ONTARIO POWER GENERATION

Albert Sweetnam
Executive Vice President

Darlington Nuclear New Project

700 University Avenue, Toronto, Ontario M5G 1X6

Tel: 416-592-7537
albert.sweetnam@opg.com

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File No: NK054-00531 P
CD No: NK054-CORR-00531-00069

Mr. Alan R. Graham
Chair, Darlington New Nuclear
Joint Review Panel

c/o Canadian Nuclear Safety Commission
280 Slater Street
Ottawa, ON
K1P5S9

Dear Mr. Chair:

OPG Response to Joint Review Panel Information Request February 2010

References:
1. JRP letter, JRP Chair to A. Sweetnam, "Darlington New Nuclear Power Plant Project: Information Requests from the Joint Review Panel", February 3, 2010, CD# NK054-CORR-00531-00064.
2. OPG letter, A. Sweetnam to JRP Chair, "Response to Information Requests from the Joint Review Panel February 3, 2010", February 8, 2010, CD# NK054-CORR-00531-00065.

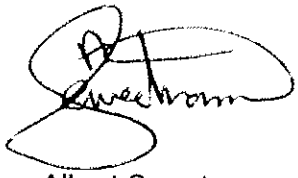
The purpose of this letter is to respond to the Information Requests (IRs) from the Joint Review Panel as provided in Reference 1.

The Attachments to this letter provide detailed responses to some of the IRs; OPG will provide responses to the outstanding IRs by March 19, 2010 as committed in Reference 2.

As the review of the Environmental Impact Statement (EIS) and Licence to Prepare a Site Application (LTPS) by the federal authorities and the Panel has not stopped (Reference 1), OPG requests clarification on which specific IRs were deemed to be sufficiently substantive to preclude further analysis of elements of these submissions. This information will allow OPG to appropriately prioritize its work on the outstanding IRs, and thus minimize any extension of the public review period to determine sufficiency of information to proceed to hearing.

If you have any questions, please contact Ms. Laurie Swami, Director of Licensing and Environment, Darlington New Nuclear Project, at 905-837-4540, extension 5203.

Sincerely,



Albert Sweetnam
Executive Vice President
Darlington New Nuclear Project
Ontario Power Generation

Att
cc. Ms. J. Beaudet, JRP Member
Mr. J. K. Pereira, JRP Member
Ms. K. McGee, JRP Co-Manager - CNSC (Ottawa)
Ms. D. Myles, JRP Co-manager – CEAA (Ottawa)

ATTACHMENT A

Attachment to OPG letter, Albert Sweetnam to JRP Chair," OPG Response to Joint Review Panel Information Request February 2010"

February 25, 2010

CD# NK054-CORR-00531-00069

OPG Response to Joint Review Panel Environmental Impact Statement (EIS) Information Request February 2010

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
2	2.3 Traditional Knowledge	**JRP IR:** Indicate if, how and where traditional knowledge, gathered through round table discussions or elsewhere, was used in development of the EIS. If it was not used, indicate why and whether there are plans to incorporate traditional knowledge before the hearings. **Rationale:** The EIS Guidelines state that "the Proponent must incorporate into the EIS the traditional knowledge to which it has access or that it may reasonably be expected to acquire through appropriate due diligence in keeping with appropriate ethical standards and without breaching obligations of confidentiality." It appears that the Proponent contacted a number of aboriginal groups; however, it is not evident whether traditional knowledge was incorporated in the EIS.
		OPG Response: OPG sought to incorporate Traditional Knowledge both in the development of the EIS and in the conduct of the EA studies. The EIS guidelines require that the proponent incorporate into the EIS the traditional knowledge to which it has access or that it may reasonably be expected to acquire**.** As described in the EIS, page 10-101 through to 10-107, OPG sought to engage Aboriginal Peoples to determine, among other things, whether local and traditional knowledge could assist in developing the EA study process or in describing the existing environment. In addition, OPG made funds available to those who wished to contribute local and traditional knowledge (among other things) in the development of the EIS. OPG did not obtain information pertaining to traditional knowledge from Aboriginal communities at the time of writing the EIS. The details of how OPG sought to incorporate Traditional Knowledge, and the efforts OPG undertook to acquire Traditional Knowledge, are described in the Aboriginal Interests TSD (AI TSD), and are summarized in the bullets below. • OPG approached First Nations, Métis and other Aboriginal Communities in March 2007 to discuss, among other things, whether local and Traditional Knowledge could assist in developing the EA study process (AI TSD, page E-2) and again in March 2008 to determine whether Traditional Knowledge could assist in describing the existing environment (AI TSD, page F-1). • On May 2, 2008, OPG invited 11 Aboriginal communities, Métis councils and organizations to participate in a roundtable discussion at Darlington Nuclear in Bowmanville, ON. OPG sought to share information on the NND EA, solicit feedback on proposed VECs and encourage dialogue among participants about a number of matters, including 'whether local and Traditional Knowledge could assist in describing the existing environment' (AI TSD, Section 8.3.3.2 page 8-6 and Appendix B page B-11).

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		• OPG introduced its New Knowledge Funding Program in March 2008, to support the contribution of new information and/or research findings of relevance and value to the EA. This program was available to those who may have wished to contribute information and/or feedback regarding proposed VECs, local and Traditional Knowledge, traditional land use and perceived impacts of the Project. Notification of this program was provided in written correspondence in the months of April and September 2008 (AI TSD, Section 8.5.3, page 8-15). • As indicated in the Aboriginal Interest TSD, Section 9.0, page 9-1, limited information was provided to OPG regarding Traditional Knowledge, or how traditional use of lands and resources could be affected as a result of the Project. Since submission of the EIS, OPG has entered into a mutually-beneficial arrangement with the Métis Nation of Ontario (MNO), to facilitate the presentation of Traditional Knowledge during the Joint Review Panel Process. OPG and the MNO will jointly present a report (the "JRP report") to the Joint Review Panel for the OPG New Nuclear at Darlington Project as soon as possible, and no later than prior to the completion of the OPG New Nuclear at Darlington EA hearings.
3	3 Presentation of the EIS	**JRP IR:** Provide cross-references to appropriate sections of the EIS, in tabular format. This will allow readers to easily locate the assessment of environmental effects when a pathway is described in multiple sections of the EIS. **Rationale:** This section provides an example of how the EIS Report format fails to convey information in a readily usable and transparent manner. This section, and many others, state "Residual effects in other environmental components as they may result from lake circulation as a pathway will be described in the appropriate section of this EIS" (EIS, Page 5-29). Not only is the necessary information fragmented and scattered throughout the EIS/TSDs, but there is no easy way to track down where those effects have actually been assessed. Cross-referencing would make the task much easier for reviewers, be they from the Government, First Nations, Métis or the general public. As it stands, this approach is a barrier to the transparency of the information.
		OPG Response: Information presented in the EIS is consistent with the format of the EIS Guidelines, and OPG provided a correlation table (Table 1.5-1) that cross-references the EIS Guidelines. The approach to presenting information was used by OPG in many of its nuclear related EAs, including Pickering NGS Units 2 and 3 Guaranteed Defuelled State (2008), Pickering B Refurbishment and Continued Operation (2007), Darlington Used Fuel Dry Storage Project (2003), Pickering A Return to Service (2000) and many more, that were completed, and subsequently accepted by the CNSC as the Responsible Authority. Specifically, with regards to finding information fragmented in s.5.3.5.3, OPG provided a summary table, Table 5.15-1 which presents a summary of the likely adverse environmental effects, mitigation and residual adverse effects, and it also states the specific pathways to other environmental components.

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
4	5.1 Setting 11 Effects Prediction, Mitigation Measures and Residual Adverse Affects	**JRP IR:** Provide: • Anticipated timeframe for the transition of land use surrounding the Darlington Nuclear Site from existing sensitive land uses to employment and industrial uses. • Reasons why it is anticipated that new and stable residential dwellings/subdivisions will be redeveloped for employment/industrial uses when public attitude research conducted by IntelliPulse (IntelliPulse 2008b) found that only 4% of LSA residents are likely to move because of the Project (EIS, Page 5-139). • The input and/or indication of support that the municipality has provided for the potential transitioning of community facilities and open spaces to employment/industrial. • Clarification of whether land use evolving in this predicted manner affects the Plant Parameter Envelope more or differently than if land use remains as "sensitive land uses" and whether the site and the corresponding design and mitigation will remain appropriate regardless of direction of land use change. **Rationale:** The EIS indicates that existing land uses in proximity to the Project site include a range of residential, employment and commercial and related uses, including sensitive land uses (i.e., residential, institutional, open spaces) and that a number of developments that are of a sensitive land use nature are proposed for the future. The EIS suggests, "As the intensity of use increases on the DN site, the existing sensitive land uses surrounding the site will likely transition to employment and industrial uses". (EIS, Page 5-110) This needs to be clarified as to the potential timing of land transition within the LSA, and to verify the data/stakeholder input on which the assumptions for the likelihood of land transition were made. Further, this information may have a bearing on other EIS and Licence to Prepare Site (LTPS) elements such as the assumptions about possible risks from the region immediately around the plant (security, external events, etc.) and their effects on the design of facility to mitigate these risks.
		OPG Response: The Regional Municipality of Durham and the Municipality of Clarington develop and adopt Official Plans which include land use policies within the municipalities. The planning period used in the Durham Regional Official Plan extends to 2031, whereas Clarington's extends to 2016. These plans are prepared with public input and assist in ensuring the future land needs of the municipalities are adequately addressed. The approved Official Plans designate some lands surrounding the Darlington Nuclear site for employment uses. Additional lands north of the Darlington Nuclear site have been identified for future employment uses to address future demands to 2056, through a recent amendment (Amendment 128) to the Durham Regional Official Plan. The actual timing of individual properties transitioning to employment uses is determined by a number of factors,

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		including market conditions and the interests of individual property owners. These types of land use transitions have no effect on the PPE, or assumptions made about possible risks to the site. The corresponding design and mitigation remain appropriate. Robust nuclear emergency plans exist to ensure the safety of the public and the environment. Both the Region and Clarington, which have responsibilities for off-site emergency response, are well aware of the proposed plans for new nuclear at the Darlington site. Detailed responses to the information request are provided below: • The timeframe anticipated for the transition of land use surrounding the DN site from existing sensitive land uses to employment and industrial uses is dependent on several factors, including land use designation, market conditions, availability of municipal services, and interests of property owners to develop their lands in accordance with the Official Plans. The Durham Regional Official Plan currently designates lands for employment uses to the west and east of the Darlington Nuclear site, as illustrated in Figure 3.3-2a found on Page A-9 of the Land Use Existing Environmental Conditions TSD. Over the long-term (i.e. from 2031 to 2056) Amendment 128 to the Durham Region Official Plan anticipates that the existing sensitive land uses immediately north of Highway 401 will transition to employment uses, with additional new residential uses further to the north and east of these employment uses (Figure 3.3-3k , Page A-24 of the Land Use Existing Environmental Conditions TSD). • New and stable residential dwellings/subdivisions are not anticipated to be redeveloped for employment/industrial uses. Section 5.8.5 of the EIS provides a general description of planned urban growth in the vicinity of the DN site, which includes a description of Durham Region's growth scenarios over time. The Public Attitude Research survey undertaken by IntelliPulse was undertaken to identify potential changes in attitudes and behaviour that might be attributable to the New Nuclear at Darlington Project and does not directly relate to municipal Official Plans governing future land uses. • Official Plans are released by the municipality for public review and comment, and ultimately adopted by Council in a vote. As such, an adopted Official Plan represents a municipality's support for those uses. Input from the municipality that indicates a potential transitioning of open space to employment/industrial is sourced from the Durham Regional Official Plan and is described in Section 3.3.2.1 of the Land Use Existing Environmental Conditions TSD. Community facilities would not be affected by this future transition, as they are permitted in the Living Area and Employment Area land use designations. • There is no relationship between land use change/evolution and the Plant Parameter Envelope (PPE). The site and corresponding design mitigation remain appropriate regardless of direction of land use change.

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5	7.1 Purpose and Need for the Project	**JRP IR:** Provide the rationale behind Ontario's Energy Policy decision to build new nuclear units at the Darlington Site. **Rationale:** The need for the Project is a problem or opportunity that the Project is intended to solve or satisfy (Addressing "Need for", "Purpose of" "Alternatives to" and "Alternative Means" under the Canadian Environmental Assessment Act (November 2007)) The Proponent has stated (EIS, Page 1-6) that the need for the Project is to fulfill Ontario Power Generation's responsibilities under the "new unit" component of the Province's directive and if approved, the Project will be available to the Province to assist in maintaining the baseload nuclear generation capacity of 14,000 MWe. There is no mention of the public consultation process that was carried out by the Province of Ontario to establish the basis for the policy decision to build new nuclear facilities at the Darlington Nuclear Generating Station
		OPG Response: As indicated in section 7.2 of the Guidelines *"provincial energy policy is not within the terms of reference of this Joint Review Panel."* The public consultation process carried out by the Province of Ontario to establish the basis for the policy decision to build new nuclear facilities at the Darlington Nuclear Generating Station is a matter of provincial jurisdiction, and performed in accordance with the provincial requirements. The relationship of this Project to provincial energy policy is discussed in section 1.1.3 of the EIS, commencing at page 1-3.
6	7.2 Alternatives to the Project	**JRP IR:** In the context of Ontario's Energy Policy, provide documentation on how alternatives to the Project were considered and compared, in respect to the lifecycle of each alternative. **Rationale:** Examination of these alternatives would allow consideration of the feasibility of both refurbishment of existing nuclear units and the construction of new units and to determine the appropriate generation mix to meet the Province's needs. An open examination of the alternatives to the Project, including determination of feasibility, would create an understanding of the current Project in the context of Ontario's Energy Policy.

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		OPG Response: As indicated in section 7.2 of the Guidelines *"provincial energy policy is not within the terms of reference of this Joint Review Panel."* The determination of the appropriate generation mix to meet the Province's need is performed pursuant to provincial requirements. The problem this project is intended to address is the existing and projected shortfall between the provincial policy objective respecting nuclear power generation and supply. To meet the provincial policy objective of sustaining the installed nuclear capacity, some new nuclear generation will be required in the future. This was reflected in the Directive provided to OPG where it was stated, *"Recognizing that maintaining the current level of nuclear baseload through 2025 will require* ***a combination of*** *refurbishment of existing units* ***and*** *construction of replacement units"*. As described in section 1.1.3 of the EIS, current installed nuclear capacity has been reduced by approximately 1,100 MW as a result of the decision to remove from operation Units 2 and 3 at the Pickering A NGS. As noted on page 1-7 of the EIS, the decision to not refurbish Pickering NGS A Units 1 and 4 has been made. As announced on February 16, 2010, OPG has also decided that the Pickering NGS B units will be removed from service after operating for approximately 10 more years. The project is required even assuming that the Darlington NGS, Bruce A NGS, and Bruce B NGS units are refurbished. Refurbishment is not an alternative to new nuclear at the Darlington site. The licensing process for the refurbishment of Darlington NGS will be undertaken separately. Possible alternatives to the Project were identified and discussed in section 1.1.4 of the EIS, commencing at page 1-7, together with the reasons why OPG has concluded that there are no reasonable alternatives to the Project that are within the control of OPG and are consistent with Provincial Energy Policy.
11	7.3 Alternative Means of Carrying out the Project 8.1 General Information and Design Characteristics	**JRP IR:** Preferred alternative means are provided in the conclusion section of the EIS. However, preferences need to be explained with data that clearly show why one option is preferred over another option for the various alternative means presented in regards to reactor designs and number of units, a range of cooling system alternatives (including hybrid cooling towers), alternatives for low and intermediate level waste, management of excavated material, and storage of used fuel. **Rationale:** Section 8.1 of the EIS Guidelines states that when identifying the preferred means the Proponent should "identify the preferred means based on the relative consideration of environmental effects, and of technical and economic feasibility; determine and

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		apply criteria that identify alternative means as unacceptable on the basis of significant adverse environmental effects; and determine criteria to examine the environmental effects of each remaining alternative means to identify a preferred alternative." The plant parameter envelope gives the maximum and minimum effects for each scenario, but does not explain why the preferred scenario is the best by comparison. The base case (reference Project) cooling water system(s) should be based on present day best available technology. The selection/evaluation criteria are required in order to properly review the Proponent's determination of the acceptability or unacceptability of alternative cooling systems, their environmental effects and of the Proponent's choice of preferred alternative.
		OPG Response: Pursuant to Section 7.3 (Alternatives Means of Carrying out the Project) of the EIS Guidelines, OPG identifies and describes in the EIS the alternative means to carry out the project that are technically and economically feasible. The EIS also describes the environmental effects of each alternative means that are feasible for OPG. As described in Section 1.1.3 of the EIS, selection of reactor technology is being undertaken by the Province of Ontario. Accordingly, as described in the Environmental Impact Statement (EIS) on page 3-8 (sections 3.2.1 and 3.2.2), the Environmental Assessment (EA) studies considered development of the New Nuclear Darlington (NND) and the alternative means of implementing the NND Project within a bounding framework. To define the NND Project for EA purposes, OPG developed the Plant Parameter Envelope (PPE) based on the reactors being considered by the Province of Ontario. The PPE represents a "Model Plant" used for assessment purposes. In defining the NND Project for EA purposes in this manner, the PPE identified the maximum or limiting features of the Project. As a result, all potential effects associated with any means of implementing the Project included in the assessment, were considered within that Model Plant, and the effects and mitigation required to minimize the identified effects incorporated into the results of the EA. The EA studies, therefore, focused on considering the overall environmental acceptability of the alternative means rather than on their preference. At the same time, recognizing the requirement of the Guidelines to consider preference, a discussion of OPG's preference concerning the alternative means for condenser cooling, management of low and intermediate level waste, storage of used fuel and management of excavated material were included beginning on page 13-6 in the EIS (sections 13.2.2 to 13.2.5). That discussion is qualitative in nature, which is deemed consistent with the Guidelines requirement to identify relative preference. Although qualitative, the discussion is presented within a framework of aspects (i.e., criteria) relevant for the comparison. For example, the discussion of relative preference of alternatives for condenser cooling is presented in a context of the Atmospheric, Surface Water, Aquatic, Terrestrial, Socio-Economic, and Land Use Environments. The summary statements of preference are OPG's and are based on factors that are not limited to environmental comparison and include, for example, operational experience and public attitudes in the local community. In addition, a review of the assessment criteria used for the alternative means evaluation can be found by reviewing the criteria used throughout the EA studies for all other aspects of the assessment. These criteria are described in detail in each

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		applicable sections of EIS Chapter 5 (e.g., the Atmospheric Environment assessment criteria are described in Section 5.2.4). The EA studies concluded that the Project will not result in significant adverse environmental effects. Therefore, it can be concluded that any of the alternative means of carrying out the Project will not result in significant adverse environmental effects.
12	7.3 Alternative Means of Carrying out the Project	**JRP IR:** The storage of used fuel options are provided, however, the environmental effects of each of these are not described and a preferred alternative is not proposed or selected. Provide an analysis of these options and provide the preferred alternative for each reactor technology. **Rationale:** The EIS Guidelines state that "The EIS must also describe the environmental effects of each alternative means."
		OPG Response: As discussed on page 13-10 (Section 13.2.4) of the Environmental Impact Statement (EIS), each reactor will require design-specific used fuel management components, most notably, the dry storage containers, and alternatives for those containers were considered in the EA. Evaluation of alternative onsite locations for the used fuel dry storage facility is considered in the framework of the bounding site development layout. The specific design and location of storage for used fuel is dependent on selection of the reactor technology. However, the assessment of effects established that all considered forms of dry storage of used fuel will be acceptable from an environmental perspective. The EA studies concluded that the bounding Project will not result in any significant adverse environmental effects. Therefore, it can be concluded that incorporation of any of the alternative means into the Project will not result in any significant adverse environmental effects.
13	7.3 Alternative Means of Carrying out the Project	**JRP IR:** The management of low and intermediate level radioactive waste options are provided. However, the environmental effects of each of these are not described. Provide an analysis of these options for each reactor technology. **Rationale:** The EIS Guidelines state that "The EIS must also describe the environmental effects of each alternative means."

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		OPG Response: As discussed on page 13-10 (Section 13.2.3) of the Environmental Impact Statement (EIS), two alternative means of managing Low & Intermediate Level Waste (L&ILW) were considered for EA purposes: i) management of the waste on the DN site in a new L&ILW management facility; and, ii) transport of the L&ILW off the DN site to an appropriately licensed facility elsewhere. Both options were incorporated into the Project for EA Purposes (EIS Chapter 2) and were assessed individually including aspects associated with transportation to an off-site facility. A consideration of alternative onsite locations for a L&ILW management facility was included in the framework of the bounding site development layout. The assessment of effects established that neither form of management of L&ILW will result in a significant residual adverse effect. The EA studies concluded that the bounding Project will not result in any significant adverse environmental effects. Therefore, it can be concluded that incorporation of any of the alternative means into the Project will not result in any significant adverse environmental effects.
14	7.3 Alternative Means of Carrying out the Project	**JRP IR:** The alternatives for excavated material management are provided. However, the environmental effects of each of these are not described. Provide an analysis of these options for each reactor technology **Rationale:** The EIS Guidelines state that "The EIS must also describe the environmental effects of each alternative means."
		OPG Response: Information regarding alternatives for excavated material management and a summary of the environmental effects of the bounding site development layout for excavated material is provided starting on page 13-11 (Section 13.2.5) of the Environmental Impact Statement (EIS). As described in the EIS starting on page 2-18 (Section 2.4.2), three separate model plant layout scenarios were conceptualized, with each one representing the reasonable maximum extent for key parameters of the Project. The layout scenarios are realistic yet conservative, and considerably influenced by factors that remain uncertain, such as selection of the condenser cooling option, and opportunities for soil use and disposal. Excavated material quantities for the three model plant layout scenarios are indicated on page 13-12 in Table 13.2-1, with EA assumptions concerning use and disposal of the material. They, and the development concepts from which they were derived, are considered to be reasonable and conservative based on conditions at the DN site and overall development requirements; and therefore, appropriate for EA purposes. The largest quantity of excavation was adopted as the bounding site development layout for the purpose of assessment of the environmental effects related to soil and rock management.

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		The assessment of environmental effects for all activities including management of excavated material is described in the applicable sections of EIS Chapter 5. On page 5-3, Table 5.1-1 "*Potential Project-Environment Interactions"* provides a cross reference between Project Works & Activities and the environmental components. These environmental components are discussed in detail in the applicable Assessment of Environmental Effects Technical Support Documents**.** The EA studies concluded that the bounding Project will not result in any significant adverse environmental effects. Therefore, it can be concluded that incorporation of any of the alternative means into the Project will not result in any significant adverse environmental effects.
15	8.0 Description of Project 8.2 Site Preparation 8.3 Construction 11.2 Mitigation Measures	**JRP IR:** Provide the measures that will be taken to control sediment discharge to the lake. Provide the criteria to be used to determine "clean" fill material and the water quality guidelines to be followed when constructing the infill, including the cofferdam and any water intake and discharge structures. Provide the sediment testing and sediment management measures that will be undertaken for Lake Ontario sediments that may be disturbed or removed during construction activities. **Rationale:** The use of "clean fill" is an important aspect of site preparation and it is necessary to assess any effects on lake water quality during lake infilling, including construction of the cofferdam. Both the Surface Water Assessment of Environmental Effects TSD (Section 3.2.4) and the Aquatic Environment Assessment of Environmental Effects TSD (Section 3.2.1) acknowledge that suspended sediments may cause potential effects to the surface water quality, however no information is provided on how the sediments from these construction activities will be managed. The discharge water quality objectives for dewatering the contents of the completed cofferdam are necessary to assess the effects on lake water quality.
		OPG Response: Mitigation measures to control sediment discharge to Lake Ontario have been detailed to the extent practicable at this stage of NND Project planning. All aspects of the Project, including mitigation measures to control sediment discharge, will be further defined as the Project evolves through the licensing process. Since most mitigation measures are directly related to Project design aspects, the details of each measure will be elaborated during ongoing design phases and subject to detailed review during licensing.

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		OPG requires CNSC guidance on the jurisdictional boundary to be applied to the New Nuclear at Darlington (NND) Project before OPG is able to ascertain the specific criteria for "clean" fill and guidelines for water quality to be followed prior to constructing the lake infill, cofferdam, cooling water intake and discharge structures associated with the Project. The designation of nuclear facilities as Federal undertakings under the Nuclear Safety and Control Act (NSCA) places them under the exclusive jurisdiction of the Federal government. In the past, licences granted under the Atomic Energy Control Act required licensees to comply with other statutes, such as Provincial law and associated standards. Consequently, under the NSCA, the CNSC is to provide direction and clarification on the jurisdictional boundary that is to be applied to the NND Project. CNSC's determination of the jurisdictional boundary and its subsequent implementation, during site preparation and later phases of the Project, will provide jurisdictional clarity with respect to the application of Federal, Provincial or Municipal law (and associated guidance documents), and the authority responsible for administering that law. As described on page 2-80 (EIS, s. 2.9.1), the environmental effects of the NND Project will be ameliorated by the incorporation of Good Industry Management Practices into Project implementation. As the Project planning and design evolves, all Good Industry Management Practices (incorporating Good Utility Practices), will be integrated into a comprehensive and overarching Environmental Management Plan (EMP). Prior to commencing site preparation or construction, either OPG or the contractor will be required to prepare an EMP. The EMP will consolidate the strategic-level program for managing, through pro-active and pre-emptive means, the environmental effects of the Project. A key element of the EMP will be the requirement to prepare detailed, implementation-level Environmental Protection Plans (EPPs) as necessary to address specific aspects of the works that may contribute to environmental effects. An EPP is a specific and detailed procedure to guide implementation of an activity in a manner that will protect against environmental effect. Accordingly, under the EMP, detailed and specific Erosion and Sediment Control Plans will be developed, and specific monitoring requirements will be identified. OPG will independently monitor aspects of the performance of the contractor where there is a risk to the environment identified by the site preparation or construction activities. As identified on page 3-13 (Scope of Project for EA Purposes TSD, s. 3.1.3.1), the use of silt curtains, an example of Good Industry Management Practice, may be included in an EPP for managing suspended sediments during the proposed lake infill construction. Silt curtains or turbidity barriers may be maintained in place to encircle the dam-building operations to control sediment movement in the water column. This technology is typically a geo-textile curtain that is suspended from a line of floats weighted down by chains to maintain vertical geometry in the prevailing wave and current environment. The geo-textile curtain is permeable to the flow of water, but blocks the flow of sediments out of the work area. As described on page 3-13 (Scope of Project for EA Purposes TSD, s. 3.1.3.1), once the cofferdam for the lake infill is complete, the water contained within the dam will be pumped out and discharged to Lake Ontario over a period of several weeks. All appropriate measures will be incorporated into the pump out operation to ensure that discharge water quality meets applicable objectives. The material placed within the cofferdam to create the new landform will originate on-site and will satisfy applicable requirements for fill quality for lake filling in Ontario.

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17	8.1 General Information and Design Characteristics	**JRP IR:** Clarify potential inconsistencies presented in Table 4.5-1 related to intake volumes, condenser cooling water discharge temperatures and flow rates for natural and mechanical draft cooling towers. Evaluate and justify the bounding scenario assumptions for cooling water temperatures and flows. **Rationale:** SEATSD Table 4.5-1: It is not clear why the intake volume for the ACR1000 is twice that of the PWR's when the power output of the four unit ACR1000 is 4340 MWe versus 4740 MWe for three units of EPR and 4148 MWe for four units of APR1000. The condenser cooling water discharge temperature is indicated in the table to be nearly double for the PWRs versus the ACR1000 system but considering that if the intake volume for the PWRs is increased then the discharge temperature should decrease correspondingly, this difference may be a function of the intake volume differences. However, there is no information to explain why PWRs need lower intake volumes that likely result in the higher discharge temperatures stated in the table. On the other hand, the flow rate for Mechanical and Natural draft cooling towers for the PWRs is nearly twice that of the water flow indicated by the ACR1000 which is contrary to the logic above. In light of the fact that the thermal load generated by each reactor technology is relatively similar (4xACR1000, 4xAPR1000 and 3xEPR) additional information describing why the inconsistencies exist would be helpful. The bounding case for Site Drainage and Water Quality category of the Operation of Condenser Circulating Water, Service Water and Cooling Systems Project component identifies 9˚C as the maximum temperature rise however, Table 4.5-1 in the Scope of the Project for EA Purposes TSD show that 15.6˚C is the cooling water temperature rise for the PWRs. While the discharge volume from the PWRs is significantly less than the stated bounding conditions, if the maximum bounding conditions are to be considered for this Project then the 15.6˚C with the corresponding lesser volume condition may be more appropriate as the bounding condition. SWAETSD Table 3.1-1: The bounding case for Site Drainage and Water Quality category of the Operation of Condenser Circulating Water, Service Water and Cooling Systems project component identifies 9˚C as the maximum temperature rise, however, Table 4.5-1 in the Scope of the Project for EA Purposes TSD shows that 15.6˚C is the cooling water temperature rise for the PWRs. While the discharge volume from the PWRs is significantly less than the stated bounding conditions, if the maximum bounding conditions are to be considered for this Project then the 15.6˚C with the corresponding lesser volume condition may be more appropriate as the bounding condition. The bounding scenario assumptions need to be further evaluated to determine which ones are most appropriate. **OPG Response:** Generally, increased water intake volumes result in decreased water discharge temperatures. Likewise, decreased water intake volumes result in increased water discharge temperatures however, plant parameters vary according to reactor design.

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		As such, information summarized on page 4-37 (Table 4.5-1) of the Scope of the Project for EA Purposes Technical Support Document (TSD) is based on data provided by the reactor vendors and compiled by OPG in the Plant Parameters Envelope (PPE). The PPE is a set of data derived from available vendor information for multiple reactor designs and provides a bounding envelope of plant design and site parameter values for use in the License to Prepare Site (LTPS) Application and Environmental Assessment (EA). It relates to the interaction between a nuclear power plant and the site/environment. An evaluation of the effects from two different once-through lake water cooling discharge scenarios were assessed and compared (once-through bounding scenario and alternative discharge scenario) to confirm the thermal effects were within the once-through bounding scenario. The once-through cooling and cooling tower intake volumes, condenser cooling water discharge temperatures and flow rates developed from the PPE and used in the EA are summarized below. **<u>Cooling Tower Condenser Cooling Water:</u>** All of the cooling tower technologies operate with a closed-loop water system where an initial volume of water is taken from Lake Ontario and is then continually recirculated between the condensers and the cooling towers, with a blowdown stream drawn off to control chemical concentrations in the cooling water. Make-up water is also required to offset evaporation losses. *Intake Flow Rates* - The cooling tower intake water flow rates for natural draft and mechanical draft cooling towers are estimated to be 3,240 L/s for the Pressurized Heavy Water Reactor (PHWR) and 5,300 L/s for the Pressurized Water Reactor (PWR), plus process water requirements. For EA purposes approximately 6,000 L/s was used as the cooling tower intake bounding scenario. *Discharge Flow Rates* - Cooling tower discharge diffuser flows to Lake Ontario vary based on the blowdown stream drawn off the cooling towers. Discharges to Lake Ontario are expected to be approximately 1,140 L/s for the natural draft cooling and 1,290 L/s for the mechanical draft cooling, plus process water discharges for a total water discharge of approximately 1,500 L/s to Lake Ontario (cooling tower discharge bounding scenario). *Discharge Temperatures* - Effluent temperatures from cooling towers are primarily dependant on local meteorological conditions and vary with season. Although the PPE cited a maximum temperature discharge of 37.7°C (PWR limiting value employing mechanical draft cooling), this temperature could not be reproduced using models employing local climate data for the area. Note 2 to Table 4.5-1 of the Scope of the Project for EA Purposes TSD indicates that the maximum temperature discharge is to be refined based on local climatic conditions once vendor is selected. Therefore, as documented on page 4-7 (Section 4.2.4) of the Surface Water Environment Assessment (SWE) of Environmental Effects TSD, the cooling tower discharge temperature was estimated using meteorological data to develop the various plume buoyancy conditions. **<u>Once-Through Condenser Cooling Water:</u>** *Bounding Scenario* - The once-through lake water cooling intake and discharge scenario is bounded by the PHWR, as presented on page 3-9 (Table 3.1-1 Potential Project-Environment Interactions in the SWE) of the SWE Assessment of Environmental Effects TSD. It comprises of the once-through cooling system with a maximum flow of 230 m^3/s (230,000 L/s)

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		plus service water requirements of 20 m^3/s (20,000 L/s), with a maximum temperature increase between intake and discharge lake water of 9°C. This scenario constitutes the bounding velocity and thermal dilution potential for condenser cooling water, resulting in a lower discharge temperature increase. *Alternate Discharge Scenario* - An analysis of the alternate discharge scenario for the PWR with a temperature increase through the cooling water system as high as 15.6°C and a once-through lake water cooling water maximum flow of 134 m^3/s (134, 000L/s) is presented on page 4-20 (Section 4.5.4) of the SWE Assessment of Environmental Effects TSD. The results of the analysis indicate that it is expected that the extents and magnitude of the thermal effects under this alternate discharge scenario will be similar to those expected for the assumed once-through bounding case discharge flow, temperature and design. While the assessment does not consider the regulatory implications for temperature, once the appropriate regulatory requirements/jurisdiction has been resolved, OPG will be able to determine the criteria to be followed and design accordingly for cooling water discharge temperatures to demonstrate compliance.
19	8.1 General Information and Design Characteristics 8.4 Operation and Maintenance	**JRP IR:** Provide additional information for the chemicals that are in use at the existing Darlington Nuclear Generating Station as well as all likely chemicals to be used for the operational phase of the Project as well as any sources, release points, types and quantities of non-radioactive wastes, including hazardous waste, predicted to be generated. Provide a specific description of how the chemicals will be used and an assessment of their releases and potential effects on the environment (e.g. surface water quality, aquatic environment, atmospheric environment). **Rationale:** As per EIS Guidelines, the requested information must be provided in summary form; where applicable, reference may be made to more detailed information. Lack of this information does not allow assessment of the effects due to hazardous substances. The rationale for Site Drainage and Water Quality category of the Operation of Condenser Circulating Water, Service Water and Cooling Systems project component indicates that descaling and biofouling chemicals other than chlorine may be added to service water and cooling water. Tables 4.5-5 and 4.5-7 of the Scope of Project for EA Purposes TSD, lists the chemicals likely to be used and stored at the Project site. Table 4.5-5 lists the likely concentrations in the waste stream expected at the Project based on the waste stream data for William States Lee III Nuclear Generating Station instead of data from the existing Darlington Nuclear Generating Station. Table 4.5-7 lists the types of containment for the chemicals to be used and stored at the Project site but does not provide the amounts expected to be stored or the storage capacities planned on-site. Furthermore, while both tables list typical frequency of use of the chemicals, no details are provided for any of the chemicals in relation to how or where their use might occur.

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		OPG Response: The typical chemicals that will be stored and used at the NND site during the operational phase of NND can be found on page 4-50 (Section 4.5) of the Scope of Project for EA Purposes Technical Support Document. The list of chemicals in Table 4.5-7 is intended to provide representative chemicals and uses. Specific details on the type of chemicals to be stored and used cannot be provided until a vendor is selected. The final Environmental Assessment (EA) follow-up program will require acceptance by the responsible authority, and it will be implemented through the licensing process for the new nuclear facility. The example given for chemical concentration in liquid effluent streams on page 4-44 (Section 4.5.2.2) of the Scope of Project for EA Purposes TSD is from that of William States Lee III Generating Station. The data was obtained from the application for the new construction of an AP1000 reactor. This data provides an example of the chemical usage from one of the three possible technologies that could be used for the New Nuclear Plant at Darlington. This is considered to be more appropriate for this EIS than data from the Darlington Nuclear Generating Station (DNGS). Regardless of the specific chemicals used at NND, procedural controls will be in place to ensure their safe transport, storage and handling. Hazardous chemicals will be managed using the Workplace Hazardous Materials Information System (WHMIS) principles. The environmental effects of such chemicals and hazardous waste will be mitigated by the incorporation of Good Industry Management Practices into Project implementation. As the Project planning and design evolves, all Good Industry Management Practices (incorporating Good Utility Practices), will be integrated into a comprehensive and overarching Environmental Management Plan (EMP). The generation of non-radioactive wastes will be minimized to the extent practicable through re-use and recycling programs. All residual waste will be collected regularly by licensed contractors and transferred to appropriately licensed off-site disposal facilities. Hazardous wastes will be handled in accordance with applicable regulations.
21	8.2 Site Preparation 8.3 Construction 8.4 Operation and Maintenance	**JRP IR:** Provide and justify the list of “applicable quality criteria” for stormwater management. As a component of this, discuss the considerations for stormwater sediment and its quality. **Rationale:** The water quality criteria which the Proponent deems appropriate will be essential for determining the adequacy of proposed stormwater management measures. Stormwater quality data from the existing Darlington Nuclear Generating Station should be used to help establish objectives. An increased focus on stormwater sediment appears to be necessary since it is a likely vector for contaminants that cause toxicity. Sediment quality is important for assessing potential effects on the aquatic

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		environment and possibly for maintenance of stormwater management facilities. Where stormwater ponds are planned, sediment handling should be taken into account, with respect to accumulation and frequency of removal, and considerations of disposal. Such frequency can be reduced by oversizing sediment storage in the pond.
		OPG Response: The criteria for evaluation of surface water effects of the project provided in Table 5.3-2 on page 5-27 of the EIS (Table 3.2-2, on page 3-12 of the Surface Water Environmental Effects Technical Support Document) are indicative of the standards that will be applied in the establishment of the design of the effluent and stormwater management systems to ensure the resulting discharge does not cause deleterious effects. Stormwater control and management features for New Nuclear at Darlington will be designed to meet current Good Industry Management Practices and comply with all legal requirements. The Surface Water Environment Assessment of Environmental Effects Technical Support Document, page C-6 (Section C.3) assumes that stormwater management features will be designed in accordance with the Ministry of Environment (MOE) Stormwater Management Planning and Design Manual (MOE 2003) to exhibit the level of protection as agreed upon following Certificate of Approval (C of A) application negotiations with the MOE. The MOE design manual considers the requirements of the federal *Fisheries Act* by defining different levels of protection with a goal of maintaining or enhancing the existing aquatic habitat (e.g., stormwater management ponds designed for an enhanced protection level with 80% long-term suspended solids removal from runoff). Although, jurisdictional boundary has not been determined to be able to finalize the applicable water quality criteria, OPG will meet the resulting regulatory standards. In addition, OPG is committed to developing a follow-up monitoring program where parameters to be measured and frequency for sampling will be finalized (Pg 11-9, Table 11.6-2 of the EIS). **Reference:** • Ontario Ministry of Environment (MOE). 2003. Stormwater Management Planning and Design Manual.
24	8.2 Site Preparation 8.3 Construction 8.4 Operation and Maintenance	**JRP IR:** Provide information to demonstrate that effluents, including stormwater, will be in compliance with the Fisheries Act. **Rationale:** The Fisheries Act does not allow for “mixing zones”. Un-diluted effluent must pass toxicity testing to be in compliance.

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		OPG Response: As indicated in section 1.2.3, page 1-10 of the EIS, effluent, including stormwater, that is released during the construction and operation of the nuclear facilities will comply with all legal requirements, including the requirements in section 36 of the Fisheries Act respecting the discharge of deleterious substances. If necessary, authorization for release of deleterious substances will be sought concurrent with the construction licensing process under the Nuclear Safety and Control Act. The criteria for evaluation of surface water effects of the project provided in Table 5.3-2, on page 5-27 of the EIS (Table 3.2-2, on page 3-12 of the Surface Water Environmental Effects Technical Support Document) are indicative of the standards that will be applied in the establishment of the design of the effluent and stormwater management systems to ensure the resulting discharge does not cause deleterious effects. The criteria include the requirements of Ontario Regulations 215/95, Effluent Monitoring and Effluent Limits – Electric Power Generation Sector, (MISA). Pursuant to the MISA regulations, effluent testing for toxicity was performed on process effluents at the point of discharge into the once-through cooling water system, and treatment systems were installed in OPG's existing facilities where necessary. The discharges from the existing facilities routinely pass toxicity testing, confirming that the discharge will not have a deleterious effect on fish or fish habitat. This program is similar to the programs that have been authorized under the Fisheries Act for other industrial sectors. OPG's experience, in combination with the referenced criteria, will ensure that the effluent management systems can be designed such that substances contained in the effluent released will be unlikely to alter the quality of the receiving water to render it deleterious to fish or fish habitat. The condenser cooling water that is changed by heat from its natural state, will be returned to the lake through a system, such as the diffusers currently used at DNGS, that makes the heated water unlikely to cause deleterious effects to fish or fish habitat. The intake and diffuser used at DNGS were designed to minimize the effects of the once-through cooling water on fish and fish habitat. Monitoring during operations has confirmed that "no effects are known to occur as result of thermal discharges" from DNGS. (Golder 2006) The design of the discharge system for the new nuclear facilities will be subject to regulatory review during the construction licensing process, and will include consideration that the resulting effluent must result in compliance with applicable legislation or receive applicable authorizations. **Reference:** • Golder Associates Ltd. (Golder) 2006. Review of Thermal Mitigation Technologies for Nuclear Generating Stations (Report No. 05-1112-068). Submitted to the Canadian Nuclear Safety Commission, March 2006.

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25	8.2 Site Preparation Section 10.1.4 Terrestrial Environment 10.1.3 Groundwater	**JRP IR:** Provide information on soil quality, contaminant profile and concentrations, sampling methodology, and soil characteristics in the site study area. Describe any legacy contamination (e.g., nature, proposed remediation, etc.) of soil and groundwater, especially where earthmoving and dewatering may occur. Provide information on how contaminated soils and/or ground water will be managed to avoid further adverse environmental effects. **Rationale:** Detailed information is required to adequately establish baseline soil quality and assess effects on soil flora and fauna, including any legacy contamination, in the Site Study Area, and to support the predictions of potential concentrations in soil of radioactive and hazardous substances.
		OPG Response: Soil and groundwater quality within the Site Study Area is summarized starting on page 4-68, Section 4.6 of the EIS and fully detailed in section 4.6 of the Geological and Hydrogeological Existing Environmental Conditions Technical Supporting Document (TSD). An assessment of soil samples showed that the quality of the soil is within expected values for an industrial site. Across the Site Study Area OPG instituted a managed program which is responsible for addressing legacy contamination that was identified in the late 1990s. The program has characterized a few small discreet areas of concern where remedial actions have been undertaken to reduce or remove impacts to soil. The Environmental Assessment assumes that any legacy contamination within the New Nuclear-Darlington site (NND) will be remediated prior to the start of NND site preparation activities by the vendor. Therefore, soil affected by legacy contamination will not be present at the start of the NND earth moving or dewatering site preparation activities. The EIS, page 2-80, section 2.9.1, describes the implementation of an Environmental Monitoring Program (EMP) to be used by the vendor and OPG from the commencement of site preparation and construction. The EMP will describe the program for managing, through pro-active and pre-emptive means, the environmental effects of the Project. Fundamental to the EMP are the Environmental Protection Plans (EPP) which will be detailed, implementation-level actions developed to protect against environmental effects from specific aspects of the Project works and activities. To avoid future adverse environmental effects to the soil and groundwater environment, an EPP will be developed to include specific actions to consider contaminated soil prevention and management.

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28	9.1 Spatial Boundaries and Scale 10.2.6 Human Health	**JRP IR:** Confirm that the Mississaugas of Scugog First Nation is included in the Regional Study Area **Rationale:** The Mississaugas of Scugog First Nation is approximately 39 kilometres from the Project site.
		OPG Response: The Mississaugas of Scugog Island First Nation reserve lands and community are located on Scugog Island and lie within the Regional Study Area (RSA) for the DNNP EIS. The EIS states that the closest Aboriginal community is physically located approximately 50 km from the DN site (EIS, Section 5.12.2 "Assessment of Likely Effects in Aboriginal Communities", p. 5-169). The Aboriginal Interests TSD states that the Mississaugas of Scugog Island First Nation is the closest Aboriginal community to the proposed NND site (Section 5.3 "Location of First Nations, Metis Councils and Organizations", p. 5-3) and is within the RSA. This is consistent with that communicated by a member of the Mississaugas of Scugog Island First Nation who described the community as being within the RSA while attending an OPG Community Information Session in May 2009 (Aboriginal Interests TSD, Appendix B "Record of Engagement with First Nations, Métis Councils and Organizations", p. B-10).
34	10.1.2 Surface Water	**JRP IR:** Confirm that location SW-15 is in fact Darlington Creek instead of Wilmot Creek. Provide the figure number of the map that shows the surface water monitoring locations. **Rationale:** References to maps should be made in the text to facilitate public review. Currently, reviewers have to sift through many documents to find SW-15 or other sampling locations.
		OPG Response: OPG acknowledges that Table 3.5-2 on page 3-11 in the Surface Water Existing Environmental Conditions TSD has incorrectly identified location SW-15 as Wilmot Creek. SW-15 is a sampling location in Darlington Creek as shown in Figure 2.2-1 (Appendix A). All the analytical data associated with Darlington Creek have been reported correctly in Section 4.3.5 and Appendix C.

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36	10.1.3 Groundwater	**JRP IR:** Provide a summary of the "groundwater event" in the vicinity of the Lagoons and discuss whether there is the potential for the proposed NND to affect the fate of any potential contaminants. **Rationale:** It is not clear whether there are any contaminants associated with the former waste lagoons and if this could be affected by the proposed NND.
		OPG Response: The groundwater event was an isolated incident which occurred in 2001 when a spill of wastewater containing elevated tritium occurred just south of the wastewater lagoons. These lagoons are facilities associated with the existing station and are located well west of the New Nuclear – Darlington (NND) site. The shallow groundwater in the vicinity of the lagoons flows south-west towards the lake and not towards the NND site. Therefore the groundwater quality in the area of the wastewater lagoons does not affect the groundwater quality in the NND site. The wastewater lagoons are shown on Figure 3.2-1 of the Geological and Hydrogeological Environment Existing Environmental Conditions Technical Support Document, page 3-17, just north of the monitoring wells identified as DN-1/2/3/4. The water table map for the wastewater lagoons area and the NND site on page 4-57 (Figure 4.5-9), illustrates the shallow groundwater flow directions across the entire site and shows the separation of groundwater between the lagoons and the NND site. The event occurred in May 2001 when a small quantity of tritium inadvertently entered the wastewater lagoons from one of the building effluent sumps in the powerhouse. A spill of approximately 2 Curies (7.4×10^{10} Bq) of tritiated water occurred in the vicinity near the lagoons. At the time, notifications of the event were made to the appropriate regulatory agencies and the local community. Groundwater monitoring near the lagoons indicated a limited area was affected with elevated concentrations of tritium in groundwater. Several years of tritium measurements showed that tritium decreased with time until the concentrations were essentially the same as background concentrations.
42	10.1.5 Aquatic Environment	**JRP IR:** Provide the report(s) for the benthic invertebrate study conducted by Kinectrics in 2005 and/or 2006. **Rationale:** From the discussion in AEETSD Section 3.13, it is evident that the information in one or both of these reports may contribute to the understanding of the potential for entrainment of chironomid, amphipod and Mysis organisms as a result of current operations at Darlington Nuclear Generating Station.

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		OPG Response: The requested benthic invertebrate studies were provided directly to Environment Canada in response to the Proposed Information Request posted on the EA Registry on January 12, 2010, consistent with the protocol established by the Joint Review Panel for requesting references. **Reference:** • OPG letter to R. Dobos, "OPG Response to Request for Reference Documents by Environment Canada (EC)", February 8, 2010, CD #NK054-CORR-00521-00002.
43	10.1.5 Aquatic Environment	**JRP IR:** Provide the report for the benthic invertebrate study that was conducted in November 2008. **Rationale:** This study was briefly discussed in AEETSD Section 3.3.1.6. From this short discussion, it is evident that this information would be important to assess the potential effects of the cooling water thermal plumes on the benthic invertebrate community, in addition to losses arising from the proposed 40 ha lake Infill.
		OPG Response: Benthic invertebrate fieldwork was completed within the boundaries of the potential lake infill as part of the Environmental Assessment (EA) in November 2008. A separate report on this work was not prepared as the study was fully incorporated in the Aquatic Environment Existing Environmental Conditions Technical Support Documents (TSD). Information gathered as part of the benthic invertebrate sampling for the lake infill area in November 2008 is presented on page 3-63 to 3-65 (Section 3.13) of the Aquatic Environment Existing Environmental Conditions TSD. OPG letter, A. Sweetnam to R. Dobos, "OPG Response to Request for Reference Documents by Environment Canada (EC)**",** February 8 2010, CD# NK054-CORR-00521-00002, has been sent to EC to clarify this issue.
48	10.2.7 Physical and Cultural Heritage Resources Section 11.5.7 Physical and Cultural Heritage Resources	**JRP IR:** Describe the monitoring/contingency plans for the site preparation and construction phases of the Project should physical or cultural heritage/archaeological resources be encountered, especially during aquatic-based activities.

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		Rationale: Limited information was provided on the potential aquatic cultural or physical heritage resources in the study area (as requested i EIS guidelines) as the Proponent chose to modify the SSA to be terrestrial-based only. However it is noted in the EIS, for exampl historic shipwrecks may exist within the local study area. The Aboriginal Interest TSD identified interested Aboriginal groups to be consulted in the event that archaeological resources are encountered. Given the limited aquatic-based information and Aboriginal interests in this topic, monitoring and contingency planning provisions need to be provided.
		OPG Response: As described on Page 2-80 (Environmental Impact Statement (EIS) Section 2.9.1), an Environmental Management Plan (EMP) will be developed for the Project. The EMP will include a series of detailed Environmental Protection Plans (EPPs) to address specific aspects of work that may contribute to environmental effects. An EPP will be developed and followed regarding new discoveries of physical and cultural heritage resources during Site Preparation and Construction activities. This EPP will follow a similar process as was carried out during the baseline study and effects assessment of the New Nuclear at Darlington Environmental Assessment; that is, OPG would require an contract archaeologists, licensed in Ontario, to identify the physical or cultural heritage value/importance of the resources and, if necessary, to provide a path forward for protection, avoidance or excavation of the resources in accordance with the Ontario Heritage Act. No underwater archaeological or cultural remains have been observed by OPG in their underwater study (or recorded by Ontario Ministry of Culture (MCL) in the lake waters near the Site Study Area) that could be adversely affected by the Project. The EIS states on page 4-134 (Section 4.10.2) that *"… MCL's registry of marine sites was also contacted in order to confirm the presence or absence of underwater archaeological sites in the off-shore vicinity of the SSA. According to the MCL, there are no known marine archaeological sites in the lake waters near the SSA (personal communication, MCL, August 3, 2007)."* In addition, two underwater videos in the vicinity of the New Nuclear Darlington Project proposed lake infill were viewed. No cultural remains were observed. (See Page 3-40 (Section 3.1.3.3) of the Physical and Cultural Heritage Resources Existing Environmental Conditions Technical Support Document.) **Reference:** • Ministry of Culture, Ontario, Ontario Heritage Act, 2005.

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50	11.1 Effects Prediction	**JRP IR:** The Proponent should justify why the following Project Works and Activities are excluded from having potential Project-environment interactions that will likely result in measurable changes to the surface water environment: • stormwater Management; and • operation of Secondary Heat Transport System and Turbine Generator **Rationale:** Stormwater discharges will contribute contaminants and heat into Lake Ontario. The Operation of Secondary Heat Transport System and Turbine Generator may release various process chemicals into Lake Ontario via effluent discharge. In both cases, measurable changes in the surface water environment are conceivable and may interact cumulatively with the other Works and Activities that were included in the assessment.
		OPG Response: Stormwater Management and Operation of Secondary Heat Transport System and Turbine Generator Project works and activities were fully considered in the evaluation of potential Project-environment interactions with respect to the Surface Water Environment (SWE). Details of the assessment and information where the data can be found in the Environmental Assessment (EA) are summarized below. The Stormwater Management activity is identified as a "Common to Site Preparation and Construction" works and activity on page B-4 (New Nuclear – Darlington - Basis for the EA Table) in the SWE Assessment of Environmental Effects Technical Support Document (TSD). However, the text notes that "stormwater management features will be developed to address the requirements for runoff control both during site preparation and construction (temporary) and during operations (permanent). Wherever possible, stormwater management features will consider the needs of both construction and operation phases". As presented on page 3-5 (Table 3.1-1 Potential Project-Environment Interactions in the SWE) in the SWE Assessment of Environmental Effects TSD, Management of Stormwater has the potential to interact with the following SWE subcomponents: Water Temperature; Site Drainage and Water Quality; and Shoreline Processes. These potential interactions were forwarded for evaluation of potential Project-Environment interactions and assessment of likely measurable change. Details of this assessment are presented on page C-5 (Section C.3) of the SWE Assessment of Environmental Effects TSD. This evaluation concluded that the Stormwater Management Project Works and Activity is not considered to result in a measurable change to Water Temperature; Site Drainage and Water Quality; and Shoreline Processes subcomponents of the SWE. As presented on page 3-7 (Table 3.1-1 Potential Project-Environment Interactions in the SWE) in the SWE Assessment of Environmental Effects TSD, Operation of the Secondary Heat Transport System and Turbine Generators is not considered to

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		have the potential to interact with the SWE. During this activity, as described on page 4-35 and 4-36 (Section 4.5.1) of the Scope of the Project for EA Purposes TSD, a continuous stream of water, called blowdown, is removed from the steam generators to remove suspended solids from the steam generator water and to limit the concentration of dissolved solids. This blowdown water is processed to remove impurities, and then reused, with no discharge to the environment. The auxiliary systems supporting the operation of the turbine generators are supplied with lubricating oil, seal oils and hydrogen gas which can interact with water quality through leakage. Any leaks or spills would be directed to the inactive or active drainage systems. As such the SWE interactions with Operation of Secondary Heat Transport System and Turbine Generators would be captured in Operation of Condenser and Condenser Circulating Water, Service Water and Cooling Systems; and Operation of the Active Ventilation and Radioactive Liquid Waste Management Systems, as described on page 3-6 and 3-7 (Table 3.1-1 Potential Project-Environment Interactions in the SWE) in the SWE Assessment of Environmental Effects TSD.
53	11.2 Mitigation Measures	**JRP IR:** Identify additional opportunities to use waste heat from the reactors to generate steam needed elsewhere on site, or for "district heating" either on or off site **Rationale:** Any heat that can be devoted to these other areas would reduce heat that would be discharged into Lake Ontario, or to cooling towers, or other cooling options. Energy savings arising from these options translate into reduced air emissions and greenhouse gas emissions, as well.
		OPG Response: As stated on page 10-56 (Section 10.3.4.1) of the Environmental Impact Statement (EIS), typically, condenser cooling systems in nuclear power plants produce a low-temperature waste heat stream, one that is very diffuse and only slightly warmer than the surrounding water temperature. Having the ability to recover waste heat in an efficient and meaningful way would require a larger temperature difference than is generally produced by a nuclear power plant. There are very few efficient uses for low temperature heat and the economic benefits of waste heat recovery generally do not justify the cost of recovery systems.
54	11.2 Mitigation Measures	**JRP IR:** Be more specific in describing mitigation measures. All proposed mitigation must be described by Project phase, timing and duration. Information must be provided on methods, equipment, procedures and policies associated with the proposed mitigation. The Proponent must discuss and evaluate the effectiveness of the proposed measures and assess the risk of mitigation failure and the potential severity of the consequences of such failures.

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		Rationale: Not enough detail was provided for many of the mitigation measures proposed. It is not acceptable to describe mitigation measures only in terms of "good industry management practices and direct OPG experience". Mitigation measures can not be assessed if they are not described. Also, the Proponent has stated that plans or programs will be provided as mitigation for various effects but these have yet to be developed and no details of the plans and programs have been provided. For example, Dust Management Program, Noise Management Program and plans for the development of artificial habitat for terrestrial species. These programs must be explained in sufficient detail so that it can be determined whether they will be sufficient to mitigate the effects. Information is required on which regulations, policies, scientific data etc. the plans will be based on, who will prepare them, when, etc. The Proponent has stated that things will be in compliance with applicable guidance, however it is not stated to which guidance it is referring. In some instances, the mitigation measures described in the EIS are not mitigation measures. For example, implementing an adaptive management strategy is not a mitigation measure.
		OPG Response: The EIS Guidelines (s. 11.2) requires that the proponent describe both the general and specific measures intended to mitigate environmental effects, including those that respond directly to statutory or regulatory requirements. The proposed mitigation measures are detailed in each of the applicable TSDs and summarized in the relevant sections of EIS Chapter 5. All mitigation measures are further summarized in EIS Table 5.15-1 in a framework of the effects (and applicable VEC) each mitigation measure is intended to address, the Project phase during which it will be implemented and the residual effect following implementation of the mitigation measure(s). Many of the mitigation measures relate to features to be included in the Project design (i.e., in-design measures) and actions to be taken during construction (e.g., Dust (or Noise) Management Plan). These represent commitments made by OPG to ensure that effects are ameliorated, and which will be incorporated by the vendor during design and/or construction. Since neither a vendor nor a reactor type have been selected, the mitigation measures must be sufficiently flexible for the vendor to develop the details that consider the specific nature of its design and construction activities. With respect to environmental guidance that will be considered in future mitigation design, reference is made to page 5-195 (EIS s. 5.15) which states: *"A principle of note with respect to mitigation measures is that for the purpose of this EA, and consistent with OPG operating policy, compliance with all applicable environmental regulations and other statutory requirements will be a matter of course and the Project will be designed, constructed and operated accordingly. For this reason, regulatory obligations (e.g., secondary*

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		containment for fuel storage tanks) and the commitment to meet them are not identified as specific mitigation measures. They are, however, assumed as features of the Project and their benefits in terms of environmental effects management are considered in the evaluation." In several cases, the proposed mitigation measures include a commitment to implement Good Industry Management Practices. This term is defined in the Glossary as a process that is based on repeatable procedures; has been shown to be effective over time; and is synonymous with Good Utility Practices as they are recognized in the North American utility industry. Based on this description, it is reasonable to expect that the use of Good Industry Management Practices, where they are identified as mitigation will be effective in addressing the intended effect. It is also noted that the Good Industry Management Practices included in the Project will be incorporated into a comprehensive Environmental Management Plan (EMP). The EMP will consider applicable standards and protocols including, but not limited to the Environmental Codes of Practice for Steam Electric Power Generation – Construction (Environment Canada 1989). The EMP is described on page 2-80 (EIS s. 2.9.1). The mitigation measures have been detailed to the extent practicable at this EA stage of Project planning. The general intent of each measure is described, and where practicable, more specific details of the measure are provided, recognizing that the Project remains in its early planning stages. All aspects of the Project, including mitigation measures, will be further defined as it evolves through the licensing process. Since most mitigation measures are directly related to Project design aspects, the details of each measure will be elaborated during ongoing design phases and subject to detailed review during licensing. As noted on page 3-15 (EIS s. 3.2.5), all mitigation measures are proposed with the confidence that they will be effective in ameliorating environmental effects. This confidence is largely based on the use of proven principles and experience as described above. An important element of the EIS is a follow-up program whose primary function will be to determine the effectiveness of mitigation measures, and if or where they may not be fully effective, to identify new mitigation strategies. The scope and nature of the final EA follow-up program will be developed in consultation with the selected vendor, government agencies, community and other stakeholders as described on page 11-2 in section 11.2 of the EIS. The final EA follow-up program will require acceptance by the Responsible Authority, and it will be implemented through the licensing process for the nuclear facility. With respect to the comment that Adaptive Management is not considered a mitigation measure, we note that application of an adaptive management strategy is proposed as a mitigation measures in a single case where it is included as a feature, in addition to several in-design mitigation measures, to ensure that the loss of aquatic biota through impingement and entrainment is effectively addressed. Adaptive management is defined on page 15-15 (EIS, s.15.3 Glossary of Terms) as *"the integration of design, management, and monitoring to systematically test assumptions in order to adapt and learn, and apply and implement."* Given the length of time of the operation and maintenance phase of the Project, this was suggested as a means to address changes such as introduction of new aquatic species in the aquatic environment over time.

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55	11.3 Significance of Residual Adverse Effects	**JRP IR:** Revise table 9.3-1 by providing a ranking of "not applicable" instead of "low" for criteria which do not apply to the VEC. **Rationale:** It appears that some effects have been given inappropriate rankings. For example the criteria of "ecological importance" should not be given a ranking if the effect is a social effect. Also, the criteria of "effect on psycho-social human health" or "Societal Value" should not be given a ranking if the effect is strictly an ecological/physical environmental effect. For example, the loss of nesting habitat for Bank Swallows VEC should not be given a low ranking for "Effect on Physical Human Health", "Effect on Psycho-social Human Health" and "Societal Value". These criteria do not apply to the VEC, and they should be ranked "not applicable" or "n/a".
		OPG Response: The methodology for determining significance is described in s.9.2.2, and shown in Figure 9.2-1. As it has been applied, assignment of "low" ranking has the same effect as an interpretation as "n/a". Replacing the "low" rankings with an "n/a" ranking would not affect the overall conclusion relating to significance. The purpose of the number and diversity of Effects Criteria is to ensure that each residual effect is analyzed in terms of all appropriate aspects; and that the same criteria are consistently applied to all effects. Using different criteria for different residual effects would not provide an evaluation of significance that was consistently weighted for all effects. In the example given, it is incorrect to suggest that the noted criteria are not relevant for bank swallows (or other ecological attributes). Such attributes do have a sociological connection that must be considered for a complete and fulsome analysis. It is conceivable that the loss of an ecological resource in a community would be seen as an effect in terms of societal values within that community. Bank Swallows generally nest in colonies in streamside, river or lake banks across much of North America. OPG has documented the size of Bank Swallow colonies on the existing Darlington site and along the shorelines in Durham Region as shown in Table 3.4-4 Results of Bank Swallow Habitat Survey along the North Shoreline of Lake Ontario in Durham Region (page 3-28, Terrestrial Environment Existing Conditions TSD). The portion of the colony being removed will be confined to the Site Study Area and a larger portion of the associated colony will still remain viable. Currently, the Bank Swallow is common and even abundant in some areas, and it is not designed for a special level of protection in Canada or in Ontario.

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56	11.3 Significance of Residual Adverse Effects	**JRP IR:** Revise tables 9.1-1 and 9.3-1. When determining the likelihood of significance, consider three general steps: 1. Determine whether the environmental effects are adverse 2. Determine whether the adverse environmental effects are significant 3. Determine whether the significant adverse environmental effects are likely to occur. When assessing significance, any effect which receives a rating of high in any category (magnitude, spatial extent, duration, frequency or reversibility) must be carried forward. Probability and frequency are two different concepts and should be determined separately. Residual adverse effects should be determined to be significant or not significant first. If an adverse effect is determined to be significant, then it should be examined for probability i.e. likelihood of occurrence. Note that probability or likelihood of occurrence is not a criterion to be used in the determination of significance. **Rationale:** The approach in the EIS states that in order for an effect to be significant, it must rate high or medium in all of the assigned criteria (magnitude, spatial extent, duration, frequency and reversibility). If a low rating is given for any of these criteria the effect is deemed not significant and no further assessment or application of mitigation is considered. This is limiting the assessment. An effect which receives a low rating for any given criteria may still require additional assessment.
		OPG Response: The determination of significance in the EIS considered the six prescribed criteria listed on page 42 of the EIS Guidelines (s.11.3 Significance of Residual Adverse Effects) which includes the criterion of "probability". The methodology used in the EIS, including the significance criteria, was developed in consultation with and supported by feedback from the public. The criteria used included all those criteria suggested in CEA Agency guidance (see below) as well as others deemed relevant to the assessment. The CEA Agency's Reference Guide: Determining Whether A Project is Likely to Cause Significant Adverse Environmental Effects (1994) provides general guidance on the criteria that should be used but it does not advocate a specific approach nor include a detailed methodology for determining significance. It does acknowledge, however, that different methods may be used.

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		OPG believes the assessment of significance in the EIS is appropriate based on past nuclear EA practices involving the CNSC as the Responsible Authority (RA). The determination of significance as described from page 9-1 to 9-23 (EIS Chapter 9) and presented in Table 9.3-1 Determination of Significance of Residual Adverse Effects (page 9-11 to 9-27) used two approaches to calculate significance. The first was the two-step criteria-based process following the approach used by the CNSC in its Screening Report for the Pickering B Refurbishment and Continued Operation project in 2007. Considering that precedent, this technique was used for the EIS as it was accepted by the CNSC. The second approach required each Technical Specialist responsible for identifying the residual effect and rating it within the individual significance criteria to apply his/her professional judgement to make the overall significance determination (i.e., significant; not significant) based on the collective criteria ratings. This professional judgement approach was consistent with that used in the OPG EA Study Report for the Pickering B Refurbishment and Continued Operation project. It was also consistent with the approach used in other nuclear-related EAs conducted for OPG over the past 10 years. The results presented in Table 9.3-1 Determination of Significance of Residual Adverse Effects (page 9-11 to 9-27) show that both methods resulted in the same assignment of significance for each of the environmental effects evaluated. As a result, we do not believe that the significance analysis in the EIS is inappropriate or inaccurate. We acknowledge that the CEA Agency's Reference Guide (1994) suggests that consideration of the *"probability of occurrence"* take place after the effect has been determined significant. We have considered the Reference Guide, however for overall guidance purposes only; and there are many examples in EA practice where probability is included in the evaluation of significance rather than as a subsequent step (including in the above-noted EA for the Refurbishment and Continued Operation of Pickering B which was recently accepted by the CNSC). Further, we note that the EIS Guidelines (s. 11.3) require that the assessment of significance consider six criteria, one of which is *"probability of occurrence".* Accordingly, we considered this parameter in our analyses. The methodology used for determining significance included a criterion that combined *"frequency* and *"probability"* as a single measurement parameter. In typical EA practice, it has become understood that an estimate of the return frequently of an event is a factor in determining the probability of the event, and vice versa. As such, frequency and probability are directly linked. This linkage is clearly made in the EIS where they are applied as a combined measurement parameter. For example, in the case of the residual effect being disruption to wildlife travel along the east-west wildlife corridor (see Table 9.3-11, page 9-18 of the EIS), the "probability" of disruption is likely. This likely probability is based on the ecologist's judgement that there will be a periodic "frequency" of occurrence (although it will only occur during site preparation and construction activities). The assignment of a Medium rating for the Frequency/Probability criterion for this residual effect is consistent with the effects level definitions in Table 9.1-1 of the EIS. The approach taken to assessing significance was developed in consultation with, and supported by feedback from the public. In the fall of 2008, a preliminary list of criteria for determining significance in the EIS was presented at a community information

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		session in fall 2008 where the public was asked to provide feedback (see page 10-47, EIS s. 10.3.1.7). At a similar event in spring 2009, the proposed approach to determining significance was introduced and the public was asked if the approach represented a fair and reasonable process. Of the responses received during and after the events, 65% indicated that the two-step approach to determining significance was fair; and the combined criterion *"frequency/probability"* was deemed second in overall importance in the evaluation (by 77% of respondents) with only *"magnitude"* of the effect considered more important (by 80% of respondents) (see page 4-13, Communications and Consultation TSD, s.4.1.6 Significance Assessment).
57	11.3 Significance of Residual Adverse Effects	**JRP IR:** Reconcile the different definitions of reversibility contained in the EIS and glossary. **Rationale:** Different definitions of reversibility are found throughout the EIS and glossary.
		OPG Response: OPG conducted an electronic word search of the EIS, including s. 15.3 (Glossary of Terms) and found no definition of "Reversibility" other than as it is provided in s. 9.1. Reversibility is defined on page 9-1 (EIS s. 9.1) as: *"The degree to which the effect can or will be reversed (typically measured by the time it will take to restore the environmental attribute or feature)".* For added clarity, (and as the principle of reversibility was applied in the analysis) an effect is considered reversible if it ceases once the source/stressor is removed and the attribute (e.g., Valued Ecosystem Component) returns to, or very close to, its pre-project state.
58	11.3 Significance of Residual Adverse Effects 11.4.5 Aquatic Environment (effects, mitigation and significance)	**JRP IR:** Provide a detailed assessment of all mitigation measures and best available technology economically achievable that can be applied to the once-through condenser cooling water (ccw) intake and forebay design to reduce fish impingement and entrainment losses associated with this ccw technology. Such potential mitigation measures may include but not be limited to the following: • installing additional intake deterrents (perimeter barriers, adding acoustic fish deterrents at the intake or additional screening preventing targeting larval entrainment, decreasing intake velocities and/or velocity gradients, etc.); • locating the intake in (deeper) waters least frequented by fish; and • installing fish return and recovery systems in the forebay. The assessment should include revised estimates of intake entrainment and impingement for above mitigation options.

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		Rationale: Prior to the issuance of a Fisheries Act Section 32 Authorization for the killing of fish by means other than fishing, Fisheries and Oceans Canada can request that a Proponent demonstrate that all economically and technically reasonable mitigation measures directed at reducing fish mortality have been incorporated into its project design. While mortality measures provided in terms of "total equivalent adults" or "percentage contribution to lake-wide biomass" may be a factor in the final assessment of tolerable mortality effects for some species, the known local presence of fish listed (or under consideration for listing) under the Species at Risk Act and the Ontario Endangered Species Act requires close attention to assessing what mitigation measures are incorporated into the Project to prevent or minimize risk of mortality or harm to these at-risk fish species. The Proponent is expected to take all reasonable precautions to protect the environment using the best available technology economically achievable to eliminate or mitigate adverse effects [EIS Guideline sec 11.3]. Impingement and entrainment are residual adverse effects (EIS section 5.4.5.3). Predicted annual losses are estimated at ~65,000 fish for NND and over 100,000 fish cumulative Darlington Nuclear Generating Station and Darlington New Nuclear Power Plant Project with the proposed porous veneer intake (impingement plus entrainment converted to age-1 equivalent adults) (Aquatic Environment Effects TSD sections 3.3.2.2 and 3.3.2.3). The UK Environment Agency Best Practice Guide advises acoustic fish deterrents and fish return systems to accompany such offshore intakes (Turnpenny and O'Keefe 2005). These systems have been tested and installed at Ontario Great Lakes stations (FITC 1992; Aquatic Environment Effects TSD: Table 3.3.2-2).
		OPG Response: The purpose of the Environmental Assessment (EA) was to determine whether the Project is likely to result in significant adverse effects. As such, the Project has been defined for EA planning purposes within a bounding framework in a manner that recognizes several of its key features will remain undefined until a vendor has been selected by the Province of Ontario; and the detailed engineering design appropriate for the Canadian Nuclear Safety Commission (CNSC) application for a licence to construct has been completed. As outlined below, for EA planning purposes, both the once-through lake water cooling and cooling tower options (closed cycle cooling option) considered for the Project employ mitigation measures to minimize fish impingement and entrainment losses. Based on the assessment of effects, the EA concludes that the fish impingement and entrainment losses associated with the once-through lake water cooling and cooling towers options result in a minor adverse effect (not significant). As presented on page 13-6 (Section 13.2.2) of the Environment Impact Statement (EIS), in terms of condenser cooling options, the once-through lake water cooling is the present day best technology economically achievable and is OPG's preferred condenser cooling option for this Project . Through the ongoing, multi-stage licensing process, as the detailed design of the Project advances, appropriate additional mitigation measures (beyond those required by the EIS Guidelines, i.e. adding acoustic fish deterrents at the intake and fish return and recovery system in the forebay) will be evaluated and incorporated

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		OPG notes that operating experience of these additional measures suggests limited success as demonstrated by the number of fish impinged and entrained at locations with additional mitigation measures as present on page 3-27 (Table 3.3.2-2, Comparison of Entrainment and Impingement Estimated Losses at Different Plants on Great Lakes) of the Aquatic Environment Effects Technical Support Document, when compared to the existing Darlington Nuclear Generating Station (DNGS) once-through lake water cooling design. As discussed on page 5-202 (Table 5.15-1, Summary of Likely Environmental Effects, Mitigation Measures and Residual Adverse Effects) of the EIS, as a minimum, in-design mitigation measures incorporated into the Project design to minimize fish impingement and entrainment losses associated with the once-through lake water cooling intake (similar mitigation measures are proposed for the cooling tower intake) include locating the intake structure in less sensitive habitat removed from more productive nearshore habitats and spawning areas (i.e. minimum water depth of 10 m); designing the intake structure to limit the velocity of the water in the vicinity of the intake (application of standard approach velocity to less than 0.15 m/s), minimizing the impingement of fish and effects of local currents; and a Fish Habitat Compensation Plan. As documented on page 5-24 (Section 5.3.2.1) of the EIS, it is expected that the performance of the new once-through lake water cooling intake in terms of velocities will be similar to that of the existing DNGS intake, which has a design average intake velocity of less than 0.15 m/s (0.5 ft/s) at the intake structure and meets modern codes (i.e. United States (US) Environmental Protection Act (EPA) 316b) related to fish losses. It follows then that the effects associated with the once-through lake water cooling intake for the Project can be assessed by examining the effects that have been observed for the existing DNGS intake structure. In a 1997 report, it was concluded that the DNGS fish deterrent design of the intake proved to be sufficiently effective, eliminating the need for any additional fish diversion and handling system. Based on 4 years of operational sampling verifying the performance of the design, the magnitude of intake fish losses at DNGS, both by quantity and type, has been consistently below any practical threshold of biological significance to local stocks or regional populations of any type of fish. The levels are at least an order of magnitude below those experienced at any similar sized generating station on the Great Lakes (Ontario Hydro 1997). Recent velocity measurements at the existing DNGS intake structure confirm the intake velocity average remains less than 0.15 m/s (SENES 2009). An additional mitigation measure, identified through the assessment of impingement and entrainment losses associated with operation of the once-through lake water cooling option, included the implementation of an Adaptive Management Strategy to address changes into the environment associated with aquatic ecosystems over time. Based on the above mitigation measures, the operation of the once-through cooling water intake (and to a lesser degree, the cooling tower intake) will result in the loss of some aquatic biota through impingement and entrainment. These losses represent a residual adverse effect, although no species listed under the Species at Risk Act or Ontario Endangered Species Act are expected to be impinged. In the determination of significance of residual adverse effects as presented on page 9-11 (Table 9.3-1, Determination of Significance of Residual Adverse Effects) of the EIS, this effect was deemed as a minor adverse effect (not significant).

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		References: • Ontario Hydro. 1997. Condenser Cooling Water Intake Fish Impingement Monitoring Sampling Verification. Ontario Hydro Nuclear. Report No. NK38-REP-07000-013-R00. • SENES Consultants Limited (SENES) 2009. Aquatic Environment Results of the Intake Velocity Study at the Existing Darlington Nuclear Generating Station. Report No. NK054-REP-07730-0313783.
62	11.4.3 Groundwater	**JRP IR:** Provide additional details of the Geology and Hydrogeology follow-up program regarding groundwater effects and sampling methodologies. **Rationale:** The guidelines calls for additional details regarding the proposed follow-up program: "The Proponent is to document the proposed monitoring or follow-up programs designed to assess the effects of the Project on groundwater, including measured parameters, sampling methodologies, locations and frequencies, and performance criteria against which the effects of the site activities will be evaluated."
		OPG Response: Although the follow-up program as described in Chapter 11 of the Environmental Impact Statement (EIS) is preliminary in nature, the Geological and Hydrogeological environmental sub-component identifies the Groundwater Flow and Quality as a follow-up program. This program is further sub-divided into three programs that are described on page 11-12 (Table 11.6-2 of the EIS). The programs are described as: 1. Monitoring groundwater flow to confirm EIS predictions, 2. Confirm EIS predictions post-construction of on-site groundwater flow regime and 3. Confirm base flow estimates in Darlington Creek at the beginning of the Operation and Maintenance phase. The groundwater sampling program for the New Nuclear at Darlington Environmental Assessment is described on Page 3-12, Section 3.4 of the Geological and Hydrogeological Existing Environment Conditions Technical Support Document (TSD). This program included, among other details, the provincial protocol for analytical methods that were implemented. Similarly, the groundwater follow-up program will follow the existing protocols used in completing the baseline conditions field work. The scope and nature of the final EA follow-up program will be developed in consultation with the selected vendor, government agencies, community and other stakeholders, as necessary. The final EA follow-up program will require acceptance by the Responsible Authority, and it will be implemented through the CNSC licensing process for the nuclear facility.

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64	11.4.4 Terrestrial Environment	**JRP IR:** Provide information on the risk to wildlife within the CN railway when used as a functional wildlife corridor, except for animals which can avoid collision as mentioned in the EIS, Page 4-63. Justify why this risk is acceptable. **Rationale:** This information is required to assess risk to wildlife as a result of disruption in landscape connectivity. Ontario Power Generation indicates in the EIS that the Canadian National (CN) railway will serve as a wildlife corridor as a measure to preserve landscape connectivity.
		OPG Response: The risk to wildlife that crosses the CN railway tracks when using this as a corridor to get from one place to another on the DN site has not been studied by OPG. OPG is not proposing the CN railway or its Right of Way as the wildlife corridor. OPG assessed the east-west wildlife corridor on OPG property adjacent to the CN railway. No biological inventories or risk assessments of wildlife have been taken on the parcel of land that belongs to CN. As mentioned on page 4-63 (Section 4.5.4.6 Landscape Connectivity) of the EIS, most of the connectivity is focussed on the north side of the CN railway line. Page 5-79 (Section 5.5.9.1) of the EIS states the following likely effect: *"Access for wildlife travel along the wildlife corridor extending east-west across the DN site is likely to be interrupted at points in time during the Site Preparation and Construction phase. This is considered an adverse effect of the Project and is further evaluated in terms of mitigation measures and residual effects."* Page 5-79 (Section 5.5.9.2) of the EIS state the following as the mitigation measure: *"Incorporate to the extent practicable in the Project Design, measures to maintain access for wildlife travel on the east-west wildlife corridor during construction activities; and to enhance the corridor function for the long term."* Page 5-79 (Section 5.5.9.3) of the EIS states the following residual adverse effect (after mitigation): *"Periodic and short-term disruption to wildlife travel along the east-west wildlife corridor during the Site Preparation and Construction phase of the Project". Page 9-18 (Section 9.3) of the EIS, Table 9.3-1 states that the residual effect is "Minor adverse (Not significant)"*. It also explains the following: *"Although there is no major wildlife corridor on site, a corridor does exist. Wildlife using the east-west corridor through the DN site are already adapted to the road network and high levels of human disturbance that characterize both the Local Study Area (LSA) and Site Study Area (SSA). The DN site remains permeable for many of these species and the period of disturbance will be relatively limited."*

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65	11.4.5 Aquatic Environment (effects, mitigation, significance)	**JRP IR:** Provide a coastal engineer's report and associated biological analysis to assess the effect on lakebed substrate replenishment if the Raby Head bluff is removed. This assessment should take into consideration the effect on sediment transport of the operation of two once-through condenser cooling water intakes and diffusers. The coastal engineer's report should include a biological analysis of the existing use of this area by fish and then explain how this habitat structure and function would change as a result of any identified changes to the quantity and composition of substrate material transported into this area. **Rationale:** The EIS and Surface Water Technical Supporting Document recognize that the lakebed surface composition within the aquatic SSA is influenced by the substrate contributions of the Raby Head Bluffs and the sediment transported to the SSA by near-shore currents. It is also noted that near-shore current velocity and direction can be altered by the effects of operating a once-through cooling system and diffuser which may result in changes to the substrate; finer suspended sediments are pulled in through the cooling water intake leaving larger material than would be native to the area. Despite the recognition of measurable changes occurring to the circulation patterns, sediment transport and sediment nourishment within the SSA, there is no evaluation in the EIS of the extent of these changes and whether this could negatively effect the productive capacity of fish habitat area bounded between the two diffusers.
		OPG Response: Independent of reactor design, condenser cooling water design or lake infill, necessary excavation and grading and the placement of shoreline protection works on the eastern portion of the Darlington Nuclear (DN) site (i.e. Raby Head bluff) will result in an effect of the Project as described on page 2-12 (Section 2.4.1) of the EIS. A coastal engineer's report is not a requirement of the Environmental Impact Statement (EIS) Guidelines, however, these and other coastal engineering requirements will be fully addressed during detailed engineering design in support of the appropriate authorization/license applications. For EA planning purposes, the proposed shoreline protection works and the operation of an additional cooling water intake were considered in the Assessment of Likely Effects on Shoreline Processes, as documented on page 5-39 (Section 5.3.8) of the EIS. The EIS concludes that there are no adverse environmental effects on Shoreline Processes predicted as the result of the Project. As noted on page 4-28 (Section 4.3.5.4) of the EIS, the existing Darlington Nuclear Generating Station (DNGS) cooling water intake does not have a significant impact on sediment transport. However, the DNGS discharge diffuser mixing zone has the potential to deflect sediment in onshore or offshore directions depending on the orientation of ambient currents. An assessment

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		of predicted sediment transport at the DN site as a result of the Project is documented in the *Surface Water Environment Assessment of the Future Sediment Transport at the Darlington Nuclear Site* (McCorquodale 2009). This report is based on existing information, supplemented with three-dimensional modelling (three scenarios: Baseline Scenario – no lake infill with existing operations of DNGS; Future Scenario 1 – lake infill, including shoreline protection with the proposed once-through cooling water for the Project, combined with existing operations at DNGS; and Future Scenario 2 – lake infill, including shoreline protection with the proposed cooling tower option for the Project, combined with existing operations at DNGS). For EA bounding purposes, each future scenario assumed the maximum lake infill and shoreline armouring which would preclude ongoing sediment addition in front of the New Nuclear at Darlington site. The report concludes that proposed lake infilling results in a small decrease in the transport distance of sediment during high wind and wave conditions. The analyses also show the annual transport capacity in front of the proposed infill will be reduced due to the increase in nearshore depths. Currently the St Marys wharf is the biggest contributor of offshore deflection of sediment and this will not change with the Project. However, the model predictions for west to east longshore currents suggest that infilling will reduce the tendency for the St Marys Cement wharf to deflect longshore transport into deeper water. This will compensate for the lower transport and supply potential in the future scenarios as the result of shoreline protection and lake infill. The north shore nearshore of Lake Ontario, including the vicinity of the DN site, is a high energy environment. Its ecology is heavily skewed toward the seasonal and intermittent presence of migratory Lake Ontario fish species which now includes high abundances of invasive species such as round goby. The round goby appear to be outcompeting the few native species that inhabit this area as well as likely preying on eggs and larvae of migratory species. The results from the recent sampling events in the Site Study Area (SSA) and the Fisheries and Oceans Canada Habitat Alteration Assessment Tool model continue to illustrate the low productivity of this open coast environment. As a result, changes to the habitat structure and function are unlikely to occur in the SSA as a result of shoreline protection works and activities; and the operation of two once-through condenser cooling water intakes and diffusers. However, OPG is committed to developing an EA follow-up monitoring program to verify that there are no adverse effects on lake circulation and shoreline processes, as discussed on page 11-8 (Table 11.6-2, Preliminary EA Follow-Up Program Elements) of the EIS. **Reference:** • McCorquodale, J. A. 2009. Surface Water Environment Assessment of the Future Sediment Transport at the Darlington Nuclear Site. NK054-REP-07730-0313785.
67	11.4.5 Aquatic Environment	**JRP IR:** Clarify how the terminal and concrete intake structure associated with the proposed once-through condenser cooling water alternative would be installed.

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		Rationale: The Scope of Project for EA Purposes Technical Support Document (Page 3-17) indicates that for the once through condenser cooling water intake, "A berm or steel sheet pile cofferdam would be constructed and pumped out to facilitate excavation of the lake bottom and construction of the structure `in the dry'. This area will require continuous dewatering once the cell has been emptied during the construction period." It would appear that this description may be a misprint since there is a separate reference to underwater blasting. Confirmation of the intended installation technique is required to qualify the severity of the disturbance associated with the intake installation.
		OPG Response: Although the referenced statement refers to construction "in the dry", alternate methods utilizing underwater blasting may be considered when a vendor is selected and detailed design is underway. Any underwater blasting operations will comply with applicable guidance to reduce incidental fish mortality. The quotation in the Information Request Rationale is taken from page 3-17 (Section 3.2.2.1) of the Scope of Project for Environmental Assessment (EA) Purposes Technical Support Document, and refers to construction of the intake structure and intake tunnel opening for once-through lakewater cooling. The reference to use of a cofferdam and construction "in the dry" is based on early planning assumptions. This technique is considered feasible in the circumstances, but is not the only manner in which this structure could be constructed. When a vendor is selected and detailed project design is underway, alternate methods of installation, such as in-water placement of intake structure components (similar to the installation technique used for the existing Darlington plant) and underwater blasting to join the intake tunnel to the lakebed, may be considered. All of the activities associated with such an alternate approach, such as lakebed dredging, in-water work, and underwater blasting, have been identified and assessed in this EA associated with other Project works and activities (eg, for cooling tower intake/discharge installation). Related mitigation actions, such as sediment control and compliance with applicable guidance for underwater blasting to reduce incidental fish mortality, would be undertaken to ensure that any environmental effects are acceptable.
75	12.2 Nuclear Accidents	**JRP IR:** Provide the rationale which justifies the basis for analyzing only two Beyond Design Basis Accidents (Large Loss of Coolant Accident (LLOCA) plus Loss of Long Term Cooling (LOLTC) plus failure of containment isolation (FIS); and Stagnation Feeder Break plus failure of containment isolation). **Rationale:** This information is required to validate the Beyond Design Basis Accidents (BDBA) source terms and dose consequences.

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		OPG Response: This information request is in relation to Section 4.2.5.1 of the Malfunctions, Accidents and Malevolent Acts TSD, wherein a brief summary of the ACR-1000 safety analysis results is provided, including identification of the limiting Design Basis Accidents per the EIS Guidelines. In the context of that discussion, the results of two Beyond Design Basis Accidents (BDBAs) are mentioned simply to highlight the robustness of the reactor design and exclusion zone boundary – in terms of meeting the RD-337 dose limits for Design Basis Accidents. Detailed information regarding BDBAs is to be provided in the Application for a Licence to Construct, once the vendor has been chosen. **Reference:** • CNSC RD-337, "Design of New Nuclear Power Plants", November 2008
76	12.2 Nuclear Accidents	**JRP IR:** Provide the rationale and the expected contributions of internal flooding and internal fire events to the small and large releases frequencies. **Rationale:** The Proponent claims that a limited scope flood assessment including only dominant sequences has been performed and concluc the contribution of internal flooding events to Core Damage Frequency (CDF) is low. Regarding fire events, the quantitative screening analysis of fire induced CDF in the reactor building and reactor auxiliary building the assessment of other buildings, confirmed that the ACR-1000 design effectively minimizes the contribution of fire induced CDF overall plant risk. Based on the flood assessment and fire induced CDF analysis, the Proponent expects the safety goals will be met with adequate margins. In order to verify the Proponent's expectation of meeting the safety goals, information supporting this claim is required.
		OPG Response: OPG has provided the required information as stated in the *Guidelines for the Preparation of the EIS of OPG's Darlington New Nuclear Power Plant Project*, Section 12.2 Nuclear Accidents, which indicates that *"The proponent must credibly demonstrate that it meets the safety goals defined in CNSC Regulatory Document RD-337, Design of New Nuclear Power Plants"* and that a high level safety analysis must be provided together with qualitative descriptions of principal types of accidents and malfunctions to identify limiting credible sequences. A sufficient level of detail has been provided (i.e., high level and

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		qualitative, per Section 12.2 of the EIS Guidelines) appropriate for the purposes of the Environmental Impact Statement. Furthermore, consistent with CNSC responses to the Joint Review Panel (JRP) at the public meeting held on December 15th, 2009, details of issues such as fire safety and fire hazards are considered as part of the application for a Licence To Construct. Specifically the *Malfunctions, Accidents and Malevolent Acts Technical Support Document* (TSD), Section 4.2.5.1, page 4-35 deals with *"ACR-1000 plant responses to … internal fire and flood events".* It notes that *"The ACR-1000 design target for CDF is a frequency between 8x10^{-8} and 8x10^{-7} per reactor year, for at-power, shutdown, internal fire and internal flood events."* Table 4.2-5 illustrates that the CDF for internal events for an Operating State and Shutdown State sum to 1.8x10^{-7} per reactor year, which is much lower than the 10^{-5} per reactor year safety goal for CDF in RD-337. The expected relatively low contributions of internal fire and flood events to the CDF provide confidence that the RD-337 CDF safety goal will be met with adequate margins. Detailed analyses and demonstration that the CDF complies with the applicable RD-337 safety goal will be provided as part of the licensing process at the stage of the application for a Licence to Construct, for the chosen reactor design. This is consistent with the CNSC licensing process (CNSC document INFO-0756 Revision 1) which indicates that an *"application for a Licence to Prepare Site does not require detailed information or determination of a reactor design; however, high level design information is required for the environmental assessment that precedes the licensing decision for a Licence to Prepare Site. An application for a Licence to Construct must contain more detailed information about the reactor design and a supporting safety case…".* The chosen reactor design will meet Canadian regulatory requirements.
77	12.2 Nuclear Accidents	**JRP IR:** Given the differences between the US-NRC and CNSC safety goals, provide the rationale supporting the claim that the revised values for the safety goal will meet the CNSC requirements. **Rationale:** There are differences between US and Canadian regulatory philosophy and framework. The US-Nuclear Regulatory Commissior and CNSC definition of the safety goals are not the same, and as a result, the comparison of releases frequency is not straightfor The Proponent claims that the results of the safety assessments for AP-1000 and EPR provide important insights into the expected performance of the reactor; however, there is no information in the submission to support the claim that the Canadian safety goals are met.

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		OPG Response: OPG has provided the required information with a sufficient level of detail (i.e., high level and qualitative, per Section 12.2 of the EIS Guidelines) appropriate for the purposes of the Environmental Impact Statement. For instance, as indicated in Sections 4.2.5.2 and 4.2.5.3 of the Malfunctions, Accidents and Malevolent Acts Technical Support Document, the EPR and AP1000 Large Release Frequencies (LRFs), are both on the order of 10^{-8} per reactor year, while the US-NRC prescribed limit is on the order of 10^{-6} per reactor year. Although the US-NRC LRF is defined differently, the large degree of margin to compliance provides confidence that the designs under consideration could meet the CNSC LRF Safety Goal defined in Regulatory Document RD-337. Detailed analyses and demonstration of compliance with all RD-337 safety goals will be provided as part of the licensing process at the stage of the application for a Licence to Construct, for the chosen design. This is consistent with the CNSC licensing process (CNSC document INFO-0756 Revision 1) which indicates that an *"application for a Licence to Prepare Site does not require detailed information or determination of a reactor design; however, high level design information is required for the environmental assessment that precedes the licensing decision for a Licence to Prepare Site. An application for a Licence to Construct must contain more detailed information about the reactor design and a supporting safety case…".*
79	12.2 Nuclear Accidents	**JRP IR:** Provide the available information that defines the system level probabilistic safety assessment, or an equivalent level and type of information. Provide the bounding event sequences and their rationale in support of meeting the safety goals. Provide the available information/assessments regarding the contribution of the external events to the safety goals. **Rationale:** In order to demonstrate the Safety Goals limits are met, the Proponent is expected to provide at least PSA at the system level, (or equivalent information) considering all plant operating states (including both at power and shutdown states), and all the internal and external events. The judgment supporting the expectation that the small (I-131) and large releases (Cs-137) frequencies from containment are les the regulatory thresholds is not provided (Leach 2008). The information under subsections for the AP-1000 PSA (Westinghouse 2007) is either "deleted" or "this section intentionally blar Only the table of contents and some sparse information is available. The contribution of the external events to the safety goals is neither fully supported in the submission (e.g., ACR-1000) nor references provided (AP-1000, EPR).

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		OPG Response: The publicly available PSA information, as well as any information received from the vendors, has been reviewed and summarized in the Environmental Impact Statement (EIS) on Page 7-43 (Section 7.3.2.1). The system level probabilistic safety assessment (PSA) is currently not available in public domain. It will be provided to OPG after vendor selection. Additional details are provided in the Malfunctions, Accidents and Malevolent Acts Technical Support Document (TSD) beginning on page 4-29 (Sections 4.2.4. – 4.2.6). For the purposes of this TSD, information on the risk analyses completed for the reactor technologies was taken from preliminary or publicly available safety assessments prepared for a variety of licensing, design certification, and screening type applications. OPG has provided the required level of detail (i.e., high level and qualitative) as stated in Section 12.2 of the EIS guidelines, to credibly demonstrate that the CNSC Regulatory Document RD-337 safety goals will be met with sufficient margin on frequency and consequence. Detailed analyses and demonstration of compliance with all RD-337 safety goals will be provided as part of the licensing process at the stage of the application for a Licence to Construct, for the chosen design. This is consistent with the CNSC licensing process (CNSC document INFO-0756 Revision 1) which indicates that an *"application for a Licence to Prepare Site does not require detailed information or determination of a reactor design; however, high level design information is required for the environmental assessment that precedes the licensing decision for a Licence to Prepare Site. An application for a Licence to Construct must contain more detailed information about the reactor design and a supporting safety case…".* The chosen reactor design will meet Canadian regulatory requirements. The following provides clarification on the supporting referenced documents: • The original AECL documentation from which the TSD information was extracted - AECL Letter, G. Leach to L. Swami, Request for Additional Information to Support New Nuclear Site Licensing and Environmental Assessment: Supplementary Information, July 31, 2008, CD#NK054-CORR-01210-0319744, was provided to the CNSC under separate cover letter (OPG letter A. Sweetnam to G. Schwarz "Reference Documents for the Environmental Impact Statement to Prepare Site Application for OPG's New Nuclear at Darlington Project-Part1," February 8, 2010, CD# NK054-CORR-00531-00062). • The available information for the Westinghouse AP-1000 can be accessed via US NRC ADAMS Database Accession Numbers ML083230284 and ML0083230285. • The available information for the contribution of external events to safety goals for the AREVA EPR can be accessed via US NRC ADAMS Database Accession Number ML091671748.

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
80	12.2 Nuclear Accidents	**JRP IR:** Provide the rationale on how the CNSC dose acceptance criteria will be met, and clarification as to whether a steam generator tube rupture should be classified as an anticipated operational occurrence (AOO) or a design basis accident (DBA). **Rationale:** EIS Guidelines (Page 50) state, "The required level of information is qualitative description of principal types of accidents and malfunctions to identify limiting credible sequences including external hazards (natural and human-induced), design basis accider beyond design basis accidents, including severe accidents." AP-1000 and EPR do not meet the CNSC dose acceptance criteria (some DBAs with higher consequences than the requirements). Further, it is noted that a steam generator tube rupture is considered as an AOO for EPR and as a DBA for AP-1000 and ACR-1000.
		OPG Response: Rationale on how the CNSC dose acceptance criteria will be met for the EPR and the AP1000 can be found in Sections 8.2 to 8.2.2 and 8.3 to 8.3.2.3, respectively, of the OPG report entitled *Site Boundary Considerations for New Nuclear – Darlington*, NK054-REP-01210-00009-R001 (Reference OPG 2009a of the Malfunctions, Accidents and Malevolent Acts Technical Support Document). This document was submitted in support of the Application for Licence to Prepare Site. Per Canadian regulation definitions, a Steam Generator Tube Rupture (SGTR) should be classified as a DBA for all three reactor designs considered. In the UK licensing process, this event for the EPR has been classified as an AOO. The rationale as to why a SGTR should not be classified as an AOO for the EPR in Canada can be found in Section 8.2.1, paragraph eight (8) of the *Site Boundary Considerations for New Nuclear – Darlington* report.
81	12.2 Nuclear Accidents	**JRP IR:** Provide corrective measures for the situation where the EPR and AP-1000 designs were not able to meet the dose acceptance criterion of 20 mSv expected of a design basis accident (DBA) as in CNSC Regulatory Document-337. **Rationale:** EIS Guidelines (Page 49) state, "The EIS must identify and describe the probability of possible malfunctions or accidents associat each reactor design considered and with other facilities in the nuclear power plant that contain radiological substances and must consider the potential adverse environmental effects of these events."

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		CNSC staff noted that for EPR the effective dose resulting from a LOCA was calculated to be 122 mSv at the exclusion area bour (EAB) of 805 m, and that for AP-1000 the effective doses resulting from a LOCA and a fuel handling accident were calculated to b mSv and 24 mSv, respectively, at the EAB of 805 m. The adequacy of the exclusion boundary proposed for EPR and AP-1000 should be validated in relation to mitigation measures that would limit dose consequences to the dose acceptance criteria of 20 mSv for a DBA. This is needed to support the proposed site layouts.
		OPG Response: The designs in question have been assessed and deemed capable of meeting the RD-337 dose criteria; the rationale is provided in submitted material (as discussed below). Hence, no corrective measures are expected to be needed for compliance with the dose criteria. Detailed supporting information for the selected design would be submitted along with the Application for a License to Construct. The selected reactor design will meet Canadian regulatory requirements. Rationale on how the criteria will be met for the US EPR and the AP1000 can be found in Sections 8.2 to 8.2.2 and 8.3 to 8.3.2.3 respectively of the OPG report entitled *Site Boundary Considerations for New Nuclear – Darlington*, NK054-REP-01210-00009-R001 (Reference OPG 2009a of the Malfunctions, Accidents and Malevolent Acts TSD). This document was submitted in support of the Application for Licence to Prepare Site. **References** • CNSC RD-337, "Design of New Nuclear Power Plants", November 2008
83	12.2 Nuclear Accidents	**JRP IR:** Provide information that: • justifies that design features of dry spent fuel storage prevent criticality accidents under all conditions; or • assesses the consequences of criticality accident as per section 12.2 of EIS Guidelines. **Rationale:** Criticality accidents at the dry spent fuel storage facility were not considered because "design features should ensure that a criticality event would not occur", pages 6-17, 6-23, and 6-28 the TSD. However, summary of design features of the dry storage facility, see page ES-5 of the TSD, does not ensure prevention of accidents under all conditions and, therefore, as per section 12.2 of EIS Guidelines, which is consistent with requirements of Canadian Standards Association (CSA) Standard N282.2 "Interim Dry Storage of Irradiated Fuel", consequences of criticality accidents should be assessed if accidents are possible.

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		OPG Response: The Information Request (IR) is for either: justification that design features of dry spent fuel casks will prevent criticality accidents under all conditions; or, assessment of the consequences of criticality accidents. The Rationale for the IR suggests that there is an inconsistency in the Nuclear Waste Management Technical Support Document (NWM TSD), but this seems to be based on the assumption that a modelled accident scenario involving a dry spent fuel cask is a criticality accident. For clarification, the accident in question is not a criticality accident. The NWM TSD is internally consistent, particularly regarding assertions about criticality accidents. Criticality accidents can be defined as criticality events outside of the reactor core resulting from the improper spacing or moderation of nuclear fuel enriched in uranium, which may result in an acute release of radioactivity to the environment. The accident scenario under consideration in the *NWM TSD* does not represent a criticality accident as defined in the preceding. In this case, dose would result from gaseous radionuclides (i.e. tritium and Kr-85) that are conservatively assumed to be released immediately after 30% of the sheaths on the used fuel failed as a result of the dropping of a dry spent fuel cask. Ensuring criticality safety for dry fuel storage under all credible circumstances will be achieved as a design requirement for all three reactor types (NWM TSD, page ES-6).
88	12.3 Conventional Accidents	**JRP IR:** Provide information to support the claim that damage to a tote (e.g. hydrazine) is unlikely. **Rationale:** Totes are generally made of metal or of plastic in a metal cage. Neither of these types of totes is structurally different or generally stronger than a plastic or metal drum, so a forklift could just as easily puncture a tote as it could a drum. Puncturing a drum is a credible scenario as outlined in the TSD, so puncturing a tote should also be considered as credible. As such, this scenario would increase the volume of hydrazine (or other chemical) that could be spilled, and thereby increase the potential effects.
		OPG Response: Hydrazine totes, such as those currently used by OPG, are engineered containers built to stringent requirements and are less likely to be accidentally punctured by a forklift than drums. As such, a scenario involving simultaneous puncture of 2 drums of hydrazine by a forklift, with subsequent spillage of all contents of these 2 drums (410 litres), was selected for assessment in the Environmental Assessment. Page 3-23 (Section 3.4.3) of the Malfunctions, Accidents and Malevolent Acts Technical Support Document describes hydrazine tote containers and provides the explanation for why puncture of a tote is not considered to be a credible accident.

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		Hydrazine totes currently used by OPG are built to the requirements of the CAN/CGSB-43.146-2002 standard, with stringent performance requirements (eg, maintaining integrity following a drop test from 1 metre). The totes are engineered to provide protection from physical damage through enclosure of the polyethylene inner containers by protective heavy steel sheet sides. Thus, puncture of a hydrazine tote was considered to not have a reasonable probability of occurring during the project. In addition, it is of note that the evaluated scenario (spill of 410 litres of hydrazine) represents half the volume of a hydrazine tote (900 litres), so the likely effects of a tote puncture would not be substantially different from the evaluated scenario.
90	13 Cumulative Effects	**JRP IR:** Provide the information which supports the total cumulative dose to public at the Darlington site boundary will be well below regulatory limits. **Rationale:** In Table 8.4-3 of the EIS, the total cumulative dose to public at the Darlington site boundary is expected to be less than 6 micro Sv/year. The EIS further states the following: "The cumulative doses to members of the public and workers, including contributions from other on-site and off-site sources (including Pickering Nuclear Generating Station and the Port Hope area low-level radioactive wastes) were found to be well below regulatory limits." The basis for this statement needs to be provided.
		OPG Response: As indicated in Table 8.4-3 of the EIS, the total annual cumulative dose to members of the public at the DN site boundary from OPG and Port Hope area sources combined is expected to be less than 6 µSv/y. This estimated total annual cumulative dose is less than 1% of the CNSC's regulatory limit for members of the public (1,000 µSv/y). The rationale to support the cumulative dose estimates is provided on pages 8-64 to 8-69 of the Environmental Impact Statement.
91	13 Cumulative Effects	**JRP IR:** Review the cumulative effects section to ensure that the assessment incorporates all environmental components and activities including blasting and dewatering, that could have an effect on VECs, for example: • surface water environment o water quality for lake Ontario o stormwater management with respect to climate change • aquatic environment o Round Whitefish. • atmospheric environment o dust and noise Consider the cumulative effects as a result of accidents and malfunctions.

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		Rationale: The EIS states that "Environmental studies have been conducted on and around the DN site since 1972. A large body of information on the physical, biological and social environments relative to the site and vicinity is available." All residual adverse effects, whether minor or significant should be considered in the cumulative effects assessment.
		OPG Response: The assessment of cumulative effects considered guidance provided by the Reference Guide: Addressing Cumulative Environmental Effects (CEA Agency 1994) and Cumulative Effects Assessment Practitioners Guide (CEA Agency 1999). The assessment of cumulative effects included all residual environmental effects regardless of their deemed significance. Note that no residual adverse effects were determined to be significant. The residual effects are tabulated in EIS Table 8.3-1a (adverse effects) and Table 8.3-1b (beneficial effects). The tables also indicate the VECs relevant to each residual effect. With regard for the examples noted in the information request, the following is noted: • Surface Water Environment – there were no residual effects identified hence no potential cumulative effects; • Aquatic Environment – Residual effects were indentified and considered further for cumulative effects. The relevant VECs were Benthic Invertebrates and Fish Species. Round Whitefish is included as a VEC indicator species; • Atmospheric Environment – there were no residual effects identified hence no cumulative effects. As described in EIS s. 3.2.10 (and repeated in s. 8.2), the cumulative effects assessment did not consider the effects of malfunctions and accidents because these events are hypothetical and have a low probability of occurrence. This is consistent with the Practitioners Guide (CEA Agency 1999) which acknowledges that such events (i.e., accidents and malfunctions) are "rare" and should be considered as "unique circumstance" as their potential effects are too extreme to be considered together with those caused by normal activities. The exclusion of accidents and malfunctions from the assessment of cumulative effects is also consistent with all environmental assessments conducted for OPG nuclear facilities during the recent past. These include the EAs completed and accepted by the CNSC (the RA) for the Pickering A Return to Service (2001); Darlington Used Fuel Dry Storage Project (2002); Pickering Waste Management Facility Phase II (2003); and Refurbishment and Continued Operation of Pickering B NGS (2007).

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
92	13 Cumulative Effects	**JRP IR:** To have selected to conduct the cumulative effects assessment to the principle of "same type of effect, same time, same location" is limiting, in that it gives the worst case scenario at a single point in time. Effects do not have to occur at the same time to act cumulatively. Revise the analysis, taking into account appropriate spatial and temporal boundaries **Rationale:** Effects do not necessarily have to be of the same type, occur at the same time and in the same location to be considered cumulative effects.
		OPG Response: Any definition of cumulative effects is based on the concept of the coincidence (i.e., combination) of effects of the project and effects of other projects. A coincidence of effects requires that they overlap. Establishing overlap using the concept of *"same effect; same timeframe; same geographic space"* is a common technique with considerable precedence including numerous recent EAs conducted under the *Canadian Environmental Assessment Act (CEAA)*. These have included those completed and accepted by the Canadian Nuclear Safety Commission (CNSC) (the Responsible Authority (RA)) for the Pickering A Return to Service (2001); Darlington Used Fuel Dry Storage Project (2002); Pickering Waste Management Facility Phase II (2003); and Refurbishment and Continued Operation of Pickering B Nuclear Generating Station (2007). The cumulative effects assessment considered guidance provided by the *Reference Guide: Addressing Cumulative Environmental Effects* (Canadian Environmental Assessment (CEA) Agency 1994) and *Cumulative Effects Assessment Practitioners Guide* (CEA Agency 1999). Both documents stress the importance of effectively scoping the cumulative effects assessment such that it results in meaningful conclusions; and that the primary considerations in scoping should be the environmental effects to be considered and the appropriateness of spatial and temporal boundaries for the assessment. The New Nuclear Darlington (NND) cumulative effects assessment applied a liberal scoping framework that included: (i) all residual environmental effects of the Project; (ii) a large Regional Study Area established primarily for purposes of the Cumulative Effects Assessment; and, (iii) the entire construction and operational timeframe of the Project. The concept of *"same effect; same timeframe; same geographic space"* was applied as a means of realistically establishing effects within this framework that were truly "cumulative" rather than simply "similar".

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		This approach to establishing if an effect is cumulative is supported by CEA Agency 1999 (s. 3.3.2, pg. 30) where the importance of spatial and temporal overlap is addressed through the following query and response: *"Do actions rarely or never occur at the same time, and do actions originating in one location rarely or never continue on to other locations? If yes, cumulative effects interaction is weak."* From this, it is inferred that for a meaningful cumulative effect interaction to exist, the interaction must overlap in time and in space. OPG sponsored two workshops with a focus on cumulative effects as described in the Communications and Consultation Technical Support Document (TSD). The first workshop included EA specialists who share technical information related to studies undertaken for the EAs for Highway 407 East Extension, Energy from Waste and NND Project. A second workshop was held with proponents of planned and future projects within 10 km of the Darlington Nuclear site. Workshop participants shared information on the timing, works and activities for each project and what environmental effect may overlap in time and space and completed a matrix of potential effects. This information was used to determine what projects are likely to have a cumulative effect, and if so, the nature of it. A preliminary list of projects to be considered in the cumulative effects assessment and the methodology were shared with the public. The public were asked to identify any potential projects (current or planned) that they felt were important to consider from a cumulative perspective. Some participants commented on, or inquired about the cumulative effects being considered for this Project with other development such as Energy from Waste and relocation of the Canadian National rail line. These comments were considered in determining the appropriate responses in the EIS, Chapter 8 Assessment of Cumulative Environmental Effects.

ATTACHMENT B

Attachment to OPG letter, Albert Sweetnam to JRP Chair," OPG Response to Joint Review Panel Information Request February, 2010"

February 25, 2010

CD# NK054-CORR-00531-00069

OPG Response to Joint Review Panel Licence to Prepare a Site (LTPS) Information Request February 2010

LTPS IR#	CNSC Regulation	Detailed Information Request and Response
1	General Nuclear Safety and Control Regulations – Section 3(1)(b)	**LTPS IR:** Describe to what extent the proposed site preparation activities are dependent on the different reactor technologies, cooling technologies and waste management options under consideration for the Darlington Site and what proposed site preparation activities, if any, will be started prior to the selection of the reactor technology, cooling technology and waste options. **Rationale:** Given that decisions on a reactor technology, cooling technology, and waste options have not been made at the time of the LTPS Application, it is unclear whether Ontario Power Generation is proposing to proceed with site preparation activities in advance of these decisions and what the implications are of proceeding with this approach.
		OPG Response: Site preparation activities are largely independent of the reactor technology and waste management options, with the exception of lake works which will require additional federal authorizations. OPG anticipates that all of activities listed in the LTPS Application can be undertaken prior to vendor selection. The decision to initiate any site preparation activities in advance of vendor selection has not been made at this time. This is a business decision that would be made in conjunction with the Ontario Government's plans and in consideration of OPG's financial risk. Work related to any shoreline protection and lake infill would proceed only after obtaining all appropriate authorizations.
2	General Nuclear Safety and Control Regulations – Section 3(1)(b)	**LTPS IR:** Provide further details with respect to the following statement made in LTPS Section 1.2.2, page 1-5: "Other activities in addition to those described in this Licence Application may be undertaken in parallel, under other regulatory approvals as appropriate". Provide a list of the non-CNSC approvals/permits (other Federal, Provincial, Municipal etc.) that will be necessary to carry out these activities and include these as separate milestones in the indicative project schedule (Figure 2.1-1).

LTPS IR#	CNSC Regulation	Detailed Information Request and Response
		Rationale: Specific details of activities that may be undertaken in parallel to those described in the LTPS Application under other regulatory approvals is needed to gain the appropriate contextual understanding and interfaces between those proposed activities authorized under LTPS and those authorized under other regulatory jurisdictions.
		OPG Response: OPG requires CNSC guidance on the jurisdictional boundary to be applied to the New Nuclear at Darlington (NND) Project before OPG is able to provide a definitive list of non-CNSC approvals/permits (Provincial, Municipal) necessary to carry out activities that may be undertaken in parallel to those described in the Licence to Prepare Site (LTPS) Application. OPG noted that further guidance was needed from the CNSC respecting the application of Provincial and Municipal laws to the Project on page 9 of the initial Project Description for the Site Preparation, Construction and Operation of the Darlington B Nuclear Generating Station, s. 2.3.2. The designation of nuclear facilities as Federal undertakings under the Nuclear Safety and Control Act (NSCA) places them under the exclusive jurisdiction of the Federal government. In the past, licences granted under the Atomic Energy Control Act required licensees to comply with other statutes, such as Provincial law and associated standards. Consequently, under the NSCA, the CNSC is to provide direction and clarification on the jurisdictional boundary that is to be applied to the NND Project. CNSC's determination of the jurisdictional boundary and its subsequent implementation, during site preparation and later phases of the Project, will provide jurisdictional clarity with respect to the application of Federal, Provincial or Municipal law (and associated guidance documents), and the authority responsible for administering that law. As required under subsection 3(1)(b) of the General Nuclear Safety and Control Regulations, OPG provided a high level description beginning from page 1-4 (LTPS Application, s. 1.2) of the proposed activities, encompassed by the definition of Nuclear Facility, to be conducted under the Licence to Prepare Site. The definition of Nuclear Facility includes a preliminary list of systems traditionally considered to be part of a Nuclear Facility as described in CNSC guidance documents and operating station documentation. Physical activities to be covered by the Licence to Prepare Site include those related to preparing for construction of the Nuclear Facility. Other activities that may be undertaken in parallel to those described in the Licence Application, under other regulatory approvals, are not considered part of the Licence Application. OPG will be able to provide a list of non-CNSC Provincial and Municipal approvals/permits necessary to carry out the activities that may be undertaken in parallel to those described in the LTPS application following CNSC direction on the jurisdictional boundary for the Project.

LTPS IR#	CNSC Regulation	Detailed Information Request and Response
		With respect to the applicable Federal approvals and permits, the following preliminary applications have been submitted: • Approval under subsection 35(2) (for the harmful alteration, disruption or destruction of fish habitat), and section 32 (for the destruction of fish by means other than fishing) of the Fisheries Act from the Minister of Fisheries and Oceans Canada • Approval under subsection 5(1) of the Navigable Waters Protection Act from the Minister of Transport Canada for works to be built under or through navigable waters that may interfere with navigation. Other Federal authorizations that may be required during site preparation are listed on page 9 of the initial Project Description, s. 2.3.1. For convenience, these are listed below: • Approval under section 10 of the Railway Safety Act from the Minister of Transport Canada if the proposed work departs from engineering standards, or if the municipality, railway company, adjacent neighbour to whom notice is given under section 5 of the Notice of Railway Works Regulation, objects to the work. • Approval under subsection 103(1) of the Canada Transportation Act from the Canadian Transportation Agency if an agreement on the construction of a crossing across the railway cannot be reached with the railway company. • Approval under section 7(c) of the Explosives Act from the Minister of Natural Resources Canada for the temporary storage of explosives.
3	Class I Nuclear Facilities Regulations – Section 3(d), 3(f), 3(g), 3(h)	**LTPS IR:** List each of the Ontario Power Generation Management Programs (PROGs) and associated implementing procedures (PROCs), standards (STD) and instructions (INS), as well as all proposed EPC Co. produced documents such as safety plans, environmental protection plans, etc. that will be required to be in place prior to the start of site preparation activities. For each document listed, provide the timelines for when the document will be in place (if not in place already) and clarify when CNSC staff will be given an opportunity to review these documents prior to implementation. **Rationale:** CNSC staff requires further assurance that Ontario Power Generation management programs and vendor produced documentation applicable to site preparation will be in place prior to the commencement of site preparation activities. The project schedule (Figure 2.1-1) provides approximate timelines for the licensed activities associated with the Licence to Prepare Site application; however the schedule does not include the timelines for the development of the integrated management system and issue of its component plans, programs and procedure documents as well as the required vendor produced documentation referenced in the application.

LTPS IR#	CNSC Regulation	Detailed Information Request and Response
		OPG Response: OPG has committed to implementing all required Management Programs (including Vendor produced documentation) applicable to site preparation to be in place prior the commencement of site preparation activities as noted in Section 2.1.1 *"Quality Management System Overview - OPG's Application for a Licence to Prepare Site for the future Construction of OPG New Nuclear at Darlington and procedures"* and repeated below: *"The DNNP Management System and implementing documents apply to review and oversight of site preparation activities. All implementing documents required for site preparation will be in place prior to the start of licensed activities. The present version of the DNNP Management System is focused on the selection of the EPC Co. and development of the licence applications. As the project progresses through the licensing process, the organization and related activities will evolve. The DNNP Management System will be revised to ensure management of the activities occurring during each phase of the project."* OPG has provided a listing of the following documentation to the CNSC: • Implemented DNNP Management Programs and associated procedures, standards and instructions; • Outstanding Management Programs including vendor produced documents with the milestone by which they will be implemented; • Additional supporting deliverables to support the Management Programs that are to be provided by the vendor after selection as detailed in the current Request for Proposal process. The DNNP Management System and implementing documents that are required for site preparation will be in place prior to the start of licensed activities. **Reference:** • OPG letter, A. Sweetnam to G. Schwarz, "Listing of DNNP Management System Documents and Vendor Produced Documents", February 25, 2010, CD# NK054-CORR-00531-00070.

LTPS IR#	CNSC Regulation	Detailed Information Request and Response
5	Class I Nuclear Facilities Regulations – Section 4(a)	**LTPS IR:** Clarify whether Ontario Power Generation's review and acceptance of the site evaluation studies performed by technical consultants was governed under the DNNP Management System or other Ontario Power Generation governance framework. **Rationale:** It is unclear from the information provided what processes Ontario Power Generation used to evaluate the site evaluation studies performed by their technical consultants.
		OPG Response: Review and acceptance of the site evaluation studies was performed under the DNNP Management System once established, while earlier review and acceptance activities were conducted using other appropriate and rigorous OPG management systems in place for procurement of nuclear safety services. The CNSC's *Class I Nuclear Facilities Regulations*, Section 4(a) specifies that an application for a licence to prepare site shall contain a description of the site evaluation process. In addition, it is an expectation in RD-346 *Site Evaluation of New Nuclear Power Plants*, Section 11, that a Quality Assurance (QA) program is established at such a time that it can be applied to the site evaluation process. Review and acceptance of the site evaluation studies was conducted by OPG during a transition by the Darlington New Nuclear Project (DNNP) from following an existing OPG management system for procurement of nuclear safety services to following a new management system developed for DNNP. Both management systems require an acceptance process by OPG and are very similar. It was confirmed that OPG review and acceptance of the site evaluation work satisfied the requirements of the new DNNP management system, which meets CSA Standard N286-05, *Management System Requirements for Nuclear Power Plants*. Throughout the site evaluation process, a QA program was in place and applied, including for OPG's review and acceptance of the site evaluation studies performed by technical consultants.

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6	Class I Nuclear Facilities Regulations – Section 4(a)	**LTPS IR:** Specify which of the recommendations made in the site evaluation studies conducted by the technical consultants will be implemented and how these recommendations will be tracked and monitored through to completion. **Rationale:** A number of recommendations were made in the site evaluation studies, however, it is unclear which of these recommendations will be implemented and what measures are in place to ensure these recommendations are tracked and monitored through to completion.
		OPG Response: The detailed site evaluation study reports provide supporting technical detail to the Site Evaluation for OPG New Nuclear at Darlington – Nuclear Safety Considerations report, which is considered a licensing basis document. Key recommendations from the studies were brought forward into this document. OPG anticipates that once the Licence to Prepare Site is issued, recommendations made in licensing basis documents will be implemented and tracked to completion using DNNP's Management System. Any recommendations made in the detailed studies are considered to be outside the licensing basis and are not considered to represent commitments for implementation. **Reference:** • OPG Report, NK054-REP-01210-00008, Site Evaluation for OPG New Nuclear at Darlington – Nuclear Safety Considerations, September 14, 2009.
7	Class I Nuclear Facilities Regulations – Section 4(a)	**LTPS IR:** Describe the approach that Ontario Power Generation will take if: 1. The design that is selected for the Darlington Site does not fit within the bounds of the Plant Parameter Envelope in one or more aspects; or 2. The Plant Parameter Envelope values are updated or revised during the course of the project. **Rationale:** Given the uncertainty in the vendor selection process at the time of the LTPS Application, it is unclear from the information provided how these potential scenarios will be addressed by the applicant.

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		OPG Response: As indicated on page 5 of Ontario Power Generation Report, *Use of Plant Parameters Envelope to Encompass the Reactor Designs Being Considered for the Darlington Site*, N-REP-01200-10000-R002, March 11, 2009, also submitted with the Licence to Prepare Site (LTPS) Application on September 30, 2009, "The design that is ultimately selected to be built at the site will have to fit within the bounding envelope defined by the PPE." As illustrated on page 8 of the report, and described in section 2, the vendors provided values for their designs that were developed under their quality assurance programs. These values were used by OPG in the site evaluation studies and resulted in our conclusion that a new nuclear power plant at the Darlington site would not pose an unreasonable risk to the public, environment, or our workers. The vendors confirmed that the resulting Plant Parameter Envelope developed by OPG could be achieved by their design. Accordingly, the selected vendor design will have to fit within the bounds of the Plant Parameter Envelope, as currently established. If the Plant Parameter Envelope must be updated or revised during the review of the application for the Licence to Prepare Site, the vendors will be asked to re-confirm that their design will continue to fit within the bounds of the revised Plant Parameter Envelope. In response, the vendor may propose an alternative value to OPG and satisfy our expectation that the alternative value continues to afford a level of safety consistent with our evaluations based on the current values. Assuming OPG is satisfied, a revised Plant Parameter Envelope will be submitted, updating the application, with an indication of the impact of the change on the supporting licensing basis reports. Assuming that the Plant Parameter Envelope is, as proposed, part of the licensing basis for the new nuclear facility at the Darlington site, after the Licence to Prepare Site is issued the vendor will demonstrate to OPG's satisfaction that the design of the facility fits within the values used. The vendor will be required to adjust their design until it fits within the Plant Parameter Envelope, or the vendor will need to satisfy OPG that the value can be adjusted, and the Plant Parameter Envelope revised, without introduction of unreasonable risk to the public, environment, or our workers. If OPG is satisfied, the Plant Parameter Envelope will be revised, consistent with current regulatory practices respecting licensing basis documents.
8	Class I Nuclear Facilities Regulations – Section 4(a)	**LTPS IR:** Justify splitting the Plant Parameter Envelope data into the various tables (Vendor Design Specific/Reactor Class Specific/Single Unit/Prorated) or consolidate Plant Parameter Envelope Tables 3 to 7 into one table and present the single unit bounding value and prorated bounding values next to each other to facilitate comparison. **Rationale:** For licensing purposes splitting the data into the various tables makes it difficult to ascertain the bounding Plant Parameter

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		Envelope values and provides duplicate information for those parameters that are not to be prorated based on the number of units on site.
		OPG Response: As discussed below, owing to the different nature and intended use of the various plant parameters, OPG considers it reasonable and acceptable to present the Plant Parameter Envelope (PPE) data in multiple parameter tables. As stated in CNSC Information Document INFO-0756 (Revision 1) *Licensing Process for New Nuclear Power Plants in Canada*, an application for a license to prepare site does not require detailed information or determination of a reactor design; however, high level design information is required. OPG believes that the PPE concept is consistent with the approach allowed under Canadian regulatory expectations. However, there is no specific requirement with respect to the format of the PPE. OPG derived the PPE similar to the concept applied for the Early Site Permit process (ESP) used in the United States to resolve siting and environmental issues at a specific site before finalization of a reactor design. As described on Page 13 (Section B.5.0) of the referenced PPE report, the need for multiple parameter tables was based on the nature of the parameter and intended use of the values from different reactor types and designs. The PPE, as presented in the tables discussed below, is used in support of the evaluation of the impact of the site on the plant, and the impact of the plant on the environment. • Table 3 provides the site parameters and composite limiting values for all reactor designs considered. For these parameters, a single set of limiting values is appropriate because the parameters are common to the reactor design and reactor safety assessments. • Tables 4 and 6 provide vendor design-specific parameters that relate to doses, source terms, and fuel storage. These values are considered in vendor-specific assessments and hence multiple sets of values need to be carried forward as part of the PPE. The PPE will be used to confirm that the selected technology is bounded by the evaluations that have been based on the PPE values. • Tables 5 and 7 provide reactor class-specific parameters that are related to plant operation and construction. These may not be compared directly for all vendors due to different reactor types and hence the PPE shows a comparison of limiting values for particular classes of reactor design. **References:** • CNSC INFO-0756-Rev1, “Licensing Process for New Nuclear Power Plants in Canada”, May 2008 • OPG Report, N-REP-01200-10000 R002, “Use of Plant Parameter Envelope to Encompass the Reactor Designs Being Considered for the Darlington Site”

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11	Class I Nuclear Facilities Regulations – Section 4(b)	**LTPS IR:** Describe the mitigation measures for each of the natural and human-induced external hazards that have been identified as warranting design mitigation and clarify how this information will be taken into consideration in the detailed design of the plant. **Rationale:** Reasonable assurance is required that the designs under consideration will be able to withstand the effects of the natural and human-induced external hazards identified and that the results of site evaluation studies will be carried forward into the detailed design of the plant.
		OPG Response: In support of the Licence to Prepare Site (LTPS) Application, OPG identified natural and human-induced external hazards, evaluated them in accordance with Canadian regulatory requirements, and identified which ones needed to be further considered in terms of mitigation measures as part of the design basis of the plant. The types of mitigation measures in question are anticipated to be practicable, for example, through use of conventional engineering means. With input from the results of the site evaluation studies, the required design mitigation measures will be developed during the detailed design process for the Application for the Licence to Construct (LTC). *Class I Nuclear Facilities Regulations*, Section 4(b) lists information requirements for a Licence to Prepare Site Application (LTPS), specifically a description of the site's susceptibility to human activity and natural phenomena. Additionally, RD-346 *Site Evaluation for New Nuclear Power Plants*, Section 4.0, indicates that site evaluation information is expected to feed into the site-specific plant design process. As discussed in the report *Site Evaluation for OPG New Nuclear at Darlington - Nuclear Safety Considerations* (NSC), Section 6.0, page 74 of 81, and in fulfillment of *Class I Nuclear Facilities Regulations*, Section 4(b), the natural and human-induced potential external hazards evaluated were: 1) Meteorological events; 2) Flooding hazards; 3) Seismic hazards; 4) Geotechnical hazards; 5) External, human induced hazards; and, 6) Hazards related to site characteristics and its influence on potential dispersion of radioactive materials. Section 4.11 of the NSC report identifies certain hazards which warrant mitigation through consideration in the design basis of the proposed plant, including: 1) Aircraft crashes; 2) Release of hazardous fluids (specifically toxic gases); 3) Boiling Liquid Expanding Vapour Explosion (BLEVE) missiles; 4) Overpressure caused by deflagration explosions; 5) Electromagnetic interference; and, 6) Blasting at the St. Marys Cement Plant quarry. The assessment concluded that engineering solutions can be implemented for the proposed plant to mitigate the risks associated with these hazards.

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		To ensure required mitigations are taken into consideration, OPG will specify engineering design mitigation requirements to the vendor, and OPG will confirm during the review of design that these requirements are met. This is consistent with RD-346 in terms of site evaluation information the design process. Development of specific mitigation measures is a component of detailed design. OPG will provide details on mitigation measures as part of the Application for the Licence To Construct (LTC).
12	Class I Nuclear Facilities Regulations – Section 3(k	**LTPS IR:** Additional information is requested on the Preliminary Decommissioning Plan and Cost Estimate, more specifically: • escalation factors used and the time over which they apply; • cost table detail and working assumptions. It must be in a level of detail to facilitate independent verification. Not enough detail is provided; • cost estimates must be conservative estimates for labour, materials, environmental assessment, monitoring and administration. They should reflect local rates and assume that work is completed by independent contractors not Ontario Power Generation staff; and • the estimated licensing and regulatory cost recovery fees including time and processes associated with the issuing of a decommissioning licence, a environmental assessment and the issuance of a licence to abandon. **Rationale:** The submission is lacking information to be able to determine the sufficiency of the Preliminary Decommissioning Plan and Cost Estimates. G-219 "Decommissioning Planning for Licensed Activities" and G-206 "Financial Guarantees for the Decommissioning of Licensed Activities" provide guidance on what information to provide.
		OPG Response: The Preliminary Decommissioning Plan was prepared in accordance with the CNSC Regulatory Guide G-219 for Decommissioning Planning for Licensed Activities. Similar plans have been developed for all of OPG's nuclear facilities. Additional information on the Preliminary Decommissioning Plan and Cost Estimate has been provided in the confidential report NK054-PLAN-00960-00002 *"Cost Estimate for Decommissioning of OPG New Nuclear at Darlington Site – Prepared Site"* provided to the CNSC (. The report provides sufficient information to enable verification of the report conclusions with respect to escalation factors, cost table details and working assumptions and cost estimates, consistent with CNSC Regulatory Guide G-206 Financial Guarantees for the Decommissioning of Licensed Activities.

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		The licensing and regulatory cost recovery fees are estimated to be less than 2%-3% of the total estimated cost of $86M. **Reference:** • OPG letter, A. Sweetnam to G. Schwarz, "Supporting Information for Preliminary Decommissioning Plan for the Licence to Prepared Site Application for OPG's New Nuclear at Darlington", February 25, 2010, CD# NK054-CORR-00531-00066.
13	Class I Nuclear Facilities Regulations – Section 4(e)	**LTPS IR:** Demonstrate how shoreline fumigation was considered in the modeling analysis for atmospheric pathways. **Rationale:** Shoreline fumigation is a well known phenomenon that has been investigated in coastal areas around the world, including lake Ontario. The phenomenon results in a temperature inversion which causes the air to be very stable resulting in very little convection or turbulence to mix (disperse or dilute) pollutant concentrations. Models that do not simulate shoreline fumigation often predict maximum ground level concentrations that are far lower than "real world" concentrations.
		OPG Response: The document *Site Evaluation of the OPG New Nuclear at Darlington – Part 2: Dispersion of Radioactive Materials in Air and Water* is in accordance with CSA standard N288.1-08, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*. Page 31 of the Standard (Section 6.1.1.4) states that in general, fumigation "has a small effect on air concentrations for the meteorological conditions and downwind distances of interest at Canadian nuclear facilities, and thus need not be considered." Quantitative justification for excluding fumigation can be found in documents referenced in the Standard. **References:** • CSA N288.1-08, Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities (2008)

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14	Class I Nuclear Facilities Regulations – Section 4(e)	**LTPS IR:** In addition to the airborne release parameters presented in Table 3.1-2, provide the following parameters for each of the reactor types: • # of stacks for each reactor type • stack diameters stack parameters for other radiological and non-radiological airborne release points on-site (i.e. decontamination centre, fuel storage bays, standby generators etc.) **Rationale:** The additional airborne release parameters are required to adequately model the airborne releases from the various reactor types.
		OPG Response: The requested level of detail was not required to perform the modelling of radiological releases. Calculations and modelling for radiological releases were performed in accordance with CSA Standard N288.1-08, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities,* and were completed in a simplified and conservative manner such that doses were overestimated. Non-radiological (conventional) releases to atmosphere from normal operations are addressed in the Environmental Impact Statement (EIS) and in the *New Nuclear at Darlington Environmental Assessment, Atmospheric Environment Assessment of Environmental Effects Technical Support Document* (TSD). Section 4.3.3.3 on Operation of Electrical Power Systems of the TSD indicates that *"the potential releases to air from this activity primarily results from the operation of emergency and standby power and auxiliary boilers. Under normal conditions, these units only operate for testing conditions."* The impact from radiological releases is assessed in Sections 3 and 4 of the *Site Evaluation of the OPG New Nuclear at Darlington- Part 2: Dispersion of Radioactive Materials in Air and Water* report (NK054-REP-01210-00016-R001). Section 3.1 of the report states that releases from the decontamination centre and fuel storage bay area located within the power plant are already accounted for in the releases specified in Table 6.1 of the *Use of Plant Parameters Envelope to Encompass the Reactor Designs Being Considered for the Darlington Site* report (N-REP-01200-10000-R002). Section 3.6 of the *Part 2* report indicates that operation of the radioactive waste and used fuel management systems will result in airborne emissions to atmosphere and that radioactive releases to air will mainly comprise of tritium, C-14 and noble gases which will be processed through dehumidifiers, activated charcoal delay beds and filters before release; these releases represent a small fraction of releases due to normal operations. The level of detail provided is consistent with standard methodology, as demonstrated by referring to CSA N288.1-08, Section

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		6.1.1.3, where it is recognized that *"it is generally more convenient to combine all the release locations into one virtual source located at the centre of the facility"*. This is what was done for the modelling for the EIS using the IMPACT code. Combining emission points into one location is also conservative, as it increases the maximum concentration calculated. Additional source detail such as stack numbers, stack diameters and locations of stacks from other facilities were not used. The simplifying assumption of a point source, per CSA N288.1 Section 6.1.1.3 foregoes the requirement of using stack details. **References:** • (CSA) Standard N288.1-08, Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities • Site Evaluation of the OPG New Nuclear at Darlington- Part 2: Dispersion of Radioactive Materials in Air and Water report (NK054-REP-01210-00016-R001)
16	Class I Nuclear Facilities Regulations - Section 4(b) RD-346, Section 5.3	**LTPS IR:** Provide the St. Mary's Quarry blasting monitoring data (peak ground velocity, PGV, and/or peak ground acceleration, PGA) at two monitoring stations (DREO and DRWO) with the corresponding explosive quantity, Q, that is primed within one round and with detonators having the same delay number and the distance, R, between the explosive charges and the monitoring locations, and assess the potential effects of phase 4 St. Mary's Quarry blasting on the project (the NNP). Provide a table which contains the predicted PGVs and PGAs with different quantities of explosive and distances. If the potential effects are adverse, remediation provisions should be provided to mitigate the effects as appropriate. **Rationale:** Blasting from St. Marys Quarry can influence the stability of natural slopes, earthworks, and structures associated with the project or directly damage the structures. The blasting vibration could also impact the function of the instruments and switches used for power plant operation. Sandy materials can liquefy under dynamic loads resulting from blasting and substantially lose their shear strength. Information provided in the submissions cannot predict the potential effects of the blasting, particularly from phase 4 of the project.

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		This information is also needed for the purposes of the Environmental Impact Statement review. Blasting-induced vibration can be expressed as: $PGV = k\left(\frac{R}{\sqrt{Q}}\right)^{-m}$ where k and m are site parameters, which can be obtained from the monitoring data (PGA can be expressed in a similar formula). Ontario Power Generation is expected to obtain this equation by using the monitoring data. The effect of blasting on the project can be predicted with the values obtained from the equation with the different explosive quantities and distances and the standard limits.
		OPG Response: The effects of St. Marys' blasting occurring nearer to the DN site will be dealt with by industry standard engineering design of plant structures and equipment as part of detailed design in support of the Application for a Licence to Construct. The blasting at St. Marys introduces two effects: blast wave and seismic impact. These are both addressed in the *Nuclear Safety Considerations* (NSC) report, Section 4.10, pages 60 and 61. One effect is the blast wave associated with the detonation. This was assessed and deemed not to require mitigation. The rationale is provided in the *Summary Report: Site Evaluation Studies for Nuclear Installations at Darlington, External Human Induced Events*, Table 4-1 on page 12 of 17, for Explosions, Fixed Sources, and St. Marys Blasting. St. Marys is screened out for current production (and for production phases well into the future) because the distance from the proposed plant exceeds the Screening Distance Value and hence does not require mitigation for blast wave effects. This assessment for blast wave effects is considered to be valid for a time period that encompasses site preparation, facility construction, and to the end of facility operation (which is not expected to coincide with potential Phase 4 operation at St. Marys Quarry). The second effect concerns the seismic impact of the quarry operation. As indicated in *Part 6: Evaluation of Geotechnical Aspects* report (and *Part 3: Summary of Seismic Hazard Evaluations*), the effects of blasting have been monitored at two monitoring stations located at the east and west sides of the DN site. The monitoring data are with Natural Resources Canada. In a one year period the highest peak ground velocity recorded was 1.57 mm/sec. This is in the range between "noticeable to persons" and "troublesome to persons", but is much less than the "damage to walls" threshold level. Nonetheless, the seismic effects of St. Marys' blasting occurring nearer to the DN site should be accounted for in the plant design. Consistent with RD-346, there is assurance of no unreasonable risk for construction of a new nuclear plant at the site, and technical data will feed into the detailed design process as part of the License to Construct stage.

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17	Class I Nuclear Facilities Regulations - Section 4(b) RD-346: 7.5	**LTPS IR:** Discuss the liquefaction potential of the new waste pile/landfill based on available information and its effects on the project. **Rationale:** Most of the waste pile/landfill is comprised of remoulded tills and sands (predominantly silty sands and sandy silts), which are liquefaction susceptible materials. Liquefaction of the pile could affect the safe operation of the downstream NPP, the CN rail and the surrounding environment. This information is also needed for the purposes of the EIS review.
		OPG Response: CNSC Regulatory Document *RD-346 Site Evaluation for New Nuclear Power Plants*, Section 7.5, Geotechnical Hazards, mentions liquefaction of the subsurface materials. It is noteworthy that liquefaction of subsurface materials for the proposed Northeast Landfill would be a topic relevant to the materials that currently exist on the location of the proposed Northeast Landfill site. Such materials would form the foundation of the proposed Northeast Landfill. Structures such as the proposed Northeast Landfill will be designed and constructed to be stable, including resistance to liquefaction, through implementation of standard engineering and good industry management practices. Such practices have successfully been used to create landfills and large soil stockpiles to ensure stability, as evidenced by the success of the existing Northwest Landfill built in the 1980s using materials similar to those for the proposed Northeast Landfill. Prior to the construction of the Northeast Landfill, detailed design and analysis for stability, including resistance to liquefaction, will be performed. OPG will specify requirements to the vendor and will confirm satisfaction of these requirements during oversight activities as part of the work during the Licence to Prepare Site phase.

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20	Class I Nuclear Facilities Regulations – Section 4(a)	**LTPS IR:** Provide a schedule and/or plan to conduct the detailed geotechnical investigations that are required to update the current information, to confirm the site conditions and foundation structure assessments, and to provide sufficient data for detailed facility design. **Rationale:** Since data from only four boreholes in the areas for new nuclear construction were evaluated in the Evaluation of Geotechnical Aspects report, the site conditions, analyses/assessments of the earth structures, and conclusions developed in the site evaluation will need to be confirmed with more site specific information obtained from the detailed site geotechnical investigations.
		OPG Response: As per the LTPS page 4-5 (Section 4.1.2) site characterization investigation work to support detailed design work may be performed during the site preparation phase. This site investigation work may include activities such as additional borehole preparation and analysis, detailed soil and rock analysis, additional seismic characterization, ground and surface water analysis, topographic analysis and detailed bathymetry of the lake bottom. These physical activities may be performed concurrently with the licensed site preparation activities; however they do not require federal regulatory approval and are mentioned here to provide full understanding of works to be performed. OPG's current plan is to complete this work as a prerequisite to the major site preparation activities. The detailed site investigation will be completed by the vendor, once selected. OPG will ensure that the detailed geotechnical investigation is completed to confirm the site conditions and foundation structure assessments. OPG will oversee and monitor the performance of the vendor, who will collect sufficient information required for the detailed design.
21	Class I Nuclear Facilities Regulations – Section 4 (b) RD-346 Section 7.7	**LTPS IR:** Provide information on the potential birds and other wildlife that could affect NPP structures, systems and components. **Rationale:** This information is required to assess the potential for biological phenomena to affect NPP structures, systems and components at Darlington. For example, birds nesting near air intakes can result in blockages, and pathogens or chemically reactive agents from nesting areas can enter intakes. Similarly, wildlife that could potentially reside within Nuclear Power Plant structures and systems and cause damage (e.g. rodents degrading wire insulation inside wiring cabinets).

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		OPG Response: Currently, the Darlington Nuclear (DN) site has a process in place to manage nuisance wildlife that could adversely affect station operations. A similar process will be followed based on the Environmental Management System for New Nuclear at Darlington (NND) (see Page 2-80 (Section 2.9.2 Environmental Impact Statement). OPG Nuclear has governance in place, as part of its Environmental Management System, that provides guidance on managing nuisance flora and fauna at its nuclear stations (Controlled and Protected Areas). Wildlife can be classified as a nuisance based on the following criteria: hazard to health and safety of employees and the public, risk to the reliable operation of the station, high probability of damage to site property, and adverse effect on the station's biodiversity program. Operating experience at Darlington Nuclear Generating Station has indicated that there have not been issues with rodents entering the Protected Area and damaging electrical wiring. The following is an example of how the nuisance fauna have been managed at the DN site. The DN site has an egg-oiling program under a Canadian Wildlife Service permit for Canada Geese (since 2001) that have been nesting in the Controlled and Protected Areas, Herring Gulls (since 2006) that have been nesting in the Protected Area, and Mute Swans (since 2004) that have been nesting in the Controlled Area. The program involves locating nests and applying inert mineral oil to the eggs to prevent hatching. Management of nuisance wildlife at NND would be addressed through a similar process in accordance with NND's Environmental Management System. (See Page 2-80 (Section 2.9.2 Environmental Impact Statement)).