

Guidelines for the Preparation of the Environmental Impact Statement for Ontario Power Generation's Darlington New Nuclear Power Plant Project

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PART 1 – INTRODUCTION

1. CONTEXT

1.1 Purpose of the Guidelines

The purpose of this document is to identify for the proponent, Ontario Power Generation (OPG), the nature, scope and extent of the information that must be addressed in the preparation of the Environmental Impact Statement (EIS) for its proposed New Nuclear Power Plant project (the OPG Darlington NNPP project) for the creation of approximately 4,800 MW of electrical generation capacity. The proponent will prepare and submit an EIS that examines the potential environmental effects, including cumulative effects, of the site preparation, construction, operation, refurbishment if required, decommissioning and abandonment of the project, and that evaluates their significance. In addition, the proponent will address all requirements for a Licence to Prepare Site detailed in Appendix 2 of this document. This information will be used by the joint review panel established pursuant to the *Canadian Environmental Assessment Act* and the *Nuclear Safety and Control Act* as the basis for a public review.

While the EIS guidelines provide a framework for preparing a complete and accessible EIS, it is the responsibility of the proponent to provide sufficient data and analysis on any potential environmental effects to permit proper evaluation by a joint review panel, the public, and technical and regulatory agencies. The EIS guidelines outline the minimum information requirements while providing the proponent with flexibility in selecting methods to compile and analyze data for the EIS.

Exchanges between the proponent and other government organizations, Aboriginal people and stakeholders, where appropriate, are encouraged to ensure that the EIS responds adequately to these guidelines.

1.2 Environmental Assessment and Regulatory Process

On September 20, 2006, OPG wrote to the Canadian Nuclear Safety Commission (CNSC) indicating its intent to initiate the regulatory process to prepare a site, construct and operate up to four new nuclear reactors on the existing OPG Darlington Nuclear Site within the Regional Municipality of Durham in Ontario. The proposed OPG Darlington NNPP would generate up to 4,800 MW of electrical generating capacity for supply to the Ontario grid.

The OPG Darlington NNPP project includes site preparation, construction, operation, decommissioning and abandonment of up to four new nuclear reactors. Operations would involve activities required to operate and maintain the NNPP, including management of all conventional and radioactive wastes. The EIS will consider the potential environmental effects, including cumulative effects, of all phases of the project. The proponent is considering a range of reactor designs, but has not yet decided on a specific technology. It is anticipated that the OPG Darlington NNPP would have an approximate 60-year operating life and could include a mid-life refurbishment.

The principal buildings and structures are grouped into three primary areas: the power block, the cooling system and the switchyard. The power block consists of the buildings housing the nuclear reactors and all associated facilities and equipment. Two methods of cooling water systems are being considered for the removal of heat from the reactor: 1) cooling towers; or 2) once-through cooling system which would draw from, and discharge, to Lake Ontario. A new switchyard may be required to transmit electricity from the power station to the provincial grid.

The project triggers the *Canadian Environmental Assessment Act* given that the proponent requires authorizations under section 24(2) of the *Nuclear Safety and Control Act* in order for the project to proceed. In addition, authorizations by: Transport Canada under paragraph 5(1)(a) of the *Navigable Water Protection Act*; Fisheries and Oceans Canada under subsection 35(2) of the *Fisheries Act*; and the Canadian Transportation Agency under subsection 98(2) and subsection 101(3) of the *Canadian Transportation Act* may also be required for this project. All of these authorizations require that an environmental assessment is completed before any authorizations are granted that would enable the project to proceed in whole or in part.

On March 20, 2008, the Minister of the Environment announced his referral of the OPG NNPP to a review panel pursuant to the *Canadian Environmental Assessment Act*, and indicated that the CNSC and the Canadian Environmental Assessment Agency (CEAA) should pursue a joint environmental assessment process. A joint review panel under the *Canadian Environmental Assessment Act* and the *Nuclear Safety and Control Act* is being established to undertake an environmental assessment and regulatory review of this project. The joint review panel for this project will evaluate information that relates to the environmental assessment. The joint review panel will also consider information submitted by OPG in support of their application for a Licence to Prepare Site for a Class 1 Nuclear Facility, in accordance with the requirements of the *Nuclear Safety and Control Act* and its regulations.

The Province of Ontario's Ministry of the Environment indicated on April 5, 2007 that its legal position was that the province has no mandate to make nuclear facilities subject to the Ontario *Environmental Assessment Act*. As such, it did not foresee having any environmental assessment responsibility. However, the Province did indicate its desire to remain informed about the progress of the federal environmental assessment so that it could understand the potential implications for projects in the provincial domain.

1.3 Preparation and Review of the EIS

The EIS guidelines were prepared by the CEAA and the CNSC, in consultation with Fisheries and Oceans Canada (DFO), Transport Canada and the Canadian Transportation Agency.

An EIS is a document prepared by a proponent that allows a joint review panel, regulators, members of the public and Aboriginal groups to understand the project, the existing environment, and the potential environmental effects of the project. The proponent must also provide, as outlined in Appendix 2, all information required to support the licence to prepare site application for the joint review panel, as a panel of the

Commission, to consider and render a licensing decision under the *Nuclear Safety and Control Act*.

The proponent will prepare an EIS that addresses the requirements of these guidelines for submission to the joint review panel that will be established for this project. The EIS will then be made available to the public and stakeholders for a comment period on whether the EIS is in conformity with these guidelines. The joint review panel will determine whether additional information is required before convening public hearings.

The EIS that is made available for public and stakeholder comment should not contain:

- information that could cause specific, direct and substantial harm to the proponent, to a witness or specific harm to the environment by the disclosure of;
- information that involves national or nuclear security;
- information that is confidential (i.e., financial, commercial, scientific, technical, personal or other nature), that is treated consistently as confidential, and the person affected has not consented to the disclosure; or
- information that is likely to endanger the life, liberty or security of a person through its disclosure.

The proponent must inform the joint review panel in writing for a determination as to whether specific information requested by these guidelines should be submitted to, and retained by the joint review panel, as confidential. Such requests must contain as much detail as possible about the information to be kept confidential and provide a rationale for the request. All requests, as well as the joint review panel's determinations respecting the requests, will be made available on the project's online public registry.

Following public hearings, the joint review panel, as a panel of the CNSC, will prepare and submit a report that includes, but is not limited to, the rationale, conclusions and recommendations of the joint review panel relating to the environmental assessment of the project, including any mitigation measures and follow-up program.

This joint review panel report will be submitted to the Minister of the Environment to the Ministers of the Responsible Authorities. The report will be made available to the public at that time. The government will then respond to the joint review panel's report. The Government of Canada's response to the joint review panel report will be made available by the CEAA.

Subsequent to the Government of Canada response, the joint review panel will render a licensing decision for a Licence to Prepare Site under the *Nuclear Safety and Control Act*.

2. GUIDING PRINCIPLES

2.1 Environmental Assessment as a Planning Tool

Environmental assessment is a planning tool used to ensure that projects are considered in a careful and precautionary manner in order to avoid or mitigate the possible adverse effects of development on the environment and to encourage decision-makers to take actions that promote sustainable development and thereby achieve or maintain a healthy environment and a healthy economy.

The environmental assessment of this project must, in a manner consistent with those purposes, identify its possible environmental effects; propose measures to mitigate adverse effects; and, predict whether there will be likely significant adverse environmental effects after mitigation measures are implemented.

2.2 Public Participation and Aboriginal Engagement

Public participation¹ is a central objective of the overall review process. Public participation provides the public and organizations with a fair opportunity to contribute to the planning of projects that may affect them; allows proponents and federal authorities to better understand and address public concerns and priorities; reduces the potential for adverse environmental effects by identifying community knowledge and Aboriginal traditional knowledge that may be applied in the environmental assessment; and builds greater public trust in the environmental assessment process.

Meaningful public participation requires the proponent to address concerns of the general public regarding the anticipated or potential environmental effects of the project. In preparing the EIS, the proponent is required to engage residents and organizations in all affected communities, other interested organizations, and relevant government agencies. The proponent must provide in the EIS the highlights of this engagement, including the methods used, the results, and the ways in which the proponent intends to address the concerns identified, including a summary of issues raised during such engagement.

Another objective of the overall review process is to involve potentially affected Aboriginal people in order that the environmental assessment can identify any changes that the project may cause in the environment and the resulting effects of any such changes on the current use of lands and resources for traditional purposes by Aboriginal persons. The proponent must ensure that it engages with Aboriginal people that may be affected by the project and that have asserted or have established Aboriginal rights,

¹ As described in CEAA's Public Participation Guide (May 2008), terms such as "participation," "consultation," "involvement" and "engagement" are often used interchangeably, although they may mean different things to different people. These guidelines endeavour to use these terms in a manner that is consistent with the 'Public Participation Terminology' described in this CEAA Guidance.

Aboriginal title or treaty rights. In preparing the EIS, the proponent must ensure that Aboriginal people have the information that they require in respect of the project and of how the project may impact them. The proponent is required to describe in the EIS how the concerns respecting Aboriginal people will be addressed. That description must include a summary of discussions, the issues or concerns raised, and should consider and describe any asserted or established Aboriginal rights, Aboriginal title and treaty rights. The EIS must document the potential impact of the project on asserted or established Aboriginal rights, Aboriginal title and treaty rights, and the measures to prevent or mitigate those potential impacts.

Meaningful involvement in the environmental assessment takes place when all parties involved have a clear understanding of the proposed project as early as possible in the review process. Therefore, the proponent is required to:

- continue to provide up-to-date information describing the project to the public and especially to the communities likely to be most affected by the project;
- involve Aboriginal people in determining how best to deliver that information (e.g., the types of information required, translation needs, different formats, the possible need for community meetings); and
- explain the results of the EIS in a clear and direct manner to make the issues comprehensible to as wide an audience as possible.

2.3 Traditional Knowledge

Traditional knowledge, which is rooted in the traditional life of Aboriginal people, has an important contribution to make to an environmental assessment. Traditional knowledge refers to the broad base of knowledge held by individuals and collectively by communities that may be based on spiritual teachings, personal observation and experience on land and sea or passed on from one generation to another through oral and/or written traditions. This tradition is dynamic, substantive, and distinct living knowledge.

Traditional knowledge, in combination with other information sources is valuable in achieving a better understanding of potential impacts of projects. Traditional knowledge may, for example, contribute to the description of the existing physical, biological and human environments, natural cycles, resource distribution and abundance, long and short-term trends, and the use of lands and land and water resources. It may also contribute to project siting and design, identification of issues, the evaluation of potential effects, and their significance, the effectiveness of proposed mitigation, cumulative effects and the consideration of follow-up and monitoring programs.

Certain issues relevant to the review process are firmly grounded in traditional knowledge, such as harvesting, cultural well-being, land use, heritage resources, and others. Although the basis for traditional knowledge and science-based knowledge can differ, they may on their own or together, contribute to the understanding of these issues.

The joint review panel will promote and facilitate the contribution of traditional knowledge to the review process. It is recognized that approaches to traditional knowledge, customs and protocols may differ among Aboriginal communities and persons with respect to the use, management and protection of this knowledge. The joint review panel will consider the views of communities and traditional knowledge holders during the joint review process and determine which information should be kept confidential. 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.

Alternatively, the proponent may facilitate the presentation of such knowledge by persons and parties having access to this information to the joint review panel during the course of the review. If requested by an Aboriginal people, the proponent should cooperate with that people to develop a mutually agreed-upon arrangement for the Aboriginal people themselves to provide traditional knowledge throughout the joint review process, either by themselves or in collaboration with the proponent.

2.4 Sustainable Development

Sustainable development seeks to meet the needs of present generations without compromising the ability of future generations to meet their own needs.

Environmental assessment provides a systematic approach for identifying, predicting and evaluating the potential environmental effects of projects before decisions are made. In addition, environmental assessment provides the means to identify mitigation measures for adverse effects. Environmental assessment promotes sustainable development and contributes to decision-making that can ultimately provide net ecological, economic and social benefits to society.

A project that is supportive of sustainable development must strive to integrate the objective of net ecological, economic and social benefits to society in the planning and decision-making process and must incorporate citizen participation. The project, including its alternative means, must take into account the relations and interactions among the various components of the ecosystems and meeting the needs of the population. The proponent must include in the EIS consideration of the extent to which the Project contributes to sustainable development. In doing so, the proponent must consider, in particular:

- the extent to which biological diversity may be affected by the project; and
- the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of present and future generations.

2.5 Precautionary Approach

One of the purposes of environmental assessment is to ensure that projects are considered in a careful and precautionary manner before authorities take action in connection with them, in order to ensure that such projects do not cause significant adverse environmental

effects. The precautionary approach recognizes that a lack of full scientific certainty should not be used as a reason to postpone decisions where there is a potential for high level of risk or irreversible harm.

The document “A Framework for the Application of Precaution in Science-based Decision Making About Risk” [Reference 1] sets out guiding principles for the application of precaution to science-based decision making. The framework aids the decision-maker to assess whether precautionary decision-making is in keeping with Canadians’ social, environmental and economic values and priorities.

The proponent must indicate how the precautionary principle was considered in the design of the Project in at least the following ways:

- demonstrate that all aspects of the project have been examined and planned in a careful and precautionary manner in order to ensure that they do not cause serious or irreversible damage to the environment and/or the health of current or future human generations;
- outline and justify the assumptions made about the effects of all aspects of the project and the approaches to minimize these effects;
- evaluate and compare alternative means of carrying out the Project in light of risk avoidance, adaptive management capacity and preparation for surprise;
- demonstrate that in designing and operating the project, priority has been and will be given to strategies that avoid the creation of adverse effects;
- provide that contingency plans explicitly address worst-case scenarios and include risk assessments and evaluations of the degree of uncertainty;
- identify any proposed follow-up and monitoring activities, particularly in areas where scientific uncertainty exists in the prediction of effects; and
- present public views on the acceptability of all of the above.

In doing so, the proponent shall consider the guiding principles set out in the “Framework for the Application of Precaution in Science-based Decision Making About Risk”.

2.6 Study Strategy and Methodology

The proponent is expected to observe the intent of the EIS guidelines and to identify all environmental effects that are likely to arise from the project (including situations not explicitly identified in these guidelines), the mitigation measures that will be applied, and the significance of any residual adverse effects. It is possible that the EIS guidelines include matters that, in the judgement of the proponent, are not relevant or significant to the project. If such matters are omitted from the EIS, they must be clearly identified in the EIS with appropriate justification so that the public and other interested parties have an opportunity to comment on this judgement. Where the joint review panel disagrees with the proponent's decision, it may require the proponent to provide additional information.

The proponent must explain and justify methods used to predict impacts of the project on each valued ecosystem component (VEC), which includes biophysical and socio-economic components, the interactions among these components and on the relations of these components within the environment. The information presented must be substantiated. In particular, the proponent must describe how the VECs were selected and what methods were used to predict and assess the adverse environmental effects of the project on these components. The value of a component not only relates to its role in the ecosystem, but also to the value placed on it by humans. The culture and way of life of the people using the area affected by the project may themselves be considered VECs.

In describing methods, the proponent must document how it used scientific, engineering, traditional and other knowledge to reach its conclusions. Assumptions must be clearly identified and justified. All data, models and studies must be documented such that the analyses are transparent and reproducible. All data collection methods must be specified. The uncertainty, reliability and sensitivity of models used to reach conclusions must be indicated. The sections in the EIS regarding existing environment and potential adverse environmental effects predictions and assessment must be prepared using best available information and methods, to the highest standards in the relevant subject area. All conclusions must be substantiated.

The EIS must identify all significant gaps in knowledge and understanding where they are relevant to key conclusions presented in the EIS. The steps to be taken by the proponent to address these gaps must also be identified. Where the conclusions drawn from scientific and technical knowledge are inconsistent with the conclusions drawn from traditional knowledge, the EIS must contain a balanced presentation of the issues and a statement of the proponent's conclusions.

2.7 Use of Existing Information

In preparing the EIS, the proponent is encouraged to make use of existing information relevant to the project. When relying on existing information to meet the requirements of various sections of the EIS guidelines, the proponent must either include the information directly in the EIS or clearly direct (e.g., through cross-referencing) the joint review panel to where it may obtain the information. When relying on existing information, the proponent must also comment on how representative the data are, clearly separate factual lines of evidence from inference, and state any limitations on the inferences or conclusions that can be drawn from them according to the criteria for information quality set out in section 2.6 of the EIS Guidelines. For instance:

- assumptions must be clearly identified and justified;
- all data, models and studies must be documented such that the analyses are transparent and reproducible;
- the uncertainty, reliability and sensitivity of models used to reach conclusions must be indicated;
- conclusions must be substantiated; and
- the studies must be prepared using best available information and methods, to recognized standards of good practice in the relevant subject area.

3. PRESENTATION OF THE EIS

For clarity and ease of reference, the EIS should be presented in the same order as the EIS guidelines. However, in certain sections of the EIS, the proponent may decide that the information is better presented following a different sequence. The EIS must include a guide that cross-references the EIS guidelines with the EIS so that points raised in the EIS guidelines are easily located in the EIS.

In the interest of brevity, the EIS should make reference to, rather than repeat, information that has already been presented in other sections of the document. A key subject index would also be useful and should reference locations in the text by volume, section and sub-section. The names of the proponent's key personnel and/or contractors and sub-contractors responsible for preparing the EIS must be listed. Supporting documentation can be provided in separate volumes, and referenced by volume, section and page in the text of the EIS. The proponent must submit the EIS and all supporting documents in hard copy and in an electronic format to facilitate internet access and for record keeping and review.

The proponent must present the EIS in the clearest language possible. However, where the complexity of the issues addressed requires the use of technical language, a glossary defining technical words and acronyms must be included. The proponent should provide charts, diagrams and maps wherever useful to clarify the text, including perspective drawings that clearly convey what the developed project site would look like.

Information required to support the application for the Licence to Prepare site must clearly cross-reference the EIS where appropriate.

3.1 Environmental Impact Statement Summary

The proponent must prepare a plain language summary of the EIS that provides the reader with a concise but complete overview of the EIS.

4. SCOPE

The following section outlines the scope of the project and the factors to be assessed.

4.1 Scope of the Project

Pursuant to subsections 15(1)(b) and 15(3)(b) of the *Canadian Environmental Assessment Act*, the Minister of the Environment is proposing that the scope of the project include the site preparation, construction, operation, decommissioning and abandonment of the project components and activities proposed by OPG as described in "OPG New Build Project Environmental Assessment – Project Description" [Reference 2].

The scope of the Darlington NNPP Project includes site preparation, construction, operation, decommissioning and abandonment of up to four new nuclear power reactors for the production of up to 4,800 megawatts of electrical generating capacity for supply to the Ontario grid.

Operations would involve activities required to operate and maintain the Darlington NNPP, including management of all conventional and radioactive wastes. The Province of Ontario is considering a range of reactor designs. It is anticipated that each new reactor constructed would have an approximate 60-year operating life and could include a mid-life refurbishment depending on the reactor design technology chosen by the proponent.

The project includes up to four units, consisting of the following principal components:

- Reactor Building – contains the reactor vessel, fuel handling system, heat transport system, moderator, reactivity control mechanisms, shut down systems and containment; and
- Turbine Generator Powerhouse – contains the turbines, generators and related systems and structures that convert steam from the operation into electrical energy.

The project also includes the following shared facilities between reactors:

- Condenser Cooling Systems and Structures: including cooling towers or the once-through cooling system with all of its associated submerged intake, forebay and discharge systems;
- Low and Intermediate Level Waste Management Facility (on or off-site); and
- Expansion of the existing Darlington Waste Management Facility for storage of used nuclear fuel or construction of a new facility.

Ancillary activities that may be required include the transportation of low and intermediate level waste to be managed offsite at an appropriate licensed facility.

The following describes activities expected to be undertaken:

Preparation Phase:

Site preparation includes the following activities needed to construct the new nuclear reactors and associated physical works listed above:

- construction and enhancing of on-site roads, which would connect to local roads and provincial highway 401 as appropriate, to provide access to the site;
- re-establishment of a rail line spur if required;
- construction of a wharf if required;
- construction of parking lots and laydown areas;
- construction site fencing;
- removal of existing trees and vegetation if necessary;

- shoreline stabilization and lake infilling, coffer dam construction;
- realigning intermittent stream channels and draining some wet areas across site;
- earthmoving activities including cutting, filling, grading construction areas, creating berms and stockpiles;
- installation of necessary infrastructure such as power, water main, sewage systems, surface water drainage, storm water sewers; and
- bedrock excavation for foundations.

Construction:

Construction includes the following activities needed to construct the new nuclear reactors and associated physical works listed above:

- installation of bedrock piles;
- expansion of the switchyard;
- receipt and management of materials and components for installation;
- installation of the intake and outfall to Lake Ontario;
- construction of cooling towers if required;
- construction of the reactors, power house buildings, structures, and systems;
- removal of construction debris to a licensed facility, including any hazardous waste created during construction;
- testing and commissioning of systems and structures;
- landscaping; and
- final site fencing and security system installation.

Operation and Maintenance Phase:

The operation phase includes all of the work and activities that occur during routine operation and maintenance of the new nuclear reactors and associated buildings, structures and systems. This phase consists of the 60-year timeframe over which the nuclear power station is expected to generate electricity.

Commissioning a new nuclear power plant consists of the following general activities: verification and qualification of systems, pressure testing of vessels, fuelling of reactor; pressure testing of containment building, approach to criticality, approach to full power; testing of the reactor core physics, verification of control systems, connection to the grid, operational testing and full power operation. Some commissioning activities, specifically those that take place without fuel in the reactor core, may be authorized during the construction phase.

Following commissioning, the activities to be undertaken include the operation and maintenance of plant systems including nuclear steam supply systems, turbine generator and feedwater systems, electrical power systems, nuclear safety systems, ancillary systems, systems for maintaining facility security, activities associated with the maintenance program, materials handling systems, solid waste handling systems and administration and support systems.

Operation and maintenance activities can be categorized as follows:

- operation of equipment for production of electricity;
- verification, sampling, testing and maintenance during operation at power;
- maintenance, repairs, cleaning, and decontamination during planned shutdowns and outages;
- on-site transportation and handling of fuel, including defuelling and refuelling of the reactor;
- management of low and intermediate waste and spent fuel waste within the reactor building, and the transfer of wastes and used fuel for interim or long-term storage;
- management of hazardous substances and hazardous waste; and activities relating to environmental protection and radiation protection programs; and
- activities required to achieve a safe state of closure prior to decommissioning.

During this phase, the assessment would include consideration of the effects associated with mid-life refurbishment for CANDU-type reactors as well as the effects relating to outages to refuel or refurbish boiling water and pressurized water-type reactors.

Decommissioning and Abandonment Phase:

Decommissioning activities will commence after the last reactor has permanently ceased operation, all the fuel has been transferred out of the reactor to storage, and the reactor drained and dried. Decommissioning will then begin with a period of safe storage activities to allow the radioactivity of reactor components to decrease. Decommissioning may commence with a period of safe storage activities to allow the radioactivity of reactor components to decrease. Decommissioning activities can be conceptually summarized as follows: transfer of fuel and associated wastes to interim storage; decontamination of plant; flush purging of equipment and systems; removal of surface decontamination of facilities or equipment; dismantling and removal of equipment and systems; demolition of building; and site restoration.

Few activities are expected to be carried out for the abandonment phase of the project, since the purpose of this phase is to move from the achieved “end-state” of the decommissioning phase to the abandonment phase, which is basically an “unlicensed state”. The activities related to this phase are basically to provide the results of the decommissioning and the results of the environmental monitoring programs to demonstrate that the “site” can be made available for re-use and will no longer be under CNSC regulatory oversight.

4.2 Factors to be considered in the EIS

The Minister of the Environment is proposing that the following factors be considered in the EIS in order to adequately understand and assess the potential effects of the project.

- a. the environmental effects of the project, including the environmental effects of malfunctions, accidents or malevolent acts that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- b. the significance of the effects referred to in (a);
- c. comments that are received during the environmental assessment;
- d. measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project;
- e. purpose of the project;
- f. need for the project;
- g. alternatives to the project;
- h. alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;
- i. measures to enhance any beneficial environmental effects
- j. the requirements of a follow-up program in respect of the project;
- k. the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future; and
- l. consideration of community knowledge and Aboriginal traditional knowledge.

PART II – CONTENT OF THE EIS

Part II of the EIS guidelines provides specific instructions for the content of each section in the EIS. The EIS as a whole must reflect the Guiding Principles in Section 2.

5. CONTEXT

This section must orient the reader to the EIS by briefly introducing the geographic setting, the project, the underlying rationale for the project, the proponent, the federal joint review panel process and the content and format of the EIS.

5.1 Setting

This section must provide a concise description of the geographic setting in which the project is proposed to be constructed, describing its proximity to Lake Ontario, any parks or ecologically significant areas, and the Municipality of Clarington. This section must also outline current use of lands, waters and resources, including those used for traditional purposes by Aboriginal persons that may be affected by the project and those lands, waters and resources related to established or asserted Aboriginal rights. Maps at appropriate scales to illustrate the regional setting must be included. The description must be focused on those aspects of the environment important for understanding the potential environmental effects of the Project. A brief description of current regional land and water uses is required to integrate the natural and human elements of the environment in order to explain the interrelationships between the physical and biological aspects and the people and their communities.

5.2 Project Overview and Purpose

The proponent will briefly summarize the Project, its purpose, location, scale, components, activities, scheduling and costs. A more detailed description of the project is provided for in Section 8.

5.3 Proponent

This section must introduce readers to OPG with summary information on the nature of the management structure and organizational accountability for the:

- design, construction, operation and modification, and decommissioning of the project;
- implementation of environmental mitigation measures and environmental monitoring; and
- management of potential adverse environmental effects.

5.4 Environmental Assessment and Regulatory Process and Approvals

For the purposes of the environmental assessment, the proponent must:

- identify the planning context for the environmental assessment of the project;
- discuss government policies, regulations, and land use plans that have a bearing on the project;
- identify the requirements for the environmental assessment under the *Canadian Environmental Assessment Act*, the *Nuclear Safety and Control Act* and Regulations, the *Fisheries Act* and the *Navigable Waters Protection Act*;
- summarize and discuss the approach, including the role of regulatory bodies, to ensure compliance with existing federal and provincial environmental legislation such as the *Nuclear Safety and Control Act*, *Migratory Birds Convention Act*, *Fisheries Act*, *Species at Risk Act*, *Canadian Environmental Protection Act, 1999*, the *Lakes and Rivers Improvement Act* and the *Endangered Species Act*;
- summarize the main steps in the environmental assessment process and the main approvals required to undertake the project; and
- describe the role of the EIS in the overall environmental assessment and regulatory process.

The joint review panel will also be collecting information and evidence to support OPG's application for a Licence to Prepare Site for a Class 1 Nuclear Facility, in accordance with the *Nuclear Safety and Control Act* and its regulations. These requirements are described in Appendix 2 of these guidelines.

5.5 International Agreements

The proponent must summarize and discuss in the EIS the implications of any applicable international agreements, designations, or action plans, their implications and relationships to the planning and regulatory processes described in Section 5.4, and how they may influence the project or its environmental effects.

The location of the facility on the shores of a transboundary watershed requires specific attention be paid to the *Canada-U.S. Air Quality Agreement*, the *Great Lakes Water Quality Agreement* and other such binational treaties and agreements.

6. PUBLIC PARTICIPATION

Involvement of Aboriginal peoples, government agencies, non-governmental organizations, and other interested parties is a central objective of the overall review process. In preparing the EIS, the proponent must demonstrate how it has engaged (i.e., shared information with, and gathered input from) interested parties that may be affected or have an interest in the project, in keeping with the Guiding Principles in Section 2 of the Guidelines. The following key issues must be summarized in the EIS:

- the types of support provided to communities, organizations and individuals involved in the public participation process.
- the role of public engagement in identifying VECs, issues, effect prediction and mitigation.

- an explanation of how the results of that engagement influenced the design of the project; and
- a description of the principles and methods that will be employed to provide information to, obtain input from or otherwise engage communities and groups regarding the project activities over the lifespan of the project.

6.1 Aboriginal People

The EIS must describe the proponent's involvement of any Aboriginal people that may be affected by the project, especially those Aboriginal people claiming Aboriginal rights, title or established treaty rights at the location or in the vicinity of the project.

This description must include a summary of the history of the proponent's relationship with Aboriginal people with respect to the OPG Darlington Nuclear Site in general and the project in specific. The EIS must describe the objectives of and the methods used for Aboriginal group engagement, issues or concerns raised through such engagement and any details not otherwise subject to confidentiality agreements, including a summary of the discussions, paper and electronic correspondence and meetings held. Details may include date and time, agenda, summary of discussions and a description of how the proponent has addressed the issues or concerns raised by Aboriginal people.

6.2 Government Agencies

The EIS must describe the proponent's involvement of provincial and federal government ministries, departments or agencies and local governments which should include the Municipality of Clarington and other communities in Durham Region, Peterborough County, Simcoe County and Northumberland County as appropriate. The EIS must describe the objectives of such engagements, the methods used, issues raised during such engagements and the ways in which the proponent has addressed these issues.

6.3 Stakeholders

The EIS must describe the proponent's involvement of stakeholders (e.g., local businesses, neighbouring residences, cottagers, outdoor recreational interests and environmental non-government organizations). The EIS must describe the objectives of such engagement, the methods used, the issues raised and the ways in which the proponent has addressed these issues.

6.4 Other Public Participation

The EIS must describe any other public engagement undertaken by the proponent prior to submitting the EIS. The *Canadian Environmental Assessment Act* does not exclude the public outside of Canada, thus the EIS should describe any public participation opportunities for non-Canadians. This description must identify the objectives of such engagement, outline the methods used, and summarize the issues raised by the public, and the ways in which the proponent has addressed these issues.

7. PROJECT JUSTIFICATION

7.1 Purpose and Need for the Project

The proponent must clearly describe the need for the proposed new nuclear power plant. This description must define the problem or opportunity the project is intending to solve or satisfy and should establish the fundamental justification or rationale for the project.

The proponent must describe the purpose of the project by defining what is to be achieved by carrying out the project.

The “need for” and “purpose of” the project should be established from the perspective of the project proponent and provide the context for the consideration of alternatives in Sections 7.2 and 7.3 below.

7.2 Alternatives to the Project

An analysis of alternatives to the project must describe functionally different ways to meet the project’s need and achieve the project’s purpose from the perspective of the proponent. This section must therefore identify and discuss other technically and economically feasible methods of producing electricity other than the construction and operation of the OPG Darlington NNPP that are within the control and/or interests of OPG. As an assessment of provincial energy policy is not within the terms of reference of this joint review panel, the alternatives to the project need not include alternatives that are contrary to Ontario’s formal plans or directives. However, the EIS must explain where this rationale has been applied to exclude consideration of possible alternatives to the project.

For each identified alternative to the Darlington NNPP that are within the control and/or interests of OPG, this section of the EIS must explain how the proponent developed the criteria to identify the major environmental, economic and technical costs and benefits of those alternatives, and how the proponent identified the preferred project based on the relative consideration of the environmental, economic and technical benefits and costs. This must be done to a level of detail which is sufficient to allow the joint review panel and the public to compare the project with its alternatives.

7.3 Alternative Means of Carrying out the Project

The EIS must identify and describe alternative means to carry out the project that are, from the perspective of the proponent, technically and economically feasible. The EIS must also describe the environmental effects of each alternative means. In describing the preferred means, the EIS should identify the relative consideration of environmental effects, and technical and economic feasibility. The criteria used to identify alternative means as unacceptable, and how these criteria were applied, must be described, as must the criteria used to examine the environmental effects of each remaining alternative means to identify the preferred alternative.

To the extent that these alternative means are feasible for the proponent, this may include the following:

- siting of new nuclear reactors in different locations within the existing site;
- siting of new nuclear reactors in locations outside the existing site;
- switchyard design;
- reactor design technology, taking into consideration megawatt electrical MWe output, moderator, coolant, and fuel enrichment;
- condenser cooling water system (cooling towers or intake/discharge of lake water through underwater tunnels, including direct and indirect once-through systems and recirculating systems consisting of wet, dry or hybrid system cooling towers with natural or mechanical air circulation);
- waste management strategies for low and intermediate level radioactive waste and used fuel; and
- timing options for various components and phases of the project.

8. DESCRIPTION OF THE PROJECT

The project description must address all phases of the project, within the scope outlined in Section 4, in sufficient detail to allow the assessment of potential adverse environmental effects and take into account public concerns about the project. The proponent must describe the project as it is planned to proceed from site preparation through to construction, operation and maintenance (including any potential modifications or refurbishment that may be required during operation), decommissioning and abandonment. The description must include a timeline for all phases of the project, including preliminary decommissioning and abandonment plans. Where specific codes of practice, guidelines and policies apply to items to be addressed, those documents must be cited and may be included as appendices to the EIS.

The following information addressing the construction and operational phases of the project must be provided in summary form; where applicable, reference may be made to more detailed information.

8.1 General Information and Design Characteristics

Information to be provided in the EIS must include:

- location of the project;
- general description of all reactor design technologies being considered, including associated buildings and infrastructure;
- process and timetable for tender, selection and construction of the proposed reactor, and anticipated operational life;
- detailed siting requirements for the proposed new reactors, including any relevant criteria endorsed by the CNSC, and whether the chosen site meets the criteria of CNSC Regulatory Document RD-346 "Site Evaluation for New Nuclear

- Reactors” [Reference 3] and consideration of the applicability of any local, regional and provincial land use or urban development policies, programs and plans to the proposal;
- description of the physical requirements for the proposal, including existing and proposed exclusion zones and the protective zone, general reactor requirements, including for health and safety, nuclear safeguards and security, supply of fuel, spent fuel management and waste management and infrastructure requirements, including roads and car parking, other buildings, water service, wastewater services, electricity, gas, and telecommunications;
 - specific locations of proposed reactors and of associated buildings and infrastructure;
 - infrastructure requirements and facilities for the site preparation, construction, operation and maintenance of the proposed facility; and
 - a description of the relevant organizational and management structure, and staff qualification requirements with emphasis on safety and environmental management programs.

For each reactor design being considered, include information on the:

- basic configuration, layout, shape, size, design and operation of the facility;
- performance specifications, design philosophy, reactor type, plant configuration, and all structures, systems and components important to safety;
- safety characteristics;
- planned operational life;
- description of any special commissioning or 'start-up' procedures and requirements;
- requirements for refurbishment;
- ageing and wear issues and management of these issues, where relevant to future environmental performance and reliability;
- physical security systems (excluding prescribed information), designed specifically to isolate the project from the surrounding environment, or to prevent, halt or mitigate the progress or results of malfunctions, accidents or malevolent acts;
- engineered and administrative controls, including the use of an approved margin of sub-criticality for safety, which assure that the entire (out of reactor) process will be sub-critical under normal conditions and credible abnormal conditions – accidents or accident sequences – that have a frequency of occurrence equal to or more than one in a million years;
- stored inventories of radioactive and other hazardous materials, including locations and storage methods, and criticality control plans;
- sources, types and quantities of radioactive and non-radioactive waste, including hazardous waste, predicted to be generated;

- processes and facilities for the management of radioactive and non-radioactive waste, including low, intermediate and spent fuel waste, conventional, sanitary and hazardous wastes, to be generated by the project, including processes such as collection, handling, storage and transportation;
- sources and characteristics of any fire hazards;
- sources and characteristics of any noise, odour, dust and other likely nuisance effects from the project; and
- sources and characteristics of any potential risks (including radiological risks) to workers, the public or the environment from the project.

8.2 Site Preparation

The EIS must include a description of permanent or temporary structures that will be constructed to support site preparation. Details of general construction practices, hours of operation and proposed construction schedules should also be provided.

Under the *Nuclear Safety and Control Act's Class I Nuclear Facilities Regulations*, a Licence to Prepare Site does not permit physical work activities directly related to construction of nuclear power plant structures, systems and components. Subject to this limitation, the EIS should describe the site preparation phase of the project for the following physical works and associated physical activities:

- clearing of vegetation, grubbing, stripping of top soil, grading;
- excavating, drilling and blasting;
- installing of site services including fencing, exterior lighting and security systems, construction roadways, parking lots and of an area for the management of construction waste;
- installing coffer dams, dewatering, blasting and infilling part of Lake Ontario including the placement of fill and identification of the types of fill proposed for the infilling and shoreline stabilization;
- constructing the docking facility;
- trenching for the installation of service pipelines;
- installing temporary construction support facilities (warehouses, concrete mixing plants);
- developing on-site facilities for the storage and management of construction waste;
- topsoil and overburden storage areas;
- site access roads (including gradient) and linkages to public roadways;
- storage areas for hazardous substances and hazardous waste;
- watercourse crossings and diversions, including wetland alteration;
- visual effect management (e.g., landscaping, screening mounds and plantings, use of existing features, photographic records);
- managing potentially contaminated groundwater produced during excavations and surface runoff management;

- description of any work that will be undertaken outside of normal working hours, including a description of the nature of work and of the machinery that will be required;
- size of construction workforce;
- extent of earthmoving, building demolition/relocation, vegetation clearance and other site preparatory works, including arrangements to minimise unnecessary clearance and disturbance;
- construction standards, techniques and site management arrangements, including for on-site storage and handling of construction and other (e.g., fuel, oil) materials;
- arrangements for disposal of construction wastes during and following site preparation;
- arrangements for storm water and erosion / sedimentation control; and
- risk management (e.g., contingency plans for uncontrolled release of substances, emergency response plans).

To enable consideration of OPG's Application for a Licence to Prepare Site by the joint review panel, the proponent must also provide information in accordance with the *Nuclear Safety and Control Act and Regulations* in support of that application. These requirements are listed in Appendix 2 of these guidelines.

8.3 Construction

The proponent must describe all activities to be undertaken during this phase of the project, including timing of work program, duration of construction phase, including lead times, which may include:

- blasting/dredging and redistribution or removal of substrate material associated with construction of the intake/discharge tunnels;
- installation of pilings;
- construction of the switchyard;
- construction of cooling towers;
- noise and dust generation;
- disposal of construction wastes during and following construction;
- arrangements for storm water and erosion / sedimentation control and other environmental protection activities;
- continued installation of site services including plant security fencing and security systems;
- installation of towers and transmission lines between the power block and the switchyard and between the switchyard and the provincial grid system and other associated switchyard gear;

- transportation by road or water of building construction materials and associated installation of plant internal components (e.g., reactor components, steam generators, steam supply piping, turbines, electrical power systems, fire protection system, water piping, sewage handling and treatment equipment, lighting); and
- post-construction site rehabilitation.

This description must include the following:

- an identification of any work that will be undertaken outside of normal construction hours, including a description of the nature of work and of the machinery that will be required;
- the size of construction workforce;
- the extent of earthmoving, building demolition/relocation, vegetation clearance and other site preparatory works, including arrangements to minimise unnecessary clearance and disturbance; and
- the application of construction standards, techniques and site management arrangements, including for on-site storage and handling of construction and other (e.g., fuel, oil) materials.

8.4 Operation and Maintenance

The proponent should describe all activities to be undertaken within this phase of the project, including commissioning activities, approach to full power and planned maintenance outages. Material management plans must also be described, including issues relating to transportation such as mode and route of transport, type of material and quantities to be transported.

Description of the operation and maintenance phase and timeframe of the project and of the associated activities should include, but are not limited to:

- the commissioning activities such as general verification of equipment and systems, fuelling of reactor;
- pressure testing of containment building, approach to criticality and eventually to full power and connection to the grid;
- the operation and maintenance activities required for systems such as the nuclear steam supply system, turbine generator and feed water systems, cooling water systems, electrical power systems, nuclear safety systems, ancillary systems, systems for operating and maintaining facility security, activities associated with the maintenance program, materials handling systems, solid waste handling systems and administration and support systems;
- activities associated with mid-life refurbishment for CANDU-type reactors as well as activities relating to outages to refuel or for the refurbishment of light water reactors;
- operation of equipment for production of electricity;

- verification, sampling, testing and maintenance during operation at power;
- maintenance, repairs, cleaning, and decontamination during planned shutdowns and outages;
- fuelling and refuelling of the reactor; management of low and intermediate waste and used fuel, including transfer to interim or long-term waste storage facilities;
- past events that are relevant to the assessment of future environmental performance and reliability:
- the sources, quantities and points of release from routine radiological and non-radiological emissions and effluents, including thermal (heat) releases;
- the area of exposure to the physical effects of the discharge jet and intake suction;
- where applicable, characterization of the waste, including estimated activity in becquerels, that will be generated and stored at each of the waste management areas as a result of operation and any future refurbishment;
- predictions of future emissions and effluents from the project under normal operating conditions;
- standard design features and key operational procedures relevant to protection of workers, the public and the environment relating to the project, including the nuclear criticality safety program;
- operations workforce, composition of workforce and any infrastructure requirements;
- systems for operating and maintaining the facility security program;
- emission and effluent control, treatment and monitoring and environmental monitoring;
- non-radioactive waste handling, storage and disposal; and
- activities relating to environmental protection and radiation protection.

The end of operational activities to achieve a safe state of closure prior to decommissioning should include, but are not limited to:

- removal of fuel from reactor; and
- draining and drying of reactor

8.5 Modifications

The proponent must describe the management approach to, and conceptual plans for, potential modifications to the project, including expansion or early discontinuation. The proponent must specify the conditions or potential risks which would necessitate modifications to the project. The proposed process to follow when proposing modifications to the project should be described and include a description of plans for informing the public.

8.6 Decommissioning and Abandonment

A preliminary decommissioning plan for the facility must be included in the EIS. The proponent should refer to CNSC Guide G-219, “Decommissioning Planning for Licensed Activities” [Reference 4] for more details.

The discussion should identify the preferred decommissioning strategy, including a justification of why this is the preferred strategy. It must also include end-state objectives, the major decontamination, disassembly and remediation steps; the approximate quantities and types of waste generated; and an overview of the principal hazards and protection strategies envisioned for decommissioning.

The description of decommissioning activities (e.g., planning envelopes and work plans) can be provided at a conceptual level, but this description must include:

- transfer of fuel and associated wastes to interim or long-term licensed storage facilities;
- security measures for alerting against sabotage to hazardous radioactive waste during interim or long term storage
- any flushing/purging of equipment and systems;
- removal of surface decontamination from facilities or equipment;
- dismantling and removal of equipment and systems;
- demolition of buildings;
- management and disposal of conventional, radioactive and other hazardous waste arising from decommissioning; and,
- remediation and restoration of the site.

8.7 Waste and Used Fuel Management

In addition to the project-phase specific requirements for waste provided in the preceding subsections, the EIS must present the proponent’s proposed plan for the disposition of all radioactive and hazardous wastes and used fuel. The proponent’s activities related to the site preparation, construction, operation, decommissioning and abandonment of low and intermediate level waste management facilities, and used fuel storage facilities, must be described. Where this plan identifies that radioactive or hazardous wastes or used fuel are expected to be managed by an organization other than the proponent, the EIS must describe at a conceptual level the methods that can be used to ensure that these materials are managed in a manner the protects health, safety and the environment.

8.8 Malfunctions, Accidents and Malevolent Acts

Information on accidents and malfunctions, including intentional malevolent acts are necessary to permit consideration of relevant environmental effects in the environmental assessment. A summary of information on malfunctions and accidents should be presented in this section of the EIS. A separate section of the EIS should provide more

details regarding the information requirements relating to accidents, malfunctions and malevolent acts as per Section 12.0 of these guidelines.

8.9 Environmental Protection, Policies and Procedures

Paragraph 3(g) of the Class I Nuclear Facilities Regulations stipulates that application for a Licence to Prepare Site shall contain the proposed environmental protection policies and procedures. CNSC Regulatory Standard S-296, “Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills” (March 2006) [Reference 5] and Regulatory Guide G-296, “Developing Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills” (March 2006) [Reference 6] provide more information regarding these requirements. The fundamental direction of these regulatory documents is towards the establishment, implementation and maintenance of an Environmental Management System (EMS) by the proponent that meets the requirements of ISO 14001-2004 “Environmental Management Systems –Requirements with Guidance for Use” in the context of Canadian environmental protection policy and regulation and the specific environmental protection requirements of the *Nuclear Safety and Control Act* and its regulations.

The proponent must therefore submit its proposed environmental protection policies and procedures (i.e., EMS documentation) and demonstrate that the EMS will carry forward the results of the environmental assessment so that it covers the Site Preparation, Construction and Operational phases of the project. The EIS should describe how the mitigation measures described through Sections 11 through 14 of this document, and the Follow-up Program described in Section 15 of this document would be integrated into the EMS.

9. ENVIRONMENTAL ASSESSMENT BOUNDARIES

Scoping establishes the boundaries of the environmental assessment and focuses the assessment on relevant issues and concerns. By defining the spatial and temporal boundaries, a frame of reference for identifying and assessing the environmental effects associated with the OPG Darlington NNPP Project will be established. Different boundaries may be appropriate for each VEC.

A description of the boundaries of the proposed project in a regional context showing existing and planned future land use, current infrastructure and proposed improvements to these infrastructure, including transportation (all modes), power distribution corridors and lines, urban areas and water supplies (individual and community), must be provided. A description of any traditional land use any established or asserted Aboriginal rights, Aboriginal title or treaty rights from Aboriginal people within the wider regional context should be provided. Sensitive areas including wetlands, critical habitats as defined under the *Species at Risk Act* and archaeological sites found within the regional context must also be described.

9.1 Spatial Boundaries and Scale

In determining the spatial boundaries to be used in assessing the potential adverse and beneficial environmental effects, the proponent must consider, but not be limited to, the following criteria:

- a. the physical extent of the proposed project, including any offsite facilities or activities;
- b. the extent of aquatic and terrestrial ecosystems potentially affected by the project;
- c. the extent of potential effects arising from noise, light and atmospheric emissions;
- d. the extent to which traditional land use, asserted or established Aboriginal rights, Aboriginal title or treaty rights could potentially be affected by the project;
- e. lands used for residential, commercial, industrial, recreational, cultural, and aesthetic purposes by communities whose areas include the physical extent of the project; and
- f. the size, nature and location of past, present and reasonably foreseeable projects and activities which could interact with items b), c), d) and e).

These boundaries must also indicate the range of appropriate scales at which particular baseline descriptions and the assessment of environmental effects are presented. The proponent is not required to provide a comprehensive baseline description of the environment at each scale, but must provide sufficient detail to address the relevant environmental effects of the project and the alternative means. The EIS must contain a justification and rationale for all boundaries and scales chosen.

The geographic study areas for the EIS must encompass the areas of the environment that can reasonably be expected to be affected by the project, or which may be relevant to the assessment of cumulative environmental effects. Study areas must encompass all relevant components of the environment, including people, non-human biota, land, water, air and other aspects of the natural and human environment, notably, current use of land and resources by Aboriginal persons for traditional purposes. Study boundaries must be defined taking into account traditional knowledge, ecological, technical, social and political considerations.

The following geographic study areas should serve as the basis developing project- and effect-specific study areas:

- *Site Study Area*: the Site Study Area includes the facilities, buildings and infrastructure at the OPG Nuclear Site, including the existing licensed exclusion zone for the site on land and within Lake Ontario, and particularly the property where the OPG Darlington NNPP is proposed.
- *Local Study Area*: the Local Study Area is defined as that area existing outside the Site Study Area boundary, where there is a reasonable potential for direct effects on the environment from any phase of the project, either through normal activities or from possible accidents, malfunctions or malevolent acts. The Local Study Area should include all of the OPG Nuclear Site and the lands within the

Municipality of Clarington closest to it, as well as the area of Lake Ontario adjacent to the facility. The boundaries must change if appropriate following an assessment of the spatial extent of potential effects.

- *Regional Study Area*: the Regional Study Area is defined as the area within which there is the potential for cumulative biophysical and socio-economic effects. This area includes lands, communities and portions of Lake Ontario around the OPG Nuclear Site that may be relevant to the assessment of any wider-spread direct and indirect effects of the project.

9.2 Temporal Boundaries

In characterizing the environmental effects of the project, the proponent must consider the current baseline environment and environmental trends within the study area. The description of the existing baseline and the environmental trends should include a consideration of past projects and activities carried out by the proponent and/or others within the regional study area.

In describing and predicting the environmental effects of the project, the proponent must cover the period from the start of any site preparation activity associated with the project through construction, operation, including maintenance and repairs, and refurbishment, where applicable, and eventual decommissioning and abandonment.

In assessing cumulative environmental effects within the study area, the proponent must consider the effects of the project in combination with other past, present and future projects that are either “certain” or “reasonably foreseeable” as defined in CEAA’s “Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act” [Reference 7].

As is the case for the determination of spatial boundaries, the temporal boundaries must indicate the range of appropriate scales at which particular baseline descriptions and the assessment of environmental effects are presented.

At a minimum, the assessment must include the period of time during which the maximum effect is predicted to occur. “Maximum” refers to the greatest change from baseline conditions to what is predicted and should be bounding across reactor types. The approach taken to determine the temporal boundary of assessment should take into account the following elements:

- hazardous lifetime of the contaminants, including those associated with waste and used fuel, or with releases to the environment during both normal operation and postulated accidents, malfunctions and malevolent acts;
- duration of the operational period;
- design life of engineered barriers;
- duration of both active and passive institutional controls; and
- frequency and duration of natural events and human-induced environmental changes (e.g., seismic occurrence, flood, drought, glaciation, climate change).

9.3 Valued Ecosystem Components

The EIS must describe the general criteria used to identify VECs that may be affected by the project. The EIS must identify the methods used to predict and assess the effects of the project on VECs, and explain the criteria used to assign significance ratings to any predicted adverse effects. The spatial and temporal boundaries used in the assessment may vary as appropriate, depending on the VEC.

Table 1 presents a preliminary list of VECs for each environmental component of the assessment. This list of VECs should be modified as appropriate by the proponent in the EIS, following consultations with the public, Aboriginal people, federal and provincial government departments and relevant stakeholders.

Table 1: Preliminary List of Valued Ecosystem Components by Environmental Component

Environmental Component	VEC	VEC Category
Aquatic Biota/Fish Community	Alewife	Biological
	Lake Trout	Biological
	American Eel	Biological
	White Sucker	Biological
	Round Whitefish	Biological
	Emerald Shiner	Biological
	Benthic Invertebrates (crayfish)	Biological
Aquatic Habitat	Lake Ontario near shore	Physical
	On site aquatic habitat	Physical
Surface Water Environment	Lake water circulation	Physical
	Lake water temperature	Physical
	Lake water quality	Physical
	Lake shoreline processes	Physical
Atmospheric Environment	Air – particulates	Physical
	Air – chemicals	Physical
	Noise	Physical
Geology and Hydrogeology	Shallow groundwater quantity and quality	Physical
	Deep groundwater quantity and quality	Physical
	Soil	Physical
Vegetation and Habitat	Shrub bluff	
	• Grass of Parnassus	Biological
	• Buffalo Berry	Biological
	Wetlands	
	• Bur-reed	Biological
	• Pond Weed	Biological
Woodlands		

Environmental Component	VEC	VEC Category
	• Cedar	Biological
	• Sugar Maple	Biological
	Migratory bird habitat	
	• Area of woodland habitat	Biological
	Winter raptor feeding and roosting area	
	• Area of meadow	Biological
	• Area of cedar thicket	Biological
Birds	Breeding birds	
	• Yellow Warbler	Biological
	• American Robin	Biological
	Waterfowl	
	• Bufflehead	Biological
	• Mallard	Biological
	Bank Swallow colony	
• Bank Swallow nest holes	Biological	
Amphibians	Amphibians	
	• Northern Leopard Frog	Biological
	• Green Frog	Biological
	• American Toad	Biological
Mammals	Terrestrial mammals	
	• Meadow Vole	Biological
	• Eastern Cottontail	Biological
	• Short-tailed Weasel	Biological
	• Red Fox	Biological
	Aquatic mammals	
• Muskrat	Biological	
Land Use and Visual Setting	Planned land use	Human/Socio-economic
	Land use and development opportunities off-site	Human/Socio-economic
	Nuclear emergency infrastructure /plans & procedures	Human/Socio-economic
	Nuclear emergency infrastructure/equipment	Human/Socio-economic
	Physical features related to the property	Human/Socio-economic
	Major viewpoints	Human/Socio-economic
	Visibility from highway	Human/Socio-economic
	Shoreline visual aesthetics	Human/Socio-economic
Transportation	Road traffic volumes and safety	Human/Socio-economic
	Road system operational efficiency	Human/Socio-economic
	Rail traffic volumes and safety	Human/Socio-economic

Environmental Component	VEC	VEC Category
	Rail system operational efficiency	Human/Socio-economic
	Marine traffic volumes and safety	Human/Socio-economic
	Marine system operational efficiency	Human/Socio-economic
Physical and Cultural Heritage Resources	Aboriginal structural remains or subsurface features	Human/Socio-economic
	Resources from the pre-historic era (11,000 B.C. to A.D. 1680)	Human/Socio-economic
	Aboriginal artifacts	Human/Socio-economic
	Historic architecture or structural remains	Human/Socio-economic
	Historic-period artifacts	Human/Socio-economic
	Resources from the historic period circ (A.D. 1680 to 1900)	Human/Socio-economic
	Historic cemeteries	Human/Socio-economic
	Agricultural landscapes	Human/Socio-economic
Population and Economic Base	Population and demographics	Human/Socio-economic
	Income	Human/Socio-economic
	Employment	Human/Socio-economic
	Business activity	Human/Socio-economic
	Commercially-zoned properties and/or businesses	Human/Socio-economic
	Taxes	Human/Socio-economic
Tourism	Tourism related business	Human/Socio-economic
	Potential for stigma	Human/Socio-economic
	Municipality's vision, strategies, and plans	Human/Socio-economic
Agriculture	Farming activity	Human/Socio-economic
	Availability of agricultural land	Human/Socio-economic
Economic Development	Value of goods and services	Human/Socio-economic
Community Infrastructure	Housing and property values	Human/Socio-economic
	Real property values	Human/Socio-economic
	Municipal infrastructure and services	Human/Socio-economic
	Type and availability of municipal services	Human/Socio-economic
Community Services	Recreational and community features/resource use	Human/Socio-economic
	Community facilities and activities potentially affected by nuisance effects (dust, noise, traffic)	Human/Socio-economic
	Recreational fishing	Human/Socio-economic
	Trails and natural areas	Human/Socio-economic

Environmental Component	VEC	VEC Category
	Educational facilities	Human/Socio-economic
	Educational facilities	Human/Socio-economic
	Educational services and opportunities	Human/Socio-economic
	Health and safety facilities and services	Human/Socio-economic
	Health-related services and facilities	Human/Socio-economic
	Health care facilities and services	Human/Socio-economic
	Social services	Human/Socio-economic
Municipal Finance and Administration	Municipal finance and administration	Human/Socio-economic
	Municipal tax (and other) revenues and expenditures	Human/Socio-economic
Human Health and Radiation and Radioactivity	Members of the public	Human/Socio-economic
	Nearest residents	Human/Socio-economic
	Users of the waterfront trail	Human/Socio-economic
	Users of the soccer fields	Human/Socio-economic
	Users of Darlington Provincial Park	Human/Socio-economic
	Recreational users of surface water (including Lake Ontario)	Human/Socio-economic
	Source drinking water	Human/Socio-economic
	Transportation system safety	Human/Socio-economic
	Workers	Human/Socio-economic
	On-site non-nuclear workers	Human/Socio-economic
	On-site nuclear energy workers	Human/Socio-economic
Residents and Communities	Community character	Human/Socio-economic
	Residency tenure	Human/Socio-economic
	Use and enjoyment of property	Human/Socio-economic
	Potential effects in other environmental components in noise, dust and traffic effects relative to baseline	Human/Socio-economic
Aboriginal Interests	Community characteristics	Human/Socio-economic
	Hunting and fishing for subsistence	Human/Socio-economic
	Fishing, trapping and traditional harvesting and collecting for economic purposes	Human/Socio-economic
	Prehistoric archaeological resources, ceremonial sites, burial mounds or petroglyphs	Human/Socio-economic
	Aboriginal structural remains, artefacts or subsurface features	Human/Socio-economic

10. EXISTING ENVIRONMENT

This section of the EIS must provide a baseline description of the environment, including the components of the existing environment and environmental processes, their interrelations and interactions as well as the variability in these components, processes and interactions over time scales appropriate to this EIS. The proponent's description of the existing environment must be in sufficient detail to permit the identification, assessment and determination of the significance of potentially adverse environmental effects that may be caused by the project, to adequately identify and characterize the beneficial effects of the project, and provide the data necessary to enable effective testing of predictions during the follow-up program.

The baseline description must include characterization of environmental conditions resulting from historical and present activities in the local and regional study area (see Section 13 Cumulative Effects). The EIS must compare baseline data with applicable federal, provincial, municipal or other legislative requirements, standards, guidelines or objectives.

This description must include, but not necessarily be limited to, those VECs, processes, and interactions that either were identified to be of concern during any workshops or meetings held by the proponent, or that the proponent considers likely to be affected by the project. In doing so, the proponent must indicate to whom these concerns are important and the reasons why, including social, economic, recreational, and aesthetic considerations. The proponent must describe the nature and sensitivity of the area within and surrounding the project and any planned or existing land and water use in the area. The proponent must also indicate the specific geographical areas or ecosystems that are of particular concern, and their relation to the broader regional environment and economy. This includes, but is not limited to, a detailed description of those areas of Lake Ontario potentially affected by the project. Relevant information about the VECs is to be presented graphically to document physical and biological (e.g., home range) characteristics.

In describing the physical and biological environment, the proponent must take an ecosystem approach that considers both scientific and traditional knowledge and perspectives regarding ecosystem health and integrity. The proponent must identify and justify the indicators and measures of ecosystem health, social health and integrity it uses. These must be related to project monitoring and follow-up measures.

For the biological environment, baseline data in the form of inventories alone is not sufficient for the joint review panel to assess effects. The proponent must consider the resilience of species populations, communities and their habitats. The proponent must summarize all pertinent historical information on the size and geographic extent of animal populations as well as density. Habitat at regional and local scales should be defined in ecological mapping of aquatic and terrestrial vegetation types and species

(e.g., ecological land classification mapping). Habitat use should be characterized by type of use (e.g., spawning, breeding, migration, feeding, nursery, rearing, wintering), frequency and duration. Emphasis must be on those species, communities and processes identified as VECs. However, the interrelations of these components and their relation to the entire ecosystem and communities of which they are a part must be indicated. The proponent must address issues such as habitat, nutrient and chemical cycles, food chains, productivity, to the extent that they are appropriate to understanding the effect of the project on ecosystem health and integrity. Range and probability of natural variation over time must also be considered.

In describing the socio-economic environment, the proponent must provide information on the functioning and health of the socio-economic environment, encompassing a broad range of matters that affect the people and communities in the study area in a way that recognizes interrelationships, system functions and vulnerabilities. A description of the rural and urban settings likely to be affected by the project should be provided.

Information on existing and projected population densities and distributions in the region, including resident populations and transient populations, must be provided by project phase, and for the entire life of the project. Information such as present and future use of land and resources, including transportation infrastructure, public health infrastructure and services (municipal water treatment for domestic use or human consumption, wastewater treatment, landfill), housing and housing values, commercial fisheries in the area, recreation and tourism should also be provided to the extent that this information is required to assess potential adverse effects of the project on human health and socio-economic conditions in the area, and to assess the effects of the environment on the project. The proponent must also describe any agreements with the surrounding municipalities or other jurisdictions regarding emergency plans or protective actions.

Traditional activities carried out by Aboriginal people must be described by the proponent. The proponent should provide information that would include a description of traditional dietary habits and dependence on country foods and harvesting for other purposes, including harvesting of plants for medicinal purposes. The analysis should focus on the identification of potential adverse effects of the project on the ability of future generations of Aboriginal people (up to seven generations) to pursue traditional activities or lifestyle.

If the background data have been extrapolated or otherwise manipulated to depict environmental conditions in the study areas, modeling methods and equations must be described and must include calculations of margins of error and other relevant statistical information, such as confidence intervals and possible sources of error.

The proponent should refer to CNSC Regulatory Document RD-346, "Site Evaluation for New Nuclear Reactors" [Reference 3], for more examples on the type of information which would be required in this section of the EIS.

10.1 Biophysical Environment

10.1.1 Geology and Geomorphology

The EIS must describe the bedrock and quaternary/surficial geology, geomorphology (including coastal processes), topography, petrology, geochemistry, hydrogeology and geomechanics for the region and the area that will be disturbed by the Project. The EIS must also examine the global catalogue of earthquakes in stable continental regions, with specific emphasis on eastern Canada. The EIS must describe the structural geology, such as fractures and faults, at the site and within the local and regional study areas.

Geotechnical properties of the overburden must also be provided, including shear strength and liquefaction potential, to allow the assessment of slope stability and bearing capacity of foundations under both static and dynamic conditions. The geological model of all overburden and bedrock units through to the uppermost Precambrian unit should be described for the regional, local and site scales. When extrapolation is required in order to derive these stratigraphic sequences, the degree of uncertainty and the need for additional field investigations to reduce this uncertainty should be discussed.

The EIS must describe and assess any geotechnical and geophysical hazards within the study areas, including consideration of subsidence, uplift, seismicity and faulting, as well as consideration of the possibility of movements of the ground surface (including co-seismic rupture) and earthquake ground motions. The EIS must also assess these hazards by extrapolating the risk of an earthquake near the site from the risk of an earthquake in similar stable continental regions worldwide. Specific information on the effects of past earthquakes on existing nuclear power plants in Canada is to be provided. Where appropriate, the narrative descriptions should be supplemented by illustrations such as maps, figures, cross sections and borehole logs.

10.1.2 Surface Water

This section of the EIS must describe all surface water features, surface water quality, hydrology and sediment quality at the site, local and regional study areas.

The description must include delineation of drainage basins at the appropriate scales and include a description of hydrological data such as water levels and flow rates collected over the years. The proponent must describe hydrological regimes, including seasonal fluctuations and year-to-year variability of all surface waters and assess normal flow, flooding, and drought properties of water bodies as well as the interactions between surface water and groundwater flow systems. The proponent must describe all surface water sources used for drinking water in the area, including source water intakes for drinking water treatment facilities. Coastal geomorphology should be documented including lakefront bluffs, the characteristics of the shoreline, near-shore zone, off-shore zone and coastal currents.

The proponent must adequately document the water quality of all surface water demonstrating the use of appropriate sampling and analytical protocols, for the range of analytical parameters with the potential to be influenced by the project. This information should be presented using tables, maps and figures to provide an appropriate

understanding of surface water characteristics and conditions at the site, local and regional scales.

10.1.3 Groundwater

This section of the EIS must describe hydrogeology at the site, local and regional study areas. The description should characterize the physical and geochemical properties of all hydrogeological units in the overburden and the bedrock (from the ground surface down through to the uppermost Precambrian unit). Units should be characterized as aquifers or aquitards, and the description of each unit should include its geochemistry as well as the delineation of vertical and lateral permeabilities and directions of groundwater flow. Groundwater recharge and discharge areas should be identified (including discharge areas in Lake Ontario), and groundwater interactions with surface water should be described in detail.

A conceptual and numerical hydrogeologic model that discusses the hydrostratigraphy and groundwater flow systems should be presented. The assessment must describe anticipated or potential changes to groundwater flow and quality related to any interactions with surface waters.

The EIS must provide a description of baseline ground water quality at the site and local study area. The EIS must also describe local and regional potable groundwater supplies, including their current use and potential for future use.

10.1.4 Terrestrial Environment

This section of the EIS must describe the terrestrial species at the site and within the local and regional study areas, including flora, fauna and their habitat. The EIS must describe any wildlife corridors and physical barriers to movement that exist within the project area. Any biological species of natural conservation status at a federal, provincial, regional or local level and their critical habitats should be identified.

All protected and conservation areas established by federal, provincial and municipal jurisdictions (e.g., wilderness areas, parks, sites of historical or ecological significance, nature reserves, federal migratory bird sanctuaries and wildlife management areas, and municipal protected water supply areas) must be identified.

Sites within the local or regional study area subject to contamination from previous nuclear or non-nuclear industrial activities may require baseline characterization of radionuclide and hazardous substance levels within soil, vegetation and non-human biota.

Field surveys should be described in terms of representativeness of the target populations, the design for allocation of samples in space and time, measurement methods and results.

10.1.5 Aquatic Environment

This section of the EIS must describe the aquatic and wetland species at the site and within the local and regional study areas, including a description of the flora, fauna and their habitat. The proponent should seek from relevant authorities, such as DFO and the

Ontario Ministry of Natural Resources, any available information on aquatic and wetland species and habitat for the local and regional study areas. In addition, the proponent will need to undertake independent studies to gather the necessary information as necessary.

The description of the existing aquatic environment should include observed changes to food chain and food web dynamics as a habitat component as this relates to fish populations as a result of existing operations. In addition, the description should include how these impacts have affected fish movement, migration, spawning and nursery periods on a local and regional level.

The proponent must provide detailed habitat mapping in order to understand habitat usage by fish within the study area. This information must include depth profiles, substrate mapping, water temperature profiles, and a description of potential and known habitat usage (i.e., nursery, rearing, feeding and migratory) by fish that occur in the study areas.

The fish habitat assessment and inventory must include the area below the High Water Mark, as detailed in *DFO Factsheet - Fish Habitat and Determining the High Water Mark*, as this area functions as fish habitat seasonally and in years of higher water levels in Lake Ontario.

The EIS must identify any biological species of natural conservation status (e.g., rare, vulnerable, endangered, threatened, and uncommon) at a federal, provincial, regional or local level and their critical habitats.

A summary of results and interpretation must be provided for the on-going monitoring of entrainment and impingement of aquatic biota at the existing stations.

10.1.6 Ambient Radioactivity

The EIS must describe the ambient radiological conditions at the site and within the local and regional study areas. The EIS must provide information on the existing conditions in this regard, including an inventory of sources, their activity levels, and their origin (natural or anthropogenic), for all environmental media including air, soil, food, water, aquatic sediments, plant and animal tissue in the appropriate subsections of the EIS.

Humans and non-human biota exposed to ambient radioactivity must be assessed for all relevant routes of exposure (both internal and external exposure scenarios). Information on radiation levels to which workers and members of the public are exposed to must be provided. This must also include consideration of consumers of country food whose exposure pathways may differ due to cultural norms, including any dietary characteristics of Aboriginal peoples.

A description of the current radiological monitoring, management programs, and special studies including a detailed summary of the results of those programs, must be provided in the EIS.

10.1.7 Climate, Weather Conditions and Air Quality

The EIS must describe the climate conditions at the site, local and regional study areas. The EIS must also provide a description of seasonal variations in weather conditions within the above-noted study areas, to allow the assessment of effects on the project. Meteorological information provided should include air temperature, relative humidity, precipitation, wind speed and direction, atmospheric pressure, solar radiation, and describe the occurrence of weather phenomena including events such as tornadoes, lightning, temperature inversions and fog. Special consideration must be given in the analysis of extreme and rare meteorological phenomena. Uncertainties must be described and taken into account when discussing the reliability of the information presented.

The influence of regional topography or other features that could affect weather conditions in the study areas must be described.

A description of the ambient air quality in the study areas must be provided, with emphasis on those parameters for which there will be radiological and non-radiological emissions resulting from the project.

10.1.8 Noise

The EIS must describe current ambient day time and night time noise levels at the site, in the local study areas, and include information on its source(s), geographic extent and temporal variations. The description must also provide ambient noise levels for other areas which could be affected by the project, such as through increased traffic along transportation corridors to and from the site during construction, particularly at residences and sensitive sites (e.g., hospitals, schools, day-cares, seniors' residences, and places of worship).

10.2 Socio-economic Conditions

In describing the socio-economic environment, the proponent must provide information on the functioning and health of the socio-economic environment, encompassing a broad range of matters that affect the people and communities, including Aboriginal communities, in the study area.

10.2.1 Economy

The EIS must describe the general socio-economic conditions at the local and regional study areas. The proponent should describe population and community distribution and density in the regional study area. The description should include the proximity of the project to affected communities, fluctuations in population and population attributes (age groups, employment).

A description of the local and regional economies should also be provided, including workforce and employment. Information must be provided on the available labour supply and rates of employment in the surrounding communities and region.

10.2.2 Land Use and Value

The EIS must describe land use in the local and regional study areas. The proponent should identify past, current and planned land use(s) of the study areas or beyond, that may be affected by the project. This must include a description of the current and planned operations on the OPG Nuclear Site, and a discussion of existing land-based infrastructure that is likely to be affected by the project, such as sewer and water treatment distribution systems, wells and waste management areas.

A description of commercial fisheries that could be affected by the project should be provided.

Estimates of the current and projected value of the recreational and tourist industry (e.g., hunting, fishing, hiking, parks, kayaking, cottages along the shores of Lake Ontario) for the study areas should be provided.

A description of current or of proposed future local, regional or provincial land use or urban development policies, programs and plans should also be provided.

10.2.3 Aboriginal Land, Aquatic Area and Resource Use

In keeping with the Guiding Principles in Section 2 of these guidelines, the EIS must describe land use at the site and within the local and regional study areas. The proponent should identify the lands, waters and resources of specific social, economic, archaeological, cultural or spiritual value to Aboriginal people, including Métis that assert Aboriginal rights or title or treaty rights or in relation to which Aboriginal rights or title or treaty rights have been established and that may be affected by the project. The EIS must identify traditional activities, including activities for food, social, ceremonial and other cultural purposes, in relation to such lands, waters and resources with a focus on the current use of lands, waters and resources for traditional purposes.

Traditional land use may include areas where traditional activities such as camping, travel on traditional routes, gathering of country foods (hunting, fishing, trapping, planting and harvesting) activities were carried out. Spiritual sites should also be considered as a traditional use activity of significance to Aboriginal people.

10.2.4 Land-based Transportation

The EIS must describe the existing conditions of the proposed modes and routes of transportation (e.g., provincial highways, arterial highways, on-site access roads, railways) that will be used throughout the development. The EIS must provide information on the existing types and volumes of traffic and a description of the areas through which trucks will travel, in particular residential or school areas.

10.2.5 Navigable Waters

This section of the EIS must identify any navigation use or issues along Lake Ontario, or any other waterbodies that may be affected by the project. Information on location (latitude and longitude), width, and depth must be provided where appropriate.

10.2.6 Human Health

This section of the EIS must describe the current health profiles of the communities likely to be affected by the project. The proponent should examine the aspects of human health that are defined by the World Health Organization, and include consideration of physical health and well-being and associated emotional, social, cultural, and economic aspects.

The EIS must provide information on population health of the communities in the regional study area. A description of community and public health services available to the residents of communities and to Aboriginal people in the regional study area must also be included.

In keeping with the Guiding Principles in Section 2 of these guidelines, a discussion on Aboriginal people's health-related traditional activities, including the accessibility to spiritual sites within regional study area, should also be included. Health-related traditional activities could include gathering of country foods for consumption (hunting, fishing, trapping, planting and harvesting of plants for medicinal purposes) and activities of spiritual significance. Information on current consumption of country foods and its quality by food type, amounts consumed, parts consumed (whole body as opposed to a specific organ) by Aboriginal people must be provided where available.

10.2.7 Physical and Cultural Heritage Resources

The EIS must identify any terrestrial and aquatic areas containing features of historical, archaeological, paleontological, architectural or cultural importance. A description of the nature of the features located in those areas must be provided. Particular attention must be given to Aboriginal cultural, archaeological and historical resources since there is documented evidence of the presence of such resources in the study areas.

11. EFFECTS PREDICTION, MITIGATION MEASURES AND SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

11.1 Effects Prediction

This section must contain a description of any changes in the environment caused by the project, including the effects of these environmental changes on health and socio-economic conditions, physical and cultural heritage, current use of lands and resources for traditional purposes by Aboriginal persons, and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. Specific attention must be given to interactions between the project and the identified VECs. This section must also include changes to the project caused by the environment.

Each environmental change must be described in terms of whether it is direct or indirect and positive or adverse. Where no change is predicted, this should be noted.

The EIS must describe comprehensive analyses of both the short and long term effects of the project on the environment. The proponent must indicate the degree of uncertainty in predicting the environmental effects identified. When numerical models

are used (e.g., a quantitative ecological risk assessment model, a population level ecological risk assessment model) scientific defensibility must be demonstrated by performing model verification (e.g., peer review of model theory), calibration (e.g., adjusting key parameters to site-specific data), validation (e.g., comparison of predicted to observed), sensitivity and uncertainty analysis. Risk modelling of VEC exposure to releases of radionuclides, or hazardous substances (including thermal) shall be determined through the use of upper bounding scenarios or a combination of expected average releases and an upper bounding scenario.

The proponent is expected to employ standard ecological risk assessment frameworks that categorize the levels of detail and quality of the data required for the assessment. These tiers are as follows:

- Tier 1: Qualitative (Expert opinion, literature review, and existing site information);
- Tier 2: Semi-quantitative (Measured site-specific data and existing site information); and
- Tier 3: Quantitative (Recent field surveys and detailed quantitative methods).

Thus, if the Tier 2 assessment still indicates a potential for effects for valued receptors then a Tier 3 assessment would need to be conducted to reduce the level of uncertainty. If the risk characterization component is uncertain this may necessitate the probabilistic modeling of the population level consequences of the proposed project.

An accepted approach to population-level ecological risk assessment and its use in environmental decision-making has been developed through recent scientific work. This approach includes a determination of when a population-level risk assessment is warranted (Tier 1 and Tier 2 assessments), the consideration of exit criteria, and a determination of the value of the assessment [Reference 8].

The consideration of views from the public and Aboriginal groups, including any perceived changes attributed to the project, must be recognized and addressed in the assessment method.

When completing effects predictions, the potential for climate change influences over the predicted 60 year of operations should be considered (e.g., influence on thermal effects from cooling water releases).

11.2 Mitigation Measures

Mitigation is the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means. The proponent must describe general and specific measures intended to mitigate the potentially adverse environmental effects of the project. The proponent must indicate which measures respond directly to statutory or regulatory requirements.

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. Information must be provided on similar mitigation methods used with similar projects and the degree of success achieved.

The proponent must indicate what other mitigation measures were considered, including the various components of mitigation and explain why they were rejected. Trade-offs between cost savings and effectiveness of the various forms of mitigation must be justified. The proponent must identify who is responsible for the implementation of these measures and the system of accountability.

For species at risk defined by the federal *Species at Risk Act*, pursuant to subsection 79(1) of that Act, Responsible Authorities under the *Canadian Environmental Assessment Act* must notify the appropriate federal Minister if any listed wildlife species, its critical habitat or the residences of individuals of that species may be adversely affected by the project. Pursuant to subsection 79(2) of the *Species at Risk Act*, if the project is carried out, Responsible Authorities must also ensure that measures are taken to avoid or lessen those effects and to monitor them; these measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. Therefore, the proponent must include information in the EIS that will allow the Responsible Authorities to meet this requirement.

Compliance monitoring verifies whether required mitigation measures were implemented. Compliance monitoring on its own does not satisfy the requirements for a follow-up program described in Section 15, but serves to track conditions or issues during the project lifespan or at certain times. For each environmental component potentially affected by the project, the EIS must describe any proposed monitoring programs that will be designed.

11.3 Significance of Residual Adverse Effects

The proponent is expected to take all reasonable precautions to protect the environment. Hence, all reasonable means (e.g., best available technology economically achievable and keeping radiation doses as low as reasonably achievable) are expected to be used to eliminate or mitigate adverse environmental effects. Any residual adverse effects persisting despite proposed mitigative activities are to be assessed as to their significance.

The EIS must identify the criteria used to assign significance ratings to any predicted adverse effects. The EIS must contain a detailed analysis of the significance of the potential residual adverse environmental effects it predicts. It must contain clear and sufficient information to enable the joint review panel and the public to understand and review the proponent's judgment of the significance of effects. The proponent must define the terms used to describe the level of significance.

The proponent must assess the significance of predicted effects according to the following categories:

- magnitude of the effect;
- geographic extent of the effect;
- timing, duration and frequency of the effect;
- degree to which effects are reversible or mitigable;
- ecological and social/cultural context; and
- probability of occurrence.

In assessing significance against these criteria, the EIS must, where possible, employ relevant existing regulatory documents, environmental standards, guidelines, or objectives such as prescribed maximum levels of emissions or discharges of specific hazardous agents into the environment or maximum acceptable levels of specific hazardous agents in the environment. If the level of an adverse environmental effect is less than the standard, guideline, or objective, it may or may not be significant. The EIS must avoid repetition by identifying the potential adverse environmental effects, the proposed mitigation measures and the significance of the effects after mitigation measures have been taken into account, on each VEC, both biophysical and socio-economic, in the same discussion. A summary of the effects, mitigation and significance associated with each VEC should be provided in tabular format to provide clarity and ease of reference.

The EIS must clearly explain the method and definitions used to describe the level of the adverse (e.g., low, medium, high) for each of the above categories and how these levels were combined to produce an overall conclusion on the significance of adverse effects for each VEC. This method should be transparent and reproducible.

11.4 Biophysical Environment

11.4.1 Geology and Geomorphology

The EIS must describe any changes to the environment resulting from the removal of bedrock, unconsolidated deposits, soils or sediments that are disturbed, and stockpiled, or used for construction purposes.

The EIS must also include an assessment of changes to coastal processes and features (e.g., changes to shoreline morphology due to construction as well as changes through erosion and sediment transport) with a particular focus on potential effects of the increased flow from condenser cooling water or other discharges to surface waters and the proposed infilling of Lake Ontario.

11.4.2 Surface Water

The EIS must identify and characterize all liquid emissions, including but not limited average and maximum emissions from point sources, planned discharges, fugitive releases, deposition from airborne particulates, and surface runoff, which have the

potential to be generated during any phase of the project. A description of how these emissions could affect surface water quality and an indication of what will be done to avoid or mitigate adverse environmental effects must be provided.

The proponent is to document the proposed monitoring or follow-up programs designed to assess the effects of the project on surface water features, including measured parameters, sampling methodologies, locations and frequencies, and performance criteria against which the impacts of the site activities will be evaluated.

11.4.3 Groundwater

For all phases of the project, the EIS must describe and assess any effects the project may have on the groundwater regime including the quantity and quality of groundwater, and provide details of how the effects on groundwater will be avoided or mitigated.

Modeling should be used as required to develop and support effects predictions.

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 impacts of the site activities will be evaluated.

11.4.4 Terrestrial Environment

For all phases of the project, the EIS must describe the effects of the project on terrestrial fauna and flora and include a full accounting of effects on species of natural conservation status and their habitat. This effects evaluation should be based on results of field monitoring studies and predictions from an ecological risk assessment. It must be clear how predicted effects to the biota exposed to the project stressor compare to the expected “reference condition” for unexposed biota on a biological population basis taking into account natural variation. Potential effects may include but are not limited to:

- effects of loss of terrestrial habitat and the quality of lost habitat for relevant species;
- disturbance of feeding, nesting or breeding habitats;
- physical barriers to wildlife;
- disruption, blockage, impediment and sensory disturbance (e.g., noise and light effects) of daily or seasonal wildlife movements (e.g., migration, home ranges);
- direct and indirect wildlife mortality;
- reduction in wildlife productivity; and
- contaminant exposures through environmental and food-chain transport.

The proponent is to document the proposed monitoring or follow-up programs designed to assess the effects of the project on the terrestrial environment including potential sampling media and/or indicator species, measured parameters, sampling methodologies, locations and frequencies, and performance criteria against which the impacts of the site activities will be evaluated.

11.4.5 Aquatic Environment

For all phases of the project, the EIS must describe the effects of the project on aquatic fauna and flora and include a full accounting of effects on species of natural conservation status and their habitat. This effects evaluation should be based on results of field monitoring studies and predictions from an ecological risk assessment. Potential effects may include but are not limited to:

- effects on habitat, including aquatic vegetation and sensitive areas such as spawning grounds, nursery areas, winter refuges and migration corridors;
- effects on aquatic species, including rare and/or sensitive species;
- effects of blasting on fish and fish habitat on local aquatic systems;
- contaminant exposures through environmental and food-chain transport;
- effects of impingement/entrainment on biota;
- effects of infilling on loss of fish habitat and changes to productive capacity;
- effects of thermal plume(s) on fish habitat, health and behaviour;
- effects from the release of potential contaminants within cooling water such as blowdown constituents, biocides or anti-corrosion chemicals on aquatic biota;
- a description of mitigation/compensation options; and
- effects on wetlands.

Results of historical baseline studies and on-going monitoring of events with respect to the changes observed in aquatic species as a result of current and past operations of existing nuclear reactors will play a key role in determining future effects of new reactors. Description of potential effects must include changes to food chain and food web dynamics as a habitat component as this relates to fish populations. Particular attention must be placed on the effects to any existing sport fishing and Aboriginal commercial fishing industry.

Any works that involve significant infilling into Lake Ontario require an assessment of alternatives to avoid the infill as per the 'Hierarchy of Preferences' direction in the DFO's Policy for the Management of Fish Habitat. Any works that will result in a harmful alteration, disruption or destruction of fish habitat will be required to have a fish habitat compensation plan to meet the 'no net loss' policy objectives. The assessment of potential effects to fish and fish habitat arising from the lake filling must be done using DFO's Habitat Alteration and Assessment Tool (HAAT). The HAAT model must also be used as part of the assessment to evaluate if the compensation plan meets DFO's long term policy objective to achieve a net gain in productive capacity of fish habitat.

The proponent must describe proposed mitigation measures to reduce or eliminate effects from impingement and entrainment of aquatic biota through water withdrawal, and from subsequent release of a heated effluent, in consideration of the requirements to assess alternative means of undertaking the project. The assessment of the possible mitigation measures must include the use of closed-cycle cooling systems and the application of a

standard approach velocity at the intake screens (e.g., as applied at Canadian hydroelectric facilities).

11.4.6 Radiological Conditions

For all phases of the project, the EIS must describe, in the appropriate sections, any changes to radiation and radioactivity present in the terrestrial and aquatic environment, the atmosphere, and to workers and members or nearby communities as a result of the project. Any mitigation measures to reduce adverse environmental effects must also be described.

The proponent is to document the proposed monitoring or follow-up programs designed to assess the effects of the project related to the releases of radionuclides to the environment, including potential sampling media and/or indicator species, measured parameters, sampling methodologies, locations and frequencies, and performance criteria against which the impacts of the site activities will be evaluated.

11.4.7 Atmosphere

The EIS must identify and characterize all atmospheric emissions, including but not limited to average and maximum emissions from point sources, planned discharges, and fugitive emissions, including greenhouse gases, expected to be generated during any phase of the project. Modelling incorporating site-specific atmospheric characteristics (e.g., shoreline fumigation) is to be completed to assess potential influences on air quality, and the transport of atmospheric contaminants and any associated exposure of humans and non-human biota. The EIS is to indicate what will be done to avoid or mitigate any potential adverse environmental effects and assess the risks associated with any residual emissions. A comparison of the Project's incremental contribution to total national and provincial emissions on an annual basis is to be provided.

The proponent is to document the proposed monitoring or follow-up programs designed to assess the effects of the project related to atmospheric releases and associated air quality, including measured parameters, sampling methodologies, locations and frequencies, and performance criteria against which the impacts of the site activities will be evaluated.

11.4.8 Noise and Vibrations

For all phases of the project, the EIS must describe the predicted effects (with rationale) of any change in day time or night time noise or vibration levels on terrestrial and aquatic species and on workers and nearby residents and communities for all phases of the project. Include a description of any tonal or impulsive noise that may occur, particularly during construction. The methods to be used to monitor noise and vibration levels must also be described.

11.4.9 Effects of the Environment on the Project

The EIS must describe the potential effects that the environment may have on the project. The assessment must take into account how local lake conditions and natural hazards, such as severe weather conditions and external events (e.g., flooding, tornado, fire and seismic events) could adversely affect the project. Longer-term effects of climate change must also be discussed up to the projected abandonment phase of the project.

Consideration of applicable climate elements must include, but not be limited to:

- an estimate of its importance to the project;
- an estimate of how sensitive the project is to variations of this element;
- a discussion of climate data used; and
- change in lake level.

The sensitivity of the project to long-term climate variability and effects must be identified and discussed. The CEAA Procedural Guide, "Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners",

[Reference 9] provides guidance for incorporating climate change considerations in an environmental assessment.

11.5 Socio-economic Effects

This section of the EIS must describe the predicted changes to health and socio-economic conditions, physical and cultural heritage and current use of lands and resources, including those used for traditional purposes by Aboriginal people that result from any changes the project may cause in the environment.

11.5.1 Economy

For all phases of the project, the EIS must describe the expected effects on the regional study area's economy, including effects on employment and economic sectors such as commercial, retail and recreational sectors. It should also describe what measures are within the proponent's control to avoid or mitigate adverse economic effects.

11.5.2 Land Use and Value

This section of the EIS must describe the predicted effects (with rationale) that the proposed development will have on the existing and planned operation on the Darlington Nuclear Site as well as on other land and water uses, including tourism, changes in aesthetics, education, and recreational opportunities caused by the construction, operation and modification of the project in terms of increased noise levels, lowered air and water quality, alteration or visual and topographic characteristics of the area.

For all phases of the project, the EIS must describe the expected effects or pressures on, but not limited to, land use, the housing market (including local and regional residential rental market), property taxes, and property values within the Local and Regional Study Areas, as well as any additional areas that might be defined by the Protective Zone.

11.5.3 Aboriginal Traditional Land Use

The EIS must identify any change that the project is likely to cause in the environment and any effect of any such change on the use of lands and resources for traditional purposes by any Aboriginal group including, but not limited to, effects to hunting, trapping, fishing and gathering. For each effect, the EIS must specify, where possible, the particular area that may be affected. The EIS must identify any concerns raised by Aboriginal people about the project or other past or present means of storing or disposing of nuclear waste, and regarding the cumulative effects of the project in combination with any other over these areas.

11.5.4 Land-based Transportation

For all phases of the project, the EIS must describe the expected effects on transportation infrastructure in the regional study area. The discussion on the predicted effects (with rationale) to local and regional traffic volumes and road conditions, including provincial highways, arterial highways, on-site access roads and railways, should be provided. Information on the potential effects on the areas, through which trucks will travel, such as residential or school areas, should also be included. The proposed methods for avoiding effects on the existing transportation infrastructure should be described.

11.5.5 Navigable Waters

The EIS must identify potential effects on navigability on Lake Ontario and other water bodies that may be affected by the project.

11.5.6 Human Health

The EIS must provide a discussion on the potential effects of the project on the physical, mental, and social well-being of workers, the public and communities.

The information must include, but not be limited to, the following:

- an analysis of the effects of the project on the health and safety of all workers, including the possible effects from malfunctions or accidents;
- the predicted doses to workers, including doses to contract workers, and to members of the project resulting from activities within the scope of this project;
- a description of quantitative risk assessment modeling conducted, where necessary, for any malfunctions and accidents;
- an assessment of the project's potential effects on human health from all contaminants or other substances released from the project, as well as direct exposure to radiation, through all potential exposure pathways; and
- potential effects of noise generated from the project on human receptors within the study area.

The effects of the project on local and regional health services and public health infrastructure (water supplies for domestic use and sewage treatment) must also be described.

11.5.7 Physical and Cultural Heritage Resources

If it has been determined that sites of historical, archaeological, paleontological or architectural importance exist, the potential effects of the project on these sites and on any physical and cultural heritage resources must be identified and discussed. The proposed measures to preserve, protect or recover these resources must be described.

11.5.8 Natural Resources

The workforce required for this project, especially during the construction phase, would be considerable; therefore, the likely effects of the workforce on the biological environment must be discussed. Increased sport fishing pressure and increased traffic raising wildlife road kill rates should be taken into consideration.

12. ACCIDENTS, MALFUNCTIONS AND MALEVOLENT ACTS

12.1 General Considerations

For the purposes of the assessment, accidents and malfunctions may be separated into three categories and defined as follows:

- *Nuclear accidents*, consisting of all accidents and malfunctions with radiological consequences. These accidents may be further subdivided into nuclear accidents directly involving the reactor core (such as serious damage to the reactor core), nuclear accidents involving other on-site nuclear power plant facilities that contain radiological substances (including the storage of spent fuel waste and radioactive waste handling facilities), and nuclear accidents related to the off-site transportation of low and intermediate-level radioactive wastes. Accidents that do not directly involve the reactor core include criticality events associated with the nuclear fuel.
- *Conventional accidents*, consisting of all other accidents and malfunctions resulting in releases of non-radiological contaminants and other materials.
- *Malevolent acts*, consisting of those physical initiating events or forces (e.g., theft, diversion, civil disorder, fires, explosions, aircraft crashes) that could result from acts of sabotage or terrorist acts.

For each category of accidents and malfunctions, one or more limiting source terms must be defined. Sufficient quantitative information must be provided on all radioactive and hazardous substances that could be released to the environment in significant quantities.

The description must include the safeguards that have been established by the proponent to protect against such occurrences and the contingency procedures in place. Accident management typically relies heavily on the evacuation of personnel and of the population, as required. The proponent must demonstrate that the requirements for adequate infrastructure to support evacuation of personnel and the population can be met. The need for any necessary administrative measures must also be identified together with the responsibilities of organizations other than the proponent.

The proponent must provide a description of any contingency, clean-up or restoration work in the surrounding environment that would be required during, immediately following or in the long-term after, the postulated malfunctions and accidents, including the manner in which the related costs would be covered.

12.2 Nuclear Accidents

The EIS must identify and describe the probability of possible malfunctions or accidents associated with 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.

The proponent must credibly demonstrate that it meets the safety goals defined in CNSC Regulatory Document RD-337, “Design of New Nuclear Power Plants”, [Reference 10], with some margin on frequency, consequence or both. These safety goals are meant to ensure that the risk posed by a nuclear power plant to members of the public living near the plant is small compared with the risks to which they are normally exposed, and the releases they describe are bounding for all designs.

Two safety goals are defined in CNSC Regulatory Document RD-337, to protect the environment and the health and safety of workers and public:

- a small release frequency (SRF). The SRF addresses releases of radioactive material that would trigger temporary evacuation of the population within a few kilometres of the plant in order to prevent unacceptable health effects as a result of limited reactor core damage with impaired containment; and
- prevent unacceptable health effects as a result of severe reactor core damage and failure of containment.

Each safety goal comprises a limit, as follows:

- SRF - The sum of frequencies of all event sequences that can lead to a release to the environment of more than 1×10^{15} Bq of I-131 is less than 1:100,000 per reactor year.
- LRF - The sum of frequencies of all event sequences that can lead to a release to the environment of more than 1×10^{14} Bq of Cs-137 is less than 1:1,000,000 per reactor year.

The proponent must provide a high-level safety analysis supported by sufficient design information to demonstrate to the satisfaction of the joint review panel or its technical support staff that the accident behaviours of the various designs being proposed are understood, such that their consequences can be predicted with sufficient confidence. The required level of design information is:

- site characteristics including natural hazards;
- technical outline of the nuclear power plant including:
- plant layout;
- qualitative descriptions of all major systems, structures and components (SSCs) that could significantly influence the course or consequences of principal types of accidents and malfunctions;
- qualitative descriptions of the functionality of the SSCs important to safety;
- quantitative information on the performance and reliability characteristics;
- qualitative descriptions of principal types of accidents and malfunctions to identify limiting credible sequences including external hazards (natural and human-induced), design basis accidents and beyond design basis accidents, including severe accidents;

- scoping calculations of limiting accident sequences to provide estimates of impact; and
- system level probabilistic safety assessment, or an equivalent level and type of information.

The limiting source terms must consider accident sequences that could occur with a frequency greater than 10^{-6} per year. For those sequences having frequencies less than 10^{-6} per year but sufficiently close to this frequency, the proponent should provide the rationale for screening them out from further analysis. For nuclear accidents directly involving the reactors, the frequencies denote the frequencies per reactor year of operation.

A description of specific (out of reactor) criticality events must be provided along with a demonstration that consequences of the events do not violate criteria established by international standards [Reference 11] and national guidance [Reference 12] as a trigger for a temporary public evacuation.

12.3 Conventional Accidents

The EIS must identify and describe the probability of possible malfunctions or accidents associated with the project, and describe the potential adverse environmental effects of events which result in non-radiological releases. The proponent must provide, for all phases of the project, the following information on conventional accidents:

- an identification and discussion of any past abnormal plant operations, accidents and spills to the extent that they are relevant to the current assessment;
- a description of specific malfunction and accident events that have a reasonable probability of occurring during the life of the project, including an explanation of how these events were identified for the purpose of this environmental assessment; and
- a description of the source, quantity, mechanism, rate, form and characteristics of non-radiological contaminants and other materials (physical and chemical) likely to be released to the surrounding environment during the postulated malfunctions and accidents, including a description of emissions originating from the operation of emergency back-up diesel generators during prolonged outages.

12.4 Malevolent Acts

The EIS must address potential environmental effects that could result from intentional malevolent acts. While intentional malevolent acts are not accidents, the proponent must compare the environmental effects resulting from malevolent acts with the environmental effects identified for both accidents involving radiological substances (Section 12.2) and conventional accidents (Section 12.3). The EIS must describe the consequences of malevolent acts as either bounded by environmental effects of nuclear and conventional accidents described in the EIS, or where necessary identify where the consequences of the malevolent act are greater.

13. CUMULATIVE EFFECTS

The proponent must identify and assess the cumulative adverse and beneficial environmental effects of the project in combination with other past, present or reasonably foreseeable projects and/or activities within the study areas. The approach and methods used to identify and assess cumulative effects must be explained. The CEAA Operational Policy Statement OPS-EPO/3- 2007, “Addressing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*” [Reference 7], provides further guidance for conducting cumulative effects assessment.

The assessment of cumulative environmental effects of the project must include the following, but may also address other items:

- Identify the VECs, or their indicators, on which the cumulative effects assessment is focused, including the rationale for their selection. Present spatial and temporal boundaries for the cumulative effect assessment for each VEC selected. Emphasize VECs with special environmental sensitivities or where significant risks are involved.
- Identify the sources of potential cumulative effects. Specify other projects or activities that have been or will be carried out that could produce environmental effects on each selected VEC within the boundaries defined, and whose effects would act in combination with the residual adverse effects of the project.
- Evaluate the likelihood of development by the proponent or others that may appear feasible because of the proximity of the project’s infrastructure. Limit assessment to cumulative effects on the physical, biological, and human environments that are likely and for which measurable or detectable residual adverse effects are predicted.

A reasonable degree of certainty should exist that proposed projects and activities will actually proceed for them to be included. Projects that are conceptual in nature or limited as to available information may be insufficiently developed to contribute to this assessment in a meaningful manner. In either case, provide a rationale for inclusion or exclusion.

The EIS must describe the analysis of the total cumulative effect on a VEC over the life of the project, which requires knowledge of the incremental contribution of all projects and activities, in addition to that of the project. The EIS must include different forms of effects (e.g., synergistic, additive, induced, spatial or temporal) and identify impact pathways and trends.

Potential environmental effects on a VEC are not necessarily the result of one project. While a project-specific assessment of cumulative effects is not responsible for assessing all external environmental effects; the cumulative effects assessment must consider how a project-specific environmental effect, or suite of project-specific environmental effects, would interact with these external factors. The EIS must make clear the contribution of

the project to a total potential cumulative effect, and place potential cumulative project effects in an appropriate regional context, considering regional plans, community conservation plans, species recovery plans, management plans, objectives and/or guidelines in an integrated manner in order to understand the aspirations of people and communities in the region.

In assessing the cumulative environmental effects of this project in combination with other projects and/or activities, the proponent must identify any changes in the original environmental effects and significance predictions for the project. The proponent must also discuss the effectiveness of the proposed mitigation and/or other restitution measures and the response to such changes, as well as the implications for monitoring and follow-up programs as described in section 15.

This section must provide a brief historical overview of the timelines of the construction, commissioning and operating periods of various facilities at the OPG Darlington Nuclear Site beginning with the first construction in 1981. An example is available on pages 8-9, figure 10 of the December 2000, "Bruce Ecological Effects Review Summary" (OPG 2000), [Reference 13].

14. CAPACITY OF RENEWABLE RESOURCES

The EIS must describe the effects of the project on the capacity of renewable resources to meet the needs of the present and those of the future. The EIS must identify those resources likely to be impacted by the project, and describe how the project could affect their sustainable use. The EIS must also identify and describe any criteria used in considering sustainable use. Sustainable use may be based on ecological considerations such as integrity, productivity, and carrying capacity.

15. FOLLOW UP PROGRAM

The proponent must include a framework upon which environmental monitoring, including environmental effects monitoring where relevant, and follow-up actions will be based throughout the life of the project, should the project proceed.

A follow-up program must be designed to verify the accuracy of the environmental assessment and to determine the effectiveness of the measures implemented to mitigate the adverse environmental effects of the project. The follow-up program must be designed to incorporate pre-project information which would provide the baseline data, compliance data such as established benchmarks, regulatory documents, standards or guidelines, and real time data which would consist of observed data gathered in the field. As part of the follow-up program, the proponent must describe the compliance reporting methods to be used, including reporting frequency, methods and format.

Environmental assessment effects predictions, assumptions and mitigation actions that are to be tested in the follow-up and monitoring programs must be converted into field-testable monitoring objectives. The monitoring design must include a statistical evaluation of the adequacy of existing baseline data to provide a benchmark against

which to test for project effects, and the need for any additional pre-construction or pre-operational monitoring to establish a firmer project baseline.

The proponent must propose a schedule for the follow-up program. The schedule should indicate the frequency and duration of any required environmental effects monitoring. This schedule would be developed after statistical evaluation of the length of time needed to detect effects given estimated baseline variability, likely environmental effect size and desired level of statistical confidence in the results (Type 1 and Type 2 errors).

The description of the follow-up program must include any contingency procedures/plans or other adaptive management provisions as a means of addressing unforeseen environmental effects or for correcting exceedances as required to comply or to conform to benchmarks, regulatory standards or guidelines.

The follow-up program must describe roles and responsibilities for the program and its review process, by both peers, the public and Aboriginal people.

The EIS must provide a discussion on the need for, and requirements of, a follow-up program and include:

- the need for such a program and its objectives;
- a tabular summary and explanatory text of the main components of the program including:
 - a description of each monitoring activity under that component;
 - which of the three follow-up program objectives the activity is fulfilling (1. confirm mitigation, 2. confirm assumptions, 3. verify predicted effects);
 - the specific statement from the environmental assessment that goes along with that generic objective and will be the focus for that activity (e.g., follow-up objective: verify predicted effects; environmental assessment effect: no adverse effects at the population level for white-tailed deer because of vehicle strikes due to increased traffic within the site study area); and,
 - the specific monitoring objective for that activity (e.g., record occurrence of vehicular collisions with deer on-site to verify predicted environmental effects).
- how it would be structured;
- roles to be played by the proponent, regulatory agencies, government representatives, Aboriginal people, non-government organizations, citizens' groups and others in such a program;
- possible involvement of independent researchers;
- the sources of funding for the program; and
- information management and reporting.

The follow-up program plan must be described in the EIS in sufficient detail to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted environmental effects (or absence of them), confirm environmental assessment assumptions and confirm the effectiveness of mitigation.

16. ASSESSMENT SUMMARY AND CONCLUSION

This section of the report must summarize the overall findings with emphasis on the main environmental issues identified.

17. REFERENCES

1. Canadian Privy Council Office. "A Framework for the Application of Precaution in Science-based Decision Making about Risk". ISBN 0-662-67486-3 Cat. no. CP22-70/2003
2. OPG. "Project Description for the Site Preparation, Construction and Operation of the Darlington B Nuclear Generating Station Environmental Assessment" April 2007.
3. CNSC Regulatory Document RD-346 "Site Evaluation for New Nuclear Reactors", Canadian Nuclear Safety Commission, Ottawa, November 2008.
4. CNSC Regulatory Guide G-219, "Decommissioning Planning for Licensed Activities" Canadian Nuclear Safety Commission, Ottawa, June 2000.
5. CNSC Regulatory Standard S-296, "Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills", Canadian Nuclear Safety Commission, Ottawa, March 2006.
6. CNSC Regulatory Guide G-296, "Developing Environmental Protection Policies, Programs And Procedures At Class I Nuclear Facilities And Uranium Mines And Mills" Canadian Nuclear Safety Commission, Ottawa, March 2006.
7. CEAA Operational Policy Statement OPS-EPO/3- 2007, "Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act", Ottawa, November 2007.
8. Barnthouse, L.W., W. R. Munns Jr. and M. T. Sorensen. 2008. "Population-Level Ecological Risk Assessment". CRC Taylor and Francis, NY. Society of Environmental Toxicology and Chemistry.
9. CEAA Procedural Guide, "Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners", prepared by: The Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, November 2003.
10. DRAFT CNSC Regulatory Document RD-337, "Design of New Nuclear Power Plants", Canadian Nuclear Safety Commission, Ottawa, 2008.
11. Food and Agriculture Organization of the United Nations, International Atomic

Energy Agency, International Labour Organization, OECD Nuclear Energy Agency, Pan American Health Organization, United Nations Office for the Co-Ordination of Humanitarian Affairs, World Health Organization, “Preparedness and Response to Nuclear or Radiological Emergency, Safety Requirements”, Safety Standards Series No. GS-R-2, IAEA, Vienna, Austria, 2002.

12. Health Canada, “Canadian Guidelines for Intervention during a Nuclear Emergency”, Document H46-2/03-32E, Ottawa, Ontario, November 2003.
13. Ontario Power Generation 2000. “Bruce Nuclear Power Development Ecological Effects Review”. December 2000. Ontario Power Generation. CNSC Record Center, EDOCS #3078531.

APPENDIX 1

Glossary and Acronyms

Abandon – The act of a nuclear facility moving from a licensed to unlicensed state.

Aboriginal Peoples – Defined in Section 35 of the *Constitution Act*, 1982 as including Indian, Inuit and Métis people

Aboriginal Rights - Those rights of Aboriginal peoples which are not found in treaties or land claims agreements.

Aboriginal Title - The form of land ownership belonging to Aboriginal people and the rights coming from the aboriginal relationship with land.

Aboriginal Traditional Knowledge - Aboriginal traditional knowledge (ATK) is knowledge that is held by, and unique to Aboriginal peoples. It is a living body of knowledge that is cumulative and dynamic and adapted over time to reflect changes in the social, economic, environmental, spiritual and political spheres of the Aboriginal knowledge holders. It often includes knowledge about the land and its resources, spiritual beliefs, language, mythology, culture, laws, customs and medicines. It may be considered in the environmental assessment of a proposed project. The term traditional ecological knowledge (TEK) is often used interchangeably with the term Aboriginal traditional knowledge (see, ATK). However, TEK is generally considered to be a subset of ATK that is primarily concerned with knowledge about the environment.

Aquatic Environment – The components related to, living in, or located in or on water or the beds or shores of a water body, including but not limited to all organic and inorganic matter, and living organisms and their habitat, including fish habitat, and their interacting natural systems.

Beyond Design Basis Accident (BDBA) - An accident less frequent and more severe than a design basis accident.

CEAA - The Canadian Environmental Assessment Agency.

Country Food - A diet of local meat and fish and wild plants gained through subsistence harvest.

Darlington New Nuclear Power Plant (Darlington NNPP) - the new nuclear reactors proposed by OPG.

Design Basis Accident (DBA) - Accident conditions against which a nuclear power plant is designed according to established design criteria, and for which the damage to the fuel and the release of radioactive material are kept within authorized limits.

Ecological Risk Assessment -The process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors. This definition recognizes that a risk does not exist unless: (1) the stressor has an inherent ability to cause adverse effects, and (2) it is coincident with or in contact with the ecological component long enough and at sufficient intensity to elicit the identified adverse effect(s).

Entrainment - Occurs when fish (as defined in the *Fisheries Act*) are drawn into a water intake and cannot escape.

Environmental Assessment - Environmental assessment is a process for identifying project and environment interactions, predicting environmental effects, identifying mitigation measures, evaluating significance, reporting and following-up to verify accuracy and effectiveness. Environmental assessment is used as a planning tool to help guide decision making, as well as project design and implementation.

Environmental Effect - As defined in the *Canadian Environmental Assessment Act*.

Exclusion Zone - A parcel of land within or surrounding a nuclear facility on which there is no permanent dwelling and over which a licensee has the legal authority to exercise control. (from *Class I Nuclear Facilities Regulations*).

Impingement - Occurs when entrapped fish (as defined by the *Fisheries Act*) are held in contact with the intake screen and are unable to free itself.

Joint Review Panel - A Review Panel appointed pursuant to the *Canadian Environmental Assessment Act*.

NSCA - the *Nuclear Safety and Control Act*.

OPG - Ontario Power Generation

Project - The proposal to construct and operate up to four new nuclear reactors.

Proponent - Ontario Power Generation.

Protective Zone - The area beyond the exclusion zone that needs to be considered with respect to implementing emergency measures. This includes consideration of such matters as population distribution and density, land and water use, roadways, and consequence and evacuation planning (from RD-346)

Species at Risk – As defined in the federal *Species at Risk Act*.

Terrestrial Environment – The components related to, living on, or located on the Earth's land areas, including but not limited to all organic and inorganic matter, living organisms and their habitat, and their interacting natural systems.

Treaty Rights - Rights arising from the terms of a treaty.

VEC - Valued Ecosystem Component.

APPENDIX 2

Nuclear Safety and Control Act and its Regulations
High Level Guidelines for Applications for Licence to Prepare Site

The proponent must provide all information required under the *Nuclear Safety and Control Act and Regulations* relating to an application for a Licence to Prepare Site. The proponent must demonstrate compliance with the following and with any other requirements cross-referenced in the provisions outlined below.

Nuclear Safety and Control Act – Subsection 24(4) (available at http://laws.justice.gc.ca/en/showdoc/cs/N-28.3/bo-ga:s_8-gb:s_24/en#anchorbo-ga:s_8-gb:s_24)

24(4) No licence may be issued, renewed, amended or replaced unless, in the opinion of the Commission, the applicant:

(a) is qualified to carry on the activity that the licence will authorize the licensee to carry on; and

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

General Nuclear Safety and Control Regulations

All regulations serve to address Subsection 24(2) of the NSCA.

Information in the application shall demonstrate compliance with the NSCA and associated Regulations.

Although the application is for a *Licence to Prepare Site*, the application should also show high level planning information towards Construction and Operation activities since a large number of related activities have either long lead times or direct ties back to site preparation activities.

The following table outline, to the applicant, CNSC's expectations for information to be submitted to meet the requirements of the *Nuclear Safety and Control Act* via the *General Nuclear Safety and Control Regulations* and the *Class I Nuclear Facilities Regulations*.

Note that further guidance on the *Nuclear Security Regulations* is not included here due to its potentially prescribed nature. Applicants must approach the CNSC separately on this issue.

Where the information provided to meet these expectations is contained in a part of the Environmental Impact Statement, reference may be made to the relevant section(s) in order to avoid duplication.

General Nuclear Safety and Control Regulations (GNSCR)		
Section	Requirement	Expectations
3(1)(a)	the applicant's name and business address	Self explanatory.
3(1)(b)	the activity to be licensed and its purpose	<p>The activity is "Site Preparation". 'Purpose' provides high level description of the planned NPP including:</p> <ul style="list-style-type: none"> • number of units, • capacity, • type(s) / make(s) of reactor being considered, and • ultimate purpose(s) of the plant (e.g., electrical power production, hydrogen, desalination, process steam for external process use) <p>If subsurface preparation² of the plant footprint will be executed under the <i>Licence to Prepare Site</i>, sufficiently detailed information about the plant footprint is submitted in order to demonstrate adequate preparation of the subsurface against the human-induced and external hazards assessed during the site evaluation phase.</p>
3(1)(c)	the name, maximum quantity and form of any nuclear substance to be encompassed by the licence	Typically, there is no handling of radioactive substances during site preparation activities except for any construction-related tools that would be under existing CNSC nuclear substance and device licences.
3(1)(d)	a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence	<p>The plant description should include:</p> <ul style="list-style-type: none"> • list of plant types/designs under consideration³; • the scheduled completion date and anticipated commercial operation date of

² Subsurface preparation does not include installation of pilings or other structures meant to support or add strength to future NPP foundational structures. Drainage trenches and cable tunnels may be permitted with the provision that additional reviews will be required for the *Licence to Construct* stage if the structures will be credited in NPP safety analyses.

³ Not mandatory information for the *Licence to Prepare Site*. This information is expected by CNSC as part of the Environmental Assessment process.

General Nuclear Safety and Control Regulations (GNSCR)		
Section	Requirement	Expectations
		<p>each unit;</p> <ul style="list-style-type: none"> • for each of the above designs, total estimated capacity to be considered in the Environmental Assessment including core thermal power levels (both rated and design⁴), the corresponding net electrical output (if applicable) for each thermal power level; • the type(s) of primary reactor coolant system and ultimate heat sink types(s) being considered; • the type(s) of cooling systems, intakes, and outflows being considered; • the type of containment structure(s) being considered. <p>NOTE: per Sections 19, 20 and 21 of the <i>General Nuclear Safety and Control Regulations</i>:</p> <p>For prescribed equipment or prescribed information to be encompassed by the licence, everything that currently exists or will be kept for the duration of the licence is described in the application. Note that 21 (1) (c) includes security-related information whether kept on site or not.</p>
3(1)(e)	the proposed measures to ensure compliance with the <i>Radiation Protection Regulations</i> and the <i>Nuclear Security Regulations</i>	Activities under a <i>Licence to Prepare Site</i> should not involve radioactive dose to either workers or the public with exception to work done with tools that would be under existing CNSC nuclear substance and device licenses. <i>Nuclear Security Regulations</i> apply to activities under a <i>Licence to Prepare Site</i> . Per <i>Nuclear Security Regulations</i> Section 2:

⁴ Rated power is defined as the power level at which the plant would operate if licensed. Design power is defined as the highest power level that would be permitted by the plant design and that is used in some safety evaluations.

General Nuclear Safety and Control Regulations (GNSCR)		
Section	Requirement	Expectations
		This Part applies in respect of: (a) category I, II and III nuclear material, and (b) a nuclear power plant.
3(1)(f)	any proposed action level for the purpose of section 6 of the <i>Radiation Protection Regulations</i>	Site specific: “Green-field” sites that are not in proximity to other nuclear facilities, and where there will be no handling of radioactive materials during site preparation activities have no need to establish Action Levels.
3(1)(g)	the proposed measures to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment or prescribed information	The following information is included in a Nuclear Security Implementation Plan submission: <ul style="list-style-type: none"> • Physical access control plans (e.g., fence type and height, types of alarms etc.); • Security organization information; • Program for control of prescribed information (e.g., security drawings); • Program for developing and implementing a site access clearance system for individuals requiring unescorted access to areas/processes where prescribed information is used or stored; • Program for security of information technology; • Security Threat Assessment studies / reports; • Security response plans, including interfaces with outside agencies (e.g., local police, OPP, RCMP); • security personnel training plan.
3(1)(h)	the proposed measures to prevent loss or illegal use, possession or removal of the nuclear substance, prescribed equipment or prescribed information	
3(1)(i)	a description and the results of any test, analysis or calculation performed to substantiate the information included in the application	Generally, all data submitted in an application for <i>Licence to Prepare Site</i> supports the site evaluation process and will be evaluated during the Environmental Assessment process.
3(1)(j)	the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activity to	The following information is submitted: <ul style="list-style-type: none"> • hazardous waste management program details specific to site preparation activities;

General Nuclear Safety and Control Regulations (GNSCR)		
Section	Requirement	Expectations
	be licensed, including waste that may be stored, managed, processed or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste	<ul style="list-style-type: none"> a statement of commitment, with project timelines, to develop Radioactive and Hazardous Waste programs with a long-term view to NPP operation, decommissioning and abandonment. Programs are developed and reviewed during early plant construction, however environmental risks from Radioactive and Hazardous Waste will be evaluated during the Environmental Assessment process)
3(1)(k)	the applicant's organizational management structure insofar as it may bear on the applicant's compliance with the Act and the regulations made under the Act, including the internal allocation of functions, responsibilities and authority	<p>The application demonstrates that there are sufficient competent resources in the Applicant's organization to ensure compliance with the NSCA and associated Regulations.</p> <p>For Site Preparation activities:</p> <p>The application should demonstrate:</p> <ul style="list-style-type: none"> the applicant's organization has demonstrated project process ownership and adequate project oversight; and the relationship between the applicant's organization and contracting companies performing site preparation activities is clearly described. <p>The following site preparation organizations are adequately described:</p> <ul style="list-style-type: none"> Project Office (site preparations project oversight and regulatory compliance); Health and Safety; Security; Environmental Assessment and Compliance Assurance; Quality Assurance and Auditing; Training (qualification of site preparation staff).

General Nuclear Safety and Control Regulations (GNSCR)		
Section	Requirement	Expectations
		<p>Planning for future licensing phases:</p> <p>The future Operating Organization is named and described for the purposes of the Environmental Assessment.</p> <p>High level descriptions of the planned formation and development of construction and operating organizations and a statement of commitment, with project timelines, to provide more organizational details as the project progresses are required.</p> <p>In addition, the primary agents or contractors for the design, construction, and operation of the nuclear power plant are identified. The principal consultants and outside service organizations (such as those providing audits of the QA program) are listed. The division of responsibility is delineated among the reactor/facility designer, architect-engineer, constructor, and operator.</p>
3(1)(l)	a description of any proposed financial guarantee relating to the activity to be licensed	The Financial Guarantee under the Licence to Prepare Site adequately addresses restoration of the site required as a result of the proposed activities should the project be abandoned.
3(1)(m)	any other information required by the Act or the regulations made under the Act for the activity to be licensed and the nuclear substance, nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence	Information may be requested by CNSC staff the Commission Secretariat and / or the Review Panel Secretariat to support the application for <i>Licence to Prepare Site</i> .
3(1)(n)	at the request of the Commission, any other information that is necessary to enable the Commission to determine	

General Nuclear Safety and Control Regulations (GNSCR)		
Section	Requirement	Expectations
	<p>whether the applicant</p> <p>(i) is qualified to carry on the activity to be licensed, or</p> <p>(ii) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.</p>	
15(a)(b)(c)	<p>Every applicant for a licence and every licensee shall notify the Commission of</p> <p>(a) the persons who have authority to act for them in their dealings with the Commission;</p> <p>(b) the names and position titles of the persons who are responsible for the management and control of the licensed activity and the nuclear substance, nuclear facility, prescribed equipment or prescribed information encompassed by the licence; and</p> <p>(c) any change in the information referred to in paragraphs (a) and (b), within 15 days after the change occurs.</p>	Self explanatory.

Expectations for Contents of an Application for <i>Licence To Prepare Site</i>		
Class I Nuclear Facilities Regulations		
Section	Requirement	Expectations
3(a)	a description of the site of the activity to be licensed, including the location of any exclusion zone and any structures within that zone	The application includes the following information (diagrams as appropriate): <ul style="list-style-type: none"> • Survey diagrams / descriptions of the land on which the site will exist (e.g., province, county / town, lot #, proximity to highways, distance from nearest town(s)); • Proximity to bodies of water and other landforms of note; • Proximity to large man-made structures (e.g., rail lines, major highways, other nearby commercial facilities); • Layout(s) of plant, large cooling structures, switchyard and support buildings within an exclusion zone.
3(b)	plans showing the location, perimeter, areas, structures and systems of the nuclear facility	
3(c)	evidence that the applicant is the owner of the site or has authority from the owner of the site to carry on the activity to be licensed	Acceptable evidence includes proof of ownership (copy of land title / deed) or a letter of permission from the owner of the land for eventual construction and operation of the facilities described per 3(b) of Class I Nuclear Facilities Regulations in the application for <i>Licence to Prepare Site</i> .
3(d)	the proposed quality assurance program for the activity to be licensed	The application includes a comprehensive submission showing quality assurance plans and program covering all activities to be performed under the Licence to Prepare a Site, including the implementation plan, a detailed scope of activities, a schedule for the activities and encompasses a demonstration that the applicant's service providers and vendors have an acceptable QA program /meet the requirements for an acceptable QA program;
3(e)	the name, form, characteristics and quantity of any hazardous substances that may be on the site while the activity to be licensed is carried on	This requirement is specific to the activities proposed to be performed under the <i>Licence to Prepare Site</i> . See Section 1 of Class I Nuclear Facilities Regulations for definition of <i>hazardous substances</i> . The effects of these substances are considered in the environmental assessment.

Expectations for Contents of an Application for <i>Licence To Prepare Site</i>		
Class I Nuclear Facilities Regulations		
Section	Requirement	Expectations
3(f)	the proposed worker health and safety policies and procedures	<p>The application contains program details such as a high level program implementation plan.</p> <p>The application demonstrates that:</p> <ul style="list-style-type: none"> • the site health and safety program is under the direct oversight of the proponent; • the program will be managed by an adequately staffed and competent health and safety organization; • the program development and implementation plan will be complete and processes, procedures and auditing can be executed if the <i>Licence to Prepare Site</i> is granted.
3(g)	the proposed environmental protection policies and procedures	<p>The application contains policy and procedure that demonstrate:</p> <ul style="list-style-type: none"> • the program is under the direct oversight of the proponent; • the program will be managed by an adequately staffed and competent organization; • processes, procedures and auditing can be executed if the <i>Licence to Prepare Site</i> is granted.
3(h)	the proposed effluent and environmental monitoring programs	<p>The proposed effluent and environmental monitoring programs for site preparation activities are to be aligned with the environmental protection program. The program demonstrates:</p> <ul style="list-style-type: none"> • the program is under the direct oversight of the proponent; • the program will be managed by an adequately staffed and competent organization; • support of mitigation strategies dispositioned in the Environmental Assessment process; • compliance with accepted quality assurance standards.

Expectations for Contents of an Application for <i>Licence To Prepare Site</i>		
Class I Nuclear Facilities Regulations		
Section	Requirement	Expectations
3(i)	<p>if the application is in respect of a nuclear facility referred to in paragraph 2(b) of the <i>Nuclear Security Regulations</i> (see below), the information required by section 3 of those Regulations;</p> <p>2 (b) a nuclear facility consisting of a nuclear reactor that may exceed 10 MW thermal power during normal operation.</p>	Self explanatory.
3(j)	<p>the proposed program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the activity to be licensed</p>	<p>The application demonstrates that:</p> <ul style="list-style-type: none"> • the program is under the direct oversight of the proponent; • the program is managed by an adequately staffed and competent organization; • the program development and implementation plan is complete and processes, procedures and auditing are being executed prior to the Commission hearing for the <i>Licence to Prepare Site</i>. <p>The program implementation plan includes:</p> <ul style="list-style-type: none"> • population to be covered by the program, • methods of consultation, and • methods of establishing and maintaining quality assurance of data. <p>Evidence and data shall be submitted showing open consultation with all representatives of the community. In addition, all comments captured (resolved and unresolved) and strategies for addressing the comments are documented.</p>

Expectations for Contents of an Application for <i>Licence To Prepare Site</i>		
Class I Nuclear Facilities Regulations		
Section	Requirement	Expectations
3(k)	the proposed plan for the decommissioning of the nuclear facility or of the site	A submission showing detailed decommissioning strategies and plans (including budgets) for all activities to be performed under the <i>Licence to Prepare Site</i> such that the site can be returned to a green or brown field state (as appropriate) in the event the project is cancelled.
4 (a)	a description of the site evaluation process and of the investigations and preparatory work that have been and will be done on the site and in the surrounding area	<p>The application needs to contain:</p> <ul style="list-style-type: none"> • a comprehensive description of the methods used to determine the suitability of the site. • a clear description of activities proposed to be completed under the <i>Licence To Prepare Site</i>, including proposed mitigation strategies to be considered in the Environmental Assessment • program implementation plans for all programs • consideration is given to site preparation activities that may have a negative affect on site characteristics or intensify the effects of natural external and human induced events evaluated during the site selection process. • a program for evaluating physical characteristics that may be discovered during site preparation activities and may differ from assumptions or research presented during the Environmental Assessment phase. • all site preparation activities and mitigation measures will conform with the outcomes of the Environmental Assessment.
4 (b)	a description of the site's susceptibility to human activity and natural phenomena, including seismic events, tornadoes and floods	These effects are considered as part of the site evaluation process and in the Environmental Assessment.

Expectations for Contents of an Application for <i>Licence To Prepare Site</i>		
Class I Nuclear Facilities Regulations		
Section	Requirement	Expectations
4 (c)	the proposed program to determine the environmental baseline characteristics of the site and the surrounding area	A program for determining environmental baseline characteristics of the site and the surrounding area is implemented for the Environmental Assessment. A connection between the Environmental Assessment baseline program and the long term environmental monitoring program is demonstrated to determine environmental effects during both site preparation activities and succeeding licensing phases.
4 (d)	the proposed quality assurance program for the design of the nuclear facility	At the time of initial application for a <i>Licence to Prepare Site</i> , the application includes the quality assurance program that was used, or that will be used for the design of each reactor type being considered.
4 (e)	the effects on the environment and the health and safety of persons that may result from the activity to be licensed, and the measures that will be taken to prevent or mitigate those effects	The effects and mitigation strategies are considered as part of the site evaluation process and are reviewed during the Environmental Assessment. Effects and mitigation strategies are required for the physical activities to be carried out under the Site Preparation licence.