OPG'S DEEP GEOLOGIC REPOSITORY PROJECT

For Low & Intermediate Level Waste

December 2016

Updated Analysis of Cumulative Environmental Effects

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EXECUTIVE SUMMARY

Ontario Power Generation Inc. (OPG) is currently seeking a licence to prepare the site for and construct a Deep Geologic Repository (DGR) for its low and intermediate level radioactive waste (L&ILW) at the Bruce Nuclear Generating Station site in the Municipality of Kincardine (the DGR Project at the Bruce Nuclear site).

As requested by the Minister of the Environment and Climate Change, OPG has completed an updated cumulative effects assessment for the DGR Project at the Bruce Nuclear site in light of recent work undertaken by the Nuclear Waste Management Organization (NWMO) with three potential host municipalities for an Adaptive Phased Management Deep Geological Repository (APM DGR). The updated assessment is based on a project description prepared for an APM DGR by NWMO for the purposes of this updated analysis and considers the three municipalities of Huron Kinloss, South Bruce, and Central Huron.

The updated cumulative effects assessment of the APM DGR identified no likely adverse cumulative effects given the location of the potential site for the APM DGR and the limited extent of the environmental effects of the DGR Project at the Bruce Nuclear site and the APM DGR. Moreover, the updated assessment concluded that cumulative effects as a result of malfunctions, accidents and malevolent acts from the DGR Project at the Bruce Nuclear site and the APM DGR are unlikely. Since no adverse cumulative effects were identified, an assessment of significance of cumulative effects is not required. The original conclusions presented in the Environmental Impact Statement (EIS) regarding cumulative effects of the DGR Project at the Bruce Nuclear site and other projects and activities remain valid when the APM DGR is considered.

Furthermore, OPG has committed not to move forward with the construction of the DGR Project at the Bruce Nuclear site until the SON community is supportive of the project. Similarly, NWMO has committed that an APM DGR would not be constructed in the traditional territory of the SON without their consent. Through engagement with indigenous communities, host municipalities, and stakeholders, OPG and NWMO would identify and resolve potential impacts. These processes provide further assurance that cumulative effects are addressed, where possible.

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1. INTRODUCTION

Ontario Power Generation Inc. (OPG) is currently seeking a licence to prepare the site for and construct a Deep Geologic Repository (DGR) for its low and intermediate level radioactive waste (L&ILW) at the Bruce Nuclear Generating Station site in the Municipality of Kincardine (the DGR Project at the Bruce Nuclear site).

In 2015, a Joint Review Panel (Panel) issued the Environmental Assessment Report on the DGR, which concluded that provided certain mitigation measures are implemented, *"the project is not likely to cause significant adverse environmental effects*". In February 2016, the federal Minister of Environment and Climate Change (the Minister) requested that OPG provide additional information, prior to making a decision on the Environmental Assessment (EA). Among other things, the Minister requested:

"An updated analysis of the cumulative environmental effects of the Project in light of the results from the Phase 1 Preliminary Assessments undertaken by the Nuclear Waste Management Organization, which identified three potential host communities that fall within the traditional territory of the Saugeen Ojibway Nation."

The Phase 1 Preliminary Assessments were undertaken by the Nuclear Waste Management Organization (NWMO) as the first phase to assess the potential suitability of a community to host an Adaptive Phased Management Deep Geologic Repository (APM DGR) facility for nuclear fuel waste.

In a letter dated September 7, 2016, the Canadian Environmental Assessment Agency (CEAA) requested OPG to consider in the cumulative effects assessment all three potential host communities identified by the Nuclear Waste Management Organization (NWMO) in the traditional territory of the Saugeen Ojibway Nation (SON). Moreover, CEAA directed OPG to take a "Valued Component"[1] approach to the updated cumulative effects assessment. OPG was also requested to consider the environmental effects of accidents and malfunctions in the assessment of cumulative effects, if they are likely to result from the DGR Project at the Bruce Nuclear site in combination with other physical activities that have been or will be carried out.

To meet the requests of the Minister and CEAA, the NWMO developed a preliminary description for the APM DGR, assumed to be located at a site somewhere within the boundaries of the Township of Huron-Kinloss, the Municipality of South Bruce, and the Municipality of Central Huron in Bruce County, Ontario, within the traditional territory of the SON [NWMO 2016]. At present, no community or area has yet indicated its intent to host an APM DGR, a decision has yet to be made by the NWMO on siting, and there is no site-specific repository design or site-specific assessment of environmental effects in the communities currently engaged in the siting process. Key aspects presented in the preliminary description of the APM DGR that are of relevance for the updated cumulative effects assessment are presented in Section 4 of this report.

[1] "Valued Component" and "Valued Ecosystem Component" (VEC) are terms that are used interchangeably in environmental assessment practice to refer to elements of the environment considered to be important for scientific, social, cultural, economic, historical, archaeological, aesthetic or other reasons. For the purposes of consistency with the Environmental Impact Statement (EIS) for the DGR Project at the Bruce Nuclear site, the term VEC is used in this response.

The purpose of this document is to provide an updated assessment of cumulative environmental effects of the DGR Project at the Bruce Nuclear site taking into account the APM DGR, and a narrative on cumulative effects with respect to malfunctions, accidents, and malevolent acts. This report is prepared using the description of the APM DGR set out in the APM DGR Preliminary Description [NWMO 2016].

2. METHODOLOGY

The methodology for assessment of cumulative effects in relation to the DGR Project at the Bruce Nuclear site provided in the Environmental Impact Statement (EIS) [OPG 2011a] is consistent with the direction set out in the EIS Guidelines for the DGR Project at the Bruce Nuclear site and CEAA's Cumulative Effects Assessment Practitioner's Guide [Hegmann et al. 1999]. The updated analysis of cumulative effects presented in this report follows the same method and incorporates guidance provided in CEAA's *Operational Policy Statement Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* [CEAA 2015a] and *Draft Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* [CEAA 2014].

As presented in the EIS, the cumulative effects assessment considers residual effects identified for the DGR Project at the Bruce Nuclear site on each valued ecosystem component (VEC) and the potential for effects of past, present, and reasonably foreseeable projects and activities to affect the same VECs. Projects and activities were screened in the EIS to focus the assessment of cumulative effects on those projects and activities with environmental effects that overlap in time and space with the residual effects of the DGR Project at the Bruce Nuclear site. For the purposes of this updated analysis, the cumulative effects assessment in relation to the DGR Project at the Bruce Nuclear site has been updated to include consideration of the development of the APM DGR as requested by the Minister.

A potential cumulative effect is only identified when the same VEC is affected within the same spatial and temporal boundaries. If an overlap of effects on a VEC is identified, the potential cumulative effect is identified and described to determine if additional mitigation measures are warranted, and taking into account the mitigation, whether residual adverse cumulative effects are likely to occur, and their significance. The overall approach is illustrated in Figure 2-1 and described further below.

2.1 DESCRIPTION OF RESIDUAL EFFECTS OF THE DGR PROJECT AT THE BRUCE NUCLEAR SITE

Residual effects of the DGR Project at the Bruce Nuclear site were described in Section 7 of the EIS [OPG 2011a]. These were then considered in Section 10 of the EIS [OPG 2011a] for potential cumulative effects with past, existing and reasonably foreseeable projects. That assessment is not repeated in this updated analysis of cumulative effects. Where applicable, cross-references to the applicable section of the EIS are provided, and the residual effects of the DGR Project at the Bruce Nuclear site are summarized to provide context.

Consistent with direction in the draft Technical Guidance [CEAA 2014], the updated assessment of potential cumulative effects is focused on those VECs with residual effects from the DGR Project at the Bruce Nuclear site.

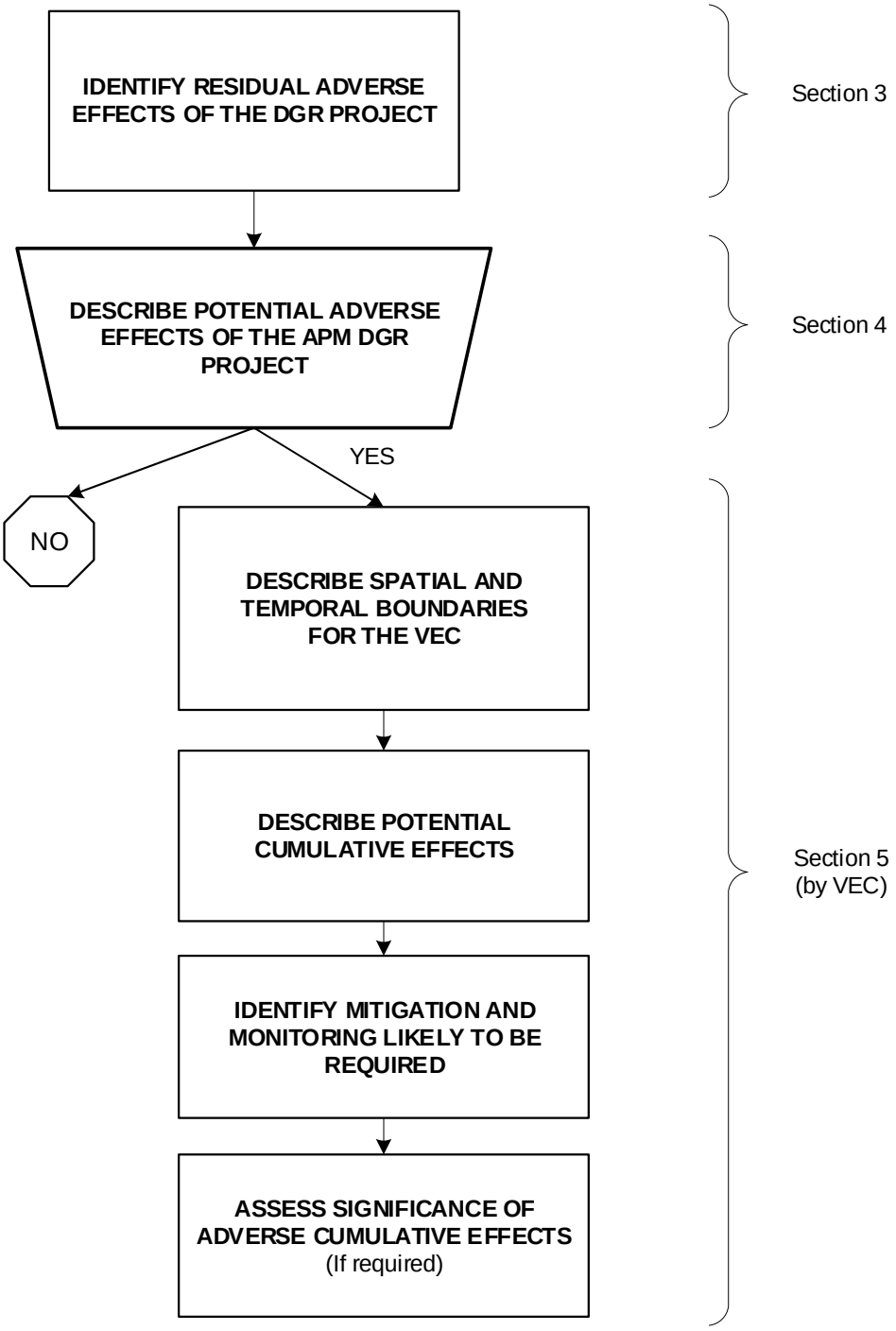

Figure 2-1: Approach for the Updated Analysis of Cumulative Effects

2.2 DESCRIPTION OF POTENTIAL EFFECTS OF THE APM DGR

A preliminary description of the APM DGR has been provided in the APM DGR Preliminary Description under separate cover [NWMO 2016]. Within this report, the APM DGR project description is summarized, and potential effects of the APM DGR on the environment described. As no specific site locations are defined, the description is provided as a narrative, and discusses the range of potential conditions that could be encountered. Potential adverse effects of the APM DGR are considered in the assessment, whether or not they are likely to be significant.

2.3 IDENTIFICATION AND ASSESSMENT OF POTENTIAL CUMULATIVE EFFECTS INCLUDING MITIGATION

Determining spatial and temporal boundaries is important to considering cumulative effects. Spatial extent of effects is considered within the context of the study areas defined in Section 5.1 of the EIS [OPG 2011a] that are relevant to the adverse residual effects identified for the DGR Project at the Bruce Nuclear site. These study areas were defined considering the potential for cumulative effects, and using a VEC-centred approach. For each VEC, the most appropriate scale for consideration of cumulative effects is described in the updated assessment, along with the rationale.

For the purposes of identifying overlap of effects in time, the temporal boundaries for the EA as described in Section 5.2 of the EIS [OPG 2011a] were taken into consideration. The temporal boundaries are based on the different phases of the DGR Project at the Bruce Nuclear site, which are shown in Figure 2-2, and are intended to frame the duration of the residual effects of the DGR Project at the Bruce Nuclear site. If the DGR Project at the Bruce Nuclear site was expanded for acceptance of decommissioning waste (a reasonably foreseeable project identified and assessed in the EIS), effects from construction and operations could extend approximately thirty years beyond the period shown on Figure 2-2. A cumulative environmental effects assessment of decommissioning waste from OPG owned or operated nuclear reactors was assessed in OPG's EIS submission (Section 10) and is not addressed here. That assessment was based on the emplacement of decommissioning waste in an extension of the DGR (approximately doubling the underground capacity). This extension is not part of the proposed DGR Project, and accordingly, prior to such an expansion, a separate environmental assessment process would be completed in the future, which would take into account OPG's DGR and the APM DGR, as required.

Where potential effects from both the DGR Project at the Bruce Nuclear site and the APM DGR are identified on the same VEC, the effects of both are described in the context of the spatial and temporal boundaries described above. Where an effect may overlap in time and space on a VEC, the effect is described further. Potential effects are considered in the context of whether they are likely to be measurable and adverse. A measurable change in the environment is defined as a change that is real, observable or detectable compared with existing conditions. An adverse effect is when there is a measurable change sufficiently large to have a negative effect on the environment. Thresholds for measurable change and adverse effects were defined in the EIS [EIS 2011a] for each VEC. These VEC-specific definitions are repeated within Section 5 where appropriate to assess potential effects.

Where potential effects are identified, mitigation measures are proposed to reduce or eliminate the effect. If, following mitigation, a residual cumulative effect remains; the significance of the effect is described. Significance of residual adverse cumulative effects is assessed considering the magnitude, geographic extent, timing and duration, frequency and irreversibility of the effect, considering guidance in CEAA's Operational Policy Statement *Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012* [CEAA 2015b]. This uses the same approach and references the response to Information Request (IR) EIS-12-510 (narrative significance assessments) [OPG 2014], where applicable.

Likelihood is the probability of an effect occurring. Likelihood may be influenced by a variety of factors, such as the likelihood of disturbance occurring, or the likelihood of mitigation being successful. Likelihood is typically described using four categories: unlikely, possible, likely and highly likely. The likelihood of a cumulative effect occurring is determined in this document using professional judgement in combination with the thresholds described above for what would be considered measurable, adverse and/or significant for a VEC.

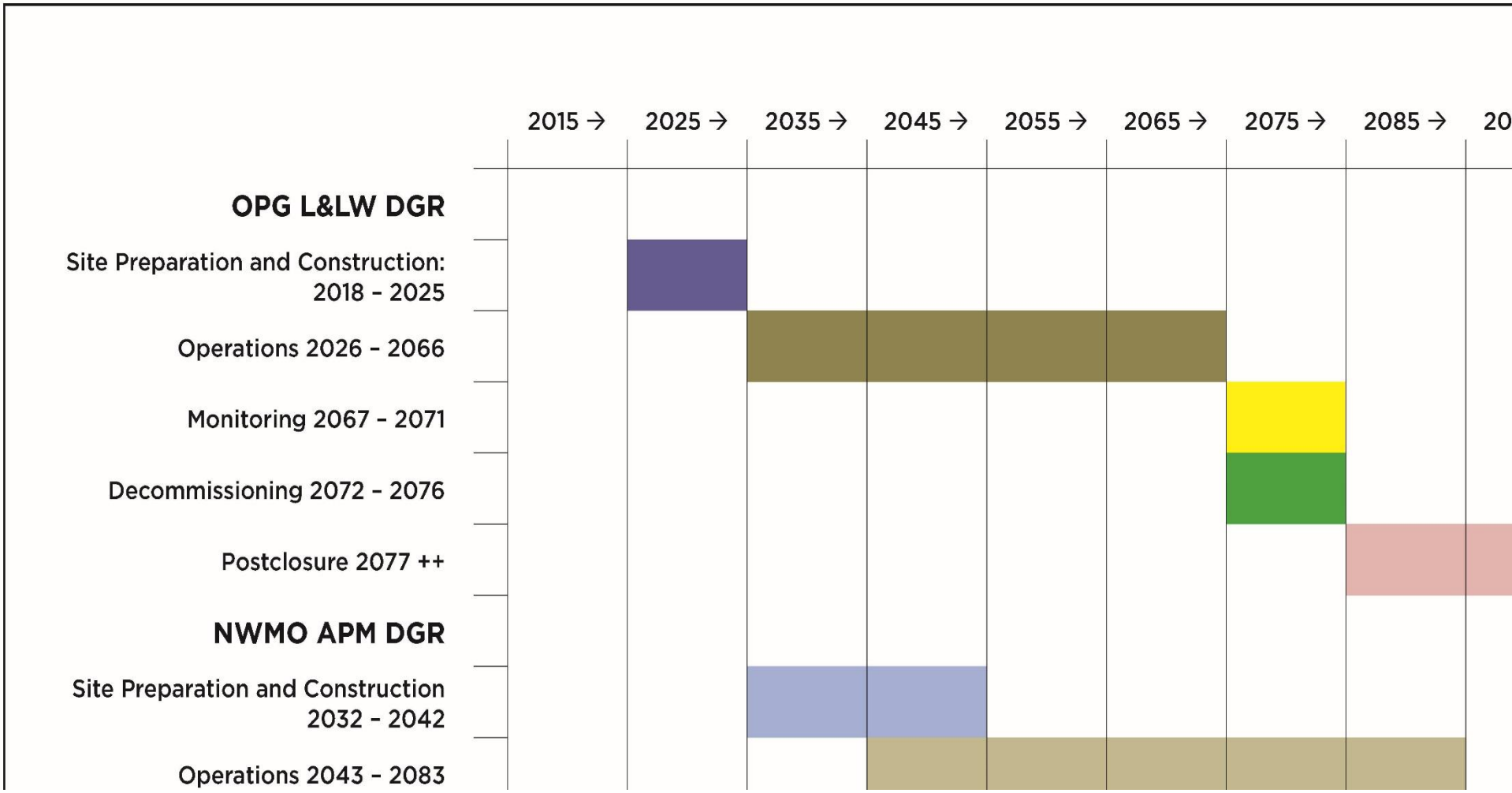

Figure 2-2: Timelines of the DGR Project at the Bruce Nuclear Site and the APM DGR Project

3. RESIDUAL EFFECTS OF THE DGR PROJECT AT THE BRUCE NUCLEAR SITE

The cumulative effects assessment builds on the results of the assessment of the effects of the DGR Project at the Bruce Nuclear site that were considered to have a residual adverse effect on VECs. The residual effects of the DGR Project at the Bruce Nuclear site are described in Section 7 of the EIS [OPG 2011a], and are summarized in Table 3-1. Table 3-1 provides the basis for the cumulative effects assessment.

Table 3-1: Summary of Residual Adverse Effects of the DGR Project at the Bruce Nuclear Site Considered in the Updated Analysis of Cumulative Effects

Environmental Component	Valued Ecosystem Component	Residual Adverse Effect
Hydrology and Surface Water Quality	Surface Water Quantity and Flow	31% reduction in surface water quantity and flow in the North Railway Ditch upstream of Stream C resulting from reduction in drainage area from the construction of the stormwater management system.
		114% increase in surface water quantity and flow during the site preparation and construction phase and a 61% increase during the operation phase in the drainage ditch at Interconnecting Road resulting from operation of the stormwater management system, redirected drainage area flows, dewatering of the shaft excavation during construction and the shaft sump pumping during operations.
Terrestrial Environment	Eastern White Cedar	Loss of eastern white cedar in the Project Area[2] during site preparation and continuing through DGR Project at the Bruce Nuclear site life.
Aquatic Environment	Burrowing Crayfish	Removal of a portion of burrowing crayfish habitat in the South and North Railway Ditches, as well as other ditches and the abandoned rail spur in the western portion of the Project Area, during site preparation and construction.
	Redbelly Dace	Removal of a portion of non-critical habitat in the South Railway Ditch during construction of the rail bed crossing.
	Creek Chub	
	Variable Leaf Pondweed	
	Benthic Invertebrates	
Air Quality	Air Quality	Increase in concentrations of air quality indicators during site preparation and construction, operations and decommissioning phases.
Noise Levels	Noise Levels	Increase in noise levels during site preparation and

[2] The Project Area corresponds to the boundary of the OPG-retained lands where the DGR Project at the Bruce Nuclear site is being proposed and encompasses an area of 95 hectares (ha) and captures the surface and underground features of the DGR Project at the Bruce Nuclear site [OPG 2011a].

Environmental Component	Valued Ecosystem Component	Residual Adverse Effect
		construction, and decommissioning phases.
Socio-economic Environment	Other social assets	Change in noise levels in the Baie du Doré area resulting in reduced enjoyment and use of personal property in this localized area during site preparation and construction, and decommissioning phases.
Human Health	Overall Health for Local Resident	Effect to the overall health for local resident and member of Indigenous communities resulting from exposure to acrolein in air during the site preparation and construction phase.
	Overall Health for Member of Indigenous Community	
Radiation and Radioactivity	Human Exposure to Radiation	Radiological emissions as a result of the DGR Project at the Bruce Nuclear site.
	Radiation Dose to Non-human Biota	

Source: From Table 10.3-1 in the EIS [OPG 2011a]

The radioactivity assessment in the EIS [OPG 2011a] considered the incremental effects of the DGR Project at the Bruce Nuclear site in comparison with regulatory standards. Predicted doses were well below the regulatory standards and therefore no adverse effects of the DGR Project on radiation and radioactivity VECs were identified. However, although no residual adverse effect was identified in Section 7 of the EIS [OPG 2011a], it was still considered in the cumulative effects assessment in the EIS for consideration of potential cumulative effects, consistent with direction in the EIS Guidelines. It is therefore also considered here as part of the updated analysis. The assessment of potential cumulative effects on radiation and radioactivity VECs (Section 5.8) considers potential for cumulative changes through all pathways (e.g., groundwater, air).

A number of beneficial effects were identified for the DGR Project at the Bruce Nuclear site in the EIS (Table 10.3-2) [OPG 2011a]. Similar beneficial effects are anticipated as a result of the APM DGR, and might have a cumulative effect on the socio-economic environment; however, these beneficial effects are not discussed further as part of this updated analysis. This assessment focuses instead on the identified residual adverse effects of the DGR Project at the Bruce Nuclear site to focus the cumulative effects assessment on those VECs with the potential to result in cumulative adverse effects, consistent with the methodology provided in the draft CEAA Technical Guidance [CEAA 2014].

Residual adverse effects as a result of the DGR Project at the Bruce Nuclear site were not predicted for the following VECs listed in Table 3-2, as outlined in Section 7 of the EIS [OPG 2011a]. Consequently these VECs are not considered further as part of this updated analysis.

Table 3-2: VECs for which No Residual Adverse Effects of the DGR Project at the Bruce Nuclear Site were Identified

Environmental Component	Valued Ecosystem Component
Geology	Soil quality
	Overburden Groundwater Quality
	Overburden Groundwater Transport
	Shallow Bedrock Groundwater Quality
	Shallow Bedrock Solute Transport
	Intermediate Bedrock Water Quality
	Intermediate Bedrock Transport
	Deep Bedrock Water Quality
	Deep Bedrock Solute Transport
Hydrology and Surface Water Quality	Surface Water Quality
Terrestrial Environment	Other Plant VECs (Heal-all, Common Cattail)
	Mammal VECs (muskrat, white-tailed deer, northern short tailed shrew)
	Amphibian and Reptile VECs (midland painted turtle, northern leopard frog)
	Bird VECs (mallard, red-eyed vireo, wild turkey, yellow warbler, bald eagle)
Aquatic Environment	Lake Whitefish
	Smallmouth Bass
	Brook Trout
	Spottail Shiner
Vibrations	Vibrations
Human Health	Overall Health of Seasonal Users
	Health of Workers
Ecological Features	Lake Huron
	Stream C
	South Railway Ditch
	Wetland within the Project Area

As discussed previously, a residual adverse effect on the radiation and radioactivity VECs was not identified in Section 7 of the EIS [OPG 2011a]. However, radiation and radioactivity has been included to allow for the consideration of potential cumulative effects.

4. PRELIMINARY DESCRIPTION OF THE APM DGR

A preliminary description of the APM DGR has been provided in the APM DGR Preliminary Description [NWMO 2016]. The intent of this section is to provide a summary of key aspects of the APM DGR and to outline the likely types of effects of the APM DGR that could overlap with the residual adverse effects of the DGR Project at the Bruce Nuclear site on VECs. This section is intended to provide context for the updated analysis of cumulative effects presented in this document and should be read in conjunction with the APM DGR Preliminary Description [NWMO 2016].

4.1 PROJECT DESCRIPTION

The APM DGR includes the site selection, regulatory approvals, site preparation, construction, operation, decommissioning and long-term performance of above- and below-ground facilities for the long-term management of Canada's nuclear fuel waste. The APM DGR is a separate facility and project from the DGR Project at the Bruce Nuclear site, and would not accept L&ILW generated from outside of the APM DGR. As noted in Section 1, no community or area has indicated its intent to host an APM DGR, a decision has yet to be made by the NWMO on siting, and there is no site-specific repository design or site-specific assessment of environmental effects in the communities currently engaged in the siting process.

In southern Ontario, the Township of Huron-Kinloss and the Municipalities of South Bruce and Central Huron are currently engaged with the NWMO in the siting process for the APM DGR. The NWMO is also in discussion with Indigenous communities with traditional lands in these areas, and in particular with the SON. The NWMO is also in discussion with several other communities elsewhere in Ontario. Selection of a preferred site for the APM DGR is subject to these discussions and to further technical assessments; it is not expected that a selection decision will be made before 2023.

However, for the purposes of this updated analysis, it has been assumed that a site has been selected in one of the three communities in southern Ontario. Specifically, consistent with the preliminary description of the APM DGR provided by NWMO [2016], the APM DGR is assumed to be located at a site somewhere in Bruce County within the Township of Huron-Kinloss or the Municipality of South Bruce, or in Huron Country within the Municipality of Central Huron (Figure 4-1). Although the specific site is not identified, based on this assumption, the APM DGR would be at least 20 kilometres (km) from the DGR Project at the Bruce Nuclear site, and potentially as far as approximately 86 km.

The facilities associated with the APM DGR include surface facilities consisting of underground access and ventilation buildings, a used fuel packaging plant, facilities for the preparation of sealing materials, various infrastructure and support services and facilities, and a waste rock management area. The underground facilities would comprise access-ways (shafts and tunnels), emplacement rooms, and various underground service areas and installations designed to safely contain and isolate used nuclear fuel over the long term. Following the operational phase of the APM DGR, the facility would be maintained for an extended monitoring period. At the end of this phase, the facility would be sealed and closed as part of decommissioning.

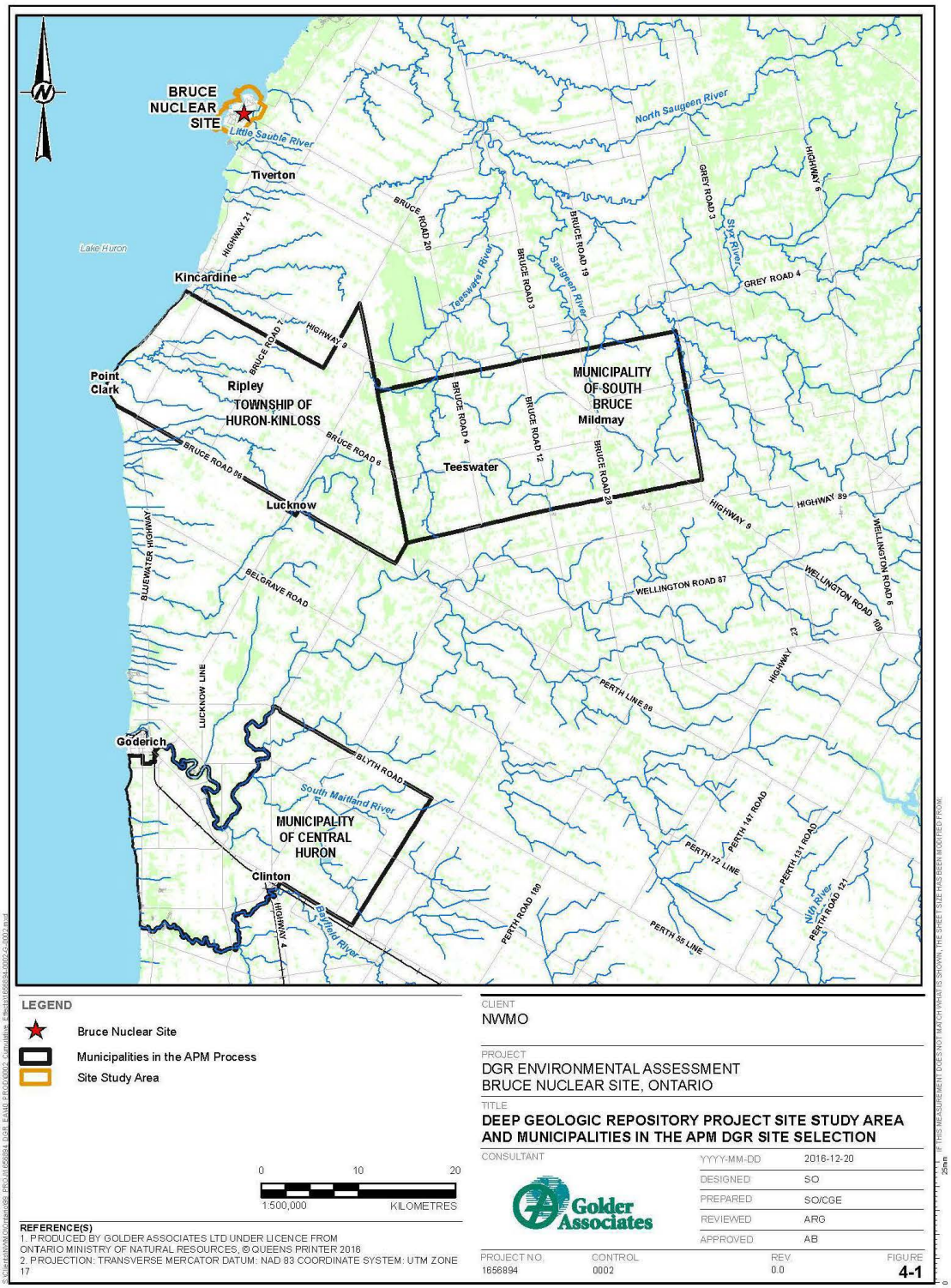

Figure 4-1: Deep Geologic Repository Project Site Study Area and Municipalities in the APM DGR Site Selection Process

Nuclear fuel waste will be transported from interim storage facilities to the APM DGR. The main storage sites are Pickering, Darlington, Bruce (including Douglas Point), Gentilly, Point Lepreau, Chalk River and Whiteshell. It is assumed that transport of used fuel will be by road [NWMO 2016].

Preliminary estimated timelines have been identified by NWMO for the APM DGR [NWMO 2016], as illustrated in Figure 2-2. It is noted that actual timelines have not been established yet and will be driven by a variety of factors, including the time it takes to identify a suitable site with an informed and willing host; the time required to assess technical safety; and time required to obtain regulatory approvals [NWMO 2016]. The preliminary estimated timelines considered for the purposes of the updated cumulative effects assessment are as follows:

- Site Selection Phase – started 2010, approximately 20-25 years to complete;
- Site Preparation and Construction Phase – approximately 10 years;
- Operations Phase – approximately 40 years, assuming a used fuel inventory of approximately 4.6 million used fuel bundles;
- Extended Monitoring Phase – assumed to be 70 years;
- Decommissioning and Closure Phase – approximately 30 years; and
- Postclosure Phase – indefinite.

4.2 POTENTIAL RESIDUAL EFFECTS OF THE APM DGR

As part of the NWMO's Phase 1 Preliminary Assessments of the APM DGR, a high-level screening assessment was performed for each potential host community to identify potential interactions between the APM DGR and the environment. These potential environmental interactions are presented for the Township of Huron-Kinloss, the Municipality of South Bruce, and the Municipality of Central Huron in the Preliminary Assessment for Siting a Deep Geological Repository for Canada's Used Nuclear Fuel reports released by NWMO for each community [NWMO 2014, NWMO 2015].

In these reports, similar potential environmental interactions were identified for the three communities. The tables provided in these reports outlining the potential interactions by project phase (i.e., site selection, construction, operation, decommissioning and closure) are provided in Appendix A. Moreover, potential environmental interactions during the postclosure phase were determined based on the APM DGR description provided by [NWMO 2016]. These potential interactions are summarized in Table 4-1.

Table 4-1: Potential Interactions between the APM DGR and the Environment

Environmental Component	Project Phase				
	Site Selection Phase	Site Preparation and Construction Phase	Operations Phase	Decommissioning and Closure Phase	Postclosure Phase[(a)]
Atmospheric Environment					
Air Quality	●	●	●	●	
Noise	●	●	●	●	
Light	●	●	●	●	
Vibration		●	●		
Subsurface Environment (i.e., Geology and Hydrogeology)					
Groundwater Quality	●	●	●	●	●
Groundwater Flow	●	●	●	●	●
Aquatic Environment					
Surface Water Quality	●	●	●	●	●
Surface Water Flow	●	●	●	●	
Aquatic Habitat and Biota	●	●	●	●	
Terrestrial Environment					
Wildlife Habitat and Biota	●	●	●	●	●
Radiation and Radioactivity					
Radiation and Radioactivity		●	●	●	●
Cultural Resources (Indigenous Heritage Resources and Euro-Canadian Heritage Resources)					
Archaeological Resources	●	●			
Local Enjoyment of the Area			●	●	

Note:
'●' = Potential interaction between the APM DGR and the environmental component
(a) Potential environmental interactions during the postclosure phase were determined based on NWMO 2016
Source: Adapted from NWMO 2014, NWMO 2015, NWMO 2016

The Preliminary Assessment reports state that the management and mitigation of all potential environmental interactions identified for the APM DGR at the three communities are possible and no significant residual effects are anticipated [NWMO 2014, NWMO 2015]. However, for the purposes of this updated cumulative effects assessment, it has been assumed that all potential environmental interactions identified for the APM DGR have the potential to result in residual effects after the implementation of mitigation.

Radiation and radioactivity is a particular topic of interest for consideration of potential for additive effects. The radiological emissions from the APM DGR will consist of natural radioactivity, notably radon and uranium released from the rocks due to the underground excavation, as well as air or water discharges primarily from the surface facilities (i.e., the used fuel packaging plant). With the implementation of mitigation, such as handling the used fuel dry, minimal storage of used fuel on the surface, using corrosion-resistant containers to package the used fuel, welding and sealing the used fuel containers, and using appropriate ventilation systems, it is anticipated that no residual effects of radioactivity on humans and non-human biota will be predicted for the APM DGR. However, the likely effects of radiation doses to human and non-human biota as a result of the APM DGR are being addressed in the cumulative effects assessment of the DGR Project at the Bruce Nuclear site for the consideration of potential cumulative effects.

As outlined in Section 2, all residual effects are carried forward for the assessment of cumulative environmental effects regardless of whether they are considered a significant or a not significant residual effect. The potential environmental interactions identified for the APM DGR in Table 4-1 that could act cumulatively with the residual effects of the DGR Project at the Bruce Nuclear site are being carried forward for consideration in this updated cumulative effects analysis**.**

For the purpose of the updated cumulative effects analysis, it is assumed that the siting process for the APM DGR will take into consideration environmental constraints. In-design mitigation measures, an environmental management program, a radiation monitoring program, and good management practices (such as effective operating procedures) would avoid or reduce potential environmental effects. The required permits and approvals for a project of this nature would be obtained for the APM DGR, and conditions and additional mitigation measures identified through the permitting process implemented as required.

5. UPDATED ASSESSMENT OF CUMULATIVE EFFECTS IN CONSIDERATION OF THE APM DGR

This section provides a summary of the assessment completed for the DGR Project at the Bruce Nuclear site as presented in Section 10 of the EIS [OPG 2011a]. This section also provides the updated analysis of cumulative effects of the DGR Project at the Bruce Nuclear site on VECs in consideration of the APM DGR.

The APM DGR may act cumulatively with the DGR Project at the Bruce Nuclear site since the APM DGR may result in similar types of residual effects on VECs that will occur and persist within the same timeframe and affect the same geographic region as the residual effects of the DGR Project at the Bruce Nuclear site. Although the site preparation and construction phases of both projects are likely to occur at different times, the effects of the two projects will overlap temporally. Figure 2-2 shows the different phases of the APM DGR, and their estimated duration (per Section 4.1), in relation to the phases of the DGR Project at the Bruce Nuclear site.

The transportation of used fuel from the Bruce Nuclear site to the APM DGR was also already considered in the initial cumulative effects assessment carried out for the DGR Project at the Bruce Nuclear site (Table 10.4-3 in the EIS) [OPG 2011a]. However, for the purposes of this updated analysis, the transportation of used fuel from the Bruce Nuclear site to the APM DGR is considered in conjunction with the transportation of used fuel from other nuclear sites to the APM DGR when assessing for cumulative effects.

The following sections provide the updated cumulative effects assessment in consideration of the APM DGR. Each section examines potential cumulative effects per VEC in consideration of the potential residual effects of the APM DGR (see Section 4.2), and determines which effects affect the same VEC, and overlap temporally and spatially with the residual effects of the DGR Project at the Bruce Nuclear site.

5.1 SURFACE WATER QUANTITY AND FLOW

5.1.1 Potential Cumulative Effects

Residual adverse effects of the DGR Project at the Bruce Nuclear site were identified on the hydrology (i.e., change in flow) of existing engineered channels (i.e., North Railway Ditch and drainage ditch at Interconnecting Road). None of the residual adverse effects identified were assessed to be significant [OPG 2011a; OPG's response to IR-EIS-12-510 (OPG 2014)]. These residual effects are predicted to be restricted to the Site Study Area (Figure 5-1), which comprises only a small portion of the local watershed area, and are predicted to occur throughout all project phases. These effects are not predicted to extend into Stream C or Lake Huron beyond the point of discharge.

The cumulative effects assessment for surface water quantity and flow described in the EIS [OPG 2011a] used the Site Study Area as the cumulative effects study area (Figure 5-1) since the residual adverse effects of the DGR Project at the Bruce Nuclear site on surface water quantity and flow are restricted to that scale (i.e., site drainage).

Potential residual effects from the APM DGR have been identified on surface water flow during site selection, construction, operation, and decommissioning and closure of the APM DGR. The APM DGR will involve site clearing, construction dewatering, and management of surface water drainage, stormwater, and wastewater. A process and potable water supply will be required for the APM DGR (approximately 100 m^3/d), and may be sourced from a local river or waterbody. Mine water pumped from the underground dewatering sumps will be piped and discharged to a dewatering settling pond at an assumed estimated rate of 500 m^3/day. These activities may contribute to a change in flow in local drainage areas in the vicinity of the selected site for the APM DGR. Decommissioning and closure activities are expected to be similar to those encountered during site preparation and construction, and may also contribute to a change in surface water quantity and flow. Thus, the APM DGR is likely to have both an overlap in effect on the VEC (i.e., effects on surface water flow) and an overlap in time with the residual effects of the DGR Project at the Bruce Nuclear site on surface water quantity and flow. However, due to the location of the APM DGR with respect to the DGR Project at the Bruce Nuclear site (see Figure 5-1), an overlap of effects in space on surface quantity and flow is unlikely, as discussed further in Section 5.1.3.

5.1.2 Mitigation

Potential mitigation measures have been identified for the APM DGR to minimize effects on surface water quantity and flow. Dewatering for subsurface construction, surface water drainage management, operational and potable water supply, and waste water management could be designed and implemented in compliance with applicable regulations and permitting requirements (e.g., Ontario Ministry of Environment and Climate Change [MOECC] Environmental Compliance Approval [ECA], Permit to Take Water, as required). Although the extent of in-water work cannot be evaluated until the selected site for the APM DGR is known, the siting and design would seek to avoid or mitigate effects on surface water quantity and flow around the APM DGR site. Permits would be obtained for the APM DGR, as applicable, potentially including permitting with the local Conservation Authority, Ministry of Natural Resources and Forestry (MNRF), MOECC, and Fisheries and Oceans Canada (DFO), as required.

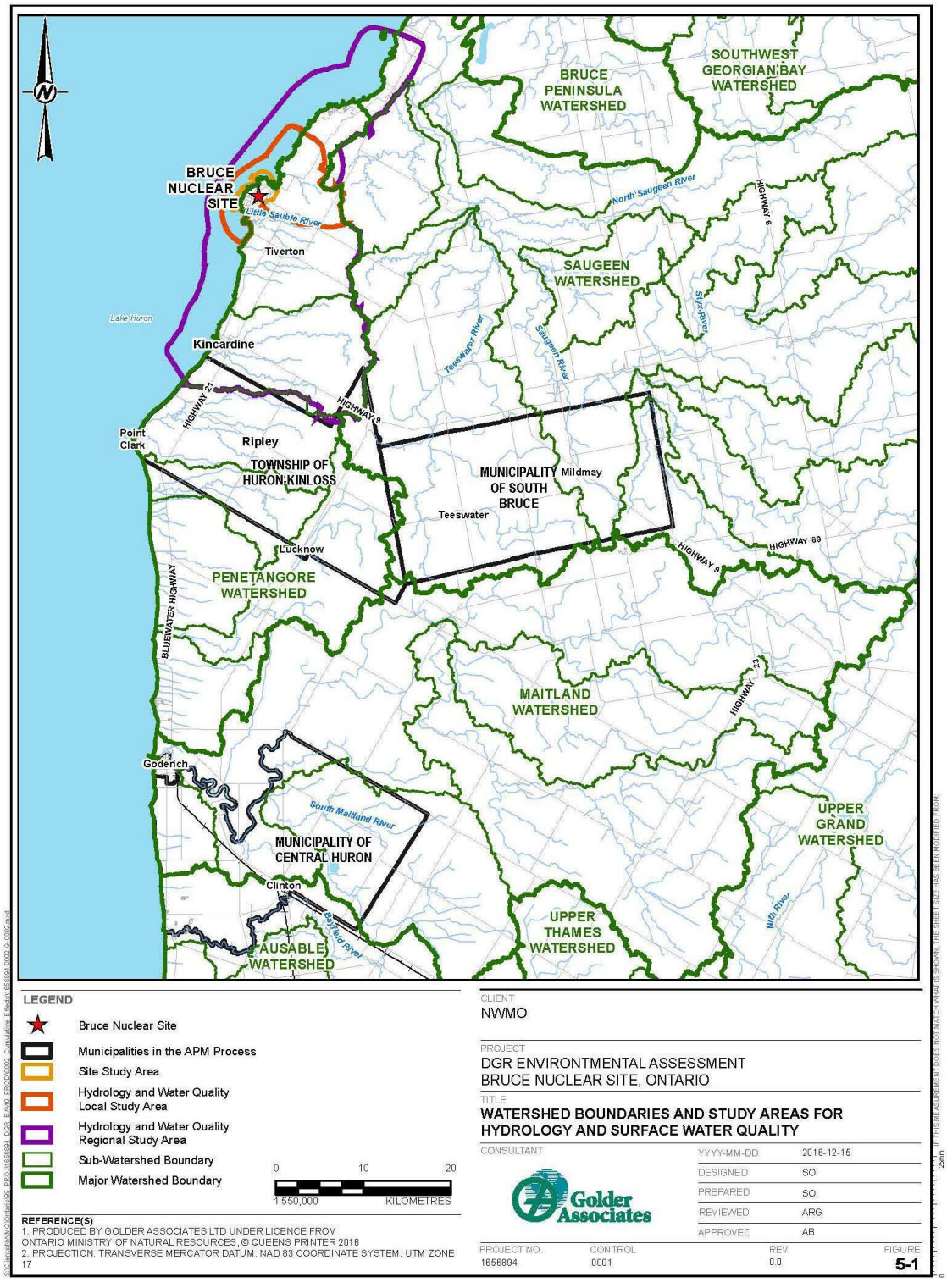

Figure 5-1: Watershed Boundaries and Study Areas for Hydrology and Surface Water Quality

5.1.3 Assessment of Cumulative Effects

The DGR Project at the Bruce Nuclear site is located within the Little Sauble River watershed, a small local watershed with several small watercourses draining directly into Lake Huron. Although an overlap in effect on the VEC and in time has been identified, the APM DGR will not drain into any local watercourse that flows through the DGR Project at the Bruce Nuclear site (i.e., not within the Little Sauble River watershed), or within a quaternary watershed (subwatershed) in the vicinity of the DGR Project at the Bruce Nuclear site (see Figure 5-1). Therefore, it is unlikely that activities of the APM DGR (i.e., water takings or discharges) would have an effect on surface water quantity and flow within the local drainage areas likely to be affected by the DGR Project at the Bruce Nuclear site in the Site Study Area.

Water takings from local rivers and waterbodies and mine dewatering discharges required for the APM DGR would be expected to be minimal (see Section 5.1.1) and are not likely to contribute to a cumulative change in surface water quantity and flow. Since the APM DGR would not be within the same local watershed or quaternary watershed as the DGR Project at the Bruce Nuclear site, potential cumulative residual effects of the APM DGR on surface water quantity and flow are unlikely.

Both the APM DGR and the DGR Project at the Bruce Nuclear site would be located in watersheds that ultimately discharge into Lake Huron. As noted above, the changes in contributing flow from the watersheds of either project are small compared to the total flow in Lake Huron. As defined in the EIS [OPG 2011a, Section 7.3.2], adverse effects are considered to be those where there is a predicted change in flow >±15% in the affected receiving waterbody. Therefore, no adverse cumulative effects on surface water quantity and flow in Lake Huron itself are likely.

Therefore, there are no likely adverse cumulative effect on surface water quantity and flow, and the conclusion in the EIS [OPG 2011a] that the DGR Project at the Bruce Nuclear site will not act cumulatively with other projects/activities on surface quantity and flow remains valid in consideration of the APM DGR.

5.2 TERRESTRIAL ENVIRONMENT

5.2.1 Potential Cumulative Effects

A residual adverse effect of the DGR Project at the Bruce Nuclear site on eastern white cedar was identified in the EIS but was assessed to be not significant [OPG 2011a; OPG's response to IR-EIS-12-510 (OPG 2014)]. The residual effect is predicted to occur at commencement of construction of the DGR Project at the Bruce Nuclear site, and remain in full effect until rehabilitation following decommissioning. The predicted loss of mixed wood forest containing eastern white cedar as a result of the DGR Project at the Bruce Nuclear site is estimated to be 8.9 hectares (ha) of an isolated and fragmented portion of the woodlot within the Site Study Area. The area of eastern white cedar to be removed as a result of the DGR Project at the Bruce Nuclear site is not large enough to make the population of eastern white cedar in the Terrestrial Environment Local Study Area (Figure 5-2) unsustainable.

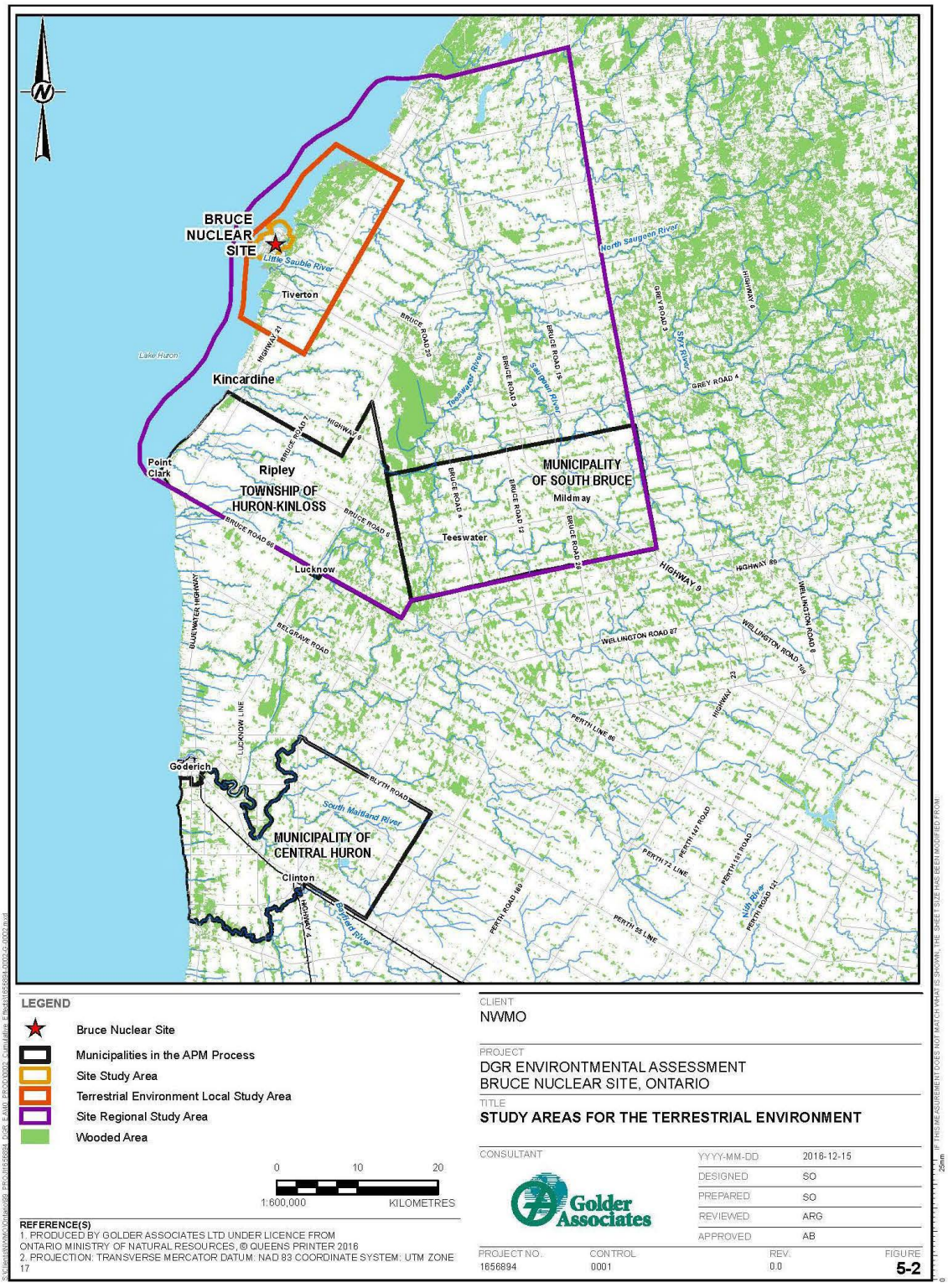

Figure 5-2: Study Areas for the Terrestrial Environment

The cumulative effects assessment for the DGR Project at the Bruce Nuclear site terrestrial environment [OPG 2011a] used the Site Study Area to determine the potential for the DGR Project at the Bruce Nuclear site to act cumulatively with other projects and activities on eastern white cedar, since the residual adverse effect of the DGR Project at the Bruce Nuclear site on the terrestrial environment is restricted to the Site Study Area (Figure 5-2). Although the residual effects of the DGR Project at the Bruce Nuclear site are restricted to the Site Study Area, the effects assessment inherently gave consideration to effects of other regional land uses or sources of stress on eastern white cedar, given that projected losses of regional forest cover would raise greater concern with respect to the loss of the stands within the Site Study Area (more specifically in the Project Area). No such future land uses were identified at a scale that cumulatively would compromise the sustainability of eastern white cedar due to its widespread occurrence throughout southern Ontario.

Potential residual effects from the APM DGR have been identified on terrestrial habitat or biota during all project phases of the APM DGR. The APM DGR will involve vegetation clearing for site access and for the construction of surface facilities and a waste rock management area. It is anticipated that surface facilities, waste rock management and the ventilation exhaust shaft, would require a total land clearing of up to 60 ha. These activities will contribute to a long-term loss of terrestrial vegetation, which may include mixed wood forest containing eastern white cedar. Therefore the APM DGR is likely to overlap in time with the residual effects of the DGR Project at the Bruce Nuclear site on eastern white cedar. Due to the location of the APM DGR relative to the DGR Project at the Bruce Nuclear site (see Figure 5-2), a spatial overlap of effects is unlikely (i.e., overlap in plant community loss, including eastern white cedar, is unlikely), as described further in Section 5.2.3.

5.2.2 Mitigation

The APM DGR site selection will consider environmental constraints such as the need for clearing trees for the construction of surface facilities. In-design mitigation may include selection of infrastructure and corridor locations to avoid protected areas and suitable habitat for sensitive or important plant communities (e.g., mixed wood forests with eastern white cedar) or species of conservation concern. These mitigation measures for the protection of terrestrial habitat will inherently protect plant communities of importance. However, for the purposes of the updated cumulative effects analysis, it is conservatively assumed the full 60 ha APM DGR surface footprint will be cleared. Where permitting may be required, for example from the local Conservation Authority or the municipality, the permit would be obtained prior to site clearing and conditions outlined in the permit would be implemented, as required.

5.2.3 Assessment of Cumulative Effects

Eastern white cedar is a prominent component of conifer and mixed woods throughout the Regional Study Area (Figure 5-2) and generally throughout southern Ontario. For example, it provides a large portion of the tree canopy cover in conifer and mixed woods in all of the forest stands that are present in the immediate vicinity of the DGR Project at the Bruce Nuclear site, as well as in many of the forest stands on Douglas Point, in the Municipality of Kincardine, major stretches of the Lake Huron Shoreline and in the area occupied by Bruce and Grey Counties [S.L. Ross Environmental Research et al. 1990]. As a result, it is likely that loss of mixed forest areas as a result of the APM DGR would be relatively small in relation to the abundance of eastern white cedar in the Regional Study Area.

Moreover, some literature [Krebs 1972, Cohen cited in Munkittrick et al. 2009] supports that a loss of 10% of plant populations is considered the threshold of measurability at a local scale. In order to estimate potential effects as a result of vegetation clearing for APM DGR, an appropriate local scale boundary of the quaternary watersheds within the municipalities where the APM DGR may be sited was assumed. A watershed boundary for the assessment of forest cover represents an ecological boundary that reflects the landscape patterns. Considering the extent of wooded areas within the quaternary watersheds overlapping the Township of Huron-Kinloss, the Municipality of South Bruce and the Municipality of Central Huron, the loss of vegetation up to 60 ha as a result of the APM DGR would represent a loss of wooded area less than 5% at the local scale. The DGR Project at the Bruce Nuclear site represents a loss of less than 1% of mixed wood forest containing eastern white cedar at the Local Study Area scale [OPG 2014]. Accordingly, the APM DGR in combination with the DGR Project at the Bruce Nuclear site will not constitute a loss larger than 10% of the woodland present at the local scales to the project.

Furthermore, even though there is the potential for a cumulative effect of loss of wooded area as a result of the APM DGR and the DGR Project at the Bruce Nuclear site, the APM DGR will be no closer than 20 km to the DGR Project at the Bruce Nuclear site (Figure 5-2). The APM DGR will therefore not result in plant community loss within the DGR Project at the Bruce Nuclear site Terrestrial Environment Local Study Area (i.e., there is no spatial overlap of plant community loss including eastern white cedar).

Therefore, based on the above, there are no likely adverse cumulative effects on the eastern white cedar VEC in consideration of the APM DGR, and the assessment of cumulative effects in the EIS [OPG 2011a] for the terrestrial environment remains valid.

5.3 AQUATIC ENVIRONMENT

5.3.1 Potential Cumulative Effects

Residual adverse effects of the DGR Project at the Bruce Nuclear site on the aquatic environment were identified, specifically regarding the removal of burrowing crayfish habitat, and the alteration of non-critical aquatic habitat in the South Railway Ditch. The residual effects were assessed to be not significant [OPG 2011a; OPG's response to IR-EIS-12-510 (OPG 2014)].

The residual effects on the aquatic environment are predicted to be limited to the Project Area, and are predicted to be continuous through the duration of site preparation and construction, operation, and decommissioning. The predicted loss/alteration of aquatic habitat as a result of the DGR Project at the Bruce Nuclear site accounts for less than 1% of non-critical habitat in the Project Area. The habitat loss or alteration is not expected to cause changes to the ecological function of the aquatic community or aquatic habitats in the Site Study Area (Figure 5-1). Moreover, the affected habitat is of marginal (non-critical) quality for the aquatic VECs when compared to the quality of habitat available elsewhere in the Aquatic Environment Local Study Area (Figure 5-1; equivalent to the Hydrology and Surface Water Quality Local Study Area).

For the purposes of this updated analysis, the Aquatic Environment Local Study Area is used to determine the potential for the DGR Project at the Bruce Nuclear site to act cumulatively with

APM DGR on the aquatic environment. The APM DGR has the potential to cause a residual adverse effect on aquatic habitat and biota during all project phases. The APM DGR will require clearing for site access and for the construction of surface facilities, water supply, and a waste rock management area, and waste rock will continue to be generated during operations. These activities will contribute to loss of aquatic habitat, which may include burrowing crayfish habitat, as well as habitat for aquatic VECs identified in the South Railway Ditch (i.e., redbelly dace, creek chub, variable leaf pondweed, benthic invertebrates). As discussed in Section 5.2.1, the dedicated areas required for the APM DGR may account for a total area of approximately 60 ha that may be cleared and disturbed for the APM DGR. These areas to be cleared and disturbed for the APM DGR may include aquatic habitat. Thus, the APM DGR has the potential to overlap in time with the residual effects of the DGR Project at the Bruce Nuclear site on the aquatic environment. Conversely, due to the location of the APM DGR with respect to the DGR Project at the Bruce Nuclear site (see Figure 5-1), an overlap of effects in space on the aquatic environment is unlikely, as discussed further in Section 5.3.3.

5.3.2 Mitigation

Siting, in-design mitigation measures and implementation of an environmental management program would reduce environmental effects of the APM DGR on the aquatic environment. In-design mitigation could include measures such as selection of infrastructure and corridor locations to avoid protected areas and aquatic habitats, or species of conservation concern. Consideration could be given to the timing of activities to mitigate effects on aquatic biota (e.g., outside of critical periods). Permits are expected to be required for the APM DGR, including permitting with the local Conservation Authority, DFO, and the MNRF, and would be obtained as required. Rehabilitation measures would be implemented upon decommissioning of the APM DGR.

5.3.3 Assessment of Cumulative Effects

The aquatic VECs that will be affected by the DGR Project at the Bruce Nuclear site are resilient species. The aquatic communities in the Site Study Area have sustained themselves despite a number of previous human-related disturbances. Moreover, the aquatic VECs in the South Railway Ditch are common and widespread throughout Ontario, and occur in a wide range of habitat types. There is burrowing crayfish habitat throughout the Site Study Area and burrowing crayfish populations are present within the Aquatic Environment Local Study Area in areas where suitable wetland and soil conditions exist.

Considering the location of the municipalities being considered for the APM DGR site (Figure 5-1), it is unlikely that the APM DGR will result in loss/disturbance of the same aquatic communities/habitat in the Local Study Area for the DGR Project at the Bruce Nuclear site. The potential loss/disturbance of aquatic habitat for the aquatic VECs as a result of the APM DGR would be constrained to within or in the immediate vicinity of the APM DGR site. Moreover, the APM DGR and the DGR Project at the Bruce Nuclear site will not be located within the same local watershed (i.e., Little Sauble River watershed, see Section 5.1.3) or quaternary watershed (Figure 5-1). Therefore, there will be no spatial overlap of effects on the aquatic environment within the Aquatic Environment Local Study Area defined for the DGR Project at the Bruce Nuclear site.

In summary, there are no adverse cumulative effects on aquatic VECs considering the nature of the potential effects, mitigation measures of the APM DGR, and the distance between the DGR Project at the Bruce Nuclear site and the APM DGR. The assessment of cumulative effects in the EIS [OPG 2011a] for the aquatic environment remains valid in consideration of the APM DGR.

5.4 AIR QUALITY

5.4.1 Potential Cumulative Effects

A residual adverse effect of the DGR Project at the Bruce Nuclear site on air quality was identified and was assessed to be not significant [OPG 2011a; OPG's response to IR-EIS-12-510 (OPG 2014)]. The residual effect on air quality is predicted to extend just beyond the Site Study Area (i.e., just beyond the fence line of the Bruce Nuclear site) into the Atmospheric Environment Local Study Area (Figure 5-3), and is assumed to occur throughout the site preparation and construction, operation, and decommissioning phases at different magnitudes.

During site preparation and construction of the DGR Project at the Bruce Nuclear site, the maximum ambient concentrations are predicted to increase for nine of the air quality indicators, and the maximum ambient concentrations are predicted to be greater than their relevant federal and provincial ambient air quality criteria for 24-hour suspended particulate matter, 24-hour airborne particles with nominal aerodynamic diameters smaller than 10 micrometres (μm) in diameter (PM_{10}), and 24-hour airborne particles with nominal aerodynamic diameters smaller than 2.5 μm in diameter ($PM_{2.5}$). During operations of the DGR Project at the Bruce Nuclear site, the maximum ambient concentrations are predicted to increase for eight of the air quality indicators (the threshold for an adverse effect), but none of the predicted maximum increases is predicted to be greater than its relevant ambient air quality criteria.

The cumulative effects assessment for air quality described in the EIS [OPG 2011a] used the Atmospheric Environment Local Study Area as the cumulative effects study area (Figure 5-3).

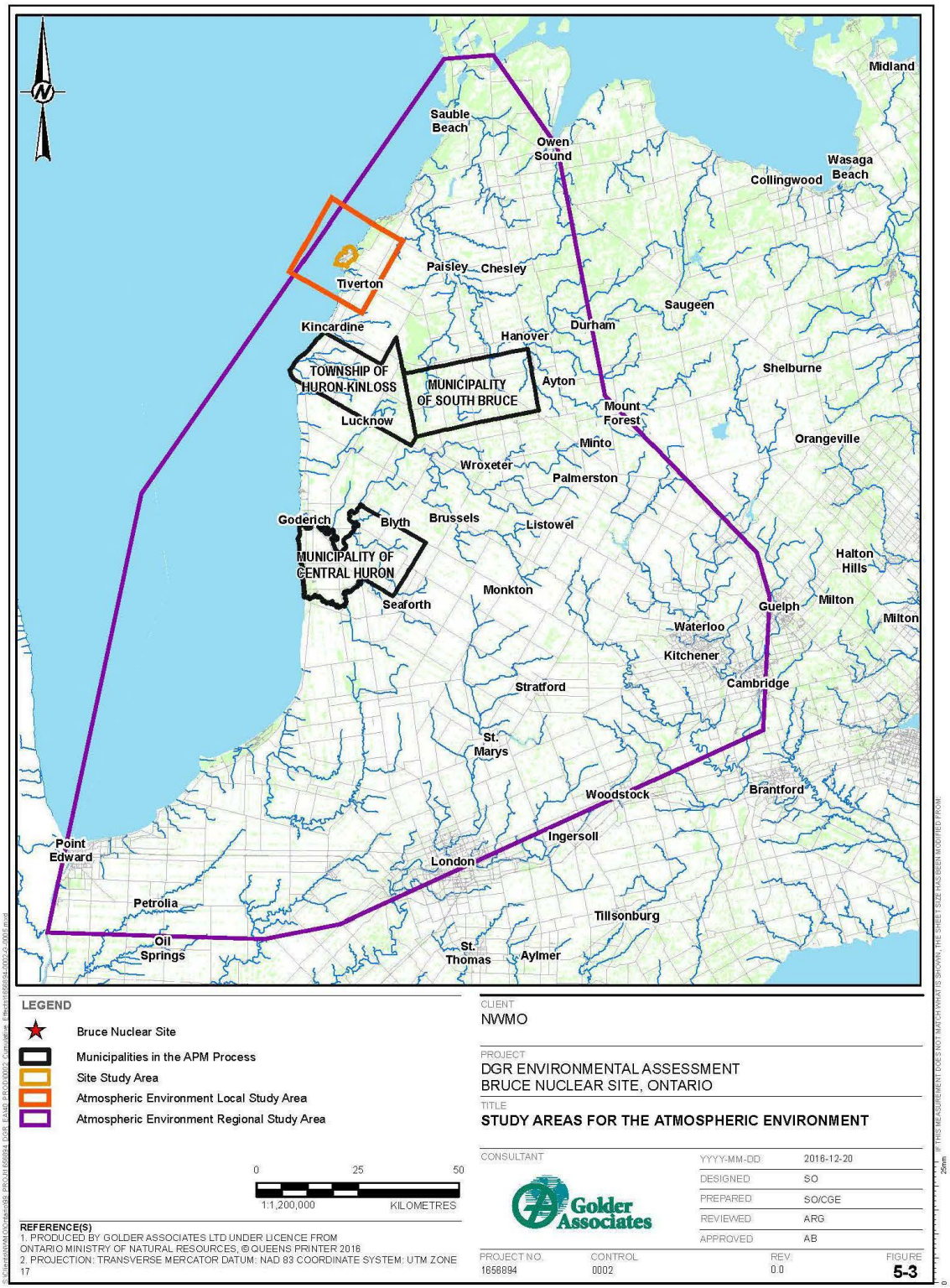

Figure 5-3: Study Areas for the Atmospheric Environment

Potential residual effects from the APM DGR on air quality have been identified during site selection, construction, operation, and decommissioning and closure of the APM DGR. The APM DGR will involve surface and subsurface investigations of the preferred site, vegetation clearing for site access, construction of surface and underground facilities, transportation of used fuel from nuclear sites to the APM DGR, vehicle and equipment use for placement of used fuel in the repository during operations, and vehicle and equipment use associated with decommissioning and closure activities. All these activities would contribute to changes in ambient air quality as a result of the APM DGR. Thus, the APM DGR is likely to have both an overlap in effect on the VEC (i.e., effects on air quality) and an overlap in time with the residual effects of the DGR Project at the Bruce Nuclear site on air quality.

The effects of the APM DGR on air quality are likely to be similar in nature to those identified for the DGR Project at the Bruce Nuclear site during site preparation and construction, operations, and decommissioning. However, the APM DGR will have repository construction activities throughout its operations phase, as additional placement rooms will be continuously excavated. It is estimated that approximately 1,580,000 m^3 of (unbulked) rock will be excavated for the APM DGR in comparison to approximately 645,000 m^3 of waste rock that will be excavated for the DGR Project at the Bruce Nuclear site during underground construction. Thus the effects on air quality during site preparation and construction may be lower than for the DGR Project at the Bruce nuclear site, but would be higher in magnitude during the operation phase of the APM DGR relative to the DGR Project at the Bruce Nuclear site. Both projects occur within the Atmospheric Environment Regional Study Area (Figure 5-3) and therefore their effects on air quality may overlap spatially.

5.4.2 Mitigation

The potential residual effects of the APM DGR are likely to occur at infrequent intervals similar to the residual effects of the DGR Project at the Bruce Nuclear site, due to the variability of hourly meteorological conditions. Good management practices and environmental management plans could be implemented to mitigate air emissions of the APM DGR, which would minimize the emissions of air quality indicator compounds throughout all phases. Applicable permits protective of the environment (e.g., an ECA from the MOECC) would be obtained, as required, for the operation of stationary sources at the APM DGR, which will require demonstration of compliance with applicable legislation (e.g., Ontario Regulation [O. Reg.] 419/05 of the *Environmental Protection Act*).

5.4.3 Assessment of Cumulative Effects

The residual effects of the DGR Project at the Bruce Nuclear site occur within its Atmospheric Environment Local Study Area, which extends approximately 10 km around the Bruce Nuclear site. The effects of the APM DGR are unlikely to extend into the Atmospheric Environment Local Study Area as it will be at least 20 km distant and possibly as far as 86 km, depending on the location of the selected site.

It is recognized that a cumulative effect on air emissions could occur within the DGR Project at the Bruce Nuclear site Atmospheric Environment Regional Study Area (Figure 5-3) since the APM DGR will fall somewhere within one of the three communities this area and the air quality at this scale represents the effect of air emissions transported in the region; thus, there is a

potential for regional spatial overlap of effects between the APM DGR and the DGR Project at the Bruce Nuclear site.

The potential residual effects of the APM DGR on air quality would occur at infrequent intervals that are unlikely to coincide with the effects of the DGR Project at the Bruce Nuclear site. They are also not likely to act cumulatively on air quality at the same receptors. It is unlikely that activities that generate air emissions associated with each project will occur at the exact same time due to the anticipated infrequent nature of air emissions across the phases of both projects, and it is also unlikely that they will persist in the atmosphere for the same duration, due to the likely variable timing of specific equipment operation and project activities. Considering the nature of the potential effects on air quality (i.e., immediately reversible), the anticipated mitigations that would be implemented at the APM DGR to meet local air quality requirements, the distance of the APM DGR from the OPG DGR Atmospheric Environment Local Study Area, the contribution of the APM DGR to cumulative effects on air quality would not be measurable (i.e., maximum cumulative concentrations of the air quality indicators resulting from the combined projects are not predicted to be higher than the maximum concentrations of the air quality indicators for one of the projects on its own).

Therefore, adverse cumulative effects of the DGR Project at the Bruce Nuclear site in combination with the APM DGR on air quality is not likely. Based on the above, the assessment of cumulative effects in the EIS [OPG 2011a] for air quality remains valid in consideration of the APM DGR.

5.5 NOISE LEVELS

5.5.1 Potential Cumulative Effects

A residual adverse effect of the DGR Project at the Bruce Nuclear site on noise levels was identified and was assessed to be not significant [OPG 2011a; OPG's response to IR-EIS-12-510 (OPG 2014)]. The residual effect on noise levels is predicted to extend over a short distance (approximately 400 m) beyond the Site Study Area (i.e., within the Atmospheric Environment Local Study Area [Figure 5-3]), and be limited to the residences located in the vicinity of Baie du Doré. Considering the mitigation measures proposed for the DGR Project at the Bruce Nuclear site, the maximum predicted increase in noise levels is predicted to be 5 decibels (dB) at receptor locations in the Baie du Doré during the quietest hour (primarily during late night/early morning hours). The residual effect is predicted to occur throughout the site preparation and construction, and decommissioning phases.

The cumulative effects assessment for noise levels in the EIS [OPG 2011a] identified the Atmospheric Environment Local Study Area as the cumulative effects study area (Figure 5-3).

Potential residual effects from the APM DGR have been identified on noise levels during site selection, construction, operation, decommissioning, and closure of the APM DGR. The APM DGR will involve detailed surface and subsurface investigations of the preferred site, vegetation clearing for site access, construction of surface and underground facilities, transportation of used fuel from nuclear sites to the APM DGR, vehicle and equipment use for placement of used fuel in the repository during operations, and vehicle and equipment use associated with decommissioning and closure activities. All these activities will also contribute to an increase in

ambient noise levels as a result of the APM DGR. Thus, the APM DGR is likely to have both an overlap in the effect on the VEC (i.e., effects on noise levels) and an overlap in time with the residual effects of the DGR Project at the Bruce Nuclear site on noise levels.

The potential residual effects of the APM DGR on noise levels are likely to be similar in scale to those identified for the DGR Project at the Bruce Nuclear site during site preparation and construction, and decommissioning. However, unlike the DGR Project at the Bruce Nuclear site, the operation phase of the APM DGR will include the excavation of additional placement rooms (i.e., beyond the initial panels to be built during the construction phase), and the transportation of the excavated rock to the waste rock management area at surface. Therefore, this noise source would extend throughout the APM DGR operations phase.

Noise generated by vehicles transporting used fuel from nuclear sites to the APM DGR would extend over the travel routes and would be intermittent in nature. Assuming road transport, it is estimated that there would be about two shipments per day of used fuel to the APM DGR on average. Due to the location of the APM DGR with respect to the DGR Project at the Bruce Nuclear site (see Figure 5-3), a spatial overlap of effects on noise levels due to road transport in the vicinity of Baie du Doré is unlikely, as discussed further in Section 5.5.3.

5.5.2 Mitigation

Good management practices have been identified for the APM DGR [NWMO 2016] that are likely to control and attenuate noise levels throughout all phases, and ensure that they would meet applicable regulatory limits and guidelines (e.g., MOECC guidelines for noise or equivalent), and municipal bylaws, as required. Relevant permits would be acquired for the APM DGR (e.g., an ECA from the MOECC), and any conditions and additional mitigation measures identified in the permit with regards to noise emissions would be implemented, as applicable.

5.5.3 Assessment of Cumulative Effects

The APM DGR site would be at a minimum 20 km from the DGR Project at the Bruce Nuclear site, and the Baie du Doré area that is predicted to experience the highest changes in noise levels as a result of the DGR Project at the Bruce Nuclear site. Noise levels attenuate with distance, with most of the DGR Project noise predicted to attenuate within 400 m of the Bruce Nuclear site.

Similar activities are anticipated to occur at the APM DGR site. Adverse effects on noise levels were considered to be likely if the predicted cumulative ambient noise levels at a receptor location change by more than 3 dB [OPG 2011a]. Given the spatial separation (i.e., >20 km) activities at the APM DGR will not contribute to ambient noise levels in the vicinity of the Baie du Doré.

Movement of used fuel from the Bruce Nuclear site to the APM DGR was already considered in the cumulative effects assessment for the DGR Project at the Bruce Nuclear site [OPG 2011a]. It is here also considered in this updated cumulative effects analysis along with the shipment of used fuel from other nuclear sites to the APM DGR site and other sources of noise at the APM DGR site. The estimated number of shipments per day arriving at the APM DGR (i.e., average of approximately two per day) and leaving the Bruce Nuclear site to the APM DGR site (total of

10,600 shipments over the 40 year operation phase of the APM DGR), would make a minimal contribution to overall noise levels in the vicinity of both projects. Moreover, transport of used fuel from nuclear sites other than the Bruce Nuclear site would not occur on routes close to the Bruce Nuclear site; thus, a cumulative contribution to ambient noise levels in the vicinity of the DGR Project at the Bruce Nuclear site, specifically the Baie du Doré, due to the transportation of used fuel to the APM DGR is unlikely.

In summary, no adverse cumulative effects are likely on the noise level VEC. This is considering the nature of the potential residual effects and anticipated mitigation associated with the APM DGR, along with the distance of an APM DGR site relative to the DGR Project at the Bruce Nuclear site, and the Baie du Doré residences in particular. The assessment of cumulative effects in the EIS [OPG 2011a] for noise levels therefore remains valid in consideration of the APM DGR.

5.6 HUMAN HEALTH

5.6.1 Potential Cumulative Effects

A residual effect of the DGR Project at the Bruce Nuclear site was identified on the overall health of local residents and members of Indigenous communities with respect to the exposure to acrolein in air during the site preparation and construction phases (acrolein is generated by combustion sources including vehicles). However, based on the results of a human health risk assessment, the resulting health risks were considered low and the residual effect was assessed to be not significant [OPG 2011a]. The residual effect is predicted to be restricted to the Human Health Local Study Area, which corresponds to the 10 km emergency planning zone (centred at the Bruce Nuclear site), as identified by Emergency Management Ontario [OPG 2011a].

For the purposes of this updated analysis, the cumulative effects assessment for human health uses the Local Study Area as the cumulative effects assessment study area since the residual adverse effect of the DGR Project at the Bruce Nuclear site on human health is limited to that geographic extent.

The APM DGR will involve surface and subsurface investigations of the preferred site, vegetation clearing for site access, construction of surface and underground facilities, transportation of used fuel from nuclear sites to the APM DGR, vehicle and equipment use for placement of used fuel in the repository during operations, and vehicle and equipment use associated with decommissioning and closure activities. All these activities may require the use of motor vehicles which can contribute to acrolein emissions that may affect human health of local residents and members of Indigenous communities. Thus, the APM DGR has the potential to have an overlap of effect on the VEC (i.e., effects on human health) with the residual effects of the DGR Project at the Bruce Nuclear site on human health. The residual effects of the DGR Project at the Bruce Nuclear site on human health associated with acrolein in air occur within its Local Study Area. Thus, a spatial overlap of effects between the APM DGR and the DGR Project at the Bruce Nuclear site is unlikely, as further discussed in Section 5.6.3.

The effects assessment of the DGR Project at the Bruce Nuclear site determined that the contribution to acrolein concentrations resulting from the DGR Project at the Bruce Nuclear site

is small relative to background levels. As discussed in Section 5.4, the effects of the APM DGR on overall air quality are likely to be similar in scale to those identified for the DGR Project at the Bruce Nuclear site, except that repository construction activities of the APM DGR will occur throughout its operation phase. Thus, the effects on overall air quality, including acrolein emissions, may be higher in magnitude than for the DGR Project at the Bruce Nuclear site during its operation.

5.6.2 Mitigation

Consideration for in-design mitigation measures, good management practices and environmental management plans could be used to mitigate air emissions of the APM DGR, which would minimize air emissions from motor vehicles throughout all phases of the project (see Section 5.4.2).

5.6.3 Assessment of Cumulative Effects

Similar effects of the APM DGR on air quality are unlikely to extend into the DGR Project at the Bruce Nuclear site's Local Study Area as the APM DGR will be at least 20 km distant and possibly as far as 86 km, depending on the location of the selected site. However, it is recognized that a cumulative effect on overall air quality can occur within the DGR Project at the Bruce Nuclear site Atmospheric Environment Regional Study Area (Figure 5-3) since all APM communities fall within this area; thus, there is potential for a regional spatial overlap of effects between the APM DGR and the DGR Project at the Bruce Nuclear site to occur with regard to overall air quality.

However, the potential residual effects of the APM DGR on air quality would occur at infrequent intervals that are unlikely to coincide with the effects of the DGR Project at the Bruce Nuclear site. It is unlikely that air emissions associated with each project (including acrolein emissions) will occur at the exact same time due to the anticipated infrequent nature in air emissions across the phases of both projects, and it is also unlikely that they will persist in the atmosphere for the same duration. Acrolein's high vapour pressure indicates that it will occur primarily in the vapour phase [MOE 2005]. Acrolein will degrade and disperse in the atmosphere in a short timeframe and it is not likely to be transported over long distances.

Considering the nature of the potential effects on overall air quality, the expected contribution of acrolein emissions with respect to background conditions, and the location of the APM communities with respect to the DGR Project at the Bruce Nuclear site, the contribution of the APM DGR to cumulative effects on air quality, and more specifically human health with respect to acrolein in air, would be not be adverse (i.e., maximum cumulative concentrations of acrolein resulting from the combined projects are not predicted to be higher than the maximum concentrations of the air quality indicators for one of the projects on its own at a given human receptor location). Therefore, an adverse cumulative effect of the DGR Project at the Bruce Nuclear site in combination with the APM DGR on human health is not likely.

5.7 SOCIO-ECONOMIC ENVIRONMENT

5.7.1 Potential Cumulative Effects

A residual adverse effect of the DGR Project at the Bruce Nuclear site regarding increased noise levels and their effect on the enjoyment of private property was identified. The residual effect was assessed to be not significant [OPG 2011a]. The residual effect on the enjoyment of private property as a result of the DGR Project at the Bruce Nuclear site is predicted to be limited to a small portion of the Local Study Area, specifically to the residences located in the vicinity of Baie du Doré. Considering the mitigation measures proposed for the DGR Project at the Bruce Nuclear site, the maximum predicted increase in noise levels is predicted to be 5 dB at receptor locations in the Baie du Doré during the quietest hour (as discussed in Section 5.5), which is considered a noticeable level of change that will have an effect on the enjoyment of private property. The residual effect is predicted to occur throughout the site preparation and construction, and decommissioning phases.

For the purposes of this updated analysis, the cumulative effects assessment for the socio-economic environment (enjoyment of private property) uses the Local Study Area, particularly the Baie du Doré residences, as the cumulative effects assessment study area since the residual adverse effect of the DGR Project at the Bruce Nuclear site is limited to that geographic extent.

Potential residual effects from the APM DGR have been identified on the overall local enjoyment of the area during operation and decommissioning and closure of the APM DGR. Regarding potential noise sources that may have an effect on the enjoyment of the area (i.e., the vicinity of the selected APM DGR site), the APM DGR will involve transportation of used fuel from nuclear sites to the APM DGR site, vehicle and equipment use for placement of used fuel in the repository during operations, and vehicle and equipment use associated with decommissioning and closure activities. All these activities will contribute to an increase in ambient noise levels as a result of the APM DGR that may have an effect on the enjoyment of private property. Thus, the APM DGR has the potential to have both an overlap of effect on the VEC (i.e., increase in noise levels that may affect private enjoyment) and an overlap in time with the residual effects of the DGR Project at the Bruce Nuclear site on the enjoyment of private property. Given the location of the APM DGR with respect to the DGR Project at the Bruce Nuclear site (see Figure 5-3), a spatial overlap of effects on use and enjoyment of property due to road transport in the vicinity of Baie du Doré is unlikely, as discussed further in Section 5.7.3.

5.7.2 Mitigation

Mitigation measures related to increased noise levels to be implemented for the APM DGR have been described in Section 5.5.2. Moreover, the design of the APM DGR would be developed to reflect the specific location selected for the repository and facilities as agreed with the host community. A specific location would be selected for the APM DGR if there is a sufficient degree of confidence that a safe, secure and socially acceptable transportation plan can be developed to transport used nuclear fuel to that location. NWMO would conduct transportation planning and evaluations aligned with community input [NWMO 2016].

5.7.3 Assessment of Cumulative Effects

The APM DGR site would be a minimum 20 km from the DGR Project at the Bruce Nuclear site, and the Baie du Doré area. Noise levels attenuate with distance, with most of the DGR Project noise predicted to attenuate within 400 m of the Bruce Nuclear site, as discussed in Section 5.5.3. It is unlikely that activities associated with the APM DGR would contribute to ambient noise levels in the vicinity of the Baie du Doré, and have a cumulative effect on the private enjoyment of the Baie du Doré area. Moreover, the transport of used fuel from the Bruce Nuclear site to the APM DGR (10,600 shipments over the 40 year operation phase of the APM DGR) would not have a measurable cumulative contribution to noise levels in the vicinity of the DGR Project at the Bruce Nuclear site and the private enjoyment of the Baie du Doré area. The additional approximately two trips per day of fuel shipments are small relative to the thousands of employees travelling to and from the Bruce Nuclear site daily. Furthermore, shipments of used fuel would not likely travel specifically on the roads closest to the Baie du Doré residences.

The additional transport of used fuel from other nuclear sites to the APM DGR would not occur on routes close to the DGR Project at the Bruce Nuclear site; therefore, this additional transport would not affect the ambient noise levels in the vicinity of the Baie du Doré area. Thus, this additional transport associated with the APM DGR is not expected to affect the private enjoyment of the Baie du Doré area.

In summary, considering the distance of an APM DGR site with respect to the DGR Project at the Bruce Nuclear site in general, and the Baie du Doré residences in particular, the minimal contribution to noise levels as a result of the transport of used fuel from the Bruce Nuclear site to the APM DGR site, and the difference in routes associated with the additional transport of used fuel from other nuclear sites, no adverse cumulative effect on the private enjoyment of the Baie du Doré area is likely.

Based on the above, the assessment of cumulative effects described in the EIS [OPG 2011a] for the private enjoyment of the Baie du Doré area remains valid in consideration of the APM DGR.

5.8 RADIATION AND RADIOACTIVITY

5.8.1 Potential Cumulative Effects

The levels of radiation and radioactivity due to the DGR Project at the Bruce Nuclear site are predicted to be well below relevant criteria, and therefore no residual effects were identified. However, this assessment has considered the incremental effects of the APM DGR to allow comparison with regulatory standards and consideration of potential cumulative effects. Potential radiological emissions of the DGR Project at the Bruce Nuclear site and APM DGR are described below.

The assessment of potential exposure to workers from the normal operation of the DGR Project at the Bruce Nuclear site concluded that Nuclear Energy Worker radiation exposure as a result of the DGR Project is predicted to be much lower than OPG's occupational dose target of 10 milliSieverts per year (mSv/a), which is below the Canadian Nuclear Safety Commission (CNSC) worker dose limit of effectively 20 mSv/a (maximum 50 mSv in one year).

Project-related doses to members of the public due to external radiation from the site, and from airborne and waterborne emissions from the DGR Project at the Bruce Nuclear site, are predicted to be well below the regulatory limit for members of the public of 1 mSv/a, including in the long-term after the DGR Project at the Bruce Nuclear site has been closed and sealed. The public doses were calculated assuming people lived at the Bruce Nuclear site fence line during the operating phase and directly on top of the repository in the postclosure phase; however, this is unlikely to occur. Any dose to people living farther from the site would be much smaller. Moreover, Project-related doses to members of the public are expected to be lower than the natural background dose rate of about 1.8 mSv/a (i.e., below 1 mSv/a). Therefore, incremental doses to workers and members of the public would remain well below regulatory limits, and are not considered to be adverse.

Aquatic and terrestrial biota receive radiation doses from exposure to radioactivity in the atmosphere, surface water and from other media into which it transfers. The effects of the DGR Project at the Bruce Nuclear site radioactivity emissions would be an increment to the baseline concentrations around the site. However it should be noted that over 50% of the waste inventory intended for the DGR is already in storage at the Western Waste Management Facility (WWMF), and will increase to 70% by the time the operations phase begins. As wastes are transferred into the DGR, the corresponding emissions from the WWMF will decrease, so any increase in environmental concentrations as a result of the DGR Project at the Bruce Nuclear site will be offset, in part, by the decrease in concentrations of emissions from the WWMF.

As the DGR Project at the Bruce Nuclear site emissions will be less than the current total Bruce Nuclear site emissions, a screening level estimate of the potential DGR Project at the Bruce Nuclear site effects on non-human biota was made by conservatively assuming the project causes an incremental increase in tritium and carbon-14 concentrations equal to the existing values. This conservatively assumed radioactivity release to the terrestrial and aquatic environment from the DGR Project at the Bruce Nuclear site showed that an adverse effect on non-human biota is not expected.

The APM DGR has the potential for radiological emissions during construction (primarily radon emitted by the host rock), operations (radon arising from transportation of used fuel from nuclear sites, and repository operation), decommissioning and closure (radon and infrastructure removal), and postclosure (release of radioactivity from underground if containers fail), and therefore may create an additive effect with the DGR Project at the Bruce Nuclear site.

5.8.2 Mitigation

In order for the APM DGR to receive a licence, the potential emissions from the APM DGR would have to be mitigated through site selection, engineering design and operations such that the releases did not result in doses that exceeded regulatory criteria. Mitigation measures include the selection of the site and repository depth with favorable geology, and an engineered barrier system to isolate and contain the used fuel within the repository footprint. This facility would be monitored to ensure that it met all regulatory and environmental requirements, in particular at the APM DGR site fence line. The CNSC may also conduct an independent environmental monitoring program as per its current practice around existing nuclear facilities [CNSC 2016].

5.8.3 Assessment of Cumulative Effects

Radiological releases from both the DGR Project at the Bruce Nuclear site and the APM DGR are expected to be much less than the regulatory limits at the respective facility fence lines, and these limits (e.g., 1 mSv/a public dose) are conservative values where no effects will be observed. Moreover, the potential APM DGR communities in Bruce County and Huron County are at least 20 km from the DGR Project at the Bruce Nuclear site. Since neither project is predicted to generate adverse radiological effects and since both projects will be located far from one another, adverse cumulative radiological effects are not likely to occur.

In both projects, the waste radioactivity would be largely contained within and near the repository. Due to the low permeability of the host rock, small amounts could diffuse into the surrounding host rock. This could eventually lead to an increase in radioactivity in the deep groundwater systems near the repositories. These groundwater systems extend across the sedimentary rock formations in this area, and in particular would likely be connected between the area around the DGR Project at the Bruce Nuclear site, and a potential APM DGR site in the area. However these systems are highly saline (non potable) and move very slowly.

The effect on these groundwater systems from the DGR Project at the Bruce Nuclear site was evaluated in response to an Information Request, IR-EIS-08-397 [OPG's response to IR-EIS-08-397 (OPG 2013)], where the radioactivity levels in more permeable groundwater systems directly below (Cambrian) and above (Guelph) the DGR Project at the Bruce Nuclear site were evaluated. The calculated levels at even 1 km distant were many orders of magnitude below any level of concern. Similar calculations have not been made for the APM DGR as it is still in the siting phase. However, in general, a similarly very small effect would be expected due to the durable containers and the low permeability of the surrounding rock formations. These indicate that any cumulative effect of slow postclosure transport of radioactivity through deep groundwater systems between the two DGRs would be very unlikely.

It is also important to recognize that the overall purpose of the DGR Project at the Bruce Nuclear site and the APM DGR is to isolate L&ILW and nuclear fuel waste, respectively, from humans and the surface environment. Managing these wastes deep underground in a repository will inherently result in a net reduction in potential radiological exposure to humans and non-human biota in the long term.

Current radioactivity levels in Lake Huron and the other Great Lakes are well below levels that would affect humans or biota, and continue to decline following the international moratorium on atmospheric nuclear weapons testing in the 1960's. Isolation and containment of radiological sources deep underground as a cumulative outcome of the DGR Project at the Bruce Nuclear site and APM DGR will help ensure the continued protection of Lake Huron from potential radiological effects in the very long term.

Based on the above, a cumulative effect on radiation and radioactivity as a result of the DGR Project at the Bruce Nuclear site and the APM DGR is unlikely. The assessment of cumulative effects described in the EIS [OPG 2011a] for radiation and radioactivity remains valid in consideration of the APM DGR.

5.9 SIGNIFICANCE OF CUMULATIVE EFFECTS

Any residual adverse cumulative effects must be assessed for significance. No residual adverse cumulative effects of the DGR Project at the Bruce Nuclear site were identified in consideration of the APM DGR. Therefore, the assessment of the significance of the residual adverse cumulative effects is not required. Follow-up monitoring is proposed for the DGR Project at the Bruce Nuclear site to confirm adverse effects do not occur and that in-design mitigation measures are effective, as described in Section 13 of the EIS [OPG 2011a]. It is anticipated that a follow-up program would be developed for the APM DGR once a site-specific assessment of environmental effects is completed.

6. ASSESSMENT OF CUMULATIVE EFFECTS FOR MALFUNCTIONS, ACCIDENTS AND MALEVOLENT ACTS

With respect to the DGR Project at the Bruce Nuclear site, malfunctions, accidents, and malevolent acts were considered in both the EIS [OPG 2011a] and the Preliminary Safety Report [OPG 2011b], and by supporting documents including the Malfunctions, Accidents and Malevolent Acts technical support document [AMEC NSS 2011]. Bounding accident scenarios were identified specific to the type of accident (i.e., non-radiological vs. radiological) and when the accident could occur (i.e., during site preparation, construction, operations or decommissioning vs. following closure).

The environmental effects of accidents, malfunctions, and malevolent acts are considered in the assessment of cumulative effects if they are likely to result from the Project in combination with other physical activities that have been or will be carried out. This section presents a discussion of potential cumulative effects between the DGR Project at the Bruce Nuclear site and potential effects of the APM DGR. Radiological accidents and malevolent acts are discussed first, followed by non-radiological.

6.1 RADIOLOGICAL MALFUNCTIONS, ACCIDENTS AND MALEVOLENT ACTS

6.1.1 Adverse Effects of the DGR Project at the Bruce Nuclear Site

The conclusion in the EIS and the Preliminary Safety Report was that during the site preparation, construction, operation and decommissioning phases, there were no credible malfunctions or accident scenarios that would lead to radiological impacts off-site above regulatory criteria [OPG 2011a,b]. Accidents considered included vehicle fires and container drop. The conclusion was based on several factors, including the stable geological conditions at the Bruce Nuclear site, the location of the DGR Project at the Bruce Nuclear site adjacent to the interim waste storage at WWMF (i.e., minimal surface transport), the nature of the wastes (i.e., solid material, low to intermediate levels of radioactivity, higher activity wastes are in more robust containers), and the ability to isolate waste panels underground if there was an accident.

Following operations, the facility would be closed and sealed with no activities taking place. The safety assessment considered normal evolution and disruptive scenarios, rather than accidents and malfunctions. Normal evolution considers how the repository is likely to evolve in the future. This includes inleakage of water from the rock into the repository, rockfall within the repository, and degradation of the waste packages. Under normal evolution, there were no adverse releases (i.e., dose consequences were below applicable regulatory criteria to member of public).

Disruptive scenarios consider unlikely or “what if” scenarios. The assessment specifically analyzed inadvertent human intrusion, shaft seal failure, poorly sealed borehole, and vertical fault scenarios. These scenarios were very unlikely to occur, so the risk (probability and consequence) remained low.

In all these scenarios considered, a more permeable path is created from the repository to surface. The most important consequence would be the release of carbon-14 bearing gas from the repository. There would also be longer-term release of other radionuclides via water. As

documented in the Preliminary Safety Report [OPG 2011b], the probability of occurrence of these scenarios is low, and potential adverse effects would be localized to around the DGR Project at the Bruce Nuclear site.

Regarding malevolent acts, the radiological consequences of credible malevolent acts are expected to be bound by those of malfunctions and accidents discussed above, such as from container fire or drop [OPG 2011a]. Scenarios including use of explosives (e.g. during waste package transport to the DGR Project at the Bruce Nuclear site) have the potential to produce public consequences exceeding those of the bounding accident scenarios, but public consequences remain below the acute accident dose criterion. Once the wastes have been emplaced underground, the risk and offsite consequences of malevolent acts decreases compared with those for surface storage and handling.

6.1.2 Potential Cumulative Effects with APM DGR

The APM DGR would be sited, designed and operated to be safe, including consideration for risk from malfunctions, accidents and malevolent acts. However, as no site has been selected for an APM DGR, there is presently no detailed design or safety assessment for an APM DGR in southern Ontario which would include a quantitative assessment of malfunctions, accidents and malevolent acts. However, based on information that has been published, as outlined in [NWMO 2016], the public dose consequences from credible malfunctions and accidents during preclosure activities at an APM DGR would be well below the public dose limits.

As noted in Section 6.1.1, during site preparation and construction, operations and decommissioning phases, there were no credible malfunctions or accident scenarios that would lead to radiological impacts off-site above regulatory criteria. In addition, as described in Section 5 when considering potential cumulative effects of likely adverse effects of the two projects, there is substantial spatial separation, and measurable cumulative effects are not likely.

In the postclosure phase, if one of the above postclosure failure scenarios occurred at the DGR Project at the Bruce Nuclear site after several hundred years, the main potential radiological consequence from a dose perspective would be the release of gaseous carbon-14. Its effects would be of highest magnitude around the DGR Project at the Bruce Nuclear site, as it would disperse in the atmosphere. At that time in the future, the APM DGR would also be closed and sealed and it is expected that there would be no additional radiation (i.e., orders of magnitude below the dose criterion) at surface due to the APM DGR; therefore there would be no cumulative effect.

The possibility of failure of both repositories due to some common cause can be considered. The most credible potential common cause of failure would be continental-scale glaciation, which would be an extreme event. Glaciation is also the most likely cause of large earthquakes or faulting in this area in the next one hundred thousand years. Both repositories are sited and engineered to withstand the effects of glaciation, so it is unlikely that either repository would experience a loss of containment as a result of glaciation. Furthermore, glaciation in southern Ontario is not expected to occur for at least 60,000 years, by which time much of the radioactivity in both DGRs would have decayed, and in particular the carbon-14, which is a key radionuclide in the DGR Project at the Bruce Nuclear site. There would therefore be no likely cumulative effect.

Security measures at the Bruce Nuclear site, within which the DGR Project at the Bruce Nuclear site is located, include facility fences and controlled access to both the Bruce Nuclear site and the DGR Project at the Bruce Nuclear site; emergency response and preparedness planning; and security screening for all personnel working at the DGR Project at the Bruce Nuclear site facility consistent with the standard requirement for workers within the Bruce Nuclear site. NWMO would employ similar security measures and safeguards for the APM DGR site [NWMO 2016]. These security measures are expected to decrease the likelihood of the APM DGR being subject to malevolent acts.

6.2 NON-RADIOLOGICAL MALFUNCTIONS, ACCIDENTS AND MALEVOLENT ACTS

6.2.1 Adverse Effects of the DGR Project at the Bruce Nuclear Site

Credible accidents during the site preparation, construction, operations and decommissioning phases were identified that have the potential to affect the environment, including a spill of fuels, chemical, lubricants and oils, and an explosion. The potential effects of initiating events such as fires and vehicle accidents were considered congruent with the radiological consequences and are therefore captured in the discussion in Section 6.1. The consequences of a spill or explosion would be the same, regardless of the project phase they occur in, therefore, the discussion below applies to each of the site preparation and construction, operations, and decommissioning phases.

A spill could include a vehicle accident, failure of on-site storage equipment (i.e., a storage tank) or operational errors. For the purpose of the assessment, the maximum volume of a spill is assumed to be approximately 4,500 L diesel fuel, 200 L of a chemical or 100 L of a lubricant or oil. Potential effects of a spill would be contained within the DGR Project at the Bruce Nuclear site. In the unlikely event a spill would reach a waterbody, it would be confined to the onsite drainage ditches, where it can be contained in advance of a release to the environment (e.g., Lake Huron). Measurable changes to soil and groundwater quality from a spill are possible. The majority of spills would be recognized and responded to immediately because of the inherent nature of construction activities (i.e., the malfunction/accident occurs while workers are present), and, therefore the likelihood of an accident or malfunction creating a persistent adverse effect to soil quality and/or groundwater quality is considered to be minimal.

Some accidents such as a rockfall or an explosion (e.g., premature blasting) could seriously harm a worker if they were nearby; however, from the public perspective, there would be a localized release of emissions that may interact with air quality and noise. These emissions would be similar to that experienced during normal project activities such as blasting, and would be expected to dissipate quickly, and are therefore not likely to have a measurable effect outside of the Bruce Nuclear site.

Potential effects of non-radiological malfunctions and accidents are mitigated through preventive measures, contingency plans and emergency procedures. OPG has many similar programs already in place at the WWMF. There are no potential non-radiological accident scenarios during the postclosure phase.

The potential non-radiological consequences of malevolent acts are expected to be bound by those of non-radiological malfunctions and accidents, particularly in terms of affecting the public [OPG 2011a].

6.2.2 Potential Cumulative Effects with APM DGR

An APM DGR would likely have potential effects, including potential non-radiological malfunctions and accidents, similar in nature to those identified for the DGR Project at the Bruce Nuclear site. As noted in Section 6.2.1, potential consequences of a non-radiological accident during site preparation and construction, operations and decommissioning phases are unlikely to extend beyond the site.

As described in Section 5, potential effects of the normal operation of the DGR Project at the Bruce Nuclear site are unlikely to act cumulatively with those of the APM DGR due to the spatial separation and limited extent of the effects of both projects. Similarly, effects of a malfunction or accident such as a spill or explosion are unlikely to act cumulatively with the APM DGR as they are limited to the Bruce Nuclear site, and are unlikely to overlap spatially on the biophysical environment VECs.

If a non-radiological spill were to occur during the construction, operation or decommissioning of the APM DGR, it is expected that, similar to the DGR Project at the Bruce Nuclear site, it would be responded to quickly, and remedial actions put in place to limit effects on the environment. Therefore, no adverse cumulative effects are likely as a result of a non-radiological spill.

In the highly unlikely event that there was an accident at the APM DGR at the same time, or in close proximity time-wise to an accident at the DGR Project at the Bruce Nuclear site, there could be further erosion of people's feelings of well-being and sense of safety and security. This could be mitigated through further communications and educational programs by both proponents. In addition, given the differences in timing of the active phases of the projects (i.e., no likely overlap in construction phase), the likelihood of this occurring is extremely low. Therefore, overall, there are no likely adverse cumulative effects of an explosion when considering the APM DGR Project.

As discussed, in Section 6.1.2, security measures and safeguards will be implemented at the DGR Project and the APM DGR. Combined with the distance between the projects, this would decrease the likelihood of both projects being subject to malevolent acts.

7. SUMMARY

Table 7-1 summarizes the assessment of cumulative effects of the DGR Project at the Bruce Nuclear site on VECs in consideration of the APM DGR. The findings of the updated CEA are consistent with earlier findings that the DGR Project is not likely to cause significant adverse cumulative environmental effects. Notwithstanding this conclusion, OPG has committed to continue to share information about and monitor public attitudes toward the DGR Project at the Bruce Nuclear site, and to include explicit consideration of, among other things, stigma (see Mitigations Report Table A8).

Additionally, OPG has committed to the SON that OPG will not move forward with the construction of a deep geologic repository for L&ILW until the SON community is supportive of the project. Further, OPG and SON have committed to the good faith, informed resolution of potential project impacts through the ongoing engagement between SON and OPG. The engagement process between SON and OPG is strong and ongoing (see Appendix B for a copy of a recent SON community newsletter).

NWMO has also specifically committed that an APM DGR would not be sited in the traditional territory of the SON - the Chippewas of Nawash Unceded First Nation and Saugeen First Nation – without community consent. Any siting within this territory would be informed by discussions with the SON regarding potential effects and their mitigation [NWMO 2016]. As discussed in Section 1, the Township of Huron Kinloss, the Municipality of South Bruce and the Municipality of Central Huron fall within the traditional territory of the SON.

OPG and NWMO have discussed the proposed work for this updated cumulative effects analysis with SON, ensured that SON was updated throughout the process, and reviewed the preliminary results with SON.

OPG has also agreements with Métis representative organizations in the area and meets with them on a quarterly basis. The same level of information about the DGR project is shared with these Métis organizations as with SON. Specifically, the Métis organizations are the Historic Saugeen Métis (HSM), based in Southampton and the Georgian Bay Traditional Territory Community Committee (GBTTCC), made up of the Moon River, Georgian Bay, and Great Lakes Métis Councils within the Métis Nation of Ontario Region 7. NWMO has also engaged with these Métis organizations on the APM DGR project.

These mechanisms, along with any federal requirements for future assessments and regulatory approvals, provide a reasonable basis to address any future concerns that may arise, if an APM DGR is located in one of the three identified municipalities.

Table 7-1: Summary of the Cumulative Effects Assessment in Consideration of the APM DGR

Environmental Component	Valued Ecosystem Component	Residual Effect Identified for the DGR Project at the Bruce Nuclear Site	Potential Overlap with the Residual Environmental Effects of the APM DGR (Yes/No)			Potential for a Cumulative Effect (Yes/No)	Likely Adverse Cumulative Effects Predicted (Yes/No)
			Type of Effect	Temporal Interaction	Spatial Interaction		
Hydrology and Surface Water Quality	Surface Water Quantity and Flow	31% reduction in surface water quantity and flow in the North Railway Ditch upstream of Stream C resulting from reduction in drainage area from the construction of the stormwater management system.	Yes	Yes	No	No	No
		114% increase in surface water quantity and flow during the site preparation and construction phase and a 61% increase during the operation phase in the drainage ditch at Interconnecting Road resulting from operation of the stormwater management system, redirected drainage area flows, dewatering of the shaft excavation during construction and the shaft sump pumping during operations.	Yes	Yes	No	No	No
Terrestrial Environment	Eastern White Cedar	Loss of eastern white cedar in the Project Area during site preparation and continuing through DGR Project life.	Yes	Yes	No	No	No
Aquatic Environment	Burrowing Crayfish	Removal of a portion of burrowing crayfish habitat in the South and North Railway Ditches, as well as other ditches and the abandoned rail spur in the western portion of the Project Area, during site preparation and construction.	Yes	Yes	No	No	No
	Redbelly Dace	Removal of a portion of non-critical habitat in the South Railway Ditch during construction of the rail bed crossing.	Yes	Yes	No	No	No
	Creek Chub						
	Variable Leaf Pondweed						
	Benthic Invertebrates						
Air Quality	Air Quality	Increase in concentrations of air quality indicators during site preparation and construction, operations and decommissioning phases.	Yes	Yes	Yes	Yes	No
Noise Levels	Noise Levels	Increase in noise levels during site preparation and construction, and decommissioning phases.	Yes	Yes	No	No	No
Socio-economic Environment	Other social assets	Change in noise levels in the Baie du Doré area resulting in reduced enjoyment and use of personal property in this localized area during site preparation and construction, and decommissioning phases.	Yes	Yes	No	No	No
Human Health	Overall Health for Local Resident	Effect to the overall health for local resident and member of Indigenous communities resulting from exposure to acrolein in air during the site preparation and construction phase.	Yes	Yes	Yes	Yes	No
	Overall Health for Member of Indigenous Community						
Radiation and Radioactivity	Human Exposure to Radiation	Radiological emissions as a result of the DGR Project at the Bruce Nuclear site.	Yes	Yes	Yes	Yes	No
	Radiation Dose to Non-human Biota						

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8. CONCLUSIONS

The updated analysis of the cumulative effects of the DGR Project at the Bruce Nuclear site in light of the APM DGR project shows that there is no potential for likely adverse cumulative effects and the conclusions presented in the EIS for the DGR Project at the Bruce Nuclear site [OPG 2011a] regarding cumulative effects remains valid. This report also shows that cumulative effects are unlikely as a result of malfunctions, accidents, and malevolent acts related to both projects.

The position remains that, as the Panel concluded:

> *"This evaluation led to the Panel's determination that adverse effects on the valued ecosystem components caused by the DGR project would be too limited in magnitude, spatial extent, duration and/or frequency to cause significant cumulative effects when acting in combination with the effects of past, current or reasonably foreseeable projects."*

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10. ABBREVIATIONS AND ACRONYMS

APM	Adaptive Phased Management
CEAA	Canadian Environmental Assessment Agency
CNSC	Canadian Nuclear Safety Commission
DFO	Fisheries and Oceans Canada
DGR	Deep Geologic Repository
EA	Environmental Assessment
ECA	Environmental Compliance Approval
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
IR	Information Request
Panel	Joint Review Panel
L&ILW	Low and Intermediate Level Waste
Minister	Minister of the Environment and Climate Change
MNRF	Ministry of Natural Resources and Forestry
MOECC	Ontario Ministry of Environment and Climate Change
NWMO	Nuclear Waste Management Organization
OPG	Ontario Power Generation
SON	Saugeen Ojibway Nation
VEC	Valued Ecosystem Component
WWMF	Western Waste Management Facility

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APPENDIX A: POTENTIAL ENVIRONMENTAL INTERACTIONS OF AN APM DGR IDENTIFIED DURING PHASE I PRELIMINARY ASSESSMENTS

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Table A-2: Potential Interactions of an APM DGR with the Biophysical Environment during Site Selection Process

Environmental Component	Main Considerations	Is there Potential for an Effect?	Is Management and Mitigation Possible?	Are Significant Residual Effects Anticipated?
Atmospheric Environment	Vehicle emissions, dust, noise, light	Yes	Yes	No
Subsurface Environment	Change in groundwater quality and flow from exploration boreholes	Yes	Yes	No
Aquatic Environment	Change in surface water quality and flow from site clearing, disturbance to aquatic habitat or biota from access construction	Yes	Yes	No
Terrestrial Environment	Clearing and disturbance to terrestrial habitat or biota from access construction, noise, increase in traffic	Yes	Yes	No
Radiation and Radioactivity	None – no additional radiation beyond natural background	No	—	—
Cultural Resources	Disturbance of archaeological resources from clearing	Yes	Yes	No

Source: NWMO 2014, NWMO 2015

Table A-3: Potential Interactions of an APM DGR with the Biophysical Environment during Construction

Environmental Component	Main Considerations	Is There Potential for an Effect?	Is Management and Mitigation Possible?	Are Significant Residual Effects Anticipated?
Atmospheric Environment	Vehicle and equipment emissions, dust, noise, light, vibration due to underground blasting	Yes	Yes	No
Subsurface Environment	Change in groundwater quality and flow due to withdrawal for supply, drawdown for drilling and construction dewatering, and management of run-off from hardened surfaces	Yes	Yes	No
Aquatic Environment	Change in surface water quality or flow, disturbance to aquatic habitat or biota due to placement of infrastructure and required water supply, vibration due to underground blasting	Yes	Yes	No
Terrestrial Environment	Clearing and disturbance to terrestrial habitat or biota from infrastructure or rock pile placement, noise, vibration from underground blasting, effects of increase in traffic	Yes	Yes	No
Radiation and Radioactivity	Doses to humans and biota from radon and natural rock activity	Yes	Yes	No
Cultural Resources	Disturbance of archaeological resources from clearing, placement of infrastructure, underground blasting	Yes	Yes	No

Source: NWMO 2014, NWMO 2015

Table A-4: Potential Interactions of an APM DGR with the Biophysical Environment during Operation

Environmental Component	Main Considerations	Is There Potential for an Effect?	Is Management and Mitigation Possible?	Are Significant Residual Effects Anticipated?
Atmospheric Environment	Vehicle and equipment emissions, dust, noise, light, vibration due to underground blasting	Yes	Yes	No
Subsurface Environment	Change in groundwater quality and flow due to withdrawal and dewatering, and management of run-off from hardened surfaces and the excavated rock pile	Yes	Yes	No
Aquatic Environment	Change in surface water quality or flow, disturbance to aquatic habitat or biota due to required water supply, run-off from surfaces and the rock pile, water discharge from underground, and vibration due to underground blasting	Yes	Yes	No
Terrestrial Environment	Disturbance to terrestrial habitat or biota from infrastructure or rock pile placement/run-off, noise, vibration from underground blasting, increase in traffic	Yes	Yes	No
Radiation and Radioactivity	Doses to humans and biota from radon, natural rock activity and repository operation	Yes	Yes	No
Cultural Resources	Disturbance to local enjoyment of the area	Yes	Yes	No

Source: NWMO 2014, NWMO 2015

Table A-5: Potential Interactions of an APM DGR with the Biophysical Environment during Decommissioning and Closure Activities

Environmental Component	Main Considerations	Is There Potential for an Effect?	Is Management and Mitigation Possible?	Are Significant Residual Effects Anticipated?
Atmospheric Environment	Vehicle and equipment emissions, dust, noise, and light	Yes	Yes	No
Subsurface Environment	Change in groundwater quality and flow due to closure of underground, and changed management of run-off from hardened surfaces and the rock pile	Yes	Yes	No
Aquatic Environment	Change in surface water quality or flow, disturbance to aquatic habitat or biota due to removal of infrastructure, run-off from the rock pile and water supply	Yes	Yes	No
Terrestrial Environment	Clearing and disturbance to terrestrial habitat or biota from infrastructure or rock pile removal, noise, increase in traffic	Yes	Yes	No
Radiation and Radioactivity	Doses to humans and biota from radon and from residual radioactivity during infrastructure removal operations	Yes	Yes	No
Cultural Resources	Disturbance to local enjoyment of the area	Yes	Yes	No

Source: NWMO 2014, NWMO 2015

Table A-6: Potential Interactions of an APM DGR with the Biophysical Environment during Postclosure Phase

Environmental Component	Main Considerations	Is there Potential for an Effect?	Is Management and Mitigation Possible?	Are Significant Residual Effects Anticipated?
Atmospheric Environment	None	No	-	-
Subsurface Environment	Change in groundwater quality and flow from site due to closure of shafts and to heating of rock	Yes	Yes	No
Aquatic Environment	Change in surface water quality around site as it transitions from industrial to final state	Yes, may be beneficial	Yes	No
Terrestrial Environment	Change in terrestrial environment around site as it transitions from industrial to final state	Yes, may be beneficial	Yes	No
Radiation and Radioactivity	Dose to humans and biota if there is some release of radioactivity	Yes	Yes	No
Cultural Resources	No further impact – site would have already been disturbedl	No	No	No

Note: Potential environmental interactions during the postclosure phase were determined based on NWMO 2016

REFERENCES

NWMO. 2014. *Phase 1 Desktop Assessment, Environmental Report. Communities of Huron-Kinloss, Brockton and South Bruce, Ontario.* APM-REP-06144-0107.

NWMO. 2015. *Phase 1 Desktop Assessment, Environmental Report. Municipality of Central Huron, Ontario.* APM-REP-06144-0125.

NWMO. 2016. *APM DGR Preliminary Description. Prepared to Support Ontario Power Generation Cumulative Effects Response to Minister of Environment and Climate Change Canada (2016).* Nuclear Waste Management Organization Report APM-REP-06415-0201.

APPENDIX B: SAUGEEN OJIBWAY NATION COMMUNITY NEWSLETTER

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June 2016

Ezhwebak

STEWARDSHIP AND NUCLEAR ISSUES

Our teachings tell us that being a good Steward in our Territory – Anishnaabekiing - is about mino-bimaadiziwin – *living in a good way with all Creation*. Our role as Stewards is deeply connected to who we are as Anishnaabe. We are deeply connected to our Lands, Waters and Other Beings that exist here among us. Preserving a positive relationship with Anishnaabekiing is important to us because we are dependent on it and Mother Earth for our continued survival and for living a good life.

Ezhwebak (What's Happening) *Stewardship and Nuclear Issues* will provide you with information and updates as they relate to our People and Territory. In this edition you will learn about preliminary plans and ideas for addressing 1) the nuclear waste problem, and 2) the historical and ongoing impacts of nuclear power generation on our Communities and our Territory. This will be done through our Community Process. Our Community Process must support our role as Stewards who have responsibilities to Anishnaabekiing and Mother Earth.

"Stewardship is about taking care of our Lands, Waters and preserving all of Creation. It's like the Miigizi [Eagle] and the Kokokohoo [Owl] who watches, listens over movements of the day. If we close our eyes and ears, we are going to miss an important piece for our People. We need to take care of our Land, Waters, Fish, Animals, People, Children, Elders, and Those Ones Yet To Come. Our Anishinaabe Language and Mother Earth is our base and foundation and we must continue to keep them alive and well. Also, we cannot forget about our Ancestors and our burial grounds. We need to be in control and not let others walk over us. All of our Community Members have a voice and need to be heard." – Elder Shirley John

IN THIS ISSUE

The Nuclear Waste Problem in Anishnaabekiing

Over the past fifty years, nuclear power generation in Anishnaabekiing - Saugeen Ojibway Nation (SON) Territory - has produced a large amount of nuclear waste. This nuclear waste - as well as some waste from other nuclear power plants in Ontario - is being stored at the Bruce site. This nuclear waste problem has become a source of serious concern for our Communities.

For decades now, the SON Joint Chiefs and Councils have been in discussion with the nuclear industry and governments regarding these concerns.

We know that:

- The Bruce Nuclear Generating Station, with its eight reactors, is the largest nuclear facility in the world;
- The Bruce Nuclear Generating Station's plans for refurbishment of the reactors are in the works and would keep the facility operational into the 2060s;
- Ontario Power Generation (OPG) is responsible for finding a safe solution for the low and intermediate-level waste stored at the Bruce site;
- OPG has proposed a deep geologic repository for low and intermediate-level waste at the Bruce site (DGR Project) and has committed to the SON that the project will not go ahead without SON consent (on page 8 you will find out more about the Canadian Environmental Assessment process for the DGR project and what the Minister of the Environment and Climate Change has said about this);
- The Nuclear Waste Management Organization (NWMO) is responsible for the long-term management of Canada's used nuclear fuel (high-level waste). They are currently in the process of siting a location for a used fuel storage site;
- Three municipalities in Anishnaabekiing remain in the siting process for a used fuel storage site. Those municipalities are South Bruce, Central Huron and Huron-Kinloss.

We Must Decide Our Future

The SON Joint Chiefs and Councils have always said that we must determine our own role and future within our Territory. When it comes to the nuclear waste problem this is no different. Our exclusion from decisions on major projects within our Territory has had serious implications for our Communities and on our way of life. Major nuclear projects in the Territory - such as those at Douglas Point and the Bruce site - have impacted us and will continue to have an impact on us for many more years to come. **We are not expected to solve the problem but we do have an opportunity to try and change the situation for the betterment of our People and our future.**

Commitments

We have worked hard to have the nuclear industry and government recognize our rights. In 2013, Ontario Power Generation (OPG) committed to the SON that it would not build the DGR Project without our consent. OPG also committed to address the historical impacts of its operations in our Territory. This was a significant victory!

Serious efforts are being made to get a similar commitment from the Nuclear Waste Management Organization (NWMO). The NWMO is considering Anishnabekiing as a potential site for Canada's used fuel.

The SON Joint Chiefs and Councils fully support the Communities in understanding the situation and changing it for the betterment of our People and our future. This will be done through the Community Process and through continued discussion with OPG and the NWMO (See: Community Process Page 4).

Photo Credits: Leonard McLeod

Our Legacy Issues and the Bigger Picture for Our Nuclear Issues

Since 1968, our Communities and our Territory have had to bear the burden of the nuclear industry. The nuclear industry continues to impact us now and will do so for generations to come. We call these *legacy issues* - the historical and ongoing impacts of nuclear power generation on our Communities and our Territory. The problem is not just the nuclear waste - the problem is the entire nuclear industry. For the last several decades, we have not been included in the conversation. The time has come for us to tackle all of these issues for the health and well-being of our Communities and our Territory.

In 2013, OPG made a two-part commitment to the SON:

1) That they would not go ahead with the DGR project without SON consent;
2) That they would work with us to address *legacy issues*.

These legacy issues impact:

- Our Land, Water, Air, and Animals within Anishnaabekiing;
- Our health and well-being;
- Our economy;
- Our rights.

Our approach will be to look at these impacts as historical, current, and ongoing in order to strengthen our role as Stewards and as self-determining People in our Territory.

We will make our decisions through the Community Process.

Next Steps

First, everyone will have the opportunity to discuss the DGR Project and our legacy issues. Second, everyone will be asked to prioritize the legacy issues so that the SON Joint Chiefs and Councils know which issues should be worked on in the immediate term and in the long term. We will do all of this through the Community Process.

For now, we ask that you prepare to bring forward your concerns, questions and interests as they relate to our legacy issues. It may be helpful to discuss these with your family and fellow community members. When the first stage of community engagement rolls out, you will be provided opportunities to talk and discuss these issues in a forum where legacy issues can be documented and prioritized.

Our Community Process:

Anishnaabekiing, Anishnaabe Inwewin, Anishnaabe Naaknigewin – Our Territory, Our Voice, Our Decisions

The Joint Chiefs and Councils and the SON Environment Office have been working very hard to build a communications and community engagement plan that will provide you with the information that you want, and that will gather your input to ensure your voice is heard. The process of informing, discussing, gathering input from everyone, developing options and solutions, and making decisions is referred to as our Community Process and has received the name Anishnaabekiing, Anishnaabe Inwewin, Anishnaabe Naaknigewin – Our Territory, Our Voice, Our Decisions.

Our Own Process

The SON Joint Chiefs and Councils want to ensure that this process is distinctive to the People of the SON. We have created a special logo to identify our unique process. The development of the logo was a collaborative effort. Concepts were provided to a group of people of different age groups and backgrounds from our Communities. The Environment Office staff collected comments and ideas from these participants and worked with the designer and an artist from the Community to finalize the logo.

The Anishnaakekiing, Anishnaabe Inwewin, Anishnaabe Naaknigewin - Our Territory, Our Voice, Our Decisions logo concept was developed by Chantal Lalonde Design and artistically interpreted by Adrian Nadjiwon in a realistic Woodland Style. It embraces features of who we are and what we value. As Anishnaabek, we strive for mino-bimaadizwin – *living in a good way with all Creation.* We give honour and respect to our Ancestors who provided us with all that we need to live and thrive in this way – our Lands, Waters, Air, and our languages, teachings, laws and ways to connect with Creator.

The circle symbolizes the balanced way of life that we strive for. The four quadrants of the circle identified by the colours yellow, red, black, and white encompass many of our teachings such as those on the four directions, the four seasons, the four stages of life, and how we work with others as a part of humankind. In this logo, we see the elements that are important to us as Stewards of our Territory and that are important to remember when we think about our nuclear issues.

We see the Land represented by the sandy beaches along Lake Huron and the escarpment that stretches out across our Territory. We see the Water, the lifeblood of our Lands represented here, as well as Aadikmeg (Lake Whitefish) that we continue to depend on for food sustenance and for our local economies. Aadikmeg is a symbol of abundance, fertility and beauty, and this totem is responsible for learning among our People. Migizi (Eagle), a symbol of foresight, is the totem that is responsible for leadership. With an open beak, the voice of Migizi is clear, truthful and speaks words from a place of wisdom, courage and integrity.

The logo reminds us of Anishnaabekiing (Our Territory). It reminds us that through this process of becoming informed and using Anishnaabe Inwewin (Our Voice) to speak our concerns, ideas and solutions, we can come to decisions on our nuclear issues together. Anishnaabe Naaknigewin (Our Decisions) will be a reflection of who we are and how we envision our future and the future of our People and Anishnaabekiing.

Principles for the Community Process

There are currently four preliminary principles that help guide the design of the Community Process. As the Community Process unfolds, there will be opportunities for everyone to shape these principles and add to them even further.

1. The Community Process Must be Community Driven

The Community Process must be inclusive of all members whereby everyone has the opportunity to be informed, provide input into the design of the Community Process, provide input into the development of options and solutions, and make decisions.

2. The Community Process Must be Rooted in Our Values, Teachings and Laws

The Community Process must center the values, teachings and laws that govern our People. The Community Process can integrate Western legal structures and knowledge systems as reinforcement for matters that require this perspective.

The medicine wheel provides us with many teachings, including those on how we can come to make important decisions. We can draw from these teachings as we go through the Community Process. The earliest stage of the process can be referred to as "Vision." Likened to the season of spring, in this stage, we begin to explore our own ways for coming to a resolution on the issues we are faced with. We can begin to ask for guidance from the Creator. The next stage can be referred to as "Time." In this stage, we learn more about the issue from different angles as a community and as individuals. We develop our relationships with one another. We can look to all of Creation and to the Creator for direction. Once we have taken the time to understand the issue in a fulsome way, we start the "Reason" stage by figuring out how we are going to deal with it. In this stage, we look at our options and make our final decisions based on what we believe is right for us. When our final decisions have been made, we enter the stage referred to as "Movement" where we enact our decisions and ensure they will be respected, understood and continually renewed in ways future generations see fit.

3. The Community Process Must be Protective of SON Rights and Interests

The Community Process must focus on protecting our rights and way of life for now and for generations to come, including our rights as decision makers in our Territory.

4. The Community Process Must be Focused on the Big Picture

The Community Process must address all aspects of nuclear issues including: finding a resolution to the legacy issues, the ongoing operations at the Bruce site, and current and future nuclear projects in Anishnaabekiing. The Community Process is about asserting our jurisdiction through continual reaffirmation and reflection upon our role as Stewards in our Territory.

Timeframe

There is no timeframe on the Community Process. We have the space and time to become informed and to make these important decisions.

Currently the SON Joint Chiefs and Councils are not negotiating anything with OPG. Negotiations will begin once the Communities have provided the political leaders the mandate and terms to do so.

Other similar processes of collective decision-making among Indigenous communities have occurred in the past. We have learned that some of those processes have taken decades to unfold. Ultimately, the community will decide when the time has come to make decisions.

Everyone Has A Role in The Community Process

The SON Communities

We have the ultimate say in how the nuclear issues in our Territory will be resolved. In the short term, community members are asked to get informed (see page 7 for current ways you can be informed), to help shape the Community Process through opportunities as they become available, to voice concerns, contribute ideas on how to resolve issues, and to reflect on proposed options and solutions. At some point in the future, community members will be asked to make formal decisions on agreements to resolve the issues through a ratification process.

The SON Joint Chiefs and Councils

The SON Joint Chiefs and Councils (or Joint Council), as the collective of the Councils from Saugeen and Chippewas of Nawash First Nations, are the political representatives for our People. They receive direction from us and will ensure the Community Process is fully supported both politically and financially. They will be responsible for implementing the decisions that come from us and will advocate on our behalf throughout any negotiations with OPG and other external parties in order to resolve the nuclear power, waste and legacy issues.

The Advisory Team

The SON OPG Advisory Team (or Advisory Team) is comprised of two members from each Council and a Lead Negotiator. The team reports to and receives direction from the Joint Council. It is the body responsible for engaging with OPG and with other external parties to address the legacy and ongoing nuclear issues affecting our Territory. The team also supports the Community Process in ways directed by the Joint Council.

The Working Group

The Working Group will provide support and advice to the Advisory Team and act as the first point of contact for troubleshooting issues as they arise in the Community Process and during future negotiations.

The SON Environment Office

The SON Environment Office (SON EO) provides coordination and support to the Joint Council, the Advisory Team, Working Groups and to the SON Communities through the Community Process to address our nuclear power, waste and legacy issues.

Working Groups

The Community Process will take time and effort. While it will be driven and shaped by the communities, a number of working groups and committees will support the process. They will, for example, ensure that information is being developed and shared widely and will ensure that the Community Process is consistent with our values, ways and perspectives. Working Groups could be developed to:

- Bring youth involvement and perspective to the Community Process;
- Bring our values, teachings and laws into the Community Process;
- Support communications and community activities;
- Gather information on nuclear waste storage options for the community;
- Support the identification and prioritization of our legacy issues;
- Work on one or more of our legacy issues (*i.e.*, impacts on land, water, fisheries, culture, health or well-being).

Outreach and Engagement

In the fall and last month, we held preliminary focus group sessions with our Seniors, Youth, Program Managers/ Supervisors, Knowledge Keepers and some of our community members. The information gathered from these focus groups has helped with the design of the first stage of community engagement and we anticipate gathering more feedback from you that will help shape things as we go along. The first stage of community engagement will include a number of forums for discussion in the Community and in other areas outside of the Community where our members are living. The use of a wide range of media including internet, webinar, social media and radio will also be developed as part of the communications plan. All members will have opportunities to voice ideas, questions and concerns. These are your decisions to make and we must have a process that works for everyone.

HOW YOU CAN GET INFORMED

It is important that you be informed of these issues as we begin to look at options to address the nuclear issues in the Territory, including the nuclear waste problem, the ongoing operations at the Bruce site, and the many concerns you may have about the history of nuclear power generation in our Territory.

The SON Joint Chiefs and Councils and the Environment Office are currently developing several ways for sharing information and for gathering all of your input. Currently there are a couple of ways that you are able to receive information.

By Mail

If you are living in the communities, you will have information delivered to your homes. If you are living outside of the communities and if we have your most up to date contact information, then you will receive information in the mail. It is important that your mailing address is updated with your current information. You may also wish to remind family and other members of the SON to update their mailing address.

- Members of the **Chippewas of Nawash First Nation** can update their addresses through Iris Ashkewe, Banc Membership, at (519) 534-1689 or e-mail iris.ashkewe@nawash.ca .
- Members of the **Saugeen First Nation** can update their addresses through Cheree Urscheler, Band Membership, at (519) 797-2781 x. 1122 or e-mail curscheler@saugeenfirstnation.ca .

Online

We are continually uploading information online. For an easy and quick way to receive information you may:

- Visit the SON website www.saugeenojibwaynation.ca ;
- Like the SON Facebook page: Saugeen Ojibway Nation Environment Office – Official;
- Add the SON on Twitter @SON_Environment; and
- Provide us with your e-mail address (see how below).

If you would like to receive information through email, all members of the Saugeen Ojibway Nation can e-mail SONEO@saugeenojibwaynation.ca to be added to the e-mail list. Please indicate which First Nation you are a member with. When you sign up, you will receive all information coming out f the SON Environment Office. This list is separate from any other e-mails lists in the Communities and so we require your authorization to add you to it. You can send us an e-mail to remove your name from the list at any time.

Also, be sure to check out our video on our website: The Voice For Anishnaabekiing: Addressing Nuclear Issues in the Territory.

You Will Be Asked to Make Some Important Decisions!

As members of the SON, you will be asked to make decisions on a number of issues related to nuclear power, waste and legacy issues and so it is important that you be informed. We will need to begin to discuss how we are going to make these decisions and to look at various options that can include a referendum vote or another ratification process.

Tours Offered by Ontario Power Generation

If you would like to see how the waste is currently stored, you can sign up for a SON tour of the Western Waste Management Facility at the Bruce site offered by OPG. You will also see the proposed location for the DGR Project. Tours will take place on Friday June 17 and Friday July 22. To register, please email Rae-Anna Whiteduck at nuclear.program@saugeenojibwaynation.ca

List of Acronyms

BP – Bruce Power
CEAA – Canadian Environmental Assessment Agency
CNSC – Canadian Nuclear Safety Commission
DGR – Deep Geologic Repository
DGR Project – DGR for low and inetermediate-level radioactive waste
JRP – Joint Review Panel or the "Panel"
NWMO – Nuclear Waste Management Organization
OPG – Ontario Power Generation
SON – Saugeen Ojibway Nation
SON EO – Saugeen Ojibway Nation Environment Office

Update on the Proposed Deep Geologic Repository for Low and Intermediate Level Radioactive Waste

In May 2015, the Joint Review Panel (the Panel) completed its environmental assessment report based on the hearings in 2013 and 2014; that report was sent to the Federal Minister of Environment and Climate Change (the Minister) and released to the public (information was sent out to the SON Community by way of a Community News Release and a Frequently Asked Questions document).

The SON Joint Chiefs and Councils determined that there were concerns with some of the conclusions drawn by the Panel, and they raised these concerns with the Minister so that she would consider them in making her decision on the Environmental Assessment.

As discussed in the most recent Community News Release (February 18, 2016), the Minister announced that she has paused the timeline for her decision on the Environmental Assessment for OPG's proposed DGR Project. The Minister has requested additional information from OPG, including:

1. A study into alternate locations for the DGR Project; and
2. An analysis of the cumulative (or compounding) effects of the DGR Project and a Project for the Disposal of Used Fuel in SON Territory.

The Joint Chiefs and Councils understood the questions raised by the Minister because the SON has raised similar questions with OPG. The SON Joint Council had previously asked why alternate locations for the DGR Project have not been explored. The SON Joint Council had also stated that the siting of a Project for the Disposal of Used Fuel in the Territory must not happen without our consent. We believe the Minister made her announcement based on the messages she had heard from our People and our Political Leadership. Her acknowledgement of our Territory in her second point signals to other governments and the industry that the SON must have a lead role in determining which projects are acceptable in the Territory.

Once the Minister has the information she needs—and it is not yet clear when this will be—she will issue a statement on whether the DGR Project can be done safely and without harm to the environment. She will also set out the conditions that OPG would need to comply with if the DGR Project is built. **Her decision will not, however, determine whether the DGR Project goes ahead. We will make the decision as to whether the DGR Project may go ahead in our Territory.**

Final Note from the SON Joint Chiefs

Members of the Saugeen Ojibway Nation,

We appreciate all the feedback received from community members involved in the focus groups and who have provided advice to our Advisory Team on these important issues. We are thankful to all those community members who have provided constructive input into shaping the Community Process thus far. We will be able to provide a full report once we have received input from everyone during the first phase of engagement activities.

We also congratulate Chantal Lalonde and Adrian Nadjiwon on their hard work on the brand and the Environment Office staff and technical support staff that have contributed to the work that has been accomplished so far.

Developing the first stage of community engagement takes time and, on behalf of the whole Joint Council, we thank all of our community members for your patience. The first stage of community engagement requires a dynamic communications plan; this is currently under development by the Joint Council and the SON Environment Office. It is important to ensure that we roll out a process that includes all of our members and that can address all of the needs of the Community throughout this process wherever possible.

We have no doubt that everyone will face challenges and fears but it is important to remember that we are all in this together.

Miigwetch - All Our Relations,

Chief Greg Nadjiwon
Chippewas of Nawash First Nation

Chief Vernon Roote
Saugeen First Nation