ONTARIO POWER GENERATION

Dean Townsend, P. Eng.
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June 29, 2020

CD# NK054-CORR-00531-10533

MR. MARC LEBLANC
Commission Secretary

Canadian Nuclear Safety Commission
280 Slater Street
Ottawa, Ontario
K1P 5S9

Dear Mr. Leblanc:

Application for Renewal of OPG's Darlington New Nuclear Project (DNNP) Nuclear Power Reactor Site Preparation Licence (PRSL)

The purpose of this letter is to submit the licence renewal application for the Nuclear Power Reactor Site Preparation Licence (PRSL) 18.00/2022 to the Canadian Nuclear Safety Commission (CNSC) for the Ontario Power Generation Incorporated's (OPG) Darlington New Nuclear Project (DNNP). The PRSL expires on August 17, 2022.

OPG is a Canadian corporation located at 700 University Avenue, Toronto, Ontario, M5G 1X6.

OPG requests a ten-year licence renewal, from August 18, 2021 to August 18, 2031, to allow OPG to conduct the site preparation activities for the future construction and operation of a new Nuclear Generating Station (NGS) as described in the original application (Reference 1). As communicated in Reference 2, OPG's decision to seek early renewal of the PRSL is to minimize the risk of the licence expiring and to preserve, for both OPG and our shareholder, the Province of Ontario, maximum flexibility for future nuclear generating capacity at the Darlington site.

The management and control of the DNNP PRSL is the overall responsibility of Mr. Dean Townsend, Senior Vice-President, Nuclear Engineering and Chief Nuclear Engineer (Acting).

Enclosure 1 is the DNNP PRSL Renewal Application. The application demonstrates that:

- OPG is qualified to conduct the site preparation activities on the DNNP site authorized by the licence and will make adequate provision 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.
- The DNNP site remains suitable for a new NGS over its lifespan in light of relevant current codes and standards, and current baseline conditions.

The application also describes the 14 CNSC Safety and Control Areas relevant for a licence to prepare site, OPG's Management System and other matters of regulatory interest. The information that is included with this application is in accordance with the requirements of the Nuclear Safety and Control Act (NSCA) and associated regulations, and Appendix A of REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*.

To demonstrate how the renewal application satisfies the requirements of the Nuclear Safety and Control Act and applicable regulations, as well as regulatory document REGDOC-1.1.1, the PRSL Renewal Application Matrix provided in the Appendix A and B of the application shows the mapping of OPG application sections to the above requirements.

Consistent with OPG's approach towards open and transparent public communications, OPG will be posting this application on its external web-site www.opg.com.

Should you have any questions, or require additional information, please contact Mr. David Train, Manager, Regulatory Projects at (905) 839-6746, ext. 5360 or by e-mail at david.train@opg.com.

Sincerely,

Dean Townsend, P. Eng.
Senior Vice President, Nuclear Engineering
and Chief Nuclear Engineer (Acting)
Ontario Power Generation Inc.

cc:
C. Carrier - CNSC (Ottawa)
H. Robertson - CNSC (Ottawa)
L. Andrews - CNSC (Ottawa)
D. Miller - CNSC (Ottawa)
K. Cormier - CNSC (Ottawa)
J. Burta - CNSC (Ottawa)
K. Hazelton - CNSC Site Office (Darlington)

References:

1. OPG Letter, A. Sweetnam to Panel Members, "OPG New Nuclear at Darlington Project - Application for a Licence to Prepare Site", September 30, 2009, CD# NK054-CORR-00531-00035.

2. OPG Letter, M.R. Knutson to C. Carrier, "DNNP – Notice of Intent for Early Renewal of Power Reactor Site Preparation Licence PRSL 18.00/2022", April 26, 2019, e-Doc # 5889574, CD# NK054-CORR-00531-10493.

Enclosure:

1. Darlington New Nuclear Project Power Reactor Site Preparation Licence Renewal Application – June 2020.

ENCLOSURE 1

Darlington New Nuclear Project

Power Reactor Site Preparation Licence Renewal Application

June 2020

Darlington New Nuclear Project

Power Reactor Site Preparation Licence Renewal Application

June 2020

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Executive Summary

Ontario Power Generation Inc. (OPG) currently holds a Nuclear Power Reactor Site Preparation Licence (PRSL) 18.00/2022 ([R-1], [R-2]) for the Darlington New Nuclear Project (DNNP) with a licence expiry date of August 17, 2022. OPG is applying to renew this licence for a 10-year term. A renewed licence will preserve for both OPG and our shareholder, the Province of Ontario, the option for future nuclear generating capacity at the Darlington site.

This licence application provides the information required to demonstrate that OPG meets or exceeds all of the applicable requirements of the *Nuclear Safety and Control Act* (NSCA) and the associated regulations.

The application demonstrates that the Darlington Nuclear (DN) site remains suitable for a new Nuclear Generating Station (NGS). The application also describes the management system and various programs, processes, and personnel that OPG has in place to meet the requirements of the Canadian Standards Association (CSA) Standard N286-12, *Management System Requirements for Nuclear Facilities* [R-4], in support of site preparation activities. This will ensure that all work is performed with quality, to the appropriate standard and with minimal impact to the public, workers, and the environment. Collectively, these elements ensure that safety is the overriding priority in any activities undertaken to prepare the site under this licence.

To date, OPG has not initiated any licensed activities and has not selected a reactor technology for DNNP. For the PRSL renewal, the bounding project scope of DNNP as described in the *Application for a Licence to Prepare Site for the Future Construction of OPG New Nuclear at Darlington* that OPG submitted in 2009, (hereinafter referred to as the "original application"), [R-5] remains unchanged.

Since 2012, OPG has continued to fulfill the requirements of the current PRSL. OPG has submitted eight DNNP annual reports to the Canadian Nuclear Safety Commission (CNSC) [R-21] and a midterm licence report in 2018 [R-22]. These reports provided the status and progress of activities related to DNNP including those associated with advancing commitments made by OPG during the Joint Review Panel (JRP) process, as accepted by the Government of Canada. The commitments are documented in the

Darlington New Nuclear Project Commitments Report [R-19].

PRSL Renewal Activities

In support of the PRSL renewal, OPG has completed a compliance review of the CNSC Regulatory Document (REGDOC)-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities* [R-6], updated baseline data and reviewed the current codes, standards and practices in accordance with OPG's *DNNP PRSL Renewal Plan* [R-25].

OPG has also conducted various environmental studies, some of which are focused on DNNP commitments that require long lead time or require OPG to continue to carry out baseline monitoring that can be advanced independently from a reactor technology selection. The results of these studies are summarized in Section 4.4 of this application.

The Licence Renewal Activity Reports (LRARs) ([R-7] to [R-16]), a Site Selection Threat and Risk Assessment (SSTRA) update [R-17], and an Aggregate Assessment Report [R-18] were prepared to further support the requested 10-year licence renewal. The Aggregate Assessment Report provides an overall assessment to confirm the existing licensing basis remains valid for the next licensing period or, if applicable, identifies mitigating actions that will be carried forward to the DNNP Commitments Report [R-19].

Site Evaluation

The studies and evaluation concluded that the DNNP site continues to be suitable for the proposed new NGS.

In support of the original application [R-5], a number of site evaluation studies were performed in order to demonstrate the DNNP site meets the regulatory requirements.

General areas reviewed included:

- An evaluation against the CNSC Safety Goals
- Evolving natural and human-induced factors
- Hazards associated with external events (natural and human-induced)
- Potential impact of the site on the environment
- Demographics and emergency planning
- Consideration of future life extension

In support of the PRSL renewal, OPG has completed the following activities and confirmed:

- The compliance review of DNNP Licence Basis Documents (LBDs) against REGDOC-1.1.1 confirmed the conclusions of the site evaluation remain valid.

- Assessed the applicability and impact of the updated baseline data based on the latest Darlington Probabilistic Safety Assessment (PSA) hazard screening analysis relative to the DNNP site. No changes were identified that affect the conclusions in the DNNP LBD.
- Identified and addressed any new or updated regulatory documents, codes and standards, issued since the original application that apply to site evaluations. The reviews of the regulatory documents, codes and standards did not identify any compliance gaps in the key LBDs. Therefore, OPG concludes the DNNP LBDs remain valid and compliant with current regulatory codes and standards.

OPG has also completed a nuclear security review [R-16] and an update to the SSTRA [R-17]. Results of the SSTRA did not foresee any significant security risk to meet the *Nuclear Security Regulations*. There are no unique or additional factors related to OPG's ability to safely implement and provide security at this site.

Section 4.0 of this application summarizes the review and overall conclusions of the site evaluation.

Site Preparation

OPG has determined the adequacy and effectiveness of the programs in place to ensure site preparation activities as defined in the PRSL can be carried out in accordance with the applicable requirements. Section 5.0 of the application describes compliance with the Safety and Controls Areas (SCAs) applicable to the site preparation phase.

DNNP Commitments

During the current licensing period, OPG continued to address some commitments and advanced initiatives that will enable future advancement of DNNP. OPG will continue to report the status and closure of commitments listed in the DNNP Commitments Report [R-19].

Section 6.6 of this application summarizes the completed and ongoing commitments.

Indigenous and Public Engagement and Communications

OPG values the relationships it has with Indigenous communities, the public and stakeholders.

OPG fosters open and ongoing communications and engagement programs with the public and stakeholders in communities where our

facilities are located, as well as with the broader general public.

OPG keeps the public and stakeholders informed about DNNP as part of the existing engagement and communications activities for the Darlington Nuclear Generating Station (DNGS). Topics such as station operations, environmental performance, and the status of projects (like DNNP) are communicated through various methods and forums with the goal of ensuring transparent disclosure of our activities and their potential impacts.

OPG's relationship with its host community remains strong due to ongoing open engagement and sustainable partnerships with community stakeholders, including government, media, business leaders, educational institutions, interest groups, and community organizations.

OPG also meets with Indigenous communities on an ongoing basis to provide informational updates, to ensure meaningful engagement and communications (*Indigenous Engagement Report* [R-20]).

Overall Conclusion

In summary, this licence application contains sufficient information to demonstrate that OPG meets all of the requirements of the NSCA and the associated regulations and shows OPG:

(a) is qualified to carry on the activity to be licensed; and

(b) will, in carrying on that activity, make adequate provision 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.

As evidenced throughout this application and supporting documents, OPG asserts that, consistent with the scope of this application:

- Nuclear safety will be assured such that the public, personnel and the environment are protected;
- The DNNP site is suitable for the construction and operation of a new NGS;
- A new NGS at the DNNP site would not pose any unreasonable risk to the public, personnel, or the environment;
- A management system is in place to effectively conduct the site preparation activities through the next licence period;

- Staff are qualified and competent to carry on the licensed activities; and
- Transparency and appropriate Indigenous and public consultations will continue.

The PRSL continues to be a significant asset for OPG and the Province of Ontario, as it enables the option for future additional nuclear generation capacity in Ontario, which would maintain a reliable source of baseload nuclear power within Ontario's energy supply mix. OPG is requesting to renew the PRSL for another 10-years to allow for the project to advance in accordance with OPG's current business planning assumptions for new generation capacity.

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1.0 Overview

1.1 Introduction

Ontario Power Generation Inc. (OPG) is responsible for approximately half of the electricity generation in the Province of Ontario. OPG provides low-cost power in a safe, clean, reliable and sustainable manner for the benefit of the people of Ontario and our shareholder, the Province of Ontario.

The Darlington Nuclear (DN) site is home to the four-unit Darlington Nuclear Generating Station (DNGS) and Darlington Waste Management Facility (DWMF). DNGS was commissioned by OPG's predecessor company, Ontario Hydro, with the first unit commissioned in 1990.

OPG currently holds a Nuclear Power Reactor Site Preparation Licence (PRSL) 18.00/2022 ([R-1], [R-2]) for the Darlington New Nuclear Project (DNNP) located on the DN site in the Municipality of Clarington, in the Regional Municipality of Durham. Figure 1 and Figure 2 provide satellite and aerial photographs of the DNNP site.

The PRSL allows OPG to conduct the site preparation activities for the future construction and operation of a new Nuclear Generating Station (NGS) with a maximum net electrical output of 4800 megawatt electric (MWe).

The PRSL expires on August 17, 2022. OPG is applying for a 10-year licence renewal with a licence term starting from August 2021. This renewal would allow for the project to advance in accordance with OPG's current business planning assumptions for new generation capacity. This approach will mitigate the risk of the PRSL expiring and preserve, for both OPG and our shareholder, the Province of Ontario, maximum flexibility for future nuclear generation at Darlington. The PRSL continues to be a significant asset for OPG and the Province of Ontario, as it enables the option for future additional nuclear generation capacity in Ontario, which would maintain a reliable source of baseload nuclear power within Ontario's energy supply mix.

To date, OPG has not initiated any licensed activities and has not selected a reactor technology for future generation and no Engineering, Procurement and

Construction (EPC) Company has been contracted. OPG continues to undertake the activities to maintain the DNNP's PRSL and address the regulatory commitments for DNNP. OPG's efforts have been focused on the collection of information to assist the site specific design activities that will be performed prior to site preparation.

Since 2012, OPG has continued to fulfill the requirements of the current PRSL. OPG has submitted eight DNNP annual reports to the Canadian Nuclear Safety Commission (CNSC) [R-21] and a midterm licence report in 2018 [R-22]. These reports provided the status and progress of the DNNP activities and the commitments that OPG made during the Joint Review Panel (JRP) process, as accepted by Government of Canada and documented in the *Darlington New Nuclear Project Commitments Report* [R-19].

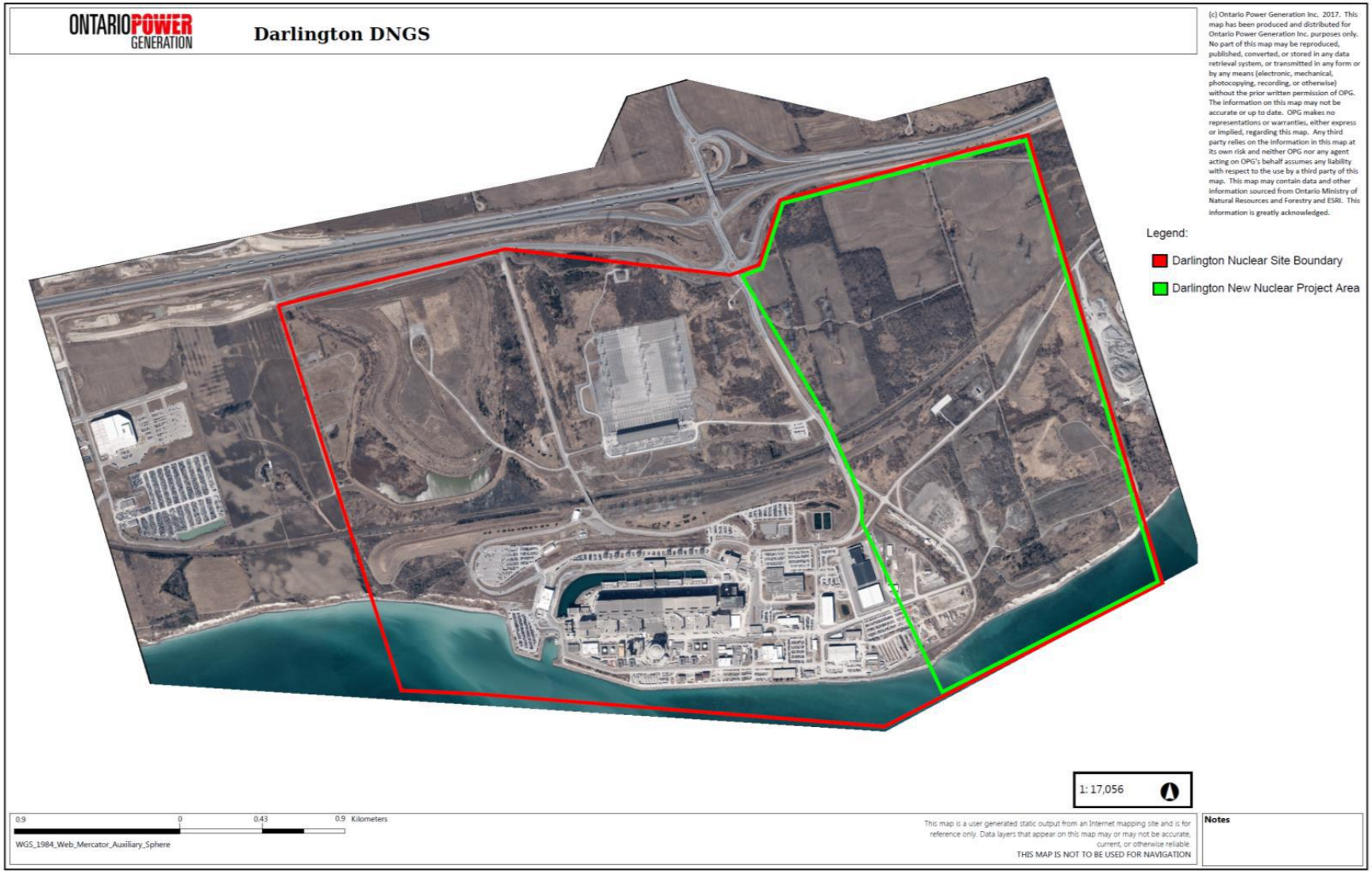

Figure 1: Satellite View of Darlington Nuclear Site and DNNP Project Site

Figure 2: Aerial View of DNGS from the West. DNNP Project Site is Immediately East of the Existing Station. Beyond OPG's Darlington Property Boundary is St. Marys Cement Plant (circa 2008).

To fulfill OPG's *Application for a Licence to Prepare Site for Future Construction of OPG New Nuclear at Darlington*, hereinafter referred to as the "original application", [R-5] and support the Environmental Assessment (EA) conducted for DNNP [R-23], OPG undertook extensive studies, assessments and consultations with various stakeholders to complete the site evaluation. The studies concluded that the DNNP site is suitable for a new NGS and the project is not likely to cause significant adverse effects, provided the mitigation measures proposed and commitments made by OPG are implemented [R-19].

In support of the PRSL renewal, OPG has completed the following activities in accordance with the DNNP PRSL Renewal Plan [R-25]:

1. Addressed Regulatory Document (REGDOC)-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*, [R-6] requirements and guidance which includes:
    a. Reviewed original application materials [R-5] against REGDOC-1.1.1 requirements and guidance and addressed identified gaps.
    b. Completed a review of current codes, standards and practices referenced in the licensing basis and those associated with CNSC REGDOC-1.1.1 [R-6].
    c. Updated or reviewed selected baseline data associated with the site.
2. Indigenous engagement on PRSL renewal.
3. Public engagement on PRSL renewal.
4. Review of the management system that governs site preparation activities.

In addition, Licence Renewal Activity Reports (LRARs) ([R-7] to [R-16]), a Site Selection Threat and Risk Assessment (SSTRA) update [R-17], and an Aggregate Assessment Report [R-18] were prepared to further support the 10-year licence renewal. The Aggregate Assessment Report provides an overall assessment to confirm the existing licensing basis remains valid for the next licensing period and identifies mitigating actions that will be carried forward to the DNNP Commitments Report as required [R-19].

1.2 General Description of Applicant

1.2.1 Name and Business Address

Licence Applicant and Complete Legal Name: Ontario Power Generation Inc.
Business Address: 700 University Avenue 19th Floor, Toronto, Ontario M5G 1X6

1.2.2 Mailing Address

OPG's mailing address is the same as the business address that is provided in Section 1.2.1 above.

1.2.3 Persons who have Authority to Interact for the Applicant with CNSC

The contact persons who have the authority to interact for the applicant with the CNSC are as follows:

Mr. Dean Townsend
Title: Senior Vice President, Nuclear Engineering and Chief Nuclear Engineer (Acting)
Contact Information: dean.townsend@opg.com, (905) 839-6746 x5418
Address: 889 Brock Road, Pickering, Ontario L1W 3J2

Mr. Robin Manley
Title: Vice President, New Nuclear Development
Contact Information: robin.manley@opg.com, (905) 839-6746 x5430
Address: 889 Brock Road, Pickering, Ontario L1W 3J2

Mr. Scott Burns (for security only)
Title: Vice President, Security and Emergency Services
Contact Information: scott.burns@opg.com, (905) 839-6746 x5012
Address: 889 Brock Road, Pickering, Ontario L1W 3J2

Dr. Jack Vecchiarelli
Title: Vice President, Nuclear Regulatory Affairs and Stakeholder Relations
Contact Information: jack.vecchiarelli@opg.com, (905) 839-6746 x5444
Address: 889 Brock Road, Pickering, Ontario L1W 3J2

Mr. David Train
Title: Manager, Regulatory Projects
Contact Information: david.train@opg.com, (905) 839-6746 x5360
Address: 889 Brock Road, Pickering, Ontario L1W 3J2

1.2.4 Proof of Legal Status

OPG is not a first time applicant and therefore proof of legal status is not required for this application. As a corporate applicant, the following information is provided per REGDOC-1.1.1 [R-6]:

Corporation's Legal Name: Ontario Power Generation Inc.
Corporation Number: 001720591
Date of Incorporation: January 1st, 2007
Registered Office Address: 700 University Avenue 19th Floor, Toronto, Ontario M5G 1X6

1.2.5 Evidence that Applicant has Ownership of the Site

A copy of the Transfer/Deed of Land filed in the Land Titles for the Province of Ontario showing OPG-Darlington Inc. as the owner of the Darlington Nuclear site was attached in OPG's original application [R-5]. The survey that identifies the property described in the Transfer/Deed of Land was also provided along with the original application [R-5].

Effective June 20, 2007 by Instrument Number DR614956 [R-5], the registered owner of the lands changed from OPG-Darlington Inc. to Ontario Power Generation Inc.

On March 31, 2015, Ontario Power Generation Inc. sold and transferred certain lands to Her Majesty the Queen in Right of the Province of Ontario, represented by the Minister of Transportation and similarly to the Municipality of Clarington on September 30, 2015. These lands were transferred to the Province and to the Municipality to support highway infrastructure projects including the Highway 407/401 Durham East Link, and interchange improvements at Holt Road and Highway 401. These transfers have no impact on OPG's safe management of the land covered under the PRSL. No licensed activities were intended to be performed on the transferred lands and there is no change under the current application.

As a result of the sale and transfer of these lands, PIN 26606-0133 (LT) was replaced by PINs 26606-0363 (LT), 26606-0366 (LT) and 26606-0367 (LT).

The legal descriptions for the new PINs that replaced PIN 26606-0133 (LT) are available upon request.

1.2.6 Identification of Persons Responsible for Management and Control of Licence

Mr. Dean Townsend, Senior Vice President, Nuclear Engineering and Chief Nuclear Engineer (Acting), is responsible for management and control of the DNNP PRSL 18.00/2022.

1.2.7 Billing Contact Person

Information regarding billing contact person is as follows:

Mr. Dean Townsend
Title: Senior Vice President, Nuclear Engineering and Chief Nuclear Engineer (Acting)
Contact Information: dean.townsend@opg.com, (905) 839-6746 x5418
Address: 889 Brock Road, Pickering, Ontario L1W 3J2

1.2.8 Legal Signing Authority

Information regarding the legal signing authority is the same as provided in Section 1.2.7.

1.2.9 Nuclear and Hazardous Substances

For the PRSL renewal, the nuclear and hazardous substances as described in the original application [R-5] remain unchanged.

There will be no nuclear substances encompassed by the site preparation licence. Any site preparation activities which would require construction-related tools containing radioactive nuclear substances as defined in the *Nuclear Substances and Radiation Devices Regulations* will be performed under the authority of CNSC nuclear substance and device licences.

The handling of nuclear substances is not part of this application. The activities licensed under the PRSL will not involve handling of radioactive materials and will not generate any radioactive wastes. All site preparation activities will take place outside the existing Protected Areas established on the DN site for the DNGS and the DWMF.

Any hazardous substances that may be present and/or hazardous wastes generated as a result of site preparation activities will be limited to those employed during standard construction processes. These would include

chemicals, fuel, lubricants and compressed gases used during operation and maintenance of site preparation equipment, as well as solvents and cleaners used to clean the equipment. Additional substances on site may consist of paint, aerosol cans, oil and electrical components used in the construction and relocation of services and utilities, construction of support facilities, and explosives used during excavation activities.

The management of hazardous wastes, which include the storage, processing, disposal or transportation of hazardous or liquid industrial waste generated during the site preparation will comply with applicable federal and provincial requirements, such as the *Transportation of Dangerous Goods* (TDG) *Act* and TDG Regulations, *Environmental Protection Act*, General – Waste Management, O. Reg. 347, Environment and Climate Change Canada (ECCC) guidelines and waste management best practices. Spills will be reported in accordance with regulatory requirements.

2.0 General Description of the Project

This section of the licence application describes the activities to be licensed and provides a short descriptive overview of the project.

2.1 Activity to be Licensed

OPG is requesting a renewal for PRSL 18.00/2022 [R-1] with the following licensed activities that are currently listed in the licence:

a) Construction of site access control measures;
b) Clearing and grubbing of vegetation;
c) Excavation and grading of the site to a finished elevation of approximately +78 metres above sea level (masl);
d) Installation of services and utilities (domestic water, fire water, sewage, electrical, communications, natural gas) to service the future nuclear facility;
e) Construction of administrative and support buildings inside the future protected area;
f) Construction of environmental monitoring and mitigation systems; and
g) Construction of flood protection and erosion control measures.

The PRSL also allows OPG to possess and use prescribed information that is required for, associated with, or will arise from the above activities.

At this time OPG is not proposing any changes to the scope of planned activities for site preparation.

Access Control Measures

Access control may be established during site preparation to create a construction island. Any fences used during any phase from site preparation onwards will comply with security requirements appropriate to the work (e.g., in some areas permanent fences may be needed in place of temporary fences).

Access control measures are described in the separate security protected submission [R-24].

Clearing and Grubbing

Clearing and grubbing of vegetation, roots and stumps will be done at locations where embankments are to be built, or excavations are to be cut, or at locations where permanent or temporary facilities/structures are to be constructed. Appropriate erosion and sediment control measures will be installed prior to starting these activities. Any trees, brush, bushes, stumps and windfall that cannot be safely managed on site will be disposed of/removed from site to a licensed facility or placed in a designated soil spoil area and in accordance with regulatory requirements. Good industry practices applied during clearing and grubbing activities to reduce overall environmental effects include:

- Minimizing the area to be cleared to the extent feasible;
- Minimizing compaction of roots in areas that will not be cleared; and
- Compliance with seasonal constraints and regulatory requirements.

Excavation and Grading

The site preparation activities will involve the excavation and grading of soil, rock and like material, and associated activities to facilitate its excavation and transfer to storage areas. Associated activities will include drilling and blasting. Rock excavation will include activities related to general site grading and grading for building and structure foundations. A separate application will be filed with the Ministry of Natural Resources Canada for a licence for the temporary storage and use of explosives before these activities are undertaken as set out in Section 7 of the *Explosives Act*. Blasting will be carried out using conventional explosives in controlled charges as required.

Excavation and grading will be by means of construction equipment such as bulldozers, excavators, front-end loaders and trucks. Depending on the suitability of the excavated soil, there may be opportunities for re-use of the excavated soil on site. Excavated soil may be deposited on site in the northeast quadrant of the site, to create a berm south of the CN rail lines, as lake infill or hauled to an off-site location. Any contaminated soil or rock encountered will be managed according to regulatory requirements. Excavated rock may be crushed for more efficient placement on site and may be re-used to construct parking and laydown areas or as foundation backfill. Further excavation for subsurface preparation of the plant footprint will consist of soil and rock excavation cut from the level surface of the

generic power block in preparation for the foundations of the new nuclear reactor(s) and other structures, which will be built during the construction phase.

Installation of Services and Utilities

Since the previous licence application, OPG has upgraded the domestic and fire water supply and sewage treatment infrastructure on the DN site. The upgrade took into account the projected needs of the DNNP, and included tie-in points for future use by the project. Therefore, as part of site preparation, continuation of the infrastructure to support the DNNP will be required from the tie-in points from the shared DN site system.

The installation of services and utilities will include those required during construction and those of a more permanent nature to support the future nuclear facility operations. The utilities and services installations covered by this application include:

- Potable water supply will be extended via underground conduit into the DNNP site preparation construction area from the existing water main available on the DN site for any potable water requirements and for fire protection.
- Sanitary sewage collection within the DNNP site preparation construction area for both temporary (as required) and permanent requirements will be connected via underground conduit to the existing DN site sewage collection system.
- Electrical and communication services via underground and/or aerial cables or towers will be extended into the DNNP site preparation construction area from adjacent available networks.
- Natural gas will be provided as required via underground conduit from existing gas mains.

Administration and Support Facilities within the Future Protected Area

Administration and support facilities for site preparation and later phases will be constructed and located on the property, including within the future protected area. These may include offices, workshops, storage and security buildings and utility structures such as transformers.

Environmental Monitoring and Mitigation Systems

Prior to site preparation activities commencing at the site, environmental monitoring and mitigation measures will be proposed and a plan will be put in place to ensure adequate mitigation of environmental effects. The mitigating measures will be developed in advance of the work and will follow good industry management practices to:

- Mitigate any potential effects;
- Monitor environmental releases; and
- Take appropriate action and notify the appropriate regulatory body as required.

For instance, the excavation, soil handling and transport activities can impact the airborne particulate and stormwater quality. They will require plans to be developed that will consider dust control, and surface water and erosion/sediment control. Other activities will require monitoring and mitigation of noise and odour. Handling of fuels and lubricants used during site preparation activities will require contingency measures in the event of spills to contain the spill, stop the source where possible and direct subsequent clean-up.

Flood Control and Shoreline Protection

To accommodate the site layout and provide for shoreline protection, some amount of lake infilling likely will be required in the area directly south of the proposed project area along the Lake Ontario shoreline. The new shoreline created by the lake infill as well as any undisturbed shoreline within the boundaries of the site will be further stabilized and protected with armour stone blocks or similar revetment placed at the shoreline surface to dissipate any existing or potential wave energy and erosion.

2.2 Descriptive Overview

The project scope described in Section 1.2 of the original application remains unchanged [R-5]. The PRSL is intended to allow OPG to conduct the site preparation activities for the future construction and operation of a new NGS with a maximum net electrical output of 4800 MWe to supply the Ontario grid. The projected in-service dates for each unit are not yet known but, for planning

purposes, the first reactor has been assumed to be in operation by 2028 as described in the DNNP PRSL Renewal Plan [R-25].

In alignment with Section 1.3 of the original application [R-5], there is no construction of a Nuclear Facility or nuclear structures, systems and components encompassed by this licence. The site preparation will be suitable and appropriate for a future Nuclear Facility bounded by the factors considered in the DNNP Plant Parameter Envelope (PPE) [R-26]. The reactor technology selected for the DNNP will be evaluated against the PPE (see Section 4.3 for more information) to ensure that the construction and operation of such Nuclear Facility causes no significant changes or impacts on the current DNNP EA conclusions.

Indicative Timeline:

An indicative schedule for DNNP, including site preparation, is shown in Figure 3. This schedule shows approximate timelines for the licensed activities associated with this application. (Note that some of the indicated activities may continue during the construction phase of the DNNP.)

Prior to the commencement of PRSL licensed activities, OPG will provide a Level 1 and Level 2 Project Management schedule in accordance with commitment D-P-8 of the DNNP Commitments Report [R-19].

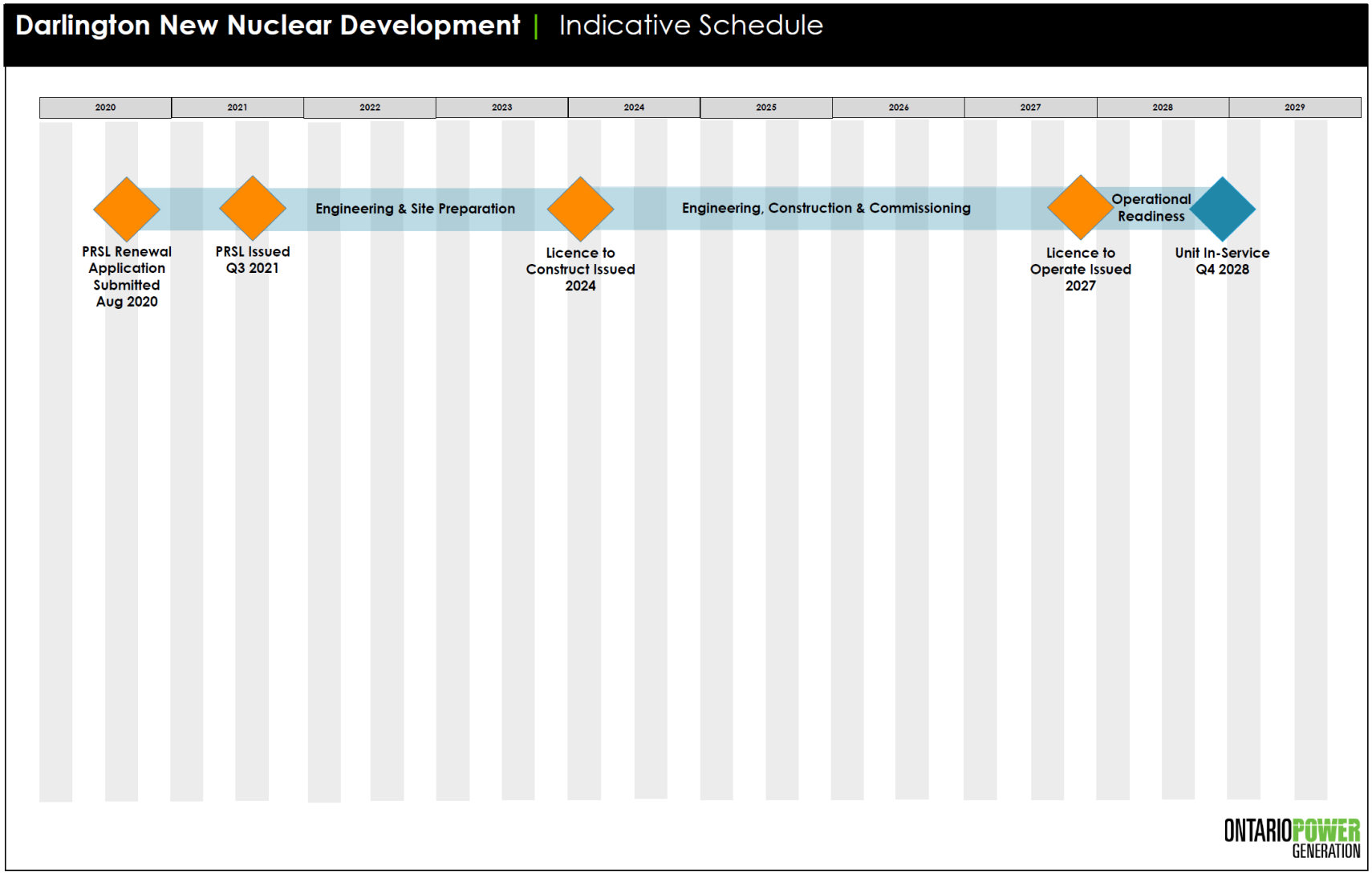

Figure 3 Indicative Project Schedule for DNNP

3.0 Site Description

The DNNP site, general proposed layout, and ownership of the site remain unchanged from the original application [R-5].

In general, the portion of the DN site proposed for DNNP is the easterly one third (approximately) of the overall DN site. It is bounded by the DN site property limits on the east and north boundaries, by Lake Ontario to the south, and by Holt Road and DNGS on the west.

Labelled maps are provided in Section 3.1 showing the project's location and surrounding area.

3.1 Location and Site Layout

The location and proposed site layouts for DNNP remain unchanged from the original application documents [R-5]. There have been changes to some infrastructure in the surrounding areas including roads and highways developments the details of which have been captured in the LRARs ([R-7] to [R-16]). Figure 4 to Figure 9 outline the location of the site, bounding proposal for the extent of site preparation as well as a generic site layout to the extent practical. Detailed layout of specific structures and systems will be produced to support a future Licence to Construct (LTC) application following the technology selection process.

Figure 4 illustrates the location of the DN site from a local context.

Figure 5 provides a survey drawing of a portion of the DN site including the area for DNNP.

Figure 6 is a 2019 orthographically produced photograph of the DN site, which illustrates the proposed boundary for the DNNP construction site.

Figure 7 provides a 2019 contour drawing with the existing DN site structures represented.

Illustration of the proposed site contours after completion of site preparation activities is shown in Figure 8.

Figure 9 illustrates the proposed layout for the DNNP site and includes the following proposed areas:

- Excavated area;
- New soil stockpile (denoted as Northeast Landfill Area) composed of inert materials from the excavated area proposed for the northeast quadrant;
- Available space for construction or operational use for support buildings and structures;
- Condenser Cooling Water intake / discharge channel (conceptual locations only);
- Switchyard and transmission corridor;
- Waste transfer and storage areas;
- Site roads and related infrastructure; and
- Proposed DNNP Exclusion Zone[1].

The proposed Exclusion Zone for DNNP maintains a minimum distance of 500 m from the reactor building walls, as described in Section 4.8, Exclusion Zone Determination, of this application. In accordance with the DNNP Commitments Report (commitment D-C-3.1), the precise location of the Exclusion Zone and supporting calculations will be provided with the LTC Application [R-19].

[1] Exclusion Zone : a parcel of land within or surrounding a nuclear facility on which there is no permanent dwelling and a licensee has the legal authority to exercise control over that land.

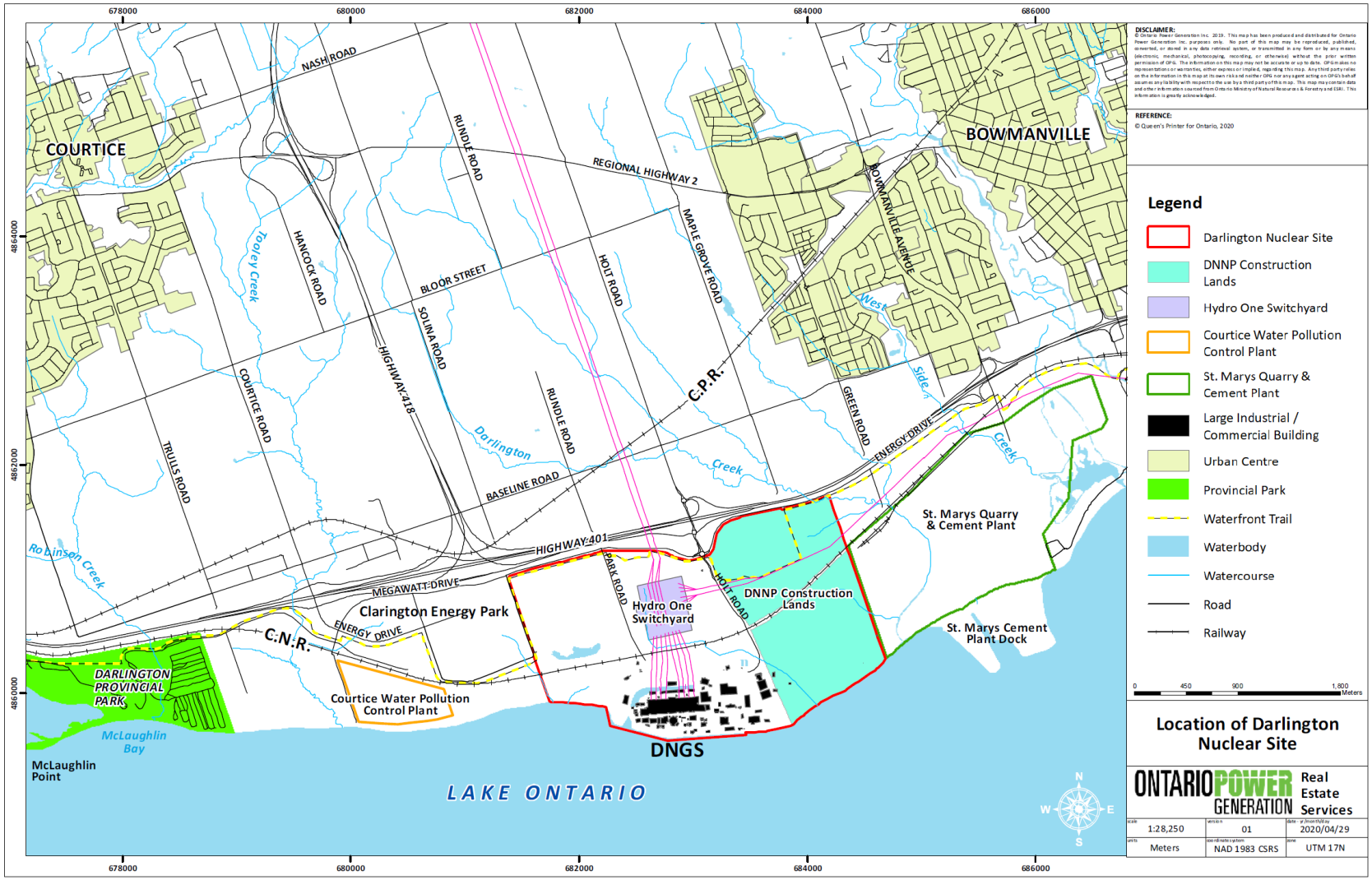

Figure 4: Location of Darlington Nuclear Site

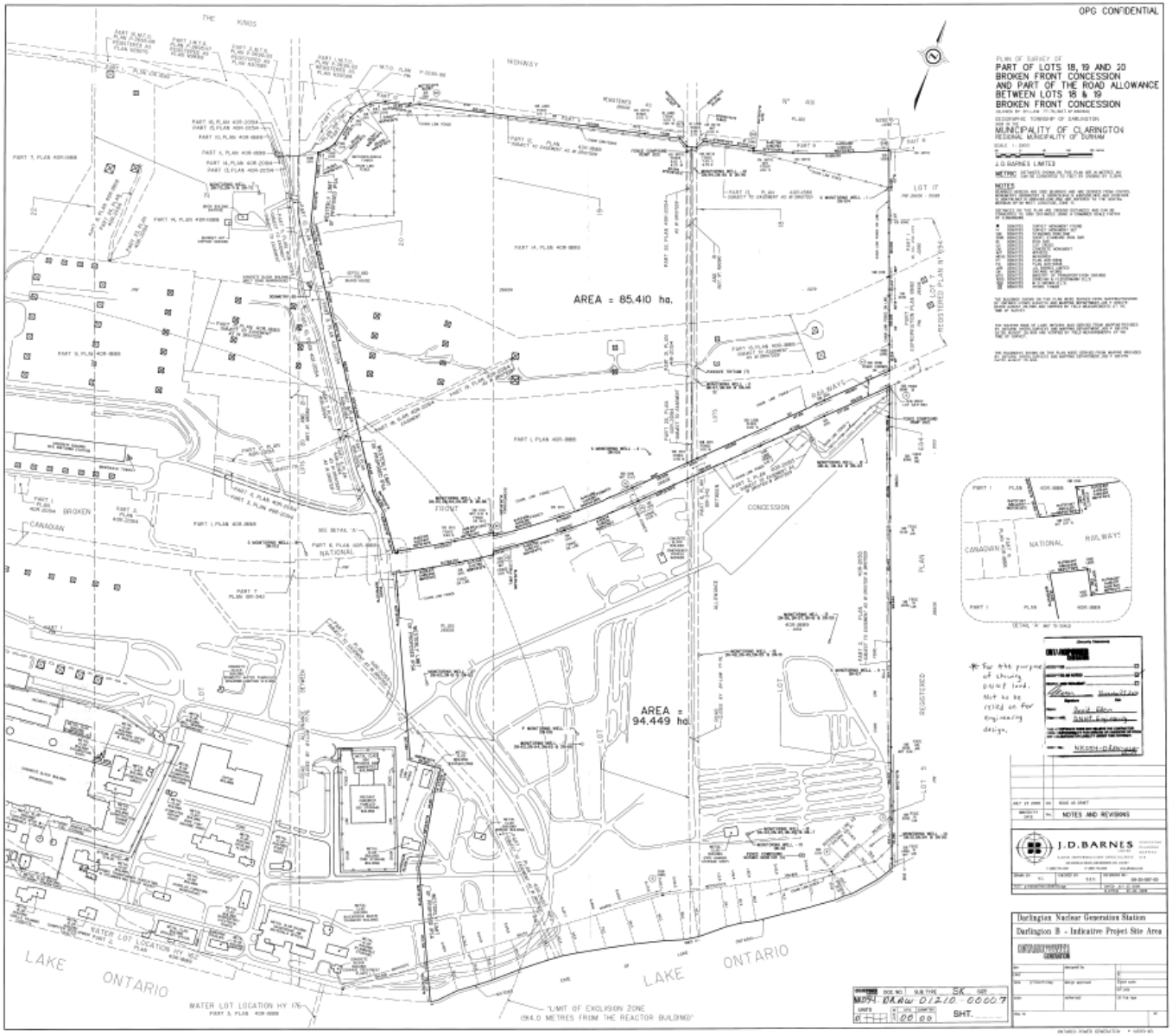

Figure 5: OPG Darlington New Nuclear Project (DNNP) Survey Drawing

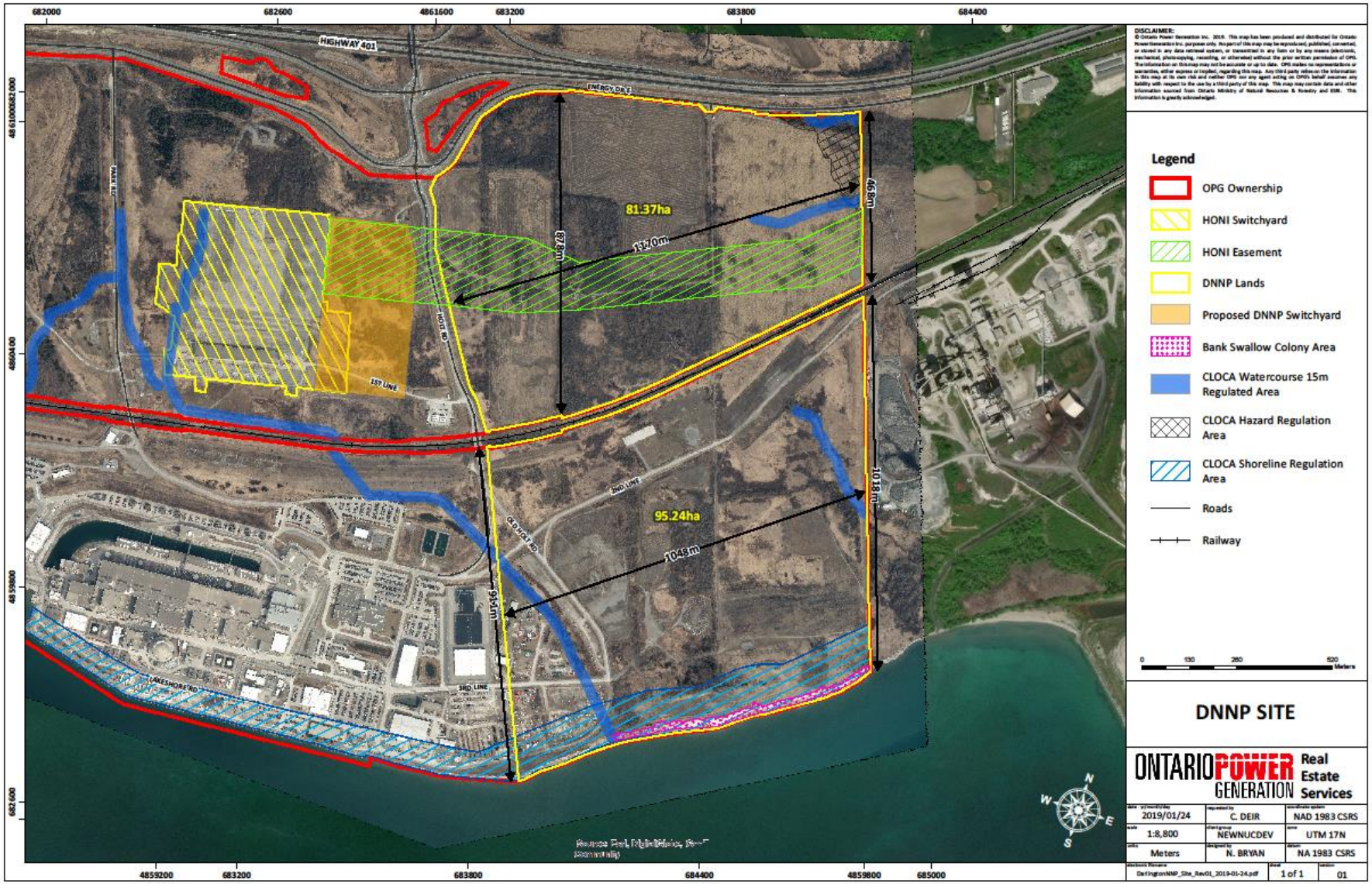

Figure 6: Photograph of DN Site Illustrating DNNP Construction Site Boundary

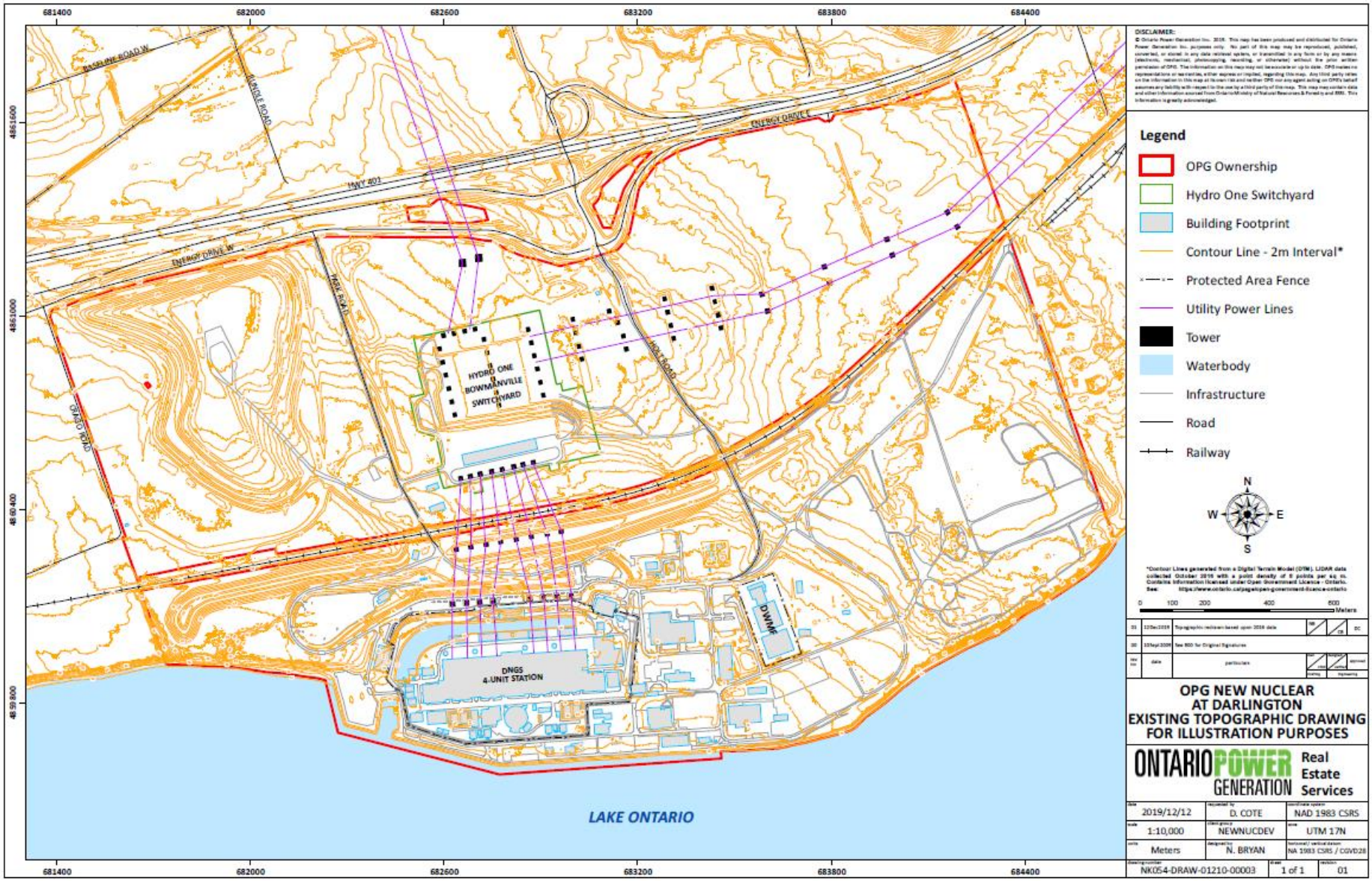

Figure 7: DN Site Existing Contour Drawing

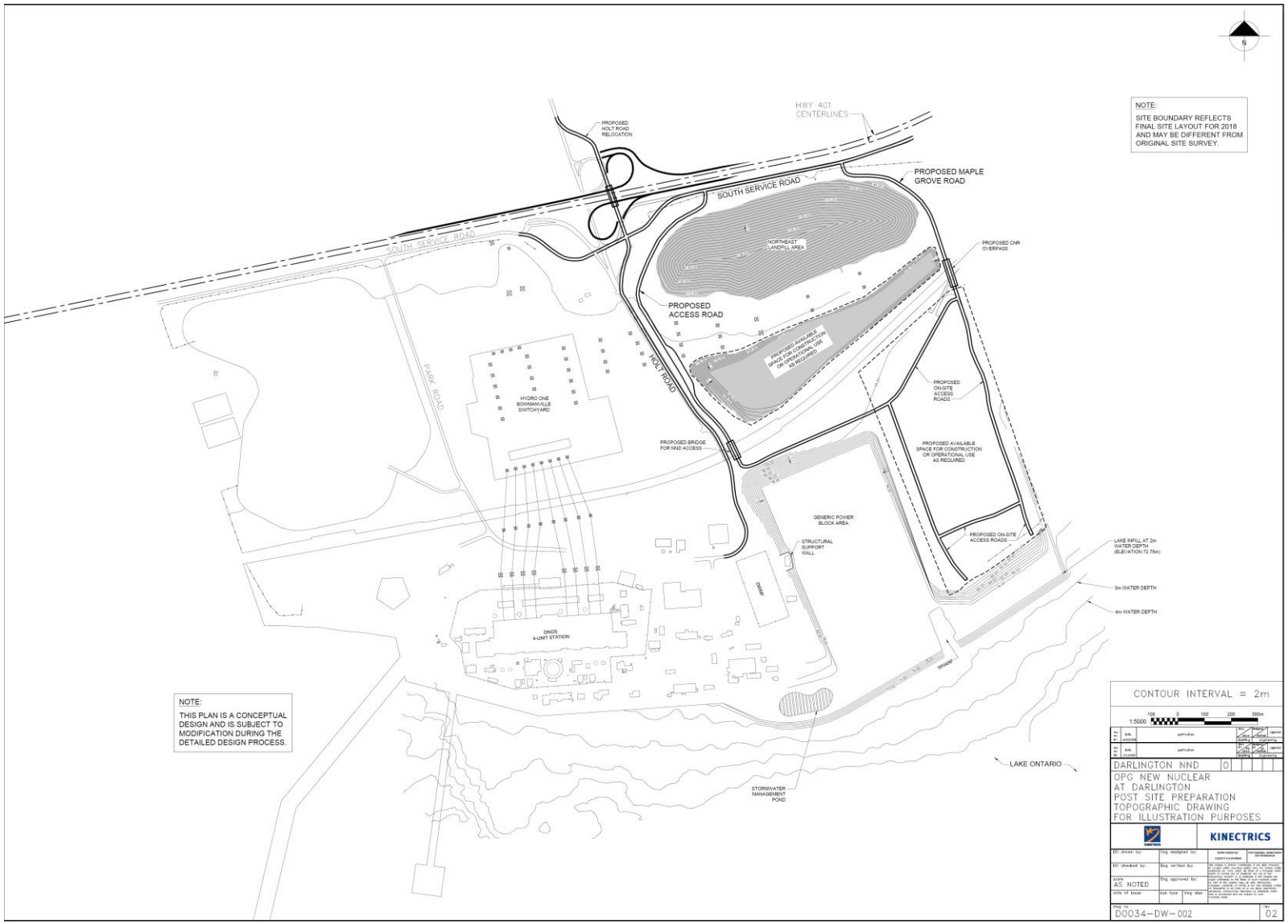

Figure 8 DN Site Proposed Contour Drawing

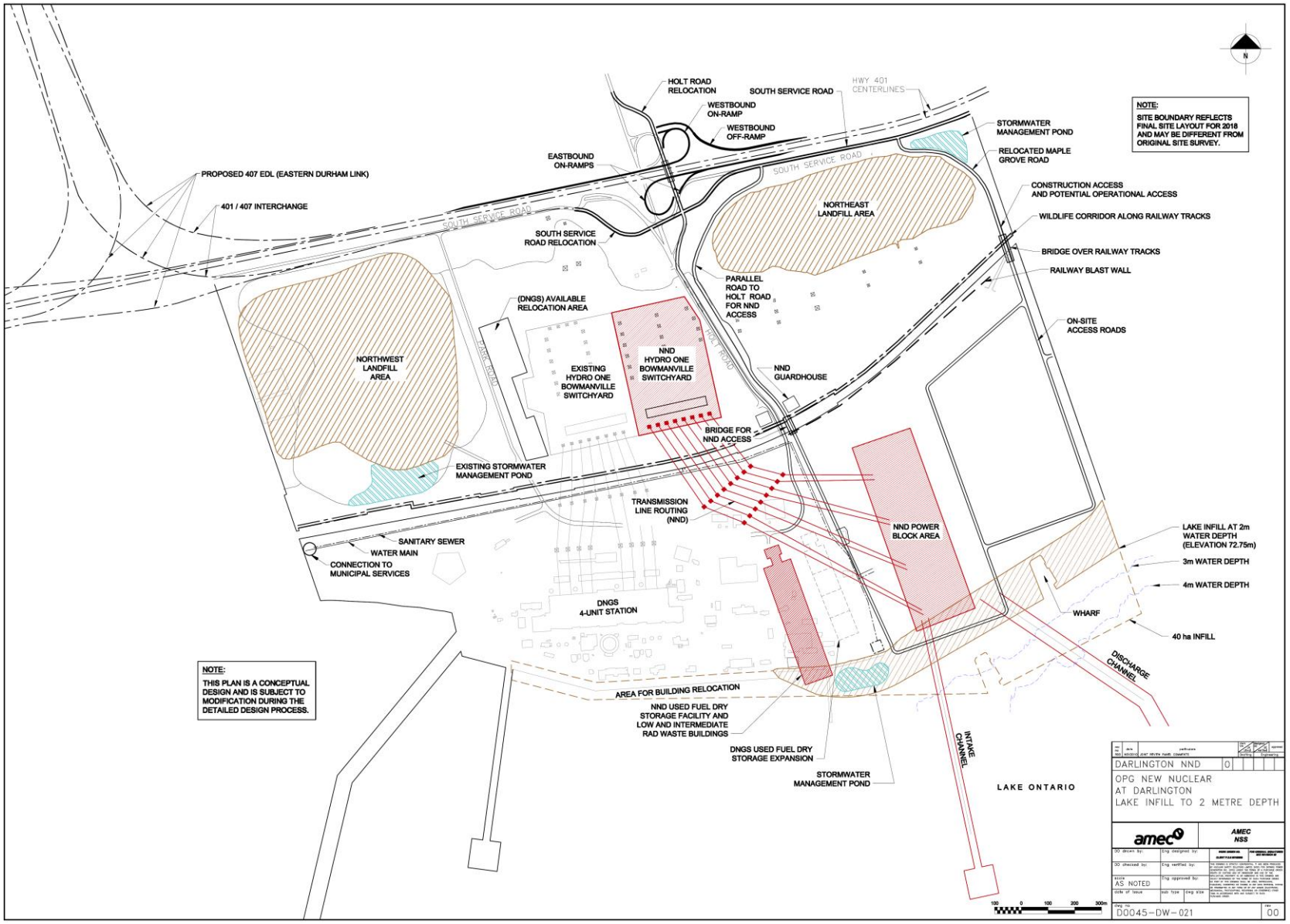

Figure 9: OPG Darlington New Nuclear Project (DNNP) Proposed Site Layout

3.2 Environmental Risk Assessment

OPG completed an Ecological Risk Assessment (EcoRA) and assessment of effects on human health for DNNP in support of the original application [R-23]. The EcoRA includes an assessment of effects on non-human biota from exposure to radiological and non-radiological emissions. The assessment of effects of the DNNP on human health considers the physical, mental, and social well-being of workers and members of the public. The assessments concluded that no residual adverse effects on human health or non-human biota are expected as the result of DNNP activities. This conclusion is confirmed in the Environment LRAR [R-15].

Additionally, a Canadian Standards Association (CSA) N288.6-12, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills,* compliant Environmental Risk Assessment (ERA) was produced for the DN site in 2016 [R-27], which concluded that the DN site is operating in a manner that is protective of human and ecological receptors residing in the surrounding area. The ERA will be routinely updated in accordance with REGDOC-3.1.1, *Reporting Requirements for Nuclear Power Plants*, to reflect current conditions across DN site.

4.0 Site Evaluation

This section of the application addresses the site evaluation process and the investigations and preparatory work that have been done, and will be done, on the site and surrounding area.

4.1 Introduction

In support of the original application [R-5], a site evaluation was performed ([R-31], [R-36] to [R-44], [R-69], [R-70]) in order to demonstrate that the DNNP site meets the requirements and expectations of the *Class I Nuclear Facilities Regulations* [R-32] and the CNSC Regulatory Document RD-346, *Site Evaluation for Nuclear Power Plants* [R-33]. The site evaluation studies considered the following:

- meteorological events,
- flooding hazards,
- seismic hazards,
- geotechnical hazards,
- external human-induced hazards, and
- hazards related to site characteristics and their influence on potential dispersion of radioactive materials.

Studies also included high-level evaluations of radiological releases during normal operations and accident conditions including emergency planning considerations. The assessments considered the entire life cycle of the facility including projections of population growth.

These hazards were assessed in terms of risk to the new NGS and ultimately, to the public and the environment. Additionally, the projected performance of the new NGS was evaluated against safety goals for the expected conditions at the site.

Given that the PRSL for the DNNP site is not for a specific reactor technology, a PPE approach [R-26] was used to establish a bounding scenario for the site evaluation. Further details regarding the PPE are provided in Section 4.3 of this application.

Based on the evaluations performed, OPG demonstrated that the DNNP site is a suitable location for the design and construction of a NGS and will not create an unreasonable risk to the public, personnel or the environment. For each of the

hazard areas evaluated, the risk was determined to be negligible or could be reduced to an acceptable level through design mitigation.

Results of the site evaluation from these reports were consolidated and summarized in a single report titled, *Site Evaluation for OPG New Nuclear at Darlington – Nuclear Safety Considerations* [R-31]. In addition, the following OPG Reports provided details that satisfy specific regulatory expectations in the identified areas: *Emergency Preparedness Site Evaluation for OPG New Nuclear at Darlington* [R-44], *Exclusion Zone Determination for Darlington New Nuclear Project* [R-41] and *Preliminary Decommissioning Plan OPG New Nuclear at Darlington – Site Preparation* [R-58].

In 2018, REGDOC-1.1.1 [R-6] superseded RD-346 [R-33], which the original application [R-5] was based upon. CNSC REGDOC-1.1.1 [R-6] sets out requirements and guidance for site evaluation and site preparation for new reactor facilities. It represents the CNSC's adoption of the site evaluation principles set forth by the International Atomic Energy Agency (IAEA) in NS-R-3 (Rev 1), *Site Evaluation for Nuclear Installations* [R-30] and the IAEA guides that support it. The scope of REGDOC-1.1.1 goes beyond NS-R-3 in several aspects, such as protection of the environment, security of the site and protection of prescribed information.

In preparation of the renewal application, OPG has completed the following activities:

- Conducted a compliance review of DNNP Licence Basis Documents (LBDs) against REGDOC-1.1.1 as an incremental clause by clause review to identify potential gaps.
- Assessed the applicability and impact of the updated baseline data.
- Identified and addressed any new or updated regulatory documents, codes and standards since the original application, that apply to site evaluations.

Results of the technical site evaluations are provided in the subsequent sections.

The preparation of the PRSL renewal documents is in accordance with the OPG Nuclear (OPGN) Management System[R-49].

4.2 Review and Update of the Site Evaluation Program and Process

4.2.1 General Considerations and Oversight of the Site Evaluation Process

The evaluation process, summarized in subsequent sections, is captured in detail in the associated LRARs ([R-7] to [R-16]).

4.2.2 Process for Gathering Baseline Data

The process for gathering the baseline data was similar to that described in Sections 4.1 and 4.2 of the original application [R-5]. The DNNP Nuclear Safety LRAR [R-11] addresses developments since the original application by assessing the applicability and impact of the updated baseline data based on Darlington Probabilistic Safety Assessment (PSA) hazard identification and screening. This review of the baseline data was based on extreme conditions, defined as Review Level Conditions (RLCs), and confirmed that no further evaluation was required for any of the elements/hazards considered and no new hazards were screened in. The baseline data was used to evaluate suitability throughout the lifecycle of the facility.

The process of evaluation of the site suitability included an evaluation of any potential limitations or challenges the site may present for the application of applicable security measures. This process is documented in the Security LRAR [R-16] and SSTRA report [R-17].

For environmental baseline data gathering, data quality objectives were specified in a step-wise framework that was applied to all technical teams involved, including contractors. Section 4.4 of this application and the Environment LRAR [R-15] provides further information on the process for gathering environmental baseline data.

4.2.3 Process to Evaluate Natural and Human-Induced Factors that may Affect Safety and Security

The DNNP's LBDs capture the process to evaluate natural and human-induced factors that may affect safety and security. OPG staff has conducted a hazard screening assessment and documented the results in the *Darlington NGS PSA Summary Report* [R-34] for DNGS. The assessment concludes that no new significant hazards exist and the existing detailed PSA reports cover the screened-in hazards. Given the proximity of the DNGS site to the DNNP site, this assessment is

directly applicable to the DNNP site. Commitments made in support of DNNP for preliminary safety analysis and design (D-C-3) are summarized in [R-19] and will be provided to the CNSC during the application for the LTC.

4.3 Plant Parameter Envelope

The plant parameter envelope (PPE) is a set of data derived from available information for multiple reactor designs. It provides a bounding envelope of plant design and DN site characteristics for use in the DNNP EA and original application [R-26]. It relates to the interaction between a nuclear power plant and the site/environment.

The site evaluation studies used the PPE and validated that a new nuclear power plant at the Darlington site would not pose an unreasonable risk to the public, personnel or environment, and demonstrated that the DNNP site is suitable for a new nuclear power plant.

The design of the facility of the selected nuclear reactor technology must fit within the PPE values. The technology provider will be required to demonstrate their design fits within the PPE or adjust their design to ensure it fits within the PPE. If necessary, OPG would demonstrate that any variances from the PPE do not present additional unreasonable risk to the public, personnel, or environment. The PPE would remain consistent with current regulatory practices respecting licensing basis documents.

The PPE also takes insights from the site characteristics and may be impacted based on changes to the site characteristics since the original application [R-5]. As per the new environmental data collected, and conclusions provided in the Environmental LRAR [R-15], the site characteristics have not shown any impact to change the PPE.

The Nuclear Safety LRAR [R-11] included a review of the PPE [R-26], in compliance with the methodology laid out in the DNNP PRSL Renewal Plan [R-25]. It concluded the PPE evaluation is current with respect to the current codes and standards.

With respect to the PPE, the original evaluations for site suitability were completed in accordance with RD-346, RD-337, *Design of New Nuclear Power Plants* and NS-R-3 Rev. 0, *Site Evaluation for Nuclear Installations*, which have since been superseded by REGDOC-1.1.1, REGDOC-2.5.2, *Design of Reactor Facilities: Nuclear*

Power Plants, and NS-R-3 Rev 1, respectively. There were no significant findings as a result of the updated evaluations and any new requirements were either already satisfied as documented in the existing LBDs or they will be addressed at a later stage upon the selection of a reactor technology. These findings were reviewed in detail in the relevant appendices of the Nuclear Safety LRAR [R-11].

REGDOC-1.1.1 also introduces new considerations for safety analysis information on non-malevolent nuclear accidents and malfunctions to be in line with the level of plant design information available at each licensing phase, and the application of a graded approach for the type of facility being considered. The PPE bounds the site evaluation and EA undertaken as part of the PRSL, inclusive of the non-malevolent nuclear accidents described in [R-35]. The Nuclear Safety LRAR [R-11] reviewed these considerations in detail and they are either satisfied as documented in the existing LBDs or will be addressed at a later stage upon the selection of a reactor technology.

In summary, all the current applicable regulatory documents and IAEA standards were revisited, as well as site characteristics, to identify potential new requirements applicable to the PPE for a thorough review. No revisions are required to the PPE as no significant gaps have been identified that would alter the existing PPE. The PPE was developed to bound all reactor technology designs in consideration at the time of the original application. When a reactor technology is selected for DNNP, the design details will be evaluated as per OPG's commitment D-C-3.2 in the DNNP Commitments Report [R-26].

4.4 Site Characteristics

In support of the original application [R-5], OPG provided information on the baseline characteristics of the DNNP site [R-23][R-31]. No site characteristics were identified that would render the DNNP site unsuitable for the future construction and operation of a new NGS.

The baseline data collection programs supporting the original application were conducted in accordance with a documented systematic framework [R-23]. The framework included: baseline data requirements, gap analysis, and the development and implementation of a baseline data collection program. Data quality objectives were specified in a step-wise framework, which was applied to all technical teams involved, including contractors. This ensured credible, quality data was collected by all teams. More recent baseline data collection programs align with the CSA standard N288.4-10, *Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills*, which outlines a systematic planning process for the design of environmental monitoring programs. Both N288.4-10 and the framework used to collect baseline data supporting the original application cite Environmental Protection Agency (EPA) *Guidance on Choosing a Sampling Design for Environmental Data Collection (EPAQA/G-5S, 2002)*, which specifies consideration for data variability and uncertainties.

Baseline data collection was performed either under OPG's or the vendor's quality management system.

For each environmental component, the baseline characterization included identification of the Valued Ecosystem Components (VECs) considered relevant for that environmental component. VECs are features of the environment selected to be the focus of an EA because of their ecological, social, cultural, or economic value and their potential vulnerability to effects of the project. The selected VECs served as endpoints for the assessment of environmental effects for each environmental component and are summarized in the DNNP Environmental Impact Statement [R-23]. Selection of the VECs in support of the EA incorporated input from the public and other stakeholders, including Indigenous groups.

OPG validated the accuracy of the supporting documents of the original application by conducting reviews against REGDOC-1.1.1 as well as new or revised codes, standards and practices. Where additional baseline data has been

collected, this data was evaluated to identify any changes. Any gaps or changes are documented and addressed in the Environment LRAR [R-15] and summarized here.

A summary of the site characteristics for the DNNP site and any updates based on new requirements or new data is provided in the sections below.

4.4.1 Topography

The general topography for the DNNP area has not changed from the original application documents [R-5].

The DN site is situated in an undulating to moderately rolling limestone till plain bisected by the Canadian National Railway's main line in an east to west direction. The previously irregular terrain was graded in the existing DNGS powerhouse area to an elevation of about 100 m. This site elevation of 100 m is equal to an elevation of +78 masl. The surface elevation rises towards the north with a mean elevation of 122 m just south of the railway tracks and irregular ground from 120 m to 128 m elevation to the north of the tracks. To the east, the site for the DNNP is composed of a gentle slope rising upward from an approximate elevation of 102 m to 112 m over a distance of 400 m. Further east, the existing ground elevations rise substantially to a height of about 130 m near the east site boundary. Figure 7 is a topographic map illustrating the current contours of the DN site as well as existing DN site structures.

The only notable changes since the original submission are the reconfiguration of the Holt Road and Highway 401 Interchange (discussed further in Land Use LRAR [R-13]) and changes to adjacent road names. The reconfiguration of the Holt Road/Highway 401 interchange resulted in transfer of 47.5 acres from the original DN site, including approximately 7 acres from the DNNP site. There is no impact to the conclusions of the original site evaluation. Although road names adjacent to the DN site have changed, the geographic location of the DNNP remains the same.

4.4.2 Atmospheric and Meteorological Data

To support the original application [R-5], ambient air quality, climate and meteorological conditions in the Local and Regional Study Areas were characterized. Dispersion modelling was conducted to determine the air quality concentrations at specific receptor locations [R-23].

No gaps were identified in the review against REGDOC-1.1.1 with respect to atmospheric and meteorological data. Reviews against relevant codes, standards and practices identified potential gaps; updated Canadian Climate Normals, revisions to the Provincial air quality standards, and new Canada-wide air quality standards. The impact of these potential gaps and OPG's plan to address them is described further below in this section. Furthermore, baseline climate, meteorology and air quality conditions for the Local and Regional Study Areas were also updated in 2019 to progress DNNP commitment D-P-12.2 [R-19].

Results of the 2019 baseline update indicated a general improvement in air quality since 2009 for some parameters (nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and particulate matter ($PM_{2.5}$)) and minor differences in meteorological data from the original application documents. A summary of 2019 baseline updates is provided below:

- In 2019, the most recent Canadian Climate Normals available from ECCC, spanning the 1981-2010 period, were used to characterize air temperature and precipitation. Wind speed and wind direction at 10 m and 50 m levels were collected from the 50 m meteorological tower located at the DN site.
- The highest monthly average temperatures, both regionally and locally, occurred in July and their lowest monthly average occurred in January.
- The regional mean precipitation was highest in August and lowest in February, while the local mean precipitation was highest in September and lowest in February.
- The average wind speed measured at a height of 10 m was approximately 2.8 m/s, and calms were reported 16.5% of the time. The prevailing winds were from the north-westerly quarter (43% of the time) and from the southeast (6.8% of the time).

There were minor differences in 2019 baseline data for air temperature, precipitation, and wind compared to what was reported in the original application supporting documents [R-15]. These minor differences in meteorological data do not alter the conclusions with respect to the residual adverse effects of the project on the Atmospheric Environment. Therefore, there is no impact to the conclusions of the original site evaluation [R-15].

Depending upon the measurement parameter, baseline air quality is considered to have generally improved or to be within the natural variability experienced in the area [R-15] as compared to conditions documented in the original application [R-23]. In the intervening period, there has been a significant reduction in the mean 1-hour and 24-hour ambient nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) concentrations and 24-hour ambient particulate matter ($PM_{2.5}$) concentrations. The 24-hour ambient total suspended particulate and PM_{10} concentrations have remained relatively stable.

Since the original application, standards for $PM_{2.5}$ have become more restrictive and standards for NO_2 and SO_2 are expected to become more restrictive in the near future. While the frequency of predicted exceedances for 24-hour limit for $PM_{2.5,}$ and the 1-hour SO_2 criteria at modelled receptors is expected to increase during site preparation, annual $PM_{2.5}$ and SO_2 concentrations are expected to remain below their respective new standards at all receptors. As such, the conclusions reached in 2009 with respect to annual concentrations of $PM_{2.5}$ and SO_2 do not change. For NO_2, it is predicted that during site preparation there will be an increase in the number of receptors where the 1-hour and annual NO_2 concentrations will exceed the 2025 standard [R-15]. It is important to note that these potential exceedances are tied to the previous dispersion modelling results, which were based on a highly conservative or "bounding" assessment scenario. The bounding assessment scenario varied by contaminant of concern and included the simultaneous and maximum operation of equipment during the peak year of site preparation and construction activities. This conservative assessment scenario tends to "over-predict" potential exceedances. The potential exceedance of $PM_{2.5}$ (24-hour), NO_2 (1-hour and annual), and SO_2 (1-hour) standards at the modelled receptor locations is to be addressed by following industry best practices for large construction projects and implementing an adaptive management program described below.

The DNNP Commitments Report includes the development of a comprehensive adaptive management program and the implementation of air quality monitoring on an ongoing basis (commitment D-P-12.2) [R-19]. Adaptive management is a planned and systematic process for continuously improving environmental management practices (i.e., best practices for large construction projects) by learning from their outcomes. Adaptive management provides the flexibility to identify and implement new mitigation measures or to modify existing measures

throughout each phase of the project (i.e., the "life of the project"). These commitments are considered sufficient to address the changes in air quality standards for $PM_{2.5,}$ SO_2 and NO_2 and as a result, the changes in existing and future air quality standards for these parameters does not alter the conclusions with respect to the residual adverse effects of the project nor the site evaluation. .

Additionally, since the original application there have been changes to air quality standards for polycyclic aromatic hydrocarbon (PAH) and volatile organic compounds (VOCs), which are released due to fuel combustion. These changes will be addressed as part of the existing commitment to develop an ambient air quality monitoring program (commitment D-P-12.2) [R-19].

The commitments outlined in the DNNP Commitments Report [R-19] for the Atmospheric Environment (D-P-12.2) are sufficient to address the changes in baseline and air quality standards and therefore, the conclusions of the original site evaluation remain valid.

4.4.3 Geological and Geophysical Data

Geology (including structural geology) and geotechnical aspects for DNNP are characterized in the original application documents ([R-38]and [R-42]) and remain unchanged.

Regional and site geology is characterized by upper and lower till layers with predominant glacial deposits between the upper and lower till layers, overlaying bedrock. The glacial deposits are associated with the Oak Ridges Moraine.

Surficial till layers include the upper Newmarket Till (silt till), followed by the lower Sunnybrook Till (fine sandy silt till with medium to coarse sand and clay and trace fine gravel) which is situated above bedrock. The glacial deposits spanning between the till layers consists of interglacial deposits of fine sand and silt layers known as the Thorncliffe Formation. Interglacial deposits also reside beneath the lower till layer, likely corresponding to the Scarborough Formation.

Bedrock originates from Ordovician-age sedimentary sequences which consists of shale and limestone associated with, in order of increasing depth, the Blue Mountain Formation, Lindsay Formation, Verulam Formation, Bobcaygeon Formation and Gull River Formation. Finally, the Shadow Lake Formation, a sandstone and shale unit, is situated above the Precambrian Basement.

The review of codes, standards and practices against the original application materials did not identify gaps and the geological environment remains unchanged [R-15].

See Sections 4.5.5 and 4.5.6 of this application for discussion on Geotechnical and Geophysical Hazards as well as Seismic and Geological Hazards.

4.4.4 Hydrological Data

To support the original application [R-5], hydrological data, surface water data, and sediment quality data in the Site, Local, and Regional Study Areas were obtained and provided in the original application supporting documents [R-23].

No gaps were identified against REGDOC-1.1.1 with respect to hydrological, surface water, and sediment data. Results of the codes, standards and practices review identified updates to the Canadian Council for Ministers of the Environment (CCME) Canadian Water Quality Guidelines (CWQGs) and Health Canada's Guidelines for Canadian Drinking Water Quality with some parameters within the guidelines becoming more stringent. Details of these changes are provided in the Environment LRAR [R-15]. The changes to the CCME CWQGs and Health Canada's Guidelines for Canadian Drinking Water Quality do not alter any conclusions regarding residual adverse effects of the project. Therefore, there is no impact to the conclusions of the original site evaluation.

Furthermore, some baseline hydrological, surface water quality, and sediment quality components were updated since the original application [R-5] to progress DNNP commitments D-P-12.3 and D-P-12.6 [R-19]. These updates to baseline information are provided in the Environment LRAR and summarized below [R-15]:

- Lake temperature and thermal plume data were collected at the DN site in 2011-12 and again in 2017-18 and are consistent with the data presented in the original application supporting documents.
- Lake current data collected in 2011 are consistent with the data presented in the original application supporting documents.
- Base flow measurements were taken at Darlington Creek in 2019 and compared to baseline flow measurements which supported the original application. The data are within expected natural variability.

- In 2011-12 and in 2019, additional surface water samples and sediment were collected on Lake Ontario in the vicinity of the DN site. In 2019, surface water was also collected at a reference location and surface water and sediment samples were collected at Coot's and Treefrog Ponds on the DN site. The surface water and sediment samples collected were analyzed for various physical, conventional and radiological parameters. Comparison of these results with data from the original application supporting documents demonstrated that baseline conditions have remained similar – surface water and sediment quality remain within their respective surface water quality and sediment quality guidelines with few exceptions [R-15].

These baseline hydrological, surface water, and sediment quality updates do not alter the conclusions with respect to residual adverse effects of the project on the surface water environment and the conclusions of the original site evaluation remain valid.

4.4.5 Hydrogeological Data

For the hydrogeological environment groundwater flow and groundwater quality were characterized in the original application documents [R-23].

A summary of baseline updates and changes to REGDOC-1.1.1 baseline data requirements as well as new or revised codes, standards and practices is provided below.

Groundwater Flow

Groundwater table flow, intermediate (interglacial deposits) and deep groundwater flow (shallow bedrock) were characterized for the Regional, Local, and Site Study Areas. Vertical groundwater flow within the Site Study Area was also characterized. Groundwater quality within the overburden and bedrock was characterized for the Site Study Area.

Results of the baseline update for groundwater flow concluded that the groundwater flow systems for the Site Study Area are considered to be the same as described in the original application documents [R-23]. Generally, groundwater flows from north to south approaching Lake Ontario. Within the northeast extent of Site Study Area, which lies north of the CN railway, inferred groundwater flow is toward the east. General flow patterns within the interglacial deposits and shallow

bedrock are similar to the water table and likely also remain unchanged. From the shallow/water table there is a downward vertical hydraulic gradient to the lower interglacial deposits and shallow bedrock.

One potential gap was identified against REGDOC-1.1.1 indicating that "The applicant shall use hydraulic properties, in conjunction with water level and gradient information, to estimate rates and directions of groundwater flow, the rate of transfer between aquifers, and the capture zone of wells." Through the review [R-15], it was concluded that the intent of REGDOC-1.1.1 has been met. Thus, the original conclusions regarding residual adverse effects of the project and the conclusions of the original site evaluation remain valid [R-15].

Groundwater Quality

Annual groundwater monitoring has occurred across the Site Study Area since the original application. Groundwater quality has been consistent with that documented in support of the original application.

Groundwater continues to meet applicable guidelines, with the exception of a few areas where natural geologic properties account for the elevated concentrations.

Results of the codes, standards and practices review identified updates to the Provincial groundwater guidelines for non-potable groundwater in 2011. The 2011 Provincial updates included more stringent guidelines (i.e., either a guideline value decreased or a new guideline was implemented) for some parameters. A comparison of 2009 baseline groundwater quality parameters against the 2011 Ministry of Environment, Conservation, and Parks (MECP) Table 3 guidelines identified an exceedance for sodium, chloride, petroleum hydrocarbons (PHC) F3, and chrysene (a PAH). Exceedances of sodium, chloride, and PHC F3 are attributed to natural background [R-15]. Chrysene was the only PAH to exceed the new guideline and the exceedance is considered marginal and anomalous as all other PAHs remained below detection limits.

The updated groundwater baseline data and updates to provincial groundwater guidelines for non-potable groundwater do not change the conclusions with respect to the residual adverse effects of the project on the hydrogeological environment nor the conclusions of the original site evaluation.

4.4.6 Biological Data

The biotic characteristics of the site were documented [R-23] to support the original application submission. Updates to site characteristics are documented in the Environment LRAR [R-15] and are described herein.

Baseline terrestrial flora, fauna and food chain data

To support the original application [R-5], terrestrial data in the Site, Local, and Regional Study Areas were obtained and provided in the original application supporting documents.

With respect to terrestrial flora, fauna and food chain data, the review against REGDOC-1.1.1 and related codes, standards and practices showed:

- One potential gap was identified against REGDOC-1.1.1, requiring a description of natural and human-induced pre-existing environmental stresses and the current ecological conditions that indicate such stresses. This has now been addressed and documented in [R-15]. The existing stressors do not change the residual adverse effects of the project on the terrestrial environment and do not impact the conclusions of the original site evaluation.
- Species lists under the federal Species at Risk Act (SARA) and the provincial Endangered Species Act (ESA) have been updated since the original application [R-15]. This is addressed below.

Changes to baseline that have the potential to alter residual adverse effects of the project on the terrestrial environment were identified and one update to commitments [R-18] is proposed below. Updates to baseline information are provided in the Environment LRAR [R-15] and summarized below:

- Baseline updates were conducted for vegetation, soil, breeding birds, insects, amphibians and reptiles, mammals, landscape connectivity, and species-at-risk (SAR).
- There has been an 11 hectare (34 percent) increase in wetland area in the Site Study Area.
- There are six bird species that breed at the Site Study Area that became listed as SAR since the original application.

- There are six migrant bird species that are either new SAR records on the Site Study Area or became listed as a SAR since the original application.
- There is one breeding turtle species within the Site Study Area that became listed as a SAR since the original application.
- There are seven bat species that use the DNNP Site Study Area as foraging or roosting habitat, three of which have become listed as SAR since the original application.
- Since the original application, a new sapling of an endangered species (Butternut tree) was found in 2018 within the Site Study Area. This new Butternut tree was assessed as retainable (i.e., will support the protection or recovery of the species) whereas for the original application, the single identified Butternut tree was classified as non-retainable because it was affected by Butternut Canker disease. The identification of the new retainable Butternut tree does not alter the conclusions with respect to the residual adverse effects of the project on the terrestrial environment. An update to commitment D-P-3.7 is proposed to include the new retainable Butternut in site planting plans through the ESA Notice of Activity ([R-15]; see also Section 6.6).

Existing mitigation and commitments documented in the DNNP Commitments Report (D-P-3.4, D-P-3.7, D-P-3.8, D-P-7.2, D-P-12.5) [R-19] were developed to be adaptable and will be scaled appropriately to address identified changes to baseline as well as to conform to any permitting requirements such as the Overall Benefits permit to address threatened and endangered species under the provincial ESA. With the proposed update to commitment D-P-3.7 to address the new Butternut tree, the updates in the terrestrial baseline will not change the conclusions with respect to residual adverse effects of the project on the environment nor the conclusions of the original site evaluation.

Update on Progress of Commitments

OPG continues to progress some long lead time deliverables on a number of commitments [R-19]. For Bank Swallows, DNNP commitments D-P-3.8 (Bank Swallow Mitigation Measures) and D-P-12.5 (Terrestrial Environment – Methodology Reports for Environmental Monitoring and EA Follow-up) are applicable. OPG 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. In the 2018 midterm licence report [R-22] and 2019 DNNP annual report [R-21], updates were provided in support of DNNP commitments D-P-3.8 and D-P-12.5 [R-19]. OPG continues to monitor DN site Bank Swallow colonies annually and continues to explore artificial nesting structures. OPG has also continued facilitating the collaboration of research on the decline of Bank Swallows with government, non-government organizations, and industry. The Bank Swallow has become listed as a SAR since the original application, therefore any impacts to Bank Swallows will be addressed as part of the provincial Overall Benefits permit. Bank Swallow mitigation listed under commitment D-P-3.8 may need to be revisited in the future to align with the conditions of the Overall Benefits permit. OPG continues to conduct regular inventories for breeding birds, amphibians, reptiles, and mammals at the Site Study Area, including targeted surveys for SAR (D-P-12.5).

Baseline aquatic biota and habitat and, baseline food chain data

To support the original application, aquatic data in the Site, Local, and Regional Study Areas were obtained [R-23].

Potential gaps were identified against three sections of REGDOC-1.1.1 pertaining to baseline aquatic habitat and biota, baseline aquatic food chain data, and the effects of the thermal plume on the aquatic habitat. These have now been addressed and documented in the Environment LRAR [R-15]. All but one potential gap has been addressed through the updated aquatic environment baseline. For the remaining potential gap related to specific information to be included on a Fish Habitat Map, it was determined that although such a map was not created, the necessary information had been gathered and was considered during assessment of project effects and site evaluation. Therefore, the potential gap does not impact conclusions about residual adverse effects of the project nor the site evaluation.

Species list for both the federal SARA and the provincial ESA have been updated [R-15] since the original application.

Details regarding the 2019 baseline update for the aquatic environment are summarized below. In all instances, the updates do not alter conclusions with

respect to the residual adverse effects of the project on the aquatic environment nor the conclusions of the original site evaluation:

- Updates were described for the following: plankton community, benthic invertebrates, fish impingement and entrainment, fish community (adult, juvenile, larvae, and eggs), thermal plume, and fish habitat. These studies demonstrated similar findings as those documented in the original application supporting documents and any differences observed are attributed to natural variability. These updates to baseline [R-15] do not alter conclusions with respect to residual adverse effects of the project on the aquatic environment and do not impact the conclusions of the original site evaluation.
- Since the original application submission, two fish species, Lake Sturgeon and American Eel, have become listed provincially as SAR under the ESA. Since any impacts to provincial SAR will be addressed as part of the provincial Overall Benefits permit, the ESA listings of Lake Sturgeon and American Eel do not alter conclusions with respect to residual adverse effects of the project on the Aquatic Environment and do not impact the conclusions of the original site evaluation [R-15].

The changes described in the Environment LRAR [R-15] do not change the conclusions with respect to residual adverse effects of the project on the aquatic environment nor the conclusions of the original site evaluation.

4.4.7 Baseline Ambient Radioactivity and Pre-Existing Hazardous Substances

Baseline ambient radioactivity

Baseline radiation and radioactivity was characterized in the original application documents for the Regional, Local and Site Study areas [R-23]. Baseline radiation and radioactivity comprised the following environmental subcomponents:

- Atmospheric environment, including gamma radiation, gaseous radioactivity and radioactive particulate in air and precipitation;
- Surface water environment, including radioactivity in Lake Ontario, local streams and nearby municipal water supply plants;
- Aquatic environment, including radioactivity in sediments and fish;

- Terrestrial environment, including radioactivity in vegetation, animals and foods;
- Hydrogeological environment, including radioactivity in soils, shallow wells recharged with precipitation and deep wells;
- Radiation dose to members of the public, including radiation doses to population groups with characteristics which may cause them to be exposed at a higher level than the rest of the population; and
- Radiation dose to workers, including radiation doses to nuclear energy workers and other workers on the DN site.

Baseline radiation and radioactivity included natural background, background from anthropogenic sources (fallout from nuclear testing and releases from nuclear sites) and releases from the DN site.

The baseline characterization demonstrated that doses to members of the public and site workers resulting from the operation of the DN site are very low compared to the regulatory limits of 1 millisievert (mSv) per year for members of the public and non-Nuclear Energy Workers, and 100 mSv per five year period with a maximum of 50 mSv in any one year for Nuclear Energy Workers [R-23]. Doses resulting from the existing operation of the DN site are a small fraction of the annual average Canadian background radiation dose of 1.8 mSv [R-23]. Baseline levels of radionuclides in the environment result in only very small doses to non-human biota indicating there are no ecological risks from radionuclides to biota at the DN site [R-23].

The results of the compliance review concluded that there were no gaps against REGDOC-1.1.1 nor other relevant codes, standards or practices as it relates to radiation and radioactivity in the environment [R-15].

OPG continues to monitor radiation and radioactivity through its Environmental Monitoring Program (EMP) for DN site. Results of the EMP are published annually and made available to the public. Results of the 2019 EMP concluded that 2019 public dose for the DN site was 0.4 μSv (represented by the adult of the Farm Critical Group) and that site public dose remains a small fraction of both the annual legal dose limit and the annual natural background radiation in the area [R-28].

Additionally, a CSA N288.6-12 compliant ERA was produced for the DN site in 2016 [R-27], which concluded that the DN site is operating in a manner that is protective of human and ecological receptors residing in the surrounding area. The ERA will be routinely updated in accordance with REGDOC-3.1.1 requirements to reflect current conditions. The ERA contains a human health risk assessment (HHRA) and an EcoRA for both radiological and non-radiological parameters and physical stressors [R-27].

Baseline conditions for ambient radioactivity have remained similar to those presented with the original application, therefore there is no impact to the conclusions of the original site evaluation.

Pre-existing hazardous substances

Baseline conditions for pre-existing hazardous substances have remained similar to those presented with the original application, therefore there is no impact to the conclusions of the original site evaluation.

The original application documents identified areas on DNNP land as potentially contaminated with non-radioactive substances. OPG has made steady progress towards addressing these areas which include the spoils disposal area, former DNGS concrete plant, and sandblast grit storage area [R-22]. These areas are designated as "F1" in Figure 10. Remediation and decommissioning activities conducted for the area F1 completed following 2009 are summarized in the DNNP midterm licence report [R-22]. Sampling results indicate that the use of F1 as a soil staging area did not cause any significant environmental or human health impacts. No additional monitoring or investigation was recommended by environmental subject matter experts [R-22]. In June 2018, OPG informed the CNSC of the completion of the decommissioning of the temporary soil staging area F1 [R-29].

As outlined in the DNNP Commitments Report [R-19], prior to site preparation, OPG will conduct a comprehensive soils characterization program (commitment D-P-3.6). The presence of contaminated soil or rock will be assessed and managed if encountered to meet regulatory requirements [R-19].

The 2016 ERA, which contains a HHRA and EcoRA for both radiological and non-radiological parameters and physical stressors, concludes the DN site is operating

in a manner that is protective of human and ecological receptors residing in the surrounding area [R-27].

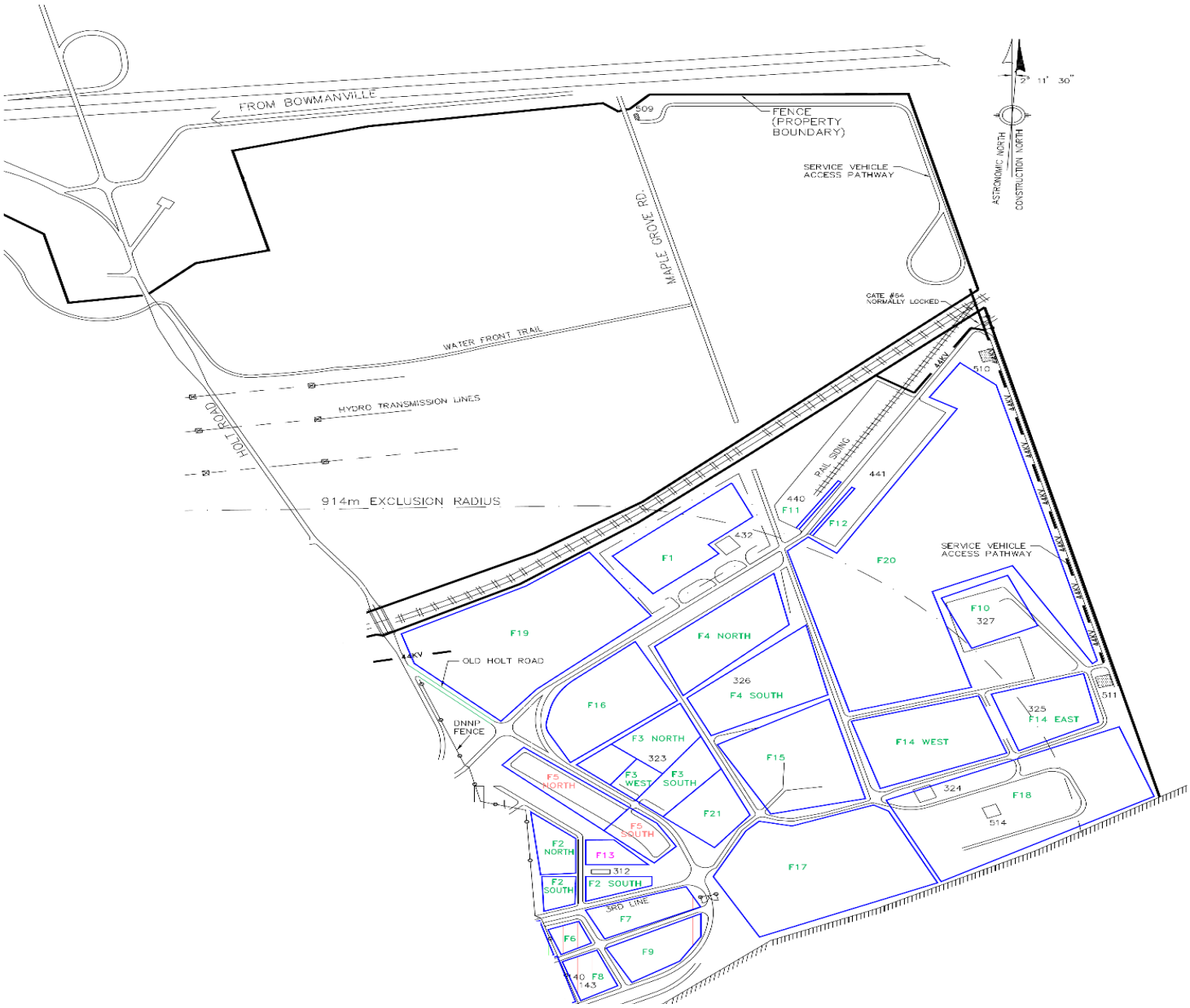

Figure 10: DNNP Site Specific Areas

4.4.8 Land Use

Although there have been changes in land use within the Land Use Assessment Zone, there have been no changes that alter the conclusions reached previously in 2009 with respect to project impacts, specifically considering land use structure and impacts on sensitive land uses in proximity to the DN site [R-13].

In 2019, land use baseline data was updated and included: (1) a brief history of land use in the Local Study Area, including information on major industries in the vicinity of the DN site; (2) consideration and identification of new information starting from 2009 that was contained in provincial land use policies and regional/municipal official plans and relevant to the Local Study Area for current and planned land uses, and (3) a description of primary recreational uses [R-13].

Land use was originally characterized in the Environmental Impact Statement (EIS) submitted for the original application [R-23]. A compliance assessment of DNNP Licence Basis materials against any new or modified requirements or guidance found in REGDOC-1.1.1 showed no potential gaps identified with respect to Land Use [R-13]. With respect to current codes and standards, no gaps were identified [R-13]; land use planning is governed by the Planning Act in the Province of Ontario, and any updates were captured in the 2019 baseline land use update [R-13].

The Land Use Effects Assessment completed in 2009 identified two likely environmental effects relating to land use (i.e., planned land use structure and impacts on sensitive land uses in proximity to the DN site) within a 10 km radius of the DN site [R-23]. The 2019 review and update within this 10 km Land Use Assessment Zone shows that the majority of new development is occurring within existing urban areas (Oshawa, Courtice, Bowmanville, and Newcastle). This pattern of growth and development is consistent with provincial plans which seek to focus urban growth within existing urban areas, while maintaining limited development with the Greenbelt Plan and Oak Ridges Moraine. The most noteworthy changes occurring in Land Use have been at a policy level, including reviews and updates to provincial plans and the Provincial Policy Statement. The monitoring and development activity within the Land Use Assessment Zone that has been undertaken by OPG since 2011 has demonstrated that residential development has been occurring primarily within the existing urban areas. This form of development is consistent with the policies of the Growth Plan and the respective official plans [R-13].

There have been no substantive changes to the Land Use environment since the 2009 Land Use Effects Assessment was completed and therefore, the DNNP commitment D-P-12.7 [R-19] related to land use remains valid [R-13].

4.5 Evaluation of Natural External Events

The screening of natural hazards for DNGS was updated in 2015 for the Darlington Risk Assessment (DARA) PSA as per [R-34]. The hazard screening was updated subsequently for the 2020 DARA PSA update compliant with the requirements of REGDOC-2.4.2, *Probabilistic Safety Assessment (PSA) for Nuclear Power Plants*. There have been no changes to the conclusion of the hazard screening report. This will be reflected in the final PSA summary report when all the elements of the 2020 DARA PSA are completed. The conclusions from the 2020 DNGS hazard screening assessment are leveraged to inform this licence renewal application and the conclusions of the Nuclear Safety LRAR [R-11] due to the close proximity, shared site characteristics such as geographical features and environmental/meteorological conditions of the existing DNGS site with the DNNP site.

The natural hazards considered include a wide range of events and are mostly severe meteorological conditions for which RLCs are defined [R-11]. This review focused on the RLC and environmental changes known to impact the RLC [R-11]. Hazards were either screened out or will be addressed during the detailed design phase upon selection of a reactor technology similar to the way they are addressed for DNGS. This conclusion is in line with the original application [R-5] and with the commitment D-C-3 [R-19]. The preliminary safety analysis and design will address external hazards in detail to ensure required safety goals are met.

The 2009 assessment of meteorological events in [R-36] was performed to review the historical meteorological data to identify extreme values of possible meteorological conditions/hazards occurring at the DNNP site using Ontario's extreme weather profile to create a baseline. The extreme values for the meteorological variables associated with wind, precipitation and snow pack were considered. The conclusions of the hazard assessments performed in the 2009 LBDs ([R-36], [R-37], [R-38], and [R-39]) and Nuclear Safety LRAR [R-9]) stated that the hazards identified will be used to perform safety analysis during plant design phase.

An assessment in the Nuclear Safety LRAR [R-11] was performed for any change or impact to the conclusions of the 2009 LBDs [R-36] due to the change in codes and standards that were applied. Additional insights from the 2020 DARA hazard screening assessment were also considered to assess the impact on the conclusions of the 2009 LBDs.

The following are the conclusions of the current assessment [R-11] performed for the events that were investigated.

4.5.1 Climate Change

Historical data assessment and future climate change prediction was performed in support of the original application [R-5] in the Nuclear Safety consideration LBDs [R-31]. The historical data for the past century and possible prediction for the future 100 years was analyzed. Key climatic parameters such as temperature, precipitation and wind speed were looked at. The impact on the extreme conditions due to climate change was addressed in the evaluation of meteorological events LBDs [R-36]. The assessment of meteorological events LBD in support of DNNP PRSL renewal is discussed below which covers the impact of climate change. Overall, the changes in extreme conditions did not go beyond the RLC conditions and, for the ones that posed any hazard as described in [R-36], will be mitigated through designed barriers. Detailed hazard analysis and safety assessment with respect to climate change will be performed under OPG commitment D-C-3 in [R-19] as a part of the LTC application.

4.5.2 Meteorological Hazards

Meteorological event assessment to support the original application [R-36] was developed in accordance with RD-346, NS-R-3 Rev. 0, and NS-G-3.4, *Meteorological Events in Site Evaluation for Nuclear Power Plants (NPP)*. These regulatory and guidance documents are now superseded by REGDOC-1.1.1, NS-R-3 Rev. 1, and SSG-18, *Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations Specific Safety Guide*, respectively. The review of these new codes and standards was performed for their impact on the 2009 LBDs and identified no impact on the conclusion of the 2009 LBDs for meteorological events assessment [R-36] as documented in the LRAR [R-11]. While meteorological hazards will be considered as part of the technology selection and final design for

DNNP, these hazards for DNNP in [R-36] were reviewed against the updated Hazard assessment for DNGS according to the RLCs.

Review of all the potential meteorological events as prescribed in REGDOC-1.1.1 was performed with the following conclusions:

Temperature and Humidity: No change in RLC temperature values was found in the extreme low and extreme high temperature; as such, the conclusions made in the 2009 LBDs for Meteorological Events [R-11] are still valid. Effects of condensation and evaporation due to extreme temperatures are not considered in this evaluation as it is evident from DNGS operating experience there are no extreme conditions that could arise due to condensation and evaporation. This will be re-confirmed as part of preliminary safety analysis for the future LTC application as per OPG commitment D-C-3 [R-19].

Humidity was evaluated for extreme values for the data collected [R-36]. Humidity evaluations showed no indications of extreme conditions that would require additional design mitigation [R-31] and hence, do not require further evaluation.

High winds: A high wind PSA will be performed as a part of the LTC application in accordance with OPG commitment D-C-3 [R-19]. The high wind PSA will consider impact from wind pressure-loading effects and wind–propelled missile analysis from various categories of high wind and their impact on severe core damage and large release analysis. The most recent high wind PSA update for DNGS was completed in 2015 and is scheduled to be updated in 2020. Insights from these assessments can be used in the future high wind assessment for the DNNP site, once the reactor technology is selected.

Abrasive dust and sand storms: This is not identified as a potential hazard for DNNP or the existing DNGS site due to the unlikeliness of such an event and lack of historical event data [R-36]. This hazard does not require further evaluation.

Precipitation: Daily maximum precipitation values are significantly below the RLC value of 420 mm in the first 12 hours with 51% of the precipitation in the 6th hour. Therefore, flooding or other hazards due to precipitation have been screened out for the DNGS site and hence, can be screened out for the DNNP site as well due to its proximity to the DNGS. The PPE for DNNP does include precipitation, the design of DNNP will consider this hazard and will be assessed against this hazard as part of the safety analysis.

Snow/ Snowpack: Snow/snowpack hazard was considered for evaluation and assessment in the future safety analysis and during the design of the plant at DNNP [R-36]. The snow/snowpack hazard has been recently screened out due to low consequence in the DARA 2020 hazard screening update. This hazard can also be screened out for DNNP due to its close proximity to the DNGS site. The PPE for DNNP does include snow/snowpack, the design of DNNP will consider this hazard and will be assessed against this hazard as part of the safety analysis.

Freezing Rain: Freezing rain hazard was considered for evaluation and assessment in the future safety analysis and during the design of the plant at DNNP as per [R-36]. Freezing rain has been recently screened out due to low consequence in the DARA 2020 hazard screening update. This hazard can also be screened out for DNNP due to its close proximity to the DNGS site.

Avalanches: Avalanches were not considered in the 2009 meteorological assessment for DNNP PRSL application [R-36]. Avalanches were screened out due to topographical conditions from the 2020 DARA hazard screening assessment. Due to similar topology of DNNP as DNGS, this hazard can be screened out for DNNP as well.

Ice Storms: Ice storms were identified as a potential hazard in the 2009 meteorological assessment [R-36] and have also been identified as a potential hazard for systems that are housed outside the plant as per assessment done for 2020 DARA hazard screening and as documented in the Nuclear Safety LRAR [R-11]. Ice storms events will be considered in the future safety analysis and plant design activities.

Meteorites: Meteorites were not considered during the 2009 meteorological assessment for DNNP PRSL application [R-36]. No additional analysis is required as this hazard was screened out as per quantitative screening for 2020 DARA hazard screening assessment as documented in [R-11].

Geomagnetic Storms and Flares: Geomagnetic storms and flares were not considered during the 2009 meteorological assessment for the original application [R-36]. No additional analysis is required as this hazard was subsequently reassessed and screened out in 2015 and 2020 DNGS hazard screening assessments.

Lightning: Lightning data was gathered and evaluated in 2009 and concluded that lightning strikes are a frequent occurrence in Southern Ontario. This hazard was further reassessed in 2020 DARA hazard screening assessment and screened out due to low hazard to the site. This hazard does not warrant any further investigation at this time.

4.5.3 Surface Water Hazards

Flood Hazards (Surface and Groundwater)

The flood hazard assessment performed in 2009 in support of DNNP PRSL [R-37] was developed in accordance with RD-346, IAEA NS-R-3 Rev. 0, and NS-G-3.5 *Flood Hazard for Nuclear Power Plants*. These regulatory and guidance documents are now superseded by REGDOC-1.1.1, NS-R-3 Rev. 1, and SSG-18, respectively. The review of these new codes and standards was performed for their impact on the 2009 LBDs created in support of the original application. This review concluded that there is no impact on the conclusion of the 2009 LBD for Flood Hazard Assessment [R-37] as documented in the Nuclear Safety LRAR [R-11].

In the 2009 Flood Hazard Assessment for DNNP [R-37], potential flood hazards as a result of probable maximum flood leading to surface water hazards from runoffs, storm surge, seiche, tsunamis, wave and wind effects etc., were considered as a possible hazard. This hazard was reassessed in the 2020 DNGS hazard screening assessment and was subsequently screened out, either due to low consequence or low frequency. The conclusion of 2020 DNGS hazard screening are applicable to the DNNP site due to close proximity to the DNGS site. Impact from ground water hazards to the buildings and construction at the DNNP site will be evaluated during the LTC phase for the selected design as a part of D-C-3 commitment [R-19].

Adequacy of water supply has also been assessed in 2020 DNGS hazard screening. Potential causes that could lead to an adequate water supply hazard are marine hazards such as algae and frazil ice formation. This hazard has been screened out in the 2020 DNGS hazard screening assessment due to low consequence. Conclusions of the 2020 DNGS hazard screening are directly applicable to the DNNP site as the water supply to both sites is on the same water body (Lake Ontario) and in close proximity. This hazard will be reviewed during detailed PSA assessment during the LTC phase as a part of the D-C-3 commitment.

4.5.4 Groundwater Hazards

Groundwater flow and groundwater hydrology was assessed as a part of the original application. Boreholes and wells have been fitted with monitoring equipment for sampling and level monitoring purposes [R-31]. The information collected from the existing monitoring bore wells will be used during the construction phase to design the reactor foundations according to the allowable bearing capacity. No further analysis is required for this licence application.

4.5.5 Geotechnical and Geophysical Hazards

Geotechnical and geophysical assessment to support the original application [R-38] was developed in accordance with RD-346, IAEA NS-R-3 Rev. 0, and NS-G-3.6 *Geotechnical Aspects of Site Evaluation and Foundations for Nuclear Power Plants*. These regulatory and guidance documents are now superseded by REGDOC-1.1.1, NS-R-3 Rev. 1, and SSG-18, respectively. The review of these new codes and standards was performed for their impact on the 2009 LBDs. This review concluded that there is no impact on the conclusion of the 2009 LBD for geotechnical aspect [R-38] as documented in the Seismic and Geotechnical LRAR [R-9] and Aggregate Assessment Report [R-18]. OPG commitments with respect to geotechnical and geophysical hazards are tracked in commitment D-P-9 in the DNNP Commitments Report [R-19]. The commitments made are as follows:

- Development of Design Extension Condition (DEC) level of seismic hazard and Seismic Beyond Design Basis Conditions for DNNP
- Perform paleo-seismic investigation for DNNP site
- Define Design Basis Earthquake (DBE) for the design selected at DNNP

The conclusion of the assessment performed is that the 2009 Geotechnical and Seismic Aspect Assessment [R-38] remains valid for DNNP PRSL renewal.

4.5.6 Seismic and Geological Hazards

<u>Earthquakes</u>

This review concluded there is no impact on the conclusion of the 2009 LBD for Seismic Hazard Assessment [R-39] due to the updates to these Regulations and Guidance documents, as documented in the Nuclear Safety LRAR [R-11].

Seismic hazard assessment to support the original application [R-39] was developed in accordance with RD-346, NS-R-3 Rev. 0, and NS-G-3.3 *Evaluation of Seismic Hazards for Nuclear Power Plants*. These regulatory and guidance documents are now superseded by REGDOC-1.1.1, NS-R-3 Rev. 1, and SSG-18, respectively. The review of these new codes and standards was performed for their impact on the 2009 LBDs created in support of original application.

The DNGS seismic hazard curve was updated as a part of the DARA 2020 Probabilistic Seismic Hazard Assessment (PSHA) update and is compliant with current codes and standards (namely CSA N289.1-18 *General Requirements for Seismic Design and Qualification of Nuclear Power Plants*). The updated seismic hazard curve for DNGS was provided to the CNSC. Giving consideration to the close proximity of the two sites (i.e., DNNP and DNGS), the hazard curve used to characterize the seismic conditions for DNGS is deemed applicable to the DNNP site. The updated DNGS seismic hazard curve or an updated DNNP curve can be utilized during the design and construction stage of DNNP. This is captured under commitment D-C-3 [R-19] for which the objective is to demonstrate that the reactor design fits within the PPE values. In addition, the original seismic hazard curve used to characterize the DNNP site in the 2009 LBD was evaluated against the updated DNGS curve. In conclusion, the original curve used in the original application bounds the updated DNGS curve. Therefore, no additional seismic hazard analysis is required to renew the DNNP PRSL at this time.

Surface Faulting

There are no active surface faults or tectonic plates in the vicinity of the DNNP site. Therefore, there is no hazard from surface faulting at DNNP site.

Volcanic Hazards

There are no volcanic structures or active volcanoes in the farthest vicinity that impact the DNNP site. Therefore, volcanic hazard is not a potential hazard to the DNNP site.

4.5.7 Biological Hazards

Assessment of impact to the site from microorganisms, macroscopic plants, mollusks and algae has been considered as a potential hazard at the DNNP site in the original application LBD [R-31]. Impact of the biological hazards (algae,

mussels or clams) on the water intake from the lake can be mitigated by the design such as screening, filtering and chemical treatment, etc. Other wildlife such as birds and animals are not considered as a potential hazard to the site based on operational experience from existing sites (Pickering Nuclear Generating Station (PNGS) and DNGS).

Potential hazards leading to unavailability of fore bay intake are assessed as a part of detailed PSA analysis and will be considered in future analysis performed as a part of the LTC as per commitment D-C-3 [R-19].

4.5.8 Natural Fire Hazards

Natural fire hazards such as forest fires do not pose an incremental risk to the site due to very low probability and little source of fire [R-31]. The 2020 DNGS hazard screening assessment screens out external natural fire hazard due to lack of natural fire sources (forests and parks) within the screening distance of the site. Similarly, due to the close proximity of DNNP to the DNGS site, natural fire hazard can be screened out and does not warrant further investigation at this time.

4.5.9 Summary of Evaluation of Natural External Events

The 2009 hazard assessment was performed as per RD 346 and NS-R-3 Rev. 0, which are now superseded by REGDOC-1.1.1 and NS-R-3 Rev 01, respectively. The review of the new updated regulatory and guidance documents was performed as part of this DNNP PRSL renewal application submission. There was no significant impact to the conclusion of 2009 evaluation of natural external events or hazards.

The 2009 evaluation of natural external events/hazards was compared with the conclusion of the 2020 DNGS hazard screening assessment for DNGS. The hazards arising from natural external events would be similar for both DNGS and DNNP due to their close proximity. The impact assessment from the comparison between the two studies is documented in Nuclear Safety LRAR [R-11]. The impact assessment did not result in identification of any new external natural events or hazards.

Based on the above discussion, no new actions are required for DNNP licence renewal outside of the existing commitments made in the DNNP Commitments Report[R-19]. The commitments made in D-C-3 section of the DNNP Commitments Report [R-19] will be provided to the CNSC during the LTC phase of DNNP.

4.6 Evaluation of External, Non-Malevolent, Human-Induced Events

Human-Induced External Events Hazard Assessment [R-40] was performed as a part of the original application [R-5]. The review and conclusions of the external human-induced hazards evaluation are summarized below.

4.6.1 Aircraft Crash Events

The plant containment will be made robust to withstand large impacts such as an airplane crash. Large airplane crash occurrence has been screened out in the 2020 DNGS hazard assessment due to its low frequency. The conclusion of the 2020 hazard screening assessment is directly applicable to the DNNP site due to its close proximity. This hazard does not warrant any additional assessment at this time. Aircraft crash events will be considered for re-evaluation during the LTC application as part of commitment D-C-3 [R-19].

4.6.2 Other Transportation Hazards

Railways and shipping lanes do not pose any physical damage risk to the DNNP site. The potential hazards associated with road, rail and water transportation (e.g. explosions and hazardous material release) are considered and discussed below.

4.6.3 Fires and Explosions

Fires due to release of flammable fluids were assessed in the original application. Thermal radiation hazards such as pool fires, jet fires and Boiling Liquid Expanding Vapor Explosion (BLEVE) were considered for fire and explosion hazard evaluation. Since there are no substantial sources located near the DNNP site, these hazards (e.g. toxic gases, missiles, secondary fires, high temperatures etc.) pose a negligible incremental risk [R-31].

Fire and explosion hazards have been evaluated and their frequency is estimated to be lower than the Design Basis Probability Value (DBPV). The 2020 DNGS hazard screening evaluated potential explosion hazards due to train derailment or chemical explosions and qualitatively screened them out due to the robustness in design. Fire and explosion hazards will be re-evaluated during detailed PSA as per commitment D-C-3 during the LTC phase.

4.6.4 Chemical and Radiological Hazards

The DNNP site has various shipping lanes, which carry bulk marine shipments and the Canadian National and Canadian Pacific railway lines within the exclusion zone of the site. The probability of accidents posing significant threat to the site as per the 2020 DNGS hazard screening is low. This conclusion is also applicable to the DNNP site due to its close proximity to the DNGS site. Transport vehicles carrying toxic and hazardous materials (mainly gaseous) can pose a threat to worker safety which is recognized in the 2009 Site Evaluation Studies [R-40]. The effect of such events is mitigated through designed barriers at the station such as ventilation and isolation systems. In addition, physical barriers to prevent damage from debris/missile impact from explosion of transport vehicles carrying flammable or explosive materials will also be mitigated by designed barriers such as distance and shielding. Detailed analysis of this hazard will be performed during the LTC phase of this project [R-19].

The following radiological hazards for DNNP have been identified for potential radiological risk to the public, workers or environment, and evaluated as a part of the original application [R-31].

- Tritium Removal Facility accidents,
- Active liquid waste storage accidents,
- Used Fuel accidents,
- Design basis accidents, and
- Beyond design basis accidents.

No new hazards were identified for this licence renewal. These hazards were assessed using a bounding approach considering the entire facility life cycle in the 2009 site evaluation work. These hazards are not present during the site preparation stage of the project and a more detailed assessment will be submitted with the plant safety analysis during the LTC application process covering the construction and operational phases of the facility life cycle.

4.6.5 Electromagnetic Interference Hazards

Electromagnetic Interference (EMI) sources such as high voltage transmission lines, which are an integral part of the power plant are constantly present at the site. EMI is a well known phenomenon, with well established industry standards for transient immunity and/or protection, which will be used in the design of any new

nuclear facility. Based upon the hazards assessed in 2020 DNGS Hazard Screening Assessment, there are no added requirements for any new facility at DNNP site based upon proximity, and established industry standards. This hazards does not need further investigation.

4.6.6 Consideration of Future Connections to the Grid

Consideration of future connections to the grid will be undertaken with the support of the Independent Electricity System Operator (IESO) and Hydro One and are not evaluated as a part of this licence application. These assessments will be as per the IESO Connection Assessment and Approval process (IESO Market Manual 2.10). This will be done by the IESO and Hydro One at a later stage.

4.6.7 Summary of Evaluation of External, Non-Malevolent, Human-Induced Events

The 2009 hazard assessment was performed as per NS-G-3.1 *External Human-Induced Events in Site Evaluation for Nuclear Power Plants,* RD 346 and NS-R-3 Rev 00, which are now superseded by REGDOC-1.1.1, and NS-R-3 Rev 01, respectively. The review of the new updated regulatory and guidance documents was performed as a part of this application submission. There was no significant impact to the conclusion of the 2009 human-induced external events hazard assessment due to this update to the regulations and guides as documented in [R-11].

The 2009 Human-Induced External Hazard Assessment [R-40] was compared with the conclusion of the 2020 DNGS hazard screening assessment for DNGS. All human-induced external hazards were subsequently screened out as per the conclusions of the 2020 DNGS hazard screening assessment due to close proximity of the DNNP and DNGS sites.

Based on the impact assessment performed in the Nuclear Safety LRAR for DNNP PRSL renewal, it was concluded that no additional analysis needs to be performed and the conclusion of the 2009 Human-Induced External Events Hazard Assessment [R-40] still remains valid. More detailed safety analysis will be performed during the LTC phase as per the commitment D-C-3.1 made in the DNNP Commitments Report [R-19] which states:"*The plant design will consider external events such as Aircraft Hazards, Transportation – Explosion Hazards and*

Toxic Gas Hazards, Missile Hazards and Electromagnetic Interference Hazards in assessment impact of Accidents and Malfunctions".

4.7 Assessment of Site Suitability

4.7.1 Evaluation against the CNSC Safety Goals

The reactor designs that were considered within the PPE were evaluated against applicable safety goals, taking into account the characteristics of the site, and the impact of potential radiological releases from the NGS on effective dose to members of the public and emergency planning during the original application [R-5].

Applicable safety goals that the designs were evaluated against are severe core damage frequency, small release frequency and large release frequency as defined in REGDOC-2.5.2, *Design of Reactor Facilities: Nuclear Power Plants*. REGDOC-2.5.2 superseded RD 337, which was used in the 2009 assessment against the CNSC safety goals. Since the detailed designs of the selected reactor technologies were not available, a limited assessment was performed to meet the intent of RD-337 in 2009. Once a reactor technology is selected, a PSA will be performed to meet the intent of REGDOC-2.5.2 during the LTC phase as reflected in OPG commitment D-C-3 in the DNNP Commitments Report [R-19].

4.7.2 Evolving Natural and Human-Induced Factors

It is understood that hazards evolve with time and that hazard evaluations need to be performed periodically at different stages of a project and during the plant lifetime. The DNGS hazard screening assessment was recently updated in 2019 for the DNGS facility, which was used as a starting point for hazard re-evaluation in support of the DNNP site due to its close proximity. A DNNP-specific hazard screening will be performed as a part of OPG commitment D-C-3 [R-19] during the next phase of DNNP licensing.

4.7.3 Hazards Associated with External Events

Based on the hazards identified in the original application [R-5] and LBDs ([R-31], [R-36] to [R-40], [R-42] to [R-44], [R-69], [R-70]), the hazards that were reviewed in preparation for this licence application are:

- Meteorological Events,

- Flooding/ Surface/ Ground Water Hazards,
- Seismic Hazards,
- Geotechnical Hazards,
- Fire hazards (External naturally occurring), and
- External human-Induced Hazards.

These hazards were evaluated for impact due to change in applicable codes, standards and regulations as well as any possible impact identified in the hazard screening and hazard assessments being performed in support of the 2020 DARA PSA updates. External hazard characteristics for the DNNP site and DNGS are similar due to their close proximity to each other and similar geographical and topographical conditions.

In addition to the external hazards, radiological hazards and their impact on the site and the DNNP site were also assessed. It was concluded that there is no radioactive material that is stored on the site or will be stored on the site during site preparation. Radiological sources that will be used for land and geological surveys do not have a significant radiological impact on the public safety or site suitability.

The 2009 hazards assessments performed for the original application took their guidance from RD 346, IAEA NS-R-3 Rev. 0 and IAEA supporting guides. These regulatory and guidance documents were subsequently updated and superseded by REGDOC-1.1.1 and NS-R-3 Rev. 1, respectively.

A review was performed of the updated standards, regulations, and guides, and the 2020 DNGS hazard assessment was performed against the conclusions and methodology of the 2009 LBDs. The detailed assessment and results of this review are documented in the Nuclear Safety LRAR [R-11].

Based on the impact assessment performed and the results documented in the Nuclear Safety LRAR [R-11], the conclusion in the Nuclear Safety Consideration Report for Site Suitability [R-31] still remains valid, i.e., the site is suitable for a NGS and the hazards identified are acceptably low or could be reduced to acceptable levels through design mitigation. Although it does not impact the conclusions of the original site evaluation, OPG is proposing an update of the commitment D-P-9 to formally define the DBE ground motion values for DNNP and define appropriate set of seismic hazard Design Extension Conditions (DECs) and Seismic Beyond Design Conditions

for DNNP. In addition, OPG has made commitments in support of this conclusion to perform detailed safety analysis during the LTC phase, when a design is available. This commitment is documented in the DNNP Commitments Report [R-19] commitment D-C-3.

4.7.4 Potential Impact of the Site on the Environment

A summary of the potential effects of the project on the environment arising from site preparation activities, along with mitigation measures, was presented in Table 4.3-1 of the original application [R-5]. Mitigation measures include design features incorporated into the project planning to pre-empt or preclude environmental effects as well as further mitigation measures to address likely effects. Consideration of VECs and indicator species formed the basis of the effects assessment. The original application concluded that the "*identified mitigative measures are considered to adequately ensure no significant residual adverse environmental effects from the new nuclear development site preparation activities*".

Reviews were conducted against REGDOC-1.1.1 as well as new or revised codes, standards and practices to identify any gaps. Where additional baseline data has been collected since the original application, this data was evaluated to identify any changes in baseline conditions. Any gaps and/or changes are documented and addressed in the Environment LRAR [R-15]. Considering mitigation measures that are planned or already in place, these gaps/changes do not change the conclusions with respect to the residual adverse effects of the project on the environment nor the conclusions of the original site evaluation. Although it does not impact the conclusions of the original site evaluation, OPG is proposing an update of the commitment D-P-3.7 [R-19] to address the presence of a retainable Butternut tree [R-15] (see Section 4.4 for additional details).

4.7.5 Population and Emergency Planning

The review performed in the Emergency Preparedness LRAR [R-10] affirms that the conclusions provided in the LBDs ([R-41], [R-44] to [R-47]) continue to be valid with no significant changes.

The review has also confirmed that the commitments contained in the DNNP Commitments Report [R-19] related to emergency preparedness (commitment D-P-5) for the site preparation phase of the project are adequate to address the

management of potential emergency preparedness events in the immediate vicinity of the DNNP site and interfacing with existing DN emergency preparedness procedures. No new commitments are required.

4.7.6 Consideration of Future Life Extension

Future life-extension considerations that were included in the original application will be re-evaluated upon selection of a technology. This will be performed at an appropriate stage in the future of the DNNP life cycle.

4.7.7 Security Considerations

OPG completed the existing site evaluation in 2009 to ensure that a new NGS constructed at the DNNP site will not create an unreasonable risk to the public, personnel, or environment.

The preparation for the PRSL renewal required assessment activities on areas where incremental impacts may exist in the context of applicable current codes and standards, including any significant changes to the site and study area. This work was completed for the nuclear security area and confirms the current PRSL basis remains valid. The review determined no revisions to previous commitments or new commitments are required [R-16].

In support of the PRSL renewal, OPG has also completed an update to the SSTRA [R-17], in accordance with REGDOC-1.1.1. The SSTRA provides a systematic process for prioritizing the security risks associated with geographically related characteristics for a specific area under review. The SSTRA considers the exclusion and emergency planning zones[2] that surround the controlled area. The assessment considers physical site characteristics that could impede the development and implementation of future adequate security measures for all the phases of the DNNP lifecycle. The findings documented in the revised SSTRA [R-17]

[2] Emergency Planning Zone : the area outside the licensee's exclusion zone where implementation of operational and protective actions might be required during a nuclear emergency to protect public health, safety, and the environment. Emergency measures are normally controlled and executed by an external emergency planning authority.

are consistent with the previous SSTRA findings submitted as part of the original application [R-5].

The SSTRA concluded that no site characteristics could impede the development and implementation of adequate security measures through all phases of the DNNP life cycle. The results of the Nuclear Security LRAR [R-16] did not identify any concerns that may render the site unsuitable from a security perspective. The current conclusion is that the DNNP site is suitable for a new NGS.

Further details about the SSTRA are provided in Section 5.12 of this application and the SSTRA [R-17].

4.7.8 Summary of Assessment of Site Suitability

All the aspects for the site suitability have been evaluated with consideration of all the stages of the life cycle of the NGS, which includes construction, operation, refurbishment and decommissioning. Based on the assessments of potential hazards, possible human-induced events, and consideration of emergency preparedness and security considerations, it is safe to conclude that the DNNP site is suitable for all phases of the DNNP life cycle.

4.8 Exclusion Zone Determination

At the time of the original application [R-5], a reactor technology had not been selected. This remains true as of the current application. The exclusion zone requirements were determined on a limiting factor of dose to the public at the nearest boundary to meet the safety goals [R-41]. Technical information from various available designs were used to develop the PPE and exclusion zone. This information was used to evaluate the suitability of the site for the facility and to assess the environmental effects that the site could have on the facility. Emergency preparedness, security and environmental considerations were investigated for any new changes or developments for impact on the exclusion zone determination and are discussed in the following sections.

4.8.1 Emergency Preparedness Considerations

Population and emergency preparedness considerations, such as evacuation needs, were considered during the exclusion zone determination [R-41]. As per the DNNP Emergency Preparedness LRAR [R-10], these consideration have not

changed and are compliant as per the Emergency Preparedness Plan [R-47] for the DNNP site preparation activities.

4.8.2 Security Considerations

Security considerations were evaluated for the exclusion zone determination as part of the original application [R-5]. These security considerations are not considered a limiting factor in the exclusion zone determination as per [R-41]. These conclusions remains valid for the purpose of the application as a reactor technology has not been selected.

4.8.3 Environmental Consideration

Meteorological factors were evaluated in the original application activities in the exclusion zone determination LBD [R-41]. Assessment of the exclusion zone was performed for a generic site using conservative assumptions regarding meteorological conditions. A review of updated environmental data and meteorological data concluded that environmental considerations in the exclusion zone determination [R-41] still remain valid.

4.8.4 Summary of Exclusion Zone Determination

The original application [R-5] states that the existing DNGS exclusion zone covers a portion of the lands for DNNP and extends over the proposed construction site. As per the application [R-5] and the DNNP Commitments Report [R-19], *the precise location of the exclusion zone and supporting calculations will be provided with the Construction Licence application once a technology has been selected*.' This is in accordance with clause 4.6.1 of REGDOC-1.1.1, that this, refinement would take place at a later licensing stage.

The proposed exclusion zone will maintain a minimum distance of 500 m from reactor building walls. This is in line with current day codes and standards as documented in the Nuclear Safety LRAR [R-11]. Exclusion zone analysis performed [R-41] for the most limiting design as per the PPE for the DNNP site in 2009 still remains valid. The Nuclear Safety LRAR concludes that LBD on Site Boundary Conditions [R-45] remains valid for the purpose of the application as the PPE is not changing (Section 4.3) and a reactor technology has not been selected. In addition, as per commitment D-C-3 in the DNNP Commitments Report [R-19], a

precise location of the exclusion zone and supporting calculations will be provided as part of the LTC application.

4.9 Overall Site Evaluation Conclusion

In support of the original application [R-5], a number of site evaluation studies were performed ([R-31], [R-36] to [R-44], [R-69], [R-70]) to determine the suitability of the site for a new NGS in accordance with the applicable CNSC regulatory requirements.

OPG demonstrated the DNNP site is a suitable location for the design, construction and operation of a new NGS and will not create an unreasonable risk to the public, personnel or environment. For each of the hazard areas evaluated, the risk was determined to be negligible or could be reduced to an acceptable level through design mitigation.

In support of the PRSL renewal process, OPG has:

- Reviewed the applicable baseline data in view of the potential impact on the facility,
- Evaluated the natural external hazards and external non-malevolent, human-induced hazards impact on the proposed reactor facility, and potential consequence to people and the environment [R-11].
- Reviewed the security threats ([R-8]) and issues presented by the geographical location/characteristics of the proposed site [R-18].

The following general criteria were reviewed for site evaluation.

- An evaluation against the CNSC Safety Goals
- Evolving natural and human-induced factors
- Hazards associated with external events (natural and human-induced)
- Potential impact of the site on the environment
- Population and emergency planning
- Consideration of future life extension

Furthermore, OPG has also conducted the following activities:

- A compliance review of DNNP LBDs against REGDOC-1.1.1 was conducted as an incremental clause by clause review to identify potential gaps. The gaps identified in the review were carried through the LRARs ([R-7] to [R-16]) and captured in the Aggregate Assessment report [R-18] to ensure that they are addressed and do not alter the conclusions of the site evaluation.

- Assessed the applicability and impact of the updated baseline data based on the latest DARA PSA hazard screening analysis. No changes were identified that affect the conclusions in the DNNP LBDs.
- Identified and addressed any new or updated regulatory documents, codes and standards that apply to site evaluations. The reviews of the regulatory documents, codes and standards did not identify any compliance gaps in the key LBDs. OPG concludes the DNNP LBDs therefore remain valid and compliant with the current regulatory codes and standards.

The overall conclusion of the comprehensive site evaluation is the DNNP site is suitable for a new NGS. The new NGS at the DNNP site would not pose any unreasonable risk to the public, personnel or environment.

5.0 Safety and Control Measures

This section of the application addresses the Safety and Control Areas (SCA) relevant to a licence application for a PRSL.

5.1 Management System

The Management System SCA ensures adequate processes and programs are implemented to ensure OPG achieves its safety objectives, continuously monitors its performance against those objectives, and fosters a healthy safety culture.

Applicable regulatory basis:

- *General Nuclear Safety and Control Regulations, paragraphs 3(1)(i) and (k) and 12(1)(a) through (j)*
- *Class I Nuclear Facilities Regulations*, paragraphs 3(d) and 4(d)

5.1.1 Management System for Site Preparation

Existing Licence Basis

The original application [R-5] included a DNNP-specific management system that was developed in accordance with the applicable standards at the time, namely CSA N286-05, *Management System Requirements for Nuclear Power Plants* [R-67] and ISO 14000 series of standards as described in its charter [R-48] to support the DNNP organization, separate and distinct from the DNGS organization. A number of management system programs had been developed to support the original application. Other programs and implementing documents were to be developed prior to the commencement of site preparation licensed activities, as documented in the DNNP Commitments Report (commitment D-P-1 in [R-19]) and in future licencing phases, such as a Radiation Protection Program (commitment D-O-1) or a Nuclear Emergency Plan (commitment D-O-2).

The DNNP Licence Conditions Handbook (LCH) [R-2] outlines the programs necessary for site preparation and for subsequent licensing phases.

The original application outlines OPG's expected role as an owner in an EPC contract. OPG would ensure ongoing and intrusive oversight for all phases of the project through its management system, and require the EPC Company to have its

own management system compliant with applicable current standards in accordance with Commitment D-P-4 in the DNNP Commitments Report [R-19].

Licence Renewal Updates

Results over Initial Licence Period (i.e. 2012-Current):

As mentioned in Section 1.1 above, OPG has not initiated any licensed site preparation activities for DNNP. In 2013, the Government of Ontario directed OPG to defer the construction of new nuclear reactors at Darlington and maintain the licence. Subsequent to that, the dedicated DNNP organization has been integrated into the existing OPGN organization and the work to develop and maintain the DNNP Management System was deferred. OPG has maintained the DNNP site and the PRSL by making use of OPG nuclear line of business management system documents as permitted in the DNNP LCH [R-2].

As part of DNNP's PRSL renewal work, OPG conducted a strategic review of the DNNP Management System and recommended that DNNP adopt the OPGN Management System [R-49] for the site preparation phase. This would allow OPG to conduct activities related to the DNNP site preparation phase in accordance with latest codes and standards such as the updated CSA standard N286-12, *Management System Requirements for Nuclear Facilities* [R-4].

Review of Changes:

OPG has developed a plan in order to manage the process of transitioning the project from its dedicated DNNP Management System to the OPGN Management System only for the activities that are applicable to site preparation. It is expected that as the project moves forward into construction and operation phases, there will be planned decisions in advance of each phase with respect to the management system to be used.

In accordance with the Licence Condition 1.3 of DNNP's PRSL, OPG notified the CNSC on January 20, 2020 [R-71] of OPG's plan to transition the current Management System for DNNP site preparation phase to the OPGN Management System. The relevant OPGN Management System "Program Level" documents to manage the activities associated with the DNNP site preparation phase, including the renewal of DNNP PRSL, was also submitted [R-71]. OPG has reviewed the OPGN Management System documents to identify which program documents are applicable to

controlling the licensed activities associated with the DNNP site preparation phase and demonstrate compliance with the sections of CSA standard N286-12 applicable to site preparation activities. The review showed that the existing OPGN Management System Program documents listed in Table 1 are sufficient to manage and control the DNNP site preparation phase activities.

Table 1: Management System Documents for the DNNP Site Preparation Phase

Document	Title
N-CHAR-AS-0002	Nuclear Management System
N-PROG-AS-0001	Nuclear Management System Administration
OPG-PROG-0001	Information Management
N-PROG-AS-0002	Human Performance
N-PROG-RA-0003	Performance Improvement
N-PROG-RA-0010	Independent Assessment
N-PROG-TR-0005	Training
OPG-PROG-0009	Items and Services Management
N-PROG-MP-0014	Reactor Safety Program
N-PROG-MP-0009	Design Management
OPG-PROG-0010	Health and Safety Management System Program
OPG-PROG-0005	Environmental Management System
N-PROG-RA-0001	Consolidated Nuclear Emergency Plan
N-PROG-RA-0002	Conduct of Regulatory Affairs
N-PROG-RA-0011	Nuclear Security
OPG-PROG-0039	Project Management
W-PROG-WM-0003	Decommissioning Program
OPG-PROG-0042	Cyber Security
N-PROG-AS-0005	Business Planning

Following the completion of activities associated with the transition to the OPGN Management System, the DNNP Management System and Implementing Documents commitment [R-19] (D-P-1) will be revised. The revision will ensure the commitment is aligned with any remaining actions associated with the development of management system documents for the site preparation phase.

5.1.2 Management System for Design Activities during Site Preparation

The Design Management Program (N-PROG-MP-0009) will be used to manage the design activities during the site preparation. It specifies requirements for management of prescribed activities appropriate for execution and control of required design, design support, and documentation for nuclear facilities and organizations. The design control measures, in the form of management system processes, procedures and practices, ensure consistent quality of the design of facility systems, structures and components.

5.1.3 EPC Management System

The original application outlines OPG's expected role as an owner in an EPC contract. This contracting strategy remains applicable to DNNP site preparation licensed activities. Therefore, it is OPG's responsibility to ensure ongoing and intrusive oversight through its management system, and the EPC Company has its own defined and implemented management system compliant with applicable current standards in accordance with Commitment D-P-4 in the DNNP Commitments Report [R-19]. OPG will ensure that the required quality, the health, safety and security of the public and workers, and protection of the environment are achieved.

5.1.4 Human Performance and Safety Culture

Safety culture is applicable to all the activities that may affect the health and safety of the workers and the public, and the environment in every phase of the facility's life cycle. The Human Performance (N-PROG-AS-0002) and Performance Improvement (N-PROG-RA-0003) programs implement OPG's expectations for understanding and promoting a strong safety culture. As detailed in the original application, an important expectation by OPG for the EPC Company's management system is that at all times, it will demonstrate the attributes of a positive nuclear safety culture.

5.1.5 Organization

The specific organizational structure for DNNP has evolved since the original application. The organizational structure concepts described in the original application, where OPG provides an oversight role to an EPC Company, remains applicable to the site preparation license.

Figure 11 shows the current organizational structure for the DNNP organization. OPG is planning to have a project oversight organization, thus ensuring the licences and approvals are achieved and the overall contract completed once the EPC Company is established. The organizational structure will continue to evolve as project activities increase and the EPC Company for the project is established.

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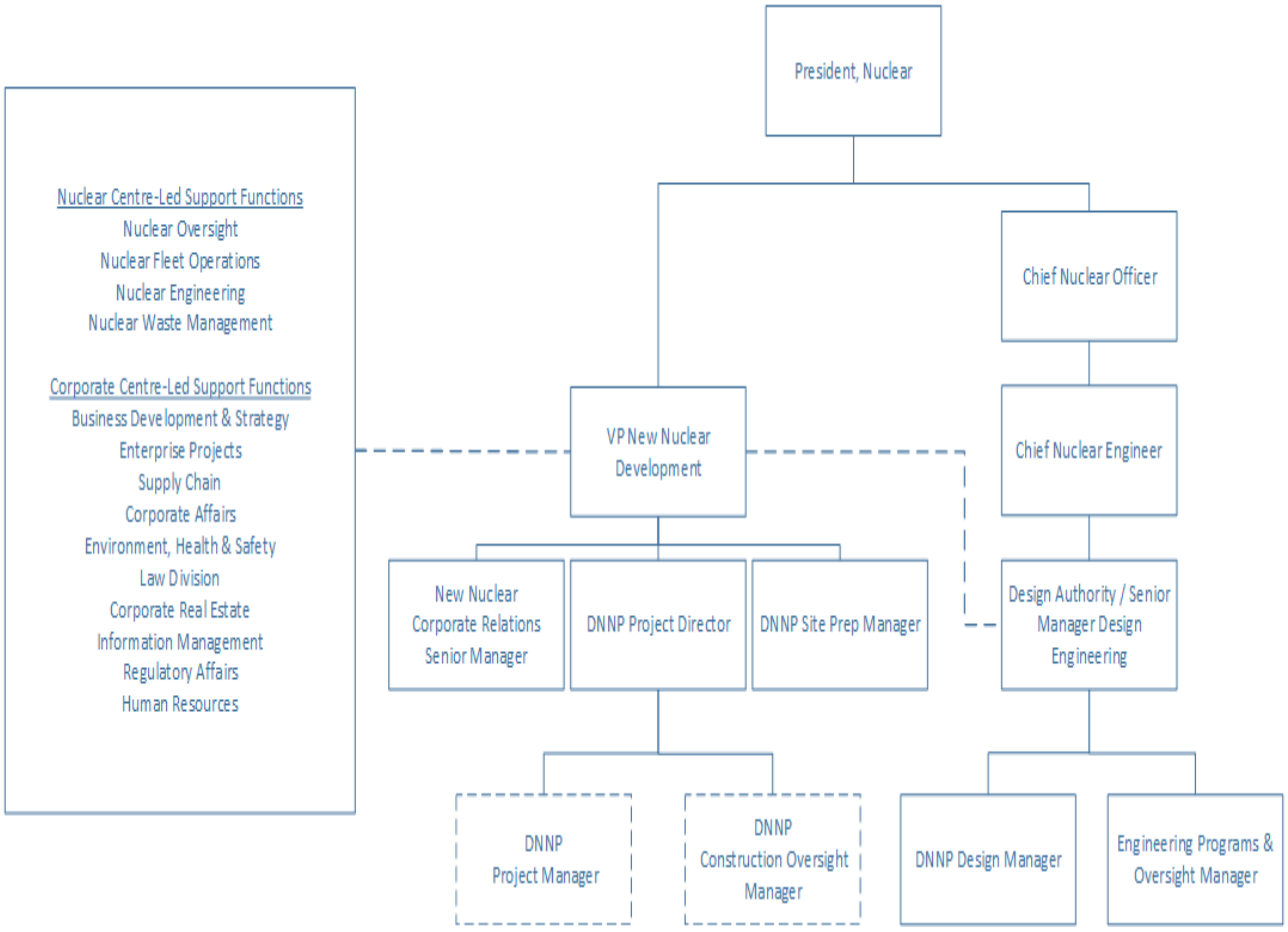

Figure 11: DNNP Site Preparation Organization Chart Overview

5.1.6 Training

The Training Program (N-PROG-TR-0005) provides the structure, processes, and tools for defining, developing, implementing, documenting, assessing, and improving the training required for nuclear staff. It ensures staff have the appropriate knowledge, skill, and attitudes for safe and efficient performance of activities throughout the lifecycle of a nuclear facility. This includes training workers for the performance of all licensed site preparation activities.

5.1.7 Applicable OPG Documents

The following documents (see Table 2) are the applicable OPG documents for the Management System SCA, which support the licensing basis and are to be listed in the LCH.

Table 2: Management System Documents for the Management System SCA

Document	Title
N-CHAR-AS-0002	Nuclear Management System
N-PROG-AS-0001	Nuclear Management System Administration
OPG-PROG-0001	Information Management
N-PROG-AS-0002	Human Performance
N-PROG-RA-0003	Performance Improvement
N-PROG-RA-0010	Independent Assessment
N-PROG-TR-0005	Training
OPG-PROG-0009	Items and Services Management
OPG-PROG-0010	Health and Safety Management System Program
OPG-PROG-0039	Project Management

5.2 Human Performance Management

In accordance with REGDOC-1.1.1 [R-6], the Human Performance Management SCA is not relevant to a licence application for a PRSL. It is noted that basic human performance management aspects are addressed under the management system SCA. Therefore, this section is left blank intentionally.

5.3 Operating Performance

The Operating Performance SCA includes an overall review of the conduct of the licensed site preparation activities and the activities that enable effective performance.

Applicable regulatory basis:

- *Class I Nuclear Facilities Regulations*, subsections 3(c), 4(a) and 4(e)

Existing Licence Basis

The original application [R-5] provided the risks and mitigation strategies/measures for the licensed site preparation activities which characterize the risks to health, safety and the environment that may be encountered by workers and the public. The licensed activities encompassed by this licence renewal application are described in Section 2.1; the same as those in the original application.

The likely environmental, health and safety effects and mitigation measures due to the conduct of licensed site preparation activities at DNNP were summarized in Tables 4.3-1 and 4.3-2 of the original application [R-5].

The mitigation measures described in [R-5], when implemented, were considered to adequately ensure no significant residual adverse environmental effects would result from the DNNP site preparation activities. These mitigation measures took the form of a variety of commitments which are now documented in the DNNP Commitments Report [R-19]. These commitments include:

- Commitment D-P-2 and sub-commitments related to the Occupational Health and Safety Plan, which is discussed in greater detail in the SCA Conventional Health & Safety of this application (Section 5.8).
- Commitments D-P-3, D-P-12, D-P-14, D-P-15 and their sub-commitments related to Environmental Protection and Monitoring Plans, which are discussed in greater detail in the SCA Environmental Protection of this application (Section 5.9) and Site Characteristics Section (Section 4.4).
- Commitment D-P-4 and its sub-commitments related to the EPC Quality Management Plan, as discussed in the SCA Management System of this application (Section 5.1).

- Commitment D-P-5 and its sub-commitments related to Emergency Management and Fire Protection plans, which is discussed in greater detail in the SCA Emergency Management and Fire Protection of this application (Section 5.10).
- Commitment D-P-7 and its sub-commitments related to Site Security Plans, which is discussed in greater detail in the SCA Security of this application (Section 5.12).
- Commitment D-P-10 and its sub-commitments related to the development of a Traffic Management Plan, the objective of which is to reduce disruption and maintain safe traffic conditions during the site preparation period.

The mitigation measures part of the above commitments will protect the workers, the public and the environment during site preparation activities. This includes the risk of working in close proximity to DNGS and the DWMF which is described in the Radiation Protection section (Section 5.7).

Licence Renewal Updates:

Results over Initial Licence Period (i.e. 2012-Current):

As outlined in the DNNP site preparation midterm licence report [R-22] and 2019 DNNP annual report [R-21], OPG has not commenced any licensed activities under the PRSL on the DNNP site.

However, OPG continues to monitor the DNNP site conditions. Adverse and potentially adverse conditions are documented in OPG's Station Conditions Record database.

There have been no reportable events related to the DNNP since the issuance of the PRSL.

In addition, OPG submits annual reports on site preparation activities to the CNSC in accordance with Licence Condition 4.3. OPG has submitted eight annual reports, the most recent in March of 2020 [R-21].

Review of Changes:

OPG has undertaken a review of licence basis materials and baseline conditions associated with the DNNP site. In general, no new risks to health, safety or the

environment have been identified requiring new mitigation measures to be undertaken [R-18]. The reviews have identified the need to adjust some existing mitigating measures particularly in the area of Environmental Protection and these are discussed in detail in Sections 4.4 and 5.9 of this application.

In addition, a review was performed to determine the level of compliance of programs, procedures, and plans within the OPGN Management System that will control future site preparation activities in the Operating Performance SCA (see Table 3).

The program was reviewed against the requirements of REGDOC-3.1.1 and CSA N286-12 and was found to be compliant with the requirements of these documents.

In summary, the existing licencing basis and DNNP commitments, with respect to the Operating Performance of site preparation and facility construction, remain appropriate for the project scope and the management system is in compliance with the latest regulatory requirements for the site preparation phase of the project.

5.3.1 Applicable OPG Documents

The following document (see Table 3) is the applicable OPG document for Operating Performance SCA, which supports the licensing basis and is to be listed in the LCH.

Table 3: Management System Document for the Operating Performance SCA

Document	Title
N-PROG-RA-0002	Conduct of Regulatory Affairs

5.4 Safety Analysis

The Safety Analysis SCA covers maintenance of the safety analysis that supports 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.

Applicable regulatory basis:

- *Class I Nuclear Facilities Regulations*, subsection 4(e)

Existing Licence Basis

In the original application, a safety analysis was performed as required by RD-346. Additional considerations were taken from IAEA guides such as NS-R-3, *Site Evaluation for Nuclear Installations* and the suite of IAEA Safety Guide NS-G-3 (3.1-3.6). Detailed assessment reports (LBDs) in support of the original application were submitted to the CNSC following the aforementioned regulations and guides ([R-35] to [R-43]). The LBDs outline the hazard assessments performed in the original application catering to natural external hazards (seismic, meteorological, biological etc.), human-induced hazards (transport accidents, fires, explosions, etc.) and their impact on the site suitability for DNNP. The details of site suitability assessment are provided in Section 4 of this licence application.

The site evaluations resulted in some OPG commitments to be addressed in the future, which are documented in the DNNP Commitments Report [R-19]. These commitments include:

- Commitment D-P-9 and its sub-commitments require OPG to perform additional activities as required by Site Geotechnical and Seismic Hazard Investigation Program [R-19].
- Commitment D-C-3 and its sub-commitments require OPG to perform preliminary safety analysis, which will be performed during the LTC phase of the DNNP site once a design is selected.

Licence Renewal Updates:

Results over Initial Licence Period (i.e. 2012-Current):

There have been no licensed site preparation activities undertaken for DNNP over the previous licensing period. OPG periodically performs hazard screening assessments for the existing operational DNGS facility. The results from this hazard assessment are applicable to the DNNP site due to its close geological proximity. The most recent DNGS hazard screening assessment was performed in 2019 (2020 DNGS hazard screening assessment) in support of 2020 DARA PSA updates. The results from this assessment have been used to support the conclusions of this licence renewal activity.

Review of Changes:

The Safety Analysis SCA is governed under OPG's Reactor Safety Program (N-PROG-MP-0014) [R-50]. Safety analysis work performed for the DNNP PRSL application conforms with the requirements of REGDOC-1.1.1 [R-6], and updated NS-R-3 Rev.01 and SSG-18.

Detailed assessment of the impact resulting from the updates of aforementioned standards and regulations was performed as a part of this licence renewal activity. The conclusions of this impact assessment are provided in the Nuclear Safety LRAR [R-11]. The highlights of the review of changes are reflected in the site evaluation section of this report (Section 4.0).

Future planned improvements in support of the DNNP life cycle are highlighted in the DNNP Commitments Report [R-19]. The commitments specific to the Safety Analysis SCA are detailed in commitments D-C-3 and D-P-9. These commitments require OPG to submit detailed safety analysis and additional assessments required by Site Geotechnical and Seismic Hazard Investigation Program prior to LTC application, once a design is selected for the DNNP site [R-19]. As part of this activity OPG will also demonstrate that the selected design conforms to the requirements of the PPE. These commitments will be performed in conformance to the OPG programs [R-50] and applicable CNSC regulatory documents and IAEA standards as mentioned earlier.

5.4.1 Applicable OPG Documents

The following document (see Table 4) is the applicable OPG document for the Safety Analysis SCA, which supports the licensing basis and is to be listed in the LCH.

Table 4: Management System Document for the Safety Analysis SCA

Document	Title
N-PROG-MP-0014	Reactor Safety Program

5.5 Physical Design

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

Applicable regulatory basis:

- *General Nuclear Safety and Control Regulations*, paragraph 3(1)(d)
- *Class I Nuclear Facilities Regulations*, paragraphs 3(a), (b) and (j)
- *Nuclear Security Regulations*, paragraph 3(b)

5.5.1 Exclusion Zone and Emergency Planning Zones

Details and information regarding exclusion zone determination for DNNP are provided in Section 4.8 of this application.

5.5.2 Civil Structures and Civil Works

Existing Licence Basis:

The original application [R-5] provides the licensed activities planned for site preparation of the DNNP. Activities include:

a) Construction of site access control measures;
b) Clearing and grubbing of vegetation;
c) Excavation and grading of the site to a finished elevation of approximately +78 masl;
d) Installation of services and utilities (domestic water, fire water, sewage. electrical, communications, natural gas) to service the future nuclear facility;
e) Construction of administrative and support buildings inside the future protected area;
f) Construction of environmental monitoring and mitigation systems; and
g) Construction of flood protection and erosion control measures.

Details and information regarding the activities can also be found in Section 2.1 of this application. As a baseline for the DNNP, topographic figures in Section 3.1 present the extent of civil works as they are understood for the scope of the project.

Lake infilling is a civil undertaking associated with site preparation activities. Commitment D-P-16 in the DNNP Commitments Report [R-19] ensures that adequate lake infill design measures will be undertaken prior to site preparation activities. The provided design will ensure that the potential effects identified in the EA are addressed.

Results over Initial Licence Period (i.e. 2012-Current):

Since the original application, and as described in Section 2.1 of this application, OPG has completed an upgrade to the domestic and fire water supply and sewage treatment infrastructure on the DN site. The specifications of the upgrade took into account the projected needs of the DNNP based on the PPE [R-26], and included tie-in points for future use by the project. Therefore, as part of site preparation, continuation of the infrastructure to support the DNNP will be required from the tie-in points from the shared Darlington site system.

5.5.3 Layout of Areas, Structures, and Systems

Existing Licence Basis

The original application [R-5] presented the proposed layout of areas, structures, and systems of the nuclear facility to the extent practicable. A high level summary is presented in Section 3.1 of this application. Additionally, OPG has committed to performing a thorough evaluation of site layout opportunities before site preparation begins, per commitments D-P-3.7 and D-P-14.1 in the DNNP Commitments Report [R-19].

The proposed layouts are based on the parameters in the PPE [R-26]. The parameters represent the largest bounding values for the different reactor technologies evaluated for the original application. The PPE is the basis for the proposed layouts of areas, structures and systems. Once the reactor technology is chosen, a more detailed layout will be proposed. To formalize this, OPG is proposing a new commitment D-P-18, *Proposed Layout of Structures in the Final Layout State (to the extent practicable)* [R-19], as recommended in the Aggregate Assessment Report [R-18].

Licence Renewal Updates:

Figures presented in Section 3.1 of this application provide information on proposed layout of areas, structures, and systems of the nuclear facility to the extent practicable.

As outlined in the DNNP site preparation midterm licence report [R-22] and 2019 DNNP annual report [R-21], there have been no licensed site preparation activities undertaken for DNNP over the previous licensing period.

Review of Changes:

OPG has undertaken a review of licence basis materials and baseline conditions associated with the DNNP site. Section 4.0 of this application summarizes much of this review. The reviews conducted have not identified any new or changed information which would alter the proposed exclusion zone, civil structures and civil works or layout of areas, structures and systems identified in the previous application. The PPE is the basis for this information [R-26] and the review of licence basis materials has not identified any changes that impact the PPE.

In addition, a review was performed to determine the level of compliance of programs, procedures, and plans that make up the OPG Management System that will control future site preparation activities.

Furthermore, the Design Management Program (see Table 5) was reviewed against the requirements of REGDOC-2.5.2 and CSA N286-12.

In summary, the existing licensing basis and DNNP commitments, with respect to the physical design of the nuclear facility, remain appropriate for the project scope and the management system is in compliance with the latest regulatory requirements identified with respect to physical design for the site preparation phase of the project.

5.5.4 Applicable OPG Documents

The following document (see Table 5) is the applicable OPG document for the Physical Design SCA, which supports the licensing basis and is to be listed in the LCH.

Table 5: Management System Document for the Physical Design SCA

Document	Title
N-PROG-MP-0009	Design Management

5.6 Fitness for Service

In accordance with REGDOC-1.1.1 [R-6], the Fitness for Service SCA is not relevant to a licence application for a licence to prepare a site. Therefore, this section is left blank intentionally.

5.7 Radiation Protection

The Radiation Protection SCA addresses the hazards associated with exposure to radioactive substances from past or present nuclear activities, as well as from the use of tools containing radioactive nuclear substances. Radiological hazards may require mitigation to maintain the safety of workers, the environment, and the public.

Applicable regulatory basis:

- *General Nuclear Safety and Control Regulations*, paragraphs 3(1)(e), 3(1)(f), 29(1)(b), 17(d) and 17(e)
- *Class I Nuclear Facilities Regulations*, subsection 3(g)
- *Radiation Protection Regulations*

Existing Licence Basis:

As described in the original application [R-5], OPG has not requested permission to possess, transfer, use, or store nuclear substances under this licence.

Workers will not be at risk of receiving radioactive doses exceeding public dose limits as a result of the licensed site preparation activities to be performed. Work done with construction-related tools containing radioactive nuclear substances will be performed under the authority of separate CNSC Nuclear Substances and Radiation Devices licence(s) and are not part of this licence.

The DNNP site is located within close proximity of the DWMF and DNGS, and thus there could be very low level exposure to ionizing radiation above background levels during site preparation activities. Any resulting exposure to workers will be a small fraction of the regulatory limits.

There will be no dose of radiation that would merit the development of an Action Level pursuant to Section 6 of the *Radiation Protection Regulations* for the activities associated with site preparation.

OPG has committed to ensure the development of an Occupational Health and Safety Plan to describe the processes and methods that will be used to collect and interpret DNGS and DWMF facilities' perimeter radiation data and verify that workers on the project site are not receiving doses in excess of the limits for non-Nuclear Energy Workers during site preparation activities (commitment D-P-2.1)

[R-19]. Section 5.8 of this application describes the Health and Safety Plan in greater detail.

Licence Renewal Updates:

Results over Initial Licence Period (i.e. 2012-Current):

There have been no licensed site preparation activities undertaken for DNNP over the previous licensing period.

Review of Changes:

There have been no changes to the Radiation Protection SCA over the Licence Period.

In summary, OPG has found that our existing DNNP commitments, with respect to Radiation Protection, remain appropriate for the project scope for the site preparation phase of the project.

5.8 Conventional Health and Safety

The Conventional Health and Safety SCA ensures adequate implementation and oversight of a program to manage workplace safety hazards and to protect personnel and equipment. Certain radiological hazards and controls are also addressed within this section.

Applicable regulatory basis:

- *Class I Nuclear Facilities Regulations*, subsections 3(f) and 4(e)

Existing Licence Basis:

The original application [R-5] provides the framework for OPG's Health and Safety Program implementation, including the interface and accountabilities associated with the EPC Company. The program will apply to all OPG personnel supporting the project, as well as the contractors' staff.

OPG has committed to ensure the development of an Occupational Health and Safety Plan prior to the start of licensed activities (commitment D-P-2.1) [R-19]. The program will ensure compliance with all applicable laws and industry best practices, and meet CNSC requirements for a PRSL.

As described in Section 5.7 of this application, the Occupational Health and Safety Plan will address conventional hazards and potential radiation exposure of workers.

Licence Renewal Updates:

Results over Initial Licence Period (i.e. 2012-Current):

As outlined in the DNNP Site Preparation midterm licence report [R-22] and 2019 DNNP annual report [R-21], there have been no licensed site preparation activities undertaken for DNNP over the previous licensing period. 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.

Review of Changes:

A review was performed to determine the level of compliance of programs, procedures, and plans that make up the OPGN Management System that will control future site preparation activities.

The Health and Safety Management System Program (see Table 6) was reviewed to ensure it meets the requirements of the latest codes and standards, which have been updated since the original application. It is aligned with CSA N286-12, and was developed based on the *Occupational Health and Safety Act* of Ontario.

In summary, OPG has found that our existing DNNP commitments, with respect to Conventional Health and Safety, remain appropriate for the project scope and the management system is in compliance with the latest requirements identified with respect to Health and Safety for the site preparation phase of the project.

5.8.1 Applicable OPG Documents

The following document (see Table 6) is the applicable OPG document for the Conventional Health and Safety SCA, which supports the licensing basis and is to be listed in the LCH.

Table 6: Management System Document for the Conventional Health and Safety SCA

Document	Title
OPG-PROG-0010	Health and Safety Management System Program

5.9 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.

Applicable regulatory basis:

- *General Nuclear Safety and Control Regulations*, paragraphs 12(1)(c) and 12(1)(f)
- *Class I Nuclear Facilities Regulations*, subsections 3(a), 3(b), 3(c), 3(e), 3(g), 3(h), 3(j), 4(a), 4(b), 4(c), 4(d), and 4(e)
- *Radiation Protection Regulations*, subsections 4(b) and 13(1)

5.9.1 General Considerations for Environmental Protection

Existing Licence Basis:

The original application [R-5] referred to the Environmental Protection Program to address the requirements for site preparation activities as well as the environmental monitoring and EA follow up plan. OPG will ensure that the site preparation activities are performed in a manner that protects the environment through the systematic evaluation of the potential environmental effects associated with all work activities, and the implementation of measures that eliminate, manage, reduce, or mitigate the risk, in accordance with an Environmental Management and Protection Plan.

Licence Renewal Updates:

Results over Initial Licence Period (i.e. 2012-Current):

As outlined in the DNNP Site Preparation midterm licence report [R-22] and DNNP annual report [R-21], there have been no licensed site preparation activities undertaken for DNNP over the previous licensing period. Since the original application, five standards and one regulatory document have been introduced that are relevant to environmental protection during the site preparation phase. These are identified in Table 2 of the DNNP PRSL Renewal Plan [R-25] and summarized below:

- REGDOC-2.9.1, *Environmental Protection: Environmental Principles, Assessments and Protection Measures;*

- CSA N288.4, *Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills;*
- CSA N288.5, *Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills;*
- CSA N288.6, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills;*
- CSA N288.7, *Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills; and*
- CSA N288.8, *Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities.*

In addition to the new standards and regulatory document listed above since the original application, OPG has progressed and continues to progress a number of pre-requisite long lead time activities in support of DNNP commitments (see Table 7).

Table 7: Activities Progressed in Support of DNNP Site Preparation Commitments

Commitment / Sub Commitment Number [R-19]	Title	Activities Progressed in Support of Commitment / Sub-commitment
D-P-3	EPC Environmental Management and Protection Plans	
D-P-3.6	Hazardous Waste Management Plan/Procedure	• Remediation and soil characterization of areas identified by OPG as potentially contaminated with non-radioactive contaminants. These areas are shown on Figure 10 as zone F1, F3, F5 North and F5 South. • Completed activities identified in the DNNP midterm report [R-22] include: o removal and remediation of the soil in the spoils disposal area, o removal of all waste sandblast grit piles, o remediation of the former concrete plant area, and o demolition of the Emergency Vehicle Garage (Building #432) o areas of F3, F5 North and South used for parts storage or staging areas have been cleared

Commitment / Sub Commitment Number [R-19]	Title	Activities Progressed in Support of Commitment / Sub-commitment

D-P-3.8	Bank Swallow Mitigation Measures and Plans	• Bank swallow monitoring studies [R-21] [R-22] including:
		  o annual burrow counts
		  o burrow occupancy studies
		• Continued development of various artificial nesting structures and associated trial periods[R-22]
		• Advancement of research into the decline of bank swallows in Ontario [R-22]

D-P-3.9	Aquatic Environment Mitigation Measures and Plans	• Baseline update of inland aquatic habitat [R-15]:
		  o Fish habitat assessment, including flow measurement, for upper reaches of two intermittent tributaries of Darlington Creek
		  o Update of Darlington Creek fisheries from Central Lake Ontario Conservation Authority data (2010-2015)
		  o Water and sediment sampling in Coot's Pond and Treefrog Pond

D-P-3.10	Smog Alert Action Plan	• Baseline update of meteorology and ambient air quality for DNNP and the surrounding area[R-15].
D-P-12	**Environmental Monitoring and Environmental Assessment Follow-up**	
D-P-12.2	Atmospheric Environment – Methodology Reports	• Baseline update of meteorology and ambient air quality for DNNP and the surrounding area[R-15].

D-P-12.3	Surface Water Environment - Methodology Reports	• Completion of water and sediment quality studies. Studies identified in the DNNP midterm report [R-22] include:
		  o 2012 Coastal Processes and Water Quality Program
		  o 2013 Deep Water Aquatic Habitat and Characterization Study
		  o 2016 Benthic Invertebrate Community Study
		• Baseline update of sediment and surface water quality in the planned lake infill, diffuser and intake

Commitment / Sub Commitment Number [R-19]	Title	Activities Progressed in Support of Commitment / Sub-commitment
		for DNNP as well as the embayment area at the outlet of Darlington Creek [R-15].
D-P-12.4	Aquatic Environment – Methodology Reports	• Fish larvae and egg entrainment studies, which focused specifically on Round Whitefish eggs and larvae during their spawning season and larval development period [R-22]. • Baseline update of adult fish community in the Site Study Area during the spring, summer and fall seasons[R-15].
D-P-12.5	Terrestrial Environment – Methodology Reports	• Annual field inventories for breeding birds, amphibians, mammals, and inland ponds for the DN site including surveys for SAR such as the Least Bittern and Bobolink [R-15], [R-22], [R-21] • Updated Ecological Land Classification in 2013 for the Site Study Area including DNNP lands [R-22], and again in 2018 [R-15]
D-P-12.6	Geological and Hydrogeological Environment – Methodology Reports	• Updated baseline discharge estimates for Darlington Creek based on results of baseflow monitoring at five stations in Darlington Creek [R-15].
D-P-14	**Fish Habitat Compensation Plan**	
D-P-14.1	Fish Habitat Off-Setting (Compensation) Plan	• Development of Big Island Wetland off set project in collaboration with Fisheries and Oceans Canada (DFO) and Quinte Conservation Authority. • Big Island Wetland offset project created approximately 17 ha of pond and wetland fish habitat [R-22]. • Monitoring results continue to be reported to DFO and the CNSC.
D-P-15	**Round Whitefish Action Plan**	
D-P-15.1	Round Whitefish Action Plan	• Completion of studies to understand and investigate the status of round whitefish and to support the Round Whitefish Action Plan (RWAP). Studies include [R-22];

Commitment / Sub Commitment Number [R-19]	Title	Activities Progressed in Support of Commitment / Sub-commitment
		○ 2-year research program with the CANDU Owner's Group to assess the thermal impacts on embryo development and survival. Study results incorporated in a revised thermal effects model. ○ OPG contribution of fish samples to Ministry of Natural Resources and Forestry to support a genetic study on round whitefish populations in Lake Ontario.

Review of Changes:

The standards listed above will be addressed in elements of the OPGN Management System transition (see Section 5.1.1). A review was performed to determine the level of compliance of programs, procedures, and plans that make up the OPGN Management System to control future site preparation activities.

OPG holds a valid Certificate of Registration to ISO 14001:2015. The Environmental Management System Program (OPG-PROG-0005) was reviewed against the requirements of REGDOC-2.9.1, CSA N288.4, CSA N288.5, and CSA N288.6. This program was found to be compliant with the requirements of these documents.

Future implementation of CSA N288.7, *Groundwater protection programs at Class I nuclear facilities and uranium mines and mills,* and N288.8, *Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities,* will be captured through the broader fleet implementation plan.

These standards will be applied to the following environmental program areas for DNNP site preparation:

- Effluent and emissions control and monitoring measures – CSA N288.5, CSA N288.8;
- Environmental monitoring measures – CSA N288.4, CSA N288.6;
- Groundwater protection and monitoring measures – CSA N288.7; and
- Environmental management system – ISO 14001.

5.9.2 Performance of Site Preparation and Facility Construction by Different Organizations

Existing Licence Basis:

In the original application [R-5], OPG indicated that an EPC Company would be selected to prepare the site. OPG outlined the requirements and expectations of the EPC Company's quality management system. OPG also indicated that through its environmental oversight program, it would ensure that the EPC Company performs the site preparation activities in a manner that protects the environment through the systematic evaluation of the potential environmental effects associated with all work activities, and the implementation of measures that eliminate, manage, reduce, or mitigate the risk. The original application states that these activities would be carried out in accordance with the reviewed Environmental Management and Protection Plan (D-P-3 [R-19]) submitted by the EPC Company. The original application did not specifically provide performance expectations of contractors in the event that site preparation activities occur prior to the selection of an EPC Company.

Licence Renewal Updates:

Results over Initial Licence Period (i.e. 2012-Current):

As outlined in the DNNP site preparation midterm licence report [R-22] and DNNP annual report [R-21], there have been no licensed site preparation activities undertaken for DNNP over the previous licensing period.

Review of Changes:

The existing licence basis has not changed. No EPC company has been selected. The environmental performance expectations outlined in the original application are also applicable to any contractors that may be utilized for site preparation activities before any EPC Company is retained.

5.9.3 Applicable OPG Documents

The following document (see Table 8) is the applicable OPG document for the Environmental Protection SCA, which supports the licensing basis and is to be listed in the LCH.

Table 8: Management System Document for the Environmental Protection SCA

Document	Title
OPG-PROG-0005	Environmental Management System

5.10 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.

Applicable regulatory basis:

- *General Nuclear Safety and Control Regulations*, paragraph 3(1)(k)
- *Class I Nuclear Facilities Regulations*, subsections 3(f) and 3(k)

Existing Licence Basis:

In the original application [R-5][R-46], OPG provided an evaluation of the OPG Emergency Preparedness Program to show it addressed the expectations outlined in RD-346. The conclusion was that the emergency program was compliant with RD-346 and will require only minor modifications to accommodate the new NGS. OPG conducted a compliance assessment against any new or modified requirements and guidance found in REGDOC 1.1.1 to identify any potential gaps. No potential gaps were identified which directly affect the Emergency Preparedness response plans or the supporting Evacuation Time Estimates [R-10].

The original application also confirmed that the implementation of the Nuclear Emergency Plans and related protective actions will not be compromised for the life cycle of the proposed new NGS.

Licence Renewal Updates:

Results over Initial Licence Period (i.e. 2012-Current):

There have been no licensed site preparation activities undertaken for DNNP over the previous licensing period.

Review of Changes:

OPG has undertaken a review of licence basis materials and baseline conditions associated with the DNNP site.

OPG's Emergency Preparedness Program document, N-PROG-RA-0001 Consolidated Nuclear Emergency Plan (CNEP) [R-51] has been revised and issued to be compliant with current REGDOC-2.10.1 *Nuclear Emergency Preparedness and Response* [R-52], the *Provincial Nuclear Emergency Response Plan (PNERP)* -

Master Plan 2017 [R-53] and the *PNERP Darlington Implementing Plan for the Darlington Nuclear Generating Station* (2019) [R-54]. The OPG Nuclear Emergency Preparedness Planning Basis [R-55] lists and describes the documents that form OPG's planning basis for a nuclear emergency response.

OPG's Emergency Preparedness Program is broad, flexible, detailed and robust. The Emergency Preparedness Program document remains aligned with current off-site planning, preparedness and implementation interfaces. As DNNP resides partly within DNGS' Exclusion Zone (nominal 914 metres) and within DNGS' Controlled Area, as identified in the Emergency Preparedness Plan [R-47], implementing procedures addressing OPG's Emergency Preparedness requirements, per N-PROG-RA-0001 *Consolidated Nuclear Emergency Plan (CNEP)* [R-51], will be developed for DNNP. As provided for in the DNNP Commitments Report [R-19] (commitment D-P-5), an Emergency Response and Evacuation Plan will be prepared for site preparation activities and alignment of the DNNP Emergency Preparedness Plan [R-57] (commitment D-P-5) with the CNEP.

OPG has established plans and procedures to coordinate with the appropriate offsite organizations. Arrangements and agreements with offsite authorities, specific to nuclear emergencies are referenced within the CNEP, including agreements with the Province of Ontario, Region of Durham and Municipality of Clarington specific to nuclear emergencies detailing planning, preparedness, coordination measures and emergency response support.

The PNERP provides the off-site planning basis for nuclear emergencies with the goal of ensuring public safety in the event of a nuclear emergency. The PNERP Master Plan establishes the principles, concepts, organization, responsibilities, policy, functions, and inter-relationships which govern all off-site nuclear emergency planning, preparation, and response in Ontario. The PNERP implementing plan for Darlington is site-specific in nature and deals with the application of the PNERP Master Plan into local characteristics, planning and operational detail.

Since the original application, OPG has made available to off-site planning authorities a revised Evacuation Time Estimate [R-56] using the 2016 National Census Data with projections out to 2028.

There are four protocols associated with a DNNP response to a nuclear emergency at the Darlington Site: Protective Action Decision; Notification; Sheltering; and Evacuation. Protective Action Decisions, including decisions on sheltering or evacuation, are made by the Province, and implemented locally by the Durham Emergency Management Organization. Notification of any staff performing site preparation or other activities on the DNNP site is governed by the CNEP.

OPG will also ensure preparation of a fire prevention and response plan prior to the commencement of site preparation activities, and ensure that the fire protection requirements are met.

Policies, procedures and programs will be in place for fire prevention, fire notification and immediate response in accordance with National Fire Code of Canada, National Building Code of Canada and applicable codes, standards and regulations. These policies and procedures will address overall response actions to non-malevolent incidents both internal and external to the construction site for both conventional and nuclear accidents.

Since DNNP is on the DN site and within the Municipality of Clarington, the policies and procedures pertinent to fire response will include considerations for Clarington Fire Services (CFS) as primary responders in adherence with the agreement between OPG and CFS. Details of the response protocol will be agreed upon by all relevant parties prior to site preparation activities being undertaken.

The fire prevention, notification and response policies and procedures will include provisions (as required) for ongoing maintenance, revision, and review in accordance with the processes laid out in the project agreement.

5.10.1 Applicable OPG Documents

The following document (see Table 9) is the applicable OPG document for the Emergency Management and Fire Protection SCA, which supports the licensing basis and is to be listed in the LCH.

Table 9: Management System Document for the Emergency Management and Fire Protection SCA

Document	Title
N-PROG-RA-0001	Consolidated Nuclear Emergency Plan

5.11 Waste Management and Decommissioning

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.

Waste management includes both nuclear and hazardous substances that are used or produced in the course of carrying on a licensed activity and that may pose a risk to the environment or the health and safety of persons.

This area also covers the planning for decommissioning.

Applicable regulatory basis:

- *General Nuclear Safety and Control Regulations*, paragraphs 3(1)(j), 3(1)(k) and 3(1)(l)
- *Class I Nuclear Facilities Regulations*, subsections 3(e), 3(k), 4(a), 4(c)

5.11.1 Hazardous Substance and Hazardous Wastes

Existing Licence Basis:

As described in the original application [R-5], the activities licensed under the PRSL for DNNP do not involve the handling of radioactive materials and will not generate any radioactive wastes. All site preparation activities will take place outside the existing Protected Areas established on the DN site for the DNGS and the DWMF. The handling of nuclear substances is not part of this application.

Hazardous substances that may be present and/or hazardous wastes generated as a result of site preparation activities will be limited to those employed during standard construction processes. These would include chemicals, fuel, lubricants and compressed gases used during operation and maintenance of site preparation equipment, as well as solvents and cleaners used to clean the equipment. Additional substances on-site may consist of paint, aerosol cans, oil and electrical components used in the construction and relocation of services and utilities, construction of support facilities, and explosives used during excavation activities.

To manage the non-nuclear hazardous substances and waste generated by site preparation activities, OPG committed to ensure the development of a Hazardous Waste Management Plan/Procedure (commitment D-P-3.6) [R-19] prior to the

commencement of licensed activities. It is noted that 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.

In addition, to manage spill prevention and response for non-nuclear materials, OPG has committed to ensure the development of a Spill Prevention and Response Plan/Procedure (commitment D-P-3.3) [R-19] prior to the commencement of licensed activities.

Licence Renewal Updates:

Results over Initial Licence Period (e.g. 2012-Current):

There have been no licensed site preparation activities undertaken for DNNP over the previous licensing period. As a result no hazardous wastes have been generated by site preparation activities.

OPG continues to maintain and manage the DNNP site (see Section 4.4 for details).

Work to develop a Hazardous Waste Management Plan/Procedure (commitment D-P-3.6) [R-19] and a Spill Prevention and Response Plan/Procedure (commitment D-P-3.3) [R-19] will be completed prior to starting any site preparation activities.

Review of Changes:

A review of DNNP licence basis materials was conducted in the area of Nuclear Waste Management [R-14] in addition to aggregated impacts from the overall review [R-18]. This review did not identify any changes with respect to baseline information or codes, standards and practices that would necessitate an update to licence basis materials previously submitted for nuclear waste management or require new commitments or changes to existing commitments for the site preparation phase of the DNNP.

With respect to non-nuclear waste management, OPG has reviewed our current commitments regarding the development of a Hazardous Waste Management Plan/Procedure (commitment D-P-3.6) [R-19] and a Spill Prevention and Response Plan/Procedure (commitment D-P-3.3) [R-19] in addition to the results

of the Aggregate Assessment [R-18] in the area of waste management. OPG has found that our existing commitments remain appropriate for the project scope with respect to waste management.

5.11.2 Decommissioning

Existing Licence Basis:

A preliminary decommissioning plan (PDP) for the site preparation phase was developed to describe the decommissioning of the site in the event the project is cancelled after the site has been prepared for construction [R-58].

A PDP for the end-of-life station was presented in Section 12 of the EIS to address the life cycle aspects of decommissioning [R-23].

Both PDPs are managed through OPG's Decommissioning Program [R-60].

Financial Guarantees associated with decommissioning are discussed in Section 6.5 of this application.

Licence Renewal Updates:

Results over Initial Licence Period (e.g. 2012-Current):

There have been no licensed site preparation activities undertaken for DNNP over the previous licensing period that would require decommissioning.

Although, as described above, OPG has developed a PDP specific for the site preparation phase, OPG previously notified the CNSC that the current PRSL only permits limited physical activities which does not include work that would require decommissioning under CSA N294-09, *Decommissioning of facilities containing nuclear substances*. The CNSC concurred with OPG's position [R-59] that OPG's financial guarantee submission letter serves in lieu of a PDP.

OPG has committed to update our PDP for site preparation (commitment D-P-13.1) [R-19] when OPG applies for authorization to commence site preparation activities to allow more substantive site preparation work.

In accordance with Licence Condition 8.2 of the LCH [R-2], review or revision of the PDP is required every five years and OPG has provided the necessary reaffirmation

as required [R-61], the latest being in December 2017 to the satisfaction of the CNSC [R-59].

Review of Changes:

A review of DNNP licence basis materials was conducted in the area of Decommissioning [R-12] in addition to aggregated impacts from the overall review [R-18].

The two previously submitted PDPs (one for site preparation and one for end-of-life station) were used as the basis for the review. The review found that existing LBDs are compliant with REGDOC-1.1.1 decommissioning planning requirements and guidance. Therefore, the conclusions of the existing site evaluation with respect to decommissioning remain valid and appropriate for the project scope.

The review identified only minor gaps in compliance of the existing PDPs with the expectations of CSA N294-09, as G-219, *Decommissioning Planning for Licensed Activities*, was the regulatory guidance in effect at the time the PDPs were produced. These minor gaps will be resolved when the PDPs are updated as committed in DNNP Commitments Report (commitment D-P-13.1) [R-19].

In addition, a review was performed to determine the level of compliance of programs, procedures, and plans that make up the OPGN Management System that will control future site preparation activities.

These programs (see Table 10) were reviewed against the requirements of G-219 and CSA N294-09. G-219 remains unchanged since the original application and CSA N294-09 is the current decommissioning standard reflected in the OPG Nuclear operating licences for DNGS and the PNGS. OPG's Decommissioning Program has previously been shown to be compliant with the requirements of G-219 and CSA N294-09 which satisfies REGDOC-1.1.1.

In summary, OPG has found that our existing DNNP commitments, with respect to decommissioning planning, remain appropriate for the project scope and our management system to be in compliance with the latest requirements identified with respect to decommissioning for the site preparation phase of the project.

5.11.3 Applicable OPG Documents

The following documents (see Table 10) are the applicable OPG documents for the Waste Management SCA, which support the licensing basis and are to be listed in the LCH.

Table 10: Management System Documents for Waste Management SCA

Document	Title
W-PROG-WM-0003	Decommissioning Program
NK054-PLAN-00960-00001	Preliminary Decommissioning Plan OPG New Nuclear at Darlington Site – Site Preparation

5.12 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 objective of the OPG Security Program is to establish a state of security readiness to ensure safe and secure operation of OPG stations and facilities.

Applicable regulatory basis:

- *General Nuclear Safety and Control Regulations*, paragraphs 3(1)(d), 3(1)(g), and 3(1)(h) and sections 21 through 23
- *Class I Nuclear Facilities Regulations*, subsection 3(i)
- *Nuclear Security Regulations*, section 3

5.12.1 General Considerations for Security

Existing Licence Basis:

Security considerations in the original application had been evaluated for the site preparation phase under the requirements of RD-346 and applicable regulations. This evaluation was performed as per OPG's *Security Risk Management Policy*, OPG-POL-0019. The evaluation in the original application concluded the site was appropriate from a security perspective for new nuclear development. OPG also made commitments related to the application of security as documented in D-P-7.

Licence Renewal Updates:

Results Over Initial Licence Period (2012-Current):

The OPG Security Program supports OPG's need to manage residual risk to the public created by the operation of its facilities, protect assets and respond to emergencies that impact operations and the public. Key elements of this program include response to threats and maintaining compliance with legislative requirements, while minimizing the adverse impact on legitimate staff and plant operations.

The security program implemented for DNNP will be revised as required to address risk and regulatory requirements associated with the project. Revisions will occur in

a phased approach reflecting the stages of the project life cycle from site preparation, construction, and operation to decommissioning.

OPGN's Security Program is documented in N-PROG-RA-0011 *Nuclear Security* [R-64].

OPG has conducted a nuclear security review in support of DNNP's licence renewal [R-16]. The review included revising the SSTRA [R-17] and an analysis to determine if there are any program gaps with respect to current regulations, codes and standards applicable to the site preparation phase of the project. The results of the assessment did not identify any concerns that may render the site unsuitable from a security perspective. The results of this review are summarized in the sections below.

The regulatory documents REGDOC-1.1.1, REGDOC-2.12.1, *High Security Facilities, Volume II: Criteria for Nuclear Security Systems and Devices*, REGDOC-2.12.1, *High Security Facilities, Volume I: Nuclear Response Force,* Version 2, REGDOC-2.2.4, *Fitness for Duty, Volume III, Nuclear Security Officer Medical, Physical, and Psychological Fitness,* and REGDOC-2.12.2, *Security: Site Access Security Clearance*, were reviewed in the context of OPG's Nuclear Security program as it relates to the site preparation phase of DNNP.

The review concluded that OPG's Management System relating to security, implemented through the Nuclear Security program document and associated instructions and guides, meets the requirements of the applicable regulatory documents.

Proposed Measures to Comply With REGDOC-1.1.1 Site Evaluation and Site Preparation for New Reactor Facilities

OPG has updated the SSTRA [R-17] in accordance with the guidance provided in REGDOC-1.1.1. The findings documented in the revised SSTRA are consistent with the previous SSTRA findings submitted as part of the original application. The SSTRA concluded that no site characteristics would impede the development and implementation of adequate security measures through all phases of the DNNP life cycle.

The security program implemented for DNNP will be revised as required to address risk and regulatory requirements associated with the project. Revisions will occur in

a phased approach reflecting the stages of the project life cycle from site preparation, construction, and operation to decommissioning.

OPG will implement measures appropriate for each phase of the project to ensure compliance with the *Nuclear Security Regulations*, related regulatory documents and applicable codes and standards as well as any additional measures required to protect personnel, information and physical assets against security risks identified in the SSTRA.

There have been no licensed site preparation activities undertaken for DNNP over the previous licensing period. OPG continues to maintain security for and manage the DNNP site as part of the overall DN controlled area.

Review of Changes:

The review of DNNP licence basis materials conducted in the area of Security did not identify any changes with respect to baseline information or regulations, codes, standards and practices that would necessitate an update to licence basis materials previously submitted in the area of Security. In addition, OPG's review of the security related commitments as documented in commitment D-P-7 of the DNNP Commitments Report [R-19] concluded that no new commitments or changes to existing security related commitments are required for the site preparation phase of the DNNP.

The review included the OPGN Management System that will control future site preparation activities. The review concluded that OPG's management system relating to security, implemented through the Nuclear Security Program meets the requirements of the applicable regulatory documents.

OPG's measures to comply with REGDOC-1.1.1 Section 4.12 Security, Nuclear Security Regulations Section 3, Class 1 Nuclear Facility Requirements, Section 3(i), General Nuclear Safety and Control Regulations Section 3(1)(e), 3(1)(g), 3(1)(h) are described in paragraphs 5.12.2 to 5.12.9 below.

5.12.2 Prescribed Information

OPG-STD-0030 *Protecting OPG's Information and Intellectual Property* [R-62] governs the access to, use, storage and transmittal of prescribed and security protected information. OPG staff and contractors are required to comply with the requirements of this standard. Prescribed and security sensitive information is only

provided to persons with a valid security clearance and "need to know". OPG's methods to protect prescribed information are further discussed in a separate security protected submission [R-16] and the DNGS Station Security Report [R-63] and are applicable to DNNP.

5.12.3 Site Security Measures

OPG will implement security measures appropriate for each phase of DNNP based on the requirements of the *Nuclear Security Regulations* and associated regulatory documents as well as any additional measures identified through its threat and risk assessment process. Security measures relating to the DNNP site will be established in accordance with N-PROG-RA-0011, Nuclear Security.

Access Control

The DNNP site is contained within the DNGS controlled area. Public access to the DNGS controlled area is restricted through the use of fencing and signage, with the exception of the portion occupied by the waterfront trail on the north and the soccer fields on the west areas of the site. OPG Nuclear Security Officers (NSO) patrol the controlled area on a regular continuous basis.

During site preparation activities, security and access control measures will be established as appropriate, such as additional fencing and contractor security staff, meeting OPG requirements.

A site plan containing additional information in accordance with Section 16 of the *Nuclear Security Regulations* will be developed for the DNNP site at the appropriate phase of the project.

Prescribed Equipment

It is not anticipated that prescribed equipment would be used during the site preparation phase. In the event that prescribed devices are to be used, measures to control access to and prevent unauthorized use or removal of the prescribed equipment will be developed upon identification that any such equipment is to be used during the site preparation phase.

5.12.4 Site Access Clearance

OPG maintains a clearance program that is in compliance with the *Nuclear Security Regulations* and CNSC REGDOC-2.12.2, *Site Access Security Clearance*. Staff and contractors requiring unescorted access to DNNP site, in excess of five consecutive days, will require a security clearance commensurate with the activities performed and access required. Any staff requiring access to prescribed information require an OPG site access security clearance regardless of work location.

5.12.5 Security Arrangements with Offsite Response Forces

OPG has an agreement with the Durham Regional Police Service (DRPS) that documents arrangements with DRPS to provide an offsite response to OPG facilities located on the Pickering and Darlington sites [R-63]. The agreement ensures the necessary resources are available to address design basis security events. OPG conducts drills and exercises that include integrated response with the DRPS offsite response force. Lessons learned from these drills and exercises are implemented within the security program. The agreement includes requirements to ensure compliance with *Nuclear Security Regulations* section 35. The agreement is subject to annual review and may be revised if required to reflect any additional response needed to address the DNNP during various phases of the project. A copy of the agreement has been previously submitted to the CNSC as an attachment to the *Darlington Nuclear Generating Station Security Report* [R-63].

5.12.6 Physical Security

Physical security measures for the site preparation phase of the DNNP project will focus primarily on DNNP site access control as described above. Additional security measures to comply with the *Nuclear Security Regulations* and associated regulatory documents will be implemented during the construction and operating phases of the DNNP project.

A description of DNGS site existing security equipment, systems and procedures as well as a description of proposed on-site and off-site communications equipment, systems and procedures is contained in the *Darlington Nuclear Generating Station Security Report* [R-63] previously submitted to the CNSC. Additional equipment, systems and procedures will be implemented as well during the construction and operating phases of the DNNP, where required.

5.12.7 Cyber Security

OPG's Cyber Security Program (OPG-PROG-0042) is designed to implement OPG's corporate Cyber Security Policy (OPG-POL-0035). Information technology and industrial control systems are managed in a secure, vigilant and resilient manner that minimizes cyber risks to information assets, renewable generation and nuclear facilities.

The objective of Nuclear Cyber Security (N-PROC-RA-0135) is to ensure the secure operations of computer systems associated to the industrial control systems within OPG nuclear facilities. Cyber security is applied to plant systems including those used to ensure safe operations and those, which provide physical security of OPG nuclear facilities.

The nuclear portion of OPG's Cyber Security Program, N-PROC-RA-0135, *Cyber Security*, complies with the requirements identified in CSA N290.7-14, *Cyber Security for Nuclear Power Plants and Small Reactor Facilities*.

5.12.8 Security Officer Program

The structure and organization of the NSO service, including the duties, responsibilities and training of NSOs is documented in the *Darlington Nuclear Generating Station Security Report* [R-63].

OPG selects, trains, and equips NSOs in accordance with the *Nuclear Security Regulations* and CNSC REGDOC-2.12.1, *High Security Facilities, Volume I: Nuclear Response Force, Version 2* and REGDOC-2.2.4, *Fitness for Duty, Volume III, Nuclear Security Officer Medical, Physical, and Psychological Fitness*. Details relating to the selection, training, and equipment provided to both armed and unarmed NSOs is contained in the *Darlington Nuclear Generating Station Security Report* [R-63].

5.12.9 Applicable OPG Documents

The following documents (see Table 11) are the applicable OPG documents for Security SCA, which support the licensing basis and are to be listed in the LCH.

Table 11: Management System Documents for Security SCA

Document	Title
N-PROG-RA-0011	Nuclear Security
OPG-PROG-0042	Cyber Security

5.13 Safeguards and Non-Proliferation

The Safeguards and Non-Proliferation SCA is intended to prevent the unauthorized access and distribution of nuclear substances, prescribed information and equipment, and controlled components and information. Safeguards and non-proliferation measures are set up throughout the lifecycle of the nuclear power station following Canadian regulations and agreements with the IAEA.

OPG has a safeguards program in place to allow for:

- monitoring and reporting on nuclear material and activities
- providing IAEA safeguards inspectors with access to areas where nuclear material is stored, and to certain specified nuclear-related manufacturing and research activities
- providing operational and design information for nuclear facilities to the IAEA

Applicable regulatory basis:

- *Nuclear Non-Proliferation Import and Export Control Regulations*

Applicable international protocols:

- IAEA INFCIRC/140, *Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*
- IAEA INFCIRC/164, *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*
- IAEA INFCIRC/164/Add.1, *Protocol Additional to INFCIRC/164*

Existing Licence Basis:

The original application [R-5] describes the extent of nuclear substances, prescribed information and equipment, and controlled components and information that are encompassed by the site preparation licence. There will be no nuclear substances or controlled nuclear components encompassed by the site preparation licence requested.

It is anticipated that during site preparation activities there may be construction-related tools containing radioactive nuclear substances, however these activities will be performed under the authority of separate CNSC nuclear substance and device licences. Measures to control access to prescribed equipment, as well as

prevent loss or illegal use, possession or removal of prescribed equipment, already exist, or will be developed upon identification that any such equipment will be used during site preparation.

OPG has programs and processes in place to meet *Import and Export Regulations*, as well as the control of information internally. Under the Conduct of Regulatory Affairs Program, a procedure is in place to obtain, renew, or amend import and export licences. This procedure was developed to be compliant with REGDOC-2.13.2, *Import and Export, Version 2*. The Information Management Program governs how OPG manages its information, including prescribed and controlled information.

OPG has programs in place at existing operating nuclear facilities to facilitate Canada's compliance with all applicable safeguards agreements. As mentioned in the EIS [R-23], OPG will similarly operate DNNP in full compliance with IAEA standards and requirements. The measures related to site buildings and structures, operational parameters and the flow and storage of nuclear material throughout the lifecycle of the nuclear facility are described in the EIS. Additionally, OPG will meet the requirements such as declarations pursuant to the Additional Protocol on future plans and providing access and assistance to IAEA inspectors for complementary access. Detailed design information relevant to safeguards will be provided to the CNSC in subsequent phases of the project as they become available. The records required by safeguard agreements will be kept and disclosed as appropriate to the CNSC and IAEA inspectors.

Licence Renewal Updates:

Results over Initial Licence Period (i.e. 2012-Current):

In order to prepare the PPE as part of the EA, OPG was required to obtain import licences from the CNSC for various reactor technology developers. As requirements for information evolved, OPG has requested to have import licences rescinded or has allowed import licences to expire in accordance with the applicable procedure. If OPG is required to obtain any new Import or Export licences related to DNNP, these will be obtained in accordance with the Conduct of Regulatory Affairs Program and the procedure to obtain CNSC Licences.

Review of Changes:

There have been no changes to the DNNP application with regards to the Safeguards and Non-Proliferation SCA over the previous licencing period. OPG's Safeguards Program has been reviewed against REGDOC-1.1.1 and found OPG to be in compliance with requirements and expectations for the site preparation phase of the project.

In summary, OPG has found that our existing licencing basis for the DNNP, with respect to safeguards and non-proliferation, remains appropriate for the project scope and our management system is in compliance with the latest regulatory and international protocol requirements for the site preparation phase of the project.

5.14 Packaging and Transport

In accordance with REGDOC-1.1.1 [R-6], the Packaging and Transport SCA is not relevant to a licence application for a licence to prepare a site. Therefore, this section is left blank intentionally.

6.0 Other Matters of Regulatory Interest

6.1 Environmental Assessment

In 2006, the Government of Ontario directed OPG to initiate the federal approvals process for new nuclear generation at an existing OPG site. A public hearing, conducted by a JRP of the Canadian Environmental Assessment Agency and Canadian Nuclear Safety Commission, was held from March to April 2011 to consider the DNNP EIS and PRSL application. In May 2012, the Government of Canada accepted the JRP recommendations for the DNNP, which concluded that the DNNP would not likely cause significant adverse environmental effects provided that OPG implements the mitigation measures proposed and commitments made during the hearing as well as the JRP's recommendations [R-19]. Since 2012, the DNNP scope and planned activities for site preparation remain unchanged from the original application [R-5].

6.2 Public Information and Disclosure Program

6.2.1 Public Information Program

OPG's Corporate Relations organization adheres to the principles and process for external communications as governed by the nuclear standard N-STD-AS-0013, *Nuclear Public Information and Disclosure*.

This document guides OPG's external community stakeholder activities, public response requirements of issues or significant events and OPG's standards to respond to the public. OPG's nuclear public information disclosure protocol is posted to our public website: www.opg.com

For OPG's Darlington Nuclear site, the community relations program proactively provides information to stakeholders on Darlington station operations and the status of key projects, including the DNNP.

OPG's community relations and public information program has been recognized as a strength by national and international utility peers. OPG benchmarks current practices amongst other industries to ensure continuous performance improvement.

6.2.2 Communications and Consultation – Darlington New Nuclear Project

In 2009, as part of the original application, OPG submitted a proposed Public Communications and Consultation Program for Site Preparation for DNNP, in accordance with CNSC Regulatory Document RD-346 and RD-99.3, *Public Information and Disclosure*.

This program built on the existing program in place at Darlington Nuclear, which has been in existence for many years and meets or exceeds all regulatory requirements. Where necessary, the program was augmented to include activities and/or stakeholders potentially interested in DNNP, but not usually within the scope of the Darlington program.

Since the licence was granted, OPG has continued to inform the public and stakeholders about the status of DNNP as an adjunct to the existing Darlington Nuclear public information program, through various methods and forums.

Information Sharing

Some methods of information sharing include, but are not limited to, the following:

- OPG provides information on DNNP and related licensing activities, as well as general information on nuclear power and the DNGS, both online and at its existing facilities at Darlington and Pickering.
- Darlington Nuclear maintains a fully-staffed Public Information Centre, where members of the public can receive information on DNNP as well as on current operations, and where staff can respond to questions. OPG also maintains a toll-free information line.
- OPG's public website serves as a means of interaction with members of the public and stakeholder groups.
- OPG maintains a presence on social media (Facebook, Twitter, and Instagram) and shares information through these media.

Community Outreach

OPG works to ensure transparency with the community adjacent to the Darlington/DNNP site and Indigenous communities with established or asserted rights and/or interests in the vicinity of Darlington/DNNP; meeting often with stakeholder groups, elected officials and municipal representatives, as well as with stakeholder groups that have a longstanding interest in the safety of nuclear power. Outreach activities to interested groups and communities may include:

- Presentations and site bus tours of the Darlington site (including the DNNP lands) to community groups, key stakeholders, industry partners and the general public.
- Quarterly Neighbours Newsletter for the Darlington Nuclear station, which is distributed to about 120,000 residents and businesses within ten kilometers of Darlington and posted online. Applicable updates on DNNP and licensing activities are included in these newsletters.
- Community groups are encouraged to use the Information Centre for events unrelated to the industry. Its meeting room and event space were built to help build greater ties to the community, and DNNP materials are available at the Information Centre to provide information and generate discussion.

- A welcome letter from the Darlington Nuclear Site Vice President is distributed to new residents in the community via the community programs (i.e. Welcome Wagon), along with relevant information pertaining to the Darlington Nuclear station and DNNP.
- Information on DNNP is made available at OPG's annual public open house for the local and regional communities, which are widely advertised with a focus on the nearby community. Staff from OPG and various industry partners are present to answer questions and provide information on DNNP, nuclear power and existing station operations.

Community Committees

OPG works with established local community committees on matters of interest and concern related to our operations and projects. Updates on the status of DNNP and licensing activities are provided to the committees.

- The Darlington Community Advisory Council meets regularly to exchange information with community leaders and local residents and who in turn, provide advice to senior OPG staff on issues of environmental, economic and public concern.
- OPG has a representative on the Durham Nuclear Health Committee and OPG staff make regular presentations on a variety of environmental, community outreach and operational issues. The committee is chaired by the Durham Region Medical Officer of Health.

Commitment:

As part of the issuance of the PRSL, OPG undertook a commitment in support of Indigenous, stakeholder and public communications and consultation, as outlined in DNNP Commitments Report [R-19]; Commitment D-P-17 - Communications, Consultation and Stakeholder Relations Program/Plan.

OPG committed to provide a Communications, Consultation and Stakeholder Relations Program to the CNSC, no later than 60 days prior to commencement of PRSL licensed activities. OPG remains committed to delivering this as part of a renewed PRSL.

6.2.3 Licence Renewal Updates

OPG recognizes that members of the local community, stakeholders and the general public have a legitimate interest in licence renewal activities related to DNNP. Since OPG's decision to apply for a licence renewal, OPG has continued to use the existing public information program (including activities and forums described above) to communicate relevant information and will continue to do so throughout the licensing activity period, including promotion of opportunities for public involvement in the process.

OPG conducted a clause-by-clause review to ensure compliance between REGDOC-3.2.1, *Public Information and Disclosure* and OPG's relevant management system documents. The review identified one gap, which has since been addressed, and OPG's relevant documentation and governance has been updated to reflect the change.

As part of the preparation of this application, OPG undertook activities in order to confirm the local community's confidence in OPG and found that general feelings of personal health, safety and community satisfaction had not significantly changed since submission of the initial application.

6.2.4 Summary

In preparation for the renewal of the PRSL, OPG will continue to undertake communications and engagement activities with the specific objectives of ensuring stakeholders, the public and indigenous communities are:

- aware of OPG's intention to renew the licence;
- provided with a forum to discuss key topics of public interest related to the application renewal;
- made aware of opportunities for public participation in the licensing process.

The activities to be undertaken will meet the requirements outlined in CNSC REGDOC-3.2.1. OPG will also meet the commitments made as part of the initial PRSL with respect to communications and consultation.

6.3 Indigenous Engagement Update

6.3.1 Indigenous Engagement Program

OPG is committed to engaging with Indigenous communities regarding its current nuclear operations and future nuclear projects, including the DNNP.

OPG's *Indigenous Relation Policy*, OPG-POL-0027, acknowledges the Aboriginal and Treaty rights of Indigenous communities as recognized in the *Constitution Act, 1982* and OPG regularly undertakes engagement with Indigenous communities with asserted or established Aboriginal and treaty rights and/or interests proximate to the project site. The policy also provides a framework for engaging with Indigenous communities and providing support for community programs and initiatives.

These Indigenous communities include:

- Members of the Williams Treaties First Nations:
    - Beausoleil
    - Rama
    - Georgina Island
    - Scugog Island
    - Hiawatha
    - Curve Lake
    - Alderville
- Mohawks of the Bay of Quinte
- Métis Nation of Ontario, Region 8

Indigenous engagement specific to the DNNP began in 2006 and continued throughout the duration of the EA licensing process, up to, including and since the issuance of the PRSL in 2012. Engagement methods have included: information sharing sessions/presentations; tours of the site; request for review and input to OPG's original application supporting documents relating to Indigenous aspects; and invitation to observe archaeological activities on the DNNP site.

6.3.2 Licence Renewal Updates

Since the PRSL was issued in 2012, OPG has continued to meet regularly with the Indigenous communities noted above on an ongoing basis to provide details of nuclear operations, projects, environmental performance, and to discuss interests and identify concerns. As discussed previously, OPG also maintains a public website (www.opg.com) which disseminates relevant information, reporting and notices regarding company activities, including for DNNP to the general public as well as Indigenous communities.

The CNSC published REGDOC-3.2.2, *Indigenous Engagement* [R-66], since the issuance of the PRSL, which sets out requirements and guidance for licensees on Indigenous engagement. OPG conducted a clause-by-clause review of REGDOC-3.2.2 to ensure compliance between the current regulatory document and OPG's relevant management system documents. OPG reviewed its Indigenous Relations Policy as it related to REGDOC-3.2.2 and no significant gaps were identified.

In support of the PRSL renewal, OPG submitted to the CNSC an Indigenous Engagement Plan in October 2019, which documents the engagement scope and activities on the DNNP that OPG has and will conduct throughout the licence renewal of the DNNP's PRSL.

In accordance with the plan, OPG provided project and licensing updates and conducted tours of the DNNP for Indigenous community representatives. Planned engagement in 2020 and 2021 ahead of the licence renewal public hearing will be focused on the identified Indigenous communities noted above and will include information sharing focused on DNNP as well as other topics of interest raised in previous engagement sessions, for example: Emergency Preparedness; Environmental Conditions; Land Use; Nuclear Waste Management; and others.

The results of DNNP PRSL renewal activities will be shared with the identified Indigenous communities as they become available.

Furthermore, OPG submitted to CNSC an *Indigenous Engagement Report* [R-20] for DNNP, in accordance with REGDOC-3.2.2 and DNNP PRSL Renewal Plan [R-25]. The report provides a list of Indigenous groups identified for engagement, a summary of the Indigenous engagement activities conducted to date, a

description of planned Indigenous engagement activities, and the proposed schedule for interim reporting to the CNSC.

Commitments

As part of the issuance of the PRSL, OPG undertook a commitment in support of Indigenous, stakeholder and public communications and consultation, as outlined in the DNNP Commitments Report [R-19]; Commitment D-P-17 - Communications, Consultation and Stakeholder Relations Program/Plan.

OPG committed to provide a Communications, Consultation and Stakeholder Relations Program to the CNSC, no later than 60 days prior to commencement of PRSL activities. OPG has not yet completed this commitment as no licensed activities have commenced and no date has been established for licensed activity commencement; OPG remains committed to delivering this as part of a renewed PRSL.

6.3.3 Summary

In preparation for the renewal of the DNNP PRSL, OPG will continue to proactively engage identified Indigenous communities through various activities, such as briefings, community information sessions and/or workshops, etc. The specific objective is to ensure that Indigenous peoples and communities in the project area are made aware of OPG's intention to renew the PRSL and are provided with a forum to discuss key topics of Indigenous interest related to the renewal application. The activities to be undertaken will meet or exceed the requirements outlined in CNSC REGDOC-3.2.2.

6.4 Intergovernmental Consultation

This section summarizes the government bodies and agencies that OPG had consultations and involvement with during the original EA and licensing process for DNNP. It also provides an update on JRP recommendations accepted by the Government of Canada that were not directed at OPG, and a summary of consultations with governmental agencies, other than the CNSC, that have occurred since the issuance of the PRSL in 2012.

During the original EA and licensing process for the DNNP PRSL, OPG had consultations and engagement with various levels of government at the Federal, Provincial and Municipal levels. The governments and government agencies are listed in the Communication and Consultation Technical Support Document [R-72].

No consultation or engagement with other national governments was deemed necessary as the project was not anticipated to have impacts in other national jurisdictions.

Following the EA process the Government of Canada accepted a number of recommendations made by the JRP. These recommendations were directed to OPG and various levels of government as shown in Appendix D of LCH [R-2].

The recommendations directed to OPG have become part of OPG's commitments and are documented in the DNNP Commitments Report [R-19]. Their status is provided in Section 6.6 of this application.

Since OPG has an interest in the outcomes of recommendations assigned to other government bodies and agencies, OPG has monitored their progress and/or offered support to progress them such as:

- Participating in the discussions of the Public Policy Statement on land use. OPG filed comments to the Ministry of Municipal Affairs and Housing with respect to concerns of sensitive land uses in proximity to its generating stations.
- Reviewing the sensitive land use process in the Official Plan of the Region of Durham, City of Oshawa and Municipality of Clarington.

The status of those recommendations applicable to the site preparation phase are provided in Table 12. (Note the Rec. # in Table 12 is the recommendation number as listed in the LCH.)

To progress OPG commitments for the DNNP, OPG continues to engage or consult with various government agencies that have interest in respective commitments to obtain their input and/or concurrence with OPG's proposed plans to address them. Table 13 summarizes the results of those consultations and/or engagements.

Table 12: Status of Government of Canada Recommendations Applicable to the Site Preparation Phase

Rec. #*	Directed to	Recommendation Description	Applicable Phase	Status
4	CNSC	CNSC exercise regulatory oversight to ensure that OPG complies with all municipal and provincial requirements and standards over the life of the project. OPG is expected to follow applicable laws and regulations at all jurisdictional levels.	Over the Life of the Project	CNSC is providing the mandated oversight to ensure compliance with federal legislation. The provincial and municipal authorities will provide oversight to ensure compliance with the provincial and municipal legislation.
41	CNSC	CNSC coordinate discussions with OPG and key stakeholders on the effects of the project on housing supply and demand, community recreational facilities and programs, services and infrastructure as well as additional measures to help deal with the pressures on these community assets.	During Site Preparation	OPG maintains an open dialogue with key stakeholders including the local and provincial municipalities. Since 2012, OPG was involved in the following discussions: • Public Policy Statement review process and filed comments to the Ministry of Municipal Affairs and Housing with respect to concerns of sensitive land uses in proximity to its generating stations, including Darlington. • Review process of the Region of Durham Official Plan • Review process of City of Oshawa Official Plan • Review process of Municipality of Clarington Official Plan
43	CNSC	CNSC engage appropriate stakeholders, including OPG, Emergency Management Ontario, municipal governments and the	Over the Life of the Project	The Public Policy Statement issued in 2014 focuses growth within settlement areas and away from significant or sensitive resources.

Rec. #*	Directed to	Recommendation Description	Applicable Phase	Status
		Government of Ontario to develop a policy for land use around NGS's.		OPG has provided support for CNSC activities to engage stakeholders in developing policy for land use around nuclear generating stations.
44	Government of Ontario	Government of Ontario take appropriate measures to prevent sensitive and residential development within three kilometers of the site boundary.	Over the Life of the Project	The most noteworthy change from a land use perspective since the 2009 Land Use Technical Support Document was the Public Policy Statement in 2014. The Public Policy Statement introduced a new policy to ensure land use compatibility between sensitive land uses and major facilities, including electricity generation facilities. OPG participated in the Public Policy Statement discussions.
45	Municipality of Clarington	Municipality of Clarington shall prevent, for the lifetime of the nuclear facility, the establishment of sensitive public facilities such as school, hospitals and residences for vulnerable clienteles within the three kilometer zone around the site boundary.	Over the Life of the Project	OPG participated in the review of the Municipality of Clarington Official Plan, to ensure future planned land use policies in the vicinity of the Darlington site would address land use compatibility concerns and that sensitive land uses, including residential, were located within appropriate land use designations.
46	Government of Ontario	Government of Ontario, on an ongoing basis, review the emergency planning zones and the emergency preparedness and response measures, as defined in the PNERP, to protect human health and safety.	Over the Life of the Project	OPG and Government of Ontario are involved in the periodic reviews of the emergency planning zones and the emergency preparedness and response measures to ensure alignment.

Rec. #*	Directed to	Recommendation Description	Applicable Phase	Status
48	CNSC	Canadian Nuclear Safety Commission coordinate a committee of federal, provincial and municipal transport authorities to review the need for road development and modifications.	During Site Preparation	The following road development and modifications have been completed or in progress: • The Ministry of Transportation, in collaboration with OPG, advanced the construction of a new interchange at Holt Road. • The extension of Highway 407 through Durham Region to link to Highway 35/115 is completed, including the 10 km link (Highway 418) to Highway 401 immediately west of the DNGS site. The second phase of the 407 extension project included about 22 kilometres of highway from Harmony Road in Oshawa to Highway 35/115 in Clarington. OPG transferred a portion of its lands to the Province to allow for this infrastructure.
55	Health Canada/ CNSC	Health Canada and the Canadian Nuclear Safety Commission continue to participate in international studies seeking to identify long-term health effects of low-level radiation exposures, and to identify if there is a need for revision of limits specified in the *Radiation Protection Regulations*.	Over the Life of the Project	No updates or new requirements have been provided by CNSC or HC in this regard. OPG will check status with HC and CNSC.

Rec. #*	Directed to	Recommendation Description	Applicable Phase	Status
59	Municipality of Clarington	Municipality of Clarington manage development in the vicinity of the project site to ensure that there is no deterioration in the capacity to evacuate members of the public for the protection of human health and safety	Over the Life of the Project	Municipality of Clarington has issued the Official Plan which addresses the development in the vicinity of the project site. OPG participated in the discussions.
62	Environment Canada	Environment Canada evaluate the need for additional air quality monitoring stations in the local study area to monitor cumulative effects on air quality.	Prior to Site Preparation	No updates or direction have been provided by ECCC to date. OPG to engage ECCC early in the planning phase of the air quality monitoring program to be implemented prior to site preparation.
65	Government of Canada	Government of Canada make it a priority to invest in developing solutions for long-term management of used nuclear fuel, including storage, disposal, reprocessing and re-use.	Over the Life of the Project	The Government of Canada, through the *Nuclear Fuel Waste Act (2002)*, assigned responsibility for the long-term management of Canada's used nuclear fuel to the Nuclear Waste Management Organization (NWMO). In 2010, the NWMO initiated a process to select a site for the repository, one where there is suitable rock and an informed and willing host. The project will only proceed with the involvement of the interested community, First Nation and Métis communities in the area, and surrounding communities, working in partnership to implement it. Collaboration, shared decision-making and willingness underpin the siting process.

Rec. #*	Directed to	Recommendation Description	Applicable Phase	Status
				Twenty-two communities initially expressed interest in the project and "the NWMO is currently engaging with two potential siting areas, including First Nation and Métis communities in the area, interested in learning more about Canada's plan. The Township of Ignace in northwestern Ontario and the Municipality of South Bruce in southern Ontario are considered potential host areas for the project". NWMO's current strategic plan (2020-2024) is to conduct further studies of the remaining sites to narrow its focus to one preferred site for the repository, with the goal of having a single preferred site identified by 2023. The Government of Canada through NWMO continues to advance towards a safe, secure and responsible solution for the management of Canada's used nuclear fuel.

Table 13: Government Agency Consultations

Government Agency	Date and Subject of consultations	Results	Outstanding action to be completed
DNNP Fish Habitat Compensation Program			
• Fisheries and Oceans Canada	May 1, 2012 DNNP Fish Habitat Compensation Program	Agreement reached on proposed approach to Big Island Restoration	None
• Quinte Conservation	May 31, 2012 DNNP Fish Habitat Compensation Program	Quinte Conservation indicates willingness to conduct required field work at Big Island wetland	None
• Fisheries and Oceans Canada	June 19, 2012 DNNP Fish Habitat Compensation Program/Big Island Sampling Plan	Concurrence from Department of Fisheries and Oceans (DFO) regarding overall approach of proposed program. Acceptance by DFO of proposed sampling method references. Additional advice provided by DFO with respect to optimizing data collected through the sampling program.	None
• Fisheries and Oceans Canada • Quinte Conservation	November 14, 2014 DNNP Fish Habitat Compensation Program	Tour of Big Island Wetland restoration work. Confirmation that wetland restoration work is complete.	None
• Fisheries and Oceans Canada • Quinte Conservation	January 08, 2015 DNNP Fish Habitat Compensation Program	Acceptance of Actual Improvement Value for Big Island Wetland restoration work	None
DNNP Siting Methodology for Intake and Diffuser			
• Environment and Climate Change Canada	October 5, 2016 DNNP Siting Methodology for Intake and Diffuser	Input from regulators on sampling methodology to identify the optimum depth for locating future intake and diffuser and	None

Government Agency	Date and Subject of consultations	Results	Outstanding action to be completed
• Fisheries and Oceans Canada • Canadian Nuclear Safety Commission		thereby narrow down the current study area to potential sites.	
Round Whitefish Action Plan (RWAP)			
• Fisheries and Oceans Canada • Ministry of Natural Resources and Forestry • Environment and Climate Change Canada • Canadian Nuclear Safety Commission	March 21, 2013 Round Whitefish Action Plan Working Group Meeting	2011 RWAP objectives re-assessed and revised.	None
• Fisheries and Oceans Canada • Ministry of Natural Resources and Forestry • Environment and Climate Change Canada • Canadian Nuclear Safety Commission	November 19, 2013 RWAP Workshop	Developed a path forward with respect to exact terms of reference for the RWAP.	None
Bank Swallow Mitigation			
• Environment and Climate Change Canada	June 19, 2013 Bank Swallow Burrow Census Methodology Review	Method for counting burrows.	None

Government Agency	Date and Subject of consultations	Results	Outstanding action to be completed
• Canadian Nuclear Safety Commission			
• Central Lake Ontario Conservation Authority • Environment and Climate Change Canada • Ministry of Natural Resources and Forestry	June 9, 2017 DNNP Bank Swallow Workshop	Provided status on Bank Shallow studies and addressed questions posed by government agency participants.	None
• Environment and Climate Change Canada	October 3, 2017 Requirements for Migratory Birds Convention Act (MBCA) and Species at Risk Act to proposed artificial Bank Swallow structure	Recommendation that OPG obtain a "SARA-compliant" scientific permit under the MBCA for a proposed artificial Bank Swallow structure.	None
• Environment and Climate Change Canada	November 30, 2017 Requirements for Species At Risk Act - compliant MBCA Scientific Permit Application	Information obtained regarding information required in the Application and confirmation of Environment and Climate Change Canada's service standards (i.e., 90 days)	None
• Ministry of Environment Conservation and Parks	July 12, 2019 Endangered Species Act Permitting Requirements and Bank Swallow Mitigation	Confirmation of permitting requirements for an artificial Bank Swallow habitat test structure. Confirmation of permitting requirements for removal of Bank Swallow habitat along shoreline bluffs.	None
• Environment and Climate Change Canada	September 9, 2019	Confirmation of Federal permitting requirements for removal of Bank Swallow habitat.	None

Government Agency	Date and Subject of consultations	Results	Outstanding action to be completed
	Federal Permitting Requirements for Removal of Bank Swallow Habitat and Construction of Artificial Habitat		
• Environment and Climate Change Canada • Canadian Nuclear Safety Commission	March 9, 2020 and March 31, 2020 DNNP Bank Swallow Mitigation EA Commitments	Bank Swallow mitigation listed under commitment D-P-3.8 may need to be revisited in the future to align with the conditions of the Overall Benefits permit.	None

6.5 Financial Guarantee

The Nuclear Safety and Control Act (NSCA) and its regulations require that applicants make adequate provisions for the decommissioning of activities licensed by the CNSC. CNSC Regulatory Guide G-206, *Financial Guarantees for the Decommissioning of Licensed Activities* [R-68], provides guidance regarding the establishment and maintenance of measures to fund the decommissioning.

The assurance of a financial guarantee is intended to address the potential that the CNSC would find itself responsible for performance of the decommissioning effort.

As submitted in the original application [R-5], OPG proposes that a financial guarantee is not required with respect to the licence to prepare the site for new nuclear development. OPG has substantial financial assets that generate ongoing revenue that could support the costs of decommissioning efforts. In the circumstances of preparation of the DNNP site, the potential that the CNSC would become responsible for decommissioning at the conclusion of site preparation is very low. OPG will continue to operate other licensed facilities at the site and retain ownership of the property. OPG has established guarantees for those facilities that include decommissioning of the DN site.

If OPG applies for authorization to commence site preparation activities to allow for more substantive site preparation work, OPG would propose an appropriate financial guarantee in accordance to CNSC Regulatory Guide G-206 [R-68] that is commensurate with the cost estimate of the decommissioning activities. This is consistent with the OPG commitment as communicated in DNNP Commitments Report [R-19].

6.6 DNNP Commitments

OPG made a number of commitments during the EA and licensing process to obtain a PRSL. Following the issuance of the licence, these commitments were captured in the DNNP Commitments Report [R-19], which has been accepted by CNSC [R-65]. These commitments are tracked and reviewed regularly as part of the annual reporting to CNSC.

All OPG commitments associated with DNNP have been organized and grouped into key commitments to facilitate their implementation. Many of these key commitments include sub-commitments, which will be completed to satisfy the key commitment. The identified commitments are organized into three phases to align with the applicable project phase (i.e., site preparation, construction, and operation). This section focuses only on commitments for the site preparation phase. Several long lead time commitments have been progressed since the project was deferred in 2013.

For convenience, the OPG key commitments applicable to the DNNP site preparation phase and their current status are provided in Table 14 below.

As part of the licence renewal process, the Aggregate Assessment Report [R-18] was prepared to provide the overall assessment of the validity of the existing licence basis for DNNP. In addition, the report identified any mitigating actions that need to be carried forward to the DNNP Commitments Report [R-19] in the form of proposed new or modified commitments. Key changes have been discussed throughout this application. Table 15 below summarizes proposed changes to existing commitments and Table 16 below summarizes new proposed commitments. OPG will revise the DNNP Commitments Report to incorporate the proposed changes identified in Table 15 and 16 and submit it to CNSC for acceptance.

Table 14: Status of Existing Commitments for Site Preparation

Deliverable #	Deliverable Title	Status
D-P-1	DNNP Management System and Implementing Documents	D-P-1.1 to D-P-1.23: management system transition in progress [R-71].
D-P-2	EPC Occupational Health and Safety Plan	Not yet required.
D-P-3	EPC Environmental Management and Protection Plans	Active.
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	EPC Site Geotechnical and Seismic Hazard Investigation Program	Not yet required, some supporting work completed.
D-P-10	EPC Traffic Management Plan	Not yet required, some supporting work completed.
D-P-11	Archaeological Excavation Reports	Complete.
D-P-12	Environmental Monitoring and Environmental Assessment Follow-up	Active.
D-P-13	Preliminary Decommissioning Plan and Financial Guarantee	Active
D-P-14	Fish Habitat Compensation Plan	Active
D-P-15	Round Whitefish Action Plan	Active
D-P-16	Lake Infill Design	Not yet required
D-P-17	Communications, Consultation and Stakeholder Relations Program	Active

Table 15: Proposed Changes to the Existing Commitments for Site Preparation

Deliverable #	Change Description	Reference for Change
D-P-1	To be revised upon completion of Management System Transition activities.	[R-71]
D-P-2	No Change.	N/A
D-P-3	Update D-P-3.7 to include Butternut tree in site planting plans through the ESA Notice of Activity process.	[R-18]
D-P-4	No Change.	N/A
D-P-5	No Change.	N/A
D-P-6	No Change.	N/A
D-P-7	No Change.	N/A
D-P-8	No Change.	N/A
D-P-9	Update commitment D-P-9.4 to include deliverables to: • formally define the DBE ground motion values for DNNP. • define appropriate set of seismic hazard DECs and Seismic Beyond Design Conditions for DNNP. These conditions will be implemented for applicable aspects of geotechnical and seismic assessment and qualification.	[R-18]
D-P-10	No Change.	N/A
D-P-11	No Change.	N/A
D-P-12	No Change.	N/A
D-P-13	No Change.	N/A
D-P-14	No Change.	N/A
D-P-15	No Change.	N/A
D-P-16	No Change.	N/A
D-P-17	No Change.	N/A

Table 16: Proposed New Commitments for Site Preparation

Deliverable #	Deliverable Title	Reference
D-P-18	Proposed Layout of Structures in the Final Layout State (to the extent practicable)	[R-18]

6.7 Improvement Plans and Significant Future Activities

This section provides improvement plans to support the site preparation activities and significant activities planned following a successful site preparation licence renewal.

OPG intends to maintain the same scope of licensed activities for the site preparation phase in the future licensed period (no changes to the licensed activities).

Per the DNNP Commitments Report [R-19], OPG will continue to progress long lead commitments and commitments that need to be completed before the start of site preparation activities. OPG will examine and plan for the completion of any new or modified commitments that have been incorporated into the DNNP Commitments Report, such as:

1. DNNP Management System and Implementing Documents (commitment D-P-1): Complete the transition of DNNP Management System to OPGN Management System. DNNP Management system implementing documents will be replaced by the applicable OPGN Management System Implementing Documents.

2. Hazardous Waste Management Plan (sub-commitment D-P-3.6): OPG is to take more soil samples for better soil characterisation.

3. Site Geotechnical and Seismic Investigation Program (sub-commitment D-P-9):
    a. OPG to complete seismic site characterisation and to include a deliverable to formally define the DBE ground motion values and appropriate set of seismic hazard DEC for DNNP against which seismic design of SSCs will be evaluated. The definition of DBE and DECs for DNNP should consider as an input the latest PSHA results for DNGS, which currently are the 2019 results, as well as any applicable regulations, codes, standards and practices.
    b. OPG to complete site geotechnical characterisation.

In addition, in order to support the transition to the next phase of the project, OPG is planning to progress activities associated with selection of the reactor technology.

7.0 Overall Conclusion

The DNNP site evaluation has been reviewed against current codes, standards and practices as well as current site baseline data. While changes have been identified and assessed, their resulting impacts are not significant and do not alter the previous conclusion on the suitability of the DNNP site for a new NGS. As such, the DNNP site remains suitable for the new NGS and would not pose any unreasonable risk to the public, personnel or environment.

The PRSL continues to be a significant asset for OPG and the Province of Ontario, as it enables the option for future additional nuclear generation capacity in Ontario, which would maintain a reliable source of baseload nuclear power within Ontario's energy supply mix. OPG is requesting to renew the PRSL for another 10-years to allow for the project to advance in accordance with OPG's current business planning assumptions for new generation capacity.

As demonstrated in this application, OPG:

(a) is qualified to carry on the activity to be licensed; and

(b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

8.0 References

[R-1] PRSL-18.00/2022, *Nuclear Power Reactor Site Preparation Licence – OPG New Nuclear at Darlington Generating Station*, August 2012.

[R-2] Licence Conditions Handbook, *OPG New Nuclear at Darlington Generating Station Nuclear Power Reactor Site Preparation Licence PRSL 18.00/2022*, August 2012, LCH-PRSL-DNNP R001.

[R-3] *Nuclear Safety and Control Act (NSCA)*

[R-4] CSA Standard N286-12, *Management System Requirements for Nuclear Facilities*.

[R-5] OPG Letter, A. Sweetnam to Joint Review Panel, *OPG New Nuclear at Darlington Project – Application for a Licence to Prepare Site*, September 30, 2009, NK054-CORR-00531-00035.

[R-6] CNSC Document, REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*, July 2018.

[R-7] OPG Letter, M.R. Knutson to C. Carrier, *DNNP – Partial Submission of Licence Renewal Activity Reports in Support of Power Reactor Site Preparation Licence Renewal*, December 18, 2019, NK054-CORR-00531-10515.

[R-8] OPG Letter, S. Burns to C. Carrier, *DNNP Submittal of Licence Renewal Security Protected Reports In Support of Power Reactor Site Preparation Licence Renewal*, December 18, 2019, NK054-CORR-00531-00265 (OPG Confidential-Security Protected).

[R-9] OPG Report, *DNNP - Site Preparation Licence Renewal Activity Report - Seismic and Geotechnical,* December 2019, NK054-REP-01210-00106 R001.

[R-10] OPG Report, *DNNP - Site Preparation Licence Renewal Activity Report - Emergency Preparedness,* November 2019, NK054-REP-01210-00107 R000.

[R-11] OPG Report, *DNNP - Site Preparation Nuclear Safety Licence Renewal Activity Report,* November 2019, NK054-REP-01210-00108 R000.

[R-12] OPG Report, *DNNP - Site Preparation Decommissioning Planning Licence Renewal Activity Report,* November 2019, NK054-REP-01210-00109 R000.

[R-13] OPG Report, *DNNP - Site Preparation Licence Renewal Activity Report - Land Use,* November 2019, NK054-REP-01210-00112 R000.

[R-14] OPG Report, *DNNP - Site Preparation Licence Renewal Activity Report - Nuclear Waste Management,* October 2019, NK054-REP-01210-00113 R000.

[R-15] OPG Report, *DNNP - Site Preparation Licence Renewal Activity Report – Environment,* May 2020, NK054-REP-01210-00110 R001.

[R-16] OPG Report, *DNNP - Site Preparation Licence Renewal - Nuclear Security Review,* November 2019, NK054-REP-01210-00105-R000 (OPG Confidential-Security Protected).

[R-17] OPG Report, *Site Specific Threat and Risk Assessment – New Nuclear at Darlington,* November 2019, NK054-REP-00531-10000 R002 (OPG Confidential-Security Protected).

[R-18] OPG Report, *Aggregate Assessment Report for the Darlington New Nuclear Project Power Reactor Site Preparation Licence Renewal,* June 2020, NK054-REP-01210-00116 R000.

[R-19] OPG Report, *Darlington New Nuclear Project Commitments Report,* June 2020, NK054-REP-01210-00078 R004.

[R-20] OPG Report, *Indigenous Engagement Report,* May 2020, NK054-REP-07421.3-00001 R000.

[R-21] OPG Report, *2019 Darlington New Nuclear Project Annual Report,* March 2020, NK054-REP-01210-00115 R001.

[R-22] OPG Report, *Darlington New Nuclear Project – Site Preparation Licence Midterm Report,* September 2018, NK054-REP-01210-00101 R000.

[R-23] OPG Report, *Environmental Impact Statement New Nuclear - Darlington Environmental Assessment,* September 2009, NK054-REP-07730-00029 R000

[R-24] OPG letter, R.J. Hagymassy to the Joint Review Panel, c/o M. Leblanc, *OPG Application for a Licence to Prepare Site – Chapter 6 – Security Protected Information*, September 30, 2009, NK054-CORR-00531-00039 (OPG Confidential-Security Protected).

[R-25] OPG Plan, *Darlington New Nuclear Project Power Reactor Site Preparation Licence Renewal Plan*, October 2019, NK054-PLAN-01210-00004 R001.

[R-26] OPG Report, *Use of Plant Parameters Envelope to Encompass the Reactor Design Being Considered for the Darlington Site,* November 2010, N-REP-01200-10000 R003.

[R-27] OPG Report, *Darlington Nuclear Environmental Risk Assessment,* November 2017, NK38-REP-07701-00001 R001.

[R-28] OPG Report, *2019 Results of Environmental Monitoring Programs,* March 2020, N-REP-03443-10023.

[R-29] OPG Letter, L. Mitchell to C. Carrier, *DNNP – Decommissioning of Temporary Use of DNNP Site by Darlington NGS*, June 13, 2018, NK054-CORR-00531-10462.

[R-30] International Atomic Energy Agency (IAEA) in NS-R-3 (Rev 1), *Site Evaluation for Nuclear Installations.*

[R-31] OPG Report, *Site Evaluation of the OPG New Nuclear at Darlington – Nuclear Safety Considerations,* September 2009, NK054-REP-01210-00008 R001.
[R-32] Class I Nuclear Facilities Regulations (SOR/2000-204).
[R-33] CNSC Document, RD-346, *Site Evaluation for New Nuclear Power Plants*.
[R-34] OPG Report, *Darlington NGS Probabilistic Safety Assessment Summary Report,* July 2015, NK38-REP-03611-10072 R001.
[R-35] OPG Report, *Malfunctions, Accidents and Malevolent Acts Technical Support Document,* September 2009, NK054-REP-07730-00024 R000.
[R-36] OPG Report, *Site Evaluation for OPG New Nuclear at Darlington – Part 4: Evaluation of Meteorological Events,* August 2009, NK054-REP-01210-00013 R001.
[R-37] OPG Report, *Site Evaluation of the OPG New Nuclear at Darlington – Part 5: Flood hazard Assessment,* November 2009, NK054-REP-01210-00012 R001.
[R-38] OPG Report, *Site Evaluation of the OPG New Nuclear at Darlington – Part 6: Evaluation of Geotechnical Aspects,* August 2009, NK054-REP-01210-00011 R001.
[R-39] OPG Report, *Site Evaluation of the OPG New Nuclear at Darlington – Probabilistic Seismic Hazard Assessment,* September 2009, NK054-REP-01210-00014 R001.
[R-40] OPG Report, *Summary Report: Site Evaluation Studies for Nuclear Installations at Darlington – External Human-Induced Events,* September 2009, NK054-REP-01210-00010 R001.
[R-41] OPG Report, *Exclusion Zone Determination for Darlington New Nuclear Project,* September 2009, NK054-REP-01210-00003 R001.
[R-42] OPG Report, *Site Evaluation of the OPG New Nuclear at Darlington- Part 3: Summary of Seismic Hazard Evaluations,* September 2009, NK054-REP-01210-00015 R001.
[R-43] OPG Report, *Site Evaluation of the OPG New Nuclear at Darlington- Part 1 External Human-Induced Events,* September 2009, NK054-REP-01210-00017 R001 (OPG Confidential).
[R-44] OPG Report, *Emergency Preparedness Site Evaluation for OPG New Nuclear at Darlington,* August 2009, NK054-REP-03490-00001 R001.
[R-45] OPG Report, *Site Boundary Considerations for NND,* September 2009, NK054-REP-01210-00009 R001.
[R-46] OPG Report, *Emergency Planning and Preparedness Technical Support Document New Nuclear Darlington Environmental Assessment,* September 2009, NK054-REP-07730-00021 R000.
[R-47] OPG Plan, *Emergency Preparedness,* January 2011, NK054-PLAN-01210-00002 R000.

[R-48] OPG Document, *DNNP Management System,* April 2012, NK054-CHAR-0001.
[R-49] OPG Document, *Nuclear Management System,* December 2019, N-CHAR-AS-0002.
[R-50] OPG Document, *Reactor Safety Program,* August 2019, N-PROG-MP-0014.
[R-51] OPG Document, *Consolidated Nuclear Emergency Plan,* December 2018, N-PROG-RA-0001.
[R-52] REGDOC-2.10.1, *Nuclear Emergency Preparedness and Response revision 2*, 2016.
[R-53] Provincial Nuclear Emergency Response Plan (PNERP) Master Plan 2017.
[R-54] Provincial Nuclear Emergency Response Plan (PNERP) Implementing Plan for the Darlington Nuclear Generating Station (DNGS), January 2019.
[R-55] OPG Report, *OPG Nuclear Emergency Preparedness Planning Basis,* May 2017, N-REP-03490-10041 R000.
[R-56] OPG Report, *Darlington NGS Development of Evacuation Time Estimates,* April 2019, NK38-REP-03490-10133 R000.
[R-57] OPG Plan, *Emergency Preparedness*, Arrangements and Agreements with Province, Region of Durham, Clarington are confidential, January 2011, NK054-PLAN-01210-00002 R000.
[R-58] OPG Plan, *Preliminary Decommissioning Plan OPG New Nuclear at Darlington Site – Site Preparation,* September 2009, NK054-PLAN-00960-00001 R002.
[R-59] CNSC Letter, C. Carrier to M.R. Knutson, "Darlington New Nuclear Project: Preliminary Decommissioning Plan", September 5, 2018, NK054-CORR-00531-10467.
[R-60] OPG Document, *Decommissioning Program,* September 2019, W-PROG-WM-0003.
[R-61] OPG Letter, W.S. Woods to C. Carrier, "Darlington New Nuclear Project: Preliminary Decommissioning Plan", December 1, 2017, NK054-CORR-00531-10451.
[R-62] OPG Document, *Protecting OPGs Information and Intellectual Property,* November 2019, OPG-STD-0030.
[R-63] OPG Letter, S. Burns to M. Beaudette and N. Riendeau, "Darlington Nuclear Generating Station Security Report Update", November 15, 2017, 8300-CORR-00531-10073 R00 (OPG Confidential - Security Protected).
[R-64] OPG Document, *Nuclear Security*, August 2018, N-PROG-RA-0011.
[R-65] CNSC Letter, C. Carrier to M.R. Knutson, "CNSC Staff Response to OPG's Darlington New Nuclear Project Commitments Report R003", July 3, 2019, NK054-CORR-00531-10503.
[R-66] REGDOC-3.2.2, *Indigenous Engagement,* version 1.1 published August 2019.
[R-67] CSA N286-05, *Management System Requirements for Nuclear Power Plants.*
[R-68] CNSC Regulatory Guide G-206, *Financial Guarantees for the Decommissioning of Licensed Activities*, June 2000.

[R-69] OPG Report, *Site Evaluation of the OPG New Nuclear At Darlington - Part 2: Dispersion of Radioactive Materials in Air and Water,* January 2012, NK054-REP-01210-00016 R002.

[R-70] OPG Report, *Site Evaluation of the OPG New Nuclear at Darlington - Additional Considerations,* September 2009, NK054-REP-01210-00018 R001.

[R-71] OPG Letter, M.R. Knutson to C. Carrier, "*DNNP – Transition of DNNP Site Preparation Management System to OPG Nuclear Management System*", January 20, 2020, NK054-CORR-00531-10516.

[R-72] OPG Report, *Communications and Consultation Technical Support Document New Nuclear - Darlington Environmental Assessment*, September 2009, NK054-REP-07730-00028 R000.

9.0 Glossary

BLEVE	Boiling Liquid Expanding Vapor Explosion
CCME	Canadian Council for Ministers of the Environment
CNSC	Canadian Nuclear Safety Commission
CFS	Clarington Fire Services
CSA	Canadian Standards Association
CNEP	Consolidated Nuclear Emergency Plan
CWQG	Canadian Water Quality Guidelines
DARA	Darlington Risk Assessment
DBE	Design Basis Earthquake
DBPV	Design Basis Probability Value
DEC	Design Extension Condition
DFO	Department of Fisheries and Oceans
DN	Darlington Nuclear
DNGS	Darlington Nuclear Generating Station
DNNP	Darlington New Nuclear Project
DRPS	Durham Regional Police Service
DWMF	Darlington Waste Management Facility
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EcoRA	Ecological Risk Assessment
EIS	Environmental Impact Statement
EMI	Electromagnetic Interference
EMP	Environmental Monitoring Program
EPA	Environmental Protection Agency
EPC	Engineering, Procurement and Construction
ERA	Environmental Risk Assessment
ESA	Endangered Species Act
HHRA	Human Health Risk Assessment
IAEA	International Atomic Energy Agency
IESO	Independent Electricity System Operator
JRP	Joint Review Panel
LBD	Licence Basis Document
LCH	Licence Conditions Handbook

LRAR	Licence Renewal Activity Report
LTC	Licence to Construct
masl	Metres Above Sea Level
MBCA	Migratory Birds Convention Act, 1994
MECP	Ministry of Environment, Conservation, and Parks
mSv	millisievert
MWe	megawatt electric
NGS	Nuclear Generating Station
NSCA	Nuclear Safety and Control Act
NSO	Nuclear Security Officer
NWMO	Nuclear Waste Management Organization
OPG	Ontario Power Generation Inc.
OPGN	Ontario Power Generation Nuclear
PAH	Polycyclic Aromatic Hydrocarbon
PDP	Preliminary Decommissioning Plan
PHC	Petroleum Hydrocarbons
PNGS	Pickering Nuclear Generating Station
PNERP	Provincial Nuclear Emergency Response Plan
PPE	Plant Parameter Envelope
PRSL	Power Reactor Site Preparation Licence
PSA	Probabilistic Safety Assessment
PSHA	Probabilistic Seismic Hazard Assessment
REGDOC	Regulatory Document
RLC	Review Level Condition
RWAP	Round Whitefish Action Plan
SAR	Species-at-Risk
SARA	Species at Risk Act
SCA	Safety and Control Area
SSTRA	Site Selection Threat and Risk Assessment
TDG	Transportation of Dangerous Goods
VEC	Valued Ecosystem Components
VOC	Volatile Organic Compound

Appendix A Licence Application Matrix – Application Regulations

General Nuclear Safety and Control Regulations	
Requirement(s)	Application Cross-Ref.
3. (1) An application for a licence shall contain the following information: (a) the applicant's name and business address;	1.2.1
(b) the activity to be licensed and its purpose;	2.1
(c) the name, maximum quantity and form of any nuclear substance to be encompassed by the licence;	1.2.9
(d) a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence;	2.1, 2.2, 5.5, 5.12
(e) the proposed measures to ensure compliance with the *Radiation Protection Regulations* and the *Nuclear Security Regulations*;	5.7, 5.12
(f) any proposed action level for the purpose of section 6 of the *Radiation Protection Regulations*;	5.7
(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;	2.1, 2.2, 5.12
(h) the proposed measures to prevent loss or illegal use, possession or removal of the nuclear substance, prescribed equipment or prescribed information;	2.1, 2.2, 5.12
(i) a description and the results of any test, analysis or calculation performed to substantiate the information included in the application;	4.0, 5.0
(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,	1.2.9, 5.11

General Nuclear Safety and Control Regulations	
Requirement(s)	Application Cross-Ref.
processed or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste;	
(k) the applicant's organizational management structure insofar as it may bear on the applicant's compliance with the *Act* and the regulations made under the *Act*, including the internal allocation of functions, responsibilities and authority;	5.1.5, 5.10, 5.11
(l) a description of any proposed financial guarantee relating to the activity to be licensed;	5.11, 6.5
(m) any other information required by the *Act* or the regulations made under the *Act* for the activity to be licensed and the nuclear substance, nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence; and	2.1, 2.2
(1.1) The Commission or a designated officer authorized under paragraph 37(2)(*c*) of the *Act*, may require any other information that is necessary to enable the Commission or the designated officer to determine whether the applicant: (a) is qualified to carry on the activity to be licensed, or	Entire Application
(b) will, in carrying on that activity, make adequate provision 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.	Entire Application
5. An application for the renewal of a licence shall contain (*a*) the information required to be contained in an application for that licence by the applicable regulations made under the *Act (i.e. in this case: General Nuclear Safety and Control Regulations section 3, Class I Nuclear Facilities Regulations sections 3 and 6, and Nuclear Security Regulations section 3)*; and	Entire Application

General Nuclear Safety and Control Regulations	
Requirement(s)	Application Cross-Ref.
(*b*) a statement identifying the changes in the information that was previously submitted.	1.1, 2.1, 2.2, 6.6
12. (1) Every licensee shall (a) ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the Act, the regulations made under the Act and the licence; (b) train the workers to carry on the licensed activity in accordance with the Act, the regulations made under the Act and the licence; (c) take all reasonable precautions to protect the environment and the health and safety of persons and to maintain the security of nuclear facilities and of nuclear substances; (d) provide the devices required by the Act, the regulations made under the Act and the licence and maintain them within the manufacturer's specifications; (e) require that every person at the site of the licensed activity use equipment, devices, clothing and procedures in accordance with the Act, the regulations made under the Act and the licence; (f) take all reasonable precautions 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; (g) implement measures for alerting the licensee to the illegal use or removal of a nuclear substance, prescribed equipment or prescribed information, or the illegal use of a nuclear facility; (h) implement measures for alerting the licensee to acts of sabotage or attempted sabotage anywhere at the site of the licensed activity;	5.1-5.7, 5.9

General Nuclear Safety and Control Regulations	
Requirement(s)	Application Cross-Ref.
(i) take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement; (j) instruct the workers on the physical security program at the site of the licensed activity and on their obligations under that program;	
15. Every applicant for a licence and every licensee shall notify the Commission of (*a*) the persons who have authority to act for them in their dealings with the Commission;	1.2.3
(*b*) the names and position titles of the persons who are responsible for the management and control of the licensed activity and the nuclear substance, nuclear facility, prescribed equipment or prescribed information encompassed by the licence; and	1.2.6, 5.1
(*c*) any change in the information referred to in paragraphs (*a*) and (*b*), within 15 days after the change occurs.	1.2.3
17. Every applicant for a licence and every licensee shall notify the Commission of (*d*) observe and obey all notices and warning signs posted by the licensee in accordance with the *Radiation Protection Regulations*; and (e) take all reasonable precautions to ensure the worker's own safety, the safety of the other persons at the site of the licensed activity, the protection of the environment, the protection of the public and the maintenance of the security of nuclear facilities and of nuclear substances.	5.7
21 (1) Information that concerns any of the following, including a record of that information, is prescribed information for the purposes of the Act:	5.12 – 5.12.9

General Nuclear Safety and Control Regulations	
Requirement(s)	Application Cross-Ref.
(a) a nuclear substance that is required for the design, production, use, operation or maintenance of a nuclear weapon or nuclear explosive device, including the properties of the nuclear substance; (b) the design, production, use, operation or maintenance of a nuclear weapon or nuclear explosive device; (c) the security arrangements, security equipment, security systems and security procedures established by a licensee in accordance with the Act, the regulations made under the Act or the licence, and any incident relating to security; and (d) the route or schedule for the transport of Category I, II or III nuclear material, as defined in section 1 of the *Nuclear Security Regulations*. (2) Information that is made public in accordance with the Act, the regulations made under the Act or a licence is not prescribed information for the purposes of the Act. **22** (1) The following persons may possess, transfer, import, export or use prescribed information without a licence to carry on that activity: (a) a minister, employee or other person acting on behalf of or under the direction of the Government of Canada, the government of a province or any of their agencies, for the purpose of assisting themselves in exercising a power or performing a duty or function lawfully conferred or imposed on them; and (b) an official of a foreign government or an international agency, for the purpose of meeting obligations imposed by an arrangement made between the Government of Canada and the foreign government or international agency.	

General Nuclear Safety and Control Regulations	
Requirement(s)	Application Cross-Ref.
(2) The following persons may possess, transfer or use prescribed information without a licence to carry on that activity: (a) a worker, for the purpose of enabling the worker to perform duties assigned by the licensee; and (b) a person who is legally required or legally authorized to obtain or receive the information. (3) For greater certainty, the exemptions established in subsections (1) and (2) relate only to the activities specified in those subsections and do not derogate from the licence requirement imposed by section 26 of the Act in relation to other activities. **23** (1) No person shall transfer or disclose prescribed information unless the person (a) is legally required to do so; or (b) transfers or discloses it to (i) a minister, employee or other person acting on behalf or under the direction of the Government of Canada, the government of a province or any of their agencies, for the purpose of assisting themselves in exercising a power or performing a duty or function lawfully conferred or imposed on them, (ii) an official of a foreign government or an international agency, for the purpose of meeting obligations imposed by an arrangement made between the Government of Canada and the foreign government or international agency, (iii) a worker, for the purpose of enabling the worker to perform duties assigned by the licensee, or (iv) a person who is legally required or legally authorized to obtain or receive the information.	

General Nuclear Safety and Control Regulations	
Requirement(s)	Application Cross-Ref.
(2) A person who possesses or has knowledge of prescribed information shall take all necessary precautions to prevent any transfer or disclosure of the prescribed information that is not authorized by the Act and the regulations made under the Act.	
29. (1) Every licensee who becomes aware of any of the following situations shall immediately make a preliminary report to the Commission of the location and circumstances of the situation and of any action that the licensee has taken or proposes to take with respect to it: (*b*) the occurrence of an event that is likely to result in the exposure of persons to radiation in excess of the applicable radiation dose limits prescribed by the *Radiation Protection Regulations*;	5.7

Class I Nuclear Facilities Regulations	
Requirement(s)	Application Cross-Ref.
3. An application for a licence in respect of a Class I nuclear facility, other than a licence to abandon, shall contain the following information in addition to the information required by section 3 of the *General Nuclear Safety and Control Regulations*: (*a*) a description of the site of the activity to be licensed, including the location of any exclusion zone and any structures within that zone;	3.1, 4.8, 5.5, 5.9
(*b*) plans showing the location, perimeter, areas, structures and systems of the nuclear facility;	3.1, 5.5, 5.9
(*c*) evidence that the applicant is the owner of the site or has authority from the owner of the site to carry on the activity to be licensed;	1.2.5, 5.3, 5.9
(*d*) the proposed management system for the activity to be licensed, including measures to promote and support safety culture;	5.1
(*d.1*) the proposed human performance program for the activity to be licensed, including measures to ensure workers' fitness for duty;	5.1, 5.2
(*e*) the name, form, characteristics and quantity of any hazardous substances that may be on the site while the activity to be licensed is carried on;	1.2.9, 4.4.7, 5.9, 5.11
(*f*) the proposed worker health and safety policies and procedures;	5.1, 5.8, 5.10
(*g*) the proposed environmental protection policies and procedures;	5.1, 5.7, 5.9
(*h*) the proposed effluent and environmental monitoring programs;	3.2, 5.1, 5.9

Class I Nuclear Facilities Regulations	
Requirement(s)	Application Cross-Ref.
(*i*) if the application is in respect of a nuclear facility referred to in paragraph 2(*b*) of the *Nuclear Security Regulations*, the information required by section 3 of those Regulations;	5.12
(*j*) 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 and the health and safety of persons that may result from the activity to be licensed; and	5.5, 5.9, 6.2, 6.3, 6.4
(*k*) the proposed plan for the decommissioning of the nuclear facility or of the site.	5.10, 5.11.2
4. An application for a licence to prepare site for a Class I nuclear facility shall contain the following information in addition to the information required by section 3: (*a*) a description of the site evaluation process and of the investigations and preparatory work that have been and will be done on the site and in the surrounding area;	4.0 – 4.9, 5.3, 5.9, 5.11
(*b*) a description of the site's susceptibility to human activity and natural phenomena, including seismic events, tornadoes and floods;	4.0 – 4.9, 5.9
(*c*) the proposed program to determine the environmental baseline characteristics of the site and the surrounding area;	4.4, 5.9, 5.11
(*d*) the proposed quality assurance program for the design of the nuclear facility; and	5.1, 5.9
(*e*) the effects on the environment and the health and safety of persons that may result from the activity to be licensed and the measures that will be taken to prevent or mitigate those effects;	5.3, 5.4, 5.8, 5.9

Nuclear Security Regulations	
Requirement(s)	Application Cross-Ref.
3. An application for a licence in respect of Category I or II nuclear material, other than a licence to transport, and an application for a licence in respect of a nuclear facility referred to in paragraph 2(*b*) shall contain the following information in addition to the information required by section 3 of the *Nuclear Substances and Radiation Devices Regulations* or sections 3 to 8 of the *Class I Nuclear Facilities Regulations*, as applicable: (*a*) a copy of the written protection arrangements made with a response force, referred to in section 35;	5.5, 5.12 See references [R-16], [R-17] and [R-19]
(*b*) the site plan referred to in section 16;	
(*c*) a description of the proposed security equipment, systems and procedures;	
(*d*) a description of the proposed on-site and off-site communications equipment, systems and procedures;	
(*e*) a description of the proposed structure and organization of the nuclear security guard service, including the duties, responsibilities and training of nuclear security guards; and	
(*f*) the proposed plan and procedures to assess and respond to breaches of security.	
(*g*) the current threat and risk assessment.	

Appendix B REGDOC-1.1.1 Mapping to Application and OPG Documents

No.	REGDOC-1.1.1 Section(s)	Application Cross-Ref.
1.	**Introduction**	1.0, 1.1
1.1	Purpose	
1.2	Scope	
1.3	Relevant legislation	
1.4	National and international Standards	
2.	**Background**	
2.1	Environmental assessment	6.1
2.2	Public and aboriginal engagement	6.2, 6.3, 6.4
2.3	Overview of site evaluation	4.0
2.4	Overview of site preparation	5.0
3.	**Site Evaluation for New Reactor Facilities**	4.0-4.3, 4.9
3.1	Role of site evaluation in the CNSC regulatory process	4.0-4.3, 4.9
3.2	Site evaluation methodology	4.0-4.3, 4.9
3.3	General criteria for site evaluation	4.7
3.4	Gathering Baseline Data	4.4
3.5	Evaluation of Natural External Events	4.5
3.6	Evaluation of External, Non-Malevolent, Human-Induced Events	4.6
3.7	Security Considerations	4.7.7, 4.8.2, 5.12
3.8	Management system	5.1
3.9	Decommissioning	5.11.2
4.	**Site Preparation for a New Reactor Facility**	5.0
4.1	Role of site evaluation in an application for a licence to prepare site	4.0-4.3
4.2	Site preparation activities	2.1, 5.0
4.3	Management system	5.1
4.4	Operating performance	5.3
4.5	Safety analysis	5.4
4.6	Physical design	5.5

No.	REGDOC-1.1.1 Section(s)	Application Cross-Ref.
4.7	Radiation protection measures	5.7
4.8	Conventional health and safety	5.8
4.9	Environmental protection	5.9
4.10	Emergency management and fire protection	5.10
4.11	Waste management	5.11
4.12	Security	5.12
4.13	Safeguards and non-proliferation	5.13
4.14	Other matters of regulatory interest	6.0
Appendix A	Licence Application Guide: Licence to Prepare Site	Entire Application
Appendix B	Site Evaluation Program and Processes	4.2.1-4.2.3
Appendix C	Baseline Data used to Evaluate Suitability Throughout the Lifecycle of the Nuclear Facility	4.0-4.4
Appendix D	Security Baseline Data – Security risks presented by the site's location	4.7.7, 4.8.2, 5.12
Appendix E	Prediction of Effects of the Environment on the Project over the Lifecycle of the Nuclear Facility	4.0-4.9
Appendix F	Assessment of Non-Malevolent Accidents, and Malfunctions and of the Consequences	4.0-4.9
Appendix G	Effects of the Project on the Environment	4.0-4.9