Joint Review Panel

Environmental Assessment Report
SUMMARY

Darlington New Nuclear Power Plant Project

August 2011

Report Summary

The Darlington New Nuclear Power Plant Project (the Project) is a proposal by Ontario Power Generation (OPG) for the site preparation, construction, operation, decommissioning and abandonment of up to four new nuclear reactors at its existing Darlington Nuclear site in the Municipality of Clarington, Ontario. The Project is expected to generate up to 4,800 megawatts of electricity for delivery to the Ontario grid with an initial need of 2,000 megawatts.

The Project includes the preparation of the site; construction of up to four new reactors and associated facilities; the operation and maintenance of the reactors and related facilities for approximately 60 years, including the management of conventional and radioactive waste; and the decommissioning and eventual abandonment of the nuclear reactors and associated facilities.

The Minister of the Environment and President of the Canadian Nuclear Safety Commission determined that a review of the Project by a joint review panel would ensure that the Project was subject to an effective and efficient environmental assessment and regulatory process. On October 30, 2009, the Minister and the President appointed a three-member Joint Review Panel (Panel) to consider the environmental assessment and the Application for a Licence to Prepare Site for the proposed Project.

The mandate of the Panel was to assess the environmental effects of the Project and to determine whether it is likely to cause significant adverse environmental effects taking into account the implementation of mitigation measures that are technically and economically feasible. The review of the Project was framed by the *Canadian Environmental Assessment Act* and the *Nuclear Safety and Control Act*. The Panel incorporated other federal, provincial and municipal policies and requirements, industry standards and best practices in its analysis and recommendations.

The components of the review included a public review and comment period, two technical review sessions, requests to OPG for additional information deemed necessary by the Panel, three open house information sessions at public venues in the Project area, submissions from federal, provincial and municipal governments, Aboriginal groups and other interested parties, and a 17-day public hearing in the Municipality of Clarington.

The Panel concludes that the Project is not likely to cause significant adverse environmental effects, provided the mitigation measures proposed and commitments made by OPG during the review, and the Panel's recommendations are implemented.

The Panel directs recommendations to responsible authorities and federal authorities, as well as to the Government of Canada, the Government of Ontario, the Municipality of Clarington and OPG.

Following is a consolidation of the Panel's recommendations. Each recommendation is numbered chronologically as it appears in the text of the main report. The report section reference is provided for each recommendation.

The Canadian Nuclear Safety Commission

Prior to Site Preparation

Recommendation # 2 (Section 4.5):
The Panel recommends that prior to site preparation, the Canadian Nuclear Safety Commission require OPG to conduct a comprehensive soils characterization program. In particular, the potentially impacted soils in the areas OPG identifies as the spoils disposal area, cement plant area and asphalt storage area must be sampled to identify the nature and extent of potential contamination.

Recommendation # 6 (Section 4.6):
The Panel recommends that prior to site preparation, the Canadian Nuclear Safety Commission require OPG to update its preliminary decommissioning plan for site preparation in accordance with the requirements of Canadian Standards Association Standard N294-09. The OPG preliminary decommissioning plan for site preparation must incorporate the rehabilitation of the site to reflect

the existing biodiversity in the event that the Project does not proceed beyond the site preparation phase.

OPG shall prepare a detailed preliminary decommissioning plan once a reactor technology is chosen, to be updated as required by the Canadian Nuclear Safety Commission.

Recommendation # 7 (Section 4.6):
The Panel recommends that prior to site preparation, the Canadian Nuclear Safety Commission require that OPG establish a decommissioning financial guarantee to be reviewed as required by the Canadian Nuclear Safety Commission. Regarding the decommissioning financial guarantee for the site preparation stage, the Panel recommends that this financial guarantee contain sufficient funds for the rehabilitation of the site in the event the Project does not proceed beyond the site preparation stage.

Recommendation # 8 (Section 5.1):
The Panel recommends that prior to site preparation, the Canadian Nuclear Safety Commission require OPG to develop a follow-up and adaptive management program for air contaminants such as Acrolein, NO_2, SO_2, SPM, $PM_{2.5}$ and PM_{10}, to the satisfaction of the Canadian Nuclear Safety Commission, Health Canada and Environment Canada. Additionally, the Canadian Nuclear Safety Commission must require OPG to develop an action plan acceptable to Health Canada for days when there are air quality or smog alerts.

Recommendation # 9 (Section 5.1):
The Panel recommends that the Canadian Nuclear Safety Commission, in collaboration with Health Canada, require OPG to develop and implement a detailed acoustic assessment for all scenarios evaluated. The predictions must be shared with potentially affected members of the public. The OPG Nuisance Effects Management Plan must include noise monitoring, a noise complaint response mechanism and best practices for activities that may occur outside of municipal noise curfew hours to reduce annoyance that the public may experience.

Recommendation # 10 (Section 5.2):
The Panel recommends that the Canadian Nuclear Safety Commission require OPG to undertake a detailed site geotechnical investigation prior to commencing site preparation activities. The geologic elements of this investigation should include, but not be limited to:

- collecting site-wide information on soil physical properties;
- determining the mechanical and dynamic properties of overburden material across the site;
- mapping of geological structures to improve the understanding of the site geological structure model;
- confirming the lack of karstic features in the local bedrock at the site; and
- confirming the conclusions reached concerning the liquefaction potential in underlying granular materials.

Recommendation # 12 (Section 5.3):
The Panel recommends that before in-water works are initiated, the Canadian Nuclear Safety Commission require OPG to collect water and sediment quality data for any future embayment area that may be formed as a consequence of shoreline modifications in the vicinity of the outlet of Darlington Creek. This data should serve as the reference information for the proponent's post-construction commitment to conduct water and sediment quality monitoring of the embayment area.

Recommendation # 13 (Section 5.3):
The Panel recommends that the Canadian Nuclear Safety Commission require OPG to collect and assess water quality data for a comprehensive number of shoreline and off-shore locations in the site study area prior to commencing in-water works. This data should be used to establish a reference for follow-up monitoring.

Recommendation # 20 (Section 5.5):
The Panel recommends that the Canadian Nuclear Safety Commission require OPG to perform a thorough evaluation of site layout opportunities before site preparation activities begin, in order to minimize the overall effects on the terrestrial and aquatic environments and maximize the opportunity for quality terrestrial habitat rehabilitation.

Recommendation #22 (Section 5.5):
The Panel recommends that the Canadian Nuclear Safety Commission require OPG to develop a follow-up program for insects, amphibians and reptiles, and mammal species

and communities to ensure that proposed mitigation measures are effective.

Recommendation # 25 (Section 5.5):
The Panel recommends that the Canadian Nuclear Safety Commission require OPG to conduct more sampling to confirm the presence of Least Bittern before site preparation activities begin. The Panel recommends that the Canadian Nuclear Safety Commission require OPG to develop and implement a management plan for the species at risk that are known to occur on site. The plan should consider the resilience of some of the species and the possibility of off-site compensation.

Recommendation # 38 (Section 5.9):
The Panel recommends that the Canadian Nuclear Safety Commission require that the geotechnical and seismic hazard elements of the detailed site geotechnical investigation to be performed by OPG include, but not be limited to:

Prior to site preparation:
- demonstration that there are no undesirable subsurface conditions at the Project site. The overall site liquefaction potential shall be assessed with the site investigation data; and
- confirmation of the absence of paleoseismologic features at the site and, if present, further assessment to reduce the overall uncertainty in the seismic hazard assessment during the design of the Project must be conducted.

During site preparation and/or prior to construction:
- verification and confirmation of the absence of surface faulting in the overburden and bedrock at the site.

Prior to construction:
- verification of the stability of the cut slopes and dyke slopes under both static and dynamic loads with site/Project-specific data during the design of the cut slopes and dykes or before their construction;
- assessment of potential liquefaction of the northeast waste stockpile by using the data obtained from the pile itself upon completion of site preparation;
- measurement of the shear strength of the overburden materials and the dynamic properties of both overburden and sedimentary rocks to confirm the site conditions and to perform soil-structure interaction analysis if necessary;
- assessment of the potential settlement in the quaternary deposits due to the groundwater drawdown caused by future St. Marys Cement quarry activities; and
- assessment of the effect of the potential settlement on buried infrastructures in the deposits during the design of these infrastructures.

Prior to operation:
- development and implementation of a monitoring program for the Phase 4 St. Marys Cement blasting operations to confirm that the maximum peak ground velocity at the boundary between the Darlington and St. Marys Cement properties is below the proposed limit of three millimetres per second (mm/s).

Recommendation # 41 (Section 6.1):
The Panel recommends that prior to site preparation, the Canadian Nuclear Safety Commission coordinate discussions with OPG and key stakeholders on the effects of the Project on housing supply and demand, community recreational facilities and programs, services and infrastructure as well as additional measures to help deal with the pressures on these community assets.

Recommendation # 47 (Section 6.7):
The Panel recommends that prior to site preparation, the Canadian Nuclear Safety Commission ensure the OPG Traffic Management Plan addresses the following:
- contingency plans to address the possibility that the assumed road improvements do not occur;
- consideration of the effect of truck traffic associated with excavated material disposal on traffic operations and safety;
- further analysis of queuing potential onto Highway 401; and
- consideration of a wider range of mitigation measures, such as transportation-demand management, transit service provisions and geometric improvements at the Highway 401/Waverley Road interchange.

Recommendation # 48 (Section 6.7):
In consideration of public safety, the Panel recommends that prior to site preparation, the Canadian Nuclear Safety Commission coordinate

a committee of federal, provincial and municipal transport authorities to review the need for road development and modifications.

During Site Preparation

Recommendation #5 (Section 4.6):
To avoid any unnecessary environmental damage to the bluff at Raby Head and fish habitat, the Panel recommends that no bluff removal or lake infill occur during the site preparation stage, unless a reactor technology has been selected and there is certainty that the Project will proceed.

Recommendation # 19 (Section 5.4):
The Panel recommends that the Canadian Nuclear Safety Commission require OPG to expand the scope of the groundwater monitoring program to monitor transitions in groundwater flows that may arise as a consequence of grade changes during the site preparation and construction phases of the Project. The design of the grade changes should guide the determination of the required monitoring locations, frequency of monitoring and the required duration of the program for the period of transition to stable conditions following the completion of construction and the initial period of operation.

Recommendation # 21 (Section 5.5):
The Panel recommends that the Canadian Nuclear Safety Commission require OPG to compensate for the loss of ponds, like-for-like, preferably in the site study area. The Panel also recommends that the Canadian Nuclear Safety Commission require OPG to use best management practices to prevent or minimize the potential runoff of sediment and other contaminants into wildlife habitat associated with Coot's Pond during site preparation and construction phases.

Prior to Construction

Recommendation # 1 (Section 4.5):
The Panel understands that prior to construction, the Canadian Nuclear Safety Commission will determine whether this environmental assessment is applicable to the reactor technology selected by the Government of Ontario for the Project. Nevertheless, if the selected reactor technology is fundamentally different from the specific reactor technologies bounded by the plant parameter envelope, the Panel recommends that a new environmental assessment be conducted.

Recommendation # 3 (Section 4.5):
The Panel recommends that the Canadian Nuclear Safety Commission require that as part of the Application for a Licence to Construct a reactor, OPG must undertake a formal quantitative cost-benefit analysis for cooling tower and once-through condenser cooling water systems, applying the principle of best available technology economically achievable. This analysis must take into account the fact that lake infill should not go beyond the two-metre depth contour and should include cooling tower plume abatement technology.

Recommendation # 14 (Section 5.3):
The Panel recommends that following the selection of a reactor technology for the Project, the Canadian Nuclear Safety Commission require OPG to conduct a detailed assessment of predicted effluent releases from the Project. The assessment should include but not be limited to effluent quantity, concentration, points of release and a description of effluent treatment, including demonstration that the chosen option has been designed to achieve best available treatment technology and techniques economically achievable. The Canadian Nuclear Safety Commission shall also require OPG to conduct a risk assessment on the proposed residual releases to determine whether additional mitigation measures may be necessary.

Recommendation # 16 (Section 5.3):
The Panel recommends that prior to the start of construction, the Canadian Nuclear Safety Commission require the proponent to establish toxicity testing criteria and provide the test methodology and test frequency that will be used to confirm that stormwater discharges from the new nuclear site comply with requirements in the *Fisheries Act*.

Recommendation # 17 (Section 5.4):
The Panel recommends that the Canadian Nuclear Safety Commission require OPG to provide an assessment of the ingress and transport of contaminants in groundwater on site during successive phases of the Project as part of the Application for a Licence to Construct. This assessment shall include consideration of the impact of wet and dry deposition of all contaminants of potential concern and

radiological constituents, especially tritium, in gaseous emissions on groundwater quality. OPG shall conduct enhanced groundwater and contaminant transport modelling for the assessment and expand the modelling to cover the effects of future dewatering and expansion activities at the St. Marys Cement quarry on the Project.

Recommendation # 26 (Section 5.5):
The Panel recommends that the Canadian Nuclear Safety Commission require OPG to develop a comprehensive assessment of hazardous substance releases and the required management practices for hazardous chemicals on site, in accordance with the *Canadian Environmental Protection Act*, once a reactor technology has been chosen.

Recommendation # 27 (Section 5.6):
The Panel recommends that prior to any destruction of the Bank Swallow habitat, the Canadian Nuclear Safety Commission require OPG to implement all of its proposed Bank Swallow mitigation options, including:

- the acquisition of off-site nesting habitat;
- the construction of artificial Bank Swallow nest habitat with the capacity to maintain a population which is at least equal to the number of breeding pairs currently supported by the bluff and as close to the original bluff site as possible; and
- the implementation of an adaptive management approach in the Bank Swallow mitigation plan, with the inclusion of a threshold of loss to be established in consultation with all stakeholders before any habitat destruction takes place.

Recommendation # 35 (Section 5.7):
In the event that a once-through condenser cooling system is chosen for the Project, the Panel recommends that prior to operation, the Canadian Nuclear Safety Commission require OPG to include the following in the surface water risk assessment:

- the surface combined thermal and contaminant plume; and
- the physical displacement effect of altered lake currents as a hazardous pulse exposure to fish species whose larvae passively drift through the area, such as lake herring, lake whitefish, emerald shiner and yellow perch.

If the risk assessment result predicts a potential hazard then the Canadian Nuclear Safety Commission shall convene a follow-up monitoring scoping workshop with Environment Canada, Fisheries and Oceans Canada and any other relevant authorities to develop an action plan.

Recommendation # 37 (Section 5.7):
In the event that a once-through condenser cooling system is chosen for the Project, the Panel recommends that prior to construction, the Canadian Nuclear Safety Commission require OPG to determine the total area of permanent aquatic effects from the following, to properly scale mitigation and scope follow-up monitoring:

- the thermal plume + 2^{o} C above ambient temperature;
- the mixing zone and surface plume contaminants;
- physical displacements from altered lake currents; and
- infill and construction losses and modifications.

Recommendation # 39 (Section 5.9):
The Panel recommends that prior to construction, the Canadian Nuclear Safety Commission require OPG to prepare a contingency plan for the construction, operation and decommissioning Project stages to account for uncertainties associated with flooding and other extreme weather hazards.

OPG shall conduct localized climate change modelling to confirm its conclusion of a low impact of climate change. A margin/bound of changes to key parameters, such as intensity of extreme weather events, needs to be established to the satisfaction of the Canadian Nuclear Safety Commission. These parameters can be incorporated into hydrological designs leading up to an application to construct a reactor, as well as measures for flood protection.

OPG must also conduct a drought analysis and incorporate any additional required mitigation/design modifications, to the satisfaction of the Canadian Nuclear Safety Commission, as part of a Licence to Construct a reactor.

Recommendation # 40 (Section 5.9):
The Panel recommends that prior to construction, the Canadian Nuclear Safety Commission require OPG to:

- establish an adaptive management program for algal hazard to the Project cooling water

system intake that includes the setup of thresholds for further actions; and
- factor the algal hazard assessment into a more detailed biological evaluation of moving the intake and diffuser deeper offshore as part of the detailed siting studies and the cost-benefit analysis of the cooling system.

Recommendation # 52 (Section 6.8):
The Panel recommends that prior to construction, the Canadian Nuclear Safety Commission require OPG to make provisions for on-site storage of all used fuel for the duration of the Project, in the event that a suitable off-site solution for the long-term management for used fuel waste is not found.

Recommendation # 53 (Section 6.8):
The Panel recommends that prior to construction, the Canadian Nuclear Safety Commission require OPG to make provisions for on-site storage of all of low and intermediate-level radioactive waste for the duration of the Project, in the event that a suitable off-site solution for the long-term management for this waste is not approved.

Recommendation # 57 (Section 7.2):
The Panel recommends that prior to construction, the Canadian Nuclear Safety Commission require OPG to undertake an assessment of the off-site effects of a severe accident. The assessment should determine if the off-site health and environmental effects considered in this environmental assessment bound the effects that could arise in the case of the selected reactor technology.

Recommendation # 58 (Section 7.2):
The Panel recommends that prior to construction, the Canadian Nuclear Safety Commission confirm that dose acceptance criteria specified in RD-337 at the reactor site boundary—in the cases of design basis accidents for the Project's selected reactor technology—will be met.

Recommendation # 63 (Section 8.1):
The Panel recommends that prior to construction, the Canadian Nuclear Safety Commission require OPG to evaluate the cumulative effect of a common-cause severe accident involving all of the nuclear reactors in the site study area to determine if further emergency planning measures are required.

During Operation

Recommendation # 15 (Section 5.3):
The Panel recommends that following the start of operation of the reactors, the Canadian Nuclear Safety Commission require OPG to conduct monitoring of ambient water and sediment quality in the receiving waters to ensure that effects from effluent discharges are consistent with predictions made in the environmental impact statement and with those made during the detailed design phase.

Recommendation # 18 (Section 5.4):
The Panel recommends that based on the groundwater and contaminant transport modelling results, the Canadian Nuclear Safety Commission require OPG to expand the Radiological Environmental Monitoring Program. This program shall include relevant residential and private groundwater well quality data in the local study area that are not captured by the current program, especially where the modelling results identify potential critical groups based on current or future potential use of groundwater.

Recommendation # 36 (Section 5.7):
In the event that a once-through condenser cooling system is chosen for the Project the Panel recommends that during operation, the Canadian Nuclear Safety Commission require OPG to undertake adult fish monitoring of large-bodied and small-bodied fish to confirm the effectiveness of mitigation measures and verify the predictions of no adverse thermal and physical diffuser jet effects.

Recommendation # 54 (Section 7.1):
The Panel recommends that during operation, the Canadian Nuclear Safety Commission require OPG to implement measures to manage releases from the Project to avoid tritium in drinking water levels exceeding a running annual average of 20 Becquerels per litre at drinking water supply plants in the regional study area.

Recommendation # 61 (Section 8.1):
The Panel recommends that during operation, the Canadian Nuclear Safety Commission require OPG to monitor aquatic habitat and biota for potential cumulative effects from the thermal loading and contaminant plume of the discharge structures of the existing Darlington Nuclear Generating Station and the Project.

Over the Life of the Project

Recommendation # 4 (Section 4.6):
The Panel recommends that the Canadian Nuclear Safety Commission exercise regulatory oversight to ensure that OPG complies with all municipal and provincial requirements and standards over the life of the Project. This is of particular importance because the conclusions of the Panel are based on the assumption that OPG will follow applicable laws and regulations at all jurisdictional levels.

Recommendation # 11 (Section 5.2):
The Panel recommends that the Canadian Nuclear Safety Commission require OPG to develop and implement a follow-up program for soil quality during all stages of the Project.

Recommendation # 43 (Section 6.2):
The Panel recommends that the Canadian Nuclear Safety Commission engage appropriate stakeholders, including OPG, Emergency Management Ontario, municipal governments and the Government of Ontario to develop a policy for land use around nuclear generating stations.

Recommendation # 56 (Section 7.1):
The Panel recommends that over the life of the Project, the Canadian Nuclear Safety Commission require OPG to conduct ambient air monitoring in the local study area on an ongoing basis to ensure that air quality remains at levels that are not likely to cause adverse effects to human health.

Fisheries and Oceans Canada

Prior to Construction

Recommendation # 30 (Section 5.7):
In the event that a once-through condenser cooling system is chosen for the Project, the Panel recommends that prior to the construction of in-water structures, Fisheries and Oceans Canada require OPG to conduct:

- additional impingement sampling at the existing Darlington Nuclear Generating Station to verify the 2007 results and deal with inter-year fish abundance variability and sample design inadequacies; and
- additional entrainment sampling at the existing Darlington Nuclear Generating Station to better establish the current conditions. The program should be designed to guard against a detection limit bias by including in the analysis of entrainment losses those fish species whose larvae and eggs are captured in larval tow surveys for the seasonal period of the year in which they occur. A statistical optimization analysis will be needed to determine if there is a cost-effective entrainment survey design for round whitefish larvae.

Recommendation # 32 (Section 5.7):
In the event that a once-through condenser cooling system is chosen for the Project, the Panel recommends that Fisheries and Oceans Canada require OPG to mitigate the risk of adverse effects from operation, including impingement, entrainment and thermal excursions and plumes, by locating the system intake and diffuser structures in water beyond the nearshore habitat zone. Furthermore, OPG must evaluate other mitigative technologies for the system intake, such as live fish return systems and acoustic deterrents.

During Construction

Recommendation # 31 (Section 5.7):
Irrespective of the condenser cooling system chosen for the Project, the Panel recommends that Fisheries and Oceans Canada not permit OPG to infill beyond the two-metre depth contour in Lake Ontario.

Over the Life of the Project

Recommendation # 28 (Section 5.7):
The Panel recommends that Fisheries and Oceans Canada require OPG to continue conducting adult fish community surveys in the site study area and reference locations on an ongoing basis. These surveys shall be used to confirm that the results of 2009 gillnetting and 1998 shoreline electrofishing reported by OPG, and the additional data collected in 2010 and 2011, are representative of existing conditions, taking into account natural year-to-year variability.

Specific attention should be paid to baseline gillnetting monitoring in spring to verify the findings on fish spatial distribution and relatively high native fish species abundance in the embayment area, such as white sucker and round whitefish. The shoreline electrofishing habitat use study is needed to establish the contemporary baseline for later use to test for effects of lake infill armouring, if employed, and the effectiveness of mitigation.

Recommendation # 29 (Section 5.7):
The Panel recommends that Fisheries and Oceans Canada require OPG to continue the research element of the proposed Round Whitefish Action Plan for the specific purpose of better defining the baseline condition, including the population structure, genome and geographic distribution of the round whitefish population as a basis from which to develop testable predictions of effects, including cumulative effects.

Recommendation # 33 (Section 5.7):
The Panel recommends that Fisheries and Oceans Canada require OPG to conduct an impingement and entrainment follow-up program at the existing Darlington Nuclear Generating Station and the Project site to confirm the prediction of adverse effects, including cumulative effects, and the effectiveness of mitigation. For future entrainment sampling for round whitefish, a statistical probability analysis will be needed to determine if unbiased and precise sample results can be produced.

Transport Canada

Prior to Construction

Recommendation # 49 (Section 6.7):
The Panel recommends that prior to construction, Transport Canada ensure that OPG undertake additional quantitative analysis, including collision frequencies and rail crossing exposure indices, and monitor the potential effects and need for mitigation associated with the Project.

Recommendation # 50 (Section 6.7):
The Panel recommends that prior to construction, Transport Canada require OPG to conduct a risk assessment, jointly with Canadian National Railway, that includes:

- an assessment of the risks associated with a derailment or other rail incident that could affect the Project;
- an analysis of the risks associated with a security threat, such as a bomb being placed on a train running on the tracks that bisect the Project;
- a comparative evaluation of the effectiveness of various mitigation measures or combination of measures (e.g., blast wall, retaining wall, recessed tracks, berm and railway speed restrictions within the vicinity of the site);
- a determination of the design criteria necessary to ensure the effectiveness of these measures (e.g., the appropriate height, strength, material and design of a blast wall); and
- a critical analysis to confirm that these measures, when properly designed and implemented, would be sufficient to provide protection to the Project site in the event of a derailment at full speed or other adverse event.

Recommendation # 51 (Section 6.7):
In the event that a once-through condenser cooling system is chosen for the Project, the Panel recommends that prior to construction, Transport Canada work with OPG to develop a follow-up program to verify the accuracy of the prediction of no significant adverse effects to boating safety from the establishment of an increased prohibitive zone. OPG must also develop an adaptive management program, if required, to mitigate potential effects to small watercraft.

Environment Canada

Prior to Site Preparation

Recommendation # 62 (Section 8.1):
The Panel recommends that prior to site preparation, Environment Canada evaluate the need for additional air quality monitoring stations in the local study area to monitor cumulative effects on air quality.

During Site Preparation

Recommendation # 24 (Section 5.5):
The Panel recommends that during the site preparation stage, Environment Canada shall ensure that OPG not undertake habitat destruction or disruption between the period of May 1 and July 31 of any year to minimize effects to breeding migratory birds.

Prior to Construction

Recommendation # 34 (Section 5.7):
In the event that a once-through condenser cooling system is chosen for the Project, the Panel recommends that prior to construction, Environment Canada ensure that enhanced resolution thermal plume modelling is conducted by OPG, taking into account possible future climate change effects. Fisheries and Oceans Canada shall ensure that the results of the modelling are incorporated into the design of the outfall diffuser and the evaluation of alternative locations for the placement of the intake and the diffuser of the proposed condenser cooling water system.

During Operation

Recommendation # 23 (Section 5.5):
The Panel recommends that Environment Canada collaborate with OPG to develop and implement a follow-up program to confirm the effectiveness of OPG's proposed mitigation measures for bird communities should natural draft cooling towers be chosen for the condenser cooling system.

Health Canada

Over the Life of the Project

Recommendation # 55 (Section 7.1):
The Panel recommends that Health Canada and the Canadian Nuclear Safety Commission continue to participate in international studies seeking to identify long-term health effects of low-level radiation exposures, and to identify if there is a need for revision of limits specified in the Radiation Protection Regulations.

The Canadian Environmental Assessment Agency

General

Recommendation # 64 (Section 8.1):
The Panel recommends that the Canadian Environmental Assessment Agency revise the Canadian Environmental Assessment Agency Cumulative Effects Practitioner's Guide to specifically include a consideration of accident and malfunction scenarios.

The Government of Canada

Prior to Construction

Recommendation # 60 (Section 7.3):
The Panel recommends that prior to construction, the Government of Canada review the adequacy of the provisions for nuclear liability insurance. This review must include information from OPG and the Region of Durham regarding the likely economic effects of a severe accident at the Darlington Nuclear site where there is a requirement for relocation, restriction of use and remediation of a sector of the regional study area.

Recommendation # 66 (Section 8.5):
The Panel recommends that the Government of Canada update the *Nuclear Liability and Compensation Act* or its equivalent to reflect the consequences of a nuclear accident. The revisions must address damage from any ionizing radiation and from any initiating event and should be aligned with the polluter pays principle. The revised *Nuclear Liability and Compensation Act*, or its equivalent, must be in force before the Project can proceed to the construction phase.

Over the Life of the Project

Recommendation # 65 (Section 8.5):
The Panel recommends that the Government of Canada make it a priority to invest in developing solutions for long-term management of used nuclear fuel, including storage, disposal, re-processing and re-use.

General

Recommendation # 67 (Section 8.5):
The Panel recommends that the Government of Canada provide clear and practical direction on the application of sustainability assessment in environmental assessments for future nuclear projects.

The Government of Ontario

Over the Life of the Project

Recommendation # 44 (Section 6.2):
The Panel recommends that the Government of Ontario take appropriate measures to prevent sensitive and residential development within three kilometres of the site boundary.

Recommendation # 46 (Section 6.3):
Given that a severe accident may have consequences beyond the three and 10-kilometre zones evaluated by OPG, the Panel recommends that the Government of Ontario, on an ongoing basis, review the emergency planning zones and the emergency preparedness and response measures, as defined in the Provincial Nuclear Emergency Response Plan (PNERP), to protect human health and safety.

The Municipality of Clarington

Over the Life of the Project

Recommendation # 45 (Section 6.2):
The Panel recommends that the Municipality of Clarington prevent, for the lifetime of the nuclear facility, the establishment of sensitive public facilities such as school, hospitals and residences for vulnerable clienteles within the three kilometre zone around the site boundary.

Recommendation # 59 (Section 7.3):
The Panel recommends that the Municipality of Clarington manage development in the vicinity of the Project site to ensure that there is no deterioration in the capacity to evacuate members of the public for the protection of human health and safety.

Ontario Power Generation

Over the Life of the Project

Recommendation # 42 (Section 6.1):
The Panel recommends that on an ongoing basis, OPG pursue its strategy to ensure that Aboriginal students can benefit from the permanent job opportunities that will be available during the lifetime of the Project. In this regard, OPG should collaborate with various secondary and post-secondary education institutions as well as Aboriginal groups to ensure that such programs would be successful.