



**Radiation Safety  
Institute of Canada**  
Institut de radioprotection du Canada

# **Peer Review Report**

## **Preliminary Radiological Safety Study - South Bruce (S19)**

Municipality of South Bruce

August 31, 2023

# Executive Summary

The Nuclear Waste Management Organization (NWMO) has been engaged in a multiyear, community driven process to identify a site where Canada's used nuclear fuel can be safely contained. The site selection process involves nine steps, with the process currently at Step 3 (Phase 2). The NWMO is now in its final screening process, and the two remaining siting areas currently being assessed under Step 3, Phase 2, are the Municipality of South Bruce (MSB) and the Township of Ignace, and their surrounding areas. The NWMO plans to complete all preliminary assessment work and to select one community/area to host the Adaptive Phased Management (APM) Project (Project) by 2024.

Building on previous work, engagement completed to-date, and MSB's 36 Guiding Principles, NWMO and MSB are working together to prepare a suite of studies which will be shared broadly with the community. The studies are being undertaken by NWMO or MSB, with some being joint efforts. The MSB has retained consultants to develop a number of studies and to peer review others developed by NWMO and their consultants. The information acquired through the studies is expected to aid MSB to make informed decisions about whether the Project is suitable for their community, and if they are willing to consider hosting it and under what circumstances and terms.

The Preliminary Radiological Safety Study - South Bruce (S19) (PRSS) is one of the studies being carried out by NWMO and their consultant Arcadis Canada Inc. [Arcadis]. The purpose of the PRSS is to summarize how radiological safety would be ensured and how radiological effects to public members would be minimized so that they stay below relevant regulatory criteria and do not cause any undue health effects.

The Study was peer reviewed by Subject Matter Experts (SMEs) from GHD (Mark Jasper) and the Radiation Safety Institute of Canada (RSIC; Laura Boksmán) in combination with the GHD Leadership Team (Greg Ferraro and Ian Dobrindt), making up (the Peer Review Team [PRT]). This peer review has been undertaken on the framing and scope of the study, and the effects assessment, in accordance with the Peer Review Protocol process established jointly by MSB and NWMO. The PRT considered several documents and information in the peer review of the PRSS Draft Report including geoscience investigation data, NWMO design reports and certain community studies to aid in their understanding, focus the peer review, and develop their findings.

The PRT provided comments on the draft version of the PRSS Report, and these were subsequently discussed in greater depth with the Study authors. The outcome of the discussion provided greater clarity and helped to focus the purpose of the Study. The clarifications, amendments, and additions to the PRSS Report are described in this Peer Review Report.

It is the view of the PRT that the PRSS Report is technical in nature and satisfies the objective of providing a preliminary summary on how the safety of the Community would be ensured, from a radiological perspective. The Report provides high level information on understanding how Guiding Principles #1 and #2 will be met. Should the MSB be selected as the host community, it is recommended that NWMO carry out further studies once the site-specific conceptual design has been prepared to further assess and describe the radiological effects on the Community. For example, the PRSS Report does not address radiation safety for the transport of the used fuel to the Project Site.

Although additional study is recommended once the site-specific design is finalized, it is the view of the PRT that the current conceptual design indicates that the radiological risk to the community is quite low during the operation and post-closure phases of the Project. Doses to the public, due to the facility will be below regulatory dose limits, and in fact are likely to be negligible compared to the natural background radiation in Canada.

The PRT understands that a plain language summary of the PRSS Report will be prepared by the NWMO once it has been finalized.

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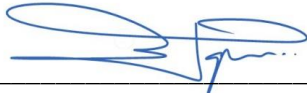
## Acronyms

APM	Adaptive Phased Management
CNSC	Canadian Nuclear Safety Commission
CWB	Community well-being
GHD	GHD Limited
MSB	Municipality of South Bruce
NWMO	Nuclear Waste Management Organization
PRSS	Preliminary Radiological Safety Study
PRT	Peer Review Team
RSIC	Radiation Safety Institute of Canada
SME	Subject Matter Expert

## Scope and limitations

GHD and RSIC have prepared this Report exclusively for the Municipality of South Bruce. All data and information contained herein is considered confidential and proprietary and may not be reproduced, published or distributed to, or for, any third party without the express prior written consent of GHD and RSIC.

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# 1. Introduction

This report documents the peer review undertaken of the Preliminary Radiological Safety Study - South Bruce (S19) (PRSS) prepared by Arcadis Canada Inc. (Arcadis) dated April 5, 2023 (Draft Report, V0 (R000e)) and July 11, 2023 (Revised Draft Report, V0 (R000f)). The Nuclear Waste Management Organization (NWMO) has been engaged in a multiyear, community driven process to identify a site where Canada's used nuclear fuel can be safely contained. The site selection process involves nine steps, with the process currently at Step 3 (Phase 2). Step 3 is defined by two phases of preliminary assessments for each interested community. Phase 1 involved primarily desktop studies documenting the current socioeconomic conditions in the communities and then considering what might be the possible implications of the Adaptive Phased Management (APM) Project (Project) on community wellbeing (CWB) for each community and the wider area. For interested communities that successfully completed the initial screening in Phase 1, Phase 2 (the current phase) involves additional work to support conducting a preliminary assessment of potential suitability and narrowing the number of communities that have expressed an interest in partnering with NWMO.

The NWMO is now in its final screening process, and the two remaining siting areas currently being assessed under Step 3, Phase 2, are the Municipality of South Bruce (MSB) and the Township of Ignace, and their surrounding areas. The NWMO plans to complete all preliminary assessment work and to select one community/area to host the APM Project by 2024 which then marks the beginning of the fourth step of APM implementation<sup>1</sup>. The selection of a final site will trigger the regulatory approvals phase of the APM Project. Federal approval under the Impact Assessment Act and licensing by the Canadian Nuclear Safety Commission (CNSC) under the Nuclear Safety and Control Act will be required. Meeting federal regulatory standards is imperative to achieve approval, and to withstand intense public and regulatory scrutiny.

Building on previous work, engagement completed to-date, and MSB's 36 Guiding Principles, NWMO and MSB are working together to prepare a suite of studies which will be shared broadly with the community. The list of studies is included in **Appendix A** grouped by similar topic area (MSB led, environment, infrastructure, and socio-economic). The studies are being undertaken by NWMO or MSB, with some being joint efforts. The MSB has retained consultants to develop a number of studies and to peer review others developed by NWMO and their consultants. The information acquired through the studies is expected to aid MSB make informed decisions about whether the APM Project is suitable for their community, and if they are willing to consider hosting it and under what circumstances and terms.

The PRSS is one of the socio-economic studies being carried out by NWMO and its consultant Arcadis. The purpose of the PRSS is to summarize how radiological safety would be ensured and how radiological effects to public members would be minimized so that they stay below relevant regulatory criteria and do not cause any undue health effects. The Report describes what radiation is, where it occurs and at what levels, applicable regulations in Canada established for the control of radiation, an overview of the Project and its phases, and measures for ensuring safety.

The Radiological Safety Assessment was peer reviewed by Subject Matter Experts (SMEs) from GHD (Mark Jasper) and the Radiation Safety Institute of Canada (RSIC; Laura Boksman) in combination with the GHD Leadership Team (Greg Ferraro and Ian Dobrindt), making up the Peer Review Team (PRT). The peer review has been undertaken on the framing and scope of the study, and the effects assessment, in accordance with the Peer Review Protocol process established jointly by MSB and NWMO.

**Section 2** elaborates on the Peer Review Protocol process followed including the steps specifically followed and discussions held with NWMO and the Arcadis team.

As described in **Section 3**, the PRT considered several relevant technical documents and information prepared by the NWMO and previous peer review findings of certain community studies in the peer review of the PRSS to aid in their understanding, focus the peer review, and develop their findings.

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1. Nuclear Waste Management Organization, 2020. Moving Towards Partnership - Triennial Report 2017 to 2019.

The results and resolution of the PRT findings are outlined in **Section 4** starting with how the Revised Draft Report has been updated to address the comments on the (initial) Draft Report. This is followed by a review of how the Study complies with the approved Statement of Work and how the Study informs the applicable Guiding Principles. Lastly, the conclusions from the peer review are provided.

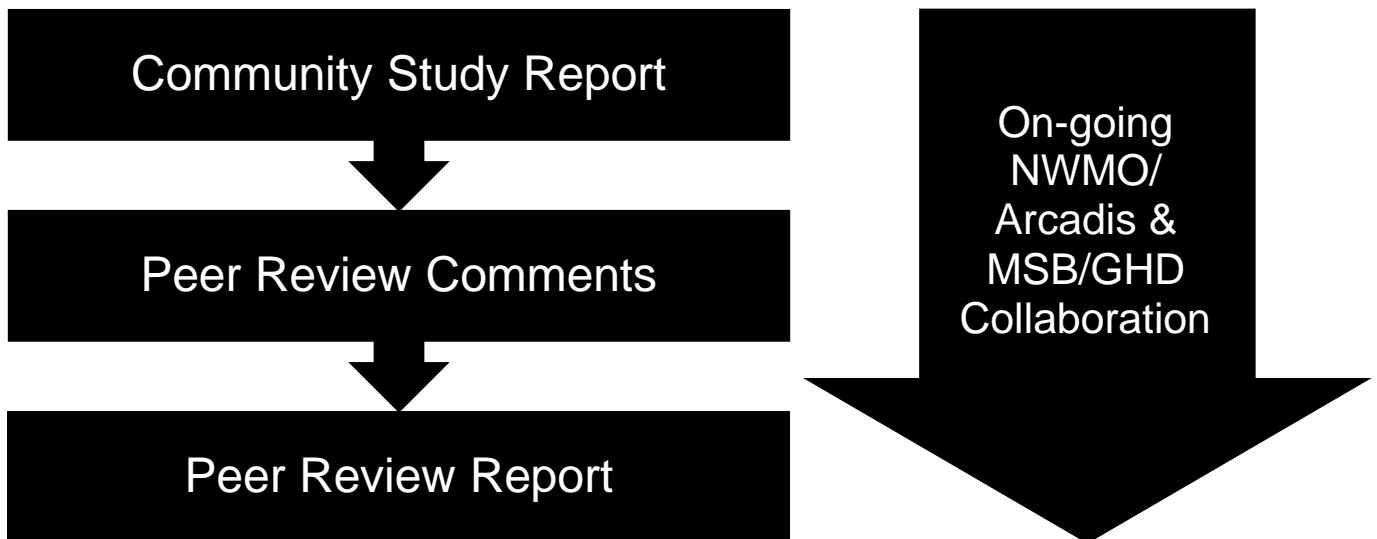
## 2. Peer Review Protocol

### 2.1 Objectives and Overview of the Peer Review Protocol Process

As mentioned, the peer review of the PRSS was undertaken in accordance with the Peer Review Protocol established jointly by the MSB and the NWMO. The Peer Review Protocol had the following established objectives:

1. To provide the community of the MSB with an independent review by qualified SMEs
2. To complete a peer review of NWMO's assessment of potential impacts and proposed benefits of locating the APM Project in MSB in comparison to existing conditions
3. To review how the potential impacts and proposed benefits adhere to the 36 principles that will guide the MSB's assessment of willingness to host the APM Project

With these objectives in mind, the Peer Review was conducted in a collaborative manner between the NWMO/Arcadis team and the MSB/GHD team while maintaining independence during the process. **Appendix B** includes the Peer Review Protocol established in June 2021 and **Figure 2.1** summarizes the process followed.



*Figure 2.1 The Peer Review Protocol Process*

With **Figure 2.1** in mind, the following identifies the primary activities carried out by the PRT:

#### **Community Study Statement of Work**

- Gain a greater understanding of the APM Project and area conditions including reviewing and providing comments on NWMO's Project design reports and considering responses received from NWMO
- Hold on-going discussions as required with the NWMO/Arcadis team providing input where appropriate (e.g., data sources to be reviewed, study area boundaries, etc.)

- Review and provide comments on the draft Statement of Work associated with the CS prepared by the NWMO/Arcadis team and consider responses received from the NWMO/Arcadis team as part of them finalizing the Statement of Work before its implementation

### **Community Study Report**

- Attend CS Draft Report Status Update Meetings organized by the NWMO/Arcadis team
- Review the CS Draft Report (V0 (R000e)) prepared by the NWMO/Arcadis team
- Review the CS Revised Draft Report (V0 (R000f)) prepared by the NWMO/Arcadis team

### **Peer Review Comments**

- Develop a preliminary list of comments including initial impressions, observations, and any potential issues and/or concerns with the CS Draft Report based on several documents and information as described in **Section 3**
- Attend a CS Draft Report Check-in Meeting with the GHD Leadership Team and MSB to discuss the preliminary list of comments and confirm those to be provided to the NWMO/Arcadis team
- Provide the preliminary list of comments on the CS Draft Report to the NWMO/Arcadis team for their understanding of the PRT's initial impressions, observations, and any potential issues and/or concerns
- Attend a CS Draft Report Working Session with the NWMO/Arcadis team to discuss the preliminary list of comments and work through them collectively in a collaborative manner. Through the Working Session some comments were determined not to be applicable to the CS based on the clarifying discussions. In addition, through the Working Session it was agreed that those comments associated with the Draft Report's structure, or to such items like how sources or exhibits are referenced, or spelling and grammar, would be excluded and the focus would be more on content and substance as it related to the Statement of Work.
- Submit the formal set of comments on the CS Draft or revised Draft Report to the NWMO/Arcadis team for their review and responses
- Review the responses from the NWMO/Arcadis team to the formal set of comments and ensure there were no significant outstanding issues and/or concerns

### **Peer Review Report**

- Prepare the draft Peer Review Report and submit to MSB for review
- Finalize the draft Peer Review Report based on any comments received and provide to MSB

## **2.2 Key Activities Associated with the Peer Review of the Preliminary Radiological Safety Study**

With the preceding process in mind, **Table 2.1** lists the key activities associated with the Peer Review carried out by the PRT comprising the SMEs from GHD (Mark Jasper) and RSIC (Laura Boksman) in combination with the GHD Leadership Team (Greg Ferraro and Ian Dobrindt) for the PRSS prepared by Arcadis. The PRSS was initiated by Arcadis following finalization of the Statement of Work in February 2021 and culminated in the Revised Draft Report being submitted to GHD on July 11, 2023.

**Table 2.1** Key Activities Associated with the Peer Review of the Preliminary Radiological Safety Study

<b>Key Activities</b>	<b>Date</b>	<b>Parties Involved</b>
Review of the Community Safety Effects Study – Statement of Work issued by MSB (February 3, 2021)	February 2021 – October 2021	GHD (Mark Jasper, Greg Ferraro, and Ian Dobrindt) and RSIC (Laura Boksman)



Key Activities	Date	Parties Involved
Review of the Preliminary Radiological Safety Study - South Bruce (S19) - Draft V0 (R000e) - issued by Arcadis (April 5, 2023)	April 2023 – July 2023	GHD (Mark Jasper, Greg Ferraro, and Ian Dobrindt) and RSIC (Laura Boksmán)
Peer Review Team Check-in Meeting to review/confirm preliminary comments	May 23, 2023	GHD (Mark Jasper, Greg Ferraro, and Ian Dobrindt), RSIC (Laura Boksmán), and MSB (Steve Travale)
Issuance of the Peer Review Team preliminary comment disposition table on the Draft Report	May 26, 2023	GHD (Mark Jasper, Greg Ferraro, and Ian Dobrindt) and RSIC (Laura Boksmán)
Peer Review Team and NWMO/Arcadis Project Update Meeting to discuss/understand the preliminary comments	June 21, 2023	GHD (Mark Jasper, Greg Ferraro, and Ian Dobrindt), RSIC (Laura Boksmán), NWMO (Charlene Easton, Karine Glenn), Arcadis (Nava Garisto), and MSB (Steve Travale)
Issuance of Arcadis Team responses to Peer Review Team's preliminary comments on the Draft Report	June 27, 2023	Arcadis (Nava Garisto)
Issuance of the Peer Review Team formal comment disposition table on the Draft Report	July 4, 2023	GHD (Mark Jasper, Greg Ferraro, and Ian Dobrindt) and RSIC (Laura Boksmán)
Review of the Preliminary Radiological Safety Study - South Bruce (S19) - Draft V0 (R000f) - issued by Arcadis (July 11, 2023)	July 11 – July 28, 2023	GHD (Mark Jasper, Greg Ferraro, and Ian Dobrindt) and RSIC (Laura Boksmán)

### 3. Key Documentation and Information Reviewed

As stated, several documents and information were considered by the PRT in carrying out the Peer Review Protocol. **Table 3.1** lists the key documents and information considered by the PRT in the review of the PRSS.

**Table 3.1** Key Documents and Information Considered in the Peer Review of the Preliminary Radiological Safety Study

Document Name/Information	Author/Source/Date	Description/Application
Preliminary Radon Assessment for a Used Fuel Deep Geological Repository (NWMO-TR-2019-09)	NWMO (December 2020)	This report provides an initial assessment of the radon hazard during construction and operation of the DGR. The assessment determined whether there is health hazard to workers, and a need for radon monitoring or development of any action levels in order to be in compliance with the applicable regulatory requirements.
Implementing Adaptive Phased Management 2021 to 2025	NWMO (March 2021)	Reviewed to understand the Project planning timelines. The PRT provided comments (November 18, 2021) for NWMO's consideration and response (January 27, 2022).
Community Safety Effects Study – Statement of Work	MSB (February 2021)	Reviewed to understand the objectives and scopes of work including inputs to the PRSS and their relationship to other Community Studies as envisioned by the MSB.

Document Name/Information	Author/Source/Date	Description/Application
Deep Geological Repository Conceptual Design Report – Crystalline / Sedimentary Rock (APM-REP-00440-0211-R000)	NWMO (September 2021)	All members of the PRT reviewed the Executive Summary to obtain an understanding of the below ground facility. Subsequently, additional sections of the Report were reviewed, by certain members of the PRT as appropriate, to obtain a greater level of understanding specific to their areas of study (e.g., Facility Design and Operation, Aggregate Resources Study, Local Traffic Effects Study, Waste Management, etc.). The PRT provided comments (November 18, 2021) for NWMO's consideration and response (January 27, 2022).
Community Studies Planning Assumptions	NWMO (October 18, 2021)	Reviewed to understand certain parameters for the Project. The PRT provided comments (November 18, 2021) for NWMO's consideration and response (January 27, 2022).
South Bruce and Area Growth Expectations Memo	metroeconomics (February 7, 2022)	Reviewed to understand the assessment of the potential for economic and demographic growth over the period from 2022 to 2046 of the Core Study Area including MSB both from the perspectives of growth independent of the Project as well as the result of the Project.
Confidence in Safety – South Bruce Site (NWMO-TR-2022-15)	NWMO (March 2022)	This report summarizes the results of the borehole investigations as of early 2022 indicating that this site would be suitable from a geologic / technical perspective for hosting a deep repository. It is intended to support public discussion around site selection.
Emergency Services Study Report (S17) – Final V3 - Southwestern Ontario Community Study	DPRA Canada Inc. and IEC (October 28, 2022)	The final output/deliverable from completing the final Emergency Services Study Work Plan for review by the PRT.
Preliminary Radiological Safety Study - South Bruce (S19) - Draft V0 (R000e) - issued by Arcadis	Arcadis Canada Inc. (April 5, 2023)	The draft output/deliverable from completing the final Statement of Work for review by the PRT.
Community Health Programs and Infrastructure Study Report (S20) – Final V5 - Southwestern Ontario Community Study	DPRA Canada Inc. (April 20, 2023)	The final output/deliverable from completing the final Community Health Programs and Infrastructure Study Work Plan for review by the PRT.
Preliminary Radiological Safety Study - South Bruce (S19) - Draft V0 (R000f) - issued by Arcadis	Arcadis Canada Inc. (July 11, 2023)	The revised draft output/deliverable from completing the final Statement of Work for review by the PRT.

## 4. Peer Review Findings and Resolution

### 4.1 Comments on the Preliminary Radiological Safety Study

The PRT provided preliminary comments to the NWMO/Arcadis team on May 26, 2023 in the form of a memo and the accompanying comment disposition table (**Appendix C**). In reply, NWMO/Arcadis provided a documented response on June 27, 2023 describing how and where the PRT's comments will be addressed in the Revised Draft Report V0 (R000f) (**Appendix C, 4<sup>th</sup> column**). Upon receiving the Revised Draft Report V0 (R000f), the PRT reviewed it to ensure the documented responses were, in fact, incorporated into the Study (**Appendix C, 5<sup>th</sup> column**).

## 4.2 Comments on Adherence to the Statement of Work

The PRSS substantively complies with the approved Statement of Work as indicated in **Table 4.1**. The PRT notes that the PRSS provides the community with a good (although somewhat technical) description of the basics of potential radiological impacts of the project. The report discusses natural background radiation to which people are already exposed, and explains the potential for additional radiological exposure to the community, using the existing level of facility design (conceptual design phase). It also describes likely facility mitigation measures relating to radiological safety, as related to the different project phases.

Table 4.1 Adherence to the Statement of Work

Step #	Description of Activities	Comments from Peer Review (V0 (R000e))	PRSS updates made following PRT comments	Comments from Peer Review (V0 (R000f))
<b>Specific Objectives</b>				
1	Summarize the potential radiological effects of the project, during all its phases, on the safety of the residents of South Bruce and on future residents in the proximity of the site.	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.
2	Describe at a high level, mitigation and/or follow-up measures to be taken if an increase in risk is identified during any phase of the project.	Objectives partially addressed as per the level of conceptual design.	N/A	Report is adequate related to the current conceptual design.
<b>Scope of Work Tasks</b>				
1	Summarize the expected activities during the main phases of the project (site preparation, construction, operation, decommissioning and closure, postclosure) focusing on aspects that could potentially result in radiological emissions.	Objectives partially addressed; decommissioning is not currently addressed in the report.	There are three locations in the document where doses due to decommissioning have now been mentioned. Section 5.3, 5.5, and Section 9.2 now state: <i>“It is further expected that the potential radiological effects of the Project during closure and decommissioning, if any, will be less than – and therefore bounded by – the potential effects during operations.”</i>	No additional references have been provided to indicate what doses are expected during decommissioning. Therefore, it is not clear how the authors can make this comparison and state that estimated decommissioning doses are expected to be less than operation doses. In fact, doses during decommissioning can be higher than during operations. Suggest that this text be removed from the report.
2	Summarize the types of potential radiological effects of the project on community safety during normal operating conditions and under hypothetical accident conditions as well as under hypothetical future disruptive events.	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.

Step #	Description of Activities	Comments from Peer Review (V0 (R000e))	PRSS updates made following PRT comments	Comments from Peer Review (V0 (R000f))
3	<p>Provide context on radiological hazards and effects from natural and man-made sources, under normal and potential accident conditions:</p> <ul style="list-style-type: none"> <li>a) Explain the presence of background natural radiation in Canada: The CNSC (2013) fact sheet on natural background radiation discusses natural radiation sources (e.g., cosmic, terrestrial, inhalation and ingestion) and suggests typical doses received from each of these natural radiation sources.</li> <li>b) Provide information on the regulatory dose limits, how they are established, including information on UNSCEAR and other international radiological safety setting bodies and activities.</li> <li>c) Provide information on man-made radiation sources and doses, both generic and local: IAEA (2004) provides information on doses from man-made uses of radiation such as weapons testing, medical procedures and occupational exposures. Where available, information on performance of the licensees should be provided.</li> <li>d) Discuss the current knowledge of hazards and effects based on similar experience in handling used CANDU fuel. Discuss briefly status of international experience on Deep Geological Disposal of Used Nuclear Waste.</li> </ul>	<p>The peer review team does not believe that potential accident conditions are relevant to sections a, b, and c of this task.</p> <ul style="list-style-type: none"> <li>a) Objectives satisfactorily addressed.</li> <li>b) Objectives satisfactorily addressed.</li> <li>c) Objectives satisfactorily addressed.</li> <li>d) Objectives are partially addressed. The Peer review team believes that the report adequately addresses the current knowledge of hazards and effects based on similar experience in handling used CANDU fuel, but believe more needs to be done to address the status of international experience on Deep Geological Disposal of Used Nuclear Waste.</li> </ul>	N/A	Comment remains unchanged.

Step #	Description of Activities	Comments from Peer Review (V0 (R000e))	PRSS updates made following PRT comments	Comments from Peer Review (V0 (R000f))
4	Describe how safety assessments are performed for the various types of effects and phases of the project at a high level with reference to e.g., the published Postclosure Safety Assessment (NWMO 2018). Explain how the precautionary principle has been applied. Discuss how the latest regulatory guidance and standards have been followed.	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.
5	Describe at a high-level the measures that the NWMO commits will be included in the project to protect the public and workers from radiological hazards. These protection measures may include features in the conceptual repository design, or programs that will be undertaken during construction and operations	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.
6	Describe at a high level the conclusions regarding potential radiological effects during the Preclosure and Postclosure periods.	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.
7	Document the above in a Community Safety Effects Study Report. The report will be written in plain language, with high-school educated, non-specialist members of the public as its intended audience.	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.

## 4.3 Municipality of South Bruce’s Guiding Principles

The PRSS informs select principles of the 36 guiding principles established by MSB. The Municipality published a Project Visioning report based on community workshops held in January 2020 that identified areas of community concern and opportunities. Based on the Project Visioning report and further public consultation, MSB passed a Council resolution endorsing the 36 principles that will guide their assessment of willingness to host the APM Project. In light of their importance to MSB, the principles have been individually linked to each of the studies as appropriate to ensure that they were fully considered or accounted for in completing the work (**Appendix D**).

Two of the 36 principles are linked to the PRSS (Guiding Principles 1 and 2). To date, Guiding Principles 1 and 2 have been informed by several studies including the following:

<p><b>Preliminary Radiological Safety Study, draft July 2023</b></p>	<ul style="list-style-type: none"> <li>• Summarizes how to ensure safety and how radiological effects would be minimized</li> </ul>
<p><b>Confidence in Safety Report, March 2022</b></p>	<ul style="list-style-type: none"> <li>• Reviews the geological safety of the site</li> </ul>
<p><b>Deep Geological Repository Conceptual Design Report, September 2021</b></p>	<ul style="list-style-type: none"> <li>• Describes the required facilities and infrastructure needed to safely receive, package, and emplace the used nuclear fuel in the underground, and the conceptual operational worker safety and radiation protection systems and programs</li> </ul>
<p><b>Preliminary Radon Assessment for a Used Fuel Deep Geologic Repository, December 2020</b></p>	<ul style="list-style-type: none"> <li>• Determines whether there is a health hazard to workers, and if there is a need for radon monitoring or development of any action levels to be in compliance with regulatory requirements</li> </ul>
<p><b>Emergency Services Study, October 2022</b></p>	<ul style="list-style-type: none"> <li>• Assesses the effects of the Project on emergency services locally and regionally</li> </ul>
<p><b>Community Health Programs and Infrastructure Study, May 2023</b></p>	<ul style="list-style-type: none"> <li>• Assesses the effects of the Project on health services locally and regionally</li> </ul>

**Table 4.2** lists MSB’s Guiding Principles 1 and 2 and how the PRSS specifically informs on them.

**Table 4.2** The MSB Guiding Principles Associated with the Preliminary Radiological Safety Study

Principle # and Description	Consideration of the Principle in the Study
<p>1. The NWMO must demonstrate to the satisfaction of the Municipality that the Project will be subject to the highest standards of safety across its lifespan of construction, operation and into the distant future.</p>	<p>The Study rightly points out that the Project preparation and construction phases do not involve the presence of used nuclear fuel on site so there is no potential for radiological effects to the public in these phases. The Study identifies multiple ways in which the Project would ensure safety during the operations phase. The ways rightly focus on preventing and minimizing releases and exposures. To this end, NWMO is planning on preparing a Pre-closure Safety Assessment (PreSA) and a Post-closure Safety Assessment (PostSA). The PreSA will assess public exposures based on the estimated emissions and compare them to regulatory criteria to ensure that there is no health risk to the public. The PostSA will determine the potential effects of the repository on the health and safety of people and the environment in the long term, during the post-closure phase. Both Assessments will follow the approach outlined in Canadian standards, guidelines, and Canadian Nuclear Safety Commission regulatory documents.</p> <p>NWMO would continue to monitor the long-term safety and performance of the repository for an extended period (70 years have been assumed for planning purposes) once all used fuel containers have been emplaced in the repository. Decommissioning activities for surface facilities would begin after enough monitoring data have been collected to support the decision to decommission and close the repository. Post-closure monitoring would be in place for as long as needed to verify that the repository is behaving in a safe manner.</p>
<p>2. The NWMO must demonstrate to the satisfaction of the Municipality that sufficient measures will be in place to ensure the natural environment will be protected, including the community's precious waters, land and air, throughout the Project's lifespan of construction, operation and into the distant future.</p>	<p>As stated above, there is no potential for radiological effects on the natural environment during the Project preparation and construction phases because they do not involve the presence of used nuclear fuel. As mentioned, the Study identifies multiple ways in which the Project would ensure protection of the natural environment (waters, land, and air) by preventing and minimizing releases and exposures during the operations and post-closure phases including monitoring to confirm performance. Some of these noted ways include the site itself (e.g., stability of the host rock, favourable underground chemical conditions for containment, etc.) as well as the design (e.g., using a multiple-barrier concept, employing emission controls that reduce and control the radionuclides in airborne and waterborne releases, etc.).</p>

## 4.4 Conclusions of the Peer Review

The PRSS substantively complies with the approved Statement of Work providing the community with a good description of the basics of potential radiological impacts of the Project. The purpose of the PRSS is to summarize how radiological safety would be ensured and how radiological effects to public members would be minimized so that they stay below relevant regulatory criteria and do not cause any undue health effects. The Report describes what radiation is, where it occurs and at what levels; applicable regulations in Canada established for the control of radiation, an overview of the Project and its phases and measures for ensuring safety.

The PRTs comments primarily dealt with technical clarification/simplification; quantification of anticipated potential radiation levels where possible, and the integration of the recommended actions from the Community Health Services Study and Emergency Response Study in building confidence in safety.

It is the view of the PRT that the PRSS Report is technical in nature and satisfies the objective of providing a preliminary summary on how the safety of the Community would be ensured, from a radiological perspective. The Report provides high level information on understanding how Guiding Principles #1 and #2 will be met. Additional information could be provided related to the status of international experiences with Deep Geological Disposal of Used Nuclear Waste.

Should the MSB be selected as the host community, it is recommended that NWMO carry out further studies once the site-specific conceptual design has been prepared to further assess and describe the radiological effects on the Community. For example, additional studies performed to assess the capabilities and capacity needed by the



municipality and other supporting public agencies to respond to radiation-related emergencies. Likewise, the PRSS Report does not address radiation safety of the transport of the used fuel to the Project Site.

Although additional study is recommended once the site-specific design is finalized, it is the view of the PRT that the current conceptual design indicates that the radiological risk to the community is quite low during the operation and post-closure phases of the Project. Doses to the public, due to the facility, will be below regulatory dose limits, and in fact are likely to be negligible compared to the natural background radiation in Canada.

So, with the preceding conclusions in mind, the PRT learned the following from their review of the PRSS Report:

- The Project would be subject to a federal Impact Assessment and regulated by robust regulatory frameworks
- The NWMO is confident that a deep geological repository could be constructed at the South Bruce Site in a manner that would provide safe long-term management for Canada's used nuclear fuel.
- The Safety assessment for the operations of the facility will be advanced along with its design
- The potential radiological effects during post-closure are expected to be less than during operations of the facility

# Appendices

# **Appendix A**

**List of Socio-Economic Community Studies**

## Appendix A. List of Socio-Economic Community Studies

ID	Study Name	Study Proponent	Lead Consultant
E01	Local Economic Development Study & Strategy	MSB	Deloitte
E02	Economic Development Program - Youth	MSB	Deloitte
E03	Local Hiring Effects Study & Strategy	MSB	Deloitte
E04	Demographics	MSB	Deloitte
E05	Agricultural Task Force/Agricultural Business Impact Study	MSB	Deloitte
E06	Fiscal Impact and Public Finance	MSB	Watson & Associates Economists
E07	Tourism Industry Effects & Strategy	MSB	Deloitte
E08	Housing Needs and Demand Analysis Study	NWMO, MSB	Keir Corp.
E09	Labour Baseline Study	NWMO	Keir Corp.
E10	Workforce Development Study	NWMO	Keir Corp.
E11	Regional Economic Development Study	NWMO	Keir Corp.
E12	Property Value Monitoring Program		
I21	Aggregate Resources Study	NWMO, MSB	Keir Corp.
I22	Infrastructure Baseline and Feasibility Study	NWMO	Morrison Hershfield
I23	Local Traffic Effects Study	NWMO	Morrison Hershfield
I24	Road Conditions Effects Study	NWMO	Morrison Hershfield
S13	Effects on Recreational Resources	MSB	Tract Consulting
S14	Local/Regional Education Study	NWMO, MSB	DPRA
S15	Land Use Study	NWMO, MSB	DPRA and MHBC
S16	Social Programs Study	NWMO, MSB	DPRA
S17	Emergency Services Study	NWMO	DPRA and IEC
S18	Vulnerable Populations Baseline and Effects Study	NWMO	DPRA
S19	Preliminary Radiological Safety Study	NWMO	Arcadis Canada Inc.
S20	Community Health Programs and Health Infrastructure Study	NWMO	DPRA

# **Appendix B**

## **Peer Review Protocol**

## **South Bruce Consultants Peer Review Protocol**

### **Protocol for Peer Review Process**

1. The scope of the peer review is variable for each NWMO study (Study). The scope and objective of each Study is variable. The Study may include development of information, data and documents in the form of a:

- Statement of Work
- Work plan
- Baseline conditions
- Modeling/prediction/forecast of future conditions
- An assessment of impact/benefits

Not all NWMO studies will include each of the above listed elements. While a collaborative peer review approach is to be used, it is important to maintain independence during the peer review process.

2. Develop an initial understanding of NWMO inputs to conducting the Study including timing, availability and sources of information.
3. Meet with NWMO and their consultants to
  - compile a list of information/documents that will need to be reviewed as part of the Peer Review
  - compile a list of parties/agencies providing information for use in preparing the Study
  - identify additional information/sources that may be pertinent to the Study
4. Undertake an initial review of the information/documents assembled and developed for the Study
  - Peer review of the SoW will include information and data pertaining to some or all of the following elements:
    - i.) Statement of Work (SoW)
    - ii.) Work plan
    - iii.) Baseline conditions
  - Provide questions/comments to NWMO on the available information/documents and ensure they have been adequately addressed with the community in mind.
5. Conduct peer review of the Study findings as they are developed which may include the following:
  - i.) Project design(s)
  - ii.) Modeling of future conditions
  - iii.) Impact assessment approach
  - iv.) Impact assessment findings
  - v.) Analysis of reliability
  - If warranted, work with NWMO and their consultants to conduct a site visit
6. Meet with NWMO and their consultants to:
  - Seek clarifications of the information/documents reviewed
  - Ensure a full understanding of the assessment approach and findings
  - Present the preliminary peer review findings (concurrences and concerns)



- Provide questions/comments and peer review findings and ensure they have been adequately addressed with the community in mind.
7. Review NWMO draft reports
    - Complete a detailed review of the draft reports
    - Identify omissions and/or inconsistencies if they occur with SOW and Work Plan
  8. Prepare draft Peer Review Report for submission to South Bruce for comments.
    - Include a summary of peer review observations, findings, and comments
  9. South Bruce will review with RedBrick for communications to public
  10. Finalize and present the Peer Review Report to South Bruce and NWMO
  11. Each consultant will need to provide a presentation of the findings of the peer reviews to the CLC.

## **Table of Contents for Peer Review Report**

1. Introduction
  - a. State the purpose of the Peer Review Report (Report)
  - b. Provide capsule summary of the proposed Project
  - c. Identify the NWMO Study that is being peer reviewed
  - d. Identify the NWMO Statement of Work for completing the Study (i.e., SOW from EOI or update)
  - e. Identify participants involved in conducting the Study
  - f. Identify the time period the Study work and Peer Review was carried out
2. Peer Review Objectives and Process
  - a. State objectives for conducting the Peer Review which include
    - i. To provide the community of SB with independent review by qualified subject matter experts
    - ii. To complete a peer review of the NWMO Assessment of potential impacts and proposed benefits in comparison to existing conditions
    - iii. To review how the potential impacts and proposed benefits adhere to the 36 principles that will guide the assessment of willingness to host the Project.
  - b. Describe the Peer Review Process Undertaken
    - i. Describe the Peer Review process that was carried out.
    - ii. List activities completed (e.g., site visits, work plan review, data review, report review, meetings, etc.)
3. Documentation and Information Reviewed
  - a. List NWMO study specific information reviewed which may include:
    - i. Scope of work
    - ii. Detailed work plan
    - iii. Baseline Conditions
    - iv. Assessment Approach
    - v. Assessment Findings
  - b. List parties/agencies involved in providing information into the study
  - c. List all documents/meetings/data/additional information and include a short summary of each
4. Peer Review Findings and Resolution
  - a. Baseline Conditions Report (concurrences and concerns and resolution)

- b. Impact Assessment (IA) Report
    - i. IA approach (concurrences and concerns and resolution)
    - ii. IA findings (concurrences and concerns and resolution)
  - c. Conclusions of peer review
  - d. Adherence to the 36 principles which are pertinent to the study
5. Summary



# **Appendix C**

**Peer Review Comments Memo**



# Memorandum

July 04, 2023 – updated August 1, 2023

<b>To</b>	Dave Rushton/Steve Travale, Municipality of South Bruce		
<b>Copy to</b>			
<b>From</b>	Greg Ferraro and Ian Dobrindt/AD/mma	<b>Tel</b>	+1 519 884 0510
<b>Subject</b>	A Preliminary Safety Assessment of the NWMO DGR – South Bruce Site (S19) Draft Report V1 – Peer Review Comments	<b>Project no.</b>	11224152-MEM-45

## 1. Introduction

This memo provides the Municipality of South Bruce (South Bruce) peer review team's preliminary comments on *The Preliminary Radiological Safety Study – South Bruce Site (S19) (Draft Report; V0 (R000e))* prepared by Arcadis Canada Inc. (Arcadis) (April 5, 2023) for your consideration and internal circulation as per the South Bruce Nuclear Exploration Project joint study review flow process. In addition, the memo will be submitted to the Nuclear Waste Management Organization (NWMO) and their consultants (Arcadis) by GHD Limited (GHD) as per the peer review protocol process.

## 2. Peer review approach

The peer review of the Draft Report was carried out by GHD and Radiation Safety Institute of Canada (RSIC). The peer review process was completed in alignment with the peer review protocol that was developed to support a collaborative approach between NWMO and South Bruce while maintaining independence during the process. In accordance with the peer review protocol process, GHD and RSIC (Subject Matter Experts) and GHD (Lead Consultant) considered the following information during our individual reviews *The Preliminary Radiological Safety Study*:

- Community Safety Effect Study – Statement of Work (February 3, 2021)
- Discussions held at the December 12, 2022 check-in meeting and follow-up comments provided on December 14, 2022
- Peer review comments on NWMO's draft project description for South Bruce community studies memo prepared by GHD Limited (November 18, 2021) and responded to by NWMO (January 27, 2022)
- Pertinent baseline and effects assessment information provided in companion Community Study/Peer Review reports and other NWMO design/assessment reports including:
  - Community Health Services and Infrastructure Study Report (April 20, 2023)
  - Emergency Services Study Report – DPRA/IEC (October 28, 2022)
  - Confidence in Safety – South Bruce Site – NWMO March 2022

- Deep Geologic Repository Conceptual Design Report Crystalline/Sedimentary Rock Environment – NWMO September 2021
- Preliminary Radon Assessment for a Used Fuel Deep Geologic Repository – NWMO December 2020

GHD and RSIC reviewed the Draft Report having the following questions in mind:

- Are there any significant concerns, issues, and/or omissions with the Draft Report?
- What are our initial observations/impressions on the Draft Report?
- Has the Statement of Work (SoW) been complied with?
- Does the Draft Report reflect the most current information available?
- Is the preliminary safety assessment provided is an extension and integrates with previous safety assessment work carried out by NWMO for South Bruce?

GHD and RSIC held an internal 10-day Peer Review Check-In Meeting working through the preceding questions. These initial observations/preliminary comments were shared with NWMO and Arcadis during a discussion on June 21, 2023, where questions were asked, clarifications sought, and suggestions offered. Following this discussion, substantive comments were finalized as listed in the Comment Disposition Table (**Table 1**).

### 3. Peer review comments

The Draft Report is one of the more well written community studies and provides a preliminary comprehensive assessment. As stated, the comment disposition table (**Table 1**) lists the peer review team's combined comments on the Draft Report. The NWMO and Arcadis have provided responses to these comments, and it is understood that each comment where appropriate will be addressed as part of finalizing the Report.

Based on the preliminary peer review, the inputs presented in the Draft Report are found to support the overall objective to summarize how safety would be ensured and how radiological effects to members of the public would be minimized to stay below relevant regulatory criteria.

In general, the study as described in the Draft Report substantially complies with the specific objectives and the scope of work tasks listed in the SoW as summarized in **Table 2**. Certain sections of the report, although technically informative and highly beneficial to the assessment are considered too technical for general public consumption. As such, a more simplified summary or wording within certain areas of the report would provide better consistency with SoW Task 7. In support of this, the inclusion of an animated conceptual site model would assist in understanding potential project derived radiation levels within the repository, adjacent environments, and beyond.

It is suggested the report identify how the safety assessment provided informs Municipality of South Bruce Guiding Principles #1 and #2.

#### **Responses (in addition to the disposition table below):**

##### **Terminology:**

See disposition to comment #1 in the table below, which outlines several proposed text revisions. The intention is to use more reader-friendly terminology (reduced technical terminology).

##### **CSM Figure:**

As discussed in the 21 June 2023 call, a CSM figure will be provided for use in a future public-friendly document rather than in this report.

**Guiding Principles:**

As discussed in the 21 June 2023 call, a few sentences of standardized text have been developed on this topic, and this text has been used in other community study reports. It will be added to this report.

**Transportation:**

As discussed in the 21 June 2023 call, the report is clear that transportation is not within its scope. Therefore, no changes are needed.

Table 1 Preliminary Radiological Safety Study – South Bruce Report Comment Disposition Table

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
1	Generic, with some specifics: Glossary	<p>The SoW indicates that the report is to be written in plain-language "with high-school educated, non-specialist members of the public as its intended audience." Parts of this report are felt to be too scientific and need to be put into better plain language for easier public understanding.</p> <p>Specific instances:</p> <ul style="list-style-type: none"> <li>– The term "Anthropogenic Radiation" is used several times. Although it is in the glossary and is explained, it is felt this will not be understood by the public. Better to just say "man-made radiation".</li> <li>– The term "Cosmogenic Radionuclide" is not as bad as the previous, but still could be simplified. The use of this term and clarifications for some of the explanations around cosmic radiation are provided in a marked-up report version.</li> <li>– The term "Primordial Radiation" is used similarly to Anthropogenic, but not quite as often. This could be simplified for the public.</li> <li>– The term "deterministic" should be explained or just use plain language. General public will not know what this means.</li> <li>– Terms "hydraulic conductivity" and "dominance of diffusive transport" and "sorption" and "diffusion coefficients" will not be easily understood.</li> </ul> <p>Locations: Glossary, and several times within Section 2.3, Section 3.2, Section 6.4</p>	<p><b>We can address most items. Need clarification of highlights in green from NWMO and of item in turquoise – from the Peer Reviewers (PR)</b></p> <p><b>Anthropogenic Radiation:</b> Text revisions are offered below. As discussed during the 21 June 2023 call, 'man-made' will be replaced with 'manufactured'.</p> <p><u>Glossary:</u> "Anthropogenic-Manufactured Radiation – Also called <del>man-made</del> "anthropogenic" radiation, is generated by human activities such as nuclear power plants, medical equipment and nuclear weapons testing. (Revised and simplified based on IAEA 2019 and CNSC 2020a)" <i>(also relocate within the glossary alphabetically)</i></p> <p><u>Section 2.3, paragraph 2:</u> "We are also exposed to <b>manufactured (also known as anthropogenic)</b> radiation from various sources, such as medical scans, X-rays, cancer treatments, the nuclear fuel cycle, as well as commercial products like smoke detectors (CNSC 2020a)."</p> <p><u>Section 2.3, paragraph 3:</u> "The following paragraphs describe the sources of natural and <b>anthropogenic manufactured</b> radiation to which people are typically exposed."</p> <p><u>Section 2.3, subsection "Nuclear Weapons Testing and Global Fallout", paragraph 1:</u></p>	Comments satisfactorily addressed.

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<p>"Testing of nuclear weapons in the atmosphere was the most significant cause of exposure of the world population to <b>anthropogenic manufactured</b> environmental sources of radiation (UNSCEAR 2000)."</p> <p><i>Section 2.3, subsection "Releases from Nuclear Power Generating Stations", paragraph 1:</i></p> <p>"The nuclear fuel cycle (e.g., uranium mines and mills, and nuclear power reactors), military establishments, research organizations, hospitals and non-nuclear industries all contribute to <b>anthropogenic manufactured</b> releases of radionuclides to the environment (IAEA 2004). Most of the <b>anthropogenic manufactured</b> radioactivity currently entering the environment is from the nuclear power industry."</p> <p><b>Cosmogenic Radionuclide:</b></p> <p><i>Glossary:</i></p> <p><b>Cosmogenic Atmospheric Radionuclide</b> – <del>The</del> radioactive nuclei produced by the interactions of cosmic rays with the nuclei of atmospheric constituents. The <b>cosmogenic</b> radionuclide most relevant to public exposure is carbon-14 (C 14, or 14C). (Revised <b>and simplified</b> based on UNSCEAR 2010)</p> <p><i>Section 2.3, subsection "Cosmic Radiation", last paragraph:</i></p> <p>"Cosmic rays interact with the nuclei of atmospheric constituents and the interactions produce a number of radioactive nuclei, <b>known as cosmogenic radionuclides. The cosmogenic radionuclide</b> the most relevant of which to public exposure, is carbon-14 (C-14, or 14C). It arises from the interaction of slow</p>	

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<p>cosmic neutrons with nitrogen 14 (N-14) in the earth atmosphere. Transformed into <sup>14</sup>CO<sub>2</sub>, it is used by plants for photosynthesis.</p> <p><b>Primordial Radionuclides:</b> Broadly speaking, replace with 'naturally occurring'. Specific revisions are outlined below.</p> <p><u>Glossary:</u> Delete 'primordial radionuclides' entry from glossary: <del>Primordial Radionuclides—Naturally occurring radionuclides of terrestrial origin. (UNSCEAR 2010)</del></p> <p><u>Section 2.3, subsection "Terrestrial Radiation", first paragraph:</u> "The earth's crust is a major source of natural radiation, which is <del>also sometimes simply referred to as primordial radiation naturally-occurring radiation.</del>"</p> <p><u>Section 2.3, subsection "Terrestrial Radiation", second paragraph:</u> People may also receive external exposures from building materials where traces of these <del>primordial naturally occurring</del> elements are found.</p> <p><b>Deterministic:</b> "The CNSC and other international regulators also put measures in place, including stringent dose limits and radioactive source tracking databases, to mitigate the chances of the public or workers receiving doses of radiation high enough to cause <del>undue deterministic (non-cancer)</del> effects (CNSC 2019b)."</p>	

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<p><b>Hydraulic Conductivity:</b></p> <p><u>Glossary:</u> Delete 'primordial radionuclides' entry from glossary: <del>Hydraulic Conductivity—A number describing the rate at which water can move through a medium.</del></p> <p><u>Section 6.4.2, second-last paragraph:</u> "Dose rates are low because of the very <del>low hydraulic conductivity</del> slow rate at which water travels through <del>of</del> the host rock <del>and</del>; the absence of fractures <del>and the dominance of diffusive transport.</del>"</p> <p><b>Diffusive Transport:</b> Captured above, Section 6.4.2.</p> <p><b>Sorption:</b></p> <p><u>Glossary:</u> Delete 'sorption' entry from glossary: <del>Sorption—Process by which dissolved substances adhere to a solid phase.</del></p> <p><u>Section 6.4.3: Second-last paragraph:</u> "The sensitivity cases considered unexpected failures of physical barriers such as the fuel, container, seals (buffer and backfill) and geosphere, as well as chemical barriers such as the fuel and Zircaloy dissolution rates, radionuclide solubility, and radionuclide sorption (i.e., <del>the influence of radionuclides adhering to solids instead of transporting in water.</del>)"</p> <p><b>Diffusion Coefficients:</b> The following changes are proposed. It is also proposed that the definition of diffusion in the glossary remain. With these</p>	



Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<p>changes the reader can now look up the term diffusion and find its explanation in the glossary, rather than the prior term "diffusion coefficients" which was not explicitly defined.</p> <p><u>Section 6.4.3: last paragraph:</u>  "The largest changes to the calculated dose rates are due to (1) changes in the number of failed containers from 10 to 1000, (2) changes to the <del>diffusion values</del> <del>used to represent radionuclide diffusion coefficients for in</del> bentonite and in the geosphere, and (3) assumptions around post-glaciation lifestyle."</p>	
2	Executive Summary – part iv Operations Phase,	<p>2nd paragraph: Report indicates that there is potential source of radiation via gas or particulates released during fuel handling "particularly if some fuel cladding becomes damaged during transport or handling". The potential that fuel is transported that has already had already been subject to fuel cladding damage is unlikely and should be mentioned.</p> <p>2nd last paragraph: Second sentence is "An operational safety assessment is therefore prepared by the NWMO..." suggest that "is therefore prepared" wording is not clear enough on timeline of this report and could be misunderstood by the public that this is already done. It is not done yet but will be done. We suggest better wording would be "therefore will be prepared".</p>	<p><b>#1) Fuel handling:</b>  The text in question appears in 2 locations:</p> <ul style="list-style-type: none"> <li>Executive Summary: subheading "iv. Operations Phase": 2<sup>nd</sup> paragraph;</li> <li>Section 5.2: 2<sup>nd</sup> paragraph.</li> </ul> <p>Proposed changes (in both locations) are as follows:</p> <p>"The radioactivity is contained within the fuel bundles. Therefore, the potential sources of radioactivity or radiation within the facility are the direct gamma and neutron radiation from the fuel bundles, and small amounts of gas or particulates that may be released from fuel during handling, <del>particularly if some fuel cladding becomes damaged during transport or handling.</del>"</p> <p><b>#2) 2<sup>nd</sup> last paragraph:</b>  The proposed change will be made. Specifically:</p>	<p>First comment satisfactorily addressed.  Second comment was not addressed.</p>

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<p>"Therefore, <del>An</del> an operational safety assessment <del>is therefore</del> will be prepared by the NWMO; it will <del>that</del> considers the design and safety features of the DGR, the potential releases, and the potential pathways by which people may be exposed to these releases</p>	
3	Section 1.1	<p>"South Bruce Municipality" should read "Municipality of South Bruce".</p>	<p>The proposed change will be made. Specifically:</p> <p><u>Section 1.1: 2<sup>nd</sup> last paragraph:</u>  "...(1) the Saugeen Ojibway Nation-South Bruce area, located in the <del>South Bruce</del> Municipality of South Bruce near Teeswater, Ontario..."</p>	Comments satisfactorily addressed.
4	Section 1.2	<p>This list of objectives is not the same as the SoW. In particular, Objectives 1 to 3 are new ancillary objectives. We suggest that Objectives 4 and 5 be stated first as per the SoW and then the other three ancillary objectives be included with the rationale for their inclusion so there is increased traceability for the reader.</p>	<p>The proposed change will be made. Specifically:</p> <p><u>Section 1.2: Objectives:</u></p> <p>The objectives of this particular Community Study, <i>Potential Radiological Effect of the NWMO DGR on Human Health - South Bruce Site</i>, are to provide <del>information and</del> <b>context</b> on:</p> <ul style="list-style-type: none"> <li>• Potential radiological effects of the Project, during all its phases, on the safety of the residents of South Bruce and on future residents in the proximity of the site; and,</li> <li>• A high-level description of safety features of the facility, mitigation and/or follow-up measures that could be taken if an increase in risk is identified during any phase of the project.</li> </ul> <p>An additional objective is to provide important context and background information on:</p>	Comments satisfactorily addressed.

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<ul style="list-style-type: none"> <li>• Radiation, radioactivity and their presence in the environment (in general);</li> <li>• Relevant Canadian regulations pertaining to protection of people from radiation;</li> <li>• Emissions of radioactivity potentially associated with the Project;</li> <li>• <del>Potential radiological effects of the Project, during all its phases, on the safety of the residents of South Bruce and on future residents in the proximity of the site; and;</del></li> <li>• <del>A high level description of safety features of the facility, mitigation and/or follow up measures that could be taken if an increase in risk is identified during any phase of the project.</del></li> </ul>	
5	Section 2.3	This section has some good explanations but is missing values (other than an image from the CNSC). Suggest that putting typical Canadian or Ontario dose values in each of the sections is valuable information to the members of the public and needed to meet the overall objectives of the SoW.	<p>Proposed changes are as follows:</p> <p><u>Section 2.3: main heading, third paragraph:</u> The following paragraphs describe the sources of natural and anthropogenic radiation to which people are typically exposed. For context, a study by Grasty and Lamarre (2004) found that the average dose that a Canadian receives from natural background sources is approximately 1.8 millisieverts (mSv) per year.</p> <p><u>Section 2.3: Subheading "Cosmic Radiation":</u> Add a new final paragraph: For context, the annual effective dose of radiation from cosmic rays in Vancouver, British Columbia, which is at sea level, is about 0.30 mSv (CNSC 2020c). Regions at higher altitudes receive more cosmic radiation (CNSC 2020c).</p>	Comments satisfactorily addressed.

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<p><u>Section 2.3: Subheading "Terrestrial Radiation":</u>  Add a new final paragraph:  For context, in Canada, the estimated highest annual dose from terrestrial radiation is approximately 1.4 mSv, as measured in the Northwest Territories (CNSC 2020c).</p> <p><u>Section 2.3: Subheading "Food and Drinking Water":</u>  Add a new final paragraph:  For context, CNSC (2020c) mentions that several sources of natural radiation affect our bodies through the food we eat, the air we breathe and the water we drink, with Potassium-40 (K-40) being the main source of internal irradiation (aside from radon decay) found in a variety of everyday foods. The average effective dose from these sources is approximately 0.3 mSv a year (CNSC 2020c).</p> <p><u>Section 2.3: Subheading "Airborne Radiation":</u>  Add a new final paragraph:  For context, the worldwide average annual effective dose of radon radiation is approximately 1.2 mSv (CNSC 2020c).</p>	

6	Section 2.5	<p>This section lists various international agencies and organizations but is pretty light on the explanation of what they do, with only a short sentence on each and then a reference to various websites for the reader to go to for more information.</p> <p>The SoW states to "provide information on the regulatory dose limits, how they are established, including information on UNSCEAR and other international radiological safety setting bodies and activities". This section doesn't really provide much information on the bodies. Some more details in the report are recommended, rather than just referring the reader to the various websites. Referring to a website doesn't necessarily meet the objective of the SoW.</p>	<p>Proposed changes are as follows (sub-headings added to divide the now-lengthier discussions of each agency):</p> <p>-----</p> <p>-----</p> <p><b>Section 2.5:</b></p> <p>...</p> <p><u><i>The International Commission on Radiological Protection (ICRP):</i></u></p> <p>The International Commission on Radiological Protection (ICRP) is an independent, international, non-governmental organization, with the mission to provide recommendations and guidance on radiological protection concerning ionizing radiation.</p> <p>The ICRP was established in 1928 to respond to concerns about the effects of ionizing radiation being observed in the medical community. It was later restructured to better take account of uses of radiation outside the medical area and was given its present name in 1950. Since 1977 the ICRP has published its recommendations in its own series of publications called the <i>Annals of the ICRP</i>. Publications cover a range of topics such as:</p> <ul style="list-style-type: none"> <li>- modelling the behaviour of radionuclides within the body (e.g., ICRP Publication #145);</li> <li>- calculating and tabulating dose coefficients (e.g., ICRP Publication #144);</li> <li>- offering recommendations on radiological protection for specific industries or situations (e.g., ICRP Publication #132: <i>Radiological Protection from Cosmic Radiation in Aviation</i>)</li> </ul>	Comments satisfactorily addressed.
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Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<ul style="list-style-type: none"> <li>– compiling nuclear decay data (e.g., ICRP Publication #107)</li> <li>– compiling information on radionuclide behaviour and transfer in the environment (e.g., ICRP Publication #114).</li> </ul> <p>Two particularly relevant publications are ICRP Publication #60, and the more recent equivalent ICRP Publication #103, which outline the ICRP's recommendations on dose limits. As per ICRP Publication #103, the ICRP continues to recommend that the limit should be expressed as an effective dose of 1 mSv in a year (ICRP 2007). Section 3.2 provides additional information on how the Canadian Nuclear Safety Commission (CNSC) uses the ICRP's recommendations to set dose limits in Canada.</p> <p>Readers are referred to the ICRP's website for further information.</p> <p><u><i>The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR):</i></u></p> <p>The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) was established to <del>define precisely the present exposure of the population of the world to ionizing radiation.</del> by the United Nations' General Assembly in 1955 and has undertaken broad assessments of the sources of ionizing radiation and its effects on human health and the environment (UNSCEAR 2020).</p> <p>In pursuit of its mandate, UNSCEAR's Scientific Committee reviews and evaluates global and regional exposures to radiation (UNSCEAR 2020). The</p>	

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<p>Committee also evaluates evidence of radiation-induced health effects in exposed groups and advances in the understanding of the biological mechanisms by which radiation-induced effects on human health or on non-human biota can occur (UNSCEAR 2020). These assessments provide the scientific foundation used by agencies of the United Nations to formulate international standards for the protection of the public, workers, and patients against ionizing radiation (UNSCEAR 2020).</p> <p>Information collected by UNSCEAR on radiation quantities, exposures, and health-related effects, is used by many agencies around the world, including the ICRP and the CNSC (see Section 3.2).</p> <p>Readers are referred to the UNSCEAR website for further information.</p> <p><u>World Health Organization (WHO):</u> The World Health Organization (WHO) has also established a radiation protection program to protect patients, workers, and the public. Focusing on public health aspects of radiation protection, this program covers activities related to radiation risk assessment, management, and communication. The WHO also <del>provides</del> publishes information on radiological topics <del>on radiation</del>, such as:</p> <ul style="list-style-type: none"> <li>– indoor air and water quality guidelines that which include radiological parameters for radon;</li> <li>– water quality guidelines that which include radiological parameters;</li> <li>– guidance on the development of medical uses of ionizing radiation; and,</li> <li>– International health regulations, which include core national capacities that countries should meet regarding</li> </ul>	

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<p>radiological/nuclear emergency preparedness and response.</p> <p>Readers are referred to the WHO website for further information.</p> <p><del>Readers are referred to these organizations' and agencies' websites for more information.</del></p> <p><u>Following International Guidance:</u> The NWMO follows international guidance in addition to Canadian regulations and guidance. For example:</p> <p><b>References Section:</b></p> <p>Add new reference for ICRP 2007: International Commission on Radiological Protection (ICRP). 2007. <i>Annals of the ICRP – The 2007 Recommendations of the International Commission on Radiological Protection</i>. ICRP Publication #103. ISBN No. 978-0-7020-3048-2. March.</p> <p>Add new reference for UNSCEAR 2020: United Nations Scientific Community on the Effects of Atomic Radiation (UNSCEAR). 2020. <i>Sources, Effects and Risks of Ionizing Radiation – USCEAR 2019 Report – Report to the General Assembly, with Scientific Annexes</i>. ISBN no. 978-92-1-139184-8. December.</p>	



Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
7	Section 3.2	<p>The following sentence is unclear: "A dose of 1 millisievert is also smaller than the dose that an average Canadian already receives from natural sources of about 1.8 millisievert". Yes, 1 mSv is less than 1.8 mSv. Where is this 1 mSv coming from and why is it being compared to 1.8 this way? It is obvious that 1 is less than 1.8. What is the intent?</p>	<p>For context, the sentence is part of the larger discussion on why the CNSC chose 1 mSv to be the dose limit. The paragraph is as follows:</p> <p><i>"In determining this limit, the agencies assume that there is no threshold, and that every exposure to radiation carries some risk. In particular, the Linear No-Threshold model (LNT) risk model is used internationally. The LNT conservatively assumes there is a direct relationship between radiation exposure and cancer rates (CNSC 2019b). A dose of 1 millisievert would imply a risk to an average person of less than one in a million based on the above ICRP risk factor. A dose of 1 millisievert is also smaller than the dose that an average Canadian already receives from natural sources of about 1.8 millisievert (Grasty and Lamarre 2004)."</i></p> <p>The sentence that the reviewer identified is pointing out that the chosen dose limit is actually <i>less</i> than the dose that an average Canadian receives from natural background radiation.</p> <p>As outlined in the proposed response to comment #5 (above), an earlier mention of the Grasty and Lamarre (2004) findings has been added to Section 2.3.</p>	<p>Comments satisfactorily addressed.</p>

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
8	Section 4	This is a good overview of the project. However, it needs to be understood by the public that some construction will be executed from time to time during the operations phase. Not all of the underground placement rooms are being constructed in the initial construction phase. Although more clearly described in other community studies, this report doesn't indicate this – it implies that the two phases are completely separate which is not entirely true. Because of this, the following statement in the report is not accurate: "It is important to understand that the construction phase does not involve the presence of used nuclear fuel on site."	The construction phase that will be underway <i>until the NWMO receives an operating licence</i> (i.e., the Construction Phase), will not involve the presence of used nuclear fuel on site.  Used nuclear fuel will not be present on-site until the Operations Phase begins.	Comments explained, no further comment.
9	Figure 4-2	This figure is not actually referenced in the text of the report. Its purpose is not clear.	Figure 4-2 and its title caption will be deleted.	Comments satisfactorily addressed.
10	Figure 5-1	This figure is not referenced in the text. It should either be removed or referenced for context. It is in the section for 'main activities' which talks about Used Fuel Containers and work being done in radiation-shielded rooms of the surface facility. But this image does not have anything to do with these DGR activities or the DGR at all. This image shows how spent fuel is currently stored in another nuclear facility (OPG).  Recommend removal as it is somewhat misleading.	Figure 5-1 and its title caption will be deleted.	Comments satisfactorily addressed.

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
11	Section 5.4	The discussion of radon is good, but dose values would be very useful to the public. Just stating "much less than" is very subjective. Giving values and comparing to limits would be useful.	<p>Proposed revisions are as follows:</p> <p><u>Section 5.4: Radon: 2<sup>nd</sup> Paragraph:</u></p> <p>"An initial assessment of the hazard posed by radon during the construction and operation of the DGR was completed by NWMO (NWMO 2020). The results of this assessment indicate that:</p> <ul style="list-style-type: none"> <li>– for members of the public, <del>even those very</del> close to the facility (i.e., 100 m from the release point), the dose rate contribution from radon emitted from the facility, during the construction phase, is 0.00011 mSv/y.</li> <li>– for members of the public farther from the facility (i.e., 1,000 m from the release point), the dose rate contribution from radon emitted from the facility, during the construction phase, is 0.000019 mSv/y.</li> <li>– for members of the public close to the ERMA (i.e., 100 m from the release point), the dose rate contribution from radon emitted from the ERMA is 0.0037 mSv/y.</li> <li>– for members of the public farther from the ERMA (i.e., 1,000 m from the release point), the dose rate contribution from radon emitted from the ERMA is 0.00064 mSv/y.</li> </ul> <p><del>and operation of the facility would be</del></p> <p>All of these dose rate estimates are much less than the dose rate contribution from natural background sources.</p> <p>Additional details are provided in the NWMO report Preliminary Radon Assessment for a Used Fuel Deep Geological Repository (NWMO 2020). This analysis would be repeated specifically for the South Bruce site if that site is selected."</p>	Comments satisfactorily addressed.

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
12	Section 5.5	This conclusion has a statement about doses during decommissioning. However, the section is for Operations. Decommissioning is not discussed in Section 5 at all, so this statement in this section's conclusion is confusing. Suggest removal. If authors feel that doses during decommissioning must be discussed, maybe a separate section on decommissioning should be added.	Proposed revisions are as follows:  <u>Section 5.5: 1<sup>st</sup> Paragraph:</u> "Safety during the operations phase will be assessed as part of NWMO's Pre-closure safety assessment. The dose to members of public from normal operations is expected to be much less than the corresponding regulatory criterion. <del>It is expected that the potential radiological effects of the Project during closure and decommissioning, if any, will be less than the potential effects during operations.</del> A preliminary safety assessment is underway based on current site and design information, with some results anticipated to be complete by the end of 2023. As the design progresses, and a site is selected, the assessment will be refined to reflect ongoing design improvements and site-specific features."	Comment not satisfactorily addressed. The statement on decommissioning was modified to state  <i>"It is further expected that the potential radiological effects of the Project during closure and decommissioning, if any, will be less than - and therefore bounded by - the potential effects during operations."</i>  Without a reference to doses expected during decommissioning, the PRT does not believe that this conclusion can be made. Depending on how the operations phase goes (spills, airborne excursions, etc.) and how smoothly decommissioning is executed, it is actually possible to have higher doses (to personnel and/or the public) during decommissioning. Recommend to remove this statement.
13	Figure 6-1	This image is poor quality and the text within it cannot be fully understood. This image was found to be very confusing and unsure what the public is supposed to get out of it. For a general member of the public, it may not be useful as it is. Maybe if it wasn't so blurry and the words could all be distinguished, it would make more sense and can be evaluated as to whether or not it will be useful.	Proposed deletions are as follows:  <u>Section 6.2: delete the sentence:</u> <del>"To provide context for the extremely long time scale that is addressed, Figure 6-1 highlights timescales for relevant past events and expected future events in Earth's history."</del>  <u>Figure 6-1: delete:</u> Delete the figure and caption.	Comments satisfactorily addressed.

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
14	Section 6.2, subsection "Up to 1,000 years"	<p>The statement "Groundwater would start to see into the repository" is likely to be very concerning to a member of the public as stated. Suggest that this needs to be clarified. The water being discussed is not the near-surface groundwater that people use for drinking (which is what the public is likely to think). This is referring to the deep level saline-type water that is separate from what ground water is accessible by people and used for drinking. Suggest describing deep saline groundwater seepage is beneficial/required in hydrating compacted bentonite barriers.</p> <p>Also, some clarity around the peak temperature of the fuel may be useful. Most general people would think of something at 100°C to be very warm and concerning (this can boil water).</p>	<p>Proposed revisions are as follows:</p> <p><u>Section 6.2: subheading "Up to 1,000 years":</u></p> <p>"At the beginning of this time the facility would be decommissioned. <b>As expected, deep groundwater would start to seep into the repository from the surrounding deep rock. This would cause will allow swelling of the bentonite sealing materials to hydrate, swell, and seal the repository.</b> Especially during the first 500 years, radioactivity and heat in the used nuclear fuel would decrease significantly due to the decay of most of the fission products. The containers would reach a peak temperature of up <del>to</del> <b>about 92400°C and then start cooling down. This is less than the targeted maximum temperature of 100°C. Temperature is accounted for in the repository layout.</b>"</p>	Comments satisfactorily addressed.
15	Section 7.1.3, subsection Airborne Radioactive Effluent	<p>Section indicates that air emissions will be particulates and gases, but then only talks about HEPA filtration. I-129 had previously been indicated as an isotope of concern for the DGR. This is not going to be stopped by HEPA filtration. Carbon filters may be required.</p> <p>Suggest to just say "filters" rather than "HEPA filters" to account for all possible filtration types that could be used.</p>	<p>Proposed revisions are as follows:</p> <p><u>Section 7.1.3, subsection 'Airborne Radioactive Effluent', 2<sup>nd</sup> sentence:</u></p> <p>"These air emissions would be controlled by the use of <b>HEPA</b> filters."</p> <p><u>Section 7.1.3, subsection 'Solid Radioactive Waste', last sentence:</u></p> <p>"Other components would include used <b>HEPA</b> filters (from filtering exhaust air), spent ion-exchange media (from filtering liquid emissions), spent components (from maintenance of hot cell equipment), and low-level waste such as used cleaning materials and personal protective equipment (NWMO 2021d)."</p>	Comments satisfactorily addressed.

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
16	Section 7.1.3, subsection Solid Radioactive Waste	This is a good explanation of the types of solid radioactive waste that the facility will generate. However, it states nothing about how they will be managed for ensuring doses to the public are not affected/remain low. Suggest to add this explanation.	<p>As discussed in the 21 June 2023 call, the final paragraph will be revised to include a new sentence:</p> <p><u>Section 7.1.3: subheading "Solid Radioactive Waste":</u></p> <p>Some radioactive solid waste would be produced during the operations phase. Modules and baskets from the incoming transportation packages would represent the most significant source of solid radioactive waste. When a module/basket has been emptied of its used nuclear fuel bundles, it would be processed including decontamination to achieve free-release limits, which would then allow shipment to offsite metals recycling facilities (NWMO 2021d). Other components would include used HEPA filters (from filtering exhaust air), spent ion-exchange media (from filtering liquid emissions), spent components (from maintenance of hot cell equipment), and low-level waste such as used cleaning materials and personal protective equipment (NWMO 2021d). <b>All radioactive waste generated on site will be managed in accordance with applicable regulations and best practices.</b></p>	Comments satisfactorily addressed.
17	Section 7.1.5	<p>This starts with the wording "Along with the radiation monitoring program, ... Such a program has not been mentioned yet in this report. Clarity is requested.</p> <p>This seems to be a pretty simplistic section for a very important part of the facility programs, for protecting the public from radiation. It mentions that radioactivity will not leave on workers' clothing or shoes, but what about on other things (e.g., used equipment, metal sent for recycling, trucks leaving after dropping off fuel). A better description of all things in the radiation protection program would help the public</p>	<p><b>#1) Sentence begins by mentioning radiation monitoring program, but such a program has not yet been introduced:</b></p> <p>There is good information on monitoring programs, including radiation monitoring, in the later Section 7.1.8 "Monitoring Systems".</p> <p>So, it is proposed to relocate Section 7.1.8 "Monitoring System" so that it precedes 7.1.3 "Radiation Protection Program". This way readers will have read it and have some understanding of monitoring programs by the time they encounter the discussions on radiation protection.</p>	<p>Comment was well addressed. The Peer review team does have one minor suggested addition to Section 7.1.5: We suggest that the following text be added to include the public in this listing. Suggested text, "... on-site contractors, members of the public located outside the facility, etc. ..."</p> <p>After review of the prior revision, the PRT provided the following comment:</p> <p>Additionally, we suggest that the Canadian average exposure stated in the Preliminary Radon Assessment for a Used Fuel Deep Geological Repository</p>

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
		<p>understand that there are many controls in place to protect them.</p>	<p><b>#2) More Discussion on Radiation Protection Program:</b></p> <p>As discussed in the 21 June 2023 call, this section will be expanded to include brief discussion on what the intention of a radiation protection program is, and in general, what a radiation protection program entails.</p> <p>The existing text, which outlines specifics that will be incorporated into NWMO's program, will follow.</p> <p><u>Section 7.1.5: Radiation Protection Program:</u></p> <p>Along with the radiation monitoring program, a radiation protection and control <del>system</del> program would also be in place.</p> <p>In general, radiation protection programs are established at a facility to help ensure that no one receives a radiation exposure that exceeds the regulatory dose limit, and to ensure that radiation exposures are kept "As Low As Reasonably Achievable" (ALARA). Radiation protection programs typically focus on workers, but also have provisions that cover visitors, on-site, contractors, etc. Radiation protection programs generally outline a variety of measures that are used to achieve their goals. These measures can be physical or design-based, such as having shielding materials built into the facility. They can be procedural, for example, outlining specific procedures that are to be followed when performing certain tasks, developed in such a way that following the procedure reduces exposure. They can also be administrative, such as limiting the amount of time that someone has to perform an activity, or limiting the number of times they can perform certain activities, again with the intention of reducing their exposure.</p>	<p>report (1 mSv/y), also be added to the sentence after the bullets in the suggested updated text.</p> <p>This was mistakenly added to comment #17 for Section 7.1.5 but was actually intended for comment # 11 on Section 5.4. We recommend to move this sentence to the end of Section 5.4 from Section 7.1.5.</p>

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
			<p>Radiation protection programs may also identify certain types of protective clothing or equipment that must be used when performing certain tasks.</p> <p><del>This system</del> The Project's radiation protection program would incorporate the following features (NWMO 2021d), as well as others:</p> <ul style="list-style-type: none"> <li>– Use of personal dosimeters for all staff or visitors within the Protected Areas;</li> <li>– Use of a multi-zone system where staff would be monitored when they travel between defined radiation safety zones (typically from higher to lower zones);</li> <li>– A whole-body counter for personnel to use annually or quarterly;</li> <li>– Fixed area gamma monitors located throughout the facility to gauge local dose rates at places routinely occupied by operating personnel;</li> <li>– Air radiation monitors located throughout the facility, including the exhausts for ventilation systems; and,</li> <li>– Radiation vehicle monitors (portable and fixed) at entry or unloading areas.</li> </ul> <p>While the radiation protection program would be mainly focused on minimizing doses to workers, it would also benefit members of the public by emphasizing contamination control. It would help prevent radionuclides from leaving the facility, for example, on workers' clothing or shoes.</p>	



Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
18	Section 7.1.7 Emergency Response	<p>Paragraph 2 states that the ERT would be supported by on-site and off-site fire and first aid responders.</p> <p>The Emergency Services Study Report (DPRA &amp; IEC 2022) found that additional studies would be required to establish the need for public first responder support and determine how this would be implemented in collaboration with the community.</p> <p>Therefore, we suggest changing this sentence to read:</p> <p>"These resources would also be supported by on-site fire and first aid responders, the DGR's various superintendents and shift managers, and may be supported by off-site community emergency services."</p>	<p>The proposed text will be added. Specifically:</p> <p><u>Section 7.1.7: subheading Emergency Response, last paragraph:</u></p> <p>"The primary personnel involved in handling any emergency would reside within an ERT. These resources would also be supported by on-site and <del>off-site fire and</del> first aid responders, <del>as well as</del> the DGR's various superintendents and shift managers, <del>and may be supported by off-site community emergency services.</del> Communications staff would be available to coordinate and assist in the required incident communications activities (NWMO 2021d)."</p>	Comments satisfactorily addressed.
19	Section 7.1.8 Coordination and Collaboration with Communities	<p>For clear language purposes it is suggested that "emergency response measures" be changed to "emergency response support services".</p>	<p>The proposed text will be added. Specifically:</p> <p><u>Section 7.1.7: subheading "Coordination and Collaboration with Communities":</u></p> <p>"Additional emergency response <del>measures support services</del> that may be provided by the community are described in a community study entitled "Emergency Services Study Report" (DPRA &amp; IEC 2022). The NWMO and the community would collaborate on the resources required for emergency response (NWMO 2022)."</p>	Comments satisfactorily addressed.

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
20	Section 7.2.6	This mentions that water wells are typically not more than 150 m deep. This is good information but as the general public is not going to have any idea how deep the fuel is being placed, will not help in understanding the safety factor. Suggest to compare to the repository depth right in this section.	Proposed revisions are as follows:  <u>Section 7.2.6: 1<sup>st</sup> bullet:</u> "• There is no indication of economically-significant mineral resources at the South Bruce site. There is no groundwater at repository depth, the porewater itself is undrinkable (too salty) and, moreover, the repository would be at a nominal depth of about 500 m (NWMO 2021d) <del>that</del> which far exceeds the range of interest for water supplies <del>-. Bedrock</del> water wells, for example, do not generally exceed 150 m depth. Thus, it would be very unlikely that wells would be drilled into the repository."	Comments satisfactorily addressed.
21	Figure 8-1	This was a good figure. However, not sure that the general public audience will get the full impact, given that the vertical axis has a logarithmic scale. Suggest that the safety factor will be much more obvious if the scale is not logarithmic.	As discussed in the 21 June 2023 call, the log-scale figure will be replaced with a linear-scale figure, however, the figure will use a break in its scale to help convey just how low the dose results are compared to the dose limit.  An example figure with a scale break is included below, beneath this disposition table.  The figure will be included in the updated version of the report.	Comments satisfactorily addressed.
22	Section 8.2 Confidence in Safety - Operations Phase	Bullet 7 – This bullet only highlights emergency preparedness measures. Suggest that this be expanded to include emergency preparedness and response measures.	Proposed revisions are as follows:  <u>Section 8.2: first main bullet, 7<sup>th</sup> sub-bullet:</u> "o establishing emergency preparedness and response measures; and,"	Comments satisfactorily addressed.
23	Executive Summary	Second sentence is "A necessary by-product of this carbon-free source of energy is used nuclear fuel" is an opinion and has nothing to do with the DGR safety assessment. Suggest that opinions on carbon-free do not contribute to the objectives of the safety assessment.	As discussed in the 21 June 2023 call, the sentence will be revised to avoid the topic of carbon emissions. I.e.:  <u>Executive Summary: 2<sup>nd</sup> sentence:</u> "An <del>necessary unavoidable</del> by-product of <del>this carbon-free source of nuclear</del> energy is used nuclear fuel"	Comments satisfactorily addressed.

Comment Number	Report Section Reference	Comments from Peer Review	How and Where Comments are Addressed	Peer Review Responses to NWMO/Arcadis Comments
24	Section 8.2 Confidence in Safety - Operations Phase	This is a new comment, so there was no content here from before.	This is a new comment, so there was no content here from before.	<p>New comment based on review of latest (R000f) document:</p> <p>An additional paragraph has been added that states:</p> <p><i>"It is expected that the potential radiological effects of the Project during closure and decommissioning, if any, will be less than - and therefore bounded by - the potential effects during operations"</i></p> <p>As mentioned above, for comment 12 where a similar statement was added, without a reference to doses expected during decommissioning, The PRT is not aligned with this conclusion.. Depending on how the operations phase goes (spills, airborne excursions, etc.) and how smoothly decommissioning is executed, it is actually possible to have higher doses (to personnel and/or the public) during decommissioning. Suggest removing or modifying this statement.</p>

**Comment #21:**

Example figure:

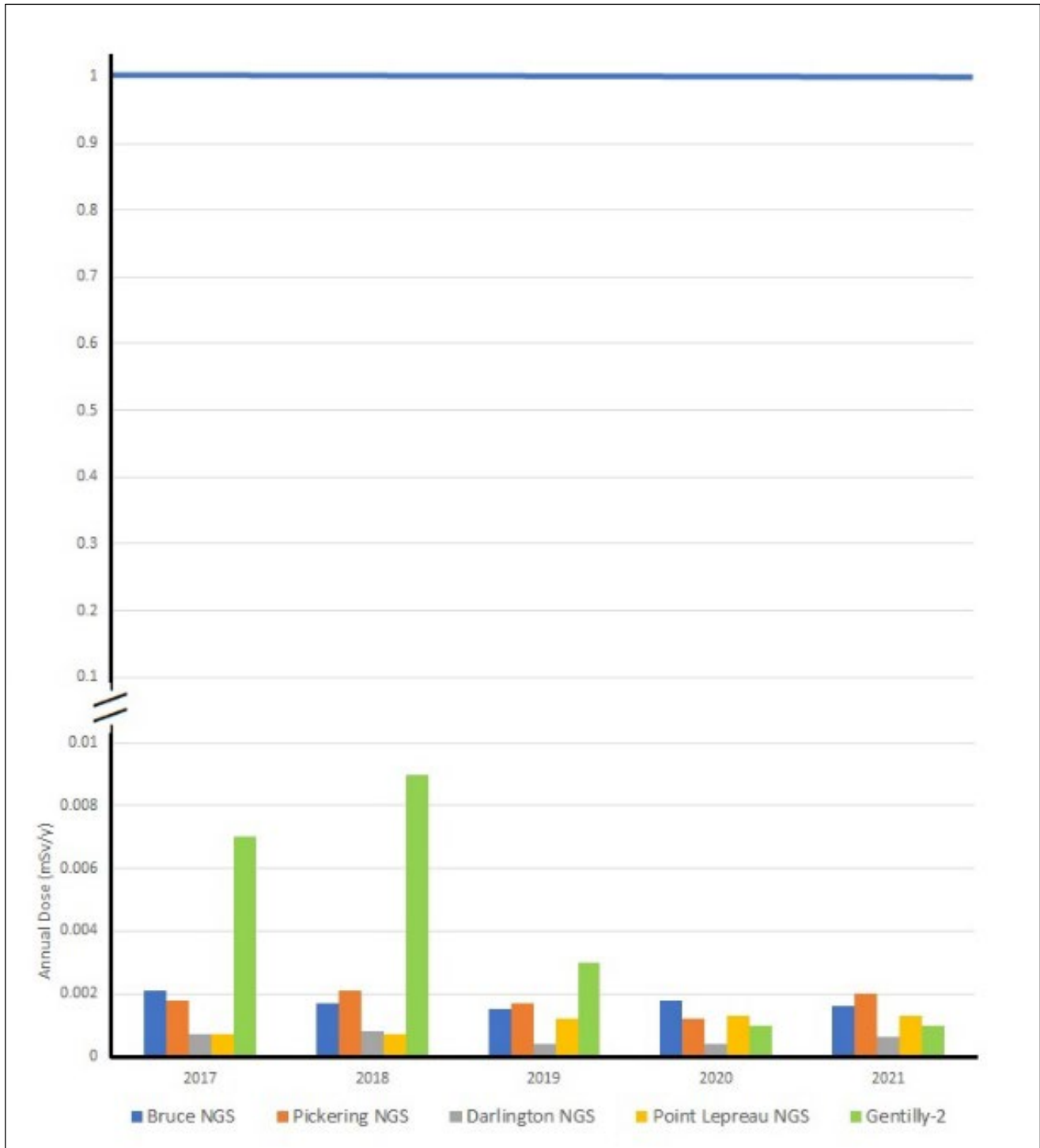


Table 2 Assessment of the Study Statement of Work

Step #	Description of Activities	Comments from Peer Review (V0 (R000e))	How and Where Comments are Addressed	Comments from Peer Review (V0 (R000f))
<b>Specific Objectives</b>				
1	Summarize the potential radiological effects of the project, during all its phases, on the safety of the residents of South Bruce and on future residents in the proximity of the site.	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.
2	Describe at a high level, mitigation and/or follow-up measures to be taken if an increase in risk is identified during any phase of the project.	Objectives partially addressed as per the level of conceptual design.		Report is adequate related to the current conceptual design.
<b>Scope of Work Tasks</b>				
1	Summarize the expected activities during the main phases of the project (site preparation, construction, operation, decommissioning and closure, postclosure) focusing on aspects that could potentially result in radiological emissions.	Objectives partially addressed; decommissioning is not currently addressed in the report.	There are three locations in the document where doses due to decommissioning have now been mentioned. Section 5.3, 5.5, and Section 9.2 now state: <i>"It is further expected that the potential radiological effects of the Project during closure and decommissioning, if any, will be less than – and therefore bounded by – the potential effects during operations."</i>	No additional references have been provided to indicate what doses are expected during decommissioning. Therefore, it is not clear how the authors can make this comparison and state that estimated decommissioning doses are expected to be less than operation doses. In fact, doses during decommissioning can be higher than during operations. Suggest that this text be removed from the report.
2	Summarize the types of potential radiological effects of the project on community safety during normal operating conditions and under hypothetical accident conditions as well as under hypothetical future disruptive events.	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.

Step #	Description of Activities	Comments from Peer Review (V0 (R000e))	How and Where Comments are Addressed	Comments from Peer Review (V0 (R000f))
3	<p>Provide context on radiological hazards and effects from natural and man-made sources, under normal and potential accident conditions:</p> <p>a) Explain the presence of background natural radiation in Canada: The CNSC (2013) fact sheet on natural background radiation discusses natural radiation sources (e.g., cosmic, terrestrial, inhalation and ingestion) and suggests typical doses received from each of these natural radiation sources.</p> <p>b) Provide information on the regulatory dose limits, how they are established, including information on UNSCEAR and other international radiological safety setting bodies and activities.</p> <p>c) Provide information on man-made radiation sources and doses, both generic and local: IAEA (2004) provides information on doses from man-made uses of radiation such as weapons testing, medical procedures and occupational exposures. Where available, information on performance of the licensees should be provided.</p> <p>d) Discuss the current knowledge of hazards and effects based on similar experience in handling used CANDU fuel. Discuss briefly status of international experience on Deep Geological Disposal of Used Nuclear Waste.</p>	<p>The peer review team does not believe that potential accident conditions are relevant to sections a, b, and c of this task.</p> <p>a) Objectives satisfactorily addressed.</p> <p>b) Objectives satisfactorily addressed.</p> <p>c) Objectives satisfactorily addressed.</p> <p>Objectives are partially addressed. The Peer review team believes that the report adequately addresses the current knowledge of hazards and effects based on similar experience in handling used CANDU fuel, but believe more needs to done to address the status of international experience on Deep Geological Disposal of Used Nuclear Waste.</p>		<p>Comment remains unchanged.</p>
4	<p>Describe how safety assessments are performed for the various types of effects and phases of the project at a high level with reference to e.g., the published Postclosure Safety Assessment (NWMO 2018). Explain how the precautionary principle has been applied. Discuss how the latest regulatory guidance and standards have been followed.</p>	<p>Objectives satisfactorily addressed.</p>	<p>N/A</p>	<p>Objectives satisfactorily addressed.</p>

Step #	Description of Activities	Comments from Peer Review (V0 (R000e))	How and Where Comments are Addressed	Comments from Peer Review (V0 (R000f))
5	Describe at a high-level the measures that the NWMO commits will be included in the project to protect the public and workers from radiological hazards. These protection measures may include features in the conceptual repository design, or programs that will be undertaken during construction and operations	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.
6	Describe at a high level the conclusions regarding potential radiological effects during the Preclosure and Postclosure periods.	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.
7	Document the above in a Community Safety Effects Study Report. The report will be written in plain language, with high-school educated, non-specialist members of the public as its intended audience.	Objectives satisfactorily addressed.	N/A	Objectives satisfactorily addressed.

# **Appendix D**

**36 Guiding Principles**



# South Bruce Guiding Principles for NWMO's Site Selection Process


The Nuclear Waste Management Organization (NWMO) is seeking an informed and willing host for a deep geologic repository (DGR) to safely store Canada's used nuclear fuel, and a Centre for Expertise. To guide its work, South Bruce held a comprehensive visioning process in 2019 and 2020 to get input on what people cared about most in relation to the Project. The process, in addition to other community input and feedback resulted in the creation of 36 Guiding Principles which focus on safety for people and the environment, ensuring the Project brings meaningful benefits to the community, and ensuring the municipality has a voice in decision-making.

The principles were adopted by Council resolution and they have guided municipal activities and engagement related to the Project. South Bruce is seeking NWMO commitments on how it would meet or address these 36 expectations and aspirations for the Project. This is a key step in determining whether the Project is right for the community and will help people make an informed decision when a public referendum is held to measure willingness to be a host community.

## Safety and the Natural Environment

1. The NWMO must demonstrate to the satisfaction of the Municipality that the Project will be subject to the highest standards of safety across its lifespan of construction, operation and into the distant future.
2. The NWMO must demonstrate to the satisfaction of the Municipality that sufficient measures will be in place to ensure the natural environment will be protected, including the community's precious waters, land and air, throughout the Project's lifespan of construction, operation and into the distant future.
3. The NWMO must demonstrate to the satisfaction of the Municipality that used nuclear fuel can be safely and securely transported to the repository site.
4. The NWMO will ensure that the repository site will not host any nuclear waste generated by other countries.
5. The NWMO must commit to implementing the Project in a manner consistent with the unique natural and agricultural character of the community of South Bruce.
6. The NWMO will minimize the footprint of the repository's surface facilities to the extent it is possible to do so and ensure that public access to the Teeswater River is maintained, subject to meeting regulatory requirements for the repository.
7. The NWMO must commit to preparing construction management and operation plans that detail the measures the NWMO will implement to mitigate the impacts of construction and operation of the Project.

## People, Community and Culture

8. The NWMO must demonstrate to the satisfaction of the Municipality that it has built broad support for the Project within the community of South Bruce.
  9. The Municipality will, in collaboration with community members, develop and establish an open and transparent process that will allow the community to express its level of willingness to host the Project.
  10. The NWMO will identify the potential for any positive and negative socio-economic impacts of the Project on South Bruce and surrounding communities and what community benefits it will contribute to mitigate any potential risks.
  11. The NWMO, in consultation with the Municipality, will establish a property value protection program to compensate property owners in the event that property values are adversely affected by the NWMO's site selection process and the development, construction and/or operation of the Project.
  12. The NWMO, in consultation with the Municipality, will establish a program to mitigate losses to business owners in the event that their business is adversely affected by the NWMO's site selection process and the development, construction and/or operation of the Project.
  13. The NWMO, in partnership with the Municipality, will develop a strategy and fund a program to promote the agriculture of South Bruce and the surrounding communities.
  14. The NWMO, in partnership with the Municipality, will develop a strategy and fund a program to promote tourism in South Bruce and the surrounding communities.
  15. The NWMO, in partnership with the Municipality, will commit to implement programs to engage with and provide opportunities for youth in the community, including investments in education and the provision of scholarships, bursaries and other incentives for youth to remain in or return to the community.
  16. The NWMO will implement the Project in a manner that promotes diversity, equality and inclusion.
  17. The Municipality recognizes the important historic and contemporary roles Indigenous peoples have and continue to play in the stewardship of the lands we all call home and will, in the spirit of Reconciliation, work with the NWMO and local Indigenous peoples to build mutually respectful relationships regarding the Project.
  18. The NWMO will commit to relocate the working location of a majority of its employees to South Bruce as soon as it is reasonably practicable to do so after the completion of the site selection process.
  19. The NWMO will, in consultation with the Municipality, establish a Centre of Expertise at a location within South Bruce to be developed in conjunction with the Project.
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## Economics and Finance

20. The NWMO, in consultation with the Municipality, will commit to implementing a local employment and training strategy with the objective of ensuring that the majority of employees for the Project are located within South Bruce and surrounding communities.
21. The NWMO, in consultation with the Municipality, will commit to implementing a business opportunities strategy that will provide opportunities for qualified local businesses to secure agreements that support the Project and that requires the NWMO to take all reasonable steps to create opportunities for qualified local businesses to benefit from the Project.
22. The NWMO will commit to implementing a procurement strategy for the Project that gives preference to the selection of suppliers who can demonstrate economic benefit to South Bruce and surrounding communities.
23. The NWMO will enter into an agreement with the Municipality providing for community benefit payments to the Municipality.

## Capacity Building

24. The NWMO will cover the costs incurred by the Municipality in assessing community well-being and willingness to host the Project.
25. The NWMO will fund the engagement of subject matter experts by the Municipality to undertake peer reviews of Project reports and independent assessments of the Project's potential impacts on and benefits for the community as determined necessary by the Municipality.

26. The NWMO agrees to cover the costs of the Municipality's preparation for and participation in the Project's regulatory approval processes, including the Canadian Nuclear Safety Commission's licencing process and the assessment of the Project under the Impact Assessment Act (or other similar legislation), that are not otherwise covered by available participant funding.
27. The NWMO will fund the Municipality's preparation of a housing plan to ensure that the residents of South Bruce have access to a sufficient supply of safe, secure, affordable and well-maintained homes.

## Services and Infrastructure

28. The NWMO will prepare a review of the existing emergency services in South Bruce and provide appropriate funding for any additional emergency services required to host the Project in South Bruce.
29. The NWMO will prepare an infrastructure strategy that addresses any municipal infrastructure requirements for the Project and will commit to providing appropriate funding for any required upgrades to municipal infrastructure required to host the Project in South Bruce.
30. The NWMO will prepare a review of the existing and projected capacity of South Bruce's road network and will commit to providing appropriate funding for any required upgrades to the road network.
31. The NWMO will enter into a road use agreement with the Municipality that identifies approved transportation routes during construction and operation of the Project and ensures proper funding for maintenance and repair of municipal roads and bridges used for the Project.

## Services and Infrastructure (continued)

32. The NWMO, in consultation with the Municipality and other local and regional partners, will prepare a strategy to ensure there are sufficient community services and amenities, including health, child-care, educational and recreational facilities, to accommodate the expected population growth associated with hosting the Project in South Bruce.
33. The NWMO will comply with the Municipal Official Plan and zoning by-law and seek amendments to the Official Plan and zoning by-law as necessary to implement the Project.

## Regional Benefits

36. The NWMO must demonstrate to the satisfaction of the Municipality that the Project will benefit the broader region outside of the community of South Bruce, including local Indigenous communities.

## Governance and Community Engagement

34. The NWMO will provide the Municipality with an ongoing and active role in the governance of the Project during the construction and operation phases of the Project.
35. The NWMO will continue to engage with community members and key stakeholders to gather input on community vision, expectations and principles, including concerns, related to the Project.



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Reach out anytime with your questions, comments, concerns, or if you are seeking more information. We would be happy to hear from you!

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