in the vicinity of nuclear power plants (NPPs) in Ontario.

The 2014 Provincial Policy Statement, Policy 1.2.6.1, emphasizes the needs for land use compatibility. It requires that sensitive land uses and major facilities (including electrical generation stations) be planned to ensure they are adequately buffered from each other to minimize risk to public health and safety and to ensure the long-term viability of major facilities.

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Consistent with the 2014 Provincial Policy Statement above, the Amendment No. 107 to the Municipality of Clarington Official Plan introduced a land use compatibility policy. Policy 3.7.9 of the Clarington Official Plan requires proposed sensitive land uses in the vicinity of the nuclear generating station to be reviewed in the context of emergency measures planning. OPG monitors land use policies and activities in proximity to OPG nuclear facilities to ensure no adverse impact would occur on the implementation of nuclear emergency plans.

2.4.6 Preliminary Decommissioning Plan and Financial Guarantee (DNNP Commitment D-P-13)

The Preliminary Decommissioning Plan and Financial Guarantee commitment contains two sub-commitments. OPG actively maintains sub-commitments D-P-13.1 and D-P-13.2. The details are summarized in Sections 2.4.6.1 and 2.4.6.2 respectively.

2.4.6.1 Preliminary Decommissioning Plan (DNNP Sub-Commitment D-P-13.1)

Summary of Sub-Commitment:

OPG committed that should it be necessary, OPG is to ensure decommissioning after site preparation be performed by a qualified contractor with emergency response, contingency for uncontrolled releases, environmental monitoring and visual effects management. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

The Site Preparation Licence presently permits limited physical activities and does not include work that would require decommissioning under CSA N294-09. The CNSC has concurred with OPG's position [R-30] that OPG's financial guarantee submission letter [R-8] serves in lieu of a fulsome Preliminary Decommissioning Plan. OPG has committed to update our Preliminary Decommissioning Plan when OPG applies for authorization to commence site preparation activities.

In accordance with Licence Condition 8.2 of the Licence Conditions Handbook (LCH), where the revision of the Preliminary Decommissioning Plan is required every five years, OPG has reaffirmed the Preliminary Decommissioning Plan in December 2017 [R-9].

2.4.6.2 Financial Guarantee (DNNP Sub-Commitment D-P-13.2)

Summary of Sub-Commitment:

OPG committed that a financial guarantee would be provided at the appropriate point in the preparation of the site and recognizes that a condition respecting the guarantee would be included in the initial application for a Site Preparation Licence in accordance with CSA N286-05 Annex E. If OPG applies for authorization to commence site preparation activities, OPG would propose an appropriate financial guarantee in

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accordance with G-206 that is commensurate with the decommissioning financial liabilities. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

OPG's current value of the financial guarantee represents \$0, since no decommissioning under CSA N294-09 would be required under the current Site Preparation Licence.

OPG plans to propose an appropriate financial instrument commensurate with decommissioning financial liabilities when OPG requests authorization for more substantive work on the DNNP site [R-9].

2.4.7 Fish Habitat Offsetting (Compensation) Plan (DNNP Commitment D-P-14)

The Fish Habitat Offsetting Plan commitment contains no sub-commitments. OPG is actively engaged in long lead time work associated with this commitment. The details are summarized as follows.

Summary of Commitment:

Lake infilling and shoreline protection associated with DNNP would infill a portion of Lake Ontario shoreline within the Project site to a water depth of about 2 metres. The infill would provide construction space and afford protection of the nuclear facility from the effects of storm surge and flooding. To offset fish habitat losses, OPG has committed to the creation of an offsetting plan (formerly compensation plan) (D-P-14).

OPG is to provide to Fisheries and Oceans Canada (DFO), for review and acceptance, a fish habitat offsetting plan no later than 60 days prior to commencement of lake infilling activity, as part of the DFO Authorization under the *Fisheries Act, Section 35(2)*. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

Fish Habitat Offsetting Plan - Big Island Wetland

OPG has developed a fish habitat offsetting plan in consultation with the DFO. OPG evaluated a number of offsetting measures, and ultimately decided to proceed with the Big Island Wetland project in 2012.

Big Island Wetland is located approximately 200 km east of Toronto in Prince Edward County on the Bay of Quinte. It is a coastal wetland situated between Big Island and the main land. Historically, Big Island Wetland had a large sinuous channel connecting to smaller channels and numerous pockets of open water, which allowed the waters of the Bay of Quinte to flow freely between Big Island and the surrounding portions of the Bay of Quinte.

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The introduction of Great Lakes water level regulations and construction of a causeway which connected the mainland of Prince Edward County to Big Island contributed to the accelerated succession of wetland vegetation and large reductions in the amount of open water wetland. These were due to the rapid expansion of dense cattail stands, with a corresponding reduction in the variability and diversity in fish habitat.

To improve wetland, fish and wildlife habitat use, OPG entered into an agreement with the Quinte Conservation Authority to construct three large ponds and interconnected channels. The Big Island Wetland offset project was modeled on the success of another nearby wetland enhancement project, and aims to improve water circulation, fish access and use, and water quality. The project was completed in 2014, creating 16.73 ha of pond and channel habitat (Figure 11). Monitoring of the wetland, fish use, production and habitat is ongoing. The channels and ponds were assessed in 2015 [R-17] and 2016 [R-18]. The presence of several species and life stages of fish within the created habitat was verified during spring, summer and fall. During 2015 and 2016, sampling identified 3781 fish representing 20 fish species.

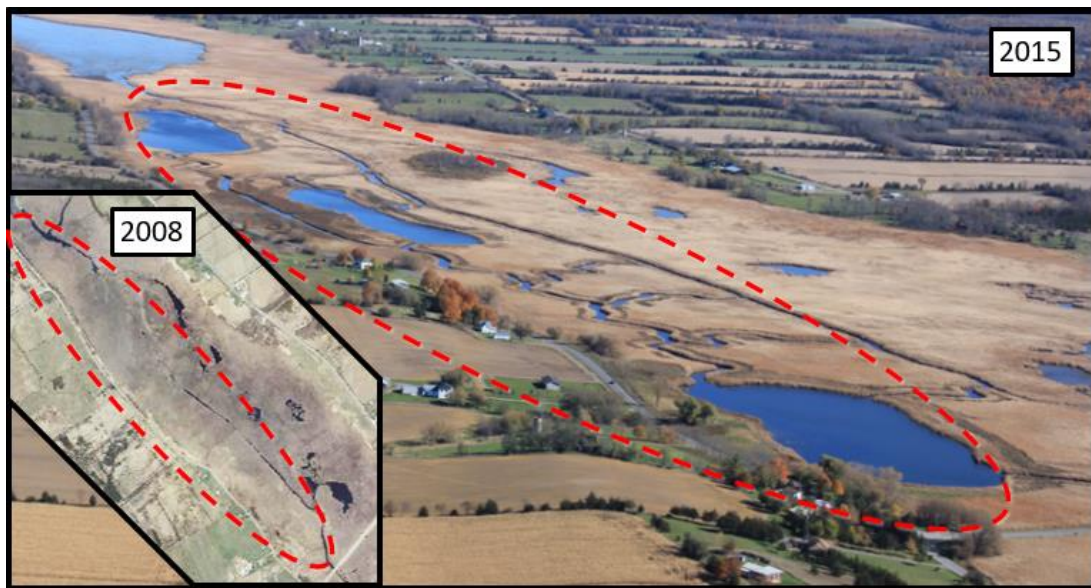


Figure 11: Aerial image of as-built conditions taken during September 2015 flight. Photos courtesy Quinte Conservation Authority.

Throughout the project, OPG has worked collaboratively with the responsible authorities to calculate benefits of the Big Island Wetland project with respect to the fisheries compensation. Presently, part of it is being used as an offset measure to counterbalance impingement and entrainment of fish occurring at DNGS and Pickering Nuclear Generating Station (PNGS). After commercial operations of PNGS ends, the impacts on fish should be significantly reduced through the Safe Storage period and the credits used for operational impacts should no longer be required. The remaining credit from the Big Island Wetland should be available to address future fish habitat impacts from the DNNP, including the proposed infill.

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The area and suitability of fish habitat, fish production, and resulting benefits is being monitored and is tracked relative to the corresponding impacts from PNGS, DNGS and DNNP. Monitoring results continue to be reported to DFO and the CNSC.

2.4.8 Round Whitefish Action Plan (DNNP Commitment D-P-15)

The Round Whitefish Action Plan commitment contains no sub-commitments. OPG is actively engaged in long lead time work associated with this commitment. The details are summarized as follows.

Summary of Commitments:

OPG committed to undertake further studies of round whitefish spawning habitat in the vicinity of the proposed DNNP. If confirmed, round whitefish spawning habitat should be considered in determining the appropriate thermal discharge mitigation options. While OPG has taken a precautionary approach and has assumed round whitefish spawning habitat exists in calculating thermal effects, the occurrence and extent of preferred round whitefish spawning habitat should be confirmed through the Round Whitefish Action Plan.

OPG to provide to DFO, for review and acceptance, a Round White Fish Action Plan no later than 60 days prior to the commencement of lake infilling activities, as part of the DFO Authorization under *Fisheries Act, Sections 32 and 35(2)* to inform fish habitat offsetting requirements and mitigation options. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

Round Whitefish Action Plan

The EA [R-19] identified round whitefish (*Prosopium cylindraceum*) as a valued ecosystem component, with the potential they could be impacted as a result of the lake infill area to the 5 m water depth contour. In Lake Ontario, the round whitefish distribution is primarily along the north shore.

To reduce the impact on round whitefish, OPG committed to ensure that the harmful alteration, disruption or destruction of fish habitat associated with the proposed lake infill would be limited to the area within the 2 m depth contour of the Lake (D-P-16).

In addition to limiting the water depth to be infilled, OPG continues to support the Round Whitefish Action Plan. OPG proposed the Round Whitefish Action Plan, with the support of DFO, MNRF, ECCC and the CNSC. This Action Plan is to better understand and investigate the current status of round whitefish and the effects that may be contributing to its declining population, not limited to just DNNP.

A number of studies have been completed to better understand round whitefish and to support the action plan. For instance, OPG sponsored a 2-year research program with the CANDU Owner's Group to assess the thermal impacts on embryo development

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and survival through controlled experiments using modern embryo incubation techniques and more realistic thermal regimes. OPG, ECCC and CNSC have collaboratively worked to incorporate the CANDU Owner's Group research into a revised thermal effects model.

This revised model has recently been used to evaluate the potential effect of lake water temperature in the thermal plume at PNGS. The results concluded that the thermal plume from PNGS is not having an adverse effect on Round Whitefish embryo survival due to the limited and spatial temporal effect [R-21]. The model was also applied to DNGS 2011 and 2012 thermal plume data and the results showed that the thermal plume effects on round whitefish embryos are not significant. As a follow-up monitoring program element for the Darlington Refurbishment and continued operations EA, OPG has monitored the thermal plume at DNGS in the winter of 2017-2018. The assessment of the data is currently underway.

OPG has also contributed fish samples to MNRF to support a genetic study on round whitefish populations in Lake Ontario. The study was published in 2016 [R-20] and reported no unique stocks. Starting in spring 2018, OPG began conducting aquatic community surveys around potential areas of the intake and diffuser for DNNP (See Section 2.4.10.1). The fish community surveys should help further characterize round whitefish habitat availability near DNNP.

The studies to date under the Round Whitefish Action Plan suggest that the overall impact of DNNP on round whitefish should be less than the prediction discussed in the EA. The results of the Round Whitefish Action Plan studies in support of DNNP would contribute to the detailed designs for the Condenser Cooling Water system.

2.4.9 Communications, Consultation, Stakeholder Relations and Indigenous Communities Program/Plan (DNNP Commitment D-P-17)

The Communications, Consultation, Stakeholder Relations and Indigenous Communities Program/Plan commitment contains no sub-commitments.

Summary of Commitment:

Information materials should be provided to the public and Indigenous communities throughout site preparation to ensure environmental, health and safety issues are effectively communicated; persons living in the vicinity are informed of general activities, effects and mitigations, and to provide up-to-date information. OPG should continue to keep its neighbours and the broader public informed concerning activities at the Darlington Nuclear site as appropriate to each phase of the Project.

OPG is to provide to the CNSC a Communications, Consultation and Stakeholder Relations Program no later than 60 days prior to commencement of site preparation licensed activities. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

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OPG Update:

OPG's existing nuclear public information and disclosure program continues to be a vehicle through which OPG communicates to stakeholders about a wide range of activities within OPG and on the Darlington Nuclear site, including current station performance and DNNP. OPG remains committed to continue communicating with the public and Indigenous communities proximate to the DNNP project site, building on the robust communication activities that took place throughout the DNNP EA and licensing process. OPG has continued providing presentations, tours and sharing information with the public and local community throughout the licence period, and maintains a public Information Centre where visitors can learn more about operations, current projects and future plans.

Indigenous Engagement

Indigenous engagement with DNNP has been extensive, starting in 2006 with a *Project Commencement Notification Letter and Invitation to Community Information Session*. Through the DNNP project, OPG has developed an ongoing, focused relationship with the four closest Williams Treaties First Nations, the Mohawks of the Bay of Quinte and the Métis Nation of Ontario Region 8 regarding issues related to the Pickering and Darlington generating stations and DNNP. These relationships have formed the foundation for ongoing work on the DNNP with Indigenous communities. Since August of 2012, OPG has made increased efforts to enhance its relationship with Indigenous communities regarding nuclear operations and projects. For example, OPG has actively involved Indigenous communities in the environmental monitoring process for both Pickering and Darlington generating stations, particularly with the Williams Treaties First Nations (Mississauga peoples resident in the First Nations of Scugog Island, Curve Lake, Hiawatha and Alderville, which are proximate to Pickering and Darlington generating stations). However, it should be noted that in November 2017, the Mississauga of New Credit informed OPG that the Williams Treaties First Nations alone would represent their interests in the area.

Indigenous Employment Programs

Indigenous employment connected to this project focuses primarily on the Indigenous communities in the vicinity: the four Williams Treaties First Nations (Scugog Island, Curve Lake, Hiawatha, and Alderville), Mohawk of the Bay of Quinte and the Métis Nation of Ontario Region 8. Each of these Indigenous community groups operate employment and training offices that OPG is in regular contact with regarding career fairs, job posting, station tours, etc. As well, in eastern Ontario, OPG has an ongoing relationship with Kagita Mikam Aboriginal Employment and Training, which provides access to candidates across their extensive network. OPG has had a relationship with Kagita Mikam since 2015.

OPG's Darlington Refurbishment Project is acting as a catalyst to encourage Indigenous people to consider a career in the trades. OPG is considering development of a trades rotation program related to DNNP, where Indigenous youth can experience several trades before choosing a path towards one. Employment would also be

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available in non-trades roles (e.g., security, project planning, IT) and would not be restricted to OPG, but include vendors and the building trades working with OPG. These items represent the current effort of the Indigenous Opportunities in Nuclear program, linked to DNGS Refurbishment, and provides a model for DNNP.

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2.4.10 Commitments Beyond Site Preparation

Updates on activities related to additional OPG DNNP long lead time commitments that are beyond the scope Site Preparation Phase are discussed in the following sections.

2.4.10.1 Condenser Cooling Water Design (DNNP Commitment D-C-1)

The Condenser Cooling Water Design commitment contains three sub-commitments. OPG has completed one of the sub-commitments (D-C-1.1) regarding the condenser cooling water options assessment report and OPG’s final decision on Best Available Technology Economically Achievable process for condenser cooling water. The details are summarized as follows.

Summary of Sub-Commitment:

The environmental assessment (EA) completed for the DNNP reported a loss of some aquatic biota (i.e., benthic invertebrates, fish) as a result of in-water construction and operation of the condenser cooling water system [R-23]. Although, the assessment concluded that the loss will not result in a residual adverse environmental effect because of the mitigation measures that should be implemented. OPG has committed to undertake a cost-benefit analysis of mechanical draft cooling and once-through condenser cooling water systems, applying the principle of Best Available Technology Economically Achievable. Best Available Technology Economically Achievable is a formalized, comprehensive decision-making technique for selecting the best technology to minimize negative environmental impact within reasonable cost.

OPG to provide to CNSC, for review and acceptance, Condenser Cooling Water Option Assessment Report and OPG’s Final Decision on Best Available Technology Economically Achievable prior to the submission of the Construction Licence Application. (This summary is paraphrased, see DNNP Commitments Report [R-4] for full description.)

OPG Update:

Condenser Cooling Water Option Assessment Report

OPG finalized the Condenser Cooling Water Option Assessment Report [R-24] in 2013. The report presents the Best Available Technology Economically Achievable (BATEA) methodology, a multi-attribute assessment approach, and its application to determine the preferred condenser cooling option for the DNNP. The BATEA, was selected as the most appropriate methodology on the basis of a comprehensive review of Canadian and international guidelines, as well as a number of recent studies of a similar nature.

The results of the 2013 evaluation of the two condenser cooling options demonstrated that the once-through cooling option as the preferred cooling water system [R-24]. This completed OPG’s deliverables related to commitment D-C-1.1. CNSC staff concurred

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that the submission was satisfactory to complete these items with several conditions that should be carried forward to the design stage [R-27].

Condenser Cooling Water Design

The design of the once-through cooling water system for DNNP seeks to improve upon the technology that currently exists at DNGS that was specifically designed to and has successfully reduced fish impingement (Figure 12).

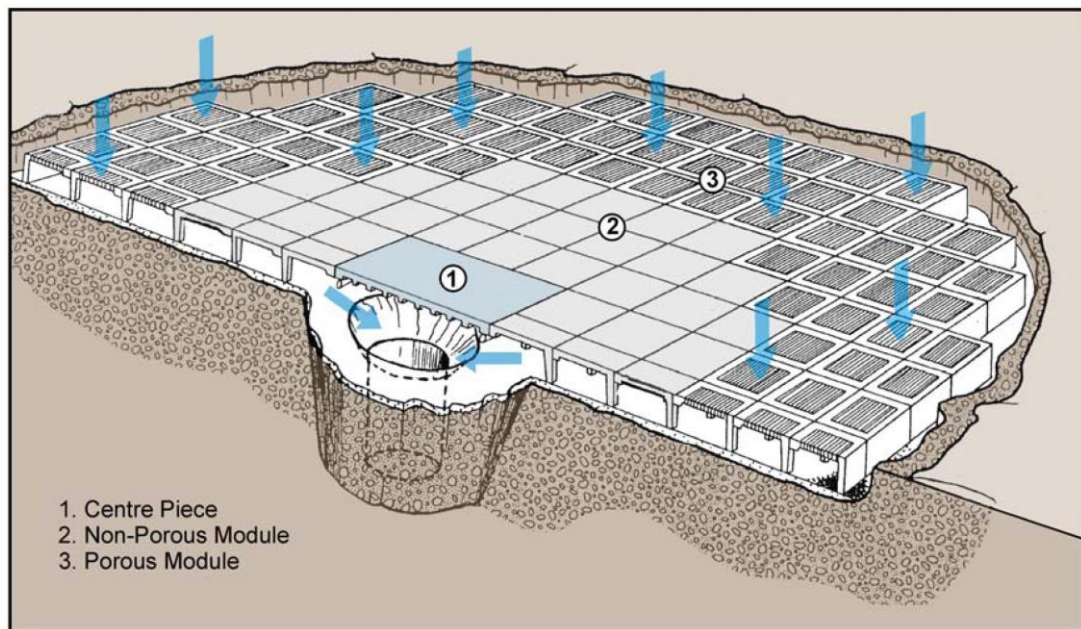


Figure 12: Design of porous veneer intake currently installed at Darlington Nuclear Generating Station (DNGS).

The intake and discharge structures are planned to be optimally located such that interaction with selected environmental variables are minimized (i.e. the least effect on the aquatic environment) with consideration of other socio-economic and operability requirements. This optimum location may be beyond the nearshore habitat zone, in areas deeper than the existing systems at DNGS. Deeper areas may have less impact on fish, such as the round whitefish, and the colder water may benefit operational requirements.

An improved understanding of the aquatic community in offshore areas (>10 m water depth) is important so that the data collected can be used to support detailed design. As a result, OPG undertook an aquatic environment study characterizing community and habitat that was completed in the fall of 2012 and spring of 2013 [R-10]. This study determined the preliminary characteristics of the aquatic environment in the offshore areas (10 to 30 m water depth) adjacent to the DNNP site. Detailed substrate mapping and surveys of adult fish, fish larvae, benthic invertebrates and zooplankton were included in the study.

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A more comprehensive aquatic study characterizing aquatic community in the area of potential intake and diffuser locations was developed. OPG held a workshop with CNSC, DFO and ECCC in 2016 to discuss the proposed sampling methodology that would support the siting of the intake and diffuser. Comments provided by the government agencies were incorporated into a methodology report [R-11]. The aquatic monitoring started in early 2018 and is currently underway.

The above aquatic study would be used to inform the design and location of the intake and diffuser structures such that effects to the aquatic environment are minimized. In addition, the study should provide year-to-year variability in adult fish communities in the area that can be used to support the Round Whitefish Action Plan (Refer to Section 2.4.8 for additional details).

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2.5 Findings of CNSC's Fukushima Task Force and Lessons Learned

In the days immediately after accident at the Fukushima Daiichi nuclear power plant on March 11, 2011, the CNSC established a Task Force to examine the readiness of a Canadian Nuclear Power Plant (NPP) response to such an event. The CNSC Task Force concluded that Canadian NPPs are safe, have a robust design that relies on multiple layers of defence and do not pose any significant risk to the health and safety of Canadians or to the environment.

To further strengthen each layer of defence built into the Canadian NPP design, the Task Force issued various actions known as the Fukushima Action Items. These lessons learned from the Task Force were implemented into operating NPPs and can be considered as operational experience for any new NPP constructions in the future.

From the various Fukushima Action Items, OPG made modifications to the Pickering and Darlington stations to further strengthen layers of defence. OPG also incorporated complementary design features into the stations to cope with Design Extension Conditions and procured portable emergency equipment to provide an additional line of defence. OPG and other Canadian NPPs have adopted the term Emergency Mitigating Equipment to categorize such temporary/portable equipment that serves as additional lines of defense during Beyond Design Basis Accidents.

Since OPG's initial application for a Site Preparation Licence, a new Regulatory document REGDOC-1.1.1, *Licence to Prepare Site and Site Evaluation for New Reactor Facilities*, has recently been issued to update requirements and guidance for site preparation and site evaluation. It also addresses requirements and guidance for a licence to prepare site. This document will replace the previously published RD-346, *Site Evaluation for Nuclear Power Plants*.

REGDOC-1.1.1 will take into account the requirements and lessons learned from the Fukushima Task Force to describe the necessary robust characterization of the site to include:

- consideration of events to include multiple and simultaneous severe external events that could exceed the design basis;
- multiple and simultaneous reactor accidents;
- discussions around emergency planning and preparations for extreme events earlier in a project.

The site evaluation covers the entire life cycle of the reactor facility. REGDOC-1.1.1 is planned to be reviewed to identify any gaps with the current approach to DNNP site preparation activities.

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3.0 SAFETY AND CONTROL AREAS

3.1 Management System

The DNNP management system is to provide assurance that the new nuclear plant will be engineered, purchased, constructed, commissioned, and turned over in accordance with the requirements of Canadian Standards Association (CSA) Standard N286-05 "Management System Requirements for Nuclear Power Plants". Since the Government of Ontario directed OPG to defer the construction of new nuclear reactors at Darlington in 2013, the process to select a technology and EPC Co. for site preparation was suspended. Additionally, the accountabilities of the previous DNNP project organization have been transferred to the OPG Nuclear fleet organization and the current accountabilities for DNNP work activities are defined in accordance with [R-31].

No licensed activities under the Site Preparation Licence for the DNNP site have been planned and the DNNP management system documents have not been revised since the deferral of DNNP. Regulatory inspections of the DNNP management system or its implementation and safety culture evaluations have not been made since the project deferral.

3.2 Human Performance Management

The development and implementation processes to ensure nuclear specific training program are not required at this time. OPG continues to use qualified personnel to perform work activities supporting DNNP.

3.3 Operating Performance

3.3.1 Conduct of Site Preparation Activities

OPG has not commenced any licensed activities under the Site Preparation Licence on the DNNP site and has not engaged an EPC Co., therefore has not needed to verify compliance of the EPC Co. activities to the site preparation requirements.

3.3.1.1 Management of DNNP Land Areas

OPG continues to maintain DNNP lands areas through monitoring and control of their uses. Two areas west of Holt Road (e.g. zones F5N and F5S, See Figure 4) and all areas east of Holt Road associated with the DNNP site have been cleaned up, fenced and maintained. Temporary barriers and gates were installed on road access points to ensure no unauthorized use of the site for laydown (See Figure 13).

As noted above in Section 2.4.1, the DNNP land in the vicinity of the old concrete mixing site was temporarily used to manage soil from infrastructure construction projects at the existing DNGS site. The temporary use concluded in 2016. OPG formally notified the CNSC before the temporary use and when the use concluded on March 3, 2014 and August 11, 2016 respectively.

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The site was decommissioned and restored in Q3 2017 and the CNSC has been notified [R-28].



Figure 13: Example of Signage and Barrier Erected at Access Points Along the West Side of the DNNP Site.

3.3.2 Event Reporting

OPG continues to monitor the DNNP site conditions. Adverse and potentially adverse conditions are documented in OPG's Station Condition Record database. There have been no reportable events related to the DNNP since the issuance of the Site Preparation Licence.

3.3.3 Annual Reporting

OPG has submitted six annual reports on Site Preparation Activities to the CNSC in accordance with Licence Condition 4.3 Annual Report for Site Preparation [R-7], the most recent in March of 2018 [R-25].

3.4 Conventional Health and Safety

Site preparation licensed activities have not commenced. There have been no occupational health and safety events and no Ministry of Labour investigations or orders related to the DNNP since the issuance of the Site Preparation Licence.

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3.5 Environmental Protection

Site preparation licensed activities have not commenced. There have been no DNNP activities undertaken that would require the monitoring of emissions, effluent or wastes. There have been no environmental excursions related to project activities since the issuance of the Site Preparation Licence.

3.6 Emergency Management and Fire Protection

There have been no reportable fire or emergency events for the DNNP site since the issuance of the Site Preparation Licence.

As discussed in Section 3.1, any activities undertaken at the site prior to contracting an EPC Co. have been performed using the existing approved OPG Nuclear fleet management system, including fire protection and emergency response measures.

3.6.1 Emergency Management

No Emergency Preparedness enhancements have been made relating specifically to DNNP commitments, however the following notable programmatic updates have occurred which would eventually affect Emergency Preparedness on the DNNP site.

Darlington facility is compliant with CNSC REGDOC 2.10.1 Nuclear Emergency Preparedness and Response.

The Office of the Fire Marshal and Emergency Management administers the Provincial Nuclear Emergency Response Plan (PNERP) on behalf of the Province and coordinates nuclear emergency preparedness and response in Ontario. All other major organizations (e.g., municipalities, nuclear power plants) involved develop their own plans consistent with the requirements of the PNERP, its implementing plans and their mandate.

Following the accident at the Fukushima Daiichi nuclear power plant, the Office of the Fire Marshal and Emergency Management initiated a project to review the Provincial Nuclear Emergency Response Plan (PNERP) and the planning basis for nuclear emergency response. The Province's goal with this update was to make the plan more transparent and accountable, increase alignment with national and international standards, incorporate lessons learned from recent international emergencies, and enhance emergency planning. The revised PNERP was approved by Cabinet in December 2017. OPG has conducted a gap assessment between its existing Consolidated Nuclear Emergency Plan and the updated PNERP, creating a transition plan to expeditiously revise OPG's plan to align with the provincial plan.

The most recent Evacuation Time Estimate study was issued for the Darlington Nuclear site in 2015 [R-26]. Efforts are currently underway to revise the Darlington Nuclear site Evacuation Time Estimate study by early 2019. The 2019 study plans to follow the same methodology as the 2015 study, but use the most recent census data and address new requirements of the revised PNERP. These studies take into

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consideration the time required to evacuate schools, hospitals and other residential institutions, with support from the province, local municipalities, police and transit organizations, in a variety of scenarios.

3.6.2 Fire Protection

No Fire Protection enhancements have been made relating specifically to DNNP commitments. However, significant improvements that OPG has made since 2013 to its Fire Protection Program at the existing DNGS would also be considered for the future DNNP program. These improvements have been driven by the Fire Hazard Assessment and Fire Safe Shutdown Analysis, combustible material safety audits and drill evaluations. Their reports have been submitted to the CNSC and highlights of these improvements are listed below:

- Darlington's Emergency Response Team participates in HAZMAT and live fire drills annually and routinely participates in site based drills and practices. Many of the scenarios involve multiple disciplines and integrated response with the Site Security organization to practice and implement a unified response to emergencies.
- OPG operates a Fire and Emergency Services training school located at the Wesleyville facility near the town of Port Hope. This facility has been in operation for 22 years and provides Systematic Approach to Training based training in fire fighting, high angle rescue, medical response, incident command, and hazardous materials response to OPG's Emergency Response Team.
- The Fire and Emergency Services training school also provides training in first aid, fire prevention, fire investigation, fire inspection, and fire engineering to other work groups. External to OPG, the Fire and Emergency Services training school provides fire and emergency services training to other Canadian nuclear operators, fire colleges, municipal fire departments, and private industrial fire brigades from across Ontario.
- The training delivered by OPG satisfies provincial requirements and the international benchmark of the National Fire Protection Association standards. External audits and benchmarking with other training facilities is routinely performed to ensure we continue to exceed regulatory requirements.
- OPG has a bilateral agreement with the Durham municipalities providing support and availability of specialized resources in emergency situations. This was demonstrated in April 2015, when Darlington provided specialized on-scene support for a fire at a century-old building in Whitby.

3.7 Waste Management

There have been no DNNP licensed activities undertaken that involve hazardous or radiological materials, or that generate hazardous or radiological wastes since the issuance of the Site Preparation Licence.

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3.7.1 Preliminary Decommissioning Plan

Refer to Section 2.4.6.1.

3.8 Security

There have been no security events on the DNNP site since the issuance of the Site Preparation Licence. As no EPC Co. has been contracted and no site preparation activities have been planned. To date, no Security enhancements have been made relating specifically to DNNP commitments.

Darlington Site Security regularly patrols the DNNP footprint in order to ensure the integrity of the site condition.

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5.0 GLOSSARY

BCE	Before the Common Era
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
DFO	Fisheries and Oceans Canada
DNGS	Darlington Nuclear Generation Station
DNNP	Darlington New Nuclear Project
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
EPC Co.	Engineering, Procurement and Construction Company
HAZMAT	Hazardous Material
IT	Internet Technology
JRP	Joint Review Panel
LCH	Licence Conditions Handbook
MNRF	Ministry of Natural Resources and Forestry
MTCS	Ministry of Tourism Culture and Sport
NPP	Nuclear Power Plant
OPG	Ontario Power Generation
PNERP	Provincial Nuclear Emergency Response Plan
PNGS	Pickering Nuclear Generation Station
REGDOC	Regulatory Document