ENVIRONMENTAL ASSESSMENT FOR OPG'S DEEP GEOLOGIC REPOSITORY FOR LOW AND INTERMEDIATE LEVEL WASTE

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ABSTRACT

The environmental assessment process for the Deep Geologic Repository (DGR) Project was initiated very early in the planning stages. Feasibility studies were initiated in 2003, after Ontario Power Generation (OPG) and the Municipality of Kincardine signed a Memorandum of Understanding agreeing to assess options for long-term management of low and intermediate level waste (L&ILW) options at the Bruce nuclear site. The location of the DGR, in the Municipality of Kincardine, is based on a willing and informed host community. The preferred approach, the DGR at the Bruce nuclear site, was advanced based on results of feasibility studies which looked at a number of options for long-term management of L&ILW and support from the local community and their elected representatives.

The federal environmental assessment of the project was initiated following the signing of a Host Community Agreement and completion of a telephone poll, the results of which indicated that the majority of Municipality of Kincardine residents support the project. The environmental assessment began in 2006 as a comprehensive study and was ultimately referred to a joint review panel process in 2009.

The environmental assessment considers the potential near-term effects of the construction and operations of the proposed project. Because of the nature of the project, the assessment of effects also considers long-term effects extending out to the million year time-frame, including effects of climate change, glaciations and seismic activity.

1. INTRODUCTION

For over 35 years, the low and intermediate level waste (L&ILW) produced as a result of the operation of OPG-owned nuclear reactors has been stored centrally at OPG's Western Waste Management Facility (WWMF) on the Bruce nuclear site near Tiverton, Ontario. Although current storage practices are safe and could be continued safely for many decades, OPG's long-standing plan is to manage these wastes in a permanent long-term management facility. In 2001, the Municipality of Kincardine approached OPG seeking to jointly assess the feasibility of a long-term management facility for low and intermediate level waste (L&ILW). The work plan included an Independent Assessment Study of options for the long-term management of low-level waste (LLW), with the existing operation serving as the base case for purposes of

comparison. Although the study did not explicitly include the consideration of intermediate-level waste (ILW), it did consider whether or not each of the options could manage some or all of the ILW. The Independent Assessment Study evaluated the geotechnical feasibility, safety, potential environmental effects, and potential social and economic effects of several options. The options considered were enhanced processing, treatment and long-term storage; covered above-ground vaults; and a deep geologic repository (referred to in the Independent Assessment Study as deep rock vault), as well as the status quo option of continuation of L&ILW management at the WWMF.

2. REGULATORY FRAMEWORK

Following completion of the Independent Assessment Study in 2003 and 2004, in December 2005 OPG submitted a Project Description for a Deep Geologic Repository at the Bruce nuclear site, adjacent to the WWMF (Figure 1). An environmental assessment of the Project is required under the provisions of the Canadian Environmental Assessment Act because a licence is required from the Canadian Nuclear Safety Commission (CNSC) to allow the Project to proceed. The Ontario Ministry of the Environment determined that an environmental assessment under the Ontario Environmental Assessment Act was not required. A public hearing in October 2006, on the draft guidelines for a Comprehensive Study environmental assessment, lead to the referral of the Project to a joint review panel process for the environmental assessment and site preparation and construction licence. The Project was referred to a joint review panel given the public concerns, the potential for adverse effects, the first-of-a-kind nature of the project and concerns regarding the comprehensive study's ability to address the questions raised. The Joint Review Panel (JRP), when appointed would include two members proposed by the CNSC, as well as one member proposed by the Minister of Environment. Those members not currently commission members of the CNSC would be appointed as temporary members of the Commission.

The JRP's mandate is to conduct the Review in accordance with the Terms of Reference [1] in a manner that:

- Discharges the requirements set out in the Canadian Environmental Assessment Act;
- Permits it to obtain the information and evidence required for it to consider the Licence Application under the Nuclear Safety and Control Act; and,
- Permits it to obtain information and evidence about the adverse effects the project may have on potential or established Aboriginal rights, title or treaty rights as identified to the JRP by the Saugeen Ojibway Nation (SON) and enables it to bring any such information and evidence to the attention of the Minister of the Environment and the Responsible Authorities for the Project in support of consultation between the Crown and the SON.

The location of the DGR Project, in proximity to Lake Huron, indicated the need to consider the potential for transboundary effects in the EIS.

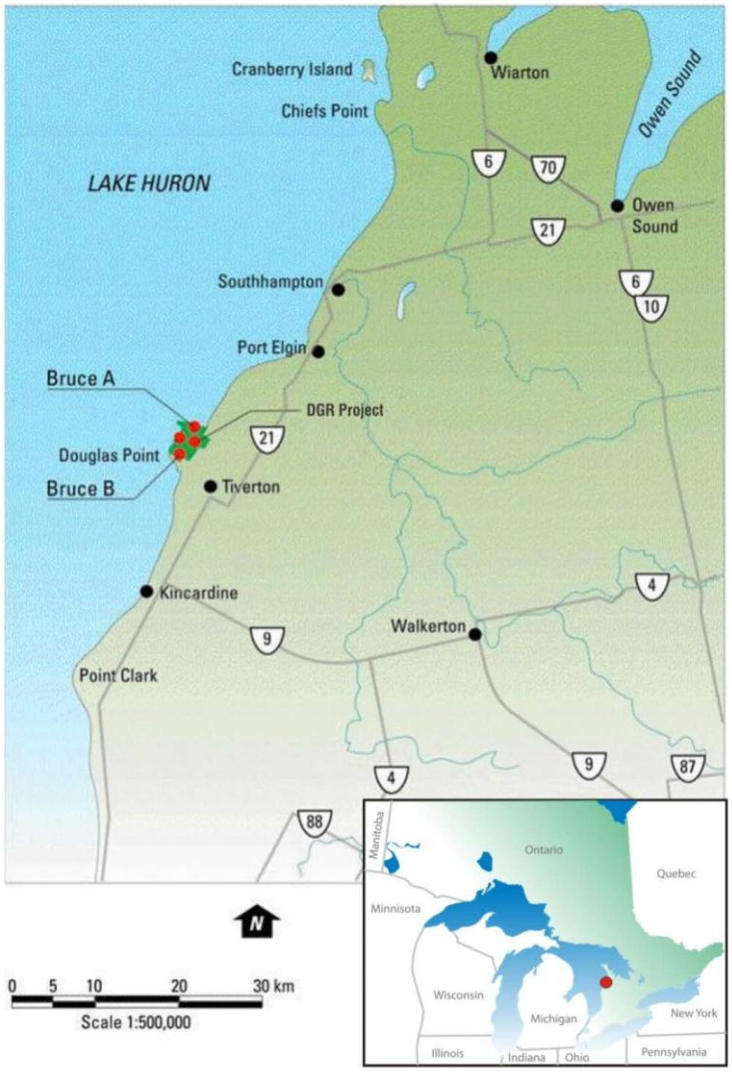

Figure 1. Location of DGR Site

3. SCOPING OF THE ENVIRONMENTAL ASSESMENT

Although the project was referred to a joint review panel process, the draft guidelines for the environmental impact statement for the DGR Project were prepared and issued for public review by the CNSC, the only Responsible Authority for the Project, and the Canadian Environmental Assessment Agency.

As with any environmental assessment, the Guidelines [2] describe the basis to conduct of the environmental assessment and focus the environmental assessment on relevant issues and concerns. The guidelines require the proponent to consider the works and activities associated with site preparation and construction, operations, decommissioning and abandonment and long-term performance. The EIS Guidelines require that the environmental assessment describe possible alternatives and provide justification for the selection of the DGR Project as the preferred alternative.

The DGR Project is a long-term management facility located adjacent to an existing licensed L&ILW processing and interim storage facility (i.e., the WWMF). LILW will continue to be

transported to and processed at the WWMF prior to being emplaced in the DGR. As a result, transportation of the waste is not included the scope of the environmental assessment.

4. ENVIRONMENTAL ASSESSMENT APPROACH

4.1 Need and Rationale

The basic need for the DGR Project derives from the fact that L&ILW consists of materials that can remain hazardous for hundreds, and in some cases, many thousands of years due to the presence of long-lived radionuclides. The need for the DGR Project is further demonstrated by OPG's regulatory responsibility, a host community interested in implementing a long-term management solution now, and an existing and forecasted waste inventory requiring management.

The study of alternatives to the DGR Project was conducted as part of the Independent Assessment Study [3] from 2003 to 2004. This study compared the technical, economic and environmental feasibility of four alternatives: status quo (continuing the existing operation), enhanced processing and storage, surface concrete vaults and deep rock vault (DGR). The Independent Assessment Study found that each of the four long-term management options is technically feasible and may be safely constructed at the WWMF. There is considerable international experience using each of the options for the long-term management of L&ILW. Each option is capable of meeting stringent Canadian and international safety standards with a considerable margin for LLW. The ability of the repository concepts to accept ILW was assessed qualitatively. The deep rock vault option is most preferred considering technical/safety factors and environmental/social factors.

Municipal support was shown for the deep rock vault (now referred to as a deep geologic repository) as the preferred course of study with regards to management of L&ILW, since it provides a greater margin of safety, it is consistent with international best practice and it provides a permanent storage method for the waste, and if necessary, will do so in the absence of institutional controls.

4.2 Assessment Approach

The approach used for assessing effects of the DGR Project supports the philosophy of EA as a planning and decision-making process. The assessment characterizes and assesses the potential effects of the DGR Project in a thorough, traceable, step-wise manner. It then proposes measures to mitigate adverse effects and predicts whether there will be likely significant adverse environmental effects after mitigation measures are implemented.

The EA focuses on the components that have the greatest relevance in terms of value and sensitivity, and which are likely to be affected by the DGR Project. To achieve this focus, specific Valued Ecosystem Components (VECs) are identified. A VEC (e.g., white-tailed deer) is considered to be the 'receptor' for both project-specific effects and cumulative effects. Each VEC can be represented by a number of 'indicators', which are features of the VEC that may be affected by the DGR Project (e.g., habitat use). Each indicator requires specific 'measures' that can be quantified and assessed (e.g., changes in habitat availability and suitability). In essence, the nature and magnitude of the potential effects of the DGR Project on these VECs have been studied and their significance determined. The selected VECs are considered to have legal, scientific, ecological, cultural, social, economic or aesthetic value. Importance may be

determined on the basis of cultural values or scientific concerns. From an ecological perspective, VECs can represent features or elements of the natural environment (e.g., a local wetland or stream) considered to be culturally or scientifically important. For the DGR EA, 43 VECs were identified, including four ecological multi-feature VECs which incorporate information from several environmental components.

The assessment was undertaken in the context of four timeframes (Figure 2). Following environmental assessment and licensing approval, construction is expected to last approximately five to seven years, followed by an operations phase. All construction activities will be completed prior to commencement of operations. The operations phase would include some 35 to 40 years when waste will be emplaced, followed by a period of post-emplacement monitoring to confirm the facility's performance. The decommissioning, and abandonment and long-term performance phases would follow the operations phase, including a period of institutional control for up to 300 years.

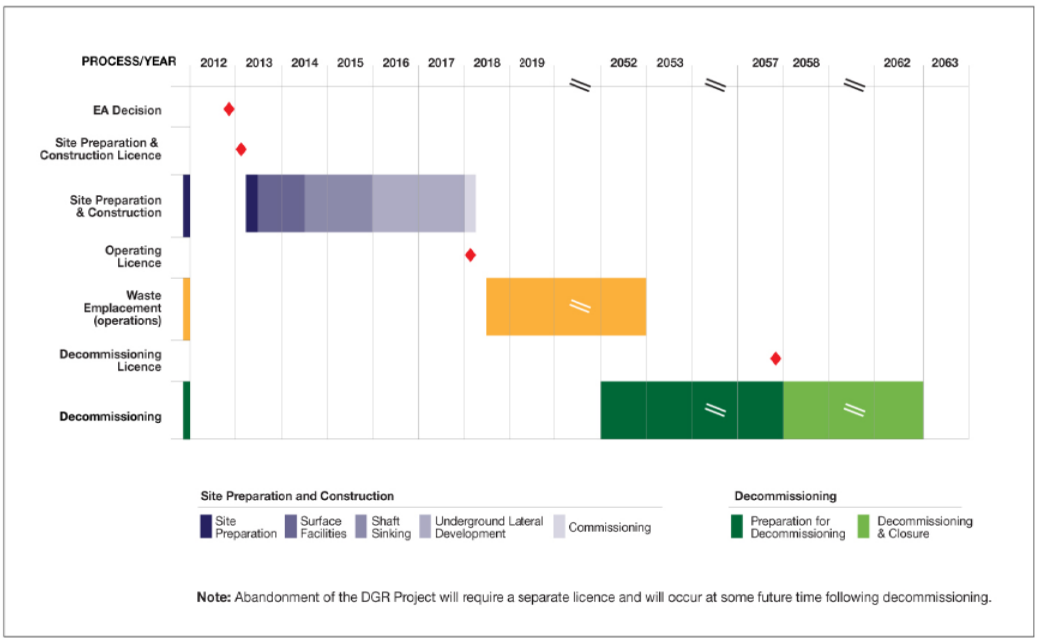

Figure 2. DGR Project Schedule

Spatial boundaries define the geographical extents within which environmental effects are considered. As such, these boundaries become the study areas adopted for the EA.
Four study areas were selected for the assessment:

- The **Regional Study Area** encompasses Bruce County with the exception of the peninsula communities of the Town of South Bruce Peninsula and Northern Bruce Peninsula Municipality;
- The **Local Study Area** corresponds to the 10 km emergency planning zone (centred on the Bruce nuclear site), as identified by Emergency Measures Ontario;
- The **Site Study Area** corresponds to the property boundary of the Bruce site, including the existing licensed exclusion zone on land and in Lake Huron; and

- The **Project Area** corresponds to the boundary of the OPG-retained lands at the centre of the Bruce nuclear site where the DGR Project is being proposed. The Project Area is the area where Project-related effects are most likely to occur and is the area of focus for the EA.

The Project Area, although not specified in the EIS Guidelines, was defined to help describe the potential site-specific effects of the DGR Project. Each study area includes the smaller study areas (i.e., they are not geographically separate). These study areas were adopted for each of the environmental components with modifications as appropriate.

The approach used in the assessment includes the following sections.

4.2.1 Describe the DGR Project

The DGR Project includes all four timeframes as described above. The DGR is designed for 200,000 cubic metres of L&ILW from OPG-owned or -operated nuclear generating stations. The DGR Project, if approved, will be constructed in competent sedimentary bedrock beneath the Bruce nuclear site. The DGR is designed to be safe in the long term, relying on the favourable and stable geology at the site which, combined with effective sealing of the repository, provides a good basis for long-term containment and isolation arguments.

The design for the DGR Project takes into account the OPG-retained lands within the Bruce nuclear site and the reference waste volumes to be placed in the repository and the surrounding geology. Two panels of waste emplacement rooms will be constructed nominally 680 m below ground surface (mBGS) within low permeability limestone in the Cobourg Formation (Figure 3).

Overall, the DGR Project will be constructed in sequential stages. All site preparation activities will be completed, followed by construction of the surface infrastructure, including the shaft headframes, waste rock management area and stormwater management pond. The two shafts (main and ventilation) will be developed simultaneously, followed by the construction of the underground services area infrastructure and access and exhaust ventilation tunnels. The emplacement rooms will then be developed.

4.2.2 Describe the Existing Environment

The description of the existing environment focused on those components of the environment that may be affected by the DGR Project. For the purposes of the EA, the environment comprises eight environmental components. Each is the subject of a TSD that supports this EIS. They include all physical, biophysical and social features that may be affected by the DGR Project:

- **Geology**: represents soil and groundwater quality and considers geological and hydrogeological conditions and seismicity;
- **Hydrology and Surface Water Quality**: represents surface water quality and surface water flow conditions;
- **Terrestrial Environment**: represents terrestrial biota and habitat;
- **Aquatic Environment:** represents aquatic biota and habitat;
- **Radiation and Radioactivity**: represents environmental radioactivity, including radionuclide emissions and doses to humans (members of the public and workers) and non-human biota;

- **Atmospheric Environment**: represents air quality, noise, light and vibrations, and considers meteorological and climatic conditions;

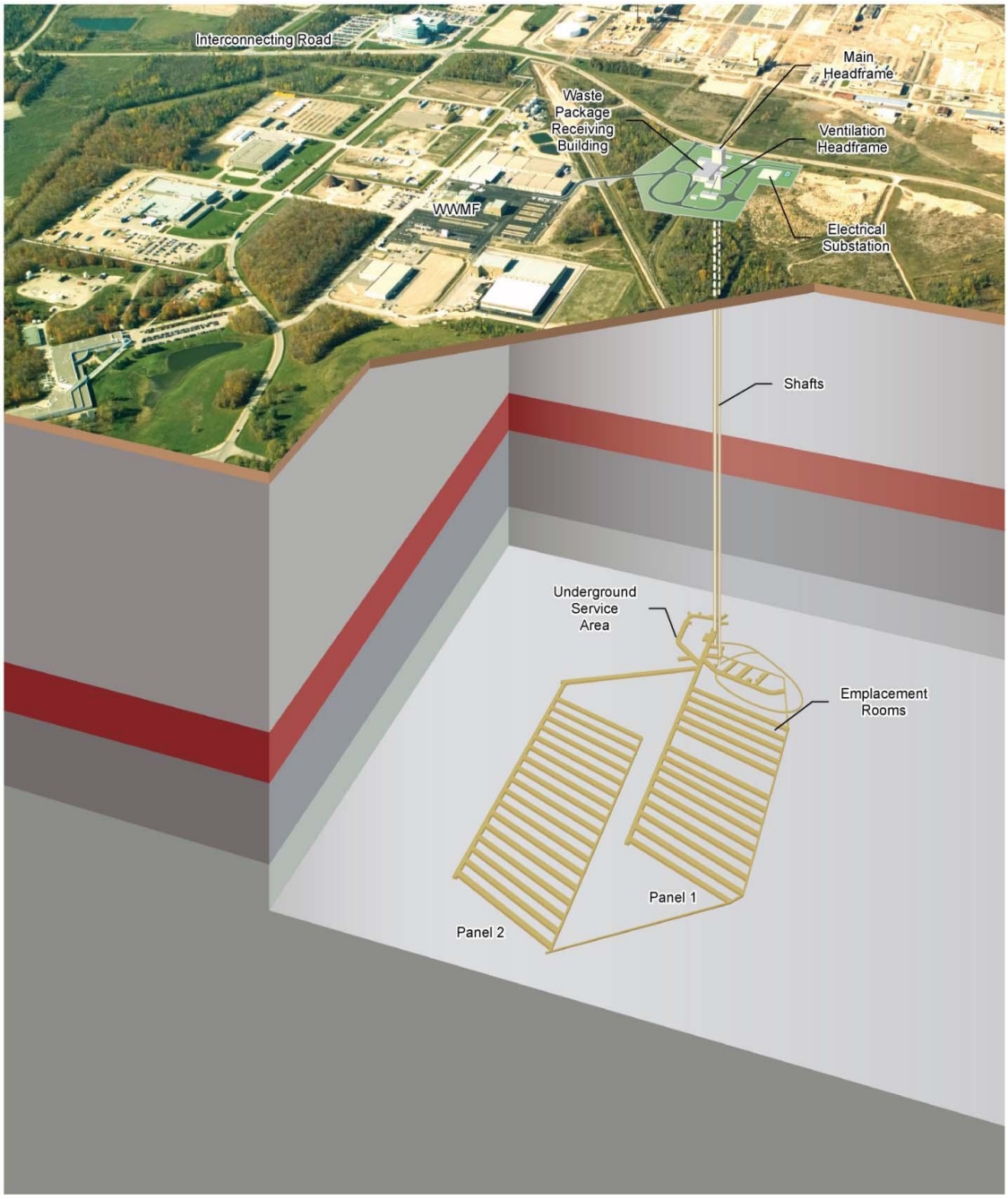

Figure 3. Layout of the DGR Project

- **Aboriginal Interests**: represents Aboriginal communities, Aboriginal heritage resources and traditional use of land and resources; and

- **Socio-economic Environment**: represents population, economic base, municipal services and finance, residents and communities, land use, transportation networks and elements, landscape and visual setting and Euro-Canadian cultural heritage resources.

The existing environment description also includes information on human health in an appendix to the EIS. The description of the existing environment is based on documented information from previous studies on the site as well as Project-specific supplementary field studies completed in 2007 and 2009.

4.2.3 Screen to Focus the Assessment

Two screening steps, first for potential interactions and secondly for likely measurable change, allow the assessment to focus on where effects are likely to occur. These steps were completed using professional judgement. A conservative approach was taken to the screening; where there was uncertainty as to whether there could be an interaction or measurable change, the interaction was advanced for further assessment.

4.2.4 Assess Effects

Where there is likely to be a measurable change, the effects on the environment were predicted and assessed as to whether or not they are adverse. If adverse effects were predicted, mitigation measures to reduce or eliminate the effect are proposed. Once mitigation measures were proposed, the likely adverse effect is reevaluated with the mitigation measures in place to identify whether any residual adverse effects remain. Residual adverse effects were then advanced for a determination of significance.

4.2.5 Assess Cumulative Effects

Cumulative effects of the DGR Project were considered in combination with the effects of other projects or activities that have been or are proposed and that will overlap in time and space with those of the Project. For the DGR Project the guidelines also required that the EIS assess the potential cumulative effects of emplacing decommissioning waste produced from the nuclear generating stations in the DGR. Although the project does not include emplacement of decommissioning waste in the DGR and there are currently no plans to emplace this waste in the DGR this was included.

The assessment of effects considers direct and indirect effects of the DGR Project, effects of the environment on the DGR Project, climate change considerations, and effects of the DGR Project on renewable and non-renewable resources. Effects are predicted in the context of temporal and spatial boundaries.

The EIS Guidelines require an identification of credible malfunctions and accidents, and an evaluation of the effects of the DGR Project in the event that these accidents or malfunctions occur. All of these effects are discussed and assessed in the Malfunctions, Accidents and Malevolent Acts section regardless of the element of the environment that is affected.

4.2.6 Determine Significance

All residual adverse effects were then assessed to determine whether the effect is significant, or not, taking into account the magnitude, geographic extent, duration, frequency, irreversibility and social/ecological context of the effect.

5. RESULTS OF THE ASSESSMENT

5.1 Assessment of Effects Under Normal Conditions

A summary of the results of the assessment of effects under normal conditions for each environmental component is provided in Table 1. Beneficial effects were also identified through the assessment process, but have not been included in Table 1 because the goal of the EA process is to identify and mitigate adverse effects on the environment.

Table 1 – Results of the Assessment of Effects of the DGR Project [4]

Environmental Component	VEC	Residual Adverse Effect
Geology	Soil Quality	No residual adverse effects
	Overburden Groundwater Quality	No residual adverse effects
	Overburden Groundwater Transport	No residual adverse effects
	Shallow Bedrock Groundwater Quality	No residual adverse effects
	Shallow Bedrock Groundwater and Solute Transport	No residual adverse effects
	Intermediate Bedrock Water Quality	No residual adverse effects
	Intermediate Bedrock Solute Transport	No residual adverse effects
	Deep Bedrock Water Quality	No residual adverse effects
	Deep Bedrock Solute Transport	No residual adverse effects
Hydrology and Surface Water Quality	Surface Water Quantity and Flow	Residual adverse effect of decreased flow in the North Railway Ditch, and an increased flow in the existing drainage ditch at the discharge from the DGR Project site
	Surface Water Quality	No residual adverse effects
Terrestrial Environment	Plant Species VECs	Residual adverse effect of removal of a small portion of eastern white cedar in the DGR Project site
	Wildlife Species VECs	No residual adverse effects

Environmental Component	**VEC**	**Residual Adverse Effect**
Aquatic Environment	VECs in Lake Huron and Embayments	No residual adverse effects
	VECs in the South Railway Ditch	A loss of a small portion of habitat used by redbelly dace, creek chub, variable leaf pondweed, burrowing crayfish and benthic invertebrates in the South Railway Ditch
	VECs in Stream C	No residual adverse effects
	VECs in other Potential Aquatic Habitats	A loss of a small portion of habitat used by burrowing crayfish in the DGR Project site
Radiation and Radioactivity	Humans	No residual adverse effect
	Non-human Biota	No residual adverse effects
Atmospheric Environment	Environment Air Quality	Increased concentrations of indicators in air during the site preparation and construction, operations and decommissioning phases
	Noise Levels	Increased noise levels at the Baie du Doré during site preparation and construction, and decommissioning phases
Aboriginal Interests	Aboriginal Communities	No residual adverse effects
	Traditional Use of Lands and Resources	No residual adverse effects
	Aboriginal Heritage Resources	The DGR Project may diminish the quality or value of ceremonial activities undertaken by Aboriginal peoples at the Aboriginal burial site on the Bruce nuclear site
Socio-Economic Environment	Population and Demographics	No residual adverse effects
	Other Human Assets	No residual adverse effects
	Employment	No residual adverse effects
	Business Activity	No residual adverse effects
	Tourism	No residual adverse effects
	Residential Property Values	No residual adverse effects
	Municipal Finance and Administration	No residual adverse effects
	Other Financial Assets	No residual adverse effects

Environmental Component	VEC	Residual Adverse Effect
	Housing	No residual adverse effects
	Municipal Infrastructure and Services	No residual adverse effects
	Other Physical Assets	No residual adverse effects
	Inverhuron Provincial Park	No residual adverse effects
	Social Assets	Increased noise levels at Baie du Doré during site preparation and construction, and decommissioning phases may reduce the use and enjoyment of property
Human Health	Overall Health	Increased exposures to acrolein in air during site preparation and construction may affect overall health[a]
	Health of Workers	No residual adverse effects
Ecological Features	Lake Huron	No residual adverse effects
	Stream C	No residual adverse effects
	South Railway Ditch	No residual adverse effects
	Wetland within the Project Area	No residual adverse effects

Note:

a Acrolein concentrations in air are driven by the existing concentrations. The DGR Project contribution to acrolein concentrations is small relative to background levels.

The above-listed residual adverse effects (i.e., non-trivial changes from existing conditions) were all assessed to be not significant.

No international residual adverse effects are predicted.

5.2 Assessment of Effects of Potential Malfunctions, Accidents and Malevolent Acts

Malfunctions, accidents and malevolent acts were assessed within the safety assessment work program completed in support of the DGR Project EA [5, 6]. The safety assessment program assessed and quantified potential effects and abnormal events from the DGR to workers, members of the public and the environment. This work considered both the site preparation and construction, operations, and decommissioning phases (preclosure), and the abandonment and long-term performance phase following closure of the repository (with a one-million-year timeframe), and analyzed the behaviour of the repository under both operational and abnormal events for both conventional and radiological scenarios.

A broad range of initiating events were identified and categorized into operations, geotechnical and external initiating events. The potential frequency for the initiating events to occur at the DGR was estimated. Malfunctions and accidents that could occur as a result of credible initiating

events were identified and a list of bounding scenarios developed. Detailed assessment of the bounding accidents was conducted to determine the potential adverse effects to the environment, taking into consideration mitigation measures.

The assessment concluded that site preparation and construction, operations and decommissioning phase malfunctions and accidents would not exceed relevant criteria for humans or non-human biota. For disruptive scenarios in the abandonment and long-term performance phase, the potential impacts on biota are also low. The predicted concentrations for some radionuclide species in the event of human intrusion or severe shaft seal failure may exceed screening criteria. Given the low likelihood of these scenarios, which are local and conservatively modeled, the risk from these scenarios is low.

5.3 Potential Effects of the Environment (Natural Hazards) on the Project

Several natural hazards were assessed to determine if, over its lifetime, hazards such as flooding, tornadoes, ice storms, seismicity or climate change could adversely affect the DGR Project. A number of mitigation measures are in place to reduce or eliminate any potential effects from the natural environment on the project, including:

- Top of shaft collar located above estimated Probable Maximum Flood levels;
- Project location about one kilometre inland from lake eliminates potential for wave run-up; and
- Surface structures designed to meet requirements of latest National Building Code; and
- Locating the DGR within a seismically stable area.

Based on the assessment, the identified effects of the natural environment on the DGR Project are not likely to result in residual adverse effects.

5.4 Potential Climate Change Effects

Climate change is any long-term change in the distribution of weather patterns over time periods that range from decades to millions of years. Climate change may affect the whole earth or may be limited to a specific region. This EA considered how the future environment could affect the DGR Project including shifts in climate (such as glaciations) that occur from one epoch to another, how the DGR Project could affect the future environment and how the DGR Project could affect climate change (e.g., contribution to climate change by the emission of greenhouse gases).

The assessment concluded that changes to the future environment because of climate change will not influence the DGR Project, nor will the DGR Project significantly change the future environment or contribute greenhouse gas (GHG) emissions to affect climate change. The DGR Project isn't expected to significantly change the future environment.

5.5 Assessment of Potential Cumulative Effects

The assessment of cumulative effects of the DGR Project in combination with other past, existing, planned or reasonably foreseeable projects was considered in this EIS. No adverse cumulative effects were identified. Table 2 provides a summary of likely adverse cumulative effects.

Table 2 - Summary of Likely Adverse Cumulative Effects

VEC Affected	Cumulative Effect Considered	Conclusion of Cumulative Effects Assessment
Surface Water Quantity and Flow	Decrease in flow in the North Railway Ditch and increase in flow in the drainage ditch at the discharge from the DGR Project site	No likely adverse cumulative effects
Terrestrial Environment	Removal of a small portion of eastern white cedar in the Project site	No likely adverse cumulative effects
Aquatic Environment	Loss of a small portion of habitat for redbelly dace, creek chub and variable leaf pondweed, burrowing crayfish and benthic invertebrates in the South Railway Ditch. Loss of burrowing crayfish habitat in the DGR Project site	No likely adverse cumulative effects
Air Quality	Increase concentrations of indicators in air	No likely adverse cumulative effects
Noise Levels	Increase in noise levels at the Baie du Doré	No likely adverse cumulative effects
Radiation and Radioactivity	Additive effects of radiological emissions from other projects	No likely adverse cumulative effects

An assessment of the significance of cumulative effects would have been undertaken had there been any residual adverse cumulative effects identified.

6. PUBLIC PARTICIPATION AND ABORIGINAL ENGAGEMENT

Throughout the environmental assessment, starting during the feasibility studies associated with the Independent Assessment Study, the proponent carried out an engagement program addressed primarily at the local community, but which reached out to include any person or group who identified an interest in the Project. Engagement included presentations to community groups, participation with a mobile exhibit in community events, open houses and newsletters sent to more than 25,000 households. All eight municipalities have remained highly engaged in DGR communication activities such as participation in the DGR Community Consultation Advisory Group, and remain strongly supportive of the DGR Project as it moves forward as is exhibited in the results of independent community leadership surveys and public attitude research [7].

Aboriginal engagement efforts began in 2003 with the Saugeen Ojibway Nation (SON), which represents two local First Nations, during the Independent Assessment Study, and continued throughout the environmental assessment. Through a Protocol Agreement signed by OPG and SON and subsequent contributions from OPG, SON was able to start an Environment Office which has participated in the DGR Project, including having technical experts review some draft

documents associated with the Project on their behalf, as well as other projects located in the traditional territories of the SON.

Engagement efforts with Métis communities began in 2008. In 2009 a Letter of Agreement was signed with one Métis community, the Historic Saugeen Métis, which has allowed them to communicate with members of their community on the DGR Project, as well as having technical experts review some draft documents for the Project on their behalf. In August 2011 a Participation Agreement with the Métis Nation of Ontario, which represents members of the three Georgian Bay Métis communities, was signed by MNO and the Presidents of each of the three communities, OPG, and the NWMO.

A number of the comments received by the CNSC on the 2006 draft guidelines originated from the United States, primarily Michigan. As a result, the proponent undertook to include these persons or groups in their engagement program and also completed briefings with several elected representatives and environmental groups in Michigan during 2009 and 2010.

Engagement activities will continue throughout the remainder of the environmental assessment process and during the site preparation and construction and operations phases of the Project.

7. FOLLOW-UP MONITORING PROGRAM

A follow-up monitoring program is proposed to:

- Verify that predictions made about the environmental effects of the DGR Project are accurate; and
- Confirm the effectiveness of mitigation measures and whether new mitigation measures are needed.

The objective of the environmental monitoring framework is to ensure that the predictions made in the EA are confirmed, anticipated licensing and legislative requirements are adhered to and best management practice is employed, while minimizing the duplication and overlap of monitoring activities and reporting. The monitoring program encompasses four groups of monitoring activities:

- EA follow-up monitoring;
- Environmental Management Plan (EMP) monitoring;
- radiological regulatory monitoring; and
- conventional regulatory monitoring (e.g., provincial and federal requirements, permits and approvals).

In addition to the four groups of monitoring activities, some baseline monitoring will be conducted prior to and during construction in order to acquire information and data to which future monitoring results can be compared.

During site preparation and construction the program proposes monitoring of conventional air quality, surface water quality, aquatic habitat, groundwater quality and public attitude toward the project. During operations the program proposes monitoring of conventional surface water and air quality, radionuclides in air and water, groundwater quality and public attitude towards the project.

Monitoring at decommissioning ensures that contaminant levels at the DGR Project site are within acceptable levels. The program proposes monitoring conventional air and surface water quality, radionuclides in air and water, soil quality and groundwater quality.

It should be noted the CNSC regulates the nuclear industry and will ensure that follow-up monitoring is implemented.

OPG will obtain necessary permits and certificates of approval for the DGR Project.

8. CONCLUSIONS

The EIS describes the DGR Project, the existing environmental conditions on the Bruce nuclear site, and assesses the likely effects of the DGR Project on the environment. The EIS also includes an assessment of likely cumulative effects of the DGR Project in combination with other past, present or reasonably foreseeable projects, as required. It describes the effects for normal conditions and as a result of malfunctions, accidents and malevolent acts. The EIS also describes and assesses the likely effects of the environment on the DGR Project, climate change, and renewable and non-renewable resources.

The significance of the likely environmental effects of the DGR Project has been assessed. Residual adverse effects — that is to say non-trivial changes from existing conditions — were identified for air quality, noise levels, surface water quantity and flow, eastern white cedar, burrowing crayfish, VECs in the South Railway Ditch, an Aboriginal heritage resource, the use and enjoyment of property, and overall human health. Based on the evaluation, each of the residual adverse effects was assessed to be not significant.

The DGR is expected to safely contain the L&ILW and isolate them from humans and nonhuman biota, including during the abandonment and long-term performance phase. The amount of contaminants reaching the surface is very small, and would occur far into the future.

The isolation afforded by the location and design of the DGR also limits the likelihood of disruptive events having the potential to bypass the natural barriers to a small number of situations with very low probability of occurring.

No residual adverse effects were identified during the assessment of the effects of the environment on the DGR Project and of the DGR Project on climate change. The assessment also considered the effect of DGR Project-related environmental effects on the capacity of renewable resources to meet the needs of the present and those of the future. The assessment determined that sustainable use of renewable resources would not be affected by the DGR Project.

The EIS concludes that with the identified mitigation measures, the implementation of the DGR Project is not likely to result in any significant adverse effects on the environment.

REFERENCES

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[7.] Wilson, M. et al, "DGR Public Engagement", Proceedings of Waste Management, Decommissioning and Environmental Restoration for Canada's Nuclear Activities Conference, Toronto, September 11-14, 2011.