CNL Responses to Federal and Provincial Comments on the Draft Environmental Impact Statement for the Near Surface Disposal Facility Project

Table 1: *Consolidated Table of Federal and Provincial Comments on the Draft Environmental Impact Statement for the Near Surface Disposal Facility Project*, 232-509220-055-000, Revision 2, 2020 December.
(See Pages 3 – 196)

Table 2: *CNL Responses to Federal-Provincial Information Requests based on the Revised Environmental Impact Statement (EIS) for the proposed Near Surface Disposal Facility (NSDF) Project*, 232-509220-055-000, Revision 1, 2020 December.
(See Pages 198 – 318)

Table 3: *Canadian Nuclear Laboratories Reponses to Federal-Provincial Review Team Third Round Information Requests on the Revised Draft NSDF EIS*, 232-509220-055-000, Revision 0, 2020 December.
(See Pages 320 – 327)

Table 4: *Canadian Nuclear Laboratories Reponses to Federal-Provincial Review Team Fourth Round Information Requests on the Revised Draft NSDF EIS*, 232-509220-021-000, Revision 0, 2020 December.
(See Pages 329 – 333)

Table 5: *Supplemental Response to CNSC-2-04 - CNL Responses to the CNSC Staff Review of the December 2020 Final EIS,* 232-509220-021-000, Revision 0, 2021 June.
(See Pages 335 – 341)

Table 1: *Consolidated Table of Federal and Provincial Comments on the Draft Environmental Impact Statement for the Near Surface Disposal Facility Project*, 232-509220-055-000, Revision 2, 2020 December.

Federal / Provincial Department	Reference Number	Old Reference	Report Section	Reviewer Comment	2019 CNL Dispositions	Accepted/Rejected
Canadian Nuclear Safety Commission (CNSC)	FC-1	CNSC-136	General	So far, there is no exact indication on how deep the waste will be emplaced, grade and elevation of the engineered containment mound (ECM) relative to the existing area grades and topography. **Expectation to address comment:** To better understand and support the description/characterization of the Site Study Area (SSA) and Local Study Area (LSA), and impacts of the project on the environment, Canadian Nuclear Laboratories (CNL) should provide in the final Environmental Impact Statement (EIS) document, an overall stratigraphic cross section which illustrate the ECM elevations, surface water, vadose, the water table aquifer, the surrounding lakes and swamps including the shore line of the Ottawa River.	Figure 1.0-1 is a plan view of the site which illustrates the location of surrounding lakes, wetlands and the Ottawa River. Figure 3.4.1-1 of the revised EIS illustrates a cross section of the engineered containment mound (ECM) including the ECM elevations for the Base Liner, existing ground surface, water table, berms and final cover system. Figures 5.3.2-2A through 5.3.2-2D are cross-sections through the ECM to compare the vadose zone, interpreted water table surface against ground surface and bedrock topography.	Accepted
CNSC	FC-2	CNSC-129	General - Geology of the site and region	The sand overburden could be subject to liquefaction under earthquake loading. When liquefied, the sand could lose all of its shear strength, leading to failure of the ECM and other structures and components associated with the proposed Near Surface Disposal Facility (NSDF). **Expectation to address comment:** CNL should assess the liquefaction potential of the sand overburden. That assessment should be done using a Design Basis Earthquake (DBE) which is commensurate with the design life time and the risk associated with each structure or component of the NSDF.	This comment is addressed in Section 10.3 of the revised EIS. An analysis of liquefaction potential was completed and indicated that the 10,000-year design seismic event scenario may cause liquefaction in the saturated native sand to silty and soils underlying the ECM resulting in unacceptable vertical and horizontal displacements. Based on this, CNL has added additional mitigation to limit the potential for liquefaction. CNL notes that the engineered solution for liquefaction mitigation removes and replaces the liquefiable soils with compacted engineered fill. Further details on Soil Liquefaction and Liquefaction Mitigation can be found in Section 2.3.1.8.2 of the NSDF Design Description [1]. Reference [1] Design Description 232-503212-DD-001, Revision 1, 2019 May.	Rejected with Follow-Up IR CNSC-2-01

Federal / Provincial Department	Reference Number	Old Reference	Report Section	Reviewer Comment	2019 CNL Dispositions	Accepted/Rejected
CNSC	FC-3	CNSC-130	General - Seismicity of the site and region	It is mentioned that the CNL DBE has a recurrence frequency of one in 1000 years. It is not clear whether CNL intends to use the same DBE to design the structures and components of the NSDF. **Expectation to address comment:** CNL should clarify which DBE would be used for each structure and component of the NSDF. The choice of a DBE should be commensurate with the design life time and the risk associated with each structure or component of the NSDF. The probability of exceedance of the DBE during the design life of a structure or component must be evaluated, and should an event stronger than the DBE occurs, the consequences must be assessed.	This comment is addressed in Section 10.3 of the revised EIS. Seismic Design of the Engineered Containment Mound is in accordance with CSA Standard N289.4-12 [1]. A 10,000 year frequency of occurrence for the DBE, (0.5% probability of exceedance in 50 years) is used. Seismic Design of NSDF structures (e.g., WWTP) is in accordance with the NBCC (2015). A 2,475 year frequency of occurrence for the DBE, (2% probability of exceedance in 50 years) is used. The assessment timeframe for the long-term safety is 10,000 years. This timeframe was determined using the criteria within REGDOC-2.11.1 [2]. The 10,000 year assessment timeframe captures the period of peak radioactivity and dose consequence, the design life of the engineered and natural barrier as well as takes the seismic design basis into consideration. Section 3.1.1.1 of the revised EIS addressed this comment however Section 2.3.4 of the Post-Closure Safety Assessment (PostSA) [3] provides a detailed justification for the selected assessment timeframe. References [1] Testing Procedures for Seismic Qualification of Nuclear Power Plant Structures, Systems and Components. CSA N289.4-12. [2] REGDOC 2.11.1 Volume III: Assessing the Long-Term Safety of Radioactive Waste Management. [3] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	Rejected with Follow-Up IR CNSC-2-01
Environment and Climate Change Canada (ECCC)	FC-4	ECCC-4	1.0, 1.1 Project Overview	It is indicated that the ECM would consist of a base liner system, a surface water management system, a final cover system and environmental monitoring systems. It is indicated that the primary liner will contain a leachate collection system and that the second liner system will contain a leak detection system. Additional information about how the leak detection system will be used to prevent and manage releases of untreated leachate should be provided as well as any other spill, prevention measures to be implemented at the NSDF. **Action Required:** Provide additional information about the leak detection system including how it will be used to prevent and manage releases of untreated leachate from the NSDF and any additional spill prevention	Section 3.4.1.4 of the revised EIS states that the Leak Detection System (LDS) component of the base liner system, is a means of monitoring potential leakage of leachate through the primary liner and transferring leachate and condensate that accumulates to sumps for subsequent removal to the Waste Water Treatment Plant (WWTP). Section 3.4.1.12 outlines that leachate will be removed from the LDS sumps and along with the contact water will be transferred to the collection tanks, from which it will be transferred to the WWTP for treatment. A discussion on how the LDS functions in the operations phase is included in Sections 3.4.1.12.1 and 3.4.1.12.2 of the revised EIS. Additional spill prevention measures are discussed in the revised EIS under: 1) Section 3.4.2.3 describes the leachate and contact water transfer system including the double-contained piping and leak alarms to address spill (leak) prevention measures. 2) Section 3.4.2.4 describes the spill prevention (secondary containment) for the storage tanks (referred to as Equalization Tanks in the NSDF Design Description [1]).	Accepted

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				measures to be implemented at the facility. Specifically, ECCC recommends that additional information on the measures to be employed if a leak is detected in the system be included.	The NSDF Design Description [1], provides more in-depth details on the LDS and additional spill prevention measures. Specifically: 3) Sections 2.3.1.4 and 2.3.1.5 of the NSDF Design Description [1] provide details on the Leachate Collection System (LCS) and LDS and how the leachate from the LCS or LDS is transferred to the WWTP. 4) Section 2.3.1.5 of [1] also describes the additional spill (i.e. leak) prevention measures provided when transferring the leachate between the Engineered Containment Mound (ECM) and the WWTP. 5) Section 2.3.2.1.1 of [1] describes the spill prevention measures for the Equalization (storage) tanks and transfers to and from the tanks. Section 7.0 of the revised EIS, Accidents and Malfunctions, includes the assessment of potential accidents and malfunctions and mitigation measures for leaks/spills related to the NSDF project. Reference [1] Design Description 232-503212-DD-001, Revision 1, 2019 May.	
ECCC	FC-5	ECCC-3	1.0, 2.2.2.1 and 3.2.2	It is indicated that all the waste to be disposed of at the NSDF will be required to meet the Waste Acceptance Criteria (WAC). Some information is provided in section 3.2.2 about the principles and guidelines that will guide the development of the WAC, including the following: "[to] *identify relevant parameters that will influence the facility design and safety case for radioactive waste to be emplaced in the engineered containment mound (ECM) so that each criterion is considered and accounted for."* It is also indicated that relevant regulations, International Atomic Energy Association (IAEA) guidelines and Canadian Standards Association (CSA) standards would be followed but no details as to which regulations, IAEA guidelines and CSA standards are provided in the EIS. Due to their relevance for environmental protection, ECCC is of the view that the WAC criteria should be developed and evaluated during the Environmental	The Waste Acceptance Criteria (WAC) [1] has been revised to reflect the reduction of inventory to only low-level waste, provide transparency on the basis of the WAC, and incorporate CNSC comments during licensing reviews. Section 3.3.1 recognizes that only low-level waste as defined in the Canadian Standards Association (CSA) standard for the nuclear industry N292.0-19 *General Principles for the Management of Radioactive Waste and Irradiated Fuel* [2] and IAEA's general guide GSG-1 *Classification of Radioactive Waste* [3], will be accepted for disposal in NSDF. The revised WAC concentration limits for bulk and packaged waste in Section 3.3.3.2 of the revised EIS were adopted from the guidance of both CSA N292.0-19 [2] and IAEA GSG-1[3]. Although these guidance documents provide a concentration range for low-level waste, to remain conservative the NSDF Project has used the lower bounds of the low-level waste guidance was used (e.g., the guidance suggests that low-level waste could contain up to 400 Bq/g of alpha-emitting waste. The NSDF WAC limit for bulk waste is 100 Bq/g of alpha-emitters). Additionally Section 3.3.1.3.1 recognizes that NSDF will follow the guidelines of Ontario's Regulation 347, General – Waste Management, for acceptable quantities and concentrations of metals, organics, and chemical compounds to limit the leaching potential of the facility. The WAC have also been developed in consideration of the Wastewater Treatment Plant to ensure it is capable of treating the contaminants in the leachate at the concentrations expected from the waste. For example there will be a small portion of waste which will be required to utilize robust packaging to prevent higher concentrations of specific contaminants	Accepted

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				Assessment (EA) process in order to understand their potential to contribute to avoiding or minimizing environmental effects. **Action Required:** Develop and incorporate the WAC into the EA process so they can be evaluated for their potential contribution to environmental effects. A list of the relevant regulatory criteria, environmental protection guidelines, IAEA guidelines, CSA standards and any other guidelines to be used for the development of the WAC should be provided as well. Further, the WAC should be developed in consideration of the Waste Water Treatment Plant (WWTP) that is proposed for the NSDF to ensure it is capable of treating the contaminants in the leachate at the concentrations expected from the waste.	in the leachate. Specifically the leachate controlled waste packages are intended to provide short-term barriers for wastes with higher radionuclides concentrations during the time the disposal cell is not covered with the final cover system (approximately 5-10 years). Thus more mobile radionuclides, such as tritium, are kept isolated from the environment to minimize liquid effluent releases during the operations phase. Leachate Controlled Waste Packages are discussed in Section 3.3.1.1 and the concentration limits are provided in Table 3.3.3-1 of the revised EIS. With respect to the control of Polychlorinated Biphenyls (PCB) containing waste both the revised EIS and the revised WAC [1] have clarified the requirements. • Section 3.3.3.3 of the EIS states that “Waste emplaced in the NSDF will meet the intent of land disposal and leachate requirements specified in the Ontario *Environmental Protection Act*, Regulation 347. This is a requirement of the WAC. • Section 4.1 of the WAC [1] states that “Materials containing Polychlorinated Biphenyls (PCBs) at a concentration of more than fifty parts per million by weight whether the material is liquid or not, and materials containing PCBs at concentrations less than 50 parts per million by weight that are leachate toxic waste are not permitted for disposal in the NSDF Furthermore Section 11.0 of the revised EIS recognized that the WAC is fundamentally a verification program to ensure that all waste received for disposal is in compliance with the design and safety basis of the facility. The control and tracking of the waste inventory into the facility allows for the verification of the assumptions used in this EIS (e.g., pathways analysis modelling is based on the reference inventory proposed to be disposed in the ECM). References [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September. [2] General principles for the management of radioactive waste and irradiated fuel, CSA N292.0:19, Canadian Standards Association, March 2019. [3] Classification of Radioactive Waste, GSG-1, International Atomic Energy Agency, 2009. https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419_web.pdf	
CNSC	FC-6	CNSC-187	2.5 Alternative means for carrying out the project	The objective of the NSDF Project is to reduce substantively the risks associated with interim storage of radioactive waste at the CNL site. In the alternative assessment, the chemical pit, reactor pit and waste management area A are the only sources of contamination considered. Seepage from the nitrate pit, the ACS pit, the	Section 2.3 of the revised EIS clarifies one of the purposes of the NSDF Project will be to reduce the liability associated with historical waste management practices, by remediation and disposal using modern engineering technology. The discussion recognizes that early waste management practices including burying Low-Level Waste (LLW) in sand trenches with no engineered barriers. The engineered containment mound has been sized to manage wastes from legacy waste management areas (WMAs) at Chalk River. The NSDF is an engineered structure with an engineered liner and leachate collection and when coupled with definitive	Rejected with Follow-Up IR CNSC-2-02

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				thorium pit, the bulk storage, and the waste management areas (WMAs), B to H are not included. Therefore, it is difficult to clearly compare how the ECM will significantly reduce the environmental risks at the CNL site compared to implementing engineering covers on each WMAs to limit the releases to the environment. **Expectation to address comment:** Please discuss how the construction of an ECM and transfer of the waste from all areas at the CNL site into the mound will substantively reduce the long-term environmental risks to the CNL site and the Ottawa River compared to decommissioning each waste areas *in situ*.	Waste Acceptance Criteria to provide multiple barriers to the environment that do not exist at other WMAs at CRL; these controls significantly reduce long term environmental risks for those wastes currently stored in situ at the WMAs. Currently, large-scale environmental remediation of CRL Waste Management Areas (WMAs) are deferred until the proposed NSDF is available to mitigate the need for additional storage capability. The remediation process, including the approach for determining remedial options is captured in CNL's Decommissioning and Demolition Program Description Document [1]. Remediation of the WMAs would be subject to separate licensing decisions by the CNSC thus discussion of the remediation options has not been included in the revised EIS. Reference [1] Decommissioning and Demolition Program Description Document, 900-508300-PDD-001, Revision 1, 2018 November.	
ECCC	FC-7	ECCC-6	2.5.2.1, 2.5.2.2 and 2.5.2.4	**Comment:** The Port Hope and Port Granby projects are listed as Canadian examples of safe, long-term management options for low level waste (LLW). No examples for intermediate level waste (ILW) waste management options are provided for Canada even though there have been other projects proposed for the management of ILW, such as Ontario Power Generation (OPG)'s Deep Geological Repository (DGR). Further, the following two statements are made: • "Near surface disposal facilities have been demonstrated globally as an effective disposal solution for the volume and nature of wastes proposed for this project." • "Geologic waste management facilities are most typically proposed for high level waste (HLW) and ILW, and the increased protection to the environment is marginal relative to the nature of the wastes (i.e., >95% by volume LLW) and protection offered through a NSDF."	The intermediate level waste (ILW) that had been proposed will NOT be disposed in the NSDF and instead be kept in safe storage until a disposal solution for ILW is available. The NSDF will accept only low-level waste. Table 2.5-1 of the revised EIS summarizes the alternatives considered in the EIS including facility type (NSDF or Geologic Waste Management Facility) and design (engineered containment mound or above-ground concrete vaults. The analysis is detailed in Section 2.5.2 and 2.5.3 respectively of the revised EIS. The analysis includes technical, economic and environmental considerations. Section 2.5.2.1.1 has been revised include Table 2.5.2-1 "Attributes of Selected Near Surface Facilities in Canada and USA for Long Term Management of Low Level Radioactive Waste". The table includes a summary of key attributes for a number of near surface facilities in Canada and USA. The key purpose of this table is to demonstrate that for other nuclear sites undergoing a large environmental remediation and decommissioning missions, a near surface ECM is a best available technology due to the magnitude of waste volume (i.e., approaching one million cubic meters) and type of waste streams (i.e., contaminated soils and demolition debris). Waste type and facility capacity has been provided in the table however other WAC would not be an appropriate comparison for the objective of this section. However, the revised WAC document [1] provides examples for benchmarking the radionuclide concentration limits that are acceptable based on similarity of low-level radioactive waste streams considered for disposal at NSDF.	Accepted

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				Action Required: Provide justification for an ECM as the most suitable storage option for Chalk River Laboratories (CRL)'s ILW in light of the fact that other projects in Canada have proposed geological repositories as the most suitable option for ILW. Further, additional information should be provided about the projects mentioned above to support the conclusion of this portion of the alternatives assessment that the NSDF is the most suitable option to contain the waste and prevent environmental effects including impacts to water quality.	The proposed NSDF Project has been specifically designed for the environmental characteristics for the CRL site and proposed reference inventory. Reference [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September.	
ECCC	FC-8	ECCC-7	2.5.3.4	Table 2.5-3 provides an evaluation of various aspects of two alternatives being assessed. Under *Environmental Effects,* the criteria *Air Quality and Greenhouse Gases* is evaluated for the two options. It is indicated that surface concrete vaults would require additional construction activities, thus resulting in additional air emissions. This comparison of alternatives needs to take into consideration that for an engineered containment mound, *"at the end of each working day, the surface of the waste will be temporarily covered with a soil layer* […] *to control the release of fugitive dust from the surface of the waste"*. This practice may result in substantial air emissions from the heavy machinery that would be used to cover and uncover the waste in the cells. **Action Required:** If not already done, consider in the assessment of alternatives the additional greenhouse gas emissions to the atmosphere that may result for the engineered containment mound option from daily covering and uncovering of waste in order to minimize the amount of fugitive dust emissions.	Greenhouse gas emissions were included in the analysis of alternatives, as outlined in Section 2.5. More specifically: • Section 2.5.2.3 indicates that greenhouse gases of the ECM compared to a geologic waste management facility would be similar. The ECM would have heavy equipment placing wastes and cover material at surface, whereas the majority of the equipment during operations of the GWMF will be below ground, and emissions managed through ventilation shafts. • Section 2.5.3.3. The greenhouse gas impacts from the Above Ground Concrete Vault (AGCV) directly from the construction are expected to be larger than those from the ECM due Greenhouse gas emissions for the AGCV facility are expected to be above that of the ECM because of concrete production.	Accepted

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Health Canada (HC)	FC-9	HC-5	2.5.4.3 Environmental Effects, p.85 Table 2.5-4, p.89	The section states “The nearest population center to the CRL site is the Village of Chalk River, approximately 6 km west” and then provides both population centers and nearest residents for the two alternative sites, without specifying the closest individual receptor to the CRL site for comparison. Additionally, the distance to the Village of Chalk River is inconsistent throughout the report (i.e., at times it is 7 km instead of 6 km). The table states “Closest local resident [to the CRL site] is approximately 6 km way from the site.” However, this contradicts the proponent’s response to comment HC-1 (Group 2 documents): “The nearest residents are cottagers on the Quebec side of the Ottawa River, and are approximately 4 km from the NSDF site.” This is also inconsistent with distances to potential critical groups in section 5.8.6.1.1.1 (i.e., 3km). The inconsistency of information leads to a lack of confidence in the identification of receptors, and the subsequent assessment of effects on health. **Expectation to address comment**: Verify consistency of information provided on receptors.	Consistency of information on receptors has been verified in the revised EIS. Specific information on the location of receptors as part of the alternative means of the facility location (Section 2.5.4.3/Table 2.5-4) is no longer included in the revised EIS as this level of detail is not required as part of the alternative means. As outlined in Section 1.2 and 5.8.6.1.1.3, the nearest population centre to the CRL site is the village of Chalk River. The village of Chalk River is located approximately 7 km from the built up area of the CRL site. The closest permanent residents in the Pontiac Regional County Municipality are located 3 km southeast of the CRL site, in the Harrington Bay area	Accepted
CNSC	FC-10	CNSC-36	2.5.6.1	**Action Required:** Provide detail on whether or not other discharge points have been considered for the treated leachate?	The revised EIS has been expanded to include a new Section 2.5.7 “Effluent Discharge Options”. Five effluent discharge options were considered as alternatives. As well, three surface water discharge locations were considered as alternatives – Perch Creek, Perch Lake and the Ottawa River. Three alternative options – discharge to Perch Lake, discharge to the Ottawa River, and combined discharge to ground and surface water were considered technically and economically feasible and each have comparable potential environmental effects. Environmental effects of three options were evaluated, as outlined in Section 2.5.7.6 of the revised EIS. All alternatives would result in small changes to surface water quality, which are	Accepted

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					not expected to result in adverse effects on aquatic biodiversity. The treated effluent will meet effluent discharge targets [1] for protection of the environment and human health. Both possible surface water options are protective of environment and human health however, discharge to Perch Lake is preferred as direct discharge to the Ottawa River is expected to be perceived unfavourably by the public and Indigenous peoples. Combined discharge to ground and surface water is the preferred option and beneficial in that the exfiltration gallery provides additional retention time for radioactive decay and replenishes water to the local wetlands. As outlined in Section 3.4.2.6, the NSDF's WWTP treated effluent discharge systems are designed for the peak flow from the WWTP. The preferred option is to discharge the treated effluent from the WWTP to the exfiltration gallery unless the groundwater elevations are determined to be too high. When this occurs the second option is to discharge the treated effluent to Perch Lake. The transfer line to Perch Lake has the capacity to discharge all treated effluent to Perch Lake and operate year-round. As such, no unplanned/accidental discharges of treated effluent are expected with the addition of the Perch Lake discharge. Reference [1] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	
CNSC	FC-11	CNSC-195	Groundwater Flow Modelling of the Near Surface Disposal Facility (E-doc#5262572)	As shown in figure 2.7 (GROUNDWATER TABLE ELEVATION MAP), there is no borehole outside of the NSDF boundary, esp. in the east part of the groundwater flow modeling domain. The groundwater table shown in the east part of the domain is very subjective as a result of lack of measurements, thus the groundwater flow model calibration using the limited data points may contain a great level of uncertainty. Depending on the groundwater table distribution, part of the groundwater originating from the proposed waste site may flow toward the east side of the Perch Creek directly, thus creating a short groundwater flow path towards the recipient. **Expectation to address comment**: CNL needs	There are data in the eastern portion of the site that show evidence of a flow divide. Text has been added to Section 5.3.2.4.2.1 based on information from approximately 30 new groundwater monitoring wells that were installed within the study area of the NSDF (Figure 5.3.2-1B shows locations of groundwater monitoring points). The data collected from these wells confirms the presence of a groundwater divide corresponding to the topographic high along the ridge. The Groundwater Flow Modelling technical supporting document [1] includes evaluation of groundwater flow pathways from the NSDF Project site (i.e., the NSDF Project footprint, where Project activities would be undertaken including proposed facilities, buildings and infrastructure), and the rates of groundwater flow from the NSDF Project components to downstream receptors .In particular, Section 4.4.2 states that the groundwater flow divide was reproduced in the model (see Figure 4.10 of [1]). Reference	Accepted

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				to address the groundwater flow model uncertainty due to lack of groundwater monitoring data in the east part of the domain.	[1] Groundwater Flow Modelling of the Near Surface Disposal Facility Chalk River Site, 232-509249-REPT-001, Revision 5, 2019 July.	
Natural Resources Canada (NRCan)	FC-12	NRCan-10	3.0 Project Description	There is no mention of the *Explosives Act* or a need for a licence under the *Explosives Act* in the EIS (only mention of the *Provincial Act*). Will there be a need for a licence under the *Explosives Act* (manufacturing or magazine/storage)? **Expectation to address comment:** Please clarify in the EIS, if there will be a need for a licence under the *Explosives Act*.	Should a licence or permit be required under the *Explosives Act* and supporting *Explosives Regulation* or the provincial *OPSS 120 – General Specification for Use of Explosives*, it will be obtained by the NSDF Project. Section 3.2.1.1 (Site preparation), clarifies that Blasting activities will follow industry standard Best Management Practices, applicable Federal regulations, and Fisheries and Oceans Canada (DFO) guidelines for use of explosives.	Accepted
NRCan	FC-13	NRCan-1	3.0 Project Description; 3.4 Preparation of the site, Page 12	The Project Description indicates**:** “Blasting activities may be required to complete site preparation.” **Action Required:** Should explosives be stored overnight, a Magazine Licence issued by NRCan will be required.	Should the project store explosives onsite, a Magazine licence from NRCan will be obtained by the NSDF Project. Section 3.2.1.1 of the revised EIS includes the fact that storage and management of explosives will be done in accordance with the *Explosives Act* and supporting *Explosives Regulation*, 2013. The revised EIS does not specify that the storage of explosives would be off the CRL site, with daily transportation in to site.	Accepted
NRCan	FC-14	NRCan-12	3.0 Project Description; 5.0 Environmental Effects	Will a magazine(s) to store explosives be required at or near the site? Please describe location (quantity-distance), footprint, type of storage structure, site access, and other ancillary works.	Should the project store explosives onsite, a Magazine licence from NRCan will be obtained by the NSDF Project. Storage and management of explosives will be done in accordance with the *Explosives Act* and supporting *Explosives Regulation*, 2013, as outlined in Section 3.2.1.1 of the revised EIS. For reasons of security, the exact location and access are not included in the revised EIS. The specific details for storage structure and other ancillary works will be further developed should the NSDF project be approved.	Accepted

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CNSC	FC-15	CNSC-201	3.2.2 Waste Acceptance Criteria	It is unclear what the other four criteria were and why, specifically, were they excluded from the development of the WAC? **Expectation to Address Comment:** Details on the excluded criteria and why they were excluded should be provided.	The NSDF Project has revised the approach on developing the Waste Acceptance Criteria (WAC) and has removed the original Section 3.2.2 content from the revised EIS. Section 3.3.3 of the revised EIS recognizes at a high level that the WAC are developed from specific safety or design criteria provided within the Design Description [2], the EIS, the Post-closure Safety Assessment [3] and the Safety Analysis Report [4]. 1) Further details on the basis of the NSDF WAC can be found in Appendix A of [1]. The WAC is under CNSC staff review as part of the license submission. References [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September. [2] Design Description. 232-503212-DD-001. Revision 1. 2019 May. [3] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [4] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September.	Accepted
CNSC	FC-16	CNSC-179	3.2.2.2	Section 3.2.2.2 provides maximum dose rate limits of waste packages for contact-handleable and for remote handling waste. These are as follows: The dose rate limits of Type 5 waste packages for contact-handleable waste are as follows: • the maximum gamma-radiation level of each waste package, measured on contact, must be less than 2 millisieverts per hour (mSv/h) • the maximum gamma-radiation level of each waste package, measured at 1 m, must be less than 0.1 mSv/h • the maximum beta-particle radiation field of each waste package, measured on contact, must be less than 10 Sv/h The dose rate limits of waste packages are as follows for remote handling:	The Waste Acceptance Criteria (WAC) [1] has been revised to specify the external dose rate limits apply to both bulk waste and waste packages to ensure radiation doses to workers handling and placing the waste are limited. Section 3.3.3.2 of the revised EIS includes the dose rate limits, consistent with both the revised WAC [1] and Safety Analysis Report (SAR) [2]. The beta dose rate limit is 10 mSv/h near-contact on waste and is consistent with CNL's Radiation Protection Program. The Radiation Protection Program sets the hazard level for beta dose rates at low if less than 10 mGyh-1 which means that the hazard lies well inside the level of work approval for CNLs Group 1 RP Staff. Beta dose rates will be reduced via packaging but the limit is specified to ensure that excessive shallow/skin doses are not encountered on packages that may simply comprise a bagged/double bagged contaminated item. References [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September. [2] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September.	Accepted

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				- the maximum gamma-radiation level of each waste package, measured on contact, must be less than 50 mSv/h - the maximum gamma-radiation level of each waste package, measured at 1 m, must be less than 1 mSv/h - the maximum beta-particle radiation field of each waste package, measured on contact, must be less than 200 mSv/h The maximum beta-particle radiation field of each waste package, measured on contact, for contact-handleable waste is considerably higher than the maximum dose rate for remote handling. Technically, there should be an insignificant beta dose rate measured outside of any waste packages since the majority, if not all, of the beta emissions are usually blocked by the waste packages (e.g., by high integrity containers). Also, the rationale for not using dose rate limits for the other types of waste, e.g., the Type 4, Decommissioning and Demolition Waste and the Type 6, Miscellaneous Waste is not provided. **Expectation to address comment:** Please revise and justify the selected maximum beta-particle dose rates for contact-handleable and for remote handling wastes. Also, an explanation for not having maximum dose rates in place for the other types of waste, to be handled by workers, has to be provided.		
CNSC	FC-17	CNSC-18	3.2.2.2	This section provides maximum dose rate limits of waste packages for contact handleable waste and for remote handling as follows: The dose rate limits of waste packages are as follows for **contact handleable waste**: - the maximum gamma-radiation level of each waste package, measured on	The Waste Acceptance Criteria (WAC) [1] has been revised to specify the external dose rate limits apply to both bulk waste and waste packages to ensure radiation doses to workers handling and placing the waste are limited. Section 3.3.3.2 of the revised EIS includes the dose rate limits, consistent with both the revised WAC [1] and Safety Analysis Report (SAR) [2]. The discussion and provision of separate dose rate limits for “contact-handleable” and “remote handling” has been removed from the revised EIS. The Waste Acceptance Criteria (WAC) [1] has been revised to specify that all waste received at the NSDF must meet the dose	Accepted

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				contact, must be less than 2 millisieverts per hour (mSv/h) • the maximum gamma-radiation level of each waste package, measured at 1 m, must be less than 0.1 mSv/h • the maximum gamma-particle radiation field of each waste package, measured on contact, must be less than 10 Sv/h The dose rate limits of waste packages are as follows for **remote handling**: • the maximum gamma-radiation level of each waste package, measured on contact, must be less than 50 mSv/h • the maximum gamma-radiation level of each waste package, measured at 1 m, must be less than 1 mSv/h • the maximum gamma-particle radiation field of each waste package, measured on contact, must be less than 200 mSv/h The maximum dose rates values of waste packages are inappropriate and ambiguous. In fact, the maximum gamma- particle dose rate, measured on contact, for contact handleable waste is considerably higher than the maximum dose rate for remote handling. Also, technically, the gamma-radiation level and the gamma-particle radiation field have the same meaning, therefore; the dose rates should be the same. Finally, the maximum dose rates for contact handleable waste appear to be non-conservative for low-level and/or intermediate level wastes.	rate limits (i.e. external gamma radiation level of ≤ 2 mSv/h near contact and ≤ 0.1 mSv/h measured at 1 m). Based on operational experience and waste records for low-level packages at CNL waste management facilities, the vast majority of waste is anticipated to meet this criterion. Waste packages exceeding these dose rate limits are managed as non-compliant waste. As per the revised SAR [2], higher dose rate waste packages that exceed the dose rate limits are subject to evaluation on a case by case basis and subject to remote handling and special considerations to ensure worker dose is further limited. References [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September. [2] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September.	

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				Action Required: Please revise and justify the selected maximum dose rates for contact handleable waste and for remote handling.		
CNSC	FC-18	CNSC-202	3.2.2.2 Waste Acceptance Criteria – Radiological Characteristics	By volume ILW will constitute 1% of the NSDF; however, it is unclear what percentage of the total activity of the NSDF ILW will represent throughout operations and during Post-Closure. **Expectation to Address Comment:** Please provide data on the proportion of total activity that ILW will account for in the NSDF during operations and by 2400.	CNL has reviewed the waste inventory proposed for the NSDF and made changes. The intermediate level waste (ILW) that had been proposed for the NSDF project will NOT be disposed in the NSDF and instead be kept in safe storage until a disposal solution for ILW is available (Section 2.2.2.1 of the revised EIS; Section 3.4.2 of CNL Integrated Waste Strategy [1)]. The text in Section 3.3.1 has been updated to confirm that the NSDF will contain only LLW as defined in CSA N292.0-19 [1] as well the IAEA Classification of Radioactive Waste (GSG-1) [2]. Section 3.3.1.3 provides a summary of the Waste Inventory proposed for the NSDF. References [1] Canadian Nuclear Laboratories Integrated Waste Strategy, CW-508600-PLA-002, Revision 1, 2019 February. [2] General principles for the management of radioactive waste and irradiated fuel, CSA N292.0:19, Canadian Standards Association, March 2019. [3] Classification of Radioactive Waste, GSG-1, International Atomic Energy Agency, 2009. https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419_web.pdf	Accepted
ECCC	FC-19	ECCC-2	3.2.2.3	It is indicated that amongst the "mixed waste" that may be placed at the NSDF there may be materials contaminated with small quantities of Polychlorinated Biphenyls (PCBs). The following clarification is provided as a note in section 3.2.2.3: "*PCB waste as defined by the Canadian PCB Regulations, the Ontario Environmental Protection Act, Regulation 347, General Waste Management and Regulation 362, Waste Management shall not be accepted for disposal in the NSDF. However, small quantities of PCB containing materials shall be accepted for disposal in the NSDF, i.e., PCB containing materials* ***having a total PCB concentration of up to 50 ppm."*** Please note that the federal PCB Regulations developed under the *Canadian Environmental Protection Act* allow the storage of PCB-containing materials having a total PCB concentration **below** 50 ppm. In addition,	As per the WAC [1] (Section 4.1) – Waste that, notwithstanding of its radioactive component, is classified as hazardous waste is not permitted for disposal in the NSDF. Specifically: […] 3. Polychlorinated Biphenyls (PCB) Waste: i. Materials containing PCBs at a concentration of more than 50 parts per million by weight whether the material is liquid or not; and ii. Materials containing PCBs at concentrations less than fifty parts per million by weight that are leachate toxic waste. Additionally the EIS (Section 3.3.3.3), states that "waste emplaced in the NSDF will meet the intent of land disposal and leachate requirements specified in the Ontario *Environmental Protection* Act, Regulation 347". Table 3.4.2-3 provides the maximum predicted PCB concentration in wastewater and the effluent discharge target. Both the maximum predicted PCB concentration and the effluent discharge target are well below the 50 part per million limit.	Accepted

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				should liquid containing PCBs be released into the environment at concentrations above 2 ppm, it would be considered to be in non-compliance with section 5 of the *Federal PCB Regulations*. **Action Required:** Provide clarification about the acceptable concentration of PCBs present in waste to be placed at the NSDF in light of the requirements under the federal PCB Regulations. Provide information about the environmental protection measures that will be implemented in order to ensure compliance with the federal PCB Regulations.	Canadian Nuclear Laboratories has a procedure [2] that describes the requirements and responsibilities for managing PCBs at all CNL sites in Canada. This includes requirements for storage, inspection and maintenance, prohibited activities for PCBs, permitted activities, laboratory analysis of PCBs, labelling of PCBs or PCB containing equipment, reporting of CNL PCB inventory and use, end of use dates, and records. References [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September. [2] Management of PCB's, 900-509200-STD-003, Revision 0, 2018 January.	
CNSC	FC-20	CNSC-180	p.3-13	In the event that a radioactive waste package does not meet the WAC, the waste generator will prepare an exemption request and submit it to the waste management organisation. In the early years of the project, the waste generator and the NSDF operator will be under the same corporate entity (CNL) and so a conflict of interest is apparent. **Expectation to address comment:** CNSC staff are of the opinion that if packages do not meet the WAC, they should not be accepted. However, in some instances, where there are few packages considered, an exemption might be possible if CNL can demonstrate that placement of few packages would not affect the overall source term or waste inventory on which the Post-Closure predictions are based (i.e., dose predictions to the public and the environment remain essentially unchanged from the predictions made in the Environmental Impact Statement). In such situation, the exemption request should be submitted to the NSDF operator, and reviewed and approved by CNSC staff to avoid any conflict of interest and comply with regulatory expectations.	Specific information on the WAC variance process is no longer included in the revised EIS. The NSDF Project WAC ensures CNL meets its responsibility as the licensee; that all waste received for disposal is in compliance with the design and licensing basis for the facility. The WAC [1] has been revised to clarify waste that do not meet the WAC is anticipated to be rare and the variance process is analogous to the Infrequently Performed Operations process as outlined in Facility Authorizations. This process applies a graded approach for determining if a requested operation requires review and approval by CNSC staff. These instances shall be authorized on a case by case basis by the Facility Authority and shall not in any circumstances result in contravening the design or safety basis of NSDF, including the overall waste inventory on which the post-closure predictions are based on. Other safety goals and design targets which must be considered are presented in Section 3.0 of the Safety Analysis Report (SAR) [2]. Any waste accepted using the Infrequently Performed Operations process will be reported to the CNSC in CRL's Annual Compliance Report. References [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September. [2] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September.	Accepted

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HC	FC-21	HC-6	3.5.1 Construction Materials, p.122	The section states "The haulage route for transportation of NSDF Project site preparation and construction equipment, and construction materials will be via public roads to the CRL property (e.g., Highway 17) and will be scheduled to reduce noise and traffic volumes, and limit inconvenience to local residents." **Expectation to address comment**: Clarify whether the haulage route passes through the Village of Chalk River. Receptors in close proximity to roadways with increased vehicle traffic (but not necessarily close to the project site itself) should be identified as they could be impacted by traffic noise. Traffic volumes provided in section 5.10.5.2.2 and scheduling measures identified in section 5.10.6.3.2 would also be useful to include here for clarity and consistency.	The information on construction materials is now found in Section 3.4.1.11 of the revised EIS. This section provides details on the transportation route of NSDF Project site preparation and construction equipment and materials will be by public roads to the CRL site (e.g., Highway 17) and will pass through the Village of Chalk River. Estimates of truck deliveries are also provided in this section, which results in approximately 15 trucks per hour (200 trucks per day) during construction for the daytime period. As a mitigation measure, transportation of equipment and construction materials will be scheduled during normal business and daylight hours to the greatest extent possible to limit inconvenience to local residents.	Rejected with Follow-Up IR HC-2-01
NRCan	FC-22	NRCan-5	3.5.2.3 Base Contours	NRCan was not able to locate a map of the intended base contours in the documents provided. The intended base contours in conjunction with figure 5.3.1-5 would indicate the amount of blasting that will be required. The volume of rock to be blasted is not provided (even as an approximate amount). **Expectation to address comment:** Please provide map, including volume of rock to be blasted.	Figure 3.2.1-1 (Rock Blasting Locations) shows the requested information on the footprint where the blasting will occur. Section 3.2.1.1 confirms that the volume of blasted rock anticipated for removal is ~170,000 $m^{3.}$	Accepted
CNSC	FC-23	CNSC-193	3.5.2.4 Base Liner, Fig 3.5.2-1	In figure 3.5.2-1 that illustrates the cross-section of the base liner, it's not clear what the "subgrade" stands for. There is no cross section showing where the base liner will be located? Is all the base liner on basement rock or partially on bedrock and partially on overburden? **Expectation to address comment:** Provide a cross section to illustrate the location of the base liner and discuss the implication of the	A cross section along the east west axis through the ECM is provided on Figure 3.4.1 1. The figure illustrates the relative elevations of the existing grade, interpreted bedrock surface, ECM subgrade, ECM base liner, and ECM final cover. Section 3.4.1.4 has been revised to include that the base liner system will be positioned on bedrock in the eastern region of the ECM near the bedrock ridge. Where the base liner is constructed on bedrock, 20 cm of granular bedding will be placed on the bedrock surface to facilitate the construction of the base liner system. This section also recognizes differential settlement has been assessed and is not	Accepted

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				base liner sitting partially on bedrock and overburden.	expected to cause tensile cracking of the compacted clay liner (CCL) component of the base liner system, or damage to the leachate collection system. The Bearing Capacity, Settlement, and Lateral Earth Pressure 1] provides the detailed method of evaluation of differential settlement. This evaluation concludes that differential settlement of the ECM foundation liner is not expected to significantly affect leachate drainage over the base of the ECM. The slope of the ECM floor will maintain positive drainage after experiencing maximum differential settlement. Furthermore, for the maximum 75-mm differential settlement between two points spaced 10 m apart on the floor of the cell, the increase in the length of a straight liner is less than 1 mm and the corresponding tensile strain is less than 0.01%. This tensile strain is well below the tensile strain capacity of 0.1% to 0.4% for CCLs. Reference [1] Bearing Capacity, Settlement, and Lateral Earth Pressure, 232-503212-REPT-001, Revision 1, 2018 December.	
ECCC	FC-24	ECCC-13	3.5.3.1	Table 3.5.3-1 provides a list of the wastewater treatment plant effluent treatment criteria. The following are observations of the information that was presented: 1. A list of all likely radionuclide and non-radionuclide contaminants that will be present in the leachate was not provided. 2. The WWTP effluent treatment criteria for trivalent and hexavalent chromium should be provided rather than for total chromium. 3. No rationale for the proposed temperature criteria of 40ºC is provided. Such elevated temperatures could be potentially deleterious to aquatic biota. Refer to Wismer and Christie (1987) for information on temperature criteria that may be protective of freshwater fish should the effluent be discharged into fish bearing waters (available at: http://www.glfc.org/pubs/SpecialPubs/Sp87_3.pdf). 4. No discharge criteria for the following water quality parameters were provided: pH, DO, and conductivity.	Information on wastewater quality is now found in Section 3.4.2.2 of the revised EIS. CNL provides the following comment dispositions: 1) The list of radiological and non-radiological contaminants are included in Table 3.4.2-2 and Table 3.4.2-3. Section 3.4.2.5.1 provides the basis for radiological and non-radiological effluent discharge targets. 2) Table 3.4.2-3 provides the updated effluent discharge target for Chromium (total), which is 1.0E-03 mg/L based on the CCME guideline value for Chromium (VI). Maximum predicted total chromium concentrations in waste water is 0.25E-03 mg/L, below the effluent discharge target. Chromium is included in the surface water quality assessment [2]. 3) The revised EIS does not include an effluent discharge target for temperature. The proposed temperature criteria was not included in Revision 0 (2017 March) of the draft EIS, however was included in an earlier draft (2016 August) of the EIS. CNL notes that processed wastewater will not be heated in the WWTP. The temperature of the treated effluent to be released to Perch Lake will be routinely monitored. The monitoring at the WWTP will be used to identify treated effluent conditions (elevated temperature conditions) that will prohibit its release to Perch Lake so that it can be held in storage until it can be released (Table 5.4.2-7 of revised EIS). 4) Effluent discharge targets for pH and Dissolved Oxygen targets are included in Table 3-1 of the NSDF Effluent Discharge Targets [1]. CNL is not aware of effluent guidelines for conductivity. The effluent discharge targets are as follows: • pH: 6.5 -9 (based on CCME guidance) • Dissolved Oxygen >15-20 C: ≥6 mg/L (based on CCME guidance) • Dissolved Oxygen ≤15: ≥9.5 mg/L (based on CCME guidance) 5) The NSDF effluent discharge targets include nitrate, nitrite and ammonia as outlined in Table 3-1 of the NSDF Discharge Targets [1]. The effluent discharge targets are as follows:	Accepted

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				5. No discharge criteria for nitrate, nitrite and ammonia were provided. 6. The WWTP effluent treatment criteria for some parameters are noted to be based on *CNL's Guideline for Effluent*. This guideline is not available for ECCC to refer to. A 2nd document is mentioned in the notes section that is also not available to ECCC for review: *"Appendix B of the CRL Acceptability Criteria for Routine and Non-Routine Discharge of Liquids to Stormwater for MAC values for individual radionuclides".* 7. It is indicated that the condensate from the evaporator will be discharged to the final discharge tank for release to the environment. It is not clear if measures will be implemented to ensure that the evaporator condensate will meet environmental protection criteria prior to release into the environment. With respect to any potential discharges of effluent into fish frequented waters, such as Perch Creek, they must be in compliance with subsection 36 (3) of the *Fisheries Act*, which prohibits the discharge of deleterious substances of any type into waters frequented by fish. **References:** Wisner, D.A. and A.E. Christie. 1987. Temperature Relationships of Great Lakes Fishes: A Data Compilation. Great Lakes Fish. Comm. Spec. Pub. 87-3. 165 p. **Actions Required:** ECCC recommends the following information be provided and assessed in the EIS to improve the	- Nitrate: 13 mg/L (based on CCME guidance) - Nitrite: 0.06 mg/L (as N) (based on CCME guidance) - Ammonia: 0.02 mg/L (based on Ontario Provincial Water Quality Objectives) 6) The NSDF effluent discharge targets have been revised [1] and are no longer based on *CNL's Guideline for Effluent* or *Appendix B of the CRL Acceptability Criteria for Routine and Non-Routine Discharge of Liquids to Stormwater*. The NSDF effluent discharge targets for non-radioactive constituents are the most restrictive of CCME Guidelines for Protection of Aquatic Life or the Ontario Water Quality Objectives. For constituents where CCME or Ontario Water Quality Objectives were not available, other provincial or toxicological benchmarks were selected. The effluent discharge targets for radionuclides, with the exception of tritium, are Maximum Acceptable Concentrations in drinking water and are derived using Health Canada Guidelines for Canadian Drinking Water – Radiological Parameters. This is a conservative approach as there will be no public access to the Perch Lake. With the exception of tritium, no credit is applied for dilution for the NSDF effluent discharge targets. 7) The current design of the NSDF waste water treatment plant does not include an evaporator. The use of an evaporator was not included in Revision 0 (2017 March) of the draft EIS, however was included in an earlier draft (2016 August) of the EIS. CNL acknowledges that any potential discharges of effluent into fish frequented waters must be in compliance with subsection 36 (3) of the *Fisheries Act*, which prohibits the discharge of deleterious substances of any type into waters frequented by fish. CNL notes the NSDF effluent discharge targets [1] are the maximum concentrations of each Contaminant of Potential Concern in the WWTP effluent such that can be discharged to the environment without adverse effects to human health or the environment. References [1] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October. [2] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	

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				understanding of potential environmental effects from the project: 1. A complete list of all radionuclide and non-radionuclide contaminants that will be treated by the WWTP. 2. Trivalent and hexavalent chromium WWTP effluent discharge criteria. 3. A rationale for the proposed WWTP effluent discharge criteria for temperature and evaluate whether this criteria would be protective of freshwater aquatic life present in the most immediate waterbody present downstream from the final discharge point. If found to be non-protective, find a more suitable discharge criteria for temperature. 4. WWTP effluent discharge criteria for the following water quality parameters: pH, conductivity. 5. WWTP effluent discharge criteria for nitrate, nitrite and ammonia. Provide detailed rationale for those discharge criteria that are based on *CNL's Guideline for Effluents*. 6. The following references that are mentioned in the report to support a review of the proposed WWTP effluent discharge criteria: a) *CNL's Guideline for Effluents*; b) *CRL Acceptability Criteria for Routine and Non-Routine Discharge of Liquids to Stormwaters.* 7. Additional information about the expected quality of the evaporator's condensate and whether it would require treatment prior to release to the environment.		
ECCC	FC-25	ECCC-116	3.6.1.3.1	The report states that "When possible, a coarser grained soil is used as daily cover to promote hydraulic connection between waste lifts and allow leachate to more readily	It is important to use coarser grained soil for daily cover to avoid hydraulic isolation of one cell from another. If the daily cover consists of relatively impermeable soil, water cannot migrate uniformly through the waste. Instead, water will be channeled in the landfill. Some cells may be saturated with water and others may be virtually dry. Wide variation in moisture conditions leads to problems with differential settlement and leachate collection. A common manifestation of low-hydraulic conductivity daily cover is the appearance of leachate seeps on landfill cover; leachate	Accepted

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				infiltrate to the base of the engineered containment mound." **Expectation to address comment:** Please provide rationale for using courser grained soil as one of the potential types of daily covers. While this type of cover may allow the compaction of soil in each cell, it may increase the amount of leachate that would be produced and that would require treatment.	flows laterally along the surface of the daily cover rather than infiltrating downward. The generated leachate will be collected and treated by the properly sized and designed collection system, equalization tank, and wastewater treatment plant. Reference Daniel, D. Geotechnical Practice for Waste Disposal. ISBN 978.1-4613-6340-9. 1997. (https://www.worldcat.org/title/geotechnical-practice-for-waste-disposal/oclc/958813809)	
ECCC	FC-26	ECCC-16	3.6.2	It is indicated that there are two possible discharge points for the treated effluent from the WWTP. It is not clear what is meant by option 1 "*discharge to an infiltration area*." Clarification as to whether this would represent a discharge to a waterbody that is considered Canadian fisheries waters should be provided. It is also indicated that "*the discharged treated wastewater quality will meet CNL's Acceptability Criteria for Routine and Non-routine Discharge of Liquids on the CRL property.*" It is not clear what the previous statement entails. **Action Required:** Provide clarification as to the type of receiving environment where discharge option #1 (i.e., discharge to an infiltration area) would discharge. Provide information to describe the requirements of *CNL's Acceptability Criteria for Routine and Non-routine Discharge of Liquids on the CRL property*.	Section 3.4.2.6 of the revised EIS has information on the WWTP treated effluent discharge systems and the type of receiving environment. The preferred option is to discharge the treated effluent from the WWTP to the exfiltration gallery unless the groundwater elevations are determined to be too high. In the event that the exfiltration gallery does not have sufficient capacity to manage the treated effluent (e.g., under high groundwater elevations), a portion of the treated effluent will be discharged directly to Perch Lake through a submerged diffuser. Figure 3.1.1-1 shows the two potential discharge locations. *CNL's Acceptability Criteria for Routine and Non-routine Discharge of Liquids on the CRL property* no longer is the basis of the NSDF effluent discharge targets. As per the NSDF Effluent Discharge targets [1], for non-radioactive constituents are the most restrictive of CCME Guidelines for protection of Aquatic Life or the Ontario Water Quality Objectives. For constituents where CCME or Ontario Water Quality Objectives were not available other provincial or toxicological benchmarks were selected. The effluent discharge targets for radionuclides, with the exception of tritium, are Maximum Acceptable Concentrations in drinking water and are derived using Health Canada Guidelines for Canadian Drinking Water – Radiological Parameters. This is a conservative approach as there will be no public access to the Perch Lake watershed, the location of the effluent discharge. The tritium discharge target is based on the criterion that tritium concentrations in Perch Creek which drains the Perch Lake watershed and discharge to the Ottawa River remain below 7000 Bq/L, the Health Canada drinking water guideline. With the exception of tritium, no credit is applied for dilution. Effluent discharge targets for radiological and non-radiological constituents are provided in Section 3.4.2.5.1 and Tables 3.4.2-2 and 3.4.2-3 of [1]. As outlined in 3.4.2.2 and specifically notes 1 and 2 for Table 3.4.2-3, treated effluent will be monitored prior to release to ensure that effluent discharge targets are met. In the event that effluent discharge targets are not met, the design includes provision to return the effluent to the	Accepted

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					collection tank for further treatment. Further, the WWTP has the flexibility to adjust treatment processes, for example by including appropriate resin in the ion exchange columns, if sampling of wastewater during operations demonstrates that the concentrations of contaminants are approaching discharge targets. Reference [1] NSDF Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	
CNSC	FC-27	CNSC-194	3.7 Management of Surface Water	CNL uses a 100 year design storm for the surface water management facility. The design storm design frequency should be commensurate with the operation duration as well as the severity of failure. Considering the fact that the probability of a storm greater than the 100 year design storm will occur at least once within the operational period of 50 years is about 40%, a bigger than the 100 year storm should be considered for the design. **Expectation to address comment:** CNL should consider using a bigger than the 100 year storm as the design storm.	Section 3.4.4.5 of the revised EIS documents the Surface Water Management Collection, Conveyance, Treatment and Discharge systems to control non-contact water including limiting surface water from uncontaminated areas discharging into contaminated areas. The management of surface water runoff from the ECM has both a contact and non-contact component: design of the contact component uses runoff volumes to address WWTP requirements and uses back-to-back 100-year storm events as the design criteria; the non-contact component uses peak flows from the 100-year+ climate change event to address runoff from the ECM cover in down-chute design and runoff volumes from the 100-year event to address storage and pumping requirements within the ECM for those areas not covered (Section 3.2 of Surface Water Management Plan [1]). The ditches can convey the 100-year + climate change flow and for most cases they can also convey the probable maximum precipitation design flow (Section 7.3.1 of [1]. The surface water management pond footprints reflect the overall storage required to control post-closure flows to predevelopment levels for the 2-year through to 100-year rainfall events at the site (Section 3.4.4.5.1 of revised EIS). Reference [1] Surface Water Management Plan, 232-508600-PLA-002, Revision 1, 2019 February.	Rejected with Follow-Up IR CNSC-2-03
CNSC	FC-28	CNSC-181	3.7.1 Surface Water Management Pond, p.3-57	CNL used basic target surface water quality objectives of 60% total suspended solids provided by the Ministry of Environment and Climate Change (MOECC) instead of normal or enhanced water quality objectives because the stormwater ponds will discharge through a contaminated wetland that has a sediment trapping function that will provide additional treatment and further protect Perch Lake and Perch creek. The filtration capacity of wetlands is not infinite and therefore, CNSC staff question why enhanced treatment was not chosen instead considering that the operations	Information on surface water management ponds is now found in Section 3.4.4.5.1 of the revised EIS. The surface water conveyance system is designed to ensure that only 'non-contact' run-off (i.e., surface water run-off that has not come into contact with waste) is directed to surface water management ponds (SWMPs). The SWMPs will not have elevated concentrations of radionuclides or metals. All contact water (i.e., water that has come into contact with waste), is directed to the WWTP. Enhanced level treatment is not possible for all three surface water management ponds because of the restricted footprint. CNL notes that SWMP #1 will meet 80% TSS removal	Accepted

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				will last 50 years and the wetland could infill by then. **Expectation to address comment:** Please provide a justification for not using enhanced water quality objectives when designing the stormwater management ponds.	(Enhanced level treatment), SWMP #2 will provide 76% TSS removal (Normal level Treatment) and SWMP #3 will provide 60% TSS removal (Basic level treatment) (See Section 3.4.4.5.1). The surface water management ponds discharge to wetlands which function as a sediment trap that will provide additional treatment prior to stormwater reaching any watercourses (e.g., East Swamp Stream, Perch Creek). There is no direct discharge to fish habitat. Basic level treatment is for SWMP #3 is therefore, considered protective of the environment. The surface water management ponds will be monitored to ensure that discharges meet environmental protection criteria and confirm that the ecological function and structure of the wetland system is maintained.	
CNSC	FC-29	CNSC-172	4.2 Communications objectives and strategic alignment	CNL states that they "regularly review their public information program to….adapt to changing business needs or circumstances, to accommodate new information, or in response to other factors". This in incorrect. CNL has not modified or updated their program in years and cannot make this claim. **Expectation to address comment:** This statement should be removed from the final EIS.	This statement has been removed from the revised EIS, however CNL notes that the CNL Public Information Program [1] was updated in 2019 July. Reference [1] Public Information Program for Canadian Nuclear Laboratories, CW-513430-REPT-001, Revision 5, 2019 July.	Accepted
CNSC	FC-30	CNSC-177	4.3.1.1.1 Public Information Sessions	CNL mentions having staff and technical experts available for public information sessions. CNSC would like a list of the areas of specialization and/or the fields of expertise that were available to the public during these sessions. **Expectation to address comment:** The final EIS should contain a list of the areas of specialization and/or the fields of expertise that were available to the public during the information sessions.	All public information sessions for the NSDF were supported by having technical experts available based on the topic of discussion to address questions/comments on a one-on-one basis. Section 3.2.1 of the Stakeholder Engagement Report [1] and 4.2.2.1 of the revised EIS includes information on the expertise that was present during the public information sessions. Reference [1] Stakeholder Engagement Report, 232-513400-REPT-002, Revision 0, 2019 November.	Accepted
CNSC	FC-31	CNSC-174	4.3.1.1.10 Other Stakeholder Engagement	CNL mentions having hosted a Renfrew County Council meeting, and a meeting with the Pontiac MP. The CNSC would like to see a record of questions/concerns raised at those meetings.	Section 4.2.1 of the EIS summarizes the meetings with Renfrew County and the Pontiac. The questions/concerns discussed in these proceedings informed the development of the initial set of project FAQs and Quick Facts, available at www.cnl.ca/NSDF Presentation materials are included in Section 5.1 of the Stakeholder Activities Report [1].	Accepted

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				Expectation to address comment: The final EIS should include documentation related to questions/concerns discussed during the Renfrew County and Pontiac MP meetings.	References [1] Environmental Assessment Stakeholder Activities Report – NSDF and NPD Closure Projects, CW–513400-REPT-001, Revision 0, 2017 March.	
CNSC	FC-32	CNSC-175	4.3.1.1.10 Other Stakeholder Engagement	CNL included a response that was sent to the Old Fort William Cottagers' Association as an appendix to the EIS. In the response, CNL commits to posting a set of questions and answers on the NSDF on their website. The CNSC would like to see evidence of those questions being posted on the CNL site. **Expectation to address comment:** The final EIS should include evidence that the Qs and As document has been added to the CNL website.	Section 4.2.1.30 summarizes the meeting with the Old Fort William Cottagers Association. Further details are in Section 4.1.1 the Stakeholder Engagement Report [1]. The questions and answers that were provided to the Old Fort William Cottagers Association informed the development of the initial set of project FAQs and Quick Facts, available at https://www.cnl.ca/en/home/environmental-stewardship/nsdf/default.aspx Over the lifetime of the NSDF Project, CNL has received many inquiries on similar themes. NSDF personnel heard and understood the key/main themes presented by interested public and continue to update publicly accessible project information. Section 4.3 of the EIS summarizes feedback heard during public engagements and through formal comments and how this feedback was incorporated into the revised EIS. Reference [1] Stakeholder Engagement Report, 232-513400-REPT-002, Revision 0, 2019 November	Accepted
CNSC	FC-33	CNSC-178	4.3.1.1.2 Environmental Stewardship Council Meetings	CNL has listed the agendas for the Environmental Stewardship Council (ESC) meetings, as well as the presentations. CNSC would like to see a record of the meetings minutes to know what was discussed. **Expectation to address comment:** The final EIS should contain meeting minutes for all ESC meetings referenced.	All Environmental Stewardship Council (ESC) agenda and meeting notes are publicly available on https://www.cnl.ca/en/home/environmental-stewardship/ESC/default.aspxThe Stakeholder Engagement Report [1] contains an example of an ESC agenda and meeting notes. Section 4.2.1 of the EIS summarizes topics presented to the ESC on the NSDF Project. Reference [1] Stakeholder Engagement Report, 232-513400-REPT-002, Revision 0, 2019 November.	Accepted
CNSC	FC-34	CNSC-173	4.3.1.1.6 Media Coverage	CNL mentions a technical meeting was held in January 2017. The CNSC would like to see a record of who participated and what was discussed **Expectation to address comment:** The final EIS should include documentation related to questions/concerns discussed during the technical meeting.	Section 4.2.1.14 of the EIS provides a summary of the technical discussion meeting. Former AECL/CNL employees and other members of the local scientific community to discuss technical aspects of the NSDF Project in Deep River, Ontario. This meeting was planned in response to a request from a local community member, who assisted in coordinating the discussion. Details on this meeting can also be found in Section 4.1.1 of the Stakeholder Activities Report [1]. Reference [1] Stakeholder Activities Report – Near Surface Disposal Facility, 232-513400-REPT-001, Revision 0, 2017 November.	Accepted

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CNSC	FC-35	CNSC-65 CNSC-176	4.3.1.2.1 Public Feedback	CNL has listed some of the questions that have been received from the public on this project. However, there is a significant amount of these questions that have gone unanswered by CNL; some of them date back over 9 months. There is also no record of recent questions received (the last question listed was from July 2016). **Expectation to address comment:** The final EIS should demonstrate that timely responses have been given to all questions. The EIS must also include a matrix to demonstrate a more complete list of all questions received up to the submission date of the EIS, and how they were dispositioned by CNL.	Section 4.3 of the EIS summarizes feedback heard during public engagements and through formal comments and how this feedback was incorporated into the revised EIS. The detailed matrix is found in Appendix R of the Stakeholder Engagement Report [1] which is a table of responses to all questions/comments on the NSDF Project since 2016 August using the same medium in which the question/comment was received. CNL has analysed all questions/comments received and have determined key/main themes. These themes, including CNL's responses are posted on the "What's new" section of the NSDF webpage, https://www.cnl.ca/en/home/environmental-stewardship/nsdf/default.aspx Reference [1] Stakeholder Engagement Report, 232-513400-REPT-002, Revision 0, 2019 November.	Accepted
CNSC	FC-36	CNSC-225	4.3.2	There is an expectation that in the final EIS submission CNL will provide an updated list and description of First Nation and Métis engagement activities, including any discussions CNL has had with identified First Nation and Métis groups regarding potential impacts to Aboriginal or/treaty rights.	Table 6.2.4 1 provides a summary of CNL's engagement activities with both First Nation and Métis to March 31, 2019. The Indigenous Engagement Report [1] has been revised and is a Technical Supporting Document to the EIS. Section 4 of this report [1] provides further information on Indigenous engagement. Reference [1] Indigenous Engagement Report, 232-513130-REPT-001, Revision 3, 2019 November.	Rejected with Follow-Up IR CNSC-2-04
NRCan	FC-37	NRCan-11	5.0 Environmental Effects	There is reference to the use of ammonium nitrate/fuel oil (ANFO) and bulk emulsion. Will a factory (permanent or temporary) licence be required? **Expectation to address comment:** Please explain.	Section 3.2.1 clarifies that Blasting activities will follow industry standard Best Management Practices, applicable Federal regulations, and Fisheries and Oceans Canada (DFO) guidelines for use of explosives [1]. Should a licence or permit be required under either the Explosives Act or the provincial OPSS 120 – General Specification for Use of Explosives [2], it will be obtained by the NSDF Project. References [1] Guidelines for the use of explosives in or near Canadian fisheries waters. Canadian technical report of fisheries and aquatic sciences 2107. DFO, Wright DG, Hopky GE. 1998 [2] Ontario Provincial Standard Specification (OPSS) in the document OPSS 120 – General Specification for Use of Explosives, 2014 November.	Accepted

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CNSC	FC-38	CNSC-226	5.1.1	The section indicates that community engagement and feedback helped in the development of the scope of the EIS, please clarify if this also included feedback from First Nation and Métis groups? If so, please mention in this section. Also, please clarify if the selection of valued components (VCs) for the EIS was influenced by engagement with First Nation and Métis communities.	A new Section 6 has been included in the revised EIS, to consolidate and summarize the major areas of assessment relevant to Indigenous peoples into one single section. This includes information on Indigenous engagement and Valued Components (VC).	Rejected with Follow-Up IR CNSC-2-04
CNSC	FC-39	CNSC-14	5.1.2	It is unclear why soil quality has not been selected as a VC for the purpose of the NSDF Project effect assessment as opposed to air quality, groundwater quality, sediment quality etc. It should be taken in consideration that soil organisms (e.g., soil invertebrates) would be directly exposed to contaminated soil and therefore should be selected for the effect assessment. **Action Required:** CNL should explain why soil quality and soil invertebrates have not been selected as VC for the purpose of the NSDF Project effects assessment.	Soil quality is a measurement indicator for geology which is identified as a Valued Component as identified in Section 5.3.1.2 and Table 5.1.2-1 of revised EIS. Terrestrial invertebrates are identified as a VC in Table 5.1.2-1 of the revised EIS. Assessment endpoints are qualitative expressions used to assess the significance of residual effects on VCs and represent the key properties of the VC that should be protected for future human generations (i.e., incorporates sustainability). Measurement indicators represent properties of the environment and VCs that, when changed, could result in or contribute to an effect on assessment endpoints. For example, soil quality is considered to be a measurement indicator for geology. All VCs have measurement indicators, but not every VC has an assessment endpoint. For example, air quality has an assessment endpoint, but groundwater quality and sediment quality are measurement indicators. Valued components with no assessment endpoint (i.e., geology, hydrogeology, hydrology and surface water quality) are still analyzed for Project-specific and cumulative (if applicable) changes in measurement indicators. The same systematic and rigorous approach is applied to VCs with and without assessment endpoints, except that effects on VCs without explicit assessment endpoints are not classified using effects criteria nor evaluated for significance. The results of the analysis are provided to other disciplines (e.g., aquatic and terrestrial environment, and human health) for inclusion in their residual effects analysis and determination of significance. How soil quality is used in the assessment of VCs is described in Section 5.3.1.2 of the revised EIS. Although soil quality is not identified as a VC, changes to soil quality are used to evaluate the potential impacts on other VC's such as groundwater quality, surface water quality and terrestrial biota (Section 5.3.1.2). Section 5.3.1.7 of the revised EIS determined there are no residual effects on soil quality as a result of the absence of primary pathways or secondary pathways having a negligible residual effect. However in order to enable a comprehensive exposure assessment of the post-closure phase for human and non-human receptors, the pathway modeling performed within the Post-closure Safety Assessment [1] provides a quantitative assessment of soil quality for the post-	Accepted

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					closure phase and discussed in Section 6.2.2 of [1]. These results are summarized in Section 5.7.6.1.2.2 of the revised EIS. The risk screening results for terrestrial invertebrates (i.e. earth worms) for the post-closure phase are provided in Section 5.1 (specifically Tables 5-3 for radiological and 5-7 for non-radiological) of the Ecological Risk Assessment [2]. The ecological risk results for the terrestrial environment are summarized in Section 5.7.6.1.2.2 of the revised EIS as well. References [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [2] Ecological Risk Assessment (EcoRA) for the NSDF Project. Canadian Nuclear Laboratories Document No. 232-121240-ASD-001. Revision 0. November 2019.	
CNSC	FC-40	CNSC-214	5.1.2 Valued Components, Table 5.1.2-1, Page 5-9	Indigenous groups were not included as a human health VC. Indigenous persons may consume higher amounts of local and country foods and may spend time in closer proximity to the site. Were Indigenous groups consulted when choosing human health VCs? It is stated that Potential Critical Groups were selected based on lifestyle and proximity to the CRL site and are those that are likely to receive the highest radiation doses as a result of CRL operations. **Expectation to address comment:** The proponent is requested to describe the consultation carried out with Indigenous groups when choosing human health VCs. The proponent is also requested to justify not including Indigenous groups as human health VCs.	Section 5.8.2 of the revised EIS now recognizes Indigenous peoples as human health VCs. A new Section 6 has been included in the revised EIS, to consolidate and summarize the major areas of assessment relevant to Indigenous peoples into one single section. This includes information on Indigenous engagement and Indigenous Health (Section 6.6). Section 6.6 of the revised EIS discusses a lifestyle survey that was completed by CNL in 2016 to learn more about the behaviour about the people living in the area with regard to their consumption of local food [1]. Information regarding identification as First Nations or Métis was also requested. The lifestyle survey did not specifically target Indigenous peoples on reserves; rather, it provided Indigenous peoples in local communities with the opportunity to self-identify. The revised EIS has also used feedback received on the draft EIS from Indigenous peoples to refine the human health risk assessment and ensure conservative representation. The hunter/recreational receptor within the Post-closure Safety Assessment (PostSA) [2] represents CNL's general understanding of how Indigenous peoples may interact with the NSDF Project based on their current practices communicated during engagement activities and reinforced with available traditional knowledge and land use studies. To address the uncertainty with how Indigenous peoples may interact with the site in the future, a sensitivity case was also explored in the PostSA [2] of a Self Sufficient Indigenous Group receptor who is assumed to obtain all of their food through hunting and gathering in the area. References [1] Life Style Surveys: Preliminary Local Food Fraction Findings, EnvP-509200-021-000, EnvP 16-081, 2016 July15. [2] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	Rejected with Follow-Up IR CNSC-2-04

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ECCC	FC-41	ECCC-31	5.2 Atmospheric Environment. Section 5.2.1.6.2 Application Case Results (page 23). and table 5.2.1-13: Emissions not included in the Assessment (page 27)	Emissions from WWTP activities and Natural Gas (NG) combustion for comfort heating: According to the EIS the emissions from the WWTP and NG combustion (for both WWTP and heating) are expected to have a negligible effect on the overall air quality. Details of the WWTP equipment and ancillaries were not included in the EIS therefore it was not possible to evaluate whether the proponent's emission estimation is correct. **Expectation to address comment:** Please provide a rationale why emissions from WWTP and NG combustion for comfort heating are considered negligible (emissions from these sources should be quantified). Provide details for equipment type and design of these activities.	Emissions from natural gas combustion for Wastewater Treatment Plant processes and comfort heating other than NOx/NO$_2$, were not retained as they are not required to be assessed per "*Procedure for Preparing an Emission Summary and Dispersion Modelling Report"* Version 4.1 [1] (See also EIS Section 5.2.1.6.2 and Table 5.2.1-13). The NOx/NO$_2$ from combustion was deemed negligible as it contributed to less than 1% of the total emissions and was therefore, excluded from the dispersion modelling. The emissions assessment has been updated for the 100% Design. Details of the specific emission calculation methods and resulting emissions estimates used for dispersion modelling are provided in the referenced Air Quality Assessment TSD [2]. References [1] https://files.ontario.ca/moecc_65_emission_aoda_en.pdf [2] Air Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-008, Revision 0, 2019 November 05.	Accepted
HC	FC-42	HC-7	5.2 Atmospheric Emissions, p.233	The section states "A quantitative noise and vibrations assessment has not been completed for inclusion in this EIS as there are not sensitive human receptors in the vicinity of the NSDF Project that would experience nuisance effects from the construction and operations phases of the NSDF Project." This is inconsistent with the statements in Section 2.5.4.3 that "Potential effects to the atmospheric environment for both alternatives are related nuisance noise from construction activities (…)." and "Nuisance noise effects are anticipated to be related to the construction phase of the project and occur intermittently." Additionally, "sensitive human receptors" were not previously defined, and the statement is inconsistent with section 5.8.6.1.1.1 which identifies "potential critical groups" located 3 km away from the CRL site, as well as receptors along the transportation route.	Section 5.2 has been updated to note the completion of a noise impact study and point to Section 5.10. (Socio-economic assessment) for a discussion of results. The potential effects of noise and vibrations related to construction activities, for example blasting, on aquatic and terrestrial biota is provided in Sections 5.5 Aquatic Environment and Section 5.6 (Terrestrial Environment). Section 5.10.5.2.2 has been updated to reflect the results of the noise assessment from construction and operations of the NSDF. Based on the noise assessment, additional information is provided on the change in Highly Annoyed (HA%), however, the effect of the increased traffic on noise levels is still considered to be a slight, but discernable change when compared to existing levels of traffic from current employees and operations at CRL. The detailed results of the noise impact study are presented in the Noise Impact Study of the CNL NSDF Project Construction-Related Road Traffic on Human Receptors [1]. Reference [1] NSDF Project Construction-Related Road Traffic on Human Receptors, 232-03701-REPT-002, Revision 0, 2018 February.	Accepted

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				Expectation to address comment: Revise the statement and include a reference to section 5.10.5.2.2 where the potential nuisance noise effects, including along the transportation route, have been qualitatively assessed.		
ECCC	FC-43	ECCC-30	5.2.1.1 Scope of the Assessment (page 1) Table 5.2.1-1 Summary of Issues Raised During Engagement and Consultation Activities that Influenced the Air Quality Assessment (page 2)	The Dust Management Plan was not provided with the EIS and therefore the mitigation measures and practices that will be used to control dust generated by the NSDF Project could not be evaluated. **Expectation to address comment:** Please provide a copy of the Dust Management Plan as part of the EIS.	A Dust Management Plan [1] has been developed that identifies and describes the dust control measures the owner or operator will use to minimize dust from becoming airborne at the facility. This plan includes dust control measures that are most appropriate for site conditions, along with an explanation of how the measures selected are applicable and appropriate for use at the site. The text in Table 5.2.1-1 has been revised to confirm that a Dust Management Plan will be implemented for the NSDF. Reference [1] Dust Management Plan, 232-03700-PLA-001, Revision 1, 2018 September.	Accepted
CNSC	FC-44	CNSC-210	5.2.1.2 Baseline Air Quality	It is stated that ozone (O_3) was included in the air quality baseline assessment as it will be used to calculate the Nitrogen dioxide (NO_2) in the effects assessment. However, ozone was not included in table 5.2.1-7 which provides a summary of the background air quality values. Table 9 of appendix 5.2.2 Air Quality Baseline Report which provides the same summary does include ozone in the table. If ozone was added as an indicator species for the air quality assessment, the background air quality values should be included in table 5.2.1-7. **Expectation to address comment:** The background air quality should be added to table 5.2.1-7 Background Air Quality Values for completeness.	Background concentrations of Ozone (O_3) have been included in Table 5.2.1-7. The data represent the 90th percentile of the 1-hour and 8-hour monitored values. The Appendix 5.2.2. Air Quality Baseline Report has been replaced with the Technical Support Document Air Quality Assessment for the Near Surface Disposal Facility [1]. The technical support document provides baseline air quality data, the emissions assessment and details on dispersion modelling. Reference [1] Air Quality Assessment for the Near Surface Disposal Facility 232-03710-REPT-008, Revision 0, 2019 November 05.	Accepted
CNSC	FC-45	CNSC-209	5.2.1.4 Baseline Air Quality	The timeframe of the background data and the meteorological data should be included in the main EIS document. In the Baseline Air Quality Data section, there is no mention over which period the data was used. Similarly there is no time frame provided in the main EIS for which	Text has been added to outline the dates over which baseline air quality and meteorological data were obtained. The timeframe for background air quality data is provided in subsection 'Baseline Air Quality' of Section 5.2.1.4.2.1 of the revised EIS.	Accepted

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				the meteorological data was obtained. One has to search in the appendices to find this information. This information should also be included in the main EIS to provide clarity regarding the appropriateness and completeness of the data used in the air quality assessment. **Expectation to address comment:** CNSC recommend that text be added to the Baseline Air Quality Data section and the Dispersion Modelling section to clearly outline the dates over which the data were obtained.	The background air quality was assessed using observations from ECCC National Air Pollution Surveillance Network (NAPS) air quality monitoring stations at locations outside the Regional Study Area (See Section 3 of the Air Quality Technical Support Document [1]. The monitoring data considered ranged from 2009 through 2013 which was the latest data available at the time of the baseline assessment in 2015 and is still considered representative of the baseline air quality for the NSDF Project site. The timeframe for meteorological data was the five year period 2011 to 2015 and is summarized in Section 5.2.1.6.1 of the revised EIS (See Dispersion Modelling). The meteorological dataset incorporated data from the CNL on-site station. Note that Appendix 5.2-2 no longer exists within the revised EIS and has been replaced by the Air Quality Technical Supporting Document [1]. Information on the meteorology is presented in Section 2 (Meteorology Assessment) of the Air Quality Assessment Technical Support Document [1]. Reference [1] Air Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-008, Rev 0, 2019 Nov	
CNSC	FC-46	CNSC-208	Table 5.2.1-5	Table 5.2.1-5 summarizes the 2014 air emission totals for industries within 25 km of the local study area. The emissions (in tonnes) of SPM, PM_{10}, and $PM_{2.5}$ for the Canadian Nuclear Laboratories are not consistent with the values in table 2 of appendix 5.2-2 Air Quality Baseline Report. **Expectation to address comment:** The discrepancy between table 5.2.1-5 in the main EIS and table 2 of appendix 5.2-2 should be reconciled. Additionally, any calculations or estimations based on these values should be verified to ensure that the correct values were used.	The SPM, PM_{10}, and $PM_{2.5}$ emissions data provided in Table 2 of Appendix 5.2-2 were incorrect. The values were not relied on for any calculations or estimations therefore no verification is required. Table 5.2.1-5 of the revised EIS provides airborne emissions for industries within the 25 km local study area and now includes emissions data for 2017 and 2018 Note that Appendix 5.2-2 no longer exists within the revised EIS and has been replaced by the Air Quality Technical Supporting Document [1]. Table 3-2 of the Air Quality Assessment Technical Support Document provides the baseline emissions data for 2017 and 2018 and is consistent with Table 5.2.1-5 of the revised EIS. Reference [1] Air Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-008, Rev 0, 2019 Nov	Rejected with Follow-Up IR CNSC-2-05
ECCC	FC-47	ECCC-24	5.2.1.5.2, Table 5.2.1-8 (Atmospheric Environment)	It is discussed in the Atmospheric Environment section of the report that there will be a truck tire wash station for vehicles leaving the NSDF Project site. There was no discussion in the Surface Water environment section (i.e.,	The vehicle decontamination facility is discussed in Section 3.4.3.4 of the revised EIS. Contaminated water from the facility is transferred by the active drainage system to the WWTP for processing. Appendix 1, Section 2.1 of the Design Description [1] provides more detail on design parameters for NSDF Design Element interfaces. This includes:	Accepted

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				section 5.4) as to how the effluent from the vehicle wash station would be managed. **Expectation to address comment:** Please provide a description of how the effluent from the truck tire wash station will be managed. There should be a discussion on how the effluent would be collected and whether it would be treated prior to its discharge into the receiving environment.	• Influent leachate/contact water, and equipment and vehicle decontamination wastewater and personnel decontamination water, are to be pumped from Pump Stations #1 and # 2, respectively, to the equalization tanks in double-wall HDPE containment force main pipes consisting of butt welded piping and equipped with leak detection devices; • Influent equipment and vehicle decontamination wastewater, personnel decontamination water, and leachate/contact water are to be conveyed from the equalization tanks to the WWTP in a double-containment pipe. Reference [1] Design Description, 232-503212-DD-001, Revision 1, 2019 May.	
CNSC	FC-48	CNSC-59 CNSC-211	5.2.1.6.2 Application Case Results	Significance was determined for residual effects from the NSDF Project. For the Application Case – Construction Phase, the EIS states no emissions were predicted for Sulfur dioxide (SO_2), Vinyl chloride (C_2H_3Cl) and odour. However, the significance assessment provided in table 5.2.1-16 is not consistent with the emission data in table 5.2.1-9. • If there are no emissions predicted for mercury (Hg), lead (Pb), Hydrogen Sulfide (H_2S), C_2H_3Cl why the direction of the significance assessment was determined negative and not neutral? Table 5.2.1-15 states that Neutral = no change in concentrations of an indicator compound relative to the base case. • Emissions of SO2 are predicted for vehicle exhaust due to ECM construction. Therefore the text in this section should be corrected. • Similarly, if there are no emissions of Hg during the construction period why was any further assessment carried out? Shouldn't the other assessment criteria have been identified as N/A? **Expectation to address comment:** CNSC staff request clarification regarding the significance	Hg and Pb emissions occur as trace elements from the combustion of diesel fuel during the Application Case – Construction Phase, and are likely emitted at very low levels. The direction of the significance assessment was therefore determined to be negative. Emission factors for Hg and Pb are not available and therefore a quantitative emissions assessment was not completed. The significance assessment for Hg and Pb has been completed for all of the evaluation criteria and is provided in Table 5.2.1-16. Sulfur dioxide emissions are predicted for the construction phase (Table 5.2.1-9). The direction of the significance assessment in Table 5.2.1-16 has been corrected and is 'negative'. There are no sources of Hydrogen Sulfide (H_2S) or C_2H_3Cl emissions during the construction phase and therefore no emissions of these compounds (Table 5.2.1-9). The direction of the significance assessment has been revised to 'neutral' (see Table 5.2.1-16 of the revised EIS).	Accepted

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				determination for SO2, Hg, Pb, H2S, C2H3Cl as outlined by the questions above.		
CNSC	FC-49	CNSC-212	5.2.2.3.2 Temporal Boundaries	The greenhouse gas (GHG) emissions from operations include the first year after closure which was identified to be the year when emissions from the decomposition of the waste are expected to be at their highest. How was it determined that the period of decomposition would not extend beyond the first year of closure and last several years? Was there any conservatism built into the assessment regarding the timeframe for the decomposition of waste and GHG emission generation? **Expectation to address comment:** Justification should be provided regarding how it was determined that the first year after closure would be the year in which the emissions from the decomposition of waste within the ECM are expected to be at their highest. An explanation should be provided for why it was determined that this would not extend over a longer time frame and therefore why a GHG assessment was not performed for the closure phase of the project.	As outlined in Section 5.2.2.5.2 of the revised EIS, the GHG emissions were estimated using information of provided in Section 2.1 of the Landfill Gas Management Plan [1]. Modelling simulations were completed, as per the Radon and Landfill Gas Modelling and Evaluation [2] for estimating the quality and quantity of landfill gases (LFG) projected to be generated from nonradioactive waste in the ECM during and following completion of waste disposal operations. Modelling was performed using the U.S Environmental Protection Agency's (USEPA's) Landfill Gas Emissions Model (LandGEM) ® (see Appendix B of [1]). Appendix A of the Radon and Other Landfill Gas Modelling and Evaluation report [2] describes the calculation methodology, inputs, and assumptions peak gas generation rates from the ECM. The LandGem® simulation results, presented in Appendix A, show the time dependence of LFG generation over the operational period and the post-closure institutional control period, which extends 300 years beyond closure of the ECM. Gas generation rates are shown at the time of closure of the ECM in year 51 when the gas generation rates are maximum. Thereafter, gas generation rates are shown at intervals of 50 years out to 300 years after closure. Gas generation increases as the ECM is filled with waste over its 50-year operational period. After closure of the ECM and construction of the final cover, gas generation decreases as there is reduced availability of moisture and oxygen in the waste. Therefore, GHG emission rates were not carried forward in the post-closure period. Section 5.2.2.3.2 of the revised EIS clarifies that the GHG emissions from operations include the first year after closure, which represents the year where emissions from the decomposition of the waste within the ECM are expected to be at their highest. Note that Appendix 5.2-3 no longer exists and has been replaced by the Air Quality Technical Supporting Document [3]. Section 4.1.3 of the TSD also contains the same text as section 5.2.2.3.2 of the revised EIS. References [1] Landfill Gas Management Plan, 232-508600-PLA-003, Revision 1, 2018 August. [2] Radon and Other Landfill Gas Modelling and Evaluation, 232-503212-TN-001, Revision 1, 2018 October. [3] Air Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-008, Revision 0, November 2019.	Accepted

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CNSC	FC-50	CNSC-79	5.2.2.5.2 (Table 5.2.2-5)	Please ensure that a copy of the "Landfill Gas Monitoring Program" developed for the NSDF Project is submitted as part of the final EIS document.	The 'Landfill Gas Monitoring Program' document has been renamed 'The Landfill Gas Management Plan' [1]. The document has been included in the EIS Submission Package. Reference: [1] Landfill Gas Management Plan, 232-508600-PLA-003, Revision 1, 2018 August.	Accepted
ECCC	FC-51	ECCC-115	5.21.4.1 – Atmospheric Environment	Canadian Ambient Air Quality Standards for Sulphur Dioxide have been recently released and come into effect in 2020. The new limits should be incorporated into the air quality assessment table 5.2.1-4 as they are lower than the *National Ambient Air Quality Objectives* and *Ontario Ambient Air Quality Guidelines* used in the draft EIS. For additional information on the new SO2 standards, visit: http://www.ccme.ca/en/resources/air/air/sulphur-dioxide.html	Table 5.2.1-4 has been revised to incorporate the new Canadian Ambient Air Quality Standards (CAAQS) for Sulphur Dioxide (SO2) that will take effect in 2020.	Accepted
ECCC	FC-52	ECCC-39	5.3	Several monitoring and mitigation plans are mentioned in the EIS but have not been provided. • Blasting Plan (section 5.3.1.5.2.2 and page 35 and section 5.5.5.4) • Surface Water Management Plan (section 5.3.1.5.2.2 and page 35, section 5.5.5.4) • Long-term Monitoring Program of Groundwater (table 5.3.2-1 on Page 38) • Leachate Sampling and Analysis Plan (section 5.3.2.8 on page 53 and 56) • Groundwater Detection Monitoring Program (section 5.3.2.8 on page 53) • Groundwater Operational Control Monitoring Program (section 5.3.2.8 on page 53)	A Blasting Plan will be prepared before start of construction by the Construction Contractor. CNL has also prepared an Invasive Species Management Plan [1]. The Surface Water Management Plan [2] and the Monitoring and Reporting Plan [3] (which provides the leachate sampling and analysis plan) have been included with the submission of the revised EIS. Groundwater Monitoring to verify predictions of impacts on groundwater will be documented in the Environmental Assessment Follow-up Program currently under development. A copy of the most recent CRL Annual Groundwater Monitoring report has been included in the EIS Submission to provide ECCC with an overview of the existing CRL groundwater monitoring program [4]. Each of the discipline-specific assessments presented in Sections 5.2 through 5.10 of the revised EIS proposes conceptual monitoring to be undertaken by CNL during construction, operations, closure and post-closure phases (i.e. the institutional control period) of the NSDF Project. Table 11.0-1 summarizes the conceptual monitoring program for the EA Follow-Up program for the NSDF Project. The information provided within the EIS are in alignment with the requirements in the Generic Guidelines for the Preparation of an EIS.	Rejected with Follow-Up IR ECCC-2-01, ECCC-2-02, ECCC-2-03, ECCC-2-04

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				Expectation to address comment: Provide all plans referenced in the EIS including but not limited to the ones listed above.	An EA Follow-Up Monitoring program is under development for the NSDF Project. The conceptual monitoring program will be developed into detailed monitoring and follow-up programs as the project progresses through the environmental assessment process, which may influence the nature, frequency and locations of monitoring. The EA Follow-up Monitoring program will include sufficient information on the type, quantity and quality of information required to reliably verify predicted effects and confirm the effectiveness of mitigation. The EA Follow-up Monitoring Program will be prepared consistent with the Canadian Standards Association's Standards N288.4-10 (Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills [CSA Group 2010]), N288.5-11 (Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills [CSA Group 2011]) and N288.7-15 (Groundwater Protection Programs At Class I Nuclear Facilities and Uranium Mines and Mills [CSA Group 2015), as applicable. CNSC, as the regulatory authority for the project, will coordinate the review of the follow-up monitoring program with Environment Canada and other interested Federal and Provincial agencies. Input from the public and Indigenous people will also be considered. References [1] Invasive Species Management Plan, 232-03710 -PLA-001, Revision 0, 2018 March [2] Surface Water Management Plan, 232-508600-PLA-002, Revision 1, 2019 February. [3] Monitoring and Reporting Plan, 232-508220-PLA-002, Revision 0, 2017 May. [4] CRL Groundwater Monitoring Program Annual Report for 2017, CRL-509249-ASR-2017, Revision 0, 2019 January 29.	
HC	FC-53	HC-2	5.3	According to section 5.3 on Geology, there is a bedrock ridge on the northern area of the NSDF, separating it from the Ottawa River. It is unclear whether blasting will be required during project construction Blasting may have impacts on nearby human receptors. **Expectation to address comment:** Please include an evaluation of noise from all project-related activities at the nearest locations where people are expected to be present.	The evaluation of noise from all project-related activities on human receptors is provided in Section 5.10.5 of the revised EIS. Blasting will be required for excavation of bedrock during the construction phase. Section 5.10.5 includes a qualitative evaluation of noise from blasting activities and a quantitative evaluation of noise from construction traffic. With regards to blasting. The nearest resident is 3 km from the NSDF site. Given the 3 km distance from the site, noise and vibrations from blasting activities are not expected to be noticeable to these residents. CNL also notes that the MOECC typically screens out noise assessments for facilities where receptors are greater than 1 km away. A noise impact study was completed to evaluate the effects of noise generated by construction traffic on residents residing along the transport route [1]. The increased level of	Accepted

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					traffic is not expected to significantly impact noise levels. Details are provided in Section 5.10.5.2.2. Reference [1] NSDF Project Construction-Related Road Traffic on Human Receptors, 232-03701-REPT-002, Revision 0, 2018 February.	
CNSC	FC-54	CNSC-52	5.3.1.4.2.2 Local and NSDF Project Site Geological Conditions	The results provided in the assessment of geology include a description of bedrock geology and stratigraphy of the LSA. Within these categories there is information on the rock type, bedrock topography, and hydraulic properties of the rock and sediments. Most of this information was collected from existing references as opposed to new characterization. However, no baseline information or discussion is given to the geotechnical aspects of the geologic units, sediments, or the regional existing seismic background. Also there appears to be little mention of erosion in the SSA and the risks or mitigation approaches needed to counteract this. Furthermore, the creation of cross sections for both bedrock geology and stratigraphy would be a useful addition to the baseline characterization of the LSA. There is also no discussion of background soil quality despite its mention as a measurement indicator. **Expectation to address comment:** CNL should provide a more complete assessment of regional geology.	Additional information on the regional geology, site characterization (i.e., hydraulic properties, stratigraphy, groundwater levels, seismic potential, soil/groundwater quality) and erosion potential is provided in the following EIS sections: • A summary of sub-surface investigations conducted at the NSDF Site and supporting documentation is provided in Section 5.3.1.4.1. • Stratigraphic cross-sections and updated maps showing the thickness of stratigraphic units are provided in Section 5.3.1.4.2.4. • A summary of hydraulic conductivity estimates for stratigraphic units from historical testing at the CRL site and recent testing in the NSDF site is provided in Section 5.3.2.4.2 of the EIS and Table 2.1 of the Technical Supporting Document 'Groundwater Flow Modelling of the Near Surface Disposal Facility [1]. • Continuous measurements of groundwater table elevations have been collected at approximately 30 monitoring wells installed at the NSDF site. Hydrographs for the monitoring well locations are provided in Appendix 5.3-1 of the EIS. An updated analysis of variability in groundwater table at the NSDF site is provided in Section 5.3.2.4.2.1 of the EIS. • Regional bedrock geology is described in Section 2.2 of [1] and 5.3.1.4.2.4 of the EIS. • A site specific Probabilistic Seismic Hazard Analysis [2] was completed for the NSDF site to determine design ground motions for the NSDF. Section 5.3.1.4.2.3 of the EIS has been updated. The design of the NSDF has been modified to limit the potential for liquefaction from a seismic event (Section 10.3). • Baseline soil quality for radiological contaminants and metals at the NSDF site are summarized in Section 5.3.1.4.2.4 of the EIS. Baseline radioactivity concentrations in soil in the East Swamp wetland adjacent to the NSDF site is provided in Section 5.7.4.7 of the EIS. • Groundwater quality at the NSDF site based on recent characterization is summarized in Section 5.3.2.4.2.2.	Accepted

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					• Erosion at the NSDF site is mitigated through surface water management, collection and conveyance and is described in Section 3.4.4.5. Surface water run-off is directed to three surface-water management which provide sediment control during construction, operations and post-closure periods. The final cover of the ECM is designed to limit water infiltration, to direct surface water away from the ECM and to resist degradation by surface geological processes (Section 3.4.1.9.3). Mitigation measures specific to erosion are described in Section 5.3.1.5.2.2 of the EIS. References [1] Groundwater Flow Modelling of the Near Surface Disposal Facility, 232-509249- REPT-001, Revision 5, 2019 July. [2] Probabilistic Seismic Hazard Analysis, 232-10170-REPT-001, Revision 1, 2018 December.	
CNSC	FC-55	CNSC-192	Figures 5.3.1-6 and 5.3.1-7, Stratigraphic Cross-Sections For The Near Surface Disposal Facility Project Site	The grey colored unit above the bedrock is not defined in the legend. **Expectation to address comment:** provide the grey colored unit in figures 5.3.1-6 and 5.3.1-7.	Figure 5.3.1-8 of the revised EIS documents that the grey unit in the figure is the upper 6 m of the bedrock unit.	Accepted
CNSC	FC-56	CNSC-53	5.3.2.2 Valued Components	Groundwater quality is not considered a VC for the hydrogeology assessment while groundwater quantity is. **Expectation to address comment:** CNL should explain why groundwater quality is only considered as an assessment endpoint and indictor as opposed to a VC.	Groundwater quality and quantity are both considered to be Valued Components (VC) for hydrogeology. Groundwater quality was included as a VC in Section 5.3.2.2 as part of the revised EIS Submission.	Accepted
CNSC	FC-57	CNSC-138	5.3.2.3.2	CNL indicates "….. *decommissioning of the wastewater treatment plant and all associated structures will be performed after the leachate quality and quantity has stabilized and no longer requires this facility"* In other sections, we can read that decommissioning of the WWTP and support	In the event that the WWTP was required beyond its design life, the unit would be refurbished to enable continued treatment of leachate or other treatment options investigated. The above text is now included in Section 5.3.2.5.2.2.	Accepted

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				facilities will be completed during Post-Closure phase (2070- 2100). CNL established that decommissioning of the WWTP will be performed after the leachate quality and quantity has stabilized and states that this should take place during the Post-Closure by 2100 (start of the ICP (Institutional Control period)). **Expectation to address comment** - Considering the fact that the WWTP has a given design life, CNL should expect and consider the case where the WWTP operation is needed for a longer period of time (beyond its design life), where leachate quality and quality hasn't not stabilized yet. In such case, can the WWTP still perform as required? CNL should consider such a condition and identify adequate arrangements and plans to address the issue accordingly.		
CNSC	FC-58	CNSC-203	5.3.2.4.2.1 Groundwater Flow	Hydrographs for all wells should be included in the EIS to allow the reader to visualize the temporal variability in water levels at the site. **Expectation to address comment:** An appendix containing hydrograph data for wells used in the hydrogeological characterization should be included in the EIS.	Hydrographs of the transducer data are included in Appendix 5.3-1.	Accepted
CNSC	FC-59	CNSC-105 CNSC-204	5.3.2.4.2.2 Groundwater Quality	Groundwater quality results have not been reported for overburden aquifers. **Expectation to address comment:** Groundwater quality data for major ions, metals and radionuclides should be reported for wells screened in the overburden.	The EIS has been updated to include additional groundwater quality data major ions, metals and radionuclides in overburden. The data is provided in Section 5.3.2.4.2.2. The data includes: • Addition of major ion, metals and radionuclide (gross beta, gross alpha and tritium) data for long term monitoring at wells representative of conditions at the NSDF Site. • Groundwater quality data collected from 21 wells in and adjacent to the NSDF Site. The wells were sampled in fall of 2017. • Addition of maps showing the spatial extent of gross beta plumes emanating legacy waste management areas located northwest of the NSDF site; the Reactor Pit 2 plume shown in Figure 5.3.2-5 and the Chemical Pit plume shown in Figure 5.3.2-4.	Accepted

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					Overburden groundwater chemistry is characterized as dilute calcium-magnesium bicarbonate-sulphate, although most of the wells located downgradient (west) of the East Mattawa Road also feature low levels of road salt contamination. Nitrate concentrations are generally less than 1 mg/L, with one sample containing 1.5 mg/L, and one trace detection of nitrite. Phosphate and total phosphorus were not detected in any of the samples. Radiological analysis of groundwater from the NSDF site did not encounter elevated concentrations of tritium, alpha or beta emitting radionuclides or gamma emitters.	
CNSC	FC-60	CNSC-139	5.3.2.5.2.1	CNL mentioned that "*The ECM will be comprised of four waste cells*" **Expectation to address comment:** CNL is expected to provide the exact number of cells based on the 90/100 % design in the final EIS document.	The ECM will consist of ten disposal cells, each designed for progressive construction, filling, and closure in sequence. The total area of the ECM is approximately 120,000 m^2. The average cell area is approximately 12,000 m^2. Section 3.4.1 provides and overview of the ECM design. The cell layout is provided in Figure 3.4.1-3.	Accepted
ECCC	FC-61	ECCC-41	5.3.2.6.1.1	Appendix 5.3-1 (Golder 2016b) was not provided with the Draft EIS. The information contained in the appendix describes the conceptual model development, modelling approach, model extent and discretization, boundary conditions, hydrostratigraphy and parameterization and model calibration. **Expectation to address comment:** Provide a copy of appendix 5.3-1 with the Final EIS.	Appendix 5.3-1 of the revised EIS contains the groundwater level hydrographs. The report 'Groundwater Flow Modelling of the Near Surface Disposal Facility' [1] (which supersedes the former Appendix 5.3-1) has been updated to include additional site characterization data and modelling. This included but is not limited to: • Additional borehole and water level information to June 2018 • Model re-calibration to incorporate new data and additional calibration to reflect seasonal high water table conditions • Enhanced hydraulic conductivity from blasting incorporated into all models • Liquefaction mitigation incorporated into all models • Operations scenarios completed using average and high water table conditions • Additional sensitivity analysis (e.g. on evapotranspiration rates and rate of discharge to the exfiltration gallery) Reference [1] Groundwater Flow Modelling of the Near Surface Disposal Facility, 232-509249-REPT-001, Revision 5, 2019 July.	Accepted
CNSC	FC-62	CNSC-205	Table 5.3.2-6	The derivation of radioisotope concentrations in leachate is not explained and does not appear to be consistent with expectations for long-lived radioisotopes. It appears that the concentrations of long-lived isotopes in waste	As discussed in Section 3.4.2.2 of the revised EIS, the radiological and non-radiological constituents of potential concern (COPC) concentrations in leachate were calculated using a partitioning model that assumes that the ratio of the contaminant concentration in the waste to the contaminant concentration in the leachate is constant. Partitioning models are commonly used in radiological assessments to determine leaching characteristics of radionuclides and metals	Accepted

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				are dropping drastically in only ~300 years between the operations period and 2400. This decrease cannot be due to decay as many of these isotopes have half-lives orders of magnitude longer. **Expectation to address comment:** The method used to obtain leachate concentrations during operation and in 2400 should be clarified and the cause of the observed decrease should be explained.	in soil and soil-like wastes. The partitioning factors were taken from the CSA Standard N288.1-14 Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities [1]. These factors conservatively estimate the leachate characteristics with the intention to avoid underestimating release rates and leachate concentrations. Further details of the partition modeling can be found in Leachate and Wastewater Characterization (Quantity and Quality) [2]. CNL acknowledges there were errors in the data presented in Table 5.3.2-6 of the draft EIS. The EIS has been revised to address changes in the reference inventory (i.e., only LLW). As a result of these changes to the EIS, Table 5.3.2-6 is no longer included in the EIS. The Leachate and Wastewater Characterization (Quantity and Quality) has also been updated to remove errors with the data as well as reflect the revised inventory [2]. The input data to determine the leachate concentrations as a function of time comes from the reference inventory at emplacement (Table 3.3.1-2 of EIS). The leachate modeling does not decay correct the radioactivity in the waste nor leachate which leads to conservative concentrations. Reference [1] CSA N288.1-14: Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities. March 2014. [2] Leachate and Wastewater Characterization (Quantity and Quality) B1551-508600-REPT-001, Revision 3. 2019 May.	
CNSC	FC-63	CNSC-206	5.3.2.7 Prediction Confidence and Uncertainty	Sensitivity analysis results for the simulations should be presented or a reference where they may be found provided. Furthermore, it is not clear what criteria were used to determine model acceptability relative to the calibration data. **Expectation to address comment:** CNL should provide sensitivity analysis results and the criteria and results used to determine the model was acceptable.	Section 5.3.2.7 summarizes the sensitivity analysis in the revised EIS. The Groundwater Flow Modelling of the NSDF [1] has complete details of the model calibration and sensitivity analysis. Criteria to determine the acceptability of the calibrated model are documented in the Section 3.4 of the Groundwater Flow Modelling report [1] and include: • Acceptable calibration statistics (low nRMS error and residual mean error) • Visual comparison of groundwater flow directions based on model results and interpretation of head measurements • Reasonable match between simulated and measured basin flows at the East Swamp weir • Simulated net infiltration was reasonable compared to basin yields A reasonable match between adjective particle tracks released from Reactor Pit 2 and the trajectory of the tritium plume emanating from Reactor Pit 2 is observed. Reference	Accepted

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					[1] Groundwater Flow Modelling of the Near Surface Disposal Facility, 232-509249-REPT-001. Revision 5, 2019 July.	
CNSC	FC-64	CNSC-207	5.3.2.8 Monitoring and Follow-Up	It is stated in the EIS that preferential flow paths will be monitored. However, it is unclear if the influence of these flowpaths on radionuclide transport has been assessed. Preferential flow has been shown to enhance contaminant mobility in natural systems. Therefore, they represent an "end-member" scenario for contaminant transport and must be considered as part of the model sensitivity analysis. **Expectation to address comment:** Details on how preferential flow paths have been assessed with respect to contaminant transport at the NSDF site should be provided. In addition, details of the proposed monitoring of these preferential flow paths should be provided as well. The monitoring data obtained should be incorporated into the groundwater model.	CNL believes this is an issue with semantics. In this context the reviewer is referring to a pathway within one of the hydrogeological units that would act as a conduit. Golder made no attempt at delineating preferential pathways within each of the hydrogeological units (each unit was assumed to have uniform hydraulic properties). In this sense we will remove reference to the word "preferential" in this context in the EIS and will clarify that the downgradient flow paths from the NSDF will be monitored. Text in Section 5.3.2.8 has been updated to read: "A groundwater monitoring network will be developed including installation of groundwater monitoring wells to monitor hydraulic and chemical conditions in the area downgradient of key NSDF facility locations, in both vertical and horizontal orientations."	Accepted
CNSC	FC-65	CNSC-182	5.4.: Non-Radiological Effects Assessment on Water Quality	CNL provides water quality modeling results for cadmium (Cd), copper (Cu), iron (Fe), lead (Pb), zinc (Zn), mercury (Hg), aluminum (Al), barium (Ba), manganese (Mn) (tables 5.4.2-8 to 17) in East swamp, Perch Lake, Perch creek and Perch creek outlet during the first operational phase from 2020 to 2025 (Scenario 1), then later from 2065 to 70 (Scenario 2), after 2100 when the WWTP is decommissioned and the cover is fully functional (Scenario 3), and post-institutional control after 2400 when the cover fails (Scenario 4). In general, the EIS indicates some exceedances of benchmark values for Cd, Hg, Ba, Cu and Al depending on the scenarios. Regardless of the exceedances, CNL concludes that the Ottawa River is expected to adequately and rapidly assimilate any discharge	In the draft EIS the concentrations of non-radiological contaminants in leachate were derived from groundwater monitoring data collected at CNL legacy Waste Management Areas. However this approach has been revised to utilize existing provincial regulations and overall improve the connection between contaminants in the leachate to the Waste Acceptance Criteria. As noted in Section 3.3.3.3 of the revised EIS, waste that is placed in the ECM will meet the intent of land disposal and leachate requirements specified in Ontario's *Regulation 347, General – Waste Management*. This requirement effectively limits the chemical characteristics of the waste including the leachability of non-radiological constituents. As such the non-radiological reference inventory was revised to reflect this restriction [1]. As noted in the Non-Radiological Inventory of Constituents of Potential Concern (COPC) [1], for the purposes of determining a maximum non-radiological inventory, it is assumed that the maximum percentage of waste volume that will approach or be at the leachate toxic limit, is approximately 2.0% of the total waste. For the few COPCs which do not have Ontario Regulation 347 (O.Reg 347) limits, CCME guidelines were used to estimate the total mass of leachable COPC in the NSDF. This waste inventory was then utilized as an input to the leachate partitioning model in [2] thus the revised predictions of non-radiological constituents in leachate are directly linked to the WAC.	Accepted

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				from the Perch Lake Watershed. CNSC staff cannot adequately verify these predictions because the EIS does not provide the concentrations and leaching rates of non-radiological contaminants from the low and intermediate level waste. While CNL indicated that there is uncertainty in the inventory data for non-radionuclides, it concludes that the waste characterisation program will ensure that the inventory envelope is not exceeded. CNL also indicated the reference inventory is considered conservative, and therefore, leachate concentrations are expected to be lower. **Expectation to address comment:** Please explain how the predictions of Cd, Cu, Fe, Pb, Zn, Hg, Al, Ba, Mn in the leachate are related to the Waste Acceptance Criteria for these metals. Are the WAC for these metals based on a maximum, 95th percentile, or mean inventory level and what are the assumptions that are used to derive the leaching rates from the current understanding of the waste inventory? CNL should also provide examples of detailed calculations underlying their predicted non-radiological contaminant levels in the receiving environment for the Post-Closure scenarios (Scenarios 3 and 4).	The approach to the post-closure safety assessment has also been revised since the draft EIS. Specifically in relation to the non-radiological inventory since it is constrained by the O.Reg 347 limit, thus does not pose a hazard, these constituents were not considered to affect the post-closure safety of the NSDF and screened out of the analysis. Furthermore the PostSA has been revised into a well-structured, transparent and traceable approach including providing all input data and supporting calculations for the post-closure phase [3]. As discussed in Section 3.4.2.2 of the revised EIS, the radiological and non-radiological constituents of potential concern (COPC) concentrations in leachate were calculated using a partitioning model that assumes that the ratio of the contaminant concentration in the waste to the contaminant concentration in the leachate is constant. Partitioning models are commonly used in radiological assessments to determine leaching characteristics of radionuclides and metals in soil and soil-like wastes. The partitioning factors were taken from the CSA Standard N288.1-14 Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities [2]. These factors conservatively estimate the leachate characteristics with the intention to avoid underestimating release rates and leachate concentrations. Further details of the partition modeling can be found in Leachate and Wastewater Characterization (Quantity and Quality) [4]. Reference [1] Non-Radiological Inventory of Constituents of Potential Concern (COPC), 232-508600-TN-007, Revision 3, 2019 August. [2] CSA N288.1-14: Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities. March 2014. [3] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [4] Leachate and Wastewater Characterization (Quantity and Quality) B1551-508600-REPT-001, Revision 3. 2019 May.	
CNSC	FC-66	CNSC-227	5.4.1.3	This section indicates that the Ottawa River is not included in the RSA, however, figure. 5.9.3-1 demonstrates that the Ottawa River, close to the shore of the CRL property at the outlet of Perch creek, is included in the RSA. Please clarify, or correct in the EIS.	The Regional Study Areas (RSA) for hydrology and surface water quality, were expanded to include a reach of the Ottawa River extending 8 km downstream of CRL. The text in 5.4.1.3.1 and Figure 5.4.1-1 have been updated to reflect this.	Accepted
ECCC	FC-67	ECCC-44	5.4.1.5.2.2., 5.4.2.5.2.2	Clarification is required on this statement: "*Treated effluent is to be discharged at a rate of 11.36 m^3/hr as surface flow into the*	The effluent discharge strategy has been revised. Treated effluent will be primarily directed to the exfiltration gallery. The revised design provides provision for discharge of treated effluent to Perch Lake via a transfer line under high water table conditions when the exfiltration gallery	Accepted

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				wetlands with ultimate discharge to Perch Creek". There is also no discussion about the potential impact of the discharge on the flow rate of the receiving wetlands, and whether any measures would be put into place to prevent the possible erosion and scouring of the wetlands. **Expectation to address comment:** As details of the project are further developed, provide information on how the rate of discharge of the treated effluent onto the wetland would be managed, and what measures would be put in place to prevent erosion and scouring to the receiving wetlands.	has reduced capacity. Details on the exfiltration gallery are found in Section 3.4.2.6.1 and in the Design Description [1]. The two treated effluent discharge pumps are rated for a maximum potential discharge of 11.25 m^3/hr each. The exfiltration gallery is below grade The design includes measures to minimize erosion and scouring (e.g. baffles). The potential for overland flow and associated erosion and scouring of the receiving wetlands is eliminated by discharge of water to Perch Lake under high water table conditions. Though the area is called the East Swamp Wetland, it is mainly a low lying forested area and provides limited fish habitat (Section 5.5.4.2.1). The potential for exfiltration gallery discharges to affect water levels in East Swamp wetland and potential fish habitat has been assessed. The annual treated effluent discharge volume is a small percentage of the water-balance of the East Swamp Wetland (Section 5.4.1.5.2.2). Groundwater flow modeling indicates that impact of the effluent discharges on water-levels will be localized to the vicinity of the exfiltration gallery. Details on Groundwater flow modelling are provided in Section 5.3.2.6 of the EIS and the Technical Supporting Document Groundwater Flow Modelling of the Near Surface Disposal Facility [2]. References [1] Design Description. 232-503212-DD-001. Revision 1. 2019 May. [2] Groundwater Flow Modelling of the Near Surface Disposal Facility. 232-509249-REPT-001, Revision 5. 2019 July.	
ECCC	FC-68	ECCC-45	5.4.1.5.2.2., 5.4.2.5.2.2	The report states, "*The maximum average annual wastewater volume is expected to be produced during the operating scenario where engineered containment mound cells 1 through 3 are filled and closed, and Cell 4 is active. Under this operating scenario, the total average annual volume of contact surface water to be treated is 10,730 m^3*." There is no discussion on how this volume is derived or reference provided for more information. In addition, there is no justification as to why this particular operating scenario would produce the largest amount of contact surface water, compared to the volumes that other operating scenarios would produce. **Expectation to address comment:** Explain how the total average annual volume of contact	Section 3.4.2.1 of the revised EIS provides a summary of the analysis of wastewater volumes generated, a brief description of the Hydrologic Evaluation of Landfill Performance used for the analysis, and justification for the scenarios producing maximum volumes. Wastewater volumes in the revised EIS have been updated and are provided for the 100% design in Table 3.4.2-1. Details on the analysis are provided in the report *Leachate and Wastewater Characterization (Quantity and Quality)* [1]. Wastewater requiring treatment comes from three general sources at the NSDF Project: 1) leachate, 2) contact water and 3) wastewater from ongoing operations at the WWTP, vehicle decontamination facility (see Section 3.4.3.4) and operations support centre facilities (see Section 3.4.3.3). With regards to calculation of leachate quantities and contact surface water. Leachate quantities are estimated based on a water balance calculation conducted with the Hydrologic Evaluation of Landfill Performance (HELP) model. The model estimates the amount of infiltrating water from precipitation at the site. The HELP model uses information on soil characteristics, precipitation, temperature and humidity, as well as cover design information such as layer characteristics, site area, slopes, and slope lengths. The result of the HELP model is a partitioning of precipitation into infiltration, runoff, and evaporation. The quantity of water that infiltrates into the waste is	Rejected with Follow-Up IR ECCC-2-05, ECCC-2-06

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				surface water to be treated was derived. In addition, provide a justification as to why the operating scenario above would produce the largest amount of contact surface water.	considered to become leachate and is eventually collected in the leachate collection system. Run-off is considered contact water. Regarding scenario's generating the maximum volume of wastewater. Essentially all the waste water, ~98%, is generated from open cell. A small volume of residual wastewater is generated from closed cells (~0.1%). Maximum waste volume results is for 9 closed cells and one active cell. Surface water quality modelling of discharge of treated wastewater to the Perch Lake Watershed is described in Section 5.4.2.6.1. The volume of water discharged for surface water modelling conservatively includes waste water volumes from normal operating conditions and waste water generated by a back to back 100-year freshet storm (see Section 5.4.2.6.1.2). Reference [1] Leachate and Wastewater Characterization (Quantity and Quality) B1551-508600-REPT-001, Revision 3, 2019 May.	
CNSC	FC-69	CNSC-113	5.4.1.6.2 Application Case Results	Selection of design storm duration needs to take into account the drainage basin size. The design storm duration of 24 hrs appears too long for such a small drainage basin. In addition, details of the design storms and modeling process are not provided for review. **Expectation to address comment:** Proponent needs to provide justification of the selection of design storm duration. Modeling details should be provided for review, which hopefully would help explain, e.g., why the 4 hr 1:100 Year Storm Event produces a smaller peak runoff rate than the 24 hr 1:100 Year Storm Event in table 5.4.1-9.	Section 5.4.1.4.2.4 of the revised EIS provides a summary of storm water design and analysis. Further information on modelling details and design storm duration are found in the Surface Water Modeling and Evaluation [1] and Surface Water Management Plan [2]. With regard to justification for selection of design storm duration the following information is provided. For stormwater analyses, 6 hr and 12 hr SCS type II storms were used, which were found to produce higher peak flows than the 24 hr distribution. Conservative estimates of runoff assumed the 100-year Return Period Rainfall as a worst-case condition with the Phase 1 Operations period (the first 20 to 25 years). The most critical runoff condition is when the Phase 2 area is being prepared for future use, and is lined to mitigate geotechnical and hydrogeological conditions during Phase 1 operation. The contact or wastewater runoff volumes were developed from the extreme precipitation event in order to determine the storage capacity provided by three equalization tanks at the WWTP. The non-contact runoff peak flows were identified so that the storage capacity of surface water management ponds within the NSDF could be determined so that post development flows from the site could be reduced to pre-development levels. The 24 hour duration storm event was selected as the design criteria for contact runoff based on the greater volume of runoff that is produced during this longer duration storm event. The design flows for the non-contact surface water SWM Ponds were based on peak flows generated by the 6/12 hour storms. These were later re-formulated and presented as total flows	Accepted

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					leaving the site. Both the SCS 6 and 12 Hour rainfall distributions produced similar results as the highest peak flows for all SCS rainfall durations. A summary of the analysis plan process is as follows: • Confirm requirement for the surface water management system for construction, operation, and expansion phases; • Identify the applicable design criteria for rainfall events at the Chalk River facility, in particular the rainfall distributions; • Assess the requirement to consider PMP event and identify any additional criteria, such as duration and distribution, which may be required to model this design event. Otherwise use industry best practice methods for modelling and will apply results to the site for the PMP event; • Delineate the proposed site and establish routing systems required to safely route drainage to designated site outlets, including consideration of flows resulting from the PMP and as a result of climate change; • Determine the maximum expected runoff condition throughout the operational phases, as the equalization tanks sizing will need to accommodate the expected flows; • Establish the peak flows (2-, 5-, 10-, 25-, 50-, 100-year; Regulatory; PMP) for conveyance systems, and design the systems using hydrologic models to achieve the targeted capacity; • Consider snowmelt and climate change in the development of design flows; • Ensure the surface water management system takes into consideration any future expansion plans on the NSDF by CNL; and • Determine the method for segregating contact and non-contact water within the ECM during the operation phase and establish discharge pumping rates required to drain runoff collected within the ECM in the event of back-to-back 100 year storms. In response the question about why a 4 hr 1:100 year storm event produces a smaller peak runoff than the 24 hr 1:100 year storm event: The runoff volume (cubic meters) is relative to the depth of rainfall produced from the storm event. The peak flow (cubic meters per second) is based on the volume and the rainfall distribution. The 24 hour event used the SCS distribution while the 4hr event used the Chicago distribution. Based on the largely rural characteristics of the site, both the Chicago and SCS rainfall distributions would produce similar peak flows. In an urban environment, the Chicago rainfall distribution typically produces higher peak flows. The Intensity-duration-frequency (IDF) table from the Town of Arnprior was used in the NSDF design criteria. This IDF table indicates that the total rainfall depth for a 4hr 1:100 year storm event would be approximately 80 mm, as compared to the 24hr 1:100 year storm event depth of 116.5 mm. The resulting runoff volume (cubic meters) from the 24hr 1:100 year storm	

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					event will be greater due to the larger depth of precipitation associated with this duration storm event. References [1] Surface Water Modeling and Evaluation, B1551-503212-TN-001, Revision 1, 2019 January. [2] Surface Water Management Plan, 232-508600-PLA-002, Revision 1, 2019 February.	
ECCC	FC-70	ECCC-43	Table 5.4.1-7, 5.4.1.5.2.2, (Section 5.4 Surface Water); 5.5.4.3 (Section 5.5 Aquatic Environment)	It is stated in the report, “Final treated effluent will be stored in tanks so that effluent is **discharged to the wetland in a controlled manner that will prevent erosion and scouring**” and “Any changes to downstream discharge, water levels and channel/bank stability resulting from operational discharges of water from the WWTP will be **localized to the wetland**”. If fish are present in the receiving wetlands, then these wetlands could be considered “water frequented by fish” under the *Fisheries Act*. In this case, ss *substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.*” During the teleconference call on February 15, 2017 with the proponent, it was clarified that there would be an “infiltration pit” excavated which would contain boulders and would contain the treated effluent which would be absorbed into the surrounding soil. It was mentioned during the call that the banks of the infiltration pit may overflow due to high precipitation and water would flow over the adjacent ground surface. **Expectation to address comment:** Provide clarification regarding the potential that the overland flow of treated effluent may reach the East Swamp Creek and the adjacent wetland.	CNL has revised the effluent discharge strategy to eliminate the potential for overland flow in the East Swamp wetland. The revised effluent discharge strategy includes provision for routing treated effluent discharge to Perch Lake (Section 3.4.2.6). This provides operational controls to eliminate the potential for overland flow in the East Swamp wetland. If required, all treated effluent could be routed to Perch Lake. The groundwater flow modelling of treated effluent discharge to the exfiltration gallery is provided in Section 5.3.2.6.1.2 of the EIS. For the scenario evaluated (50% of the effluent discharge released to the exfiltration gallery over a four month period), a localized increase in water table elevation of 1 m is predicted. Model predictions do not show impacts on watertable elevations over the larger reach of the East Swamp wetland. CNL has conducted fish surveys to evaluate potential for fish habitat in the East Swamp wetland. East Swamp Stream, a small stream which drains the East Swamp wetland, along with other surface water bodies in the Perch Lake basin were surveyed for fish habitat in 2017 [1]. East swamp stream provides fish habitat for a variety of fish species described in Section 5.5.4.2.2 of the revised EIS and [1]. References [1] Ichthyfauna Survey Data for Perch Lake, Toussaint Lake, Main Stream, and East Swamp Stream. Canadian Nuclear Laboratories ENVP-509200-021-000, Revision 1, 2017 November 16. Reference Update: The CRL Environmental Risk Assessment was updated in 2019 and can be found on the CNL website: https://www.cnl.ca/site/media/Parent/Env_Risk_Assessment_2019_Full_REV_0.pdf	Accepted

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				Additional sampling should be conducted to confirm if fish are present in the East Swamp creek and wetland adjacent to the NSDF.		
CNSC	FC-71	CNSC-111	5.4.2.4 Description of the Environment	Physical characteristics of Perch Lake, such as the wetted area and water volume, were from an old report (Robertson and Barry 1985). There have been likely changes in the physical characteristics of Perch lake over the past 30 years. These data are essential to the effect assessment. **Expectation to address comment:** More recent data should be used.	A bathymetry survey of Perch Lake has been completed and is documented in [1]. A summary of the survey results and physical characterization of Perch Lake is provided in Section 5.4.2.4.2 of the revised EIS. The survey has confirmed that there have been no substantial changes to physical characteristics of Perch Lake over the past 30 years. The commitment to conduct a bathymetric survey is no longer included in the Summary of Monitoring and Follow-up Programs section (now Section 11) as the survey has been completed. Reference [1] Physical Characterization of Perch Lake, 232-509213-REPT-002, Revision 0, 2018 July.	Accepted
ECCC	FC-72	ECCC-53	Table 5.4.2-4, Table 5.4.2-14	It is stated, "*The effluent requirement for treated wastewater is the CRL Acceptability Criteria for Routine and Non-Routine Discharge of Liquids to Stormwaters*". These criteria were not provided for review in Group 3 documents. In order to assess whether these criteria are protective of the receiving aquatic environment, a review is necessary. **Expectation to address comment:** Provide the CRL Acceptability Criteria for Routine and Non-Routine Discharge of Liquids to Stormwaters with the submission of the final EA report.	The Effluent Discharge Targets have been revised and are no longer based on the document '*CRL Acceptability Criteria for Routine and Non-Routine Discharge of Liquids*'. treatment The basis for the proposed effluent discharge target is described in EIS Section 3.4.2.5.1. The WWTP effluent discharge targets for radionuclides are the maximum acceptable concentrations for drinking water and are derived using Health Canada Guidelines for Canadian Drinking Water Quality. The use of drinking water concentrations for radionuclides is considered conservative as there is no public access to the Perch Creek and Perch Lake watershed where WWTP effluent discharges will occur. The method for calculation of the maximum acceptable concentrations is provided in Health Canada Guidelines for Canadian Drinking Water Quality. A special adjustment for the discharge target for tritium was made due to the lack of treatment technologies and its propensity to disperse rapidly in the environment. The discharge target for tritium of 360,000 Bq/L is based on maintaining tritium concentrations in Perch Creek which discharges to the Ottawa River, below the drinking water guideline of 7,000 Bq/L. The effluent discharge targets for non-radioactive constituents are based on the protection of aquatic life and may be lower or higher than drinking water criteria. The effluent discharge targets are gathered from a variety of sources Including the Canadian Council of Ministers of the Environment (CCME) and Ontario Provincial Water Quality Objectives (PWQOs). If both federal and provincial criteria were available, the lower value was used to define the discharge target. The CCME guideline values are for the	Accepted

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					protection of aquatic life; the PWQOs were developed to ensure that water quality is satisfactory for aquatic life and recreation. Other reference documents were used when CCME or PWQOs were not available. The proposed NSDF Effluent Discharge targets [1] no longer credit any dilution, with the exception of tritium. As well, the effluent strategy has been revised; treated effluent will be directed to the Exfiltration Gallery and to Perch Lake. This strategy will eliminate any potential for overland flow through East Swamp wetland from the Exfiltration Gallery. Section 5.4.2.6.1.2 (Model Scenarios), describes the two discharge scenarios used in the surface water quality modelling assessment. These are Scenario 1)50% discharge to Exfiltration Gallery and 50% discharge to Perch Lake and, Scenario 2) 0% discharge to Exfiltration Gallery and 100% discharge to Perch Lake. The exfiltration gallery has been designed to operate round the year. Winter conditions have been accounted for by doubling the calculated required design area of the gallery in line with the MOE 2003 Guidelines for Stormwater Management and Design. The design is being updated to reflect latest percolation test data obtained at the proposed gallery location. The design update will include frost protection to the system. CNL has assessed the East Swamp Wetland and it is a forested area and is not considered fish habitat. East Swamp Stream does provide fish habitat for a small number of species such as minnows. Reference [1] NSDF Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	
ECCC	FC-73	ECCC-52	5.4.2.4.2	The report states, "*In 2015, the benchmark values for pH, copper, aluminum and iron were exceeded in several instances in the Perch Creek Basin. In most cases however, these elements are present at concentrations similar to those seen at reference (i.e., unaffected) monitoring locations in the Perch Creek Basin.*" The reference (i.e., unaffected) locations described are No Name Lake and Perch Lake Inlet 4. No monitoring information is provided for the No Name Lake location, nor is a report cited for this data. Additionally, no justification is provided as to why No Name Lake and Perch Lake Inlet 4 were	CNL notes that the comments date back to the 2016 version of the EIS report. The tables referenced in these comments have been removed. No Name lake was incorrectly listed as a monitoring station and has been removed. Water quality data for Perch Lake Inlet #4 is used to estimate water quality in Perch Lake (see EIS Section 5.4.2.6.1.3).	Accepted

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				considered suitable reference locations. This is important since the reference locations could be affected by historic CRL operations. For example, the Perch Lake Inlet 4 monitoring location is connected to Perch Lake, which is known to have been impacted by the upstream Liquid Dispersal Area and discharges from some WMAs. **Expectation to address comment:** Provide the surface water monitoring information and sampling location for the No Name Lake reference site. Also, provide a justification for the selection of the No Name Lake and Perch Lake Inlet 4 as reference (i.e., unaffected) locations.		
ECCC	FC-74	ECCC-48	5.4.2.5.2.2 (5.4. Surface Water), Section 5.7.6.1.1.2 (5.7 Ambient Radioactivity and Ecological Health)	In section 5.4 (Surface Water), the report states that treated effluent would be discharged as surface flow into the wetlands with ultimate discharge to Perch Creek. In section 5.7 (Ambient Radioactivity), the report states that treated effluent would be discharged from the WWTP to an infiltration area (for discharge to groundwater) ultimately leading to the East Swamp wetland. These two statements seem to contradict each other. Clarification is required on how the treated effluent would be managed and discharged into the receiving environment. There is also no information on the location and size of the infiltration area described in section 5.7. **Expectation to address comment:** As details of the project are further developed, provide a clear discussion of the treated effluent discharge pathway to assess potential impacts to downstream surface water bodies. Some details that should be provided include: • Location of the WWTP discharge point into the infiltration area	Details regarding the design of the Exfiltration Gallery are provided in Section 3.4.2.6.1. The section includes updated information including revised WWTP discharge rates and quality and East Swamp flow rate conditions. Further information on the design of the Exfiltration Gallery can be found in Section 2.3.4.2 of the Design Description [1]. The groundwater flow modelling of treated effluent discharge to the exfiltration gallery is provided in Section 5.3.2.6.1.2 of the EIS. The groundwater flow path from the exfiltration gallery is shown in Figure 5.3.2-7 of the EIS and is to the west towards the East Swamp wetland. Groundwater discharge is to the East Swamp wetland and East Swamp Stream. For the scenario evaluated (50% of the effluent discharge released to the exfiltration gallery over a four month period), a localized increase in water table elevation of 1 m is predicted. Section 5.4.2.8 (Monitoring and Follow-Up) provides clarification that monitoring associated with the NSDF Project will include non-radiological and radiological parameters (consistent with the COPCs used in the surface water quality assessment). Reference [1] Design Description 232-503212-DD-001, Revision 1, 2019 May.	Accepted

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				- Location and size of the infiltration area - If discharging to an infiltration area, the expected groundwater path that the treated effluent would take to reach the wetlands, and potential points of discharge at the wetlands - Information on monitoring programs to measure the quality of the treated effluent being released.		
ECCC	FC-75	ECCC-57	Table 5.4.2-5	For table 5.4.2-5 - Surface Water Parameters of Concern, some of the benchmarks depend on physical parameters such as water hardness and pH. For example, the aluminum benchmark depends on pH, and the copper benchmark depends on water hardness. It would therefore be beneficial to examine these supporting water quality parameters in the surface water quality model along with the chemical parameters. Some physical parameters that would be helpful include: total dissolved solids, pH, and water hardness ($CaCO_3$). **Expectation to address comment:** Consider examining physical parameters in the surface water quality model as there are benchmark values for certain chemical parameters which are dependent on these, or provide a justification as why these will not be considered.	The list of COPCs included in the surface water quality modelling was increased in the revised EIS; the list of COPCs are summarized in Table 5.4.2-5. The screening criteria for non-radiological COPCs is outlined in Section 5.4.2.6.1.4. Water hardness (CaCO3) has been screened into the surface water quality modelling assessment, see Section 5.4.2.6.1.4. Surface water quality modelling results for hardness are provided in Table 3-13 of the Technical Support document for Surface Water Quality [1]. pH and total dissolved solids are not typically modelled as part of surface water quality, however pH is included in the NSDF effluent discharge targets, 6.5 -9 (Table 3.4.2-3 of revised EIS). Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November. [2] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	Accepted
ECCC	FC-76	ECCC-54	5.4.2.6.1.1	The following reference documents described in the surface water quality model were not provided: - CNL 2016, CRL-509243-ASR-2015 - AECOM 2016, 30 % design deliverable These documents were used in the model to input 1) the average non-radioactive contaminant background concentrations at	Canadian Nuclear Laboratories continues to issue the CRL Environmental Monitoring Report to CNSC on an annual basis. The latest report [1] was issued in 2019 June and is included in the EIS submission package. A copy of the updated Leachate and Wastewater Characterization report for the 100% design [2] is included in the EIS submission package. Reference	Accepted

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				surface water nodes and 2) the projected leachate and wastewater concentrations from the NSDF site. **Expectation to address comment:** Provide the above documents for review with the final EA report.	[1] Environmental Monitoring in 2018 at Chalk River Laboratories, CRL-509243-ACMR-2018, Revision 0, 2019 June. [2] Leachate and Wastewater Characterization (Quantity and Quality) B1551-508600-REPT-001, Revision 3. 2019 May.	
ECCC	FC-77	ECCC-55	5.4.2.6.2	In the surface water quality model methodology, the report states, "*No background concentration information was available for Perch Lake itself and thus the lake was assigned a starting concertation of zero for each model run. Similarly, PLO adopted starting background concentration of zero as this weir is considered to be the lake outlet.*" The report also notes that the Perch Lake basin is the most affected region of the CRL Supervised Area. It contains many of the site's operating WMAs, in particular the WMAs of the earliest vintage in the evolution in the waste storage practices at CRL, including the Liquid Dispersal Areas (LDAs). In addition, Perch Lake receives surface water from East Swamp stream, South Swamp Stream and Main Stream at the Perch Lake Inlet 2, which is downstream to the CRL Liquid Dispersal Area, Laundry Pit, Reactor Pit 2 and Chemical Pit. With this in mind, it is important to include background concentration information for Perch Lake and Perch Lake Outlet (PLO) in the surface water quality model, since it is likely that they are both impacted by historic CRL operations. **Expectation to address comment:** Provide a justification as to why background concentrations for Perch Lake and PLO were not included in the surface water quality model. If this information was unavailable, explain why monitoring was not conducted to	Additional background concentrations for radiological and non-radiological constituents were collected in 2018 at four locations within Perch Lake and at locations within the Perch Lake watershed including East Swamp Stream, Perch Lake inlets #1, #2. #4, Perch Lake Outlet and Perch Creek Wier. The data collection and analysis is provided in the report [Characterization of Water and Sediments From and Around Perch Lake [1], and is referenced in Section 5.4.2. As indicated in the EIS Section (5.4.2.6.1.3), measured background concentration data for the modelled constituents available for Perch Lake itself were limited to baseline data from 2018. Thus, existing condition water quality for the lake was assigned a flow-weighted average of the PL1, PL2, PL3, PL4, and PL5 average parameter concentration and flows to Perch Lake, based on monitoring data at the inlets collected from 2010 to 2016. The measured background concentrations collected in 2018 along with existing data have been incorporated into the Surface Water Modelling assessment and are included in the surface water modelling results presented in EIS Section 5.4.2.6.2 and the Technical Support document for the Surface Water Quality Assessment [2]. Regarding inflows into Perch Lake, Inlet 5 is a small stream and represents less than 3% of the total inflow to Perch Lake. Inlet 5 is in a sub-basin that is not affected by CNL operations and is therefore, not a source of contaminant loading. With regards to groundwater plumes, there is a groundwater tritium plume emanating from Reactor Pit 2. Discharge is however primarily downgradient of Perch Lake to Perch Creek. Reference [1] Characterization of Water and Sediments from and Around Perch Lake, 232-121221-REPT-002, Revision 0, 2018 September 28. [2] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	Accepted

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				obtain the information, and why concentrations of zero were assigned regardless of the potential for Perch Lake and PLO to be impacted by historic CRL operations.		
ECCC	FC-78	ECCC-56	5.4.2.6.2	In the surface water quality model parameters of concern, the toxic elements: beryllium, cobalt, fluorine, and thallium, were omitted due to the lack of benchmark values. However, there are some available provincial and federal guidelines that could potentially be used as benchmarks in the model: 1. For beryllium, there are PWQO of 11 µg/L (for water hardness ($CaCO_3$) <75 mg/L) and 1100 µg/L (for water hardness ($CaCO_3$) > 75 mg/L) (MOEE, 1994). 2. For cobalt, there is an interim PWQO 0.9 µg/L (MOEE, 1994), and also a more recent *Federal Environmental Quality Guideline protective of aquatic life* of 2.5 µg/L (Environment Canada, 2013). 3. For thallium, there is a *Canadian Water Quality Guideline* (CWQG) of 0.8 µg/L (CCME, 1999). 4. For fluorine, there is an interim CWQG for the protection of aquatic life for inorganic fluorides of 120 µg/L (CCME, 2002). **References:** CCME. 1999a. *Canadian Water Quality Guidelines for the Protection of Aquatic Life: Thallium*. CCME. 2002. *Canadian Water Quality Guidelines for the Protection of Aquatic Life: Inorganic Fluorides*.	Surface water quality model parameters of concern have updated and include cobalt, thallium and fluorine along with other non-radiological and radiological constituents. Beryllium was not included in the assessment as the source term is negligible. The maximum predicted wastewater concentration before treatment is 1.9E-06 mg/L, approximately 4 orders of magnitude below the PWQO of 11 µg/L (See EIS Table 3.4.2-3). The COPC screening process is described in Section 5.4.2.6.1.4 of the revised EIS. The surface water quality modelling update for the final EIS has considered a broader range of non-radiological and radiological constituents [1]. Non-radiological constituents included major ions [sodium, potassium, calcium, magnesium, chloride, sulphate, fluoride, TDS], nutrients [nitrate, nitrite, ammonia, and TP], and metals [aluminum, antimony, arsenic, barium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, tin, uranium, vanadium, and zinc] Radiological constituents included Carbon-14, Cobalt-60, Cesium-137, Gross beta (as Strontium 90) and Tritium). The screening process included comparison of effluent concentrations against effluent discharge targets which are based on the more restrictive of CCME guidelines for the protection of aquatic life where available and Provincial Water Quality Objectives (See Section 5.4.2.6.1.4 for other factors used in screening of constituents). Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	Accepted

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				MOEE. 1994. *Water management: policies, guidelines, provincial water quality objectives*. July 1994. Environment Canada. 2013. *Federal Environmental Quality Guidelines: Cobalt*. *Canadian Environmental Protection Act, 1999*. February 2013. **Expectation to address comment:** Provide a justification for the exclusion of the above toxic elements in the surface water quality parameters of concern, and reconsider their inclusion into the surface water quality model based on the benchmarks listed above.		
CNSC	FC-79	CNSC-97	5.4.2.6.3.1 tracer model results	The continuous tracer release of 100 mg/L at the WWTP is expected to be reduced by a 300 dilution power to 0.3 mg/L at the outlet of Perch Creek for Scenario 1 while dilution powers of approximately 150 and 40 apply for scenarios 2 & 3. CNL does not provide a rationale or calculations that support such dilution power values and CNSC staff could not link these values to the yearly annual volume of treated effluent of 10 000m^3 versus total volume discharge out of Perch Lake mentioned in section 5.3.2.6.2. **Expectation to address comment:** Please provide the rationale and the calculation supporting the dilution power values.	The surface water quality assessment has been revised. Dilution power values are no longer used in the assessment. CNL also notes that baseline concentrations for COPC's included in the surface water quality assessment were collected in 2018 [1]. The baseline concentrations are used in the surface water modelling assessment and included in the results; see EIS Section 5.4.2.6.2 and Technical Supporting Document for the Surface Water Quality Assessment. References [1] Characterization of Water and Sediments from and Around Perch Lake, 232-121221-REPT-002, Revision 0, 2018 September 28 [2] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	Accepted
CNSC	FC-80	CNSC-183	Table 5.4.2-8 to 17	None of the water quality modelling result tables provide which scenario is associated with the mean, median, 95th percentile and maximum predictions. **Expectation to address comment:** Please indicate in these tables what statistical measures are used for the considered scenarios.	Result tables have been updated to include scenario sub-headers (they were previously missing as a result of a formatting error). The statistics provided are mean, 95th percentile and maximum. Table 5.4.2-8 to 5.4.2-15 of the revised EIS provide the modelling results for a select group of COPCs based on discernible trends in the results. The surface water quality modelling results for each of the screened non-radiological and radiological COPCs are presented in the Surface Water Quality Technical Supporting document [1]. Reference	Accepted

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					[1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	
ECCC	FC-81	ECCC-60	5.5.4.3	The statement at the bottom of page 11 states "*there is no evidence to suggest that current CRL operations are negatively affecting the aquatic environment;*" however, the Proponent acknowledges throughout the report that past operations of the WMAs continue to affect the surface waters of the Perch Lake basin. Additionally, no evidence was provided within section 5.5.4.3 to support the Proponent's claim that current CRL operations are not affecting the aquatic environment. Based on the presence of legacy contaminant plumes that are present throughout the CRL site, the statement: "*there is no evidence to suggest that current CRL operations are negatively affecting the aquatic environment*" is misleading as the aquatic environment is likely being impacted at the present moment by the existing legacy contamination. **Expectation to address comment:** Revise the statement or provide the evidence that was used to support the statement as the data that was provided was collected over twenty years ago.	Updated baseline information on fish species present in the Perch Lake watershed has been collected and included in the EIS. Canadian Nuclear Laboratories collected additional background information (baseline data), on fish and fish habitat in Perch Lake 2016 through 2018. Fish and fish habitat in streams within the Perch Lake watershed were also characterized. The survey results are summarized in Section 5.5.4 and in two reports [1, 2]. With regards to the rationale to support the conclusion that fish and fish habitat have not been negatively affected; CRL conducts an environmental risk assessment for the CRL site on a five year cycle to assess potential impacts from operations. There have been no significant changes to fish community structures that could be attributed to CRL operations. The CRL Environmental Risk Assessment can be found on the CNL website: https://www.cnl.ca/site/media/Parent/Env_Risk_Assessment_2019_Full_REV_0.pdf References [1] Ichthyfauna Survey Data for Perch Lake, Toussaint Lake, Main Stream, and East Swamp Stream. Canadian Nuclear Laboratories ENVP-509200-021-000, Revision 1, 2017 November. [2] Characterization of Fish Collected from Perch Lake, 2018 July 26 to 2018 August 09. R& D Technical Memorandum. Near Surface Disposal Facility (NSDF). Reference No. 232-121221-401-001, Revision 0, 2018 December.	Rejected with Follow-Up IR ECCC-2-07
ECCC	FC-82	ECCC-61	5.5.4.3	The data used to describe the fish populations within the local study area were collected over twenty years ago in 1980 and 1997. No current information on fish in the aquatic habitats downstream of the NSDF was provided. Baseline information from 1980 and 1997 indicates the presence of thirteen species of fish but no population estimates are provided. **Expectation to address comment:** The Proponent should consider collecting updated fish community data for the receiving	Updated baseline information on fish species present in the Perch Lake watershed has been collected and included in the EIS. Canadian Nuclear Laboratories collected additional background information (baseline data), on fish and fish habitat in Perch Lake 2016 through 2018. Fish and fish habitat in streams within the Perch Lake watershed were also characterized. The survey results are summarized in Section 5.5.4 and in two reports [1, 2]. Section 5.5.4 also includes baseline information from fish surveys conducted in the 1980's and 1990's. References	Accepted

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				environment in order to monitor the effects on the aquatic ecosystem as a result of the NSDF.	[1] Ichthyfauna Survey Data for Perch Lake, Toussaint Lake, Main Stream, and East Swamp Stream. Canadian Nuclear Laboratories ENVP-509200-021-000, Revision 1, 2017 November 16. [2] Characterization of Fish Collected from Perch Lake, 2018 July 26 to 2018 August 09. R& D Technical Memorandum. Near Surface Disposal Facility (NSDF). Reference No. 232-121221-401-001, Revision 0, 2018 December 11.	
ECCC	FC-83	ECCC-62	5.5.5.2	In order to support the Proponent's prediction that the use of explosives would not measurably impact fish survival or reproductive success of fish species in the local study area, updated baseline information about fish diversity and population information is required. **Expectation to address comment:** information of current fish species and population should be collected in 2017 to monitor potential impacts of the project on the aquatic environment.	Updated baseline information on fish species present in the Perch Lake watershed has been collected and included in the EIS. Canadian Nuclear Laboratories collected additional background information (baseline data), on fish and fish habitat in Perch Lake 2016 through 2018 Fish and fish habitat in streams within the Perch Lake watershed were also characterized. The survey results are summarized in Section 5.5.4 and in two reports [1, 2]. Section 5.5.4 also includes baseline information from fish surveys conducted in the 1980's and 1990's. **References** [1] Ichthyfauna Survey Data for Perch Lake, Toussaint Lake, Main Stream, and East Swamp Stream. Canadian Nuclear Laboratories ENVP-509200-021-000, Revision 1, 2017 November 16. [2] Characterization of Fish Collected from Perch Lake, 2018 July 26 to 2018 August 09. R& D Technical Memorandum. Near Surface Disposal Facility (NSDF). Reference No. 232-121221-401-001, Revision 0, 2018 December 11.	Accepted
CNSC	FC-84	CNSC-228	5.5.6	This section indicates that fish will not be part of the monitoring program for the NSDF. It is strongly recommended that fish species of importance to First Nation and Métis communities be included in the NSDF monitoring program. Fishing resources are of high value to local Indigenous peoples. Please clarify if CNL will consider including monitoring fish as part of the NSDF specific monitoring program. If not, please provide sufficient rationale.	CNL conducts annual monitoring of fish in the Ottawa River for radioactivity as part of the Environmental Monitoring Program. The results are reported in the Annual Environmental Monitoring Report [1] and summarized in EIS Section 5.7.4.9. Annual monitoring of fish in the Ottawa River will continue. CNL will continue conducting annual monitoring of fish in the Ottawa River for radioactivity as part of the Environmental Monitoring Program, with results publicly available. Additional baseline data on fish species present in the Perch Lake and radioactivity in fish tissue has been collected. Perch Lake is an inland lake on the CRL site with no public access. Perch Lake is within the Perch Lake basin, the location of the NSDF site and is within the local study area for the aquatic environment, ecological health and ambient radioactivity. CNL has completed a survey of fish composition of Perch Lake to confirm fish species in the lake [2] and analyzed fish tissue for radioactivity [3]. The results of the survey and analysis of radioactivity in fish tissue are provided in EIS Sections 5.5.4.2 and 5.7.4.9.	Accepted

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					Section 5.5.6 clarifies that, there is no planned follow- up monitoring of fish habitat in the Perch Lake basin, rather there is routine monitoring of surface water quality parameters as measurement indicators of fish habitat and fish community assessment endpoints. This monitoring will verify the effects predictions and provide data to evaluate changes. The potential risk to fish in the Perch Lake Basin will continue to be assessed through the conduct of the CRL Environmental Risk Assessment on a five year cycle. The CRL Environmental Risk Assessment can be found on the CNL website: https://www.cnl.ca/site/media/Parent/Env_Risk_Assessment_2019_Full_REV_0.pdf References [1] Annual Safety Report Environmental Monitoring in 2017 at Chalk River Laboratories. CRL-509243-ASR-2017. Revision 0. June 2018. [2] Ichthyfauna Survey Data for Perch Lake, Toussaint Lake, Main Stream, and East Swamp Stream. Canadian Nuclear Laboratories ENVP-509200-021-000, Revision 1, 2017 November 16. [3] Characterization of fish collected from Perch Lake, 2018 July 26 to 2018 August 09, 232-121221-401-001, Revision 0, 2018 December.	
ECCC	FC-85	ECCC-64	5.5.6	No monitoring or follow-up programs have been proposed in the EIS to monitor for impacts from the Project on the aquatic ecosystem. **Expectation to address comment:** Follow-up monitoring on the aquatic ecosystem should be conducted throughout the various phases of the project in order to confirm CNL's conclusion that "measurable residual effects on aquatic biodiversity are not predicted as a result of the NSDF Project".	Table 11.0-1 summarizes the environmental assessment monitoring and follow-up programs proposed for the NSDF Project, including groundwater (hydrogeology), surface water and aquatic environment. Monitoring and follow-up programs are not specifically identified for the aquatic ecosystem, rather, operational monitoring (i.e., sampling of treated effluent in the storage tanks prior to discharge) and environmental monitoring programs for groundwater and surface water will be implemented to verify effects predictions. CNL's evaluation process for GW and SW Monitoring data include environmental performance criteria which are based on statistical measures and ecological health benchmarks. An exceedance of environmental performance criteria triggers CNL's non-conformance and corrective action process and includes and further investigation. As stated in Section 11 of the revised EIS, the monitoring and follow-up plans presented are conceptual and provide a preliminary description of the activities and framework for monitoring proposed for the NSDF Project. The details provided within the EIS are in alignment with the requirements in the Generic Guidelines for the Preparation of an EIS. The plans will be developed into detailed monitoring and follow-up programs as the project progresses through the environmental assessment process, which may influence the nature, frequency and locations of monitoring.	Accepted

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					In addition, input from regulatory agencies, the public and Indigenous peoples will be considered. These monitoring and follow-up programs will include sufficient information on the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation. These programs will also be prepared consistent with the Canadian Standards Association's Standards N288.4-10 (Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills [CSA Group 2010]), N288.5-11 (Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills [CSA Group 2011]) and N288.7-15 (Groundwater Protection Programs At Class I Nuclear Facilities and Uranium Mines and Mills [CSA Group 2015), as applicable. Adherence to these standards when developing monitoring plans ensure a systematic and transparent approach thus the monitoring plans (when prepared) will correlate monitored parameters with potential or residual adverse effects on the environment. Parameter thresholds for which mitigation actions are required will also be identified within the monitoring plans. The more detailed monitoring and follow-up programs will be submitted to the Canadian Nuclear Safety Commission for review. The CNSC, as the regulatory authority for the designated project, will also coordinate the review of the follow-up monitoring program with other interested federal and provincial agencies. The final follow-up monitoring program will be required to meet any objectives and activities that the EA Report specifies (to be prepared by the CNSC). The Surface Water Management Plan [1] as well as Monitoring and Reporting Plan [2] (which provides the leachate sampling and analysis plan) have been submitted to the CNSC as requested. References [1] Surface Water Management Plan, 232-508600-PLA-002, Revision 1, 2019 February [2] Monitoring and Reporting Plan, 232-508220-PLA-002, Revision 0, 2017 May.	
ECCC	FC-86	ECCC-87	5.6.1	Issues raised during engagement and consultation process have been summarized in table 5.6.1-1, however, the table does not address all environmental concerns. Although this table describes issues raised during the consultation process, the EIS should focus on all Species at Risk Act (SARA) listed species found in the LSA and directly affected by the proposed project, not only those identified during engagement and consultation.	The intent of Table 5.6.1-1 is only to capture any issues raised by the public during consultations. All SARA-listed species identified in Appendix 5.6-1 with confirmed observation records within the CRL site were considered as potential valued components at the species level. Each species was evaluated to determine whether its presence was likely in the Site Study Area (SSA) or the Local Study Area (LSA) defined for the terrestrial biodiversity assessment (see Section 5.6.3.1). Species that are unlikely to occur in the LSA, for which habitat was not present in the LSA or for which effects of the NSDF Project were unlikely were excluded as VCs. Rationale for inclusion or exclusion of each species at risk identified during surveys undertaken in the CRL	Accepted

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				Expectation to address comment: Ensure EIS analyzes all potential impacts to SARA-listed species in the LSA, not just those identified during engagement and consultation.	site is presented in Appendix 5.6-1. The pathways analysis for terrestrial biodiversity valued components have been captured in Table 5.6.5-1.	
ECCC	FC-87	ECCC-86	5.6.2	According to the Environmental Impact Statement (EIS), twenty species at risk are known to be from the project area. Table 5.6.2-1, which identifies the "valued components", only lists a few of these species at risk. All SARA listed species which occur on the property should be addressed so it is clear which are known to occur on or near the proposed construction site and which other species at risk could occur there but have not been detected. **Expectation to address comment:** Include and discuss all known species at risk found at the CNL Chalk River facility. Clarify which species occur on the property and identify which species are known to be on or near the proposed site of the NSDF.	The LSA is defined in section 5.6.3.1 and was used to identify species at risk to be assessed as part of the EIS. The LSA considered the need of the most sensitive species present in proximity of the project. All of the other species at risk known to be occurring at CRL have been addressed in Appendix 5.6-1 and the rationale why they have not been carried forward is provided.	Rejected with Follow-Up ECCC-2-08
ECCC	FC-88	ECCC-88	5.6.2	Valued Components for the Terrestrial Biodiversity Assessment, table 5.6.2-1, indicates there is a potential loss of bird eggs or nests during tree clearing. The *Migratory Bird Regulations* prohibit the disturbing, destroying or taking of a nest or egg. Tree clearing should therefore be planned in a manner that ensures nests and eggs are not disturbed, destroyed or taken. Table 5.6.2-1 indicates there is a potential loss of bat species at risk residences. SARA prohibits the damage and destruction of bat residences. Permits may only be granted for activities that would damage or destroy such residences if the preconditions laid out in subsection 73(3) of SARA are met. See our comments #90, #98,	Table 5.6.2-1 outlines the rationale for the selection of the species as a valued component. The potential impacts listed in the Table 5.6.2-1 would be without mitigation measures. Because of their ecological importance and because they are protected by federal legislation (*Migratory Birds Convention Act, 1994*, the suite of migratory birds with the potential to be affected by the NSDF Project was also included as a terrestrial biodiversity VC. The purpose of including the group of migratory birds together as a VC was to identify appropriate mitigation so that the NSDF Project would comply with the MBCA for all migratory birds. Section 5 of the MBCA prohibits the disturbance, destruction or removal of a nest or related shelter, or egg of a migratory bird, or possession of a live migratory bird, or a carcass, nest or egg of a migratory bird (Section 5.6.2 of revised EIS). Environment Canada Beneficial Management Practices (BMPs) as outlined on their website (http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1), will be implemented. These Beneficial Management practices are identified in Table 5.6.5-1 which indicates that: tree clearing and grubbing in complex forested habitat, will occur before April 8 or after August 31 to avoid effects on nesting birds and bat maternity roosts.	Accepted

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				#108 and #111 below also on impacts to SARA listed bat species. **Expectation to address comment:** Consult ECCC's Avoidance Guidelines for migratory birds for information on how to reduce the risk of incidental take of migratory birds, nests and eggs (http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=1B16EAFB-1).	If vegetation clearing in small areas with simple habitat (e.g., rights of way) that can be effectively searched for nests could be cleared only after an effective nests search and approval by CNL Environmental Protection. For bats see disposition to comments 90, 98, 108 and 111.	
ECCC	FC-89	ECCC-89	5.6.2	Other mortality factors that can impact Blanding's Turtles should be listed in table 5.6.2-1, the Valued Components. **Expectation to address comment:** Include examples of other sources of mortality (e.g., construction vehicle strikes on worksite and access roads, overwinter mortality from changes in hydrology in wetlands) in the EIS.	Table 5.6.2-1 (section for Blanding's Turtle), has been revised to include the following bullet: • There is the potential for Blanding's Turtle to be indirectly and directly affected by the NSDF Project through disturbance, habitat loss and mortality (e.g., vehicle strike on roads and overwinter mortality from changes in the hydrology in wetlands).	Accepted
ECCC	FC-90	ECCC-90	5.6.2	In table 5.6.2-1, the Valued Components for the Terrestrial Biodiversity Assessment, states that "Critical habitat has only partially been defined for hibernacula, as the largest threat to these species [bats] is associated with that habitat". While it is true that the largest threat at the time of the recovery strategy facing these bats was White Nose Syndrome, and it is thought that threat is largely related to hibernaculum, the recovery strategy for the little brown myotis, northern myotis, and tri-colored bat also identifies destruction or degradation of roosts as a threat of high concern. Maternity roosts have not been identified as critical habitat because of a lack of knowledge about roost habitat, but the recovery strategy indicates that at least some maternity roosts will likely be considered critical habitat when more information has been collected. See also comment #98 below.	The destruction of maternity roosts, as stated in the proposed recovery strategy for the species, is recognized as a threat in the revised EIS in Table 5.1.2-1 and Table 5.6.2-1. Section 5.6.4.8 of the revised EIS discusses bat habitat availability, habitat distribution and survival and reproduction. At CNL three species of bats (little brown myotis, northern myotis, and tri-coloured bat) have been detected throughout the Chalk River Laboratories (CRL) site using passive acoustic recorders. While each of these species have been detected, the location of roosts is unknown. In order to provide appropriate protection it is necessary to understand where roosts are, the number of individuals using these roosts as well as specific habitat requirements. As outlined in Section 5.6.4.8.1 of the revised EIS, over the course of two years, 2019 and 2020, CNL will be conducting a research project which will involve mist netting for all three federally listed bat species and affixing radio transmitters to select individuals. These individuals will be tracked to their maternity roosts and these roosts will be monitored for activity levels to determine the size and importance of each roost. In addition to determining the location of maternity roosts, the micro-habitat surrounding each roosts will be characterized.	Accepted

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				Expectation to address comment: Include "the destruction of maternity roosts is a potential significant threat to bat populations" in the EIS.	The maternity roost field work started in 2019 and resulted in 20 bats being captured and suitable to be fitted with a radio-transmitter. Those bats led to the identification of 15 different roost trees composed mainly of large-tooth aspen (*Populus grandidendata*). This information will not only allow for increased protection of maternity roosts on the CRL site but will also aid in protecting the species at a larger landscape level as the research conducted will increase the knowledge of local specific habitat requirements. With a greater understanding of important biophysical attributes at the landscape scale these elements can be protected which will allow for preservation of important summer roosting habitat. This information will be used for the development of a Sustainable Forest Management Plan (FMP) at CRL. With a FMP in place, CNL will be in a position to better manage tree removal activities to protect sensitive roosting habitat and to provide the most appropriate mitigation measures to compensate for any habitat loss that could occur. In implementing a Sustainable FMP, CNL will ensure to maintain through time roost trees required to maintain the local bat population. For this reason, the NSDF project will not contribute to significant adverse effects. The research conducted by Silvis *et al*. (2015) [1] demonstrates that day-roost selection is highly variable and may vary from year to year. This research concludes that a multi-year study and collection of the micro-habitat characteristics of day-roost trees is required to provide a fuller understanding of the ecology of tree-roosting bats to land managers to prevent taking important habitat components and support optimal habitat conditions. CNLs assessment on bats is in line with the conclusions of Sylvis *et al*. 2015 and is currently working on collecting micro-habitat conditions on known day-roosts, and this to adequately account for local variation in the roosts selection by the CRL bat species. Reference [1] Silvas, A, Ford, M, Britzke, E. Day-roost tree selection by nothern long-eared bats – What do non-roost tree comparisons and one year of data really tell us? https://www.sciencedirect.com/science/article/pii/S2351989415000347	
ECCC	FC-91	ECCC-91	5.6.2	The definition of ecosystem condition in this section includes species diversity, but does not mention "appropriate" or native species. Some of the terms used to characterize how changes to ecosystem condition are affected are questionable. For example, why does a change in structural stage affect its condition?	Section 5.6.2 has been updated to provide the definition of Ecosystem Condition i.e., "changes in native species richness, abundance and diversity." Section 5.6.4.1.3 outlines how structural stage was used as a quantitative measure of ecosystem condition. Other factors affecting ecosystem condition such as abundance and distribution of native and non-native plant species and the presence of any significant ecosystem communities (e.g., sand barrens, provincially significant wetlands) were considered	Accepted

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				Expectation to address comment: Clarify that the definition of ecosystem condition refers only to native species and explain how an ecosystem condition is affected by a change in structural stage.	qualitatively and relied upon information contained in previous studies conducted within the Regional Study Area.	
ECCC	FC-92	ECCC-92	5.6.2	The EIS describes twenty federally listed species at risk in the Regional Study Area (RSA) but common nighthawk, chimney swift, olive-sided flycatcher, and western chorus frog were excluded from the analysis and mitigation tables because they were deemed unlikely to be present in the LSA. It is unclear how much survey effort for these species was completed in the LSA. Although chimney swifts typically nest in chimneys, which are not present in the LSA, if there are suitable hollow trees present these could be used by the chimney swift. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) report for common nighthawk indicates that some individuals “probably continue to nest in hollow trees in isolated wooded areas”. Common nighthawks could nest around the wetlands or possibly in edge habitat along the power line corridors. It is not clear when surveys were conducted for the western chorus frog in the LSA during the early spring calling period. This species is often missed if surveys were not conducted early enough in the amphibian breeding season. **Expectation to address comment**: Provide more details regarding status and survey effort for common nighthawk, chimney swift, olive-sided flycatcher and western chorus frog and provide a more robust explanation as to why they were excluded from the report. Additional surveys may need to be carried out to confirm whether western chorus frogs are present in	Section 5.6.2 and Appendix 5.6-1 of the revised EIS provides detail on how species were selected as VC, including justification for inclusion/exclusion. Appendix 5.6-1 also identifies Species at Risk present (confirmed and likelihood) at the CRL site and in the Local Study Area for the NSDF Project. Specifically, Section 5.6.2 has further information on the common nighthawk, chimney swift, olive-sided flycather and western chorus frog. These species were initially considered as VCs but were ultimately not carried forward to the effects assessment for the following reasons • A common nighthawk survey was conducted during the summer of 2013. Because this species is territorial and responds to other calling individuals by making a “booming” sound, common nighthawk calls were also played (infrequently) to increase the detection of the species. A total of 43 survey points were surveyed twice. Each survey consisted of a three-minute listening period to detect nighthawks. No common nighthawks were heard during the surveys. Consequently, the proposed NSDF Project is not expected to affect common nighthawks. Additionally, eastern whip-poor-wills use similar habitats to common nighthawks and so can be considered a surrogate for determining effects on common nighthawks. • CNL properties (CRL sites and Nuclear Power Demonstration Closure Project property) have two significant roosting sites (stacks) used by the species. CNL has committed to preserve the stack on the Nuclear Power Demonstration site as part of the Nuclear Power Demonstration Closure Project. CNL is likely contributing to the recovery of the species by retaining the Nuclear Power Demonstration stack. No effects from the NSDF Project are anticipated for chimney swifts. • The forest songbird survey effort conducted on the CRL site in 2013 and 2016 involved a total of 42 survey locations and a total 3,000 minutes of recording time. Olive-sided flycatcher was only recorded once on the CRL site during these surveys and was 4 km away from the proposed NSDF Project. There was one other observation of olive-sided flycatcher approximately 3 km away from the NSDF Project in 1997. Based on these results, olive-sided flycatchers are not likely using habitats in or near the NSDF Project, and no effects to this species are anticipated. • Amphibian surveys were conducted at CRL in 2012 and 2016 and followed methods used in the Marsh Monitoring Program (https://www.birdscanada.org/volunteer/glmmp/index.jsp?targetpg=glmmpfrog). Surveys	Accepted

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				the LSA. The proponent is encouraged to discuss survey procedures with ECCC.	were conducted between April 20 and June 16 of both years. Western chorus frogs were not detected in 2012 or 2016. In 2015, Environment and Climate Change Canada (ECCC; formerly Environment Canada) advised CNL that sightings of chorus frog (Pseudacris triseriata and P. maculata) had occurred in close proximity to the CRL site. Further discussion with ECCC in February 2017 provided a different and more adequate protocol for the detection of the species. CNL notes that further discussion with ECCC in February 2017 provided a different and more adequate protocol for the detection of the Western Chorus Frog. Changes to the current survey methodology were made immediately and this new protocol adopted for surveys conducted in 2017. Although, habitat corresponding entirely to the definition of Table 3 of the Recovery Strategy for the species are not present at CRL, four areas located in the LSA were surveyed in 2017. Western chorus frogs were not detected in 2017 [Section 6.5 of 1]. In absence of the species in the wetland complex surrounding the EMR site, the project is not likely to damage or destroy Western Chorus Frog residence as defined in the Description of Residence document. • Further surveys throughout the CRL site will be conducted as part of CNL amphibian survey to be conducted every 5 years starting in 2020. Reference [1] Annual Safety Report Environmental Monitoring in 2017 at Chalk River Laboratories. CRL-509243-ASR-2017. Revision 0. June 2018.	
ECCC	FC-93	ECCC-93	5.6.4.1.1	The Forest Resource Inventory (FRI) data used to characterize plant communities are thirty years old. Given this, the FRI data used to describe the current composition and distribution of forest communities in the study area may not be accurate. Current remotely sensed imagery may provide a more relevant understanding of current terrestrial ecosystem distribution and composition. **Expectation to address comment**: Explain how relevant the thirty year old FRI data are when compared to current forest ecosystems in the LSA. Describe the level of significance of the FRI data and how it were applied to determine the amount of suitable habitat available for the various species at risk in the LSA and the RSA. Explain why current imagery was not considered to characterize the current	The text in 5.6.4.1.1 has been updated to clarify that the FRI dataset for the RSA is based on mapping work conducted in 1987 and corrected in 2009. The Province of Ontario conducts fly over and updates the FRI every 5 years. Unfortunately, federal lands are excluded from the flyover; therefore forest cover is not available. In addition, due to the sensitivity of the CRL site, the entire air space up to 3000 feet is a ‘no fly’ zone. The restricted airspace is registered as CYR510 Chalk River, ON. Extensive justification and approval is required to fly over the site.	Accepted

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				terrestrial ecosystem composition and distribution.		
ECCC	FC-94	ECCC-94	5.6.4.1.3	While seral stage and age of forest stands contribute to ecosystem condition, emphasizing community age (as is done in this section) is not a typical way to characterize ecosystem condition. Good condition early-, mid- and late-seral stands exist and all can provide important habitats and functions. Young and old forests both provide quality habitat if they are in good condition. For example, the EIS mentions that there is a plantation of the exotic Norway Spruce in the footprint of the construction site (sec 5.6.4.1.1) and may provide habitat for species at risk. **Expectation to address comment**: De-emphasize the amount that stand age contributes to ecosystem condition and consider other factors such as the presence of various plantations and their value (or lack of value) as species at risk habitat.	Text clarifying the use of stand age as an indicator of ecosystem condition has been added into Section 5.6.2 - Valued Components. *“Mature forest stand age can be used as a broad indicator of ecosystem quality as wildlife habitat features required for a broad number of wildlife species, such as cavity trees and downed woody debris, are typically found in mature forest stands and less frequently found in younger seral (i.e., intermediate) stage stands”.* Text clarifying why tree plantations were not considered as an indicator of ecosystem condition has been added into Section 5.6.4.1.1 - Ecosystem Availability. *"Although there are coniferous tree plantations within the RSA, and these were delineated by FRI mapping as separate FRI polygons, the species composition and inclusion of relatively old stand ages distinguish them from typical coniferous tree plantations in Ontario that are more heavily managed and frequently disturbed."*	Accepted
ECCC	FC-95	ECCC-95	5.6.4.1.3	According to table 5.6.4-2, Structural Stages of Forested Vegetation Communities, 31% of the LSA is made up of mature forest. The EIS states that in the LSA “there is a relatively older assemblage of forest stands compared to the RSA”. Efforts should be made to minimize the effect of the project on mature forest habitat, which is a key habitat for the Canada warbler and the three endangered bat species. It is a concern that an area with so much mature forest will be affected by the proposed NSDF Project. **Expectation to address comment**: Explain what factors were considered in selecting this site on the property and how impacts to species at risk were considered in site selection. Specifically, explain why other areas	Section 2.5.5 of the revised EIS outlines the selection process for the siting of the NSDF at CRL which included the identification of 15 potential sites within the CRL site for initial screening. This screening process included the development of mandatory criteria that must be satisfied by candidate locations; mandatory criteria included: • minimum area of 14 ha; • site must be at least 200 m wide; • access to Class IV electricity for power; • access to water for sanitary and process requirements; and • access to gas or other heating source. Exclusion criteria were then applied to remove any locations that were constrained by NSDF Project requirements or by pre-defined factors; exclusion criteria were physical, cultural, and biological features that would eliminate a location from the list of potential sites because development is either not permitted or poses a risk for the intended use/project.	Accepted

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				with less mature forest or less suitable habitat for species at risk could not be selected.	Section 2.5.5 includes details on how Species at Risk were considered as exclusion criteria for the NSDF site selection. Specifically: • Areas of nationally or provincially significant plant or tree species, in small groups or stands, in accordance with the Federal *Species at Risk Act* and habitat of those threatened or endangered species as per the *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC) listing. Research plantations at CRL may contain these species. • Known or likely habitats of national or provincially significant wildlife species in accordance with the Federal *Species at Risk Act* or COSEWIC listing as per guidance by CNL Environmental Protection. Two candidate locations from the initial selection process were identified for further evaluation after the application of the mandatory attribute criteria and the exclusion criteria; 1) the East Mattawa Road (EMR) site; and 2) the Alternate site (11A). Section 2.5.5.3 and Table 2.5.5-2 provides a comparative evaluation of the two sites with regards to Species at Risk and terrestrial biodiversity.	
ECCC	FC-96	ECCC-96	5.6.4.1.3	According to the EIS, butternut is the only plant species at risk detected on the property and it is only present at an old homestead. It is unclear how much survey effort there has been for plant species at risk or if any surveys were undertaken in the proposed construction site. Section 5.6.4 (Description of the Environment) in the EIS lists surveys conducted for various fauna (birds, bats, amphibians) but does not describe the plant surveys conducted. **Expectation to address comment**: Add details of methods and results of rare plant surveys to section 5.6.4. Further surveys may need to be required. The proponent is encouraged to discuss this matter with ECCC.	Rare plant surveys have not been conducted as part of the NSDF EIS. Appendix 5.6-1 includes a mix of species at risk and rare plants species using the NatureServe conservation ranking system (e.g. G5, S3). The purpose of the NatureServe conservation ranking system is to assess the relative risk facing a species and does not imply that any specific action or legal status is needed to assure its survival. The plant species included in the Appendix 5.6-1 have been reported at CRL from previous work survey and all species are unlikely to be found in the Site Study area (SSA). The following text has been added to Section 5.6.4.1.3: • Butternut (*Juglans cinerea*) is the only SARA listed plant species that has been recorded in the RSA (see Figure 5.6.4 1). This species does not have a high likelihood of occurring within the SSA based on the location of the RSA, which is beyond the known northern extent of the range of butternut in Ontario, and site conditions. Surveys to date have not indicated the presence of butternut within the SSA, and suitable habitat is not common in that location. Suitable butternut habitat consists of a range of tolerable soil types, but the highest quality conditions are rich, moist, well drained loams typically within streamside riparian areas, and also well drained gravely sites of limestone origin. Butternut is shade intolerant, but can be a minor component of late successional stage forests with openings in the canopy. Butternut within the RSA (but outside of the LSA) are associated with an old homestead. Some regeneration was noted in one patch during surveys, but it was always in close proximity to the parent trees that were associated with the old homestead.	Accepted

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ECCC	FC-97	ECCC-97	5.6.4.2.3	Cerulean warbler (listed as Special Concern under SARA, but assessed by COSEWIC as Endangered) was reported as being in the top four most commonly observed bird species. This is surprising since the study site is well outside of the primary range of this species and the habitat is generally not suitable. In addition, appendix 5.6-1, the list of species, indicates that the cerulean warbler has not been reported from the property. It is possible that this species has been confused with the cedar waxwing in the data reporting from field surveys if short form codes were used (i.e., CEWA which could apply to either species). **Expectation to address comment**: Confirm whether the cerulean warbler was detected on the property and if not, revise text to reflect which species were actually the most common bird species found.	The Cerulean warbler being listed as a top four commonly observed bird species was an error in an early draft (2016 December) of the NSDF EIS. CNL notes that this error was corrected in Revision 0 (2017 March). 5.6.4.2.3 of the revised EIS indicates that fifty-five migratory bird species have been recorded in the RSA during surveys, with chestnut-sided warbler, very, white-throated sparrow and black-throated blue warbler being the most commonly observed species. Cerulean warbler is not one of the top four common birds and was reported in error. The information in Appendix 5.6-3 confirms that there have been no sightings of the Cerulean Warbler in either the LSA or the RSA.	Accepted
ECCC	FC-98	ECCC-98	5.6.4.6.1	This section states that “Availability of maternity roosting habitat is not likely a limiting factor for bats in the Base Case, within the RSA.” It is not clear whether field surveys quantifying the location, number and use of suitable, unoccupied/occupied maternity roosts in the RSA have been completed. Surveys for potential maternity roost trees could be undertaken to identify if the proposed construction site contains potential maternity roost trees. **Expectation to address comment:** Provide better evidence to support the statement “Availability of maternity roosting habitat is not likely a limiting factor for bats in the Base Case, within the RSA.” If not already completed, the proponent may need to conduct surveys for potential maternity roost trees using established protocols. This will be important to future permitting decisions under SARA. As	Section 5.6.4.8.1 documents the analyses for bats and bat maternity roost habitat. Additionally the Bat Species at Risk Act (SARA) Section 73 Permitting Support technical memorandum, has been added to the EIS as Appendix 5.6-4. This technical memorandum provides details on baseline survey methods and results for bats and bat habitat. Section 5.6.4.8 includes information on a bat telemetry study that is being conducted over the course of two years, 2019 and 2020 involving netting for all three federally listed bat species and affixing radio transmitters to select individuals. These individuals will be tracked to their maternity roosts and these roosts will be monitored for activity levels to determine the size and importance of each roost. In addition to determining the location of maternity roosts, the type of habitat being used for each roost will be assessed. The field work in 2019 and resulted in 20 bats being captured and suitable to be fitted with a radio-transmitter. Those bats led to the identification of 15 different tree roosts composed mainly of large-tooth aspen (*Populus grandidendata*). This information will not only allow for increased protection of maternity roosts on the CRL site but will also aid in protecting the species at a larger landscape level as the research conducted will increase the knowledge of local specific habitat requirements. With a greater understanding of important biophysical attributes at the landscape scale these elements can be protected which will allow for preservation of important summer roosting habitat. This	Accepted

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				such, the proponent is encouraged to discuss this issue with ECCC.	information will be used for the development of a Sustainable Forest Management Plan at CRL.	
ECCC	FC-99	ECCC-99	5.6.4.7.2	This section states that there are no known Blanding's Turtle occurrences (individuals or nests) in the footprint of the construction area but provides no indication of the level of survey effort or the locations of surveys. If surveys have not been conducted in the area of the proposed construction site then the lack of observations is not particularly meaningful. **Expectation to address comment:** Provide a description of the survey effort and locations in the area of the proposed construction site that were completed for Blanding's Turtle. Further surveys may need to be carried out. The proponent is encouraged to discuss this issue further with ECCC.	To allow for transparency regarding the decision-making process, text has been added into Section 5.6.4.9.2 - Blanding's Turtle Habitat Distribution and into Table 5.6.4-11 that documents the survey effort for Blanding's Turtles in the NSDF LSA and RSA. From 2009 -2018, almost 1400 days of live trapping, 1900 person hours, and 32 telemetry have been completed in the Regional Study Area. The Local Study Areas ha had 113 days of live traps and 72 person hours of searches. CNL also continues to monitor Blanding's Turtle habitat within the CRL site as part of the CRL site Species at Risk surveys as part of CNL's Environmental Protection Program. Table 5.6.8-1 and Table 11.0-1 provides the conceptual follow up monitoring for the Blanding's Turtle related to the NSDF Project.	Accepted
ECCC	FC-100	ECCC-100	5.6.5.2	The EIS discusses effluent discharges from the project site to adjacent wetlands (e.g., "discharge to the East Swamp"). Blanding's Turtles are known from these wetlands according to the maps in the EIS and these wetlands could be used for hibernation sites. Any changes to the hydrology or water quality of the wetlands could affect over-wintering mortality of those turtles. The draft recovery strategy for the Blanding's Turtle identifies hydrological alteration as an activity that can destroy critical habitat. **Expectation to address comment:** Describe potential water quality and quantity impacts to East Swamp and other wetlands impacted by the proposed project, and how such impacts could affect sensitive species such as Blanding's Turtle.	The assessment of changes to water quality and quantity in East Swamp and other wetlands impacted by the Project, and how these impacts can affect sensitive species such as Blanding's Turtle were determined to have no linkage to residual effects or negligible residual effects on terrestrial species, including the Blanding's Turtle. Section 5.6.5.2.1 - No Linkage Pathways states that changes to surface flows, water levels and water quality from NSDF Project construction and decommissioning are expected to be limited using environmental design features and mitigation. The NSDF Project was designed to limit disturbance to the natural environment to the extent feasible and will avoid stream and wetland habitats. For example, a 30 m buffer is established along all identified wetlands near the SSA. In addition to the wetlands buffer, a 5 m treeline buffer is established from all property lines on the SSA to limit disturbance to vegetation and large tree roots at the treeline. Effects to the wetlands, including the East Swamp wetland, are expected to be minimal based on the NSDF Project's anticipated change to flows in Perch Creek and East Swamp weir flows.	Accepted

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ECCC	FC-101	ECCC-101	5.6.5.2 (table)	Table 5.6.5-1, Pathways Analysis, indicates that vegetation clearing in small areas with simple habitat may occur within the migratory bird nesting season or bat roosting season. The proponent has proposed that searches for nests and roosts, and their subsequent protection would occur prior to tree felling. ECCC disagrees with the use of the term “simple habitat” to describe this area, as the term is usually used to describe urban parks consisting mainly of lawns, or a vacant lot with few possible nest sites (see http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1#_02). ECCC does not recommend searching for nests during migratory bird nesting season due to risk of damage and a low likelihood of locating all nests. Likewise, bat roosts are also difficult to locate and unlikely to be detected. **Expectation to address comment**: Vegetation removal during migratory bird nesting periods and bat roosting season should be avoided.	Section 5.6.5.2.1 and Table 5.6.5-1 of the revised EIS states that vegetation clearing and grubbing in the majority of the SSA, and particularly in complex forested habitat, will occur before April 8 or after August 31 to avoid effects on nesting birds and bat maternity roosts. If vegetation clearing in small areas with simple habitat (i.e., that can be effectively searched for nests) cannot be conducted outside the breeding bird nesting period (April 8 to August 28), or bat maternity roosting period (May 1 to August 31), pre-clearing bird and bat surveys will be completed to confirm no active nests/roosts are present in trees to be felled. Pre-clearing bird and bat surveys will be completed by CNL’s Environmental Protection team to confirm no active nests/roosts are present in trees to be felled. This work must be approved by Environmental Protection prior to execution and can be denied if the risk to birds or bats is considered high. CNL has a risk assessment checklist to determine if an area qualifies as a simple habitat, qualifying for nest searches and clearing in the absence of nests during the breeding season. The checklist has a series of risk factors and the total score provides whether the area qualifies. Examples of the risk factors are provided in the Section 5.6.5.2.1 and Table 5.6.5-1.	Accepted
ECCC	FC-102	ECCC-102	5.6.5.2 (table)	The EIS indicates that blasting may be required during the construction phase of the proposed project. Blasting best management practices are proposed, but it is unclear what constitutes the best practices. **Expectation to address comment**: Provide a copy of the best management practices and the blasting plan that will be followed during the construction phase of the NSDF Project. This information would be needed to support potential SARA permitting.	The Blasting Plan will be developed by the Construction Contractor after that contract has been awarded since it is required to be prepared by qualified individuals. The Blasting Plan will follow ‘DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters’ [1] and ‘Ontario Provincial Standard Specification (OPSS) in the document OPSS 120 – General Specification for Use of Explosives (OPS 2014)’ [2]. Although the Blasting Plan is not available at this phase of the NSDF Project, CNL has specified requirements in technical specifications to the Construction Contractor. Examples of standard best management practices is the use of set-back distances, temporarily suspending blasting activities if wildlife are in the area, and minimizing the transport of blasting residuals into downstream waterbodies. The following text is included in Table 5.6.5-1 to describe the plan: • A Blasting Plan will be developed and implemented for the NSDF Project that will follow industry standard Best Management Practices and applicable Federal Regulations. • Additional guidance for the NSDF Project blasting limits will be obtained from the Ontario Provincial Standard Specification (OPSS) in the document OPSS 120 – General Specification for Use of Explosives (OPS 2014).	Accepted

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					• Set-back distances required for blasting will be identified in the Blasting Plan. • Blasting activities will be temporarily suspended if wildlife are observed in the blasting area. References [1] Guidelines for the use of explosives in or near Canadian fisheries waters. Canadian technical report of fisheries and aquatic sciences 2107. DFO, Wright DG, Hopky GE. 1998. [2] Ontario Provincial Standard Specification (OPSS) in the document OPSS 120 – General Specification for Use of Explosives, 2014 November.	
ECCC	FC-103	ECCC-103	5.6.5.2 (table)	The timing of daily construction work is provided in this table. Work shifts are proposed to be “standard 12 hour shifts to minimize working at night” yet the actual times are not specified. Avoiding night work will likely be beneficial to some species at risk, but how will day work affect species at risk? **Expectation to address comment**: Provide actual work times, by season, or at least approximate stopping times (e.g., at least one hour before sunset). Explain how daytime activities during the construction phase will affect species at risk, such as bats in maternity roosts. This information would be needed to support potential SARA permitting.	The table 5.6.5-2 is now Table 5.6.5-1 in the revised EIS. The standard 12 hour shift requirement has been removed from the EIS. CNL notes that this statement was also removed from Revision 0 (March 2017) and the comment was based on an earlier draft of Section 5.6 (December 2016). Sensory disturbance (i.e., lights, smells, noise, human activity, alteration of viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution. Detailed information on how bats respond to anthropogenic noise is limited and varies among species; however, it is known that female bats may abandon their maternity roosts and young if noise is at a sufficient level. Bats have been found to abandon roosts when they are directly disturbed by human activity, especially those causing loud and sudden noises. Information on how noise (decibel) levels effect roosting bats is not currently available. (Section 5.6.7.7.1 of revised EIS). CNL does not consider the noise from the NSDF construction to be significantly adding to the current level of disturbance. The current level of noise on the EMR site comes from the CRL built-up area (400 m away direct line) and the Plant Road (50 m away) is already high.NL is of the opinion that the species in the area of the proposed NSDF site are already acclimated to high noise level and the effect is not significant. The following management practice/mitigation measure to mitigate noise effects on species at risk has been added into Table 5.6.5-1 for “Sensory disturbance” • Activities with a high noise level (e.g., rock crushing) will be completed during day light conditions. • Work inside closed buildings may take place during non-daylight conditions.	Accepted
ECCC	FC-104	ECCC-104	5.6.5.2 (table)	A road mitigation plan is to be developed primarily to address risks of road mortality to the Blanding’s Turtles. ECCC requires a copy of	CNL has started implementing the detailed Blanding’s Turtle Road Mortality Mitigation Plan [1], and will continue to implement the plan moving forward. The Blanding’s Turtle Road Mortality Mitigation Plan [1] is designed to reduce or eliminate turtle road mortality at CRL	Accepted

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				the plan which will be reviewed prior to issuing a SARA permit. The mitigation plan should be implemented prior to construction traffic commencing and prior to the Blanding's Turtle active season. The mitigation plan should specify the fencing parameters to be followed as well as the type of any additional crossing structures. Consult the recent Ontario Ministry of Natural Resources and Forestry's guide to road mitigation for amphibians and reptiles. The EIS did not include procedures for dealing with species at risk (e.g., Blanding's Turtle, snapping turtle, eastern whip-poor-will, common nighthawk, etc.) if found injured on roads, or risk of illegal collection of turtles. An integrated pest management (i.e., weed management) plan is also proposed, but not provided. **Expectation to address comment**: Provide a road mitigation plan for effects on species at risk for ECCC to review, which includes mitigation details, procedures for dealing with injured species at risk and illegal collecting. Provide an integrated pest management plan, which includes measures for dealing with noxious/invasive species if they do become established and potential impacts on, and mitigation for, species at risk from herbicide application. These would be needed to support potential SARA permitting.	and increase connectivity among habitats. This plan includes mitigation implemented in four key areas: driver awareness; installation of permanent exclusion fencing; creation of nesting mounds; and replacement of culverts in key areas. Please note that the CRL site is a secured facility where only authorized people can access the site. CNL is of the opinion that illegal collection is not an issue at CRL. As per Section 5.6.4.9.3, with the implementation of the comprehensive mitigation noted in [1], CNL's activities in the RSA are predicted to have a net neutral or positive effect on the local Blanding's turtle population during the Base Case. That is, the mitigation that is or will be implemented on the CRL Site is considered sufficient to limit and offset mortality from previous and existing anthropogenic activities in the RSA. There is uncertainty regarding the effectiveness of mitigation, but monitoring and adaptive management will be implemented so that CNL achieves a net neutral or positive effect (i.e., not significant) on the Blanding's turtle population at CRL. The construction, operations and closure phases of the NSDF Project have the potential to introduce or spread noxious weed or invasive species into new areas, which can disrupt plant communities, decrease habitat quality for wildlife, decrease species diversity directly through competition and impact species at risk. The primary operational concerns for the NSDF Project upon which the Invasive Species Management Plan [2] focuses are: • Vehicle traffic on site; • Soil disturbance, and; • Trees and other unprocessed wood product transported on-site for elsewhere in Canada without proper assessment. To prevent the spread of unwanted noxious weeds and invasive species, an Invasive Species Management Plan [2] will be implemented during the construction, operations and closure phases. Reference [1] Blanding's Turtle Road Mortality Mitigation Plan, CRL-03710-REPT-002, Revision 0, 2019 November. [2] Invasive Species Management Plan, 232-03710-PLA-001, Revision 0, 2018 March.	
ECCC	FC-105	ECCC-105	5.6.7.2 (Canada warbler)	The Canada warbler recovery strategy states that land conversion, forest harvesting and silviculture, and removal of shrubs are primary threats to this species. This project will	See comment ECCC-103 (noise). The current Recovery Strategy for the Canada Warbler states: • There is a lack of understanding and data to indicate the appropriate configuration of	Accepted

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				exacerbate all of these threats (an estimated 25 hectares of suitable breeding habitat will be destroyed). It is stated that potentially suitable Canada warbler breeding habitat is broadly available in the RSA, but it is not reported if this habitat is currently unoccupied and available to displaced birds. This section refers to the "resilience and adaptability limits" of this species, which are undefined. The number of individual Canada warblers impacted by the project has not been estimated. Noise levels are mentioned as a potential source of disturbance but the spatial and temporal distribution of noise or an adequate analysis of how noise might impact Canada warbler in the LSA and RSA was not provided. **Expectation to address comment**: Examine means to avoid destruction of suitable breeding habitat for Canada warbler or explain why this is not possible. If not possible, propose mitigation (e.g., habitat enhancement or creation) to compensate for the loss of breeding habitat. Attempt to define resilience and adaptability limits for Canada warbler and explain why the destruction of 25 hectares of suitable breeding habitat for this species is within these limits. Provide an estimate of the number of individual Canada warblers that could be impacted by project construction. Provide an analysis of the impact of noise on Canada warbler habitat and individuals, including isopleth mapping. In addition to the 25 hectares of suitable habitat that will be lost through clearing, identify the amount of Canada warbler habitat that will be lost as a result of disturbance levels and edge effects from the proposed development. Describe potential mitigation measures to address this effect on this species.	important landscape biophysical attributes; • Habitat requirements may vary across the range of the species; • There is a lack of data related to the species presence and abundance in large portion of its range; • It is unclear whether certain habitats with specific biophysical attributes may be functionally more important than others; and, • The relationship between anthropogenic disturbance and habitat quality are poorly known. The Recovery Strategy document does not provide any information for the identification of suitable habitat. This analysis has been conducted in the EIS to the best of our knowledge. If the suitable habitat analysis conducted is accurate, according to a density estimates available on the Boreal Avian Modelling Project website, the Canada Warbler density estimate for Bird Conservation (BCR) 12 in Ontario would be of 0.0732 male per ha. A total of 25 ha of suitable breeding habitat is proposed to be removed which could represent 1.83 singing males. Noise levels greater than 50 dB can negatively affect birds. Canada warblers may avoid otherwise suitable habitat in areas where NSDF Project activities create noise levels greater than 50 dB. (Section 5.6.7.2.1 of the revised EIS). To mitigate potential sensory effects not only on only the Canada Warbler but other terrestrial species, CNL will avoid conducting the activities with highest levels of noise and habitat disturbance during most sensitive life history phase (i.e., breeding and nesting for birds) by conducting vegetation clearing and grubbing before April 8 or after August 31 to avoid effects on nesting birds. Because the NSDF construction will be initiated outside of the breeding season with the vegetation removal, the level of noise in the area when the birds will come back from migration will already be higher than baseline noise level. For this reason if the level of noise represent a stressor, pairs will naturally be displaced and build their nests in a location where they are comfortable.With the estimated 1701 ha of suitable habitat present at CRL, CNL is of the opinion that the Canada Warbler is adequately protected with the information available today.	

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ECCC	FC-106	ECCC-106	5.6.7.3 (Eastern whip-poor-will)	This section states that ~1 hectare of suitable eastern whip-poor-will habitat would be destroyed, but the confidence in eastern whip-poor-will habitat mapping was characterized as only moderate. The habitat analysis for the eastern whip-poor-will appears to only include areas within 50 m of wetlands, excluding all other forested areas as being too mature (figure 5.6.4-7). The recovery strategy for the eastern whip-poor-will indicates that nesting habitat can include “edges of forest with a dense tree cover” and “sparse conifer plantations” (section 3.3, Needs of the eastern whip-poor-will). Given that there are a number of linear disturbances that create forest edges in the proposed construction site (e.g., access roads, power line corridors) these areas should be considered as potential nesting habitat. In addition, the plantation in the proposed construction site should be evaluated as potential nesting habitat, as it was described as an “immature coniferous forest” (section 5.6.4.1.1). Noise levels are mentioned as a potential source of disturbance but an analysis of the spatial and temporal distribution of noise and how noise might impact eastern whip-poor-will in the LSA and RSA was not provided. Eastern whip-poor-will may nest in areas that have been cleared of vegetation from the construction, yet no analysis or mitigation is presented. **Expectation to address comment**: Provide a fuller analysis of suitable habitat for eastern whip-poor-will in the LSA. Provide estimates of how many individual eastern whip-poor-will might be impacted by project construction and the impact of noise on eastern whip-poor-will, including isopleth mapping. In addition to the 1 ha of suitable habitat that will be lost through clearing, describe the amount of eastern whip-poor-will habitat that will be lost as a result of	As outlined in Section 5.6.7.3.1 of the revised EIS, the NSDF Project is estimated to remove approximately 2 ha of suitable breeding habitat for eastern whip-poor-will, which is 15.4% of suitable habitat in the LSA and 0.3% of suitable habitat in the RSA (Table 5.6.7-6 of revised EIS). The development of the NSDF Project is unlikely to have a measurable effect on eastern whip-poor-will habitat distribution and movement in the RSA given the small size of the SSA and its location in the southeastern portion of the RSA, where most existing human disturbance is concentrated (Figure 5.6.7-5 of revised EIS). Text has been added into Section 5.6.4.4.3 - Eastern Whip-poor-will Survival and Reproduction that describes survey effort for whip-poor-wills. Species-specific surveys for whip-poor-will were completed in the Regional Study Area (RSA) in 2013. Four individuals were recorded as using habitats in the RSA. An additional three birds were recorded using habitats outside the RSA. Eastern whip-poor-will was identified as a possible breeder in the OBBA survey square 18TUS00, but was not recorded in the other OBBA survey squares that overlap the RSA; however, whip-poor-wills have been regularly reported using habitats in areas surrounding the RSA (eBird 2017). A nest has been confirmed in 2019 at CRL 3 km northwest of the SSA.	Accepted

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				disturbance levels and edge effects from the proposed development? Provide analysis and, if necessary, mitigation for the possibility of eastern whip-poor-will nesting in areas that have been cleared of vegetation. Define resilience and adaptability limits for eastern whip-poor-will and explain why the destruction of 1 hectare eastern whip-poor-will habitat is within these limits.		
ECCC	FC-107	ECCC-107	5.6.7.4 (Golden-winged warbler)	The golden-winged warbler recovery strategy states that breeding habitat loss or degradation due to human activities is one of the primary threats to this species and this project will exacerbate this threat (an estimated 24 ha of suitable breeding habitat destroyed). It is stated that there is an overall abundance of suitable golden-winged warbler habitat in the RSA, but it is not reported if this habitat is unoccupied and available to potentially displaced birds. It is not mentioned whether the 24 ha of lost habitat is potential critical habitat. The recovery strategy for this species identifies a focal area that includes the Chalk River property. Critical habitat is identified using 10x10 kilometer grid squares; although no grid squares appear to overlap the Chalk River property. This section refers to the "resilience and adaptability limits" of this species, which are undefined. The number of individual golden-winged warblers impacted by the project has not been estimated. Noise levels are mentioned as a potential source of disturbance but the spatial and temporal distribution of noise or an adequate analysis of how noise might impact golden-winged warbler in the LSA and RSA was not provided. **Expectation to address comment:** Examine means to avoid destruction of suitable breeding habitat for golden-winged warbler or explain why this is not possible. If not possible,	The information applicable to the Golden-winged warbler is now in Section 5.6.4.6. In the Golden-winged warbler Recovery Strategy, the main threat is identified to be competition and genetic swamping (hybridization) from the closely-related Blue-winged Warbler. The Blue-winged Warbler is not known to be present at CRL. Loss of breeding habitat through development is a medium level of concern, moderate severity and the causal certainty is medium. The Recovery Strategy does not identify any critical habitat significantly overlapping the CRL site (with the exception of square 18US00, a small portion of the CRL site located at the North-West). But, CNL recognizes that the CRL site is located within the focal area GL-10, an area of 178,400 ha. The Recovery Strategy recognizes that the habitat selection by the Golden-winged Warbler appears to occur at multiple scales. Forest landscapes are initially selected and within these forested areas, the Golden-winged Warblers are found nesting in a shifting mosaic of suitable habitat, often created by disturbances. The composition of the landscape may be as important as the composition of the local nesting and foraging habitat itself. It is CNL's understanding that at the moment there is 3,000 ha of critical habitat or 2% of the entire focal area that is identified in GL-10. Knowing that a breeding pair requires at least 2 ha GL-10 critical habitat has the potential for 1,500 breeding pairs and CRL could host over 1300 breeding pairs if all of the suitable habitat were to be used. If size of the CRL property 2% of critical habitat was scaled back, as present in GL-10, would represent 75 ha. Even if there is no critical habitat identified at CRL, to meet the current representation of GL-10, CNL would need to provide 75 ha of suitable habitat for the species. In addition, the Golden-winged Warbler sightings reported in the EIS are from 1997, not meeting the Ontario Habitat Occupancy Criteria. With the large potential for suitable habitat at CRL, the removal of 24 ha is not likely to affect the species.	Accepted

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				propose mitigation (e.g., habitat enhancement or creation using management tools like prescribed burning) to compensate for the loss of breeding habitat. Provide an analysis of critical habitat for golden-winged warbler in the LSA. Define resilience and adaptability limits for golden-winged warbler and explain why the destruction of 24 ha of suitable breeding habitat for this species is within these limits. Provide an estimate of the number of individual golden-winged warblers that could be impacted by project construction. Provide an analysis of the impact of noise on golden-winged warbler habitat and individuals, including isopleth mapping. In addition to the 24 ha of suitable habitat that will be lost through clearing, describe what amount of golden-winged warbler habitat will be lost as a result of disturbance levels and edge effects from the proposed development. Describe potential mitigation measures to address this effect on this species.		
ECCC	FC-108	ECCC-108	5.6.7.5 (Bats – little brown myotis, northern myotis and tri-colored bat)	The bat species at risk recovery strategy identifies the following threats to little brown myotis, northern myotis and tri-coloured bat: habitat loss and degradation (e.g., destruction or degradation of hibernacula, maternity roosts, and foraging areas), and disturbance or harm (e.g., industrial disturbance). This project will exacerbate these threats (an estimated 25 ha of suitable habitat destroyed). The EIS indicated no SARA permit would be required to destroy bat maternity roosts when not occupied. Although roost sites will not likely be occupied during vegetation clearing, they are considered residences under SARA and are protected on federal Crown land. As such, a permit is required for their destruction. Noise levels are mentioned as a potential source of disturbance but the spatial and	Information on Bats is now found in Section 5.6.4.8 of the revised EIS. To address specific comments: 1) Table 5.6.5-1 of the revised EIS indicates that: tree clearing and grubbing in complex forested habitat, will occur before April 8 or after August 31 to avoid effects on nesting birds and bat maternity roosts. 2) Section 5.6.4.8 includes information on a bat telemetry study that is being conducted over the course of two years, 2019 and 2020 to track bats to their maternity roosts. These roosts will be monitored for activity levels to determine the size and importance of each roost. The study involves netting for all three federally listed bat species and affixing radio transmitters to select individuals. In addition to determining the location of maternity roosts, the type of habitat being used for each roost will be assessed. The field work in 2019 and resulted in 20 bats being captured and suitable to be fitted with a radio-transmitter. Those bats led to the identification of 15 different tree roosts composed mainly of large-tooth aspen (*Populus grandidendata*). This information will allow for increased protection of maternity roosts on the CRL site, outside of the NSDF footprint, and will also aid in protecting the species at a larger	Accepted

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				temporal distribution of noise or an adequate analysis of how noise might impact species at risk bats in the LSA and RSA was not provided. The EIS indicates the project is "compliant" with the long-term distribution objective for these species. The evidence presented does not support this conclusion. It is also possible that the project may not support the population objective for these species. The EIS states there will be no direct mortality of bat species at risk caused by the project, but it should be noted there is potential for destruction of residences and individuals during blasting. For example, bats can roost under rocks on the ground and be killed during construction or blasting. This section refers to the "resilience and adaptability limits" of these bat species, but these limits are undefined. **Expectation to address comment**: Examine means to avoid destruction of bat maternity roosts or explain why this is not possible. If not possible, propose mitigation (e.g., habitat enhancement or creation) to compensate for the loss of potential roost (maternity and other) sites. Provide an estimate of the number of individual species at risk bats (by species) and species at risk bat residences that could be impacted by project construction. Provide evidence that alternative roost sites are actually present and unoccupied outside of the project area and that such habitat is not limiting. Remove the reference that a SARA permit is not required to destroy bat species at risk maternity roosts that are not active. Provide an analysis of the impact of noise on bat species at risk residences and individuals, including isopleth mapping. Remove	landscape level as the research conducted will increase the knowledge of local specific habitat requirements. With a greater understanding of important biophysical attributes at the landscape scale these elements can be protected which will allow for preservation of important summer roosting habitat in Ontario. This information will be used for the development of a Sustainable Forest Management Plan (FMP) at CRL. With a FMP in place, CNL will be in a position to better manage tree removal activities elsewhere at CRL. In implementing a Sustainable FMP, CNL will ensure to maintain through time sufficient roost trees required to maintain the local bat population, in line with the species distribution objective, as published in the Recovery Strategy. For this reason, the NSDF project won't contribute to significant adverse effects. CNL installed eight bat boxes at CRL in 2017 and surveys conducted in 2018 confirmed that little brown myotis used five of these eight boxes. Availability of maternity roosting habitat is not likely a limiting factor for bats in the Base Case, within the boundaries of the Regional Study Area. 3) It is not possible to provide a population estimate of individuals of SARA-listed bats or their residence that could be impacted by the project. The information provided below explain how an estimate of roost occupancy was conducted. 4) Table 5.6.4-9 outlines maternity roosting habitat availability in the Regional (RSA) and Local Study (LSA) areas. A total of 1,149 ha (30.0%) and 86 ha (41.0%) of suitable maternity roost habitat for bats is estimated to occur in the RSA and LSA respectively, in the Base Case. Forest plot data collected demonstrate a high density of suitable roost trees for bats in forest stands encompassing the project footprint. Acoustic monitoring in the proposed NSDF footprint during roost emergence window indicates that SARA-listed bats are roosting in suitable roost trees, although estimated occupancy per suitable roost tree is lower than most other stands at CRL. Overall, the data strongly support a conclusion that some roosts used by SARA-listed bats will be damaged or destroyed by the NSDF project, but that potential roost tree occupancy is low. The presence of White Nose Syndrome (WNS) in populations of little brown myotis, northern myotis, and tri-colored bats have been reduced by 94% in WNS-affected provinces such as Ontario. If local populations have been affected by WNS, the population will be well below the size required for roost trees to be limiting. Preliminary results from the telemetry conducted by Trent University at CRL during the summer of 2019, demonstrate that bats were frequently changing roosts over the course of the summer. 5) The statement regarding offsetting for removal of potential (but unverified) bat maternity roosts not being required under SARA has been removed from the revised EIS. The revised EIS does however state that maternity roots are not considered critical habitat under	

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				statements concluding that the NSDF Project would be compliant with population/distribution objectives of the bat species at risk recovery strategies or provide further evidence supporting this statement. Remove statements that no direct bat mortality will be caused by the proposed project, identify what components of the project may lead to bat mortality and propose measures to mitigate those effects. Define resilience and adaptability limits for bat species at risk and explain why the destruction of 24 ha of potential maternity roost habitat for these species is within these limits.	Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), the northern myotis (*Myotis septentrionalis*), and the tri-colored bat (*Perimyotis subflavus*) in Canada (https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_LittleBrownMyotisNorthernMyotisTricoloredBat_e_proposed.pdf) Text from the bat Species at Risk Act (SARA) Section 73 Permitting Support technical memorandum has been added into Section 5.6.7.7.1 to provide evidence that alternative roost sites are actually present and unoccupied outside of the project area and that such habitat is not limiting. 6) Text regarding impacts of noise on bats has been added to Section 5.6.7.7.1 -Bats Residual Effects Analysis. Site clearing and sensory disturbance during the construction and operations phases of the NSDF Project could also result in adverse changes to the availability of potential bat maternity roosting habitat in the LSA adjacent to the SSA if the level of disturbance causes avoidance and abandonment of occupied maternity roosts. Detailed information on how bats respond to anthropogenic noise is limited and varies among species; however, it is known that female bats may abandon their maternity roosts and young if noise is at a sufficient level. To mitigate potential sensory effects not only on bats but other terrestrial species, CNL will Avoid conducting the activities with highest levels of noise and habitat disturbance during most sensitive life history phase (i.e., breeding and nesting for birds) by conducting vegetation clearing and grubbing before April 8 or after August 31 to avoid effects on nesting birds. 7) This statement that NSDF Project would be compliant with population/distribution objectives of the bat species at risk recovery strategies has been removed from the revised draft EIS. 8) This statement that no direct bat mortality will be caused by the proposed project remains in the revised EIS with additional text. Section 5.6.7.7.1 states there will be no direct mortality of bats as a result of the NSDF Project, as the largest potential cause of mortality, removal of trees containing maternity roosts with juveniles that are not yet mobile, has been avoided through clearing outside of the period when roosts are occupied. Blasting activities are also not expected to result in direct bat mortality to bats that may be roosting under rocks as blasting will occur outside of the roosting period. 9) Text regarding bat resilience/adaptability limits has been added into Section 5.6.4.8.3. Little brown myotis, northern myotis and tri-colored bat populations that overlap the RSA are within the WNS-affected area of Canada. Consequently, these populations are particularly susceptible to any additional sources of changes to survival or reproduction because the resilience and adaptability limits of these populations may have been exceeded in the Base Case.	

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					Bats are highly mobile and commonly use human structures for maternity roosting, both of which are characteristics associated with their resilience. However, all three bat SAR species present at CRL are relatively long-lived, have low reproductive rates (females typically have one pup per year) and have considerably depressed population numbers in areas affected by WNS. These characteristics make SAR bat populations sensitive to increases in mortality and slow to recover after a reduction in population size. The available information provides evidence that SAR bats have currently surpassed their limits of adaptability and resiliency, in particular with respect to additive sources of mortality. Because the source of this mortality is WNS associated with hibernacula and has caused rapid population decline while habitats have remained relatively static, it is also clear that roosting habitat is not limiting for bat SAR. This is especially true at CRL, where potential roosting habitat is relatively common (i.e., 1,149 ha).	
ECCC	FC-109	ECCC-109	5.6.7.6 (Blanding's Turtle)	Critical habitat is that habitat deemed necessary for the survival or recovery of species at risk. The Blanding's Turtle recovery strategy lists the main threats to this turtle as land conversion for development, road networks, human-subsidized predators, and illegal collection. Other threats identified include invasive species, water management, and heavy machinery. This project will exacerbate all of these threats and 22 ha of proposed critical habitat would be destroyed. The EIS states that the effects on critical habitat distribution and connectivity will have minor effects, yet no evidence is provided to support this assertion. The increased noise and light are not expected to have measureable effects on the behaviour of Blanding's turtle and that Blanding's turtle under water (or otherwise) will be 'protected' from vibrations caused by blasting. No evidence is provided to support any of these statements. Blanding's turtle are suspected of using vocalizations underwater to communicate with potential mates, but impacts of noise/vibrations are unstudied (J. Congdon, pers. comm. 2016). The EIS states that the main Blanding's turtle migration corridors through the wetlands will remain intact within the LSA but data are lacking on	Information on Blanding's Turtles is now found in Section 5.6.4.9 of the revised EIS. To address specific comments: 1) As outlined in Section 5.6.7.8.1 of the revised EIS, the NSDF Project is estimated to remove 26 ha of critical habitat for Blanding's turtle, which represents a loss of 14.5% of the critical habitat in the Local Study Area (LSA) and 0.9% of the critical habitat in the RSA (Table 5.6.7-18). The direct removal of 26 ha is mainly composed of upland habitat. The transfer line to Perch Lake was included in the Project footprint and, as such, some wetland habitat was conservatively assumed to be removed by the transfer line. However, the transfer line will be installed underground using high-pressure directional drilling and so will not require surface disturbance (i.e., avoids the destruction of critical habitat). A small trench (2 m depth) will be excavated in the shoreline of Perch Lake to install the discharge transfer line, and a steel pile foundation will be used to suspend the line over the soft sediments in the open water section of the lake. The destruction of critical habitat for the Blanding's turtle will require a permit under Section 73 of SARA. ECCC issues permits for activities affecting species listed on Schedule 1 of SARA on a case-by-case basis. Approximately two-thirds of the project footprint falls within the proposed critical habitat defined by ECCC and within habitat of category 3 as defined by the Ontario Ministry of Natural Resources and Forestry. According to the General Habitat Description for the Blanding's Turtle of the OMNRF, category 3 habitat is described as having the highest tolerance to alteration. Nevertheless, habitat creation will take place in the form of nest mounds. Nest mounds will be created in areas known to be used by turtle species, and upon approval from ECCC, nest cage will be installed to protect nests from predation. 2) CNL is in ongoing engagement with ECCC regarding this species at risk and the management of the CRL site and consequent protection and conservation of the	Rejected with Follow-Up IR ECCC-2-09

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				known movement patterns. Blanding's turtle can overwinter terrestrially as hatchlings, thus potentially be harmed or killed during vegetation clearing and blasting. It is stated that a comprehensive road mitigation plan will be developed for the NSDF Project, but it has not been provided. ECCC cannot fully assess the impacts of this project, without reviewing the road mitigation plan. It is stated that the effects from road mortality are anticipated to be infrequent and "reversed at the end of operations (long term)". Should road mortality occur over the operational life of the project, it is unlikely that these effects would be reversed at the end of the project. Halting road kill does not reverse the effects that have already occurred. Given that Blanding's turtles have been observed at locations on all sides of the LSA and there are large wetlands within the LSA it is likely that some Blanding's turtle hibernate in some of these wetlands. The EIS states that effluent discharges from the project site will enter these adjacent wetlands and that this may change downstream discharge and water levels (table 5.6.5-1 Pathways Analysis). Anything which alters water levels of wetlands used for hibernation could potentially cause mortality of Blanding's turtle. Given that Blanding's turtle nesting habitat has not been identified to date in the LSA it is uncertain if the construction will destroy nesting habitat. This is a significant risk as the proposed site is 30 m from occupied wetlands. Blanding's turtles can nest >400 m from the nearest wetland (Blanding's turtle COSEWIC report) so areas along the power line corridors, the East Mattawa Road, or other open areas could be permanently lost as nesting habitat. **Expectation to address comment**: Examine means to avoid loss of Blanding's turtle	population and its habitats. Critical habitat will be assessed annually to ensure no significant loss at CRL and to highlight compensation measures initiated at CRL or elsewhere. As such, the residual effect from the NSDF Project on Blanding's turtle habitat availability is predicted to be neutral. 3) As outlined in Section 5.6.7.8.1 of the revised EIS, sensory disturbance (e.g., noise, light) during the construction, operations and closure phases could indirectly reduce Blanding's turtle habitat availability in the LSA if Blanding's turtles avoid areas adjacent to the SSA. The population of turtles using the Regional Study Area (RSA) has likely adapted somewhat to the current level of activity in the RSA. Additionally, records of this species nesting in active sand and gravel pits, as well as along roadsides are not uncommon, which suggests Blanding's turtles can tolerate some level of anthropogenic sensory disturbances. The incremental increase in noise and light caused by the NSDF Project is not predicted to have a measurable effect on the behaviour of Blanding's turtles in adjacent habitats (such as Perch Lake). Blasting activities in the Site Study Area (SSA) will meet the DFO guidelines for protection of fish and fish habitat from vibrations, chemicals and sedimentation, and it is anticipated that this protection will also extend to turtles and turtle habitat. Additionally, Blanding's turtles will be excluded from access to the SSA, so it is not anticipated that vibrations from activities within the SSA will have an effect on Blanding's turtles. 4) The CRL Turtle Road Mortality Mitigation Plan [1] is referenced in the revised EIS (Section 5.6.4.9.3) and will be included as part of the SARA permit application. CNL has committed to reducing turtle road mortality through implementation of the Blanding's Turtle Road Mortality Mitigation Plan [1]. Application of the plan is predicted to greatly reduce potential for road mortality in the Base Case, as a result the conclusion of the revised EIS has been updated. As per Section 5.6.9, with the implementation of the comprehensive mitigation noted in [1] as well as in Section 5.6.8, CNL's activities in the RSA are predicted to have a net neutral or positive effect on the local Blanding's turtle population during the Base Case. That is, the mitigation that is or will be implemented on the CRL Site is considered sufficient to limit and offset mortality from previous and existing anthropogenic activities in the RSA. There is uncertainty regarding the effectiveness of mitigation, but monitoring and adaptive management will be implemented so that CNL achieves a net neutral or positive effect (i.e., not significant) on the Blanding's Turtle population at CRL. Turtle hatchlings have been reported to sometimes overwintering buried in the ground as opposed to water. This strategy has been reported in the literature not to be successful for all species of turtles. For this reason, efforts should be put towards creation safe and appropriate nesting mounds for turtles to go to without risking road mortality, their nests should also be protected and monitored. This strategy will yield in much more success than on preventing the potential effects on terrestrially overwintering hatchlings.	

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				proposed critical habitat or explain why this is not possible. If not possible, propose mitigation (e.g., habitat enhancement or creation) to compensate for the loss of critical habitat. Provide evidence that effects on critical habitat distribution and connectivity will have minor effects on Blanding's Turtle (especially in light of the statement on page 158 that "The use of the habitat within the SSA [proposed construction site] by Blanding's turtles is not known"). This may require further survey data to support. The proponent is encouraged to discuss this matter further with ECCC. Provide evidence that noise, light and blasting will have minimal effects on Blanding's turtle. If available, provide data on the main Blanding's turtle movement routes, and if not, provide evidence that they will remain intact and functional. Provide an analysis of the potential impacts on terrestrially overwintering Blanding's turtle. Provide a comprehensive road mitigation plan for Blanding's turtle. Remove the statement that effects of road mortality are anticipated to be reversed at the end of the project. Provide analysis of known Blanding's turtle nest and hibernation sites in the LSA and RSA. Provide an analysis of any changes in wetland water levels and their potential effect on hibernating Blanding's turtle and how this can be mitigated.	5) Text in Section 5.6.7.8.1 - Blanding's Turtle Residual Effects Analysis regarding the reversibility of road mortality effects has been changed to irreversible. 6) As outlined in Section 5.6.4.9.1, nesting locations for the local populations are undefined. Therefore, there has been no nesting habitat confirmed in the Site Study Area to date. CNL is committed to developing nesting habitat on the CRL site by building nesting mounds at eight culverts (see Section 5.6.7.8 for more details). Artificial nest mounds will be constructed on both sides of the culverts following guidelines developed by the Northeast Blanding's Turtle Working Group. These artificial nesting mounds will be monitored for use by turtles during the nesting period using methods adapted from provincial protocols. Specifically, nesting surveys will be conducted at least once per week during the nesting period (May 15 to June 30); additional surveys will be completed after periods of rain to capture potential increases in nesting behaviour associated with even light rainfall. During nest mound inspections, maintenance of the nest mounds (e.g., vegetation removal) will occur if females are not present. More details on the locations of nesting mounds are presented in Section 5.6.4.9.3 of the revised EIS. There are four known hibernacula at CRL and none are located in the LSA or the SSA. Those habitat are closely monitored and turtle movement pattern from and to are well known and documented and do not travel in the LSA or SSA. 7) The potential for effluent discharges to the exfiltration gallery to affect water levels in East Swamp wetland and potential fish habitat has been assessed. The annual treated effluent discharge volume is a small percentage of the water-balance of the East Swamp Wetland (Section 5.4.1.5.2.2). Groundwater flow modeling indicates that impact of the effluent discharges on water-levels will be localized to the vicinity of the exfiltration gallery. A portion of the treated effluent may also be routed to Perch Lake for direct discharge to Perch Lake. The expected discharge volumes will not have an effect on Perch Lake water levels. Reference [1] Blanding's Turtle Road Mortality Mitigation Plan, CRL-03710-REPT-002, Revision 0, 2019 November.	
ECCC	FC-110	ECCC-111	5.6.8 Bats	The proposed monitoring and follow-up for bats is to install and monitor bat boxes. It is unclear what baseline data on bats are available for the study area and hence how comparisons from bat box surveys can be made. The statement "Offsetting the removal of unoccupied bat maternity roost trees is not required under SARA" is not accurate. Bat	The statement regarding offsetting for removal of potential (but unverified) bat maternity roosts not being required under SARA has been removed from the revised EIS. The revised EIS does however state that maternity roots are not considered critical habitat under Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), the northern myotis (*Myotis septentrionalis*), and the tri-colored bat (*Perimyotis subflavus*) in Canada (https://www.registrelep-	Accepted

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				species at risk maternity roost trees are residences as defined by SARA and residences (occupied or not) are protected under the Act. Offsets may be required, but avoidance of removal is the first priority of protection. It is difficult to know if the proposed installation of 16 bat boxes is sufficient to offset the loss of 30 ha of forest for three different SARA-listed bat species. Tri-colored bats in particular are known to roost alone or in small numbers (recovery strategy) suggesting that 16 bat boxes would not provide room for very many bats. **Expectation to address comment:** Provide baseline data for bats and explain how monitoring of bat boxes can be compared to baseline. Remove the statement regarding SARA requirements and offsets of removing bat maternity roosts. Consider inventorying for potential maternity roost trees in the proposed construction site. Surveying for potential maternity roost trees in the proposed construction site would help determine how many such trees would be lost during construction and would provide guidance for how many bat boxes would be required to compensate for this loss. The proponent is encouraged to discuss this matter further with ECCC.	sararegistry.gc.ca/virtual_sara/files/plans/rs_LittleBrownMyotisNorthernMyotisTricoloredBat_e_proposed.pdf) The Bat Species at Risk Act (SARA) Section 73 Permitting Support technical memorandum has been added to the EIS as Appendix 5.6-4. This technical memorandum provides details on baseline survey methods and results for bats and bat habitat. CNL installed eight bat boxes at CRL in 2017 and surveys conducted in 2018 confirmed that little brown myotis used five of these eight boxes. Availability of maternity roosting habitat is not likely a limiting factor for bats in the Base Case, within the boundaries of the Regional Study Area. Section 5.6.4.8 includes information on a bat telemetry study that is being conducted over the course of two years, 2019 and 2020 involving netting for all three federally listed bat species and affixing radio transmitters to select individuals. These individuals will be tracked to their maternity roosts and these roosts will be monitored for activity levels to determine the size and importance of each roost. In addition to determining the location of maternity roosts, the type of habitat being used for each roost will be assessed. The field work in 2019 and resulted in 20 bats being captured and suitable to be fitted with a radio-transmitter. Those bats led to the identification of 15 different tree roosts composed mainly of large-tooth aspen (*Populus grandidendata*). This information will not only allow for increased protection of maternity roosts on the CRL site but will also aid in protecting the species at a larger landscape level as the research conducted will increase the knowledge of local specific habitat requirements. With a greater understanding of important biophysical attributes at the landscape scale these elements can be protected which will allow for preservation of important summer roosting habitat. This information will be used for the development of a Sustainable Forest Management Plan at CRL.	
ECCC	FC-111	ECCC-110	5.6.8 Birds	It is suggested that the Monitoring Avian Productivity and Survivorship (MAPS) Program be used to ‘collect data on relative abundance and other key demographic parameters of bird species at risk. The MAPS program involves mist nesting and banding of birds and is expected to be run every year. In addition, it is a diurnal program that would not be appropriate to monitor the largely	There are currently no MAPS stations at CRL. As outlined in Section 5.6.4.4.3, species-specific surveys for whip-poor-will were completed in the Regional Study Area (RSA) in 2013. Four individuals were recorded as using habitats in the RSA. An additional three birds were recorded using habitats outside the RSA. Eastern whip-poor-will was identified as a possible breeder in the OBBA survey square 18TUS00, but was not recorded in the other OBBA survey squares that overlap the RSA; however, whip-poor-wills have been regularly reported using habitats in areas surrounding the RSA (eBird2017). A nest has been confirmed in 2019 at CRL 3 km northwest of the SSA.	Accepted

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				crepuscular/nocturnal eastern whip-poor-will. It has not been stated whether other MAPS stations (i.e., benchmarks) are already established in the RSA. It is unclear what baseline data available for the study areas. If no MAPS stations are currently present, it is not clear how monitoring data from new MAPS stations can be compared to the pre-disturbance condition. **Expectation to address comment:** Explain why the MAPS protocol was suggested to monitor relative abundance and how many proposed/existing MAPS stations there are. Propose a more appropriate monitoring method for eastern whip-poor-will.	Specifically for NSDF and elsewhere on-site, songbird's baseline data were collected using audio files analysis collected in 2013 and 2016. CNL recognizes that some level of granularity is lost in using passive recorders to collect data as opposed to conducting point count surveys. After discussion with the local OMNRF, it was agreed that this loss of granularity could be mitigated by increasing the survey effort, i.e. recording time to increase the detectability of bird species. A total of 3000 minutes were recorded and analysed for a total of 42 survey locations at CRL, representing an average of 71 minutes per locations. A point count survey following the breeding bird survey methodology would have yielded in additional breeding evidence (e.g., visual evidence) but the detection time would have been significantly reduced to a total of 126 minutes for the 42 points. This methodology has been endorsed by ECCC as a total of $26,605 has been provided to CNL via the Interdepartmental Recovery Fund program (IRF #2177). The funds received through this IRF proposal was also supporting the survey of Nightjars (Common Night hawk and Eastern Whip-poor-will). Text regarding monitoring of species at risk has been added into Table 5.6.8-1 - Monitoring and Follow-up Programs for Terrestrial Biology, as well as Table 11, 0-1.	
ECCC	FC-112	ECCC-112	5.6.8 Blanding's turtle	The Blanding's turtle monitoring/follow-up plan lacks details. Table 5.6.8-1, on Monitoring, indicates that the proponent will track road mortality and use adaptive management. A more detailed monitoring plan is required, that describes how often surveys will be conducted. If road surveys are not conducted frequently during the nesting period then road mortality can be overlooked. Reducing road mortality across the entire property may help compensate for the loss of 22 ha of proposed critical habitat; this matter should be discussed further with ECCC. Consider a habitat creation plan to help compensate for the loss of proposed critical habitat (e.g., creating additional nesting habitat). Consider options for introducing other threat reduction strategies (e.g., caging of nests). Nest cages have been proven to increase hatching success of eggs by reducing nest predation. An increased production of juveniles can lead to an increase in the adult population over time.	Table 5.6.8-1 and Table 11.0-1 provides the conceptual follow up monitoring for the Blanding's Turtle related to the NSDF Project. An EA Follow Up Program, which will include Blanding's Turtles is being drafted and will be finalized pending environmental assessment approval. The CRL Turtle Road Mortality Mitigation Plan [1] is referenced in the EIS (Section 5.6.4.9.3) and will be included as part of the SARA permit application. The Blanding's Turtle Road Mitigation Plan will be included as part of the SARA permit application. CNL started impleme*nting the Turtle Road Mortality Mitigation Plan [1]* in 2019, and will continue to implement the plan moving forward. The plan is designed to reduce or eliminate turtle road mortality at CRL and increase connectivity among habitats. This plan includes mitigation implemented in four key areas: driver awareness; installation of permanent exclusion fencing; creation of nesting mounds; and replacement of culverts in key areas. A key component of the *Blanding's Turtle Road Mortality Mitigation Plan* is the use of monitoring and adaptive management to determine the efficacy of mitigation and to develop and implement improvements to mitigation. CNL notes that a number of mitigation measures in the plan have been or will be implemented in the near future. This includes employee awareness, and the installation of four culverts on with the in the fall of 2019. Reference	Rejected with Follow-Up ECCC-2-10

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				Expectation to address comment: Provide more details on the Blanding's turtle monitoring and follow-up in terms of road mortality surveys and possible road mitigation plans across the property. Consider developing a habitat creation plan and/or threat reduction plan to provide an overall benefit to the species.	[1] Blanding's Turtle Road Mortality Mitigation Plan, CRL-03710-REPT-002, Revision 0, 2019 November.	
ECCC	FC-113	ECCC-26	5.7 (5.7.4.6, 5.7.4.7, 5.7.4.8, 5.7.4.9) (Ambient Radioactivity)	Throughout this draft chapter, information about the existing environmental monitoring programs at the CRL site was presented for environmental parameters that are relevant to the assessment of ecological risk from the project. While the information from existing environmental monitoring programs is valuable in providing an overview of the existing conditions throughout the CRL site, it is not specific to the preferred location of the NSDF. In order to better inform what the baseline conditions are at the preferred location for the NSDF, it expected that additional baseline information for air, surface water, sediment quality, groundwater, soil quality, fish, terrestrial plants and animals, to the extent possible, should be collected in the immediate vicinity of the preferred NSDF site. This would apply to both radiological and non-radiological parameters. **Expectation to address comment**: As the details of the project are further developed, it is requested that site-specific baseline data be collected at relevant stations in the preferred NSDF site in order to inform the evaluation of the risk from the project onto the environment. This includes the sampling of air, surface water, groundwater, soil, sediment, terrestrial plants, terrestrial animals and fish, to the extent possible, for both radiological and non-radiological parameters. Should data from existing monitoring stations be used in the	Section 5.7 of the revised EIS includes additional site-specific ambient radioactivity data collected since the draft EIS. For example, the revised section provides additional data on radioactivity in the atmospheric environment, surface water, groundwater, soil and vegetation, aquatic sediment, fish and terrestrial foodstuffs. Much of the data is from the immediate vicinity of the NSDF or within the RSA. Since the draft EIS additional NSDF specific characterization of radiological and non-radiological constituents in the environment has included: a) Additional radiological and non-radiological groundwater baseline data has been collected and added to Section 5.3.2.4.2.2. Long term groundwater quality data from a site adjacent to the NSDF site and data specific to the Site Study Area (SSA) has been included in the EIS. b) A survey of radioactivity in fish in the Perch Lake was conducted and results [1] included in Section 5.7.4.9 (Radioactivity in Fish). c) Radioactivity in soil (Section 5.3.1.4.2.4) and vegetation (Section 5.7.4.7) on the NSDF site [2,3] d) Metal concentration in soil at the NSDF Site (Section 5.3.1.4.2.4) [4] e) Additional characterization of radiological and non-radiological constituents in the surface water and sediments within the Perch Lake Watershed. The surface water data is included in the tables providing surface water quality modelling results (Section 5.4.2.6 and Sections 3.1 and 3.2 of [5]. CNL has initiated air sampling at two locations adjacent to the NSDF site and analysis of the air samples for non-radiological and radiological constituents. This data has not been included in the EIS. Bore-hole logs are provided in Appendix A of the Groundwater Flow Modelling of the Near Surface Disposal Facility which is a technical supporting document of the revised EIS. , Document # 232-509249-REPT-001, Rev 4, 2017 May. References	Accepted

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				assessment of ecological risk, justification for using the data from these stations in the ecological risk assessment should be provided.	[1] Characterization of fish collected from Perch Lake, 2018 July 26 to 2018 August 09, 232-121221-401-001, Revision 0, 2018 December. [2] Analysis of Surface Soil Samples from the Proposed Near Surface Disposal Facility Site, 232-121270-TD-004, Revision 0, 2017 October. [3] Analysis of Composite Samples of Trees on the Proposed NSDF Site, 232-121270-TD-002, Revision 0, 2017 June. [4] Metal Concentrations in Soil to be Excavated at the NSDF Site, 232-121266-021-000, Revision 0, 2018 November. [5] Characterization of Water and Sediments from and Around Perch Lake, 232-121221-REPT-002, Revision 0, 2018 September. [6] Groundwater Flow Modelling of the Near Surface Disposal Facility. 232-509249-REPT-001, Revision 5, 2019 July.	
ECCC	FC-114	ECCC-74	5.7.4.10.2	Terrestrial vegetation monitoring is not indicated to be conducted at the NSDF site. The report presents data from terrestrial vegetation monitoring conducted in the East Swamp wetland, located directly west of the NSDF site. It is known that contamination exists in the East Swamp wetland due to groundwater plumes from the Chemical Pit and Reactor Pit 2. Although the data from the East Swamp wetland are valuable in examining the local site study area, site-specific sampling would provide site specific baseline data that would be more relevant to the NSDF Project. **Expectation to address comment**: Provide a justification as to why terrestrial vegetation monitoring would not be conducted at the NSDF site and consider its monitoring ahead of the project starting.	Terrestrial vegetation monitoring for radioactivity for the NSDF footprint has already been performed in 2017 in accordance with CNL's Environmental Protection Program requirements. The monitoring conducted verified that the vegetation to be removed is free of radiological contamination [1]. Section 5.7.4.7 of the revised EIS has been updated to reflect this work. Reference [1] Analysis of Composite Samples of Trees on the Proposed NSDF Site, 232-121270-TD-002, Revision 0, 2017 June.	Accepted
ECCC	FC-115	ECCC-68	5.7.4.2	The liquid radiological effluent verification monitoring program described in this section was not provided. This monitoring program is useful to provide information on existing liquid effluent monitoring locations (and their	Section 5.7.4.2 of the revised EIS has been updated to reflect the most recent data available from CNL's effluent verification monitoring program.	Accepted

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				distances to the NSDF site), monitoring frequencies, parameters measured, and reference points for the baseline characterization of radioactivity. **Expectation to address comment:** Provide the liquid radiological effluent verification monitoring program described in this section as part of the EIS.	CNL submitted the report for *Environmental Monitoring in 2017 at Chalk River Laboratories,* CRL-509243-ASR-2017, Revision 0 in 2018 June. CNL also submitted the report for *Environmental Monitoring in 2018 at Chalk River Laboratories,* CRL-509243-ACMR-2018, Revision 0 in 2019 June.	
CNSC	FC-116	CNSC-85	5.7.4.7	CNL provided radionuclides concentrations in Bq/g and sometimes in Bq/kg. **Expectation to address comment:** Please ensure that all radionuclides concentration are in Bq/kg for consistency with other sections and ease of comparison purpose.	CNL has retained the use of Bq/kg units specifically for environmental media, consistent with the CSA N288 series. When discussing waste inventory CNL has utilized Bq/g units consistent with the CSA N292 series.	Accepted
ECCC	FC-117	CNSC-125 **ECCC-71**	5.7.4.7	The report states, "*No data are available for radioactivity in soil within the NSDF site*". In order to accurately understand baseline radioactivity conditions, site-specific soil monitoring should be conducted, especially considering the legacy contamination that is present throughout the site. **Expectation to address comment:** Provide a justification as to why on-site soil quality monitoring was not conducted as part of the EA and consider collecting baseline soil quality data within the project area.	Section 5.3.1.4.1 of the revised EIS has been expanded to include a summary of geotechnical investigations performed, including additional work since the draft EIS. As described in Section 5.3.1.4.2.4 of the revised EIS and [1], soil samples were collected at 36 locations within the site study area (SSA) and analyzed for radioactivity and metals (non-radioactivity). The analytical results for metals in surface soils at the SSA are below the provincial background values and are comparable to CRL site wide background values for soils. As per Section 5.7.4.7 of the revised EIS, the soil analysis results concluded that the SSA does not contain radionuclide concentrations above local background levels. Reference [1] Analysis of Surface Soil Samples from the Proposed Near Surface Disposal Facility (NSDF) Site, 232-121270-TD-004, Revision 0, October 2017.	Accepted
ECCC	FC-118	ECCC-73	5.7.4.9	Clarification is required regarding the baseline radioactivity information in fish sampled at Perch Lake. The information provided only shows fish sampled for tritium oxide (HTO) and organically bound tritium (OBT). Fish sampled in Chalk Lake (Maskinonge Basin) were examined for multiple radionuclides including carbon-14, cesium-134, cesium-137, tritium, organically bound tritium, gross alpha,	Canadian Nuclear Laboratories collected additional background information (baseline data), on fish and fish habitat in Perch Lake 2016 through 2018, which is summarized in Section 5.5.4 and Section 5.7.4.9 as well as in the two reports [1, 2]. These studies included an analysis of radioactivity in fish in Perch Lake. References [1] Ichthyfauna Survey Data for Perch Lake, Toussaint Lake, Main Stream, and East Swamp Stream. Canadian Nuclear Laboratories ENVP-509200-021-000, Revision 1, 2017 November.	Accepted

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				gross beta, and potassium-40. According to figure 5.4.1-2 in section 5.4 (Draft Version 2.3) the Maskinonge Basin does not drain into the Perch Lake drainage basin where the NSDF site is located and therefore does not represent the current contamination of fish in Perch Lake. The EA should provide detailed results of the monitoring conducted for fish in Perch Lake, as this data will provide important baseline information before the onset of NSDF operations. The fish sampling program in Perch Lake was referenced to document: CNL ETB 2016 – Recent Perch Lake Radiological Data. However, this document was not provided. **Expectation to address comment:** Explain why more data on the radionuclides measured in Perch Lake were not reported in the EA report. Provide the reference document "Recent Perch Lake Radiological Data" CNL ETB 2016, with the Final EIS for review. Fish from Perch Lake Basin should be tested for the same radionuclides as the fish from Maskinonge Basin to assess current levels of contamination in fish in Perch Lake.	[2] Characterization of Fish Collected from Perch Lake, 2018 July 26 to 2018 August 09. R& D Technical Memorandum. Near Surface Disposal Facility (NSDF). Reference No. 232-121221-401-001, Revision 0, 2018 December.	
CNSC	FC-119	CNSC-140	5.7.6.1.1	CNL indicates "*Dose to non-human biota from waterborne emissions is calculated during the operations phase, as well as during the post-Institutional Control (i.e., after 2400) period for the NSDF Project.*" **Expectation to address comment -** CNL is requested to clarify why (if this scenario has not been considered) dose to non-human biota from waterborne emissions is not considered (calculated) during the ICP (i.e., 2100 to 2400) with the assumption that the final cover will not perform as required (breached) and/or the ECM liner can fail and leachate will seep	An updated approach to Ecological Risk Assessment (EcoRA) [1] during the post-closure phase has been prepared as a Technical Supporting Document to the revised EIS. Dose to non-human biota from waterborne emissions during the post-closure phase (including the institutional control period) has been assessed for scenarios which consider base liner and final cover failures. The EcoRA provides a quantitative assessment of the radiological dose under the expected conditions of evolution of the site and disposal facility as well as for other evolutions of the site assessed within the PostSA [2], which have a pathway to non-human biota. This includes unlikely and extreme conditions. The PostSA developed the various scenarios assessed using the systematic Features, Events and Process (FEPs) screening process. Within the Normal Evolution Scenario, and all scenario variations based on it, conservative degradation rates for the base line and cover systems are utilized in the modelling. That is, all	Accepted

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				through it. It is expected that a quantitative assessment of the radiological impact under expected conditions of evolution of the site and disposal facility and under unlikely and extreme conditions to be completed.	scenarios assume that precipitation is able to infiltrate into the facility, through the waste and then leach into the surrounding geosphere. Thus waterborne emissions during the Institutional Control phase, as well as the potential dose consequence to non-human biota, is now accounted for. Additionally there are multiple scenarios which specifically address the expectation to explore if the base liner and final cover systems do not perform as anticipated and include: Enhanced Degradation of the Cover and Liner, Enhanced Erosion Case, Localized Cover Failure, Localized Liner Failure, Role of Cover and Role of Liner. The assessment and results of these scenarios are presented in Section 5.7.6 of the EIS where the EcoRA determined that negligible residual effects are expected. References [1] NSDF Ecological Risk Assessment, 232-121240-ASD-001, Revision 0, 2019 November. [2] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	
CNSC	FC-120	CNSC-141	5.7.6.1.1	CNL indicates "*Dose to non-human biota from airborne emissions is calculated only for the operations phase of the NSDF. This represents the bounding case, since it is expected that doses to non-human biota during the post-closure would be less than the operations phase with the installation of the final cover*". **Expectation to address comment -** While the last statement above could be true and reasonable, CNL should not solely rely on an "expectation" but to justify and support their statement/judgement with qualitative or quantitative facts (estimation, etc.).	An updated approach to Ecological Risk Assessment (EcoRA) [1] during the post-closure phase has been prepared as a Technical Supporting Document to the EIS. Dose to non-human biota from airborne emissions during the post-closure phase has been explicitly assessed. A revised PostSA [1] has been prepared and considers the airborne pathways for release of contaminants into the environment, specifically volatiles (e.g., radon, tritium) may be released into the air and have the potential to affect ecological health. Thus, the PostSA calculates the contaminant concentrations in environmental media and the EcoRA utilizes these contaminant concentrations to assess the effect on non-human biota. This statement has been removed from the EIS as airborne releases have been appropriately considered during the post-closure phase and their effects on non-human biota are anticipated to be negligible as presented in Section 5.7.6 of the EIS. References [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [2] NSDF Ecological Risk Assessment, 232-121240-ASD-001, Revision 0, 2019 November.	Accepted
CNSC	FC-121	CNSC-191	Table 5.7.6-1 & 3 (EIS) and WAC report table 6.1	Table 6.1 in the WAC report provides activity criteria for alpha, long-live beta/gamma and short-live beta/gamma radionuclide for all waste streams. It is unclear how the criteria in table 6.1 relate to waste inventory used in the	The inventory provided in the EIS is a bounding inventory used to estimate impact on environment and human health. The WAC is designed to ensure that the wastes emplaced in the NSDF do not exceed the bounding inventory used in the EIS.	Accepted

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				EIS (tables 5.7.5-1&3) and in the Post-closure Safety Assessment (table 4.2 and 4.3). **Expectation to address comment:** Please clearly explain how the activity criteria in table 6.1 of the WAC report relate to radionuclide inventories used in the EIS, PA and SAR.	Intermediate level waste has been removed from the proposed NSDF inventory. The WAC [2] has been revised and Section 3.3.3 of the EIS has been updated accordingly. The WAC still ensures the wastes emplaced within the NSDF do not exceed the reference inventory used to inform the EIS or various Technical Supporting Documents. Reference [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September.	
CNSC	FC-122	CNSC-144	5.7.6.1.1.2, Page 68 (and other sections)	CNL indicated that the "*effluent is discharged from the WWTP to an infiltration area ultimately leading to the East Swamp wetland*". **Expectation to address comment -** CNL should provide justification and rationale as to why the treated effluent is discharged to an infiltration area ultimately leading to the East Swamp wetland rather than discharging for example directly to the Ottawa River or any other discharge point?	The effluent management strategy has been updated and expanded in the revised EIS. Section 2.5.7 of the revised EIS documents expands the discussion of the five effluent discharge options with an explanation for the preferred option of discharge to ground via the exfiltration gallery and discharge to Perch Lake. As shown in Figure 3.1.1-1 the proposed location of the discharge point (i.e. exfiltration gallery) is located approximately 100 m east of East Swamp and is located within the NSDF Site Footprint CNL can provide assurance that discharged effluent will not flow back towards the ECM. Groundwater flow in the vicinity of the discharge point is towards East Swamp, a topographic low. The elevation of the ECM is well above the location of the discharge point. There is no groundwater flow towards the ECM. This has also been confirmed through groundwater flow modelling which have assessed the impact of discharge on groundwater flow patterns. Impacts are localized to the immediate vicinity of the discharge location with flow migration towards East Swamp. There is no flow towards the ECM [1]. Reference [1] Groundwater Flow Modelling of the Near Surface Disposal Facility Chalk River Site, 232-509249-REPT-001, Revision 5, 2019 July.	Accepted
ECCC	FC-123	ECCC-76	5.7.6.1.3	In the discussion of guideline selection for cobalt, it is stated that the screening value for cobalt was adopted from the recently derived *Federal Environmental Quality Guideline* of 5.2 µg/L (Environment Canada, 2013).	The screening value (i.e. the Effluent Discharge Target) for Cobalt has been revised and is 0.9 µg/L, based on the Provincial Water Quality Objective (see Table 3.4.2-3). The Provincial Water Quality Objective was selected as it is more restrictive than the CCME Guideline value. Cobalt, Fluorine and Thallium have been screened in to the revised surface water quality assessment. Beryllium was not included in the assessment as the source term is negligible. The maximum predicted wastewater concentration before treatment is 1.9E-06 mg/L, approximately 4 orders of magnitude below the PWQO of 11 µg/L (See EIS Table 3.4.2-3).	Accepted

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				According to this reference, the *Federal Water Quality Guideline for protection of aquatic life* is 2.5 µg/L, not 5.2 µg/L as listed in the report. **References:** Environment Canada. 2013. *Federal Environmental Quality Guidelines: Cobalt*. *Canadian Environmental Protection Act, 1999*. February 2013. **Expectation to address comment:** Revise report or provide clarification on value reported (5.2 µg/L).	The screening process for surface water quality assessment has been updated and is provided in Section 5.4.2.6.1.4 of the revised EIS. Screening criteria included high projected effluent concentration relative to effluent discharge targets, high existing baseline concentrations, potential for nutrient effects, ionic composition and various metals known to be toxic to aquatic life. These effluent discharge targets are the most restrictive of CCME guidelines for protection of aquatic life and Provincial Water Quality Objectives for protection of aquatic life. The COPC's identified for inclusion in the surface water quality assessment are: • major ions [sodium, potassium, calcium, magnesium, chloride, sulphate, fluoride], • nutrients [nitrate, nitrite, ammonia, and total phosphorous], and • metals [aluminum, antimony, barium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, tin, uranium, vanadium, and zinc]. Organics compounds were not carried forward for the surface water quality assessment as they are generally present in trace amounts with no obvious source in the waste inventory. See Section 3.4.2.2 Section 5.4.2 and [1]. Background concentrations for non-radiological constituents, including fluoride and sulphate, have been collected and are included in the presentation of modelling results in the Technical Support Document for Surface Water Quality [1]. Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	
CNSC	FC-124	CNSC-184	5.7.6.1.3 Exposure assessment	CNL provides the methodology to calculate total dose rates to non-human biota. However, CNL does not provide the input values used in these radiological exposure assessments so it is not possible for CNSC staff to verify the total doses predicted for the 4 scenarios. **Expectation to address comments:** Please provide calculation examples and input values for each variables in the exposure equations so	An updated approach to Ecological Risk Assessment (EcoRA) [1] has been prepared for the post-closure phase and will be submitted as a Technical Supporting Document to the EIS. The EcoRA includes a comprehensive presentation of data and calculations, in sufficient detail for traceability and repeatability purposes to independently validate the calculations. This includes input values used in the exposure assessment as well as sample calculations have been provided in an Appendix of the EcoRA.A summary of the methodology for the radiological dose assessment for non-human biota is captured in Section 5.7.6.1 of the revised EIS. Reference [1] NSDF Ecological Risk Assessment, 232-121240-ASD-001, Revision 0, 2019 November.	Accepted

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				that CNSC staff can verify the adequacy of the calculations.		
ECCC	FC-125	ECCC-78	5.7.6.1.3, Table 5.7.6-9	There are several chemicals in table 5.7.6-9 for which guidelines are not listed (for example, calcium, lithium, magnesium, manganese, potassium, etc.). For these chemicals, there is no discussion on the benchmarks that will be used in the assessment, or information on potential aquatic toxicity values available in literature. This information is especially important since the report states "*it is expected that effluent concentrations will meet the applicable Canadian Water Quality Guidelines for the Protection of Aquatic Life during the operations phase*". **Expectation to address comment:** Please provide clarification on the lack of guidelines for such chemicals and information on the alternatives that will be employed in cases where guidelines are unavailable.	Appendix 5.5-1 has been removed from the revised EIS however non-radiological exposure assessment for non-human biota is still performed for the NSDF Project for each the operations and post-closure phases. Post-Closure Phase An updated approach to Ecological Risk Assessment (EcoRA) [1], has been prepared for the post-closure phase and will be submitted as a Technical Supporting Document to the EIS. In general ecological toxicity benchmark values for non-radiological contaminants were obtained based on a hierarchy of sources which included Federal and Provincial guidelines such as CCME [2-4] and OMOE [5] as well as the U.S. EPA ECOTOX Database, U.S. EPA Ecological Soil Screening Levels, Suter and Tsao [6] and Sample et al. [7]. These hierarchies include credible, recognized references that are used in EcoRAs as common industry practice. The hierarchies generally incorporate CSA N288.6-12 guidance but in cases where N288.6-12 sources were considered outdated, values from more recent credible sources were used preferentially (with supporting rationale). More detailed descriptions of the methodologies used in selecting these toxicity benchmark values are presented Section 4.2 of the EcoRA. Operations Phase For the Operations phase, surface water quality a two tiered approach making use of effluent discharge targets and risk benchmarks/(No Effect Concentrations) described below. (See also Section 5.4.2.6.1 and [8]). Non-Radiological Constituents: The effluent discharge targets for non-radiological constituents, are based on protection of aquatic life for chronic exposure and are gathered from a variety of sources including the Canadian Council of Ministers of the Environment and Ontario Provincial Water Quality Objectives (PWQO). If both Federal and Provincial criteria were available, the lower value was used [9]. Other referenced documents are used when the CCME or PWQO documents were not available. Risk Benchmarks represent guideline values for acute exposure and are sourced from federal and provincial guidance and the literature. Values used and the source are listed in Table 5.4.2-5 of the EIS. Risk benchmarks were not available for all constituents. In these cases, the evaluation is based on effluent discharge targets based on chronic exposure. The surface water quality assessment [8], identifies Effluent Discharge Target and Risk Benchmark, used for each constituent.	Accepted

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					Radiological Constituents For radiological constituents, the effluent discharge targets represent Heath Canada drinking guidelines with the exception of Tritium for which a site specific discharge target was developed (Section 3.4.2.5.1 and [9]). The No Effect Concentrations are also used for the assessment and are based on radiation benchmarks for protection of aquatic biota (i.e., 400 uGy/hr for aquatic biota). The no effect concentrations are provided in Table 5.4.2-6 of the EIS. References [1] NSDF Ecological Risk Assessment, 232-121240-ASD-001, Revision 0, 2019 November. [2] Canadian Council of Ministers of the Environment (CCME). 1995. Protocol for the Derivation of Canadian Sediment Quality Guidelines for the Protection of Aquatic Life. CME EPC-98E. Prepared by Environment Canada, Guidelines Division, Technical Secretariat of the CCME Task Group on Water Quality Guidelines, Ottawa. https://www.ccme.ca/files/Resources/supporting_scientific_documents/pn_1176_e.pdf [3] Canadian Council of Ministers of the Environment (CCME). 2003. Guidance on Site-specific Application of Water Quality Guidelines in Canada: Procedures for Deriving Numerical Water Quality Objectives. http://ceqg-rcqe.ccme.ca/download/en/221 [4] Canadian Council of Ministers of the Environment (CCME). 2018. Canadian Environmental Quality Guidelines. http://ceqg-rcqe.ccme.ca/en/index.html [5] Ontario Ministry of the Environment (OMOE). 2011. Rationale for the Development of Soil and Groundwater Standards for Use at Contaminated Sites in Ontario. Standards Development Branch. PIBS 7386e01. 15 April. https://dr6j45jk9xcmk.cloudfront.net/documents/999/3-6-4-rationale-for-the-development-of-soil-and.pdf [6] Suter, G.W. and C.L. Tsao. 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. Prepared for the United States Department of Energy. [7] Sample, B.E., D.M. Opresko, and G.W. Suter II. 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. U.S. Department of Energy. June. [8] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	

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					[9] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	
CNSC	FC-126	CNSC-142	Table 5.7.6-3 Note 2, related to H-3	Tritium indicated total activity "*does not include sealed packages that may contain high tritium inventory*" Does this mean that CNL will revisit the initial total inventory to factor the sealed packages? How this will be reflected in case a decision is made to design the sealed packages in a way to prevent tritium leaching? **Expectation to address comment:** CNL should provide additional information in regards of the two options (decay-storage, packages leak-proof design) and how these will be implemented during facility operation.	The WAC [1], has been revised to specify the requirements for accepted packages for receipt/emplacement in the NSDF. Type 5 Packaged Waste has been divided into two sub-categories: non-leachate controlled waste packages and leachate controlled waste packages. Packages with higher concentrations of tritium (as well as other radionuclides), will be placed in leachate controlled waste packages. Additional reference to, and discussions of Type 5 waste has been provided in Section 3.3.1.1 of the EIS. Reference [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September.	Accepted
CNSC	FC-127	CNSC-196	Table 5.7.6-3, Performance Assessment Report (e-doc: 5224431), 1.7 Near Surface Disposal Facility Lifecycle	CNL uses radionuclides activities at 2400 (300 years after closure) instead of activities at 2100 to predict radiological doses to humans and non-human biota during the post-closure period (Scenario 3) and for the bathtub effect (Scenario 4). In doing so, CNL assumes that the integrity of the engineered cover will be actively maintained for 300 years until 2400. 197 It is not clear how significant a role the assumed institutional control plays in the safety case. Both G-320 and SSR-5 say that institutional control, especially active institutional control, should not be solely relied upon as a means to ensure safety. It needs to be demonstrated whether/to what degree the NSDF design relies on the 300 years of institutional control to meet with dose requirements As an example, the OPG DGR in their original EIS assumed the same 300 year institutional	The Performance Assessment was originally a mix of operational (pre-closure) and post-closure safety analysis. CNL has changed this approach to simplify the scope having the Safety Analysis Report (SAR) Technical Supporting Document include only operational (pre-closure) safety, and the Post Closure Safety Assessment (PostSA) Technical Supporting Document focus on the post closure period. The approach to the post-closure assessment has been revised to ensure an assessment is performed to demonstrate that the NSDF long-term safety is not reliant on institutional controls in order to meet the dose requirements. A revised PostSA [1] has been prepared and now utilizes the NSDF reference inventory [2] at closure (i.e., 2070) to predict radiological dose to humans and contaminant concentrations in the environmental media (which are in turn used to predict radiological dose to non-human biota in the Ecological Risk Assessment [3]). The modeling and calculations within the PostSA have included the following: The expected duration of the institutional control period in the Normal Evolution Scenario is at least 300 years. CNL recognizes that the institutional control will continue for as long as necessary and that 300 years has been used for planning purposes. A sensitivity case examines the impact of a shorter period of institutional control of only 100 years as opposed to 300 years (i.e., allowing for less radioactive decay to occur before a given post-institutional event occurs). Examining an alternative institutional control period	Accepted

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				control, but the Panel requested OPG to conduct dose calculations assuming that the institutional control period varied from 0-300 years. **Expectation to address comment:** CNL should conduct an assessment to demonstrate whether the NSDF design relies on the 300 years of institutional control to meet with dose requirements, i.e., use the radiological inventory at 2100 and provide predicted concentrations and dose to humans and non-human biota in the Perch Lake watershed and into the Ottawa River for the normal evolution scenarios.,. In the event that predicted concentrations in the Perch Lake watershed and doses to humans are unacceptably high, CNL should provide predictions to indicate how many years of institutional control are required to keep risk to an acceptable level.	provides useful perspective on the role the institutional control period plays in terms of doses to the receptor. The predicted concentrations and dose to human receptors can be found within Section 6 of the PostSA [1]. The predicted dose to non-human biota can be found within Section 5 of the EcoRA [3]. All predicted effects for human health and radioactivity in the environment are well below the regulatory criteria during post-closure phase. The results provide perspective that long-term safety of the NSDF is not reliant on institutional controls but primarily due to the inventory being restricted to LLW and the engineered barriers ensuring containment for an appropriate length of time to allow for radiologic decay. References [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [2] NSDF Reference Inventory Report, 232-508600-REPT-003, Revision 2, 2019 September. [3] NSDF Ecological Risk Assessment, 232-121240-ASD-001, Revision 0, 2019 November.	
CNSC	FC-128	CNSC-145	Table 5.7.6-4	CNL provided the predicted maximum concentrations of radionuclides in the Treated Effluent, but nothing about the concentrations of the radionuclides before treatment/processing at the WWTP. **Expectation to address comment:** CNL should provide the concentrations of radionuclides/contaminants in the ECM Leachate before treatment and information on how these concentrations were determined.	Section 3.4.2.2 of the revised EIS provides information on how leachate characteristics were estimated for the influent for both radiological and non-radiological contaminants of potential concern. Maximum predicted concentration in waste water as compared to effluent discharge targets are found in Table 3.4.2-2 (radionuclide) and Table 3.4.2-3 (non-radionuclide) of the revised EIS. In the 2017 draft EIS the determination of treatment required for Cs-137 was in error. The wastewater concentrations have been updated from the previous EIS to reflect the updated radionuclide and non-radionuclide inventories. Cesium-137 concentration (0.93 Bq/L) are below the effluent discharge target of 10 Bq/L thus treatment is not required.	Accepted
CNSC	FC-129	CNSC-146	Table 5.7.6-5 (and other sections)	CNL provided the concentrations of radionuclides in the ECM at year 2400. **Expectation to address comment:** To better reflect consideration and implementation of the “Design Optimization” principle as illustrated in G-320 and international standards requirements and guidance “*The design of a*	The approach to the post-closure assessment has been revised to ensure an assessment is performed to better reflect consideration and implementation of the “Design Optimization” principle as illustrated in REGDOC 2.11.1 [1], including the assessment of several new scenarios during the post-closure. A revised PostSA [2] has been prepared and utilizes the reference inventory [3] at closure (i.e., 2070) to predict radiological dose to humans and contaminant concentrations in the environmental media. Included in the revised assessment are “Defense-in-Depth” scenarios	Accepted

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				nuclear facility should be optimized to exceed all applicable requirements. In particular, a radioactive waste management facility should more than meet the regulatory limits, remaining below those limits by a margin that provides assurance of safety for the long term.", CNL should consider the groundwater transport scenario assessment during the ICP (i.e., year 2100 and beyond). Assuming the assessment assumptions are conservative, obtained results will show whether the design is adequate and meet the requirements. As such, CNL may improve and optimize the selected design including the minimization of operational and post-operational impacts.	which are aimed at building confidence in the performance of the NSDF after closure. These scenarios examine the extent to which the NSDF depends on key engineered barriers, and what would happen if those barriers were not present. This group of scenarios therefore involves hypothetical combinations in order to analyze the barriers in the system. Each scenario involves a change in one or more parameters related to a particular barrier; by comparing the results to those of the Normal Evolution Scenarios, the influence of the barrier is shown. The results are discussed in Section 6 of the PostSA [2] and demonstrate that the long-term safety of the facility is not reliant on any single engineered barrier thus, the design has been optimized to exceed all applicable requirements. References [1] REGDOC 2.11.1, Management of Radioactive Waste. [2] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [3] NSDF Reference Inventory Report, 232-508600-REPT-003, Revision 2, 2019 September.	
ECCC	FC-130	ECCC-79	Table 5.7.6-9	A review and revision of table 5.7.6-9 is required as there are some areas of error and missing information. A few examples below: • For cadmium, the CCME guideline is depended on water hardness, however; there is no footnote to indicate this. • For aluminum, the CCME guideline used (5 µg/L) is for pH < 6.5, however; there is no footnote to indicate this • pH and water hardness guidelines are missing, although some chemical guidelines are dependent on them • Carbon tetrachloride shows no CCME acute benchmark, although there is an existing interim benchmark of 13.3 ug/L (CCME, 1999) **Reference:** CCME. 1999. *Canadian Water Quality Guidelines for the Protection of Aquatic Life* – Halogenated Methanes - tetrachloromethane (carbon tetrachloride)	Table 5.7.6-9 was included in an early draft of the NSDF EIS (2016 December – note, the table in question was Table 5.7.6-16 (Predicted Non-Radiological Concentrations in Perch Creek and Comparison to Federal Provincial Guidelines. This table was removed from the March 2017 draft of the EIS (Revision 0) and is not included in Revision 1. A footnote has been added to Table 5.4.2-8 of the EIS regarding dependence of the CCME guideline for Cadmium on water hardness. For aluminum, the effluent discharge target is the most restrictive of CCME water quality guidelines. If ph≥6.5, the guideline is 100 µg/L, while CNL has opted to use 5 µg/L as the target. pH is included in the NSDF effluent discharge targets, 6.5 -9 (Table 3.4.2-3 of revised EIS). No effluent discharge target has been established for Bicarbonate Alkalinity as $CaCO_3$. Water hardness (CaCO3) has been screened into the surface water quality modelling assessment. All modelled hardness values were below the lower bound or within the drinking water treated effluent discharge target range (80 to 100 mg/L – Health Canada Drinking Water Quality Guidelines), with the exception of the 95th Percentile and Maximum concentrations at ESW for one scenario. Hardness is assumed to remain similar to background concentrations through the downstream Perch Creek and Perch Lake Watershed. Surface water quality modelling results for hardness are provided in Table 3-13 of the Technical Support document for Surface Water Quality [1]. With regards to justification for removal of carbon tetrachloride from the surface water quality assessment. Organic compounds were not included in the modelling as they are only present	Accepted

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				Expectation to address comment: Review table 5.7.6-9 for accuracy and completeness, and provide footnote information where applicable in the final EA report.	in trace amounts with no obvious source term in the waste inventory (Section 5.4.2.6.1.4 of the EIS). The chemical characteristics of the waste inventory are discussed in Section 3.3.3.3 and 3.3.1.3.1 of the revised EIS. References [1] CNL, Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November. [2] CNL, Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October. [3] NSDF Ecological Risk Assessment, 232-121240-ASD-001, Revision 0, 2019 November.	
CNSC	FC-131	CNSC-150	Table 5.7.7-1	The section number to which it is referred is missing in the last column “conservatism and assumptions” in the “Leaching and Transport Parameters” section. **Expectation to address comment:** Please revise to include the section number.	In Table 5.7.7-1 for leaching and transport parameters text has been included referring to the conceptual model parameter as well as the relevant Technical Supporting Document where conservatisms and assumptions are documented (e.g., Post-Closure Safety Assessment).	Accepted
CNSC	FC-132	CNSC-215	Table 5.8.2-2 (Page 5-535) Assessment Endpoints and Measurement Indicators for the Human Health Assessment	Changes to sediment quality, and changes to food quality (fish, meat, milk, etc.) were left out of the list of measurement indicators. **Expectation to address comment:** CNL is requested to acknowledge these measurement indicators.	The measurement indicators for the human health assessment are outlined in Table 5.8.2-2 including changes to sediment quality and changes to food quality.	Accepted
CNSC	FC-133	CNSC-151	5.8.5.1.1	CNL indicate that “*Radiological dose to members of the public may result from waterborne or airborne emissions from the NSDF Project. Dose to members of the public from waterborne emissions is calculated during the operations phase, as well as during the post-Institutional Control period (i.e., after year 2400) for the NSDF Project. It is assumed that during the Institutional Control period (year 2100 to year 2400), the ECM liner and cover will be functional and no leachate will seep through the ECM liner.*”	Section 5.8 has been revised to present the assessment of dose to members of the public during operation, closure and post-closure phases (including the institutional control period). A revised PostSA [1] has been prepared as a Technical Supporting Document and considers the Normal Evolution scenario as well as various Disruptive Event scenarios based on the systematic Features, Events and Process (FEPs) screening process. The Normal Evolution Scenario is based on a reasonable extrapolation of site and facility features, events and processes. Disruptive Event Scenarios postulate the occurrence of unlikely events leading to possible penetration or abnormal degradation of barriers. Specifically the Disruptive Event Scenarios have taken into account failure modes of the containment and isolation systems of NSDF. Reference [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	Accepted

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				G-320 states that "*Normal evolution scenarios should also take into account the failure modes of the containment and isolation systems. These failures can result not only from natural degradation of barriers, but from unpredictable disruptive events that might be expected to occur once or more during the assessment period, including penetration of the barriers by intrusion.*" **Expectation to address comment:** CNL should consider assessment of dose to members of the public during the operation, closure/post-closure, Institutional Control and post-Institutional Control periods. CNL should provide further justification when an assessment is not carried out for a specific phase and not only rely on own judgement or expectation/assumption.		
CNSC	FC-134	CNSC-152	5.8.5.1.1.3	CNL indicates "*For the operations phase modelling, it is conservatively assumed that no dilution occurs prior to the East Swamp wetland.*" **Expectation to address comment:** CNL should elaborate and explain what is meant by "no dilution occurs prior to the ESW" and confirm the discharge control/monitoring location of the treated leachate.	The intent was to say "For the operations phase modelling, it is conservatively assumed that no dilution occurs along the groundwater flow path from the WWTP effluent discharge to the East Swamp Stream." The revised text is in Section 5.8.6.1.1.1 of the revised EIS. The discharge targets for parameters are provided in Tables 3.4.2-2 (rad-constituents) and Table 3.4.2-3 (non-rad constituents). As noted in Section 3.4.2, the treated effluent goes into a Final Effluent Tank where it is sampled and the sample analyzed prior to discharging the treated effluent. In the event that the treated effluent does not meet the discharge targets, the effluent will be re-processed.	Accepted
CNSC	FC-135	CNSC-153	5.8.5.1.1.3	CNL indicates that "*The tritium inventory in bulk waste emplaced in the ECM, and hence releases from the ECM, will be controlled such that tritium concentrations in Perch Creek do not exceed the Drinking Water Limit.*" **Expectation to address comment:** CNL should document in the NSDF Licensing documentation, and summarize in the EIS, the process/procedure how the tritium inventory in	The WAC [1] has been revised to specify the requirements for accepted packages for receipt/emplacement in the NSDF. Type 5 Packaged Waste has been divided into two sub-categories: non-leachate controlled waste packages and leachate controlled waste packages. Packages with higher concentrations of tritium (as well as other radionuclides), will be placed in leachate controlled waste packages. Additional reference to, and discussions of the WAC, has been provided in Section 3.3.3 of the EIS. Reference	Accepted

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				bulk waste emplaced in the ECM will be controlled such that its concentration in Perch Creek (or any other water body) will not exceed the drinking water limit.	[1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September.	
CNSC	FC-136	CNSC-154	5.8.5.1.1.3	Inconsistencies regarding the post ICP groundwater transport scenario assumptions. **Expectation to address comment:** With respect to the post-ICP groundwater transport scenario assumptions, CNL is expected to elaborate and clarify their statement as indicated in the fifth bullet "*No credit is taken for the loss of the inventory due to the release occurring prior to the end of institutional control. This is a conservative approach, maximizing the inventory available for leaching*"…while table 5.8.5-3 shows concentrations of radionuclides in the ECM at year 2400?	This statement refers to loss of inventory due to leaching from the waste during operations phase when precipitation can infiltrate through the waste and leachate is collected and treated. This statement has been removed from the revised EIS. A revised PostSA [1], has been prepared and utilizes the reference inventory [2] at closure (i.e., 2070) to present the assessment of dose to members of the public during the post-closure phase (including the institutional control period). The revised approach for the human health assessment for the post-closure phase is summarized in Section 5.8.6.1.1.2 of the revised EIS and the results of human health assessment during the post-closure phase is presented in Section 5.8.6.1.2.2 of the revised EIS. Reference [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [2] NSDF Reference Inventory Report, 232-508600-REPT-003, Revision 2, 2019 September.	Accepted
CNSC	FC-137	CNSC-134	5.8.5.1.2 Radiological Dose Assessment Results, page 19	In order to understand which pathways are the larger dose contributors a breakdown of doses by exposure pathway is needed. **Expectation to address comment:** CNL is requested to provide a breakdown of doses by exposure pathways.	Section 5.8.6.1.2.2 has been updated in the revised EIS to include the highest calculated dose, the time at which the peak dose occurs as well a breakdown of the dose by key radionuclides and exposure pathways. A more detailed breakdown of each pathway and contributing radionuclides for each scenario assessed, can be found in Section 6 the revised PostSA [1]. Reference [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	Accepted
CNSC	FC-138	CNSC-216	5.8.6.1.1, Page 5-548 Application Case Methods	Releases to air from the WWTP were considered to be negligible compared to estimated releases from ECM and therefore, were not included in the assessment. **Expectation to address comment**: CNL is request to provide estimated releases to air from the WWTP and compare them to estimated releases from the ECM in order to better justify not including releases to air from the WWTP in the assessment.	The approach to calculating radiological airborne emissions and their effects on human health has been revised. Radiological airborne emissions as a result of the ECM and the wastewater treatment plant during the operations phase, are now both explicitly evaluated in the Safety Analysis Report (SAR) [1] and summarized in Section 5.8.6.1.1.1 and 5.8.6.1.2.1 of the revised EIS. The concentrations of radon, tritium, and carbon-14 in air near the surface of the ECM, as well as the resulting dose to the worker, are presented in Table 5.8.6-3 of the revised EIS. The highest emission rates from the WWTP were for americium-241, cobalt-60 and tritium, at about 0.04% of the CRL Derived Release Limits (DRL). The rest of the radionuclides were	Accepted

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					below 0.001% of the DRL. The dose to members of the public is therefore, predicted to be well below regulatory limits. Reference [1] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September.	
CNSC	FC-139	CNSC-219	Table 5.8.6-12 Doses to Potential Critical Groups due to Exposure to Waterborne Emissions for the Post-Institutional Control "Bathtub" Scenario Page 5-561	CNSC staff noted typos for the dose to one year old infant in table 5.8.6-12.	This specific table no longer exists within the revised EIS. The "bathtubbing" of the Facility in the post-closure is no longer considered as a specific scenario, but as a natural process potentially occurring in all scenarios, dependent on the water balance of the specific scenarios assessed. Within the Safety Analysis Report [1] and PostSA [2], doses to infants are still evaluated and input parameters have been verified. References [1] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September. [2] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	Accepted
CNSC	FC-140	CNSC-213	Table 5.8.6-13, Human Health Risk Assessment	In the non-radiological HHRA, table 5.8.6-13 lists the health-based guidelines for non-radiological parameters in surface water, but there are no units provided. Furthermore, it is unclear why, for many parameters, the most conservative available guideline was not used in the assessment. For example, the PWQO for cadmium was listed as 0.5 (units unknown but assumed to be µg/L), yet the value used in the assessment was U.S. EPA's guideline of 1.8 (units unknown but assumed to be µg/L). Furthermore, the guideline value for cadmium is also dependent on the hardness of water (e.g., 0.1 µg/L Cd for < 100 mg/L $CaCO_3$) and this was not considered in the assessment. Uranium, a chemically toxic COPC, was also not included in the non-radiological HHRA. The HHRA, therefore, may be less robust than would be desirable. **Expectation to address comment:** The	Section 5.8.6.2.1.3 discusses the guidelines that were used to assess the effects from non-radiological elements on human receptors. Units of the health-based guidelines of Table 5.8.6-7 are µg/L. The units are provided below footnote (h) in the table. The most conservative guideline was not always used in the assessment if it was based on ecological protection (e.g., many of the PWQOs are based upon effects to aquatic life), or if the value was an aesthetic objective or observational guideline as these are not health-based. Some additional text was included under the explanation of each source of guidelines in Section 5.8.6.2.1.3, and as noted in the first sentence under the Alternate Guideline subsection, alternate guidelines were considered where guidelines from federal or provincial jurisdictions were not health-based. The updated Surface Water Quality Assessment for cadmium predicted a negligible change in cadmium concentrations (See EIS Section 5.4.2.6.2 and Table 5.4.2-8). Cadmium was therefore screened out of the HHRA and is not included in Table 5.8.6-7 of the revised EIS. With respect to uranium, the chemicals with concentrations that were predicted by the water quality discipline to change as a result of the project were included in the assessment. Therefore,	Accepted

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				proponent is requested to revise the subject table, and provide justification on the choice of less conservative guideline for certain parameters taking into account the comments provided above. It is recommended that the most conservative available guideline be applied to the HHRA. Uncertainties associated with these guideline values should also be fully discussed in the appropriate section.	uranium was not considered to appreciably change in the environment such that an assessment was warranted.	
CNSC	FC-141	CNSC-220	5.8.6.1.1.2, Page 5-550, Receptor Characterization	Not enough detail was provided in the EIS on receptor characterization. For example, it is not clear which receptors are farmers. Although references were made to the DRL document, life style survey and Performance Assessment, the EIS should be able to stand alone as a publically available document. All assumptions used to estimate doses to receptors should be provided in the EIS. **Expectation to address comment**: CNL is requested to provide detailed descriptions of potential and hypothetical critical groups. CNL is also requested to provide all detailed receptor characteristics assumed for the dose estimates in the EIS including: all intake rates, indoor/outdoor occupancy factors, and any other assumptions.	Summaries of receptor characteristics are included in the revised EIS (Section 5.8.6.1.1.3). Specific modelling details (food ingestion rates, occupancy factors, etc.), are included in the Technical Supporting Documents for human health assessments, which include Appendix G of the Safety Analysis Report (SAR) [1] and Section 5.2.4.3.2 of the PostSA [2]. Most of the receptor data used are the default values from Canadian Standards Association (CSA) N288.1-14 [1]. References [1] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September. [2] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [3] CSA N288.1-14: Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities. March 2014.	Accepted
CNSC	FC-142	CNSC-217	5.8.6.1.1.3, Page 5-557, Contaminants	It is stated that, "(t)he contribution from fugitive emissions is considered to be negligible in comparison to ECM releases". **Expectation to address comment**: CNL is requested to provide an estimate for the contribution from fugitive emissions from the ECM to demonstrate that they are negligible.	The approach to calculating radiological airborne emissions and their effects on human health has been revised. Radiological airborne emissions as a result of the ECM and the wastewater treatment plant during the operations phase are now explicitly evaluated in the Safety Analysis Report (SAR) [1]. For example, Table 14-13 provides an estimated peak annual dose of 1.24E-02 mSv for an ECM worker from inhalation (i.e. dust). A revised PostSA [2], has also been prepared and considers volatiles (e.g., radon, tritium) that may be released from the ECM into the air during the post-closure phase. Section 5.8.6.1.2 of the revised EIS presents a summary of the assessment and results from these two Technical Supporting Documents in the assessment of Human Health.	Accepted

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					References [1] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September. [2] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	
CNSC	FC-143	CNSC-221	5.8.6.1.2, Page 5-558-561, Application Case Results	CNL should provide doses from each radionuclide and pathway. There should also be some discussion on which radionuclides and pathways contribute the most to the total estimated dose. This information is important to verify CNL's estimated doses. **Expectation to address comment:** CNL is requested to provide doses as a result of each radionuclide and pathway and comment on which radionuclides and pathways contribute the most to the total estimated dose.	Section 5.8.6.1.2.2 has been revised to include the highest calculated dose, the time at which the peak dose occurs as well a breakdown of the dose by key radionuclides and exposure pathways. A more detailed breakdown of each pathway and contributing radionuclides for each scenario assessed can be found in the revised PostSA [1]. The PostSA includes a comprehensive data and models section, in sufficient detail for traceability and repeatability purposes to independently validate the calculations. The calculation of doses to workers, members of the public and emissions to air or water during the pre-closure phase are contained within the Safety Analysis Report [2], which also presents sufficient detail for traceability and independent validation of calculations. For example, the SAR includes appendices which provide the detailed calculations of doses and emissions. References [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [2] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September.	Accepted
CNSC	FC-144	CNSC-218	5.8.6.1.2, Page 5-560, Table 5.8.6-10 Total Doses to Hypothetical Groups Using Water from the Perch Creek Outfall during Operations	The estimated doses provided in table 5.8.6-10 are inconsistent with the doses provided in the text by four orders of magnitude. **Expectation to address comment:** CNL is requested to explain how the doses of 190 µSv/year to 270 µSv/year to the hypothetical groups were determined. CNL is also requested to explain the discrepancy between these numbers and those provided in table 5.8.6-10.	There was a typo in the Draft EIS (2017). The tables referred to in the comments have been superseded and replaced. The relevant information is now presented in 5.8.6.1.2.1. The Safety Analysis Report (SAR) [1] is the Technical Supporting Document which provides further details on the dose assessment for human health during the pre-closure phase. Reference [1] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September.	Accepted
CNSC	FC-145	CNSC-222	Table 5.8.7-1: Uncertainties in the Human Health Assessment, Page 5-566	It is stated in the EIS that any issues identified with ECM during the period of institutional control can be mitigated. However, no detail was provided on mitigation measures.	The primary objective of this type of system is to prevent infiltration into the ECM – therefore ensure an intact cover system is the primary means to mitigate issues during the institutional controls. Examples of ECM failures and mitigation measures that would be implemented include:	Accepted

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				Expectation to address comment: CNL is requested to provide specific examples of mitigation measures that would be carried out for various ECM failures.	1) Erosion of the final cover system - Repair 2) Breach of the final cover system (localized)------ Inspect, Assess, repair , periodically access the leachate system for inspection and removal of leachate 3) Breach of the final cover system (multiple or indeterminant locations) Install a modern cover / cap system over the existing. Assess as above on localized breach 4) Groundwater monitoring wells detect abnormal performance results - Increase monitoring frequency – install additional wells and assess 5) Assessment of a breach of the base liner system(primary only) increase monitoring frequency , sample and assess leachate 6) Assessment of a breach of base liner system (e.g., primary and secondary) Assess and install a passive selective barrier or steel barrier with passive GW treatment) 7) Erosion of the berm – mitigated by keeping the vegetation healthy, but maximum 30 cm high. Section 11.2 of the revised EIS has been updated to provide a few specific examples of mitigation measures.	
CNSC	FC-146	CNSC-165	Figure 5.9.3-1	The RSA only covers the CRL property. As the regional study area only includes the CRL property, which is not accessible to the general public, it appears to limit the scope of the assessment of potential interactions of the project with traditional land use that may occur beyond the CRL property line in publicly accessible areas, where traditional activities are more likely to occur. **Expectation to address comment:** Please provide rationale for why the regional study area does not include an assessment beyond the CRL property line.	The RSA is defined as the area within which the potential effects of the NSDF Project may interact with the effects of other existing or reasonably foreseeable projects. The RSA for Land and Resource Use resource (Section 5.9) is the combined area of the air quality, terrestrial and aquatics RSAs, which have been used for the assessment of the air quality, groundwater, surface water, aquatic and terrestrial environments (Figure 5.9.3-1). The RSA is defined to capture effects on the terrestrial and aquatic environments as a result of the NSDF Project (e.g., habitat loss, sensory disturbance for wildlife and changes to habitat from air quality and surface water quality, changes in groundwater and surface water quality, habitat loss and changes in abundance, distribution and disturbances to wildlife and fish), as these effects have the potential to result in subsequent effects on land and resource use. Therefore, the RSA for land and resource use is a combination of the air quality and aquatic environment RSAs as this is the largest extent of potential cumulative effects on land and resource use. The air quality RSA is defined as an approximate 7.4 kilometre (km) circular radius surrounding the LSA, and the aquatic RSA includes the outlet of Perch Creek to the Ottawa River and extends roughly 8 km downstream in the Ottawa River to Harrington Bay. While there are no land and resource use tenures, or outdoor tourism or recreation activities occurring within the CRL site boundary, there may be some trapping occurring in Garrison Petawawa and in the RSA. The Ottawa River where it overlaps with the RSA boundaries would also most likely be used for some outdoor tourism and recreation.	Accepted
HC	FC-147	HC-8	5.9.4.1.3.5 Non-consumptive Tourism and Recreation, p.797	The section states “While tourism and recreation opportunities exist in Renfrew County, there are no tourism and recreation features in the RSA. There are also no access	Section 5.9.4.1.3.5 states that potential disturbance through existing traffic noise to people, including tourists and recreational site users, within the RSA is characterized with low levels of disturbance identified. As per Section 5.10.5.2.2, overall, the increase in transport vehicles is considered negligible in comparison to current traffic levels on the roads (personal vehicle	Accepted

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				points, boat caches (private or commercial), boathouses, club houses, designated camping sites, recreation camps, tourism establishment areas, potential tourism establishment areas, beaches, picnic sites, golf courses, resting areas, trailheads or Ontario Trail Network (OTN) trails in the RSA (MNRF 2016a)." However, the RSA selected for Land and Resource Use does not include the transportation route, therefore, effects of noise from increased truck traffic during construction may be underestimated. **Expectation to address comment:** Supplement the statement with a reference to the qualitative noise assessment in section 5.10.5.2.2, which does include the transportation route and would address effects from noise due to increased traffic on recreational users of adjacent lands.	traffic for over 2,000 employees and transport vehicles) to support operation of the CRL site. The change in long-term high annoyance is between 2.8% at 0.02 km and 0.5% at 0.5 km. The effect of increased traffic on noise levels is considered to be a slight but discernible change when compared to existing levels of traffic from current employees and operations at CRL. As such, this potential project-environment interaction is considered to have a negligible residual effect on quality of life. The detailed results of the noise effect study are presented in NSDF Project Construction-Related Road Traffic on Human Receptors [1].Section 5.9.5.2.1 also states that "beyond the RSA, a transportation route may affect the experience of recreation users via nuisance effects due to increased truck traffic. Section 5.10.5.2.2 provides a qualitative assessment of noise effects including the transportation route." Reference [1] NSDF Construction-Related Road Traffic on Human Receptors, 232-03710-REPT-002, Revision 0. February 2018.	
ECCC	FC-148	ECCC-82	Table 5.9.1-1	For the first area of interest (potential fish contamination in Ottawa River), the document states that "CNL has been monitoring the environment extensively, specifically Perch Creek" this statement appears to contradict the information provided in the Aquatic Habitat section (5.5) that used data that was over twenty years old. **Expectation to address comment:** Provide recent data of fish analysis and other related fish studies conducted in the various study areas and include in the Aquatic Habitat section.	Canadian Nuclear Laboratories collected additional background information (baseline data), on fish and fish habitat in Perch Lake, Toussaint Lake, Main Stream, and East Swamp Stream 2016 through 2018, which is summarized in Section 5.5.4 and in two reports [1, 2]. Within the Perch Creek basin, seven species were exclusive to lower Perch Creek, including Common Shiner, Longnose Dace, Fallfish, White Sucker, Johnny Darter, Logperch and Mottled Sculpin. It is assumed that species found in lower Perch Creek below the Perch Creek weir, also occur in the Ottawa River near the outlet of Perch Creek (e.g., shelf habitat near Point au Baptême) to meet their life history requirements (e.g., for foraging, overwintering). Species with relatively wide distributions in the Perch Creek and Perch Lake Watershed and also dominant species in upper Perch Creek included Fathead Minnow, Pearl Dace and Creek Chub. Abundant cyprinid species in Perch Lake included Bluntnose Minnow and Pearl Dace, and the dominant large-bodied species in the lake included Yellow Perch (40.4% of catch), Brown Bullhead (24.2% of catch) and Pumpkin seed (15.5% of catch). The dominant species in Main Stream were Pearl Dace and Fathead Minnow, and the only species captured in East Swamp Stream was Pearl Dace. References	Accepted

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					[1] Ichthyfauna Survey Data for Perch Lake, Toussaint Lake, Main Stream, and East Swamp Stream. Canadian Nuclear Laboratories ENVP-509200-021-000, Revision 1, 2017 November 16. [2] Characterization of Fish Collected from Perch Lake, 2018 July 26 to 2018 August 09. R& D Technical Memorandum. Near Surface Disposal Facility (NSDF). Reference No. 232-121221-401-001 Revision 0, 2018 December 11.	
CNSC	FC-149	CNSC-162	Table 5.9.1-1 and section 5.9.4.3	The EIS states *"As the proposed undertaking occurs within the general area of the Algonquins of Ontario Settlement Boundary…"* The proposed NSDF is also within the known traditional territory of the Métis Nation of Ontario, the Algonquin of Quebec and is also within the boundaries of the Williams Treaties. **Expectation to address comment:** The rationale for identifying traditional land use as an area of interest should be updated accordingly in the final EIS.	The information on Traditional Land and Resource Use is not found in Section 6.4.4.1 of the revised EIS. This section provides the methodology and results for the traditional land and resource use by Indigenous peoples. This section also outlines that the area of the NSDF Project is the traditional territory of the Algonquins of Ontario, composed of 10 Algonquin communities. It also recognizes the Mattawa/Lake Nipissing Traditional Harvesting Territory for the MNO Mattawa Métis Council, North Bay Métis Council and Sudbury Métis Council which is part of MNO Region 5. Use of the area around the CRL site by other Indigenous peoples is not certain. Indigenous interests expressed to CNL during engagement with these communities have been considered in the assessment. Information on traditional land use activities by Indigenous peoples has been drawn from: existing studies and reports; an MNO Traditional Knowledge and Land Use Study [1]; formal and informal consultation activities; and general knowledge of the region and the AOO. It should be noted that the AOO has received funding for a large traditional knowledge and land use study from CNSC and CNL and work has commenced but that work will be unlikely completed until well into 2020. Provided the AOO study is completed on time, it is CNLs intention to revise the traditional land and resource use section in the Indigenous Engagement Report [2] for submission prior the CNSC Hearing on the NSDF Project. Table 6.2.2-1 summarizes identified Indigenous communities and identification rationale. References [1] Chalk River TKLUS Study. Prepared for the Métis Nation of Ontario. 2019 *Note this reference cannot be provided as it is proprietary information of the MNO.* [2] Indigenous Engagement Report, 232-513130-REPT-001, Revision 3, 2019 November.	Rejected with Follow-Up IR CNSC-2-04
CNSC	FC-150	CNSC-166	Figure 5.9.4-1 and 5.9.4.3.2.1-Trapping	There are two trap lines adjacent to the Chalk River property PE025 and PE002. The EIS states that *"it is possible but unconfirmed whether there is any trapping occurring on the adjacent Garrison Petawawa"*	Information on Indigenous Interests is now found in Section 6.0 of the revised EIS. The results of research identified that there may be a very limited amount of trapping occurring on Garrison Petawawa property. Ministry of Natural Resources and Forestry does not identify who (Indigenous, or non-Indigenous groups/communities) hold these trap lines.	Rejected with Follow-Up IR CNSC-2-04

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				Has CNL had contact with those who have trapping rights/licence for trap lines PE025 and PE002? **Expectation to address comment:** It will be important for CNL to clarify in the final EIS if there is any active hunting or trapping in the adjacent PE025 and PE002 trap lines, as well as on adjacent private (patent) lands, specifically if they are being used by any of the identified Aboriginal groups.	In the Métis Nation of Ontario Traditional Knowledge and Land Use Study (MNO TKLUS) [1], it was identified that trapping has been a foundational element of Métis way of life and land use since the genesis of the Métis. Of the eleven participants in the MNO TKLUS, seven reported participation in trapping although none had trapped within the 50 km study area. Engagement with all Indigenous communities to the end of 2019 April, has not resulted in the identification of any Indigenous trappers operating within the RSA. This text is reflected in Sections 5.9.4.1.3.4 and 6.4.4.1.2.1. Reference [1] Chalk River TKLUS Study. Prepared for the Métis Nation of Ontario. 2019 *Note this reference cannot be provided as it is proprietary information of the MNO.*	
CNSC	FC-151	CNSC-167	5.9.4.2	The EIS states that *"A literature review and a review of the oral history of the Algonquin people were completed…"* As the proposed NSDF Project site is also located within the known traditional territory of the Métis Nation of Ontario, was any researched conducted on historical Métis use of the region and the potential for Métis related artifacts? **Expectation to address comment:** It is recommend that CNL review the MNO's research on the Métis' traditional land use in and around the Mattawa and Ottawa rivers: http://www.Métisnation.org/news-media/news/historic-research-report-on-métis-community-in-mattawanipissing-region-released/ This report was previously provided by CNSC staff to CNL on June 2, 2016.	Information on Indigenous Interests is now found in Section 6.0 of the revised EIS. Section 6.4.4.1.2 outlines that the Métis Nation of Ontario recently completed a Traditional Land Use and Knowledge Study (TKLUS) [1] that was undertaken specifically for the NSDF and Nuclear Power Demonstration (NPD) projects through funding supplied by the Canadian Nuclear Safety Commission. The study area used in the TKLUS included a 50 km radius from the NPD and NSDF Projects but documented use beyond that radius. While the study only involved eleven participants, it did document significant use within its study area. Reference [1] Chalk River TKLUS Study. Prepared for the Métis Nation of Ontario. 2019 *Note this reference cannot be provided as it is proprietary information of the MNO.*	Accepted
CNSC	FC-152	CNSC-168	5.9.4.2.2.2 Value to a Community	Missing information. Expectation to address comment – The final EIS submission should include an update on the level of community interest expressed with regards to any of the archaeological sites and	As outlined in Section 5.9.4.2.2, a four stage archaeological assessment [1], including field surveys was completed for the NSDF SSA and surrounding area. Findings of this assessment were used to inform the NSDF Project design team, and subsequently, the NSDF CRL site was modified so that archaeological sites identified during the field surveys would not be affected.	Rejected with Follow-Up IR CNSC-2-04

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				artifacts identified on the NSDF Project site. CNL should indicate how they have engaged with identified First Nation and Métis groups, the level of interest they have expressed with regards to the archaeological finds and how CNL will work with any interested groups and communities on preserving, and managing the archaeological resources identified in the study.	Information on Indigenous Interests is now found in Section 6.0 of the revised EIS. Section 6.2.4 summarizes Indigenous engagement activities including sharing of archaeological information. Section 6.2.5 outlines feedback received during engagement with identified Indigenous communities. Through formal comments received on the draft EIS, the MNO and the Algonquin Anishinabeg Nation Tribal Council have expressed concerns, which have been summarized into main topics of interest and listed in Table 6.2.5 1. The Stage 4 Archaeological Assessment [1] is available on the CNL website. CNL is committed to engaging and seeking input from Indigenous peoples whose traditional territory, Aboriginal and Treaty rights have the potential to be affected by the Project. Reference [1] Stage 4 Archeological Assessment, 232-509213-REPT-003, Revision 0, 2019 January.	
CNSC	FC-153	CNSC-230	5.9.4.3.2	This section, which describes the potential interactions of the NSDF Project with trapping, hunting, gathering and fishing activities, does not provide any evidence that CNL has gathered any details regarding traditional land use activities in close proximity to the CRL property directly from identified First Nation and Métis groups. It is recommended that in the final EIS CNL describe how they have or will be validating the assumptions currently described in this section. For example, in S. 5.9.4.3.2.3-Fishing, the section concludes "it is **likely** that there is fishing by First Nation and Métis communities on the Ottawa River in the vicinity of the CRL property. This fishing is **likely** a combination of both sport and subsistence fishing." As per the requirements/guidance in REGDOC-3.2.2 CNL should demonstrate that through its engagement activities that it has asked identified First Nation and Métis groups regarding traditional land use activities in proximity to the CRL and project location and determine if the proposed project could have	The revised EIS contains a new Section 6 – Indigenous Interests that consolidates and summarizes the major areas of assessment relevant to Indigenous peoples into one single section. The text in Section 6.2.7 of the revised EIS documents that CNL has entered into two MOU. One with the Algonquins of Ontario (AOO) and one with the Métis Nation of Ontario (MNO). These MOU's are the building blocks of a mutually beneficial relationship between CNL and the individual communities. Based on the MOU's, parties will work collaboratively to meet the needs of the individual communities as well as CNL's project requirements. Section 6.4.4.1.2 outlines that the Métis Nation of Ontario recently completed a Traditional Land Use and Knowledge Study (TKLUS) [1] that was undertaken specifically for the NSDF and Nuclear Power Demonstration (NPD) projects. The TKLUS has identified Valued Components of particular interest to them. Through this engagement process, Indigenous interests have been incorporated into the selection of final VCs for the NSDF Project. It should be noted that the Algonquins of Ontario have received funding for a TKLUS and work has commenced but that work is unlikely to be completed until well into 2020. Reference [1] Chalk River TKLUS Study. Prepared for the Métis Nation of Ontario. 2019 *Note this reference cannot be provided as it is proprietary information of the MNO.*	Rejected with Follow-Up IR CNSC-2-04

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				any potential impacts on those practices as per the requirements of CEAA 2012. Therefore, CNL must demonstrate how it has or will be validating the conclusions and assumptions made in S.5.9.4.3.2 with identified First Nation and Métis groups and organizations.		
CNSC	FC-154	CNSC-170	5.9.4.3.2.5	The EIS states that *"According to historical record this sandy spit (Pointe au Bapteme) was where the voyageurs baptized new members…"* Has CNL discussed the cultural, heritage and spiritual importance of Pointe au Bapteme with the Métis Nation of Ontario? **Expectation to address comment:** Please provide clarification in the final EIS.	Information on Indigenous Interests is now found in Section 6.0 of the revised EIS. Section 6.4.4.1.2.5 recognizes the Pointe au Baptême site along the Ottawa River as a site of significance. The Pointe au Baptême site is not within the footprint of the NSDF Project or the CRL site, but is within the Regional Study Area. Table 6.2.4-1 outlines Indigenous engagement activities up to 2019 March 31. CNL has met with the MNO twice since that time – 2019 April and 2019 October to continue dialogue on the NSDF Project. CNL has had discussions with the MNO about the Pointe au Baptême site and its significance to the MNO. MNO also provided the importance of traditional access to the Pointeau Baptême site as formal comment to Revision 0 of the EIS (CNL-ND-494). Pointe au Baptême was discussed at the MNO visit to CRL in 2017 and recently in 2019 April and 2019 October when CNL spoke again with the MNO about the site as part of a review of draft CNL dispositions to EIS comments. CNL has re-iterated in those discussions that the Pointe au Baptême site is not in the footprint nor will it be impacted by the proposed NSDF project. Of more importance to the MNO, CNL has re-iterated the occasional misconception the MNO has about access to the Pointe au Baptême site. The Indigenous Engagement Report [1] states in multiple sections (Section 6.1.5.2.1; 6.1.5.2.2; 6.1.7) that traditional access to the Pointe au Baptême site along the Ottawa River will continue to occur and will not be restricted due to the NSDF Project. A Traditional Knowledge and Land Use (TKLUS) study was submitted to CNL by MNO in 2019 [2], that included MNO perspectives of the Ottawa River Corridor Findings from the MNO TKLUS study have been incorporated into the new Section 6 of the final EIS The Métis Nation of Ontario (MNO) and CNL have signed a Memoranda's of Understanding (MOU). Together the two organizations have agreed to a mutually beneficial, ongoing working relationship and to provide a process to which CNL can engage with the MNO at the local and	Rejected with Follow-Up IR CNSC-2-04

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					regional levels in order to better understand any Métis Rights and Interests that may be impacted in the general and surrounding areas of the projects, including Pointe au Baptême. References [1] Indigenous Engagement Report, 232-513130-REPT-001, 2019 November. [2] Chalk River TKLUS Study. Prepared for the Métis Nation of Ontario. 2019 *Note this reference cannot be provided as it is proprietary information of the MNO.*	
CNSC	FC-155	CNSC-231	5.9.5.1.2	Under the section regarding potential impacts to archaeological resources there is no mention of CNL informing or engaging with interested Indigenous groups regarding the discovery of unanticipated archaeological resources or human remains. Please clarify if engagement with interested Indigenous groups will form part of CNL's procedures, as a number of Indigenous groups have expressed an interest in being informed regarding the discovery of archaeological resources and human remains including the Algonquins of Ontario, Curve Lake First Nation and the Métis Nation of Ontario.	As outlined in Section 5.9.4.2.2, a four stage archaeological assessment, including field surveys was completed for the NSDF SSA and surrounding area [1]. Information on Indigenous Interests is now found in Section 6.0 of the revised EIS. Interest in potential effects on Métis and Algonquin cultural heritage resources in the RSA. A request to review any future archaeological assessments has formally been made during engagement activities. (Table 6.4.1-1 of revised EIS). The AOO Archaeology Liaison attended the Chalk River Site in August/September 2017. Section 6.4.1 outlines feedback received during engagement with identified Indigenous communities. Through formal comments received on the draft EIS, the MNO and the Algonquin Anishinabeg Nation Tribal Council have expressed concerns, which have been summarized into main topics of interest and listed in Table 6.2.5 1. Additionally, the text in Table 5.9.5-1 of the revised EIS states that: "If any human remains are identified during construction, CNL will immediately notify the police or coroner, and the Registrar of Cemeteries, MTCS, and Indigenous communities or groups." With regards to Curve Lake First Nations (part of Williams Treaties First Nations) an offer was presented (2016 September) to participate with archaeological liaisons, no liaison participated. The archaeological report was requested and sent (2016 December) with no comments from Curve Lake. Reference [1] Stage 4 Archeological Assessment, 232-509213-REPT-003, Revision 0, 2019 January.	Rejected with Follow-Up IR CNSC-2-04
CNSC	FC-156	CNSC-171	Table 5.9.5-1	There is currently no linkage between project activities and hunting, trapping, and fishing by Aboriginal peoples as the RSA is restricted access.	The RSA for Land and Resource Use resource (Section 5.9) is the combined area of the air quality, terrestrial and aquatics RSAs, which have been used for the assessment of the air quality, groundwater, surface water, aquatic and terrestrial environments (Figure 5.9.3-1). The RSA is defined to capture effects on the terrestrial and aquatic environments as a result of the NSDF Project (e.g., habitat loss, sensory disturbance for wildlife and changes to habitat from air quality and surface water quality, changes in groundwater and surface water quality,	Accepted

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				If the RSA was to be expanded beyond the CRL property line to include adjacent lands and waterways (Ottawa River), would the conclusions in the pathways analysis for the land and resource use valued components remain the same, or need to be adjusted (i.e., would there be any predicted interactions between project activities and the environment/land and resource use beyond the CRL site boundary?). Expectation to address comment – This rationale needs to be more clearly articulated in Table 5.9.5-1 and throughout this chapter of the EIS. **Expectation to address comment:** This rationale needs to be more clearly articulated in table 5.9.5-1 and throughout this chapter of the EIS.	habitat loss and changes in abundance, distribution and disturbances to wildlife and fish), as these effects have the potential to result in subsequent effects on land and resource use. Therefore, the RSA for land and resource use is a combination of the air quality and aquatic environment RSAs as this is the largest extent of potential cumulative effects on land and resource use. The air quality RSA is defined as an approximate 7.4 kilometre (km) circular radius surrounding the LSA, and the aquatic RSA includes the outlet of Perch Creek to the Ottawa River and extends roughly 8 km downstream in the Ottawa River to Harrington Bay. While there are no land and resource use tenures, or outdoor tourism or recreation activities occurring within the CRL site boundary, there may be some trapping occurring in Garrison Petawawa and in the RSA. The Ottawa River where it overlaps with the RSA boundaries would also most likely be used for some outdoor tourism and recreation. The results of the aquatic environment assessment (Section 5.5), identify that measurable residual effects on aquatic biodiversity Valued Components are not predicted as a result of the NSDF Project. Therefore, fishing will not be affected by the NSDF Project. The aquatic and terrestrial environment assessments also consider conclusions of the ecological health assessment (Section 5.7). The ecological health assessment found no significant residual effects to terrestrial or aquatic species through potential radiological dose and exposure to non-radiological indicator compounds through operations, closure and post-closure of the NSDF.	
CNSC	FC-157	CNSC-229	Table 5.9.5-1	This table indicates that there is no potential interaction of the project with fishing resources as the RSA is restricted, however, as demonstrated in figure 5.9.3-1 demonstrates that the Ottawa River close to the shore of the CRL property at the outlet of Perch creek is included in the RSA. Please clarify, or correct in the EIS.	In the draft EIS the Regional Study Area (for surface water and aquatic environment) was primarily restricted to the CRL property but did include a small area of the Ottawa River at the mouth of Perch Creek. In the revised EIS the Regional Study Area for land and resource use has been expanded as a result of feedback on the draft EIS thus Table 5.9.5-1 has been updated to note that the LSA is restricted (and remove statements about the RSA being restricted). However as noted in Section 5.9.5.2.1, a determination of "No linkage" does not necessarily indicate an activity does not occur, it can also indicate the interaction is mitigated resulting in no detectable change in measurement endpoints. The latter is the case with fishing activities, since the results of the surface water quality assessment identify there is no residual effect as there are no measurable concentrations of indicator compounds predicted and therefore fishing will not be affected by the NSDF Project.	Accepted
CNSC	FC-158	CNSC-232	5.9.6	A number of Indigenous groups, including the Algonquins of Ontario, Kitigan Zibi Anishinabeg Nation and the Algonquin Anishinabeg Nation Tribal Council, have expressed an interest in being engaged in on-going monitoring activities for the NSDF Project and CRL site in general, especially as it relates to their traditional land use activities (e.g., fishing).	Information on Indigenous Interests is now found in Section 6.0 of the revised EIS. As documented in Section 6.4.6 of the revised EIS, CNL has been carrying out discussions with some Indigenous communities on greater involvement by them in monitoring programs. The form and level of this involvement has been discussed in only a preliminary fashion but CNL is committed to greater Indigenous involvement in these programs.	Rejected with Follow-Up IR CNSC-2-04

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				Will CNL consider the possibility of collaborating and engaging with interested Indigenous communities on environmental monitoring activities specific to the NSDF Project and the CRL site more generally?		
CNSC	FC-159	CNSC-86	5.10.3.3	Reasonably Foreseeable Development (RFD) Case: **Expectation to address comment:** Please clarify why only NPD is considered as there are other potential projects that may be constructed at the CRL site	The text is Section 5.10.3.3 of the revised EIS has been updated to document other reasonably foreseeable developments in the Regional Study Area including new/upgrades to research and development facilities, construction and operation of a small modular reactor, new support infrastructure, ongoing decommissioning and environmental remediation activities on the CRL site and the NPD Closure Project	Accepted
CNSC	FC-160	CNSC-87	5.10.4.2	CNL used diverse data in a number of section of the EIS, these data were based on surveys, censuses, information gathering at different eras (2010, 2011, 2016). **Expectation to address comment:** Please confirm that the data referenced are the most recent and current data available.	CNL confirms that Section 5.10.4.2 (Results of Socio community Characteristics) was updated to include the most recent and current data available. For example, the 2017 draft EIS, Table 5.10.4-1 (Population and Demographic Characteristics of the LSA, RSA and the Province of Ontario) included population data from Statistics Canada for 2006 and 2011. In the revised EIS, Table 5.10.4-1 was updated to include population data from Statistics Canada for 2011 and 2016 which is the most current data available (i.e. the last national census was completed in 2016).	Accepted
HC	FC-161	HC-9	5.10.4.2.10 Quality of Life, p.835	The section states "Baseline data on existing ambient noise was not collected as the NSDF Project will be constructed on CNL's existing CRL property, located 7 km away from the nearest community, the Village of Chalk River." **Expectation to address comment:** As there are receptors closer than 7 km from the site, as well as receptors along the transportation route, a brief qualitative description of the acoustic environment should be provided in the absence of baseline data. Refer to table 6.1	As outlined in Section 1.2 and 5.8.6.1.1.3, the nearest population centre to the CRL site is the village of Chalk River. The village of Chalk River is located approximately 7 km from the built up area of the CRL site. The closest permanent residents in the Pontiac Regional County Municipality (Quebec) are located 3 km southeast of the CRL site. Noise transmission will be mitigated by the topography as the NSDF Project site is situated on the lower side of the hill adjacent to East Mattawa Road (Section 5.10.5.2.2 of revised EIS). The text in Section 5.10.4.2.10 has been revised to clarify that noise impacts were assessed by using baseline data on existing traffic levels in the Village of Chalk River and published literature for typical traffic flows on different types of roads.	Accepted

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				in Health Canada's guidance document on assessing noise effects on human health1.		
HC	FC-162	HC-1	5.10.4.2.9	There appear to be human receptors closer than the 7 km reported in this section. Also, clarify if there are traditional land uses in the vicinity of the project site. References were made to sections 5.8 Land Use and 5.9 Aboriginal Land Use however these were not available for HC's review. **Expectation to address comment:** Please provide a description/characterization of potential human receptors (i.e., Aboriginal reserves, local residents, recreational users, cabins, hunting, fishing and country foods collection areas, etc.) and their distances to Project site and related activity. Maps indicating locations of all identified receptors and their precise locations with respect to the Project would be useful as well.	Communities in the vicinity of the NSDF Project site are shown on Figure 5.10.3-1 in the revised EIS. This figure has been updated to show that the nearest dwelling (3 km from the CRL site) is a full time residence, rather than a cottage. The village of Chalk River is located approximately 7 km from the built up area of the CRL site. The Town of Deep River located 9 km northwest of the CRL site. Mountain View, a settlement within the Municipality of Laurentian Hills, lies between Chalk River and Deep River, off Highway 17. Wylie, a settlement that constitutes part of the Municipality of Laurentian Hills, is located 12 km northwest of the NSDF Project. (See Section 5.10.3.1 of revised EIS). The closest Indigenous community is the Algonquins of Pikwakanagan, located at Golden Lake, approximately 50 km southeast of the CRL site.	Accepted
HC	FC-163	HC-3	5.10.4.2.9	It is stated that "(t)he haulage route for transportation of site preparation and construction equipment, and construction material will be via public roads to the CRL property…" **Expectation to address comment:** Please ensure that all major sources of noise are evaluated for all phases of the project, including receptors that may be in close proximity to roadways with increased vehicle traffic (but not necessarily close to the project site itself), otherwise, noise emissions could be underestimated and potentially affected receptors could be omitted from evaluation. Evaluate vehicle traffic on all relevant roadways near areas of human receptor locations as a	Table 5.10.5-1 outlines the effects pathways that were assessed for ambient noise levels during construction and operation and closure phases: • Construction Traffic • Blasting Section 5.10.5.2.2 and 6.5.5.2.2 discusses ambient noise levels as secondary pathways (an interaction may exist, but anticipated to be negligible and no measurable or detectable effect on base case conditions) related to construction traffic and blasting activities. For the NSDF Project, a qualitative assessment of the acoustic environment was carried out based on the separation distance between the NSDF Project site and the nearest dwelling. In accordance with Ontario Ministry of the Environment and Climate Change guideline NPC 300 [1], dwellings include permanent and/or seasonal residences. Communities in the vicinity of the NSDF Project site are shown on Figure 5.10.3-1, which includes the nearest residences on the Quebec side of the Ottawa River, approximately 3 km from the NSDF Project site. Based on this separation distance, a detailed assessment is not typically required by the Ontario Ministry of the Environment and Climate Change. Construction related traffic specifically in	Rejected with Follow-Up IR HC-2-01

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[1] Health Canada. 2016. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise. Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario. July 2016.

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				potential noise source in order to ensure that noise from the increased vehicle traffic does not result in increased public annoyance. This is particularly important in the event that these vehicles are travelling on these roads at night. Any modelling of road traffic noise should capture all project-related vehicles, type of road coverage, and night-time traffic activity. Predicted noise levels can be compared to the World Health Organization's *Night-Time Noise Guidelines* (2009)[2] and *Guidelines for Community Noise* (1999)[3]. These guidelines suggest that outdoor noise thresholds in quiet rural areas should be 40 dBA (annual average) for long-term exposure (2009). In addition, for construction noise of more than one year, for operational noise, and where noise levels are in the range of 45 to 75 dBA at specific receptor locations, Health Canada advises that health impact endpoints be evaluated on the change in the percentage of the population who become highly annoyed (%HA). Health Canada suggests that mitigation be proposed if the predicted change in %HA at a specific receptor is greater than 6.5% between project and baseline noise environments, or when the baseline-plus-project-related noise is in excess of 75 dBA.	the Town of Chalk River (since there is only one relevant roadway near human receptor locations) was also assessed in comparison to current traffic levels on the roads. Noise levels were not carried forward as part of the post-closure safety assessment as noise is highest during construction/operations. Reference [1] Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (NPC-300), 2013 August. https://www.ontario.ca/page/environmental-noise-guideline-stationary-and-transportation-sources-approval-and-planning	
CNSC	FC-164	CNSC-88	5.10.4.2.9 (Emergency and Protective Services/Fire Services)	CNL indicated that "Chalk River Laboratories has a minimum….and respond to site emergencies within four minutes…." **Expectation to address comment:** CNL to verify and confirm the stated four minutes fire fighter response time.	The discussion on the four-minute response time has been removed from the revised EIS. Chalk River Laboratories has its own full-time fire service that is staffed 24/7 with 40 full time firefighters, up to 6 casual firefighters, and a 10-member Fire Emergency Response Group. The department delivers fire and emergency services utilising 2 pumpers, an aerial, a pumper/tanker and other ancillary vehicles and equipment. The CRL fire department is comprised of a 4-platoon rotational staffing system with 10 firefighters (two officers and eight firefighters) assigned to each platoon and it is structured to provide emergency services	Accepted

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[2] World Health Organization (WHO). 2009. *Night Noise Guidelines for Europe*. Hurtley, C. (Ed). Available online at: **http://www.euro.who.int/en/health-topics/environment-and-health/noise/publications/2009/night-noise-guidelines-for-europe**

[3] World Health Organization (WHO). 1999. *Guidelines for Community Noise*. Berglund, B., Lindvall, T. & Schwela, D.H (Eds.). Available online at: **http://www.who.int/docstore/peh/noise/guidelines2.html**

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					with a minimum of eight firefighters on duty at any given time. CRL has established a reciprocal mutual fire aid agreement with fire services in the communities nearest to the NSDF Project site. Section 5.10.4.2.9 of the revised EIS provides documents that there is information on fire services.	
HC	FC-165	HC-10	5.10.5.2.2 Secondary Pathways, p.842	The section states "Communities in the vicinity of the NSDF site are shown on figure 5.10.3-1, which includes the nearest cottages on the Quebec side of the Ottawa River, approximately 4 km from the NSDF site." **Expectation to address comment:** The cottages mentioned on pg. 842 do not appear in figure 5.10.3-1. Please add the cottages to this figure.	The text in 5.10.5.2.2 has been revised to document that the nearest cottage is in fact a full time residence. Figure 5.10.3-1 has also been updated to show this dwelling as a full time residence.	Accepted
HC	FC-166	HC-11	5.10.5.2.2 Secondary Pathways, p.843 5.10.6.2.2 Service and Infrastructure, p.845	Truck traffic estimates appear inconsistent between section 5.10.5.2.2 and section 5.10.6.2.2: "It is estimated that there will be 14 trucks per day during construction and 10 trucks per day during operations. This results in less than 2 trucks per hour during construction and less than 1 truck per hour during operations for the daytime period." "It is estimated that during site preparation and construction, 115 truckloads of material will be delivered per day. In addition, it is assumed that construction workers will travel to the NSDF Project site from the local commercial accommodations using their own personal vehicles (i.e., 50 vehicles)." **Expectation to address comment:** Clarify the number of trucks estimated per day during all phases of the project and provide a justification as to how those numbers were chosen. Should the number of trucks per day be 115 as stated, this would be equivalent to more than 16 trucks per hour. In this case, the effects of noise from increased truck traffic may be	The text in Sections 5.10.5.2.2 and 5.10.6.2.2 has been updated to reflect the anticipated volume of truck traffic during both the construction and operations phase of the project. It is estimated that there will be approximately 200 trucks per day during construction (based on a construction season of 9 months) and 10 trucks per day during operations. This results in approximately 15 trucks per hour during construction and less than 1 truck per hour during operations for the daytime period.	Accepted

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				underestimated, and the assessment may need revision.		
HC	FC-167	HC-12	5.10.5.2.2 Secondary Pathways, p.843	The proponent committed to providing a discussion on blasting in their response to comment HC-2 (Group 2 documents). A discussion was not found within the documents provided. **Expectation to address comment:** Please provide a discussion on blasting as per CNL's original response to HC-2 from the Group 2 comments.	A discussion of blasting has been included in Section 5.10.5.2.2. Communities in the vicinity of the NSDF Project site are shown on Figure 5.10.3-1 (i.e., nearest community is the Village of Chalk River located 7 km away), which includes the nearest residences on the Quebec side of the Ottawa River, approximately 3 km from the NSDF Project site. Given this distance from the site, noise and vibrations from blasting activities are not anticipated to be noticeable to these residents. Blasting activities would be completed during the construction phase only and would be infrequent for a short period of time. In addition, blasting noise and vibrations will be mitigated by the topography as the NSDF Project site is situated on the lower side of the hill adjacent to East Mattawa Road. Overall, the infrequent and short-term blasting activities are considered to have a negligible residual effect on quality of life of local residents.	Accepted
HC	FC-168	HC-13	5.10.5.2.2 Secondary Pathways, p.843 5.10.6.3.2 Services and Infrastructure, p.846	The mitigation measures related to increased truck traffic during construction is presented inconsistently between these two sections: "Transportation of site preparation and construction equipment, and construction materials will be scheduled to reduce noise and traffic volumes, and limit inconvenience to local residents." "Canadian Nuclear Laboratories will also aim to schedule the delivery of vehicles travelling to and from site with construction and decommissioning materials at a time that does not interact with high traffic such as the morning and evening commutes." **Expectation to address comment:** Indicate hours of operation (specifically truck traffic generation) and whether the mitigation measure of avoiding high traffic periods is what is being referenced in section 5.10.5.2.2. Indicate whether traffic or noise management plans will be developed or currently exist.	Section 5.10.5.2.2 documents the typical hours of operation for truck transport (typically 6 days per week, with 16-hour days but may vary between 12 and 18 hours per day depending on Project activities). This section also states that transportation of equipment and construction materials will be scheduled during normal business and daylight hours to the greatest extent possible to limit inconvenience to local residents. Table 5.10.10-1 indicates that as a mitigation measure for traffic volumes, coordination of transportation of equipment and materials will avoid peak traffic to the extent possible. CNL will engage with the public as part of the Public Information Program on NSDF generated traffic and address public concerns that arise (See Table 11.0-1 Follow-up Monitoring for Socio-Economic Env). As outlined in Section 5.2 there are no sensitive receptors in the vicinity of the NSDF Project that would experience nuisance effects from the construction and operations phases of the NSDF Project due to noise and vibration. The nearest dwelling to the NSDF Project site is located approximately 3 km away. The indirect effects of noise from NSDF Project traffic on adjacent land users are discussed in Section 5.10 Socio-economic Environment. A discussion of potential indirect effects from noise and vibrations and supporting information is also provided in Sections 5.5 Aquatic Environment and 5.6 Terrestrial Environment.	Rejected with Follow-Up IR HC-2-01
HC	FC-169	HC-14	5.10.5.2.2 Secondary Pathways, p.843	The proponent committed in their response to comment HC-4 (Group 2 documents) to include notification of residents before construction	Section 5.10.5.2.2 has been updated to reflect the results of the noise assessment from construction and operations of the NSDF. The detailed results of the noise effect study are	Rejected with Follow-Up IR HC-2-02

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				commences and complaint resolution mechanisms as mitigation measures. This was not clearly indicated in the documents provided. **Expectation to address comment:** Include a reference to the public/aboriginal engagement programs, and traffic or noise management plans if they exist. This could also be added to section 4.3.3 and cross-referenced here and in section 5.10.9.	presented in the Noise Impact Study of the CNL NSDF Project Construction-Related Road Traffic on Human Receptors [1]. As stated in Section 5.10.5.2.2 CNL is committed to organizational transparency, ensuring that Indigenous peoples, the general public, local communities, elected and appointed government officials and other industry stakeholders are properly informed about activities carried out at CNL sites. This commitment is met through the company's Public Information Program (CNL 2019c), a communications program that was developed to build public awareness and trust, and to encourage transparent and proactive communication with its various stakeholders. CNL's Public Information Program includes specific communications to stakeholders, public access to information related to routine activities, radiological and non-radiological emissions, and non-routine items or events at the different sites managed by CNL. Accordingly, CNL will notify local communities of the start of NSDF Project construction. Reference [1] NSDF Project Construction-Related Road Traffic on Human Receptors, 232-03710-REPT-002, Revision 0, 2018 February.	
CNSC	FC-170	CNSC-89	5.10.7	CNL stated that one of the assumptions of future conditions is "Most workers at the NSDF Project during the operation phase will be the same individuals currently employed at CRL". **Expectation to address comment:** CNL to clarify and elaborate on the basis for this assumption taking into account that operations will last about 50 years?	The text had been revised in Section 5.10.7 of the revised EIS and states most workers at the NSDF project during the operations phase will be employed by CNL. Confidence in the prediction of the effects of the NSDF Project on the socio-economics of the local communities is based on a number of assumptions of future conditions, including the following: • workers' skill requirements will be similar to those existing at CRL; • working conditions (e.g., shift schedules) will be the same; • most workers at the NSDF Project during the operations phase will be employed by CRL; and • employees will continue to live in the same communities.	Accepted
CNSC	FC-171	CNSC-223	Table 6.4.3-1: Dose Acceptance Criteria for Accidents, Page 6-7	Dose ranges were not provided for beyond design basis accidents. **Expectation to address comment:** CNL is requested to provide dose ranges for beyond design basis accidents.	International and CNSC guidance (RegDoc 2.4.1) do not normally provide dose acceptance criteria for beyond design basis events. Instead, the consequences of the events are used to inform emergency preparedness and response plans and other contingency efforts. Selected Beyond Design Basis Accidents (BDBA), when identified, may be assessed for dose consequences based on their potential for doses significantly in excess of DBAs, and the acceptability of the dose consequences determined on a case-by-case basis. The lowest frequency range for which accident dose limits are set is 10-5 per year. Events that are predicted to occur less frequently than this have no limits set on resultant dose. Extremely rare events with potentially severe consequences are not subject to consequence analysis. This type of event	Accepted

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					includes an aircraft crash where the event frequency may be calculated as required (see Section 3.5.2, Safety Analysis Report (SAR) [1]). The consequences of beyond design basis events were considered in the Consequence of Failure Analysis report [2]. The most severe of the failures analyzed include failures of the ECM due to an extreme seismic event, as well as an uncontrolled fire of combustible waste. The Post Closure Safety Assessment [3] evaluates the consequence of a Mass Excavation and Farming scenario, where the entire mass of the ECM is brought to the surface and the material is used as farmland. This scenario could be used as an analogue to a Beyond Design Basis Accident in that all containment is lost and all waste material is exposed to the environment. In this scenario, the on-site resident/farmer receives 0.4 mSv/y, calculated at 300 years after facility closure. The dose acceptance criteria for accidents is provided in Table 7.3.1-1 of the revised EIS. References [1] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September. [2] Consequence of Failure Analysis, 232-503230-AR-001, Rev 2, 2019 February [3] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	
CNSC	FC-172	CNSC-158	6.4.4.4	In the Human Intrusion scenario assessment, CNL made the assumption that intrusion occurs immediately following the end of active institutional control period (to limit the effect of radioactive decay). **Expectation to address comment:** G-320 states "*Intrusion by burrowing animals or plant roots may be considered part of the normal evolution of some types of waste management systems. While thicker covers, rip-rap armouring, and other barriers can be designed to prevent such intrusion, human intrusion cannot be easily prevented by barrier design. Institutional controls may be placed on some facilities as a safety feature to prevent human intrusion. In such cases, assessment of the impact of human*	The approach to the Post-Closure Safety Assessment (PostSA) has been revised to ensure an assessment is performed to demonstrate that the NSDF long-term safety is not reliant on institutional controls in order to meet the dose requirements. The revised PostSA considers human intrusion scenarios including borehole drilling (acute exposures) and a house with basement (chronic exposures). Although in the Normal Evolution Scenario these events are restricted from occurring until the end of the period of institutional control, a variant of this scenario is presented with the doses calculated from 100 years, to see how they would change with a shorter period of institutional control. The human intrusion disruptive events results are presented in Section 6.4.1 of the PostSA [1]. Reference [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	Accepted

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				intrusion may have to assume scenarios in which institutional controls fail." In addition, to SSR-5, paragraph 2.15 (c), (d), (e) and (f) requirements and what has been discussed and conveyed previously, CNL is expected further to proposed intrusion scenario, to consider assessment of human intrusion during the ICP (at the beginning: to limit the effect of radioactive decay) since the institutional controls may fail (low probability but cannot be discounted). Such human actions can be used to demonstrate the robustness of the design and in considering possible improvements of the disposal system design. CNL is expected to include this information and resulting actions (if any) in their PA.		
CNSC	FC-173	CNSC-114 CNSC-224	6.4.4.4.2 Chronic Exposure from Living in a House and Farming on Top of the Engineered Containment Mound, Page 6-15	It is stated in the EIS that the NSDF Project will be designed to decrease the chance of inadvertent human intrusion. The range of protective measures include: site recognition, waste recognition, markers and placards, and passive barriers. **Expectation to address comment:** CNL is requested to provide more specific details on the protective measures that would be built into the NSDF design to decrease the chance of inadvertent human intrusion given that estimated doses to the farm resident living on top of the ECM exceed 1 mSv/yr.	Section 3.2.4.2 of the revised EIS summarizes protective measures that will decrease risk of human intrusion. Societal memory and restrictions on the land use are important mitigating factors against human intrusion. Upon closure of the facility, controls will be in place to limit land usage including recognition on the property title or deed to ensure appropriate zoning restrictions and including buffer or attenuation zones. Further and more specific details of the protective measures built into the NSDF design to decrease the chance of inadvertent human intrusion can be found in the Closure Plan [1]. These include placement of permanent granite markers providing information on the facility on the ECM. As a result of the significant reduction in the inventory (i.e., only LLW), the estimated dose to a resident living on top of the ECM is well below regulatory limits. The revised dose estimates can be found in Section 5.8.6.1.2.2 and details of the analysis and results within the PostSA [2]. References [1] Closure Plan, 232-508220-PLA-003, Revision 0, 2017 April. [2] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	Accepted
CNSC	FC-174	CNSC-159	Table 6.4.4.4-5, 6.4.4.4-6	The tables showed doses farm resident from chronic exposure and following glaciation.	The approach to the Post-closure Safety Assessment (PostSA) has been revised and reflects inventory changes to limit the proposed NSDF inventory to only LLW.	Accepted

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				Expectation to address comment: While the doses (different at different extensive times) appear to be trivial and obvious for CNL and CNSC staff, it could not be straight forward to the members of the public, therefore CNL is expected to provide further explanation and discuss the obtained doses as to why they change a little compared to the time they're evaluated.	CNL agrees that explaining the evolution of doses to members of the public is not straight forward thus the tables with doses over time have been removed from the revised EIS. Rather the revised approach to summarizing the dose to members of the public in the revised EIS includes to identify only the peak dose as CNL believes this to be of highest interest to members of the public. Also included is the time at which the peak dose occurs, the receptor whom receives the peak dose, as well as the key radionuclides and pathways for the doses. The revised post-closure phase dose estimates can be found in Section 5.8.6.1.2.2 of the revised EIS. In order to provide context to the dose results presented, Section 5.8.10 of the revised EIS notes that all doses estimated are below the average background radiation dose in Canada of 1.8 mSv/yr. Further explanations and discussions of the doses to humans in the Normal Evolution Scenario, including figures of the doses over time, is provided in Section 6.2.3 of the PostSA [1]. Reference [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	
NRCan	FC-175	NRCan-6	9.3 Seismic Events	The Project intends to use values from the National Building Code of Canada (NBCC) 2015 for the structures, but use NBCC 2015 adjusted in some way to represent 0.5% probability of exceedance in 50 years (10,000-year frequency of occurrence) for the ECM. No indication of how the lower probability is derived (or indeed its value) is given. Note AECOM (2016b) references NBCC 2010 not NBCC 2015. For Chalk River Nuclear Laboratories (CNL), the 2015 values at short periods are lower than the 2010 values, and the long period values are similar (see http://www.earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/index-en.php). Therefore a design to 2010 values will be conservative (safer) than a design performed in 2017. However, any existing design could be retained (if not overly costly) to reduce the safety concerns that might arise should future (2020, 2025) NBCC assessments increase from the 2015 values.	The design ground motions corresponding to the lower probability, i.e., 10,000-year ground motion, for the ECM have been developed using the Probabilistic Seismic Hazard Analysis (PSHA) method specific for the NSDF site [1]. The PSHA considered significant historical seismicity in the vicinity of the NSDF site and utilized the Geological Survey of Canada (GSC) 5th generation seismic hazard models, which was the model used for 2015 National Building Code of Canada (NBCC). The NSDF Engineered Containment Mound (ECM) is designed to withstand the 10,000-year ground motion at the NSDF site while maintaining containment of waste and leachate, as defined by Canadian Standards Association (CSA) Standard N289.4-12 [2]. The ECM design utilized Peak Ground Acceleration (PGA) of 0.55 g, defined by PSHA for the NSDF site [1], as the design basis earthquake. Series of seismic numerical analyses (e.g., deformation and slope stability analyses) confirmed that the ECM design will have minimal displacement and minimize potential risk of liquefaction due to design basis earthquake. The design of buildings and other conventional structures for the NSDF Project was based on 2015 NBCC design basis earthquake, which is associated with 2,475-year ground motion (i.e., 2% probability of exceedance in 50 years). The design of these conventional structures are within the scope of application of 2015 NBCC and does not require the site-specific PSHA [Ref 1]. Note that conventional structures are designed for operational period and will be decommissioned during post-closure period. The results of site-specific PSHA [Ref 1] confirmed that lower probability ground motion is more conservative for 2015 NBCC than for 2010 NBCC. The NSDF seismic design analyses have been updated to utilize 2015 NBCC and no longer utilize 2010 NBCC.	Accepted

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				Expectation to address comment: Please provide additional information on the lower probability calculations.	References [1] Probabilistic Seismic Hazard Analysis, 232-10170-REPT-001, Revision 1, 2018 December. [2] Testing Procedures for Seismic Qualification of Nuclear Power Plant Structures, Systems, and Components, CSA N289.4-12.	
NRCan	FC-176	NRCan-7	9.3 Seismic Events	The EIS states: “An analysis of liquefaction potential has been conducted and mitigation measures will be implemented into the design of the ECM”, but the response to POH Sheenboro (appendix 4.0-22 Formal Public Feedback) states: “..studies conducted to date …concluded that the soils are of adequate stability and integrity and are not subject to liquefaction in the event of an earthquake”. **Expectation to address comment:** Please clarify which of these statements is correct, including what are the studies that have been conducted to date?	The statement provided in the EIS that liquefaction mitigation measures are required is correct. The liquefaction triggering analysis was completed and is documented in [1], [2]. The analysis indicated that the 10,000-year design seismic event scenario may cause liquefaction in the saturated native sand to silty sand soils underlying the ECM resulting in unacceptable vertical and horizontal displacements. The liquefaction mitigation measure will be excavation and removal of liquefiable soils underlying the ECM and replacing these with compacted engineered granular material. Section 10.3 (Seismic Events) summarizes the analysis of liquefaction and mitigation measures. **References** [1] Seismic Analysis, 232-502312-REPT-015, Rev 2, 2019 July. [2] Slope Stability Analysis, 232-503212-REPT-011, Rev 2, 2019 July	Accepted
NRCan	FC-177	NRCan-8	9.3 Seismic Events	The following two statements appear unsupported: • “Based on the conclusions of a seismic analysis completed on the NSDF Project design, the ECM is expected to remain functional under the 10,000-year design seismic event scenario (AECOM 2016c).” • And repeated in table 9.6-1 “To support the design of the NSDF Project, a Probabilistic Seismic Hazard Assessment (PSHA) was prepared and an analysis of liquefaction potential was conducted; mitigation measures will be implemented into the design of the ECM. Based on the conclusions of the seismic analysis, the ECM is expected to remain functional	The design criteria, methods, conditions and results of the seismic analyses performed in the design of the ECM, WWTP and support facilities are summarized in the Seismic Analysis Report [1]. A slope stability analysis was also completed and confirmed that the slope designs will satisfy minimum factor-of-safety requirements for stability [2]. **Section 10.3 (Seismic Events)** summarizes the seismic analysis completed for the NSDF Project. References [1] Seismic Analysis, 232-503212-REPT-015, Revision 2, 2019 July. [2] Slope Stability Analysis, 232-503212-REPT-011, Revision 2, 2019 July.	Accepted

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				under the 10,000-year design seismic event scenario." The cited document (AECOM 2016c; should be AECOM 2017 - see below) covers only the design of NSDF structures (which are steel-frame structures and relatively simple to design against seismic forces), not the ECM as a whole (including design of the berms etc.). There are multiple mentions of a "slope stability analysis" that should cover berm design, but it does not appear in the references. **References:** AECOM (AECOM Canada Limited). 2016c. Canadian Nuclear Laboratories Near Surface Disposal Facility Design and Consulting Services: Seismic Analysis. AECOM Project Number: 60512856 (Document number not provided) The above reference may actually refer to: AECOM (AECOM Canada Limited). 2017. Seismic Analysis & Structural Calculations, Chalk River Site (includes NLBU Administrative Records) 232-503212-DK-003 Revision 0 dated 2017 03 28. **Expectation to address comment:** Please verify and provide clarification on this.		
NRCan	FC-178	NRCan-9	9.5 Glaciation	The EIS may be correct in presuming that the onset of the next glacial advance in the region will be delayed by global warming. However it focusses on what happens after the next ice sheet retreats, considering that the retreat will disperse the waste and expose the site to returning humans. This neglects that the preceding glacial advance might carry the entire NSDF away, through ice-shove and basal erosion (the NSDF's granular composition lacks	The approach to the Post-Closure Safety Assessment (PostSA) has been revised and reflects inventory changes to limit the proposed NSDF inventory to only low-level waste. As such, the assessment timeframe has also been revised to 10,000 years with detailed justification provided in the PostSA [1]. By 10,000 years post-closure the radioactivity concentration in the waste is very close to natural background concentrations. Glaciation may occur 100,000 years into the future, but this is far beyond the timeframe that the facility is hazardous. Thus, dose consequences as a result of glaciation (nor the first glacial advance) has not been assessed in the revised EIS. The glaciation discussion is presented in Section 10.5 of the revised EIS. References	Accepted

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				the resistance of bedrock as for example, a Deep Geologic Repository). If so, all of the NSDF material might end up concentrated near a small part of the ice front (such behaviour is implied by geochemical glacial tails used to locate ore deposits from drift samples). **Expectation to address comment:** The EIS should consider the effects of the first glacial advance.	[1] Post-closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	
CNSC	FC-179	CNSC-93	10.2	CNL indicated that “a fire buffer zone (5 m minimum) between forest stands and equipment will be established to further reduce the probability of neighbouring forest fire…”. **Expectation to address comment:** Please provide a reference/source for the 5 m minimum buffer zone value.	The reference to the Algonquin Forestry Services report [1] stating a fire buffer zone (5 m minimum) between forest stands and equipment will be established to further reduce the probability of a neighbouring forest fire affecting operations is now included in Section 10.2. Reference [1] Algonquin Forestry Services. 2001. Forest Fire needs and Capability Assessment and Forest Management Feasibility Review – Final Report for Chalk River Laboratories, Atomic Energy of Canada Ltd. September 2001.	Accepted
NRCan	FC-180	NRCan-2	10.3 Seismic Events	Historic earthquakes are mentioned, however, what is not mentioned, is that according to earthquake recurrence models, similar-sized events could happen closer than those mentioned, and indeed are very likely to happen during the 300-year post-closure phase. “Worker safety” and “productivity” are the listed concerns. However, the key concern is the integrity of the liners (especially given that these will be buried / hidden) during construction and post-closure. NRCan could not locate in the draft EIS any demonstration that the expected earthquake shaking will be insufficient to cause displacements large enough to rupture the membranes. The design uses NBCC 2010, but the probability level is not discussed. NRCan requests the	Section 10.3 summarizes the seismic analysis, probability of seismic event considered, mitigation measures and potential consequences. The seismic analysis assumes a 1 in 10,000 year seismic event for the ECM. The selection of the 1 in 10,000 year event is based on the CSA Standard 289.4 ‘Testing procedures for Seismic Qualification of Nuclear Power Plant Structures, Systems and Components’ Since the ECM contains low level waste, using the power plant seismic design requirement is considerably more conservative. However, this conservatism is partly offset by the fact that the ECM design life is 550 years which is approximately 10 times that of a power plant. An analysis of liquefaction potential was completed and indicated that the 10,000 year seismic event scenario may cause liquefaction in the saturated native sand to silty sand soils underlying the ECM resulting in unacceptable vertical and horizontal displacements. CNL has added additional mitigation to limit the potential for liquefaction. Overburden soil susceptible to liquefaction will be excavated down to the top of the very dense glacial till or bedrock and replaced with compacted engineered granular material. With the incorporation of the liquefaction mitigation, the ECM is expected to remain functional under the 10,000-year design seismic event scenario [1]. Predicted maximum shear displacements of the cover and baseliner systems are well below the acceptable displacement of 30 cm specified in the seismic performance criteria.	Accepted

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				responses to the following questions: How are the long-term (300-year post-closure window) effects considered? A 2% in 50 year probability (as used in NBCC 2010) approximates to a 12% in 300 year probability for the facility. Is a greater than 10% chance of exceedance during the lifetime considered appropriate? What would happen if the design ground motions were exceeded that one time in ten? NBCC 2015 is now available. For Deep River (nearby community) the 2015 hazard is lower than 2010 at short periods. It would not be necessary to re-do the analysis for NSDF, if this is shown. It would be sufficient to state that the design is safer than was considered in the design document. **Expectation to address comment:** Please provide the requested information and clearly identify how the NSDF will retain its integrity after strong earthquake shaking. Please provide a reference to your contingency plan if monitoring indicates a leak in the liners.	Contingency measures in the event of a leak in the liners following an earthquake include groundwater monitoring to assess impacts on groundwater quality, assessing potential effects on biota and humans, and development of remedial actions if required [2]. Section 3.4.1.4 has been updated to include the following text on the Leak Detection System: The Leak Detection System (LDS) component of the base liner system, is a means of monitoring potential leakage of leachate through the primary liner and transferring leachate and condensate that accumulates to sumps for subsequent removal to the WWTP. Further details on the LDS can be found in the NSDF Design Description [3]. References [1] Seismic Analysis, 232-503212-REPT-015, Rev 2, 2019 July [2] Contingency Plan for Leachate, Wastewater, Groundwater, Surface Water and Landfill Gas, 232-08600-PLA-004, Rev 0, 2017 April [3] Design Description 232-503212-DD-001, Revision 1, 2019 May.	
NRCan	FC-181	NRCan-3	10.3 Seismic Events	The design guides mentioned in section 10.3 appear to be AECL safety design guides (SDG), not CNSC's approved regulations. These are not listed in the references, and it is not apparent where they are available (one is available from the U.S. at www.nrc.gov/docs/ML0410/ML041000174.pdf). The accessed SDG is for a nuclear power plant, which does not appear to be appropriate for the NSDF. Given the nature of the NSDF, please confirm whether there are seismic design guidelines for landfills (for example in California) that would be more appropriate and could be adapted to higher-consequence (radioactive) materials on a lower-hazard site.	CNL is not aware of CNSC regulations specific to seismic analysis/design for a disposal facility. The ECM design is based on the CSA Standard 289.4 'Testing procedures for Seismic Qualification of Nuclear Power Plant Structures, Systems and Components' and design guidelines listed below. Because these guidelines do not specify the Peak Ground Acceleration (PGA) for the seismic design of the mound, a Probabilistic Seismic Hazard Analysis was conducted to determine the PGA values associated with different return periods or frequencies [1]. The choice of the 10,000 return period is based on the definition of the Design Basis Event in the CSA standard, which is appropriate for Power Plants. Since the ECM contains low level waste, using the power plant seismic design requirement is considerably more conservative. However, this conservatism is partly offset by the fact that the ECM design life is 550 years which is approximately 10 times that of a power plant. Another important aspect is that the 10,000 year return period is at par with the design of Near Surface Disposal Facilities in the US (For example Oak Ridge (OSDF) and Idaho National Laboratory CERCLA).	Accepted

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				Expectation to address comment: Please provide a copy of the other design guide ("Design for Earthquakes (Seismic Qualifications at CRL)"), together with explicit mention as to which parts of each SDG are being applied to the NSDF.	The seismic design criteria applicable to the design of the ECM, Waste Water Treatment Plant and support facilities are provided in the Seismic Criteria and Assessment report [2]. The methods, conditions and results of the seismic analyses performed in the design of the ECM, WWTP and support facilities are summarized in the Seismic Analysis Report [1]. Section 10.3 (Seismic Events) summarizes the seismic analysis, mitigation measures and potential consequences for seismic events. References [1] Seismic Analysis, 232-503212-REPT-015, Rev 2, 2019 July [2] Seismic Criteria and Assessment, 232-01040-ASD-001, Revision 2, 2019 July.	
NRCan	FC-182	NRCan-4	10.3 Seismic Events	The AECOM 2006 report is mentioned in section 10.3 but is not listed in the references. **Expectation to address comment:** Please ensure this report is referenced, and a copy appended, to the revised EIS.	Section 10.3 references AECOM 2019, which is the Seismic Analysis [1]. It is not possible to append referenced documents to the EIS because of the large number of referenced documents. Referenced design documents have been included in the EIS submission package. Reference [1] Seismic Analysis, 232-503212-REPT-015, Revision 2, 2019 July.	Accepted
CNSC	FC-183	CNSC-185	Appendix 5.4-2 Table 3 : Surface water benchmark values	CWQG were adopted for Ni and U but not for As, Se, Al, Cd, Cr, Zn or Hg. **Expectation to address comment:** Please justify not adopting CWQG for all contaminants.	Appendix 5.4-2 has been removed from the revised EIS and this information is now presented in the Surface Water Quality Assessment Technical Supporting Document [1]. Canadian Water Quality Guidelines have been used where available for evaluation of baseline data (Section 5.4.2.4.2) and the surface water quality assessment (Section 5.4.2.6). Examples of use of Canadian Water Quality Guidelines are: • Canadian Water Quality Guidelines for chronic (long term) and acute (short term) conditions where available are used in the evaluation of baseline surface water quality data in Section 5.4.2.4.2. • Effluent Discharge Targets (Section 3.4.2.5.1 and Table 3.4.2-3) for non-radiological constituents are from Canadian Water Quality Guidelines for protection of aquatic life where available. Where both CWQG and Ontario Provincial Water Quality Objectives for protection of aquatic life are available, the lower value was used. The constituents for which CWQG values were used are identified in Section 3 of [1]. Canadian Water Quality Guidelines are applied for each of the constituents identified by the reviewer (i.e., As, Se, Al, Cd, Cr, Zn, Hg). • The Effluent Discharge Targets, and by extension Canadian Water Quality Guidelines, are used in the surface water quality assessment (Section 5.4.2.6.2) and Section 3.1 of [2]. References	Accepted

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					[1] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October. [2] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	
CNSC	FC-184	CNSC-186	Appendix 5.4-2 Table 6	Values for uranium in Perch Lake inlet 1 were 0.7 and 0.76 mg/L in the spring and fall of 2015 respectively, Perch Lake inlet 2 were 2.2 and 6.8 mg/L in the spring and fall of 2015 respectively; 0.63 mg/L in the main stream above the Plant road. These values are above the CWQG of 0.015 mg U/L. The chemical pit, the reactor pit or waste management area A could likely be sources of this uranium. Therefore, when the waste is transferred into the ECM, leachate could contain high levels of U. It is generally understood that U is more chemically rather than radiologically toxic because of its low specific activity and long half-life. The non-radiological assessment does not consider chemical toxicity of U as a COPC despite the high U levels. **Expectation to address comment:** Please include the chemical toxicity of U as COPC in the non-radiological assessment performance of the NSDF or provide a justification for not including the chemical U toxicity.	Appendix 5.4-2 has been removed from the revised EIS and this information is now presented in the Surface Water Quality Assessment Technical Supporting Document. As presented in Table 3.4.2-2 of the revised EIS, based on the projected wastewater characteristics all U isotopes (untreated) and their concentrations are below the effluent limit of 3 Bq/L, and no treatment was necessary. This preliminary screening of U eliminated this parameter from further analysis. The non-radiological risk assessment only examined the chemicals that were expected to change as a result of the project. The uranium values in the 2015 Environmental Monitoring Report and transcribed to Appendix 5.4-3 of the draft EIS were incorrect. Uranium concentrations in Perch Lake in 2015 were well below the CWQG and also below the detection limit of 0.08 ug/L. Thus, uranium is not considered as a COPC. Updated baseline concentration data for uranium is provided in Table 5.4.2-5 of Section 5.4.2.4.2 of the revised EIS. The Surface Water Quality Assessment includes an assessment of the impact of uranium releases from the WWTP effluent discharges [1]. No adverse effects on water quality are predicted. Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	Accepted
ECCC	FC-185	ECCC-113	Appendix 5.6-1	A number of species listed as special concern by SARA are also known or suspected to occur in the LSA. These species include the snapping turtle, eastern milksnake, and monarch. The proposed development could reduce nesting habitat for the snapping turtle, potentially destroy hibernation sites for the milksnake, and clear patches of milkweed plants that are essential for monarchs. The monarch was recently assessed by COSEWIC as endangered	Assessments on eastern milksnake and monarch butterfly have been added into the revised EIS. The baseline conditions for eastern milksnake and monarch are provided in Sections 5.6.4.10 and 5.6.4.11, respectively. The residual effects assessment for these species is provided in Section 5.6.7.9 (eastern milksnake) and 5.6.7.10 (monarch butterfly). Most of the species level Valued Components (VCs) identified for the terrestrial biodiversity assessment, are useful indicators for broader groups of species. For example, Blanding's turtle can be used to represent other species at risk with similar requirements, such as snapping turtles (Section 5.6.2). As documented in Section 5.6.7.9.1 the contribution of the NSDF Project to adverse cumulative effects for the Blanding's Turtle is not significant; therefore, the adverse cumulative effects for the Snapping turtle is also not significant.	Accepted

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				and should be given some consideration in the EIS. Note that the CNSC is obliged, under section 79 of SARA to notify the Minister of the Environment if the project is likely to affect a listed wildlife species (including species of Special Concern) or its critical habitat. The CNSC is further obligated to identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. To ensure the CNSC can carry out this responsibility, the EIS should adequately identify the impact of the project on all listed species, including those of Special Concern and demonstrate how those affects will be avoided, lessened and monitored in a way that is consistent with SARA recovery strategies, action plans and management plans. Expectations to address comment: Include impacts to these Special Concern species in the detailed species assessments. This may involve, for example, that if Monarch habitat will be lost in the proposed construction site, offsets may be required.		
ECCC	FC-186	ECCC-114	Appendix 5.6-1	Two species, the eastern wood-pewee and the wood thrush, have been assessed by COSEWIC as Special Concern and Threatened, respectively, but have not yet been assigned a SARA status. The effect of the development on the wood thrush should also be considered in the EIS. **Expectation to address comment:** Estimate the amount of wood thrush habitat that will be lost	Section 5.6 Terrestrial Environment has been updated to include Eastern Wood-pewee and Wood Thrush. As per Section 5.6.7.6.1, the amount of Wood Thrush habitat that will be lost from the proposed NSDF Project is 32.6% of suitable habitat in the LSA. However the development of the NSDF Project is unlikely to have a measurable effect on wood thrush given they are highly mobile and capable of moving around or over the NSDF Project infrastructure. The following sections have been updated: Table 5.6.2-1 Valued Components Selected for the Terrestrial Biodiversity Assessment;	Accepted

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*subject to change upon CNL updates to several licensing documents

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				from the proposed project and describe how it would impact this species and appropriate mitigation if needed.	Table 5.6.2-2 Assessment Endpoints and Measurement Indicators for the Terrestrial Biodiversity Assessment; Section 5.6.4.5 provides a description of existing status and habitat requirements for the Eastern Wood-pewee; Section 5.6.7.4 provides an assessment of the direct and indirect effects from the NSDF Project on Eastern Wood-pewee; Section 5.6.4.7 provides a description of existing status and habitat requirements for Wood Thrush; Section 5.6.7.6 provides an assessment of the direct and indirect effects from the NSDF Project for Wood Thrush.	
CNSC	FC-187	CNSC-160	Table A-1	CNL provided in this table the description and rationale for the hazard scenario and the screening assessment conclusion. **Expectation to address comment:** A number of other are discussed in other sections of the report, it is expected that CNL follow the CRL Operating Licence and its associated LCH requirements specifically criteria 5.1 & 6.1 and respective guidance in their analysis of the normal operation/evolution, anticipated operational occurrences design basis accident and beyond design basis accidents. Those assessments should be part of the safety analysis/assessment and included in the NSDF SAR. Fire related scenario should also be assessed as part of the facility Fire Hazard Assessment.	A revised Safety Analysis Report (SAR) and a Fire Hazard Analysis (FHA) [2] have been submitted to the CNSC staff as part of the review of the license application. Both of these safety assessments have been prepared following the CRL Operating Licence and its associated LCH requirements. References [1] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September. [2] Fire Hazard Analysis, 232-503230-FHA-001, Revision 2, 2019 March.	Accepted
CNSC	FC-188	CNSC-190	NSDF Waste Acceptance Criteria report	Section 9.1.1 provides waste characterisation expectations for waste generators. Although CNL provides details about the required information to be provided by the waste characterisation program, it does not provide details regarding the number of samples required to sufficiently characterise the mean and upper bound activities and concentrations of nuclear and hazardous substances. Although	IAEA guidance as well as other industry standards for determining the minimum number of samples will be used for waste characterization at CNL. These processes use a statistical approach to define “representativeness” and determine sample density. Variables like surface area/volume, analytical requirements and homogeneity are used to calculate the number of samples required to establish the “representativeness” of a sample set. Affected lands, buildings to be demolished and waste packages in storage will be fully characterized with samples that represent the waste and tested against NSDF Waste Acceptance Criteria (WAC) [1].	Accepted

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				the IAEA (2007) provides guidance on the use of scaling factors and techniques to measure difficult to measure radionuclides, it does not include extensively on minimum number of sample required. **Expectation to address comment:** Since the appendix of the ISO 21238 provides information on minimum number of samples, CNSC staff recommend that CNL use this document along with the IAEA 2007 document for minimum number of samples. ISO Standard 21238:2007 Nuclear energy – Nuclear Fuel technology – Scaling factor methods to determine the radioactivity of low- and intermediate-level radioactive waste packages generated at Nuclear Power Plants. https://www.iso.org/standard/40081.html	A Waste Characterization procedure has been submitted to CNSC staff [2]. Appendix A of CNL's waste characterization procedure includes several characterization resources and guidelines are referenced including the ISO 21238 standard. Reference [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September. [2] Waste Characterization Management Control Procedure 900-508600-MCP-001, Revision 0, 2018 March (e-Doc 5806555).	
CNSC	FC-189	CNSC-189	NSDF Waste Forecast Analysis Report	CNL predicts a baseline waste volume of 836513 m^3 which is within the 1 000 000m^3 volume considered in table 3.2.1-1 of the EIS. However, the NSDF waste forecast report predicted a conservative volume of 1,720,058 in table 1, which almost twice as much waste currently considered in the EIS. In the event that more than 1 000 000m^3 of waste was generated or sent to the NSDF, an amendment to the licence would likely be required (e.g., since this would be outside the prediction envelope of this EIS). **Expectation to address comment:** Considering the long-term operation of the NSDF, please justify not using the most conservative volume of 1,720,058 m3 to predict environmental impacts and associated mitigation measures for the proposed NSDF Project.	The 1,720,058 m^3 volume estimate was not chosen for the NSDF as it is considered a pessimistic quantity and does not optimize the NSDF design. The total volume of 1,000,000 m^3 optimizes the design as well as is reflective of CNL's waste diversion principles. As noted by the reviewer, in the unlikely event that more than 1,000,000 m^3 of waste was generated, an amendment to the licence would be required. Table 3.3.1-1 of the revised EIS provides the estimated volume of bulk and packaged waste expected to be disposed of in the NSDF. The volumes were established by extrapolating waste already currently in storage, as well as waste forecasts from environmental remediation projects and decommissioning projects data to an assumed total volume of the NSDF at time of closure.	Accepted
CNSC	FC-190	CNSC-200	Performance Assessment Report (e-doc: 5224431)	Many conclusions of the EIS, in particular with respect to post-closure safety, are based on the results of the performance assessment (PA).	The Performance Assessment was originally a mix of operational (pre-closure) and post-closure safety analysis. CNL has changed this approach to simplify the scope having the Safety Analysis Report	Accepted

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				The PA report should be developed in a clear, transparent and traceable manner, so that the reviewer can verify the assumptions, methodology and conclusions of the report, or if necessary independently reproduce the results. The current PA report should be improved in order to meet the above expectations. In particular the following points should be addressed: 1. The assessment of Post-Closure safety of the proposed NSDF was performed for a time frame that is not clearly defined. The selection of the assessment time frame is important in presenting the long-term safety case of the proposal, and the rationale must be given, based on the hazards posed by the waste as a function of time. **Expectation to address comment:** clearly define the assessment time frame and provide a rationale based as the time evolution of the hazards posed by the wastes. 2. In the PA report, it seems that the selected assessment time was 100,000 years, although that was not explicitly stated, nor justified. If that is the case, the normal evolution scenario: - should include future glaciation since the next glaciation cycle would likely occur in that time frame. - should include the effect a beyond DBE, since the current DBE is defined for a 10,000 year return period. In the current PA, those two events are considered in disruptive scenarios. Since they are expected to occur during the 100,000 years assessment, if that is the defined assessment time, they are to be included in normal evolution scenario as recommended in CNSC's G-320 and IAEA's SSG-23.	(SAR) Technical Supporting Document include only operational (pre-closure) safety, and the Post Closure Safety Assessment (PostSA) Technical Supporting Document focus on the post closure period. The Post-Closure Safety Assessment (PostSA) has been revised into a well-structured, transparent and traceable approach to provide the analysis of the long-term performance of NSDF [1]. This includes a comprehensive data and models section in the revised PostSA, in sufficient detail for traceability and repeatability purposes to independently validate the calculations. 1) The assessment timeframe for the long-term safety is 10,000 years. This timeframe was determined using the criteria within REGDOC-2.11.1 [2]. The 10,000 year assessment timeframe captures the period of peak radioactivity and dose consequence, the design life of the engineered and natural barrier as well as takes the seismic design basis into consideration. Section 3.1.1.1 of the revised EIS addresses this comment however Section 2.3.4 of the PostSA [1] provides further detailed justification for the selected assessment timeframe. 2) The revised PostSA now includes an updated Features, Events and Processes (FEPs) table in Appendix B [1]. Events or processes commensurate with the assessment timeframe were included in the Normal Evolution Scenario and if an event was determined unlikely it was given consideration for a Disruptive Event. Specifically events that have a high probability of occurrence during the assessment timeframe of 10,000 years are included in the Normal Evolution Scenario. 3) The NSDF design has been revised through the reduction of waste inventory. Thus the design-life of the NSDF engineered barriers ensure containment for hundreds of years allowing for radiologic decay of the waste inventory. The radiologic inventory will decay three orders of magnitude in the first 100 years. By 10,000 years post-closure the radioactivity concentration in the waste is very close to natural background concentrations. Thus as noted in Section 10.5 of the revised EIS, events such as glaciation that happen far into the future can impact waste containment but it is beyond the timeframe that the facility is hazardous. 4) The revised PostSA has included a critical receptor group living on site within the Normal Evolution Scenario [1]. Specifically a small household (comprising two adults, a child and an infant) above the ECM footprint. A description of the receptors selected for post-closure phase is provided in Section 5.8.6.1.1.3 of the revised EIS. A detailed characterization of receptors used in the long-term safety modeling can be found in Section 4.1 of the PostSA [1]. 5) A geosynthesis report is not necessary for a near surface disposal facility however the requested information is available in various supporting documents of the EIS. Specifically the evolution of geological and hydrogeological models at the site and sub-regional scale is presented in [3] and [4]. Section 5.3.1.4 in the revised EIS has been expanded to summarize information from these documents in order to describe the current geological, geomorphological and hydrogeological conditions of the site and their	

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				Expectation to address comment: CNL should clearly justify the normal evolution scenario for post-closure safety. Once an assessment time frame is clearly defined and justified, events that are expected to occur during that time frame should be part of the normal evolution scenarios. 3. If the assessment time is 100,000 years as implied in the PA report, breach of containment from glaciation is likely to occur, resulting in waste dispersion. This is inconsistent with CNSC's and international guidance for long-term waste management principles. **Expectation to address comment:** CNL should design the facility in such a manner that in a normal evolution scenario waste containment with no dispersion is provided by the disposal system. 4. The EIS, which is based on the results of the PA, shows the long-term impact for an infant located in Pembroke. The impact to receptors who live on site consuming local products and water sources should instead be shown and discussed in order to provide arguments on long-term post-closure safety. **Expectation to address comment:** For the post-closure period, CNL should consider a critical receptor group living on site and use that group as the main reference group for demonstration of post-closure safety. 5. The hydrogeological model in support of the performance assessment does not take into account the future site evolution. **Expectation to address comment:** A geosynthesis report should be prepared to	future evolution during the assessment timeframe. 6) CNL has optimized the design of the facility primarily through the removal of the intermediate level waste. The proposed inventory has been optimized through an iterative process as captured in Figure 1 of the Reference Inventory Report [5]. The revised waste inventory is captured in Section 3.3.1.3 of the revised EIS. The updated dose assessment for human health in the post-closure phase is summarized in Section 5.8.6.1.2.2 of the revised but detailed results can be found in Section 6 of the PostSA [1]. A further example of design optimization is seismic design to improve the overall robustness of the facility. The ECM design has been optimized to withstand seismic hazard suitable for the NSDF site. The design of the ECM incorporates ground improvement technique (i.e. remove and replace), to avoid potential liquefaction (See EIS Section 10.3). References [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [2] REGDOC-2.11.1. Assessing the Long-Term Safety of Radioactive Waste Management. Waste Management, Volume III. [3] Three dimensional Sub-Regional Scale Geological Model – Version 2, 361101-10120-REPT-020, 2015 January. [4] Geologic Waste Management Facility Integrated Geosynthesis Report: Phase I 361101-10260-REPT-004, Revision 0, 2016 March. [5] NSDF Reference Inventory Report, 232-508600-REPT-003, Revision 2, 2019 September.	

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				describe both current geological, geomorphological and hydrogeological conditions of the site and their future evolution during the assessment time frame. The hydrogeological model in support of the PA and SAR should take both current site conditions and their future evolution into account. 6. There is no evidence that the design of the proposed facility has been optimized. Optimization of the design should be performed iteratively using the long-term safety case as a tool. As an example, although it is stated that only 1% by volume of ILW is included in the proposed waste streams, the net volume of ILW is not negligible. CNL should consider the alternatives of separate disposal of ILW and LLW and/or disposal at greater depths into the rock. In that optimization process, the resulting impact on humans and the environment, the robustness of the overall disposal system and individual barriers, the risk of human intrusion should be compared between the different alternatives, and the uncertainties related to the evolution of the site and the facility should be compared. **Expectation to address comment:** CNL should provide evidence that the currently proposed design has been optimized in terms of protection of humans and the environment, and robustness of the disposal system to withstand external perturbations either natural or human-induced.		
CNSC	FC-191	CNSC-197	Performance Assessment Report (e-doc: 5224431), 2. Bathtub Effect Overflow Scenario.	The Bathtub Effect Overflow Scenario is an important scenario as its dose caps other scenarios. CNSC staff question some of the assumptions for the Bathtub Effect Overflow Scenario dose calculation: (a) The net infiltration rate through the ECM is	The effects of climate change on precipitation has been assessed in the Climate Change Assessment Technical Supporting Document (which was previously Appendix 9.0-1 in the draft EIS). As summarised in Section 10.4.2 of the revised EIS the total annual precipitation is increasing; however, the trend is not statistically significant. Furthermore the Performance Assessment was originally a mix of operational (pre-closure) and post-closure safety analysis. CNL has changed this approach to simplify the scope having the	Accepted

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				0.3 m/y. (b) Effective porosity of the saturated zone is 0.3 with the hydraulic conductivity of 5360 m/y and hydraulic gradient of 0.007 m. (c) The flow rate in the Perch Creek is 1.77E6 m3/y (five-year average) (d) 300 years of institutional control. See comments in #197. The effect of climate change on precipitation and surface infiltration, the groundwater flow regime, as well as the Perch Creek flow rate is not reflected in the assumption.	Safety Analysis Report (SAR) Technical Supporting Document include only operational (pre-closure) safety, and the Post Closure Safety Assessment (PostSA) Technical Supporting Document focus on the post closure period. The Post-closure Safety Assessment (PostSA) has revised the approach to incorporating bathtubbing [1]. The bathtubbing of NSDF in the post-closure is no longer considered as a specific scenario, but as a natural process potentially occurring in all scenarios, dependant on the water balance of the specific scenarios assessed. As noted in Section 4.1 of the revised PostSA, climate change has been explicitly accounted within the Normal Evolution Scenario and in all scenarios through climate change information provided in the Climate Change Assessment Technical Supporting Document [2]. References [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [2] Climate Change Assessment for the Near Surface Disposal Facility, 232-509220-TD-001, Revision 0, 2019 June.	
CNSC	FC-192	CNSC-198	Performance Assessment Report (e-doc: 5224431), 8.3.2.3 Bathtub Effect Overflow Scenario	In the Bathtub Effect Overflow Scenario, “it was conservatively assumed that the contaminated water flowing out of the ECM due to the “Bathtub” effect will discharge directly into Perch Creek without any reduction in concentrations due to decay or dispersion in the groundwater.” Yet in the equation shown to calculate the flux of radionuclides a retardation factor is assumed. **Expectation to address comment:** CNL needs to explain the discrepancy between the assumption and the use of the retardation factor.	The retardation factor is used when calculating the flux of radionuclides out of the waste (i.e., the radionuclides mobilized from the waste that could leave the ECM). This radionuclide flux would then otherwise undergo further transport through soil/groundwater or overland. The Performance Assessment was originally a mix of operational (pre-closure) and post-closure safety analysis. CNL has changed this approach to simplify the scope having the Safety Analysis Report (SAR) Technical Supporting Document include only operational (pre-closure) safety, and the Post Closure Safety Assessment (PostSA) Technical Supporting Document focus on the post closure period. The Post-Closure Safety Assessment (PostSA) has been revised including the approach to bathtubbing [1]. The bathtubbing of NSDF in the post-closure is no longer considered as a specific scenario, but as a natural process potentially occurring in all scenarios, dependant on the water balance of the specific scenarios assessed. Within the revised PostSA, Section 5 outlines the models used to represent the scenarios assessment as well as the parameters and values used in these models. Further the discussion of the results in Section 6 of the revised PostSA includes the predicted fluxes in the system. Reference [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	Accepted

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CNSC	FC-193	CNSC-199	Performance Assessment Report (e-doc: 5224431), Table 7-8: Events with Potential Radiological Consequences - Internal Events	The Flooding of ECM due to Underdrain clogging event has been screened out. CNL states that "Clogging of the underdrain would lead to a rise of the groundwater table, which, although unlikely, could in turn lead to failure of the base liner due to hydrostatic pressure and uplift and flooding of the ECM cells. This scenario will be addressed by ensuring that the ECM will be designed as such that separation from the groundwater can be assured during post-closure without reliance on the underdrain." CNSC staff agree with the potential consequences of Flooding of ECM due to Underdrain clogging, but it's not clear how this can be addressed through the design. **Expectation to address comment:** CNL needs to justify the screening out Flooding of ECM due to Underdrain clogging event, by providing more details on how the ECM will be designed as such that separation from the groundwater can be assured during post-closure without reliance on the underdrain.	Flooding of the ECM due to underdrain clogging has been screened out based on the design of the ECM. The ECM design includes the following such that separation from the groundwater is assured during post-closure without reliance on an underdrain feature or system. 1) The design does not include any man-made/designed underdrain feature. An underdrain was not included in the design because clogging during the post-closure period of several hundred years could not be guaranteed. As an underdrain feature is absent, it cannot clog and result in flooding of the ECM. 2) The design achieves separation from groundwater, thus eliminating the need for underdrains by: blasting and removal of bedrock; placement of a liner system over the footprint of the ECM, thereby eliminating recharge of water to the groundwater resulting in groundwater levels below the lowest level of the ECM liner system; and after waste placement, the final cover system sheds stormwater away from the ECM footprint and prevents recharge of water to the groundwater. 3) Groundwater modelling predicts that separation from groundwater will be maintained during the institutional control period when cover and baseliner are intact as the final cover system sheds recharge away from the ECM footprint and prevents recharge to groundwater. In the event that groundwater table exceeded the top of the baseliner, there is the potential for upward flow through the secondary liner. Any inflow through the baseliner would be captured by the leak detection system (Figure 3.4.1-4 of the revised EIS) and be transported downstream through the secondary leak detection system. There would be no contact with the waste which is further sheltered by the primary liner system. The Groundwater Modelling Report has been updated and Section 4.4.2 provides confirmation that the 1.5 m separation distance between the primary liner and maximum groundwater table will be achieved and maintained [1]. Canadian Nuclear Laboratories notes that the separation distance is important for the construction phase when the clay liner is constructed (dry conditions are needed for this activity). In the event that the water table were to reach the base of the ECM during operations or post-closure phase, there would be no negative impacts. Since this scenario has been screened out on the basis of design, the revised EIS does not carry it into an assessment of effects. Reference [1] Groundwater Flow Modelling of the Near Surface Disposal Facility Chalk River Site, 232-509249-REPT-001, Rev 5, 2019 July.	Accepted
CNSC	FC-194	CNSC-188	Waste Characterisation Report 232-508600-REPT-002,	The EIS, performance assessment and safety analysis reports all rely on the conservatism of the estimated radioactivity in all 6 waste streams. The waste characterisation report	Microshield was not used to estimate radionuclide inventories of alpha and beta emitters. Microshield software was used only to estimate worker exposure rates from emplaced bulk and packaged waste based on the estimated NSDF inventory.	Accepted

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				indicates that the activities of all radionuclides considered were estimated from photon/gamma measurements using the software Microshield . It is not described how Microshield estimates alpha and beta emitter activities. Does it use scaling factors and are these scaling factors derived following international guidance by the IAEA and the ISO? In addition, the document did not indicate on how many gamma measurements were used to estimate radioactivity of nuclides nor did the report indicate if the radioactivity values were means, or upper bound activities. The waste characterisation document does not provide an uncertainty analysis of the estimated inventory. **Expectation to address comment:** Please provide an explanation on how Microshield estimates activities of difficult to measure alpha and beta radionuclides. If using scaling factors, please demonstrate how it meets IAEA and ISO standard on the use of scaling factors. Please indicate the number of measurements supporting the activities of nuclides and provide the mean, upper confidence intervals for each radionuclide. Please provide a summary in the EIS. ISO Standard 21238:2007 Nuclear energy – Nuclear Fuel technology – Scaling factor methods to determine the radioactivity of low- and intermediate-level radioactive waste packages generated at Nuclear Power Plants. https://www.iso.org/standard/40081.html IAEA 2009. Determination and Use of Scaling Factors for Waste Characterization in Nuclear Power Plants.	Scaling factors are used primarily for performing waste package source term calculations using waste stream characterization data from the waste profile where either external exposure rate or gamma emitting radionuclide concentration (like Cs-137) taken by field measurement provide the basis for scaling the other radionuclides to a measured value like the Cs-137 concentration for example. Scaling factors were used to derive the reference inventory for the bulk waste generated by environmental remediation and decommissioning projects (see [2]). A Waste Characterization procedure has been submitted to CNSC staff [2] where-in characterization requirements for waste are defined. All parameters (e.g., minimum number of samples and confidence intervals), are determined through a data quality objectives process. Appendix A of CNL's waste characterization procedure includes several characterization resources and guidelines are referenced including the ISO 21238 standard. The Waste Characterization Report has been updated to reflect the revised inventory for NSDF (i.e., only low-level waste) and submitted to CNSC staff [3]. References [1] NSDF Reference Inventory Report, 232-508600-REPT-003, Rev 2, 2019 Sept [2} Waste Characterization Management Control Procedure 900-508600-MCP-001, Revision 0, 2018 March, (e-Doc 5806555). [3] Waste Characterization, 232-508600-REPT-002, Revision 3, 2018 October, (e-Doc 5894872).	

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				www.pub.iaea.org/MTCD/Publications/PDF/Pub1363_web.pdf		
ECCC	FC-195	ECCC-117	5.4.2.10	The Proponent indicates that treated effluent will be sampled and confirmed that it meets treatment criteria before its release into the East Swamp Wetland (see Table 5.4.2-19). However, the pilot studies conducted in order to assess wastewater treatment removal efficiencies for each COPC (see Table 5.4.2-7: *WWTP Removal Efficiencies for Constituent of Potential Concern*) indicated that the WWTP may not be able to treat certain parameters (e.g., barium, cadmium and mercury). **Expectation to address comment:** The Proponent should indicate how it will ensure that all treated effluent will meet discharge criteria prior to its discharge into the receiving environment considering that the wastewater treatment plant as designed has not been proved capable of removing all COPCs to the Proponent's treatment target.	The release of treated effluent from the wastewater treatment plant is a controlled batch release process. This means the treated effluent will be monitored prior to release to the environment to confirm that effluent discharge targets are met. In the event that effluent discharge targets are not met, the effluent will be recycled for further treatment. 1. Table 3.4.2-3 of the revised EIS shows none of barium, cadmium or mercury are expected to exceed discharge criteria. Table 3.4.2-3 of the revised EIS, the flexibility of the wastewater treatment plant is discussed. Although the design of the plant targeted the removal of specific contaminants, there is sufficient capabilities within the design systems to adjust. For example addition of ion exchange columns to selectively remove contaminants from wastewater, in the event of higher than anticipated contaminant concentrations or unanticipated contaminants in influent.	Accepted
ECCC	FC-196	ECCC-118	General	During review of the draft EIS, there were cases where the original text or responses to some of ECCC's information requests included references to existing documents. These documents were provided as standalone items after the draft EIS was received. Examples include: • Surface Water Management Plan (207 pages) • Groundwater Flow Modelling (294 pages) • Annual Safety Report – Environmental Monitoring 2016 (307 pages) It was not always clear which portions of a document were relevant to the project. It is difficult to determine how the documents – individually or as a package – may change text presented in the EIS chapters or how that	Two appendices have been attached to this table to address this comment. Appendix A to this table has been included to support Section 3.2, paragraph 4 of the Generic Guidelines for the Preparation of an Environmental Impact Statement pursuant to CEAA 2012 (CEAA, May 2016). Each of the technical sections of the revised EIS have a similar structure to summarize methods and results, as well as prediction confidence and uncertainty. The table in Appendix A lists all Technical Supporting Documents for the revised EIS, the environmental component study where it is applicable, and where in the revised EIS the summary of methods and results can be found. Appendix B to this table has been included to support Section 3.3.3 of the Generic Guidelines for the Preparation of an Environmental Impact Statement pursuant to CEAA 2012 (CEAA, May 2016). The table in Appendix B identifies existing information relevant to the project used for the EIS. The information presented in the table includes the portion of information or data applying to the NSDF Project, how the information or data is applied including outlining assumptions, limitations or differences and lastly distinguishes factual evidence form inference. It should be noted that data and reports that were completed specifically for the NSDF project, including Technical Supporting Documents are not included in Appendix B.	Accepted

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				would carry through to the overall assessment of effects. **Expectation to address comment:** As required in Section 3.2, paragraph 4 of the *Generic Guidelines for the Preparation of an Environmental Impact Statement pursuant to CEAA 2012* (CEAA, May 2016) please ensure that conclusions are substantiated within the EIS text. This may include references to existing documents. To comply with Section 3.3.3 of the Generic Guidelines (CEAA, 2016) when existing documents are referenced, please: • Specify which portion of the information or data in the document applies to the NSDF Project • Explain how it applies, and any assumptions, limitations or differences • Distinguish factual evidence from inference • Note any limitations on inferences or conclusions that can be made Situations should be reviewed on a case-by-case basis and various approaches should be considered that would satisfy this expectation, for example the use of summaries or appendices.	These documents should be considered in their entirety as relevant to the NSDF project. However, Appendix A provides where the summary of methods and results can be found.	
ECCC	FC-197	ECCC-11 – ADDED BACK TO TABLE BY ECCC	Section 3.5.1 Version 0 of Project Description dated 2016/03/30	**Comment:** Approximately 155,000 m^3 of soil will require excavation for the initial design fill capacity of the NSDF. Section 3.6 of the initial Project Description (Version 0 - dated 2016/03/30) indicated that contaminated soil encountered during excavation will be managed as contaminated waste and may be stockpiled onsite and used as fill for the facility. The same language does not appear in the version 2.0 of the Project Description. As such, it is unclear if and how contaminated soils encountered during excavation of the facility	Since the draft EIS additional radiological surveys of the NSDF site have been completed. The results of the radiological surveys of soil and contamination have confirmed that the ECM footprint does not contain radiological concentrations above local background levels [1]. As such the topsoil will be stored in piles for later reuse as final landscaping of the NSDF Project site, for application elsewhere on the CRL site, or for the ECM final cover system. Section 3.2.1.1 has been updated in the revised EIS to reflect how the soil spoils (excess topsoil for reuse) will be managed. Reference [1] Analysis of Surface Soil Samples from the Proposed Near Surface Disposal Facility (NSDF) Site, 232-121270-TD-004, Revision 0, October 2017.	Accepted

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				would be identified, segregated and used in order to prevent or mitigate environmental effects. **Action Required:** Revise the latest version of the project description to describe how contaminated soils will be monitored for and identified if encountered during excavation of the NSDF. If found, also describe how they will be segregated and used in a manner that prevents or mitigates environmental effects, including impacts to water quality.		
CNSC	FC-198	CNSC-75	General	The final EIS should indicate if any of the identified First Nation and Metis groups have requested for any additional studies to be conducted by CNL in relation to the EIS including traditional land use or traditional knowledge studies as per the guidance of REGDOC 3.2.2.	Section 6.2.7 of the revised EIS documents that CNL has entered into two Memoranda's of Understanding (MOU). One with the Algonquins of Ontario (AOO) and one with the Metis Nation of Ontario (MNO). These MOU's have provided these Indigenous groups with capacity to conduct their own Traditional Knowledge and Land Use Studies (TKLUS) to support the NSDF EIS and have identified VCs of particular interest to them. (Captured in Section 6.3.1.1). The MNO has completed a Traditional Knowledge and Land Use (TKLUS) [1] specifically for the NSDF and Nuclear Power Demonstration projects through funding supplied by the CNSC and CNL. While the study only involved 11 participants, it did document significant use within its study area. Because the study only involved eleven participants, the results should not be taken as the only land uses by MNO citizens in the region. (Section 6.4.4.1.2). Information on traditional land use activities by Indigenous peoples in Section 6.4 has been drawn from the MNO's TKLUS. It should be noted that the AOO has also received funding for a large traditional knowledge and land use study from CNSC and CNL and work has commenced but that work will be unlikely completed until well into 2020. Provided the AOO study is completed on time, it is CNLs intention to revise the traditional land and resource use section in the IER for submission prior the CNSC Hearing on the NSDF Project. Reference [1] Chalk River TKLUS Study. Prepared for the Métis Nation of Ontario. 2019 *Note this reference cannot be provided as it is proprietary information of the MNO.*	Accepted
MDDELCC	FC-199	QC-1	EA Process – Study Areas and Spatial Boundaries	[English] None of the study areas (site, local or regional) include areas in the Quebec province for the assessment of the components associated with	The RSAs for the following environmental components, have been expanded to include the reach of the Ottawa River extending 8 km downstream of CRL and into Quebec: • Hydrology/Surface Water Quality (Section 5.4), • Aquatic Environment (Section 5.5),	Accepted

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		CNL-ND50		surface water and sediment quality of the Ottawa River, air quality, human health, land and resource use and the socio-economic environment. The MDDELCC is of the opinion that CNL must review the study areas beyond the provincial border, in order to fully assess the potential impacts of the project. [Français] Aucune zone d'étude (du site, locale ou régionale) de l'eébauche de l'ÉIE n'inclut de secteur du territoire québécois pour l'évaluation des composantes associées à la qualité des eaux de surface et des sediments de la riviere des Outaouais, à la qualité de l'air, à la santé humaine, à l'utilisation des terres et des ressources et à l'environnement socioéconomique.Le MDDELCC est d'avis que l'initiateur doit revoir les zones d'etude au-delà des limites territoriales, afin d'évaluer pleinement les impacts potentiels du projet.	• Ambient Radioactivity and Ecological Health (Section 5.7), • Human Health (Section 5.8), and • Land and Resource Use (Section 5.9) The RSA for socio-economic assessment has been expanded to include a large reach of western Quebec. Canadian Nuclear Laboratories Environmental Monitoring program (Section 5.7.4.3), includes monitoring locations in Quebec for ambient gamma dose, Noble gas dose, ambient tritium, radioactivity in surface water and vegetation.	
MDDELCC	FC-200	QC-2 CNL-ND7	2.3 Purpose of the Project	[English] CNL's main justification for the choice of its site, directly on the banks of the Ottawa River, is that the majority of the waste to be buried is already on the CRL site. For more precision on the origin and characteristics of the waste and that 10% of 1 000 000 m3 is equivalent to 100 000 m3, it appears necessary that CNL: a) Provide justification for why wastes from other CRL sites and of commercial activities will be transported to the NSDF b) Estimate, in cubic meters, the wastes that will come from the CRL site in comparison to the wastes that will come from other sites or commercial activities c) Confirm whether waste from the former reactor 2 sites will be buried in the NSDF and, if applicable, whether the waste is	CNL and Atomic Energy of Canada Limited (AECL) have been instrumental in the development of Canada's nuclear industry. For more than 70 years, nuclear technology has evolved to meet the needs of the world for clean, reliable energy; sustainable economic growth; and public health, safety and security. Today, CNL operates multiple sites across Canada, and manages AECL's waste liabilities. In accordance with *Canada's Radioactive Waste Policy Framework* that waste producers and owners of radioactive waste are responsible for the funding, organization, management and operation of disposal and other facilities required for their wastes. Responsible nuclear waste management includes full life cycle management from generation to disposal. CNL and AECL are working actively at strategic and operational levels to identify strategies and solutions for waste management of the entire life cycle of all radioactive waste classifications including low-level waste, intermediate level waste and high level waste. These strategies are documented in the CNL Integrated Waste Strategy [1]. CNL's preference for a low-level waste disposal was a technically feasible site on lands currently under CNL's control, ideally close to the location of generation and/or storage of the waste and in an area that is already covered by a nuclear licence.	Accepted

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				of low or intermediate level d) Specify, on an annual basis, the increase in the volume of waste from other CRL business and commercial activities in relation to the current situation e) Specify the exact nature of the waste (volume, mass, activity for all radionuclides and packaging) that will be transported from Gentilly-I to the CRL site and the planned schedule for that transfer f) Confirms the origin of the waste that will be buried in the four cells (475 000 m3) during the second phase of operation g) Describe explicitly and disaggregated, particularly for the intermediate-level waste, the precise nature of the material to be buried: volume, mass, level of activity for all radionuclides, their half-life and dose factor (mSv / kBq by inhalation and ingestion) h) Specify whether wastes that have a sufficient radionuclide content to require the use of heavy-duty containers (including concrete shielding), in order to ensure a higher level of confinement, could contain high-level waste, and in particular, specify the consequence of the failure of a container on the quality of the leachate over time, if the radionuclide content could be dissolved and migrate into water, which would make it possible to reach a subcritical or critical mass (or emitting neutrons), and the consequence of such a situation on the emission of heat. [Français] La principale justification de l'initiateur dans le choix de son site, soit directement sur les rives de la rivière des Outaouais, est que la majorité	CNL performed a detailed evaluation and analysis for alternative means for carrying out the project in Section 2.5 of the revised EIS. a) Low-level radioactive waste is by far the largest volume among radioactive waste categories (e.g. in millions of cubic meters), thus facility siting must underpin the impact of transportation. The CRL site is fairly complex site with higher levels of environmental contamination and large volumes of waste thus amalgamation of the Government of Canada's associated nuclear liabilities at the CRL site is practical. CNL also manages small amounts of radioactive wastes received from Canadian generators including hospitals and universities, consistent with existing commercial arrangements. This service ensures a reasonable and practical approach for generators of small amounts of nuclear waste to manage it. b) As noted in Figure 3.3.1-1 of the revised EIS, 90% of the waste by volume (or an estimated that 900,000 m3) of waste will come from the CRL site. A small percentage of the waste volume will come from off-site sources such as Whiteshell Laboratories and other federal nuclear liabilities (i.e. ~ 50,000 m3) and the remainder from commercial waste sources such as hospitals and universities. c) The Nuclear Power Demonstration (NPD) and Whiteshell Reactor 1 (WR-1) facilities which are proposed to be decommissioned in situ [1] thus will not be disposed of in NSDF. Any waste intended for NSDF must be compliant with NSDF's Waste Acceptance Criteria [2]. d) There is no anticipated increase in volume of waste from commercial activities in relation to the current situation. However the clean-up mission for the CRL site, and closure of the Whiteshell site, is anticipated to increase CNL waste generation. These wastes have been forecasted as part of the reference inventory development for the NSDF Project and are available in [3]. e) Based on CNL's Integrated Waste Strategy [1], the current plan is near-term decommissioning of the site with the exception of the reactor building which will continue in ongoing storage with surveillance. Details of the exact nature and the planned schedule for the transfer of decommissioning waste from Gentilly-1 is note available at this time. However decommissioning of Gentilly-1 is a separately managed process, which CNL will ensure adequate public and stakeholder engagements as part of the decommissioning planning process. f) It is expected that the majority of the waste that will be disposed in the second phase of operation will come from the CRL site. The operational lifetime of NSDF is projected to support the operation of the CRL site until 2070. g) Based on comments received on the draft EIS, intermediate level waste has been removed from the waste inventory and will not be disposed in the NSDF. The current strategy is that	

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				des déchets à enfouir se trouvent déjà sur le site des Laboratoires de Chalk River (LCR). Pour plus de précision sur l'origine et les caractéristiques des déchets et considérant que 10 % de 1 000 000 m3 équivalent à 100 000 m3, il apparaît nécessaire que l'initiateur : a) Justifie la raison pour laquelle les déchets provenant d'autres lieux d'activités des Laboratoires Nucléaires Canadiens (LNC) et d'activités commerciales seront importés aux LCR b) Estime, en mètres cubes, les déchets qui proviendront des LCR par rapport aux déchets qui proviendront d'autres sites ou d'activités commerciales c) Confirme si des déchets provenant des anciens sites des réacteurs 2 seront enfouis dans l'IGDPS et, s'il y a lieu, précise si ces déchets sont de faible ou de moyenne activité d) Précise, sur une base annuelle, l'augmentation du volume de déchets provenant d'autres lieux d'activités des LNC et d'activités commerciales par rapport à la situation actuelle e) Précise la nature exacte des déchets (volume, masse, activité pour tous les radionucléides et conditionnement) qui seront transportés de Gentilly-I aux LCR et l'échéancier prévu pour ce transfert f) Confirme l'origine des déchets qui seront enfouis dans les quatre cellules (475 000 m3) lors de la deuxième phase d'exploitation g) Décrive de façon explicite et ventilée, particulièrement pour les déchets de moyenne activité radioactive, la nature précise du matériel qui sera enfoui : volume, masse, niveau d'activité pour tous les radionucléides, leur période de demi-vie et leur facteur de dose	intermediate level waste from all CNL managed sites will be safely packaged and stored at CRL until a waste repository is available [1]. Table 3.3.1-2 of the revised EIS provides details of NSDF's revised reference inventory (i.e. only low-level waste). h) No High-Level Waste will be accepted for disposal in the NSDF. CNL's high level waste will be placed in safe, secure and suitable storage facilities until a national deep geological repository designed for used fuel becomes available [IWS]. References [1] Canadian Nuclear Laboratories Integrated Waste Strategy, CW-508600-PLA-002, Revision 1, 2019 February. [2] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September. [3] NSDF Waste Forecast Analysis, 185-508600-REPT-014, Revision 1. 2018 July.	

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				(mSv/kBq par inhalation et par ingestion) Précise si les déchets qui auront un contenu en radionucléides suffisamment élevé pour nécessiter l'utilisation de conteneurs ultrarésistants (notamment des conteneurs munis d'un blindage de béton), afin d'assurer un niveau de confinement plus élevé, pourraient contenir des déchets à haute intensité, en précisant la conséquence du bris d'un conteneur sur la qualité du lixiviat dans le temps, si le contenu radioactif pourrait être dissous et migrer dans l'eau, ce qui permettrait d'atteindre une masse subcritique ou critique (ou émettrice de neutrons), et la conséquence d'une telle situation sur l'émission de chaleur.		
MDDELCC	FC-201	QC-3 CNL-ND16	Alternative Means of Carrying out the Project Section 2.5	[English] The MDDELCC request that CNL explain in more detail why the option of the Geological Waste Management Facility (GWMF) or the above ground concrete vault (AGCV), which would ensure better construction reliability, better protection of human health and long-term safety, was not adopted, especially by: a) Clarifying whether a weighting has been allocated to the seven criteria used to assess different alternatives studied; b) Providing the additional report entitled "Site Selection Report 232-10300-TN-001 "cited in Figure 1.5-1 of the draft EIS; c) Explaining whether the examples of the NSDF sites in operation cited on page 2-18 of the draft EIS were located in a semi-continental climate zone and close to a water system, as is the current proposed project; d) Describing how the climate and proximity of the water system are likely	As part of the Alternative Means assessment in Section 2.5 of the revised EIS, CNL evaluated the Facility Type of Geological Waste Management Facility (GWMF) as well as the Facility Design of AGCV versus other alternatives. Based on comments received on the draft EIS, intermediate level waste has been removed from the waste inventory and will not be disposed in the NSDF. NSDF will only contain solid low-level waste. The engineered containment mound is designed to contain and isolate the wastes from the environment for 550 years, after which, the radioactivity has decreased to levels close to the natural background concentrations. Since the NSDF Project only accepts LLW and most of the radioactivity; thus, the hazard, decays in the first 100 years after closure, the design of the NSDF Project is commensurate with the hazard. In response to the request for additional information, CNL provides the following: a) A weighting was not allocated to the evaluation criteria used to assess the alternatives. b) The Site Selection Report [1] is a Technical Supporting Document to this EIS and has been submitted to the CNSC as the responsible authority to coordinate the Federal and Provincial agency review of the NSDF Project EIS. c) Section 2.5.2.1.1 has been revised including Table 2.5.2-1 "Attributes of Selected Near Surface Facilities in Canada and USA for Long Term Management of Low Level Radioactive Waste". The table includes a summary of key attributes for a number of near surface facilities in Canada and USA. The key purpose of this table is to demonstrate that for other nuclear sites undergoing a large environmental remediation and decommissioning missions, a near surface engineered containment mound is a best available technology due	Accepted

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				to influence the effectiveness of the NSDF; e) Specifying whether it complies with the recommendation of the International Energy Agency (Technical Considerations in the Design of Near Surface Disposal Radioactive Waste, 2001), which indicates that wastes containing short-lived radionuclides can be buried in an NSDF, while waste containing more than the specified amount of alpha-long-emitting nuclides require a phase-out in GWMFs, in particular considering that 1% of the total volume of waste would be ILW; f) Explaining why ILW is not buried in an AGCV or in another structure providing an additional barrier of protection. [Français] Le MDDELCC souhaite que l'initiateur explique plus en détails pourquoi l'option de l'installation de gestions des déchets géologiques (IGDG) ou de la voûte en béton hors sol (VBS), qui assurerait une meilleure fiabilité de construction, une meilleure protection de la santé humaine et de la sécurité à long terme, n'a pas été retenue, notamment : a) En précisant si une pondération a été allouée aux sept critères utilisés pour évaluer les différentes solutions étudiées; b) En fournissant le rapport complémentaire intitulé « Site Selection Report 232-10300-TN-001 » cité à la figure 1.5-1 de l'ébauche de l'étude d'impact; c) En expliquant si les exemples de sites d'IGDPS en exploitation cités à la page 2-18 de l'ébauche de l'étude d'impact	to the magnitude of waste volume (i.e. approaching one million cubic meters) and type of waste streams (i.e. contaminated soils and demolition debris). d) The NSDF has been designed to withstand climatic conditions and optimizing the siting of the facility. For example, the WWTP design includes provision for managing water volumes from two back to back 1: 100 year storms. The NSDF site is positioned well above Ottawa River flood elevations and dam break scenarios have been considered. e) CNL has revised the inventory such that the NSDF will contain only solid low-level waste which limits the amount of long-lived radionuclides. The Waste Acceptance Criteria applies guidance from IAEA GSG-1 [2] as well as Canadian Standards Association N292.0-19 [3] to ascertain the radionuclide concentration limits [4]. f) The current strategy is that intermediate level waste from all CNL managed sites will be safely packaged and stored at CRL until a waste repository is available References [1] Near Surface Disposal Facility Site Selection Report, 232-10300-TN-001, Revision 2, 2016 October. [2] Classification of Radioactive Waste, GSG-1, International Atomic Energy Agency, 2009. https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419_web.pdf [3] General principles for the management of radioactive waste and irradiated fuel, CSA N292.0:19, Canadian Standards Association, March 2019. [4] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September.	

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				étaient situés dans une zone climatique semi-continentale et à proximité du réseau hydrique, tel que dans le projet à l'étude; d) En décrivant comment le climat et la proximité du réseau hydrique sont susceptibles d'influencer l'efficacité de l'IGDPS; e) En précisant s'il respecte la recommandation de l'Agence internationale de l'énergie atomique (Technical Considerations in the desing of Near Surface Disposal Facilities for Radioactive Waste, 2001), qui indique que les déchets qui contiennent des radionucléides de courte durée de vie prevent ter enfouis dans des IDS, alors que les déchets contenant plus que la quantité spécifiée de nucléides émettant des rayons alpha à longue durée nécessitent une élimination dans des IGDG, notamment en considérant que 1 % du volume total des déchets aurait une activité moyenne; f) En expliquant pourquoi les déchets d'activité moyenne ne sont pas enfouis dans une VBS ou dans une autre structure fournissant une barrière supplémentaire de protection.		
MDDELCC	FC-202	QC-4 CNL-ND77	Section 2.5.4 Site selection	[English] In the opinion of the MDDELCC, the location proposed by the proponent is less advantageous with respect to hydrogeological components and surface water due to the proximity of the hydrographic network (30-meters from a wetland, 1 kilometre from the Ottawa River). This text above is new to what was captured in ND77, and will need a response.	In the Alternative Means CNL has evaluated alternate locations at the CRL site. The East Mattawa Road site has been chosen as the preferred technical and environmental option based on the alternative means analysis provided in Section 2.5. The location of the NSDF is appropriate for its function as a LLW disposal site and the engineered barriers have been designed to work with the site characteristics. It is located in a well understood and comparatively low seismic zone and is considered to be within the Canadian Shield; a stable rock formation. See FC-226 for further information. With respect to the concerns raised in items a), b) and c) the Alternative Means review considered alternative locations and technical solutions including locations outside of the CRL site and sites further away from the Ottawa River. Section 2.5 of the revised EIS has been updated and provides a detailed evaluation which led to the conclusion that the proposed NSDF on the CRL site	Accepted

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				Taking into consideration the concerns raised, the MDDELCC indicate that CNL should: a) Evaluate the possibility of moving the project location away from the water system of the Ottawa River b) Present other sites outside of the CRL site within a radius that would allow for the economic and technical feasibility of the project, but which would also offer better environmental characteristics (distance from the water system, hydrogeological characteristics, site slope, population density in the catchment area, etc.) and greater social acceptability. CNL should not restrict its research to CNL properties c) Discuss the possibility of reviewing the technical solution chosen, taking into account the site and its environmental sensitivity, in order to increase the quality of the isolation of the waste in relation to the water environment, so as to ensure the health and long-term safety of the public. [Français] De l’avis du MDDELCC, l’emplacement proposé par l’initiateur est moins avantageux en ce qui a trait aux composantes hydrogéologiques et aux eaux de surface en raison de la proximité du réseau hydrographie (milieu humide à 30 mètres, rivière des Outaouais à 1 kilomètre). Considérant ce qui précède, le MDDELCC note que l’initiateur devrait : a. Évaluer la possibilité d’éloigner l’emplacement du projet par rapport au réseau hydrographique de la rivière des Outaouais; b. Présenter d’autres sites à l’extérieur du site des LCR dans un rayon qui permet la	is the most favorable option. The EIS addresses socio-economic impacts of the Project for the preferred option. In response to specific concerns CNL provides the following: a) The possibility of moving the project location further away from the Ottawa River, was considered in the site selection process and is discussed in Section 2.5.5 of the revised EIS. Section 2.5.5 has been expanded to include all sites considered as part of the site selection process. The lower Perch Lake basin, the proposed location of the NSDF is the site of CNL’s first WMA. The hydrogeology of this basin is well understood and has been studied for over six decades. Groundwater transit times to the Ottawa River are longer for the selected site than the Alternative Site located further inland. This is because the chain of lakes on the western perimeter of the CRL site are connected to the Ottawa River. b) The consideration of sites outside of the CRL site is discussed in Section 2.5.4 of the revised EIS. The main reason for selection of the CRL site, is that 90% of the waste by volume to be placed in the NSDF is at the CRL site. These wastes have arisen from decades of Research & Development activities for development of nuclear energy, medical isotope production for Canada and abroad and innovative science. The remaining 10% of the waste volume, 5% is from other AECL sites, e.g., Whiteshell Laboratories, Prototype Reactor Sites, for example Gentilly, and 5% from other Canadian hospitals, universities and commercial sources. c) The revised EIS provides a complete assessment of effects of the project on the environmental sensitive features such as surface water (Section 5.4), groundwater (Section 5.3), species at risk (Section 5.6) and socio-economic factors (Section 5.10). The PostSA [1] has been expanded to provide a more comprehensive assessment of natural evolution and disruptive events to demonstrate the long term safety of the public. Reference [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	

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				faisabilité économique et technique du projet, mais qui offriraient également de meilleures caractéristiques environnementales (distance par rapport au réseau hydrographique, caractéristiques hydrogéologiques, pente du site, densité de population dans le bassin versant, etc.) et une meilleure acceptabilité sociale. L'initiateur ne devrait pas restreindre sa recherche aux propriétés des LCN; c. Discuter de la possibilité de revoir la solution technique retenue, compte tenu de l'emplacement du site et de sa sensibilité environnementale, afin d'augmenter la qualité de l'isolation des déchets par rapport à l'environnement hydrique, de manière à assurer la santé et la sécurité du public à long terme.		
MDDELCC	FC-203	QC-5 CNL-ND92	Project description Section 3 Page 3.21	[English] As the impermeability of the site depends greatly on the integrity of the geomembrane, the MDDELCC indicate that CNL should: a) Further document the potential effect of radiation from waste and heat on the long-term membrane integrity; b) Evaluate its resistance to seismic shocks; c) Evaluate the life of the geomembrane and specify options for repair, replacement or recovery if a defect is detected in its integrity; d) Evaluate, using recognized leakage rates, leaks across membranes, acceptable fluxes and criteria for intervention; e) Discuss the uncertainty associated with estimating the service life of the geomembrane estimated at 500 years, considering that in situ tests have not yet been carried out for such a long period; f) Specify whether a final overlay of geosynthetic clay, compacted clay or	The base liner and final cover systems are composed of a combination of natural materials (e.g., compact clay liner) and synthetic materials (e.g., high density polyethylene geomembranes) designed to work together to mitigate the release of contaminants into the environment. Long-term performance tests (discussed below) have been conducted to provide confidence that the synthetic high density polyethylene geomembrane component of the liner systems will meet the 550-year design life thus complimenting the natural clay component which will provide a hydraulic barrier for thousands of years. Canadian Nuclear Laboratories engaged Subject Matter Experts from industry and academic institutions to design the NSDF liner systems and to conduct a series of testing programs demonstrating the long-term integrity of the geomembrane. a) With respect to potential effect of radiation: The HDPE polymer has excellent radiation resistance and is suitable material as a component of liner systems for low level waste disposal facilities. Radiological effects have been considered to assess the long-term performance of HDPE geomembrane and documented in Section 5 of [1]. Conclusions include: • The conservatively estimated NSDF dose rate of $2.4x10^{-5}$ rad/hr (0.21 rad/year) is about two hundred millionth of the dose rate of 5000 rad/hr required to notably affect HDPE. • Radiation from LLW is unlikely to have a significant effect on the service-life of geomembranes relative to other physical and chemical mechanisms. • Estimated service life of the preferred NSDF geomembrane would be >2000 years, well	Accepted

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				concrete is also included in the design of the ECM to integrate multiple barriers as recommended in the IAEA documentation; and g) Explain how the collapse of waste and waste containers will be controlled over time, in order not to compromise the integrity of the waterproof cover. [Français] puisque l'imperméabilisation du site dépendra grandement de l'intégrité de la géomembrane, le MDDELCC indique que l'initiateur devrait : a. Documenter davantage l'effet potentiel du rayonnement des déchets et de la chaleur sur l'intégrité de la membrane à long terme; b. Évaluer sa résistance aux secousses sismiques; c. Évaluer la durée de vie de la géomembrane et préciser les options de réparation, de remplacement ou de recouvrement possibles si une défectuosité était détectée dans son intégrité; d. Évaluer, en utilisant des taux de fuite reconnus, les fuites à travers les différentes membranes, les flux acceptables et les critères d'intervention; e. Discuter de l'incertitude associée à l'estimation de la durée de vie utile de la géomembrane évaluée à 500 ans, considérant que des tests in situ n'ont pas encore été effectués pour une aussi longue période; f. Préciser si un recouvrement final d'argile géosynthétique, d'argile compacté ou de béton est également prévu dans la conception du MCA afin d'intégrer des barrières multiples tel que le recommande la documentation de l'AIEA;	exceeding required service life of 550 years. With respect to the potential effect of heat: The NSDF waste is not heat generating as it is only low-level waste. To estimate the long-term performance, candidate geomembranes were tested to the range of elevated temperatures for up to 85°C to accelerate aging process. Arrhenius model was utilized to estimate the service life at select temperature (10°C). This temperature was based on annual average temperature at Chalk River, Ontario (~ 5.6°C) (1981-2010), published by Environment Canada. In addition, it also accounted potential temperature increase due to global warming by a few oC for over 550 years. It is highly likely that the GMBs in the base liner and final cover will be <10°C once well covered (i.e., isolated from the atmosphere, and especially the sun, by the rest of the barrier system and by waste). Estimated service-life of the NSDF geomembrane is >2000 years at 10°C, which is beyond the required design life of 550 years. Conservatively, the estimated geomembrane service life for higher average temperatures (i.e., 15°C and 20°C) also confirmed that the NSDF geomembrane will exceed required service life of 550 years. b) The design of the NSDF ECM included seismic analyses to evaluate the performance of geomembrane due to seismic event and concluded that the geomembrane will be able to withstand the design basis seismic event considered for the NSDF. Seismic analysis includes: a site-specific Probabilistic Seismic Hazard Analysis (PSHA) [2] and followed by the development of a number of seismic numerical models. • A PSHA was conducted to determine site-specific seismic load for the NSDF design. The analysis complies with the latest Canadian codes and standards and have been reviewed by an Independent Third Party Review. • The NSDF seismic models analyzed the response of facility due to seismic loads. Seismic loads include the DBE that considers 10,000 year seismic event for the site. The magnitude of seismic load is equivalent to a seismic event with Peak Ground Acceleration of 0.55 g with epicentre located 20.8 km from the NSDF site. The results of seismic analyses confirmed that the maximum axial strain of 0.9% in geomembrane will meet the performance criteria (i.e., 3% maximum axial strain). c) The service life of the NSDF geomembrane have been studied through a series of testing and analyses [1]. The results confirm that the NSDF geomembrane will be likely to exceed the required 550 year service-life. Construction of the geomembrane will follow a stringent construction/installation plan with confirmatory tests and inspection by qualified personnel. After the geomembrane is installed, electrical dipole testing will be performed after placing a select layer of the waste. During operation (waste placement), the performance of the geomembrane will be monitored through the leachate quantity observed in the Leachate Collection System (LCS) and LDS that were part of the base liner systems. Leachate will be collected and treated. It is possible to repair any defect in the	

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				Expliquer comment l'affaissement des déchets et des conteneurs à déchets sera contrôlé dans le temps, afin de ne pas compromettre l'intégrité de la couverture étanche.	Geomembrane if detected. Furthermore an additional cover can be placed over the ECM if the geomembrane was defective and found to be leaking. d) Design criteria takes into account recognized leakage rates across membranes and acceptable fluxes. Through regular monitoring of the ECM, any exceedances of the design criteria will be assessed and the need for intervention will be determined. e) The project recognizes that HDPE geomembranes have only been used for several decades. Consequently, a well-established laboratory test method was used to demonstrate the service life of the geomembrane for the NSDF. The work included a series of laboratory tests and analyses. The results conclude that preferred NSDF geomembrane will exceed required design life of 550 years [1]. Conservatism were applied to address uncertainty: • Several leachates were utilized in the tests. These included Municipal Solid Waste (MSW) leachate which is more harmful to the geomembrane long-term performance than the NSDF leachates. • In the laboratory test, the geomembrane samples were exposed to the leachate in both sides, which is more harmful than their application in the field. • Some studies confirm that the geomembrane service-life estimated such a laboratory test is more conservative than the large-scale tests considering multiple components of barrier systems. f) The design of the ECM base liner and final cover systems has incorporated multiple barriers systems comprising of natural and synthetic materials. The IAEA documentations do not prescribe materials or design for LLW disposal facilities. An engineered disposal facility, such as the one in the NSDF, is one of the designs suitable for a LLW disposal facility. The design of the ECM liner system has incorporated the recommendations of the Subject Matter Experts from academic institutions and industries, as well as the recent existing Research & Development results. Compacted Clay Liner (CCL) and Geosynthetic Clay liner (GCL) are part of the base liner system. The GCL is part of the final cover system. Concrete is not used for the existing low level disposal facility designs, comparable to the NSDF. g) The majority of the waste in the NSDF will be bulk waste. Bulk waste will be compacted to optimize its in-place density, reduce void space, and ensure stability. Some of the waste in the NSDF will be containerized waste. The void space in the containers placed in the ECM will be controlled by grouting or compaction. All the above listed activities will minimize any settling and ensure that the mound is structurally sound to support the final cover. The ECM design included the differential settlement analyses and concluded that the differential settlement will not compromise the integrity of the final cover system. Further optimization of waste and containerized waste placement will be conducted in the future	

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					operational phase. References [1] Rowe, R. K. 2019. Near Surface Disposal Facility Geomembrane Relative Performance Report – Public Version (Redacted). Canadian Nuclear Laboratories (CNL) 232-503212-REPT-024, Revision 0, 2019 March. [2] Probabilistic Seismic Hazard Analysis, 232-10170-REPT-001, Revision 1, 2018 December.	
MDDELCC	FC-204	QC-6 CNL-ND146	Project description Section 3	[English] The MDDELCC ask that CNL assess the possibility of placing a temporary roof on the active NSDF cells in order to limit the infiltration of water into the site. This measure, which aims to limit contact, is not planned in the proposed project, whereas it has been carried out for similar sites. CNL should explain why this measure is not foreseen. [Français] Le MDDELCC souhaite que l'initiateur évalue la possibilité de placer un toit temporaire sur les cellules actives de l'IGDPS en phase d'exploitation afin de limiter l'infiltration d'eau dans le site de gestion des déchets. Cette mesure, qui vise à limiter les eaux de contact, n'est pas planifiée dans le projet à l'étude, alors qu'elle serait réalisée dans des sites similaires. L'initiateur devrait expliquer pourquoi cette mesure n'est pas prévue.	The objective of placing a temporary roof on active disposal cells is to isolate and contain waste. Although the design of NSDF currently does not utilize a temporary roof, the principles of isolation and containment are satisfied in other design features and planned operational practices. First the proposed inventory for NSDF has been significantly reduced since the draft EIS through the removal of any intermediate level waste streams. The revised inventory proposed for the NSDF is solid low level radioactive waste (LLW) which will be controlled through the WAC [1]. Additionally the WAC applies a graded approach to control leachate radionuclide concentrations during placement of waste. There will be a small portion of waste which will be required to utilize robust packaging to prevent the spread of contamination. Specifically leachate controlled waste packages are intended to provide short-term barriers for wastes with higher radionuclides concentrations during the time the disposal cell is not covered with the final cover system (approximately 5-10 years). Thus more mobile radionuclides, such as tritium, are kept isolated from the environment to minimize liquid effluent releases during the operations phase. During waste placement operations, all efforts are made to minimize the contact of precipitation with the contaminated waste thus leachate production. The operation of NSDF is limited to one cell at a time in order to limit the surface area of waste that is exposed to the environment (i.e. precipitation) at any given time. As a cell is constructed, interim covers are placed over waste to limit infiltration of precipitation and promote surface water run-off. As each disposal cell is completed the final cover system is installed over the filled disposal cell. Other operational practices to limit contact with precipitation include grading and compaction of the waste fill to promote surface water runoff. Furthermore, any water that makes contact with (or is suspect of contacting) the contaminated waste will be collected by the leachate collection system and treated to remove contaminants in the WWTP prior to controlled release into the environment. Treated effluent discharge targets are established to be protective of human and non-human biota health. The design of the NSDF ECM is a large contiguous construct, in which active cells are located adjacent to closed cells [2]. For a movable roof system, the roof base structure requires load-bearing support and anchorage, able to accommodate any potential dynamic loads such as	Accepted

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					design-basis tornado and earthquake. In designs where temporary roofs are utilized, between each adjacent cell there is an intermediate structural berm, which provides the necessary height and foundations for the moveable roof system. The NSDF ECM design does not have an intermediate "structural berm" between its cells. The NSDF ECM has a common perimeter structural berm around all of its cells, not between cells. In this way, the ECM design provides the necessary utilization of the limited NSDF site area. However, as outlined in Section 2.5.7.6.1, weather shield designs are being evaluated for compatibility with the NSDF configuration and if feasible, could be implemented as a mitigation measure and operational optimization. References [1] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September. [2] Design Description 232-503212-DD-001, Revision 1, 2019 May.	
MDDELCC	FC-205	QC-7 CNL-ND242	Project description Section 3.5.3	[English] In Table 3.5.3-1, the list of radionuclides potentially present in the waste of the IGDPS is presented. It is explained that the radionuclide concentrations were calculated from a partitioning model, but the different calculations that led to these estimates are not described. The MDDELCC request that CNL complete the information presented, by: a) Justifying the use of a partitioning model for the estimates of concentrations of radionuclides in leachates and providing more details on the modalities for the application of the model; b) Providing the report "AECOM (2016a). Leachate and Wastewater Characterization (Quantity and Quality) Canadian Nuclear Laboratories, Near Surface Disposal Facilities Design and Consulting Services. B1551-508600-REPT-001" to better describe the calculations that led to the development of Table 3.5.3-1; c) Presenting an estimate of the leaching potential of radionuclides, metals and	Canadian Nuclear Laboratories has revised predicted concentrations of radionuclides, metals and organic compounds that could be found in leachate. Table 3.4.2-2 and Table 3.4.2-3 provide the updated radiological and non-radiological concentrations in wastewater and effluent discharge target. The main supporting document to the information requested is the Leachate and Wastewater Characterization (Quantity and Quality) [1]. The input data to determine the leachate concentrations as a function of time comes from the reference inventory at emplacement (Table 3.3.1-2 of revised EIS). In response to the request for additional information, CNL provides the following: a) The use of a partitioning model is standard practice to estimate radionuclide concentrations in leachate and with regards to calculation of leachate quantities and contact surface water. Leachate quantities are estimated based on a water balance calculation conducted with the Hydrologic Evaluation of Landfill Performance (HELP) model. The model estimates the amount of infiltrating water from precipitation at the site. The HELP model uses information on soil characteristics, precipitation, temperature and humidity, as well as cover design information such as layer characteristics, site area, slopes, and slope lengths to predict volume of infiltration, run-off and evaporation. The quantity of water that infiltrates into the waste is considered to become leachate. b) References used to support responses to these comments have been submitted to the CNSC as part of the EIS package, including Leachate and Wastewater Characterization (Quantity and Quality) [1], thus is available to federal and provincial agencies. c) Predicted maximum concentrations of radionuclides, metals and organic compounds in	Accepted

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				organic compounds for the NSDF wastes, in order to obtain more representative data of the elements that could be found in leachates. [Français] Au tableau 3.5.3-1, la liste des radionucléides potentiellement présents dans les déchets de l'IGDPS est présentée. Il est expliqué que les concentrations de radionucléides ont été calculées à partir d'un modèle de partitionnement, mais les différents calculs qui ont mené à ces estimations ne sont pas décrits. Le MDDELCC souhaite que l'initiateur complète l'information fournie, notamment : a) En justifiant l'utilisation d'un modèle de partitionnement pour l'estimation des concentrations de radionucléides dans les lixiviats et en apportant plus de détails sur les modalités d'application du modèle; b) En fournissant le rapport « AECOM (2016a). Leachate and Wastewater Characterization (Quantity and Quality) Laboratoires nucléaires canadiens, Near Surface Disposal Facilities Design and Consulting Services. B1551-508600-REPT-001 (en anglais seulement) » afin de mieux décrire les calculs qui ont mené à l'élaboration du tableau 3.5.3-1; En présentant une estimation du potentiel de lixiviation des radionucléides, des métaux et des composés organiques pour les déchets de l'IGDPS, afin d'obtenir des données plus représentatives des éléments qui pourraient se retrouver dans les lixiviats.	wastewater which comprises of leachate and contact water are provided in Table 3.4.2-2 and 3.4.2-3 of the revised EIS. Reference [1] Leachate and Wastewater Characterization (Quantity and Quality) B1551-508600-REPT-001, Revision 3. 2019 May.	
MDDELCC	FC-206	QC-8	Project description Section 3.5.3	[English] The non-radiological COPCs for which treatment will be required (Table 3.5.3-2) are	COPC's in wastewater were identified based on radiological and non-radiological contaminants identified to be present in the waste inventory.	Rejected with Follow-Up IR QC-2-01

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		CNL-ND214		not all shown in Table 3.6.2-1, which indicates the rate of elimination for concentrations of non-radiological COPCs in waste water, without any explanation being given regarding their withdrawal. In addition, the majority of radionuclides for which treatment will be required (Table 3.5.3-1) are not shown in this Table (3.6.2-1), while their elimination rates should also be detailed. In order to understand the selection of COPCs, the MDDELCC is of the view that CNL should: a) Determine what the triage limits for COPCs are and make available the document entitled "Environmental Background Limits and Benchmarks for Monitoring Program, Risk Assessment and Risk Management Decisions-Chalk River Laboratories (LNC, 2017)" b) Provide details of the pilot test used to determine treatment targets; c) Provide for all COPCs (non-radiological and radiological) presented in Tables 3.5.3-1 and 3.5.3-2 as well as for TSS and nitrogen, the rate of elimination expected, the treatment target chosen (and its reference) for the design of the WWTP, as well as the effluent discharge limit. In addition, CNL should describe how the treatment targets have been defined and their origin d) Adding, to the COPCs, the decay products from the decay chains of the parent molecules such as 230Th, 210Po, 210Pb for uranium or 60Ni for 60Co, given that studies have shown radionuclides with a half-life greater than ten days should be used in a radiotoxic risk assessment e) Specify the origin of the limit value (7 000 Bq / l) which CNL undertakes to respect for tritium and justify its choice in relation to other existing criteria or in relation to the risk to the environment and health. CNL	The reference radionuclide inventory of the NSDF Project is provided in Table 3.3.1-2 of the revised EIS. Chemical characteristics of the waste are described in Section 3.3.3.3 of the revised EIS. The NSDF will not accept hazardous waste and will meet the intent of landfill disposal and leachate requirements of the Ontario Environmental Protection Act, Reg 347. Details on the total mass of metals, wood and other organic wastes are provided in [1]. The methodology used to calculate concentrations of radiological and non-radiological constituents of potential concern (COPC) in leachate is provided in Section 3.4.2.2 of the revised EIS. In general, concentrations of COPC's in leachate were calculated using a partitioning model [2]. Partitioning factors were taken from CSA Standard N288.1-14. These factors conservatively estimate the leachate characteristics with the intention to avoid underestimating release rates and leachate concentrations. In response to specific concerns from MDDELCC, CNL provides the following: a) The requested CNL document is now obsolete. Maximum predicted concentrations in wastewater and effluent discharge targets are provided in Table 3.4.2-2 and Table 3.4.2-3 of the revised EIS. b) The pilot scale test was not used to determine the treatment targets. The pilot scale test demonstrated that effluent discharge targets can be achieved for a range of COPC's (as determined at the time of the pilot test) using the proposed wastewater treatment processes [3]. The specific constituents and associated concentrations used in the laboratory and pilot scale tests were determined based on the maximum expected wastewater concentrations for constituents of potential concern, as well as other constituents that may be expected to be present in the wastewater. The maximum expected concentrations were initially determined by identifying the maximum concentrations quantified for the site groundwater. These concentrations were later refined by using the partitioning model described above. Additional constituents commonly found in leachate generated from disposal of demolition debris were also included, such as calcium, iron, magnesium, sulphate, and tannic acid. After further refinement of the waste inventory and partitioning model, it is noted that the concentrations of heavy metals and radionuclides of concern decreased in comparison to the concentrations used for the pilot scale test. Therefore, the pilot scale test provided a worst-case assessment of the treatability of the NSDF wastewater. A broad range of constituents and worst-case concentrations resulted in a complex wastewater matrix for evaluation during the pilot scale test. The pilot scale test results provided assurance that effective treatment could be achieved despite the complex wastewater matrix [3]. c) The radiological and non-radiological constituents, maximum predicted concentration in wastewater and effluent discharge targets are listed in Table 3.4.2-2 and Table 3.4.2-3 of the revised EIS. Removal efficiencies for constituents are provided in [4]. The basis for the effluent discharge targets for radiological and non-radiological constituents are described in Section	

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				should also describe the possible methods of reduction of tritium at the source (e.g., additional containment measures which could be implemented for waste with a high concentration of tritium) as well as existing treatment methods, where applicable f) Take into account the toxicity of contaminants, in addition to considering applicable criteria or standards for the development of treatment targets [Français] Les constituants non radioactifs pour lesquels un traitement sera requis (tableau 3.5.3-2) ne sont pas tous présentés dans le tableau 3.6.2-1, qui indique le taux d'élimination pour les concentrations de constituants non radioactifs dans les eaux usées, sans qu'aucune explication ne soit fournie sur leur retrait. De plus, la majorité des radionucléides pour lesquels un traitement sera requis (tableau 3.5.3-1) ne sont pas présentés dans ce tableau (3.6.2-1), alors que leurs taux d'élimination devraient aussi être détaillés. Afin de comprendre la sélection des CPP, le MDDELCC est d'avis que l'initiateur doit : a. Déterminer à quoi correspondent les limites de triage des CPP et rendre disponible le document intitulé « Environnemental Background Limits and Benchmarks for Monitoring Program Design, Risk Assessment and Risk Management Decisions-Chalk River Laboratories (LNC, 2017) » b. Fournir les détails de l'essai pilote qui a servi à déterminer les cibles de traitement c. Fournir pour l'ensemble des CPP (non radioactifs et radionucléides) présentés	3.4.2.5.1 of the revised EIS. The effluent discharge targets for radiological constituents with the exception of tritium are Health Canada guideline values for drinking water. This is a conservative approach as there will be no public access to the Perch Lake watershed, the location of the effluent discharge. The discharge target for tritium is described in item e below. The effluent discharge targets for non-radiological constituents are based on the protection of aquatic life and are gathered from a variety of federal and provincial guidelines and other reference documents. Further details on derivation of effluent discharge targets are provided in [5]. d) The Post-Closure Safety Assessment (PostSA) includes the ingrowth of radioactive progeny i.e. 'daughter products' for the radionuclides listed in Table 3.4.2-2 of the revised EIS. Table 5-12 of the PostSA [6] presents all decay chains modelled and assessed in the post-closure phase. This includes Th-230 and uranium. Ni-60 from the decay of Co-60 has not been included, but its overall estimated mass would be relatively insignificant. e) The NSDF effluent discharge target for tritium (360,000 Bq/L) is based on the criterion that tritium concentrations in Perch Creek which drains the Perch Lake watershed and discharges to the Ottawa River remain below 7000 Bq/L, the Health Canada Drinking Water Guideline. The tritium discharge target takes into consideration the existing tritium concentration in Perch Creek of approximately 3500 Bq/L. Tritium releases from the ECM will be minimized by packaging high activity tritium waste. The discharge targets derived for radionuclides including tritium will ensure that cumulative radiological emissions are well below CRL site Derived Release Limits and doses to the public from CRL site emissions remain well below license requirement of 0.3 mSv/a. See Section 2.2 of the NSDF Effluent Discharge document [5]. f) Federal (i.e. CCME Guidelines for Protection of Aquatic Life) and provincial guidelines used to derive effluent targets for non-radiological constituents consider toxicity of contaminants and are designed to be protective of aquatic biota. Further CNL's effluent monitoring program for the proposed Wastewater Treatment Plant will meet requirements for effluent toxicity testing in accordance with CNSC RegDoc 2.9.1 "Environmental Principles, Assessments and Protection." References [1] Near Surface Disposal Facility Non-Radiological Inventory of Constituents of Concern (COPC). 232-508600-TN-007, Revision 3, 2019 August. [2] Leachate and Wastewater Characterization (Quantity and Quality) B1551-508600-REPT-001, Revision 3. 2019 May. [3] Pilot Scale Test Report, B1551-503214-TR-001 Revision 0, 2017 April.	

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				dans les tableaux 3.5.3-1 et 3.5.3-2 ainsi que pour les MES et l'azote, le taux d'élimination attendu, la cible de traitement retenue (et sa référence) pour la conception de l'UTEU, ainsi que la limite de rejet à l'effluent. De plus, l'initiateur doit décrire comment les cibles de traitement ont été définies et leur provenance d. Ajouter, dans les CPP, les descendants des chaînes de désintégration des molécules mères retenus, tels que 230Th, 210Po, 210Pb pour l'uranium ou 60Ni pour le 60Co, puisque de nombreuses études ont démontré que les radionucléides qui ont une demi-vie supérieure à dix jours doivent être retenus lors d'une évaluation du risque radiotoxique e. Préciser l'origine de la valeur limite (7 000 Bq/l) qu'il s'engage à respecter pour le tritium et justifier son choix par rapport à d'autres critères existants ou par rapport au risque pour l'environnement et la santé. Il doit également décrire les méthodes de réduction du tritium à la source qui sont possibles (ex. : mesures de confinement additionnelles qui pourraient être mises en oeuvre pour les déchets à forte concentration de tritium) de même que les méthodes de traitement existantes, le cas échéant Tenir compte de la toxicité des contaminants, en plus de considérer les critères ou normes applicables pour l'élaboration des cibles de traitement.	[4] WWTP Material and Energy Balance Report, B1551-503212-REPT-001, Revision 2, 2018 November. [5] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October. [6] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	
MDDELCC	FC-207	QC-9 CNL-ND103	Section 3.6.2	[English] The following details are requested by the MDDELCC regarding the wastewater treatment process:	Section 3.4.2 describes the facilities to be constructed and processes implemented to treat wastewater associated with the operation of the ECM. Additional details of the Wastewater Treatment Plant Design can be found in [1]. In response to specific concerns, CNL provides the following:	Accepted

FINAL - Draft Consolidated Responses to CNL Dispositions to NSDF EIS Federal and Provincial Review Comments (e-Doc 5775634) – November 2017
*subject to change upon CNL updates to several licensing documents

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				a) For more precision on the role of the selected reagents (ferric chloride, sulphide sodium, sodium hydroxide and sulfuric acid) and over the retention period determined during chemical precipitation, CNL should present the details of the pilot test. It should also confirm whether it plans to use barium chloride for the precipitation of radium. b) CNL should specify the characteristics of the selected desalination membrane and present the tests carried out in order to evaluate the effects of the leachate on the membrane, in particular the level of contamination and the response of the membranes during filtration. c) CNL should clearly specify the parameters to be analyzed, the sampling frequency and the limits to be respected prior to discharge during normal operation or during heavy rains. d) CNL should present a map which indicates the exact location of effluent discharge from the WWTP and the discharge point from stormwater management ponds of uncontaminated surface water, as Figure 3.1.1-1 is not sufficiently precise. e) The MDDELCC is of the opinion that due to the presence of numerous wetlands in the project area, the infiltration of the discharge into the soil would be difficult. On page 137, one can read that this sector can be a zone of resurgence of groundwater, which prevents infiltration. More details would be needed to assess impacts at the discharge point. MDDELCC also recommend that CNL evaluate other options than infiltration or other options of discharge points and justifies their choice of variant according to the associated environmental effect.	a) Detailed roles of the chemical precipitation reagents: (1) Ferric Chloride (38% solution). Addition of an iron salt such as ferric chloride in the presence of elevated pH results in the formation of precipitated ferric hydroxide. The formation of ferric hydroxide precipitate aids in the coagulation and adsorption of some metals and radionuclides to further enhance their removal. (2) Sodium Sulfide (15% solution). Sodium sulfide is added to the second reaction tank for removal of chelated metals. Removal efficiencies for several metals, including cadmium, chromium, cobalt, nickel, strontium and especially copper, were shown to increase when sodium sulfide was added to aid the precipitation process. (3) Sodium Hydroxide (50% solution). Dosing of sodium hydroxide to achieve a pH of 10 to 10.5 was shown to be optimum during the laboratory scale tests for precipitation of most metals and non-radiological surrogates for cobalt and strontium. The pilot scale test was initially operated at a target pH of 10 with similar results to the laboratory scale tests [2]. The latter portion of the pilot scale test was operated at a target pH of 11, resulting in improved removal of calcium, magnesium, nickel, and strontium. (4) Sulfuric Acid (93% solution). Sulfuric acid is used to reduce the pH of the membrane filtration permeate prior to the ion exchange process, and for periodic cleaning of the membrane filtration membranes. Effective removal of the minor concentrations of radium was demonstrated by the strong acid cation resin; therefore, the chemical reagent barium chloride is not required for the WWTP precipitation process. b) Two-stage reverse osmosis (membrane based) polishing of microfiltration permeate was evaluated during the pilot scale test, as an alternate process technology. The pilot scale test data demonstrated that the WWTP discharge requirements can be achieved using chemical precipitation, microfiltration and ion exchange (zeolite resin followed by strong acid cation resin) [2]. Based on the results of the NSDF pilot scale test with simulated wastewater, it was concluded that ion exchange polishing provided superior performance to reverse osmosis. Therefore, reverse osmosis technology (e.g., desalination membrane technology) was not selected for the WWTP. c) CNL will monitor wastewater for parameters potentially present in the wastewater. The discharge targets for parameters are provided in Tables 3.4.2-2 (rad-constituents) and Table 3.4.2-3 (non-rad constituents). The treated effluent will be monitored prior to discharge. The discharge targets apply at all times. In the event that the treated effluent does not meet the discharge targets, the effluent will be re-processed. d) Figure 3.1.1-1 shows the locations of effluent discharge from the WWTP to either the exfiltration gallery or to Perch Lake and Section 3.4.4.5.1 documents the outlet points for each of the surface water management ponds. e) CNL has further assessed the exfiltration gallery through groundwater flow modelling and determined that the exfiltration gallery does not have the capacity to manage all the volume of effluent required. A portion of the treated effluent will be routed to Perch Lake. The NSDF design [1] and the EIS has been revised to address this change in effluent management strategy. Provision for routing effluent to Perch Lake will provide	

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				f) CNL should specify whether the estimate of the amount of leachate to be produced (6 556 m3) represents an average or maximum annual volume. [Français] La MDDELCC demande les détails suivants au sujet du processus de traitement des eaux usées : a. Pour plus de précision sur le rôle des réactifs sélectionnés (chlorure ferrique, de sulfure de sodium, d'hydroxyde de sodium et d'acide sulfurique) ainsi sur la durée de rétention déterminée lors de la précipitation chimique, le MDDELCC souhaite que l'initiateur présente les détails de l'essai pilote. Il devrait également confirmer s'il envisage d'utiliser du chlorure de baryum pour la précipitation du radium. b. L'initiateur devrait préciser les caractéristiques de la membrane de dessalement retenue et présenter les tests réalisés afin d'évaluer les effets du lixiviat sur la membrane, notamment le niveau d'encrassement et la réponse des membranes lors de la filtration. c. L'initiateur devrait préciser clairement les paramètres qui seront analysés, la fréquence d'échantillonnage ainsi que les limites à respecter avant de procéder au rejet lors de l'exploitation normale ou lors de fortes pluies. d. L'initiateur devrait présenter une carte sur laquelle sont indiqués le lieu précis de rejet des effluents de la station de traitement des eaux usées et le point de rejet des bassins de gestion des eaux de surface non contaminées, puisque la figure 3.1.1-1 n'est pas suffisamment précise. e. Le MDDELCC est d'avis qu'en raison de la	operational controls to eliminate the potential for overland flow. f) 6,556 cubic metres per year (m^3/year), is the total average annual volume of leachate, contact water, and decontamination water under the modelled operating scenario. This rate was calculated based on average annual precipitation, for a limiting condition in which one active cell is open and the remaining cells filled and closed. Note that the WWTP 100% design is more conservative, and it has been sized to accommodate a total average annual volume of leachate, contact water, and decontamination water of approximately 11,000 m^3/year. Additionally, to address the potential for greater than average volumes of leachate, contact water, and decontamination water, the WWTP design includes three Equalization Tanks with 1900 m^3 capacity each, for a total capacity of 5700 m^3. The purpose of these tanks is to provide sufficient capacity to accommodate the 4710 m^3 that would be generated by two back-to-back 100 year storms. With respect to details of the effluent monitoring, as stated in Section 11 of the revised EIS the monitoring and follow-up plans presented are conceptual and provide a preliminary description of the activities and framework for monitoring proposed for the NSDF Project. The plans will be developed into detailed monitoring and follow-up programs as the project progresses through the environmental assessment process, which may influence the nature, frequency and locations of monitoring. In addition, input from regulatory agencies, the public and Indigenous peoples will be considered. A detailed effluent verification monitoring program for the NSDF Project will be prepared consistent with the Canadian Standards Association's Standards N288.5-11 (Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills [CSA Group 2011]). This more detailed effluent monitoring plan will be submitted to the Canadian Nuclear Safety Commission for review. The CNSC, as the regulatory authority for the designated project, will also coordinate the review of the follow-up monitoring program with other interested federal and provincial agencies. The final follow-up monitoring program will be required to meet any objectives and activities that the EA Report specifies (to be prepared by the CNSC). References [1] Design Description 232-503212-DD-001, Revision 1, 2019 May. [2] Pilot Scale Test Report, B1551-503214-TR-001 Revision 0, 2017 April.	

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				présence de nombreux milieux humides dans le secteur du projet, l'infiltration du rejet dans le sol serait difficile. À la page 137, on peut notamment lire que ce secteur peut être une zone de résurgence des eaux souterraines, ce qui empêche l'infiltration. Plus de détails seraient nécessaires afin d'évaluer les impacts subis au point de rejet. Le MDDELCC souhaite également que l'initiateur évalue d'autres options que l'infiltration ou d'autres options de points de rejet et qu'il justifie son choix de variante en fonction de l'impact environnemental qui y est associé. L'initiateur devrait préciser si l'estimation de la quantité de lixiviat qui sera produite (6 556 m3) représente un volume annuel moyen ou maximal.		
MDDELCC	FC-208	QC-10 CNL-ND324	Project description Section 3	[English] The proponent explained that, according to a "conservative" hypothesis, a leak or a scenario of overflow of the ACM are possible immediately after the end of the institutional control which should take place in 2400. The MDDELCC wants the proponent to: a) Describe the long-term evolution of radionuclide content, by specifying the number of years required to ensure that each of the radionuclides anticipated to be put in the NSDF achieve a level of radioactivity that is safe for the environment and health and comparing this number of years with the life of the project (500 years) b) Confirm that, at the end of institutional control, the radioactivity of the waste and leachate will meet the 10^{15} Bq criterion of the *Class I Nuclear Facilities Regulations*	The original assessment assumed instant failure of the engineered barriers at the end of institutional control. The approach to the long-term safety assessment, called a Post-closure Safety Assessment (PostSA) [1], has been revised. The "bathtubbing" of the Facility in the post-closure is no longer considered as a specific scenario, but as a natural process potentially occurring in all scenarios, dependent on the water balance of the specific scenarios assessed. Additionally the revised modelling recognizes the 550 year design life as well as represents the gradual degradation of the base liner and final cover systems. a) As per Section 3.3.1.3 of the revised EIS, the proposed inventory for NSDF has been revised to include only low-level waste thus, limiting the presence of long-lived radionuclides in the waste. Specifically the NSDF reference inventory radioactivity will decrease about 2,000 times in the first 100 years, and approach background concentrations of radioactivity shortly thereafter. Thus, once the NSDF engineered barriers degrade, after 550 years, the levels of radioactivity released to the environment is quite small. b) The 10^{15} Bq value quoted in Class I Nuclear Facilities Regulations is not an upper limit for a disposal facility. It is a quantity that is the condition for determining if a facility is a Class I or Class II nuclear facility. Under the Class I Nuclear Facilities Regulations, CNL's proposed NSDF will be a Class 1B given it is a waste disposal facility, regardless of total inventory. By the end of the modelled institutional control period of 300 years, the radioactivity concentration of the waste is similar to natural background concentrations. c) The NSDF facility will continue to be monitored and inspected periodically, which would determine the need for repairs or maintenance throughout the institutional control period	Rejected with Follow-Up IR QC-2-02

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				c) Describe the mitigation measures that would be applicable if there were to be infiltration or overflow at the end of the institutional control and if the radioactivity of the waste and leachate was not comparable to natural radioactivity. [Français] L'initiateur explique que, selon une hypothèse « conservatrice », une fuite ou un scénario de débordement du MCA sont possibles immédiatement après la fin du contrôle institutionnel qui devrait avoir lieu en 2400. Le MDDELCC souhaite que l'initiateur : a) Décrive l'évolution à long terme du contenu en radionucléides en prenant soin de préciser le nombre d'années requises afin que chacun des radionucléides dont l'enfouissement est prévu puisse atteindre un niveau de radioactivité sans danger pour l'environnement et la santé humaine et en comparant ce nombre d'années avec la vie utile du projet (500 ans); b) Confirme qu'au terme du contrôle institutionnel, la radioactivité des déchets et du lixiviat respectera le critère de 1015 Bq du Règlement sur les installations nucléaires de catégorie 1; Décrive les mesures d'atténuation qui seraient applicables s'il devait y avoir une infiltration ou un débordement au terme du contrôle institutionnel et si la radioactivité des déchets et du lixiviat n'était pas comparable à la radioactivité naturelle.	(Section 3.2.4). The conservative scenarios analyzed in the PostSA [1], demonstrate that, even with the loss of institutional control (thus no mitigation measures), the dose consequence to the public and the environment remain low, and within regulatory limits. By the end of the modelled institutional control period of 300 years, the radioactivity concentration of the waste is similar to natural background concentrations. Reference [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	
MDDELCC	FC-209	QC-11 QC-12	Section 4	[English] Considering that the NSDF Project raises many concerns among the Quebec population, the MDDELCC seek further information on all the	CNL provides the following information to address the concerns raised amongst the Quebec population with regard to the NSDF Project. CNL notes that CNL has evolved in communication of the NSDF project from hosting regular in-person information sessions to hosting bi-monthly webinars in English and French, which is a more accessible way of	Accepted

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		CNL-ND335		steps taken or planned in Québec. Thus, the MDDELCC request the following: a) Provide the twelve comments received during the public information sessions held in Rapides-des-Joachims, Quebec, and indicate the response provided to these comments, as well as how CNL intends to consider them in the context of the project b) Indicate why CNL did not hold other public information sessions in the province of Quebec, downstream of the project, particularly in the l'Ile-aux-Allumettes, a municipality with 1,335 residents c) Confirm whether the third round of information sessions scheduled in the months of April and May 2017 took place in the province of Quebec. If so, please provide the results of these sessions: place, date, time, number of participants, questions asked and comments made, answers given and how they will be considered in the context of the project. If no public information sessions were held in Québec, please justify this decision d) Specify the nature of the public information and engagement activities with municipalities which are foreseen for the later phases of the project e) Evaluate the possibility of conducting a study of the residents in the principal areas of the Regional Municipality of the Pontiac County (e.g., Ile-aux-Allumettes) regarding the perception of risks and possible social and psychological impacts associated with residing near the proposed project. The results of such a survey could in particular inform the mechanisms for future engagement and consultation with the population of Quebec f) The Sous-comité de l'Organisation régionale de sécurité civile de l'Outaouais	dialoguing with individuals from all regions. CNL will also attend public information events whenever requested. In response to requests: a) Ten public information sessions have been held in the province of Quebec (Rapides-des-Joachims, Sheenboro, Chapeau, Fort William, and Gatineau). Comments and responses from the sessions in Quebec (QC) are found in Appendix R of the Stakeholder Engagement Report [1]. Section 4.3 of the revised EIS summarizes feedback heard during public engagements and through formal comments and how this feedback was incorporated into the revised EIS. b) CNL has engaged, and continues to engage, with any groups that have requested meetings. On 2017 August 03 CNL held an information session on L'Isle aux-Allumettes; nine individuals attended. CNL has also met, and continues to meet, with elected officials from L'Isle-aux-Allumettes, Sheenboro, MRC Pontiac, and the City of Gatineau, at various levels of government. • December 2016 – MP Will Amos, Pontiac • February 2017 – MRC Pontiac Council • April 2017 – Sheenboro Council • May 2017 - L'Isle aux-Allumettes Council • July 2017 – MRC Pontiac Council • August 2017 - Bloc Québécois Leader Mme Ouellette • February 2018 – MP Greg Fergus, Hull - Aylmer • March 2018 – MP Fergus Town Hall, Hull-Aylmer • April 2018 – MP Will Amos, Pontiac • December 2018 – MRC Pontiac Council • February 2019 – MRC Pontiac Council • February 2019 – Government of Quebec • May 2019 – Councilor Duggan, District 3 - Aylmer c) Since 2017 April, CNL has hosted four public information sessions in Quebec (see attached). CNL was hosted by the Old Fort William Cottagers' Association in Sheenboro (July 2017) (Section 4.1.18 of [2]), by Hull-Aylmer MP for a Town Hall in Gatineau (March 2018 – Section 3.1.8 of [1]) and by Mike Duggan Councillor for Lucerne/Aylmer (May 2019 – Section 3.1.27 of [1] and did not track the number of participants or receive written feedback on the Project at either event. d) CNL continues to engage throughout the planning of the NSDF Project and if a licence is granted, CNL will continue engagement through construction and operation, closure and post-closure phases although levels of engagement will be proportionate to CNL's other activities. e) CNL will consider a survey of the public within the local regions with respect to public perceptions.	

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				(ORSCO) is a key platform for informing and consulting government departments and agencies in the Outaouais region. CNL should plan to take advantage of this platform, of which they are a member, in order to share information on the project, including at biannual meetings of the subcommittee. [French] Considérant que le projet IGDPS suscite de nombreuses préoccupations dans la population québécoise, le MDDELCC souhaite avoir plus d'information sur l'ensemble des démarches réalisées ou prévues au Québec. Ainsi, le MDDELCC demande ce qui suit : a) Présente les douze commentaires reçus lors des séances tenues à Rapides-des-Joachims, au Québec, et indique les éléments de réponse qu'il a donnés à ces commentaires, ainsi que la façon dont il entend les considérer dans le cadre du projet b) Indique pourquoi il n'a pas tenu d'autres séances d'information publiques dans la province de Québec, en aval du projet à l'étude, notamment dans le secteur de l'Ile-aux-Allumettes, une municipalité de 1 335 habitants c) Confirme si la troisième ronde de séances d'information planifiée au cours des mois d'avril et mai 2017 a eu lieu dans la province de Québec. Dans l'affirmative, le MDDELCC souhaite que les résultats de ces séances soient présentés : lieu, date, heure, nombre de participants, questions posées et commentaires émis, réponses données et façon dont ils seront considérés dans le cadre du projet. Si, au contraire, il	f) Note that after a workshop last November with the Province of Quebec, CNL staff met a gentleman who was a member of ORSCO, and made attempts to contact him via e-mail, however no reply was received. References [1] Stakeholder Engagement Report, 232-513400-REPT-002, Revision 0, 2019 November. [2] Stakeholder Activities Report, 232-513400-REPT-001, Revision 0, 2017 November.	

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				n'a pas tenu de séances d'information publiques au Québec, l'initiateur devrait justifier cette décision d) Précise la nature des démarches d'information et de consultation des municipalités concernées qui sont prévues pour les phases ultérieures du projet e) Évalue la possibilité de mener auprès des résidents des principales localités de la municipalité régionale de comté de Pontiac (ex. : Ile-aux-Allumettes et ses alentours) une enquête de perception des risques et des possibles impacts sociaux et psychologiques associés au fait de résider près du projet à l'étude. Les résultats d'une telle enquête pourraient notamment venir moduler les mécanismes d'information et de consultation de la population du Québec Le Sous-comité de l'Organisation régionale de sécurité civile de l'Outaouais (ORSCO) est une plateforme privilégiée afin d'informer et de consulter les partenaires des ministères et organismes gouvernementaux de la région de l'Outaouais. L'initiateur devrait préciser s'il prévoit profiter de cette plateforme, dont il est membre, dans le but de partager l'information relative au projet, notamment lors des réunions biannuelles du sous-comité.		
MDDELCC	FC-210	QC-13 CNL-ND428	Environmental Effects Section 5	[English] The location selected for the project raises several questions about the geology, hydrogeology and the proximity of wetlands and water. For clarification, the MDDELCC requests that CNL: a) Present cross-sections of current and post-construction geology which clearly indicate the level of the surface and deep water table;	CNL provides the following in response to the concerns about the selected location: a) Figure 5.3.1-8 provides a stratigraphic cross section showing stratigraphy and watertable elevation along the flowpath from the ECM to the groundwater discharge at Perch Creek. Figure 5.3.2-2A through to 5.3.2-2D provide cross-sections showing current and post construction geology along with respective water-tables. b) CNL has performed additional site characterization since the draft EIS and has updated the groundwater modelling [1]. The revised groundwater transit time predications for the flow path from the ECM to Perch Creek is in the revised EIS. The groundwater transit time ranges between 5 and 15 years with an average transit time of 7 to 10 years (See Section 5.3.2.6.1.2). The groundwater flowpath from the ECM to Perch Creek (the nearest water	Accepted

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				b) Explain how it is possible that a groundwater migration time varying from 12 to 35 years is estimated in order to reach the nearest watercourse, since the NSDF is located 30 meters from a wetland; c) Review its assessment of the adequacy of the site, in particular taking into consideration the proximity of the water system. [Français] Le lieu choisi pour le projet soulève plusieurs interrogations par rapport à la géologie, à l'hydrogéologie et à la proximité de milieux humides et hydriques. Aux fins de clarification, le MDDELCC demande que les LNC: a. Présentent des coupes transversales de la géologie actuelle et post-construction en indiquant clairement le niveau des nappes de surface et profonde; b. Expliquent comment il est possible qu'un temps de migration des eaux souterraines variant de 12 à 35 ans soit estimé afin d'atteindre le cours d'eau le plus proche, puisque l'IGDPS est situé à 30 mètres d'un milieu humide; Revoit son évaluation quant à l'adéquation du site, notamment en considérant la proximité du réseau hydrique.	course), is via a shallow sandy aquifer and has a distance of approximately 300 m. The predicted migration rate is consistent with observed migration rate observed in other areas in the Perch Lake basin for non-reactive contaminants (i.e., tritium). c) CNL has reviewed the adequacy of the site, in particular taking into consideration the proximity of the ECM to Perch Creek. The PostSA [1] assesses a range of extreme scenarios to test the robustness of the facility design. The long-term safety assessment results demonstrate that radiation doses for various normal evolution and disruptive scenarios meet safety objectives (Section 5.7.6.1.2.2 and 5.8.6.1.2.2). References [1] Groundwater Flow Modelling of the Near Surface Disposal Facility. 232-509249-REPT-001, Revision 5, 2019 July. [2] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November	
MDDELCC	FC-211	QC-14	Environmental Effects Section 5	[English] The MDDELCC considers that it is essential to include the portion of the Ottawa River downstream of Perch Creek in the assessment in order to assess the potential transboundary impacts of the project associated with non-radioactive and radioactive elements. The MDDELCC are also of the opinion that a new baseline characterization of the surface water	In response to comments received, CNL has increased the Regional Study Area (RSA) for surface water, aquatic environment, land and resource use, ecological health and human health to extend 8 km downstream of the CRL site. This represents a significant expansion from the RSA used in the draft EIS which for the Ottawa River was limited to the mouth of Perch Creek. CNL has further characterized surface water and sediment in Perch Lake watershed (e.g. Perch Lake) for radiological and non-radiological constituent expected to present in the ECM. This information is provided in Section 5.4.2 and Surface Water Quality Assessment [1]. CNL's Environmental Monitoring Program provides routine monitoring of Ottawa River water quality	Accepted

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				quality be carried out in the Ottawa River prior to implementation of the project. This new baseline characterization is recommended to focus on COPCs and should be conducted at the mouth of Perch Creek as well as in the downstream area that could be under the influence of the project. [Français] Le MDDELCC considère qu'il est fondamental d'inclure la portion de la rivière des Outaouais située en aval du ruisseau Perch afin d'évaluer les impacts transfrontaliers potentiels du projet associés aux éléments non radioactifs et radioactifs. Il est aussi d'avis qu'une nouvelle caractérisation du milieu permettant d'avoir un état de référence récent de la qualité de l'eau de surface de la rivière des Outaouais avant la réalisation du projet serait souhaitable. Cette nouvelle caractérisation devrait porter sur l'ensemble des CPP et devrait être réalisée à l'embouchure du ruisseau Perch ainsi que dans la zone en aval qui pourrait être sous l'influence du projet.	for a suite of radiological constituents upstream and downstream of the Chalk River Laboratory Site. This information is provided in the Annual Environmental Monitoring Report submitted to the CNSC. Annual environmental monitoring results for the Ottawa River are provided on the CNL web page : https://www.cnl.ca/en/home/environmental-stewardship/performance-report/default.aspx Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	
MDDELCC	FC-212	QC-16 CNL-ND317	Environmental Effects Section 5	[English] Table 5.7.6-1 presents an inventory of the maximum estimated concentrations of radionuclides in the waste to be placed in the ECM. According to the recommendations of "Radionuclides recommended for the analysis of radioactivity in matrices" in the presence of uranium and thorium, their daughters (e.g., 230Th, 210Po and 210Pb) must be quantified in the different environmental matrices taking into account the presence or absence of secular equilibrium between the radionuclides in the decay chains. The MDDELCC requests that CNL consider assessing the fate of the daughters in the	The approach to the long-term modeling of the fate of the waste inventory has been revised reflective of the revised inventory (i.e. only low-level waste) as well as a different pathway analysis software. The revised approach is presented in the Post-Closure Safety Assessment (NSDF) [1] utilizing the new reference inventory at closure (Table 3-5 of [1]). Any screening of this reference inventory in the PostSA is transparently documented in Section 5.3.2.1.2 of [1]. The daughter products of uranium and thorium (e.g. Th-230, Po-210 and Pb-210) have been quantified in the different environmental matrices taking into account the presence or absence of secular equilibrium between the radionuclides in the decay chains (see Section 5.3.3.1 of [1]). Section 6 of the PostSA [1], presents the results of the pathway analysis including a discussion of radiological contaminants in the environment (Section 6.2.2). The surface water assessment during the operational phase has not considered radiologic decay; however this is an appropriate approach given the short timeframes in comparison to the half-lives of uranium and thorium. Based on the total inventory of Co-60 the overall concentration of Ni-60in the waste would be negligible (less than 1 mg/kg) and thus has not been assessed.	Accepted

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				uranium and radium decay chains with a half-life greater than 10 days in surface water; in particular for surface water quality and the preservation of the uses of the Ottawa River. The MDDELCC also ask that CNL justify the reason why the decay products of certain radionuclides present at the beginning of the operation of the NSDF will not be taken into account for the year 2400 (Table 5.7.6-3 and 5-524). This is for example Ni-60, descendent of Co-60. [Français] Le tableau 5.7.6-1 présente un inventaire des concentrations maximales estimées de radionucléides dans les déchets qui seront placés dans le MCA. Selon les recommandations du document « Radionucléides recommandés pour l'analyse de la radioactivité dans les matrices environnementales », en présence d'uranium et de thorium, leurs descendants (ex. : 230Th, 210Po et 210Pb) doivent être quantifiés dans les différentes matrices environnementales en tenant compte de la présence ou de l'absence d'équilibres séculaires entre les radionucléides des chaînes de désintégration. Le MDDELCC considère comme nécessaire que le LNC ajoutent les radionucléides de la chaîne de désintégration de l'uranium et du radium ayant une demi-vie supérieure à dix jours dans l'évaluation des impacts potentiels du projet, notamment pour la qualité des eaux de surface et la préservation des usages de la rivière des Outaouais. Le MDDELCC demande également que les LNC justifient la raison pour laquelle les descendants de certains radionucléides	Reference [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	

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				présents au début de l'exploitation de l'IGDPS ne sont pas pris en compte pour l'année 2400 (tableau 5.7.6-3 et 5-524). Il s'agit par exemple du 60Ni, descendant du 60Co.		
MDDELCC	FC-213	QC-17 CNL-ND397	Environmental Effects Section 5	[English] In order to assess the atmospheric dispersion of radionuclides and the need for ambient air monitoring stations in the province of Quebec, the MDDELCC request that CNL present a modeling of the atmospheric dispersion of radionuclides during the operational phase of the NSDF. This modeling will make it possible to assess whether air quality criteria in Quebec will be respected in the areas of the province that may potentially be affected by the project, as appropriate. According to the results of the modeling, CNL should also evaluate the other potential risks associated with the dispersal of these contaminants, including, for example, the potential impact on users of the Ottawa River, vacationers and Quebec forest workers who may be exposed to contamination. In addition, depending on the more detailed characterization of the waste requested in other comments, CNL should justify its selection of volatile organic compounds as indicators, in order to assess the dispersion of this category of contaminants. According to section 5.2.1.1, only chloroethylene and acrolein are used. [Français] Afin d'évaluer la dispersion de la contamination atmosphérique et le besoin d'installation de stations de surveillance de l'air ambiant sur le territoire du Québec, le MDDELCC demande que les LNC présentent une modélisation de la dispersion atmosphérique des radionucléides pendant la phase d'exploitation de l'IGDPS.	The approach to assessing human health as a result of airborne releases has been revised. The Radon and Other Landfill Gas Modelling Evaluation report [1] provides detail on the calculation of radon flux and dose rates, again based on NSDF's specific source term. The revised Safety Analysis Report (SAR) [2] provides an evaluation of all other radiological airborne emissions for NSDF during the operations phase, in relation to its specific source term. This includes airborne emissions from the wastewater treatment plant, specifically from the Equalization Tanks and filter press feed tank (which has the highest radiological source term). A summary is presented in Section 5.8.6.1.2.1 of the revised EIS. The revised approach has taken into consideration the nearest off-site receptor is located in Quebec approximately 3 km from the CRL site. The dose consequence to the off-site receptor is expected to be very low based on: 1) The air emissions from the wastewater treatment are a fraction of the CRL site derived release limits. 2) The off-site receptor inhalation dose is much lower than that of the workers in the ECM who is in direct contact with the waste. With regards to environmental monitoring for radioactivity in Quebec, CNL notes that the current environmental monitoring program includes monitoring for radioactivity in various environmental media (e.g air quality, surface water, beach sand, farm animals) in Quebec (See Section 5.7.4.3 of the revised EIS for an overview of monitoring activities). With regards to modeling of volatile organic compounds, the scope of the assessment focusses on predicting changes in indicator compounds emissions and comparison of these changes to the applicable guidelines and standards. Indicator compounds were selected to represent various NSDF Project activities, as well as activities at the CRL main campus as described in Section 5.2.1.1. Compounds that results from the decomposition of waste (e.g., hydrogen sulfide (H_2S), vinyl chloride (also known as chloroethylene) (C_2H_3Cl)) are the result of material that would be sent to the NSDF and were therefore, included as indicator compounds. C_3H_4O (acrolein) was included to represent volatile organic compounds from combustion. It is a trace element that is emitted from combustion and was included as an indicator compound. References [1] Radon and Other Landfill Gas Modelling and Evaluation, 232-503212-TN-001, Revision 1, 2018 October.	Accepted

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				Cette modélisation permettra d'évaluer si les critères de la qualité de l'air en vigueur au Québec seront respectés sur le territoire québécois affecté par le projet, le cas échéant. Selon les résultats de la modélisation, les LNC devraient également évaluer les autres risques potentiels associés à la dispersion de ces contaminants, y compris, par exemple, l'impact potentiel sur les utilisateurs de la rivière des Outaouais, les villégiateurs et les travailleurs forestiers québécois qui pourraient être exposés à la contamination. Par ailleurs, en fonction de la caractérisation plus détaillée des déchets qui aura été présentée en réponse aux questions précédentes, les LNC devraient justifier sa sélection de composés organiques volatils comme indicateurs, afin d'évaluer la dispersion de cette catégorie de contaminants. Selon la section 5.2.1.1, seuls le chloroéthylène et l'acroléine sont utilisés.	[2] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September.	
MDDELCC	FC-214	QC-18 CNL-ND432	Environmental Effects Section 5	[English] MDDELCC is of the view that CNL should reassess the effects of the NSDF on surface water and sediment quality in the Ottawa River, in particular: a) Assessing the fate of the daughters in the uranium and radium decay chains with a half-life greater than 10 days in surface water b) Comparing the estimated concentrations at the mouth of Perch Creek, in the Ottawa River, with the air quality criteria in force in Quebec c) Confirming that the ambient concentrations that are higher than the benchmark values of aluminum, copper and iron in the hydrographic systems of Perch Lake and Perch Creek as well as the mouth of Perch Creek in the Ottawa River	CNL has updated both the surface water quality assessment for the operations and closure phase as well as the post-closure phase. The updated Surface Water Quality Assessment is documented in revised EIS Section 5.4.2 and [1] and includes additional baseline data for surface water quality in the Perch Lake watershed collected in 2018. The Post-closure Safety Assessment (PostSA) [2] provides an assessment of contaminant migration in surface water during the post-closure phase. CNL provides the following response to specific comments: a) Uranium and radium isotopes did not screen into the Surface Water Quality Assessment for operations phase as only trace quantities are predicted in treated effluent (Section 5.4.2.6.1.4 of the revised EIS). CNL confirms that the fate of daughters in the uranium and radium decay chains are included in the surface water assessment for the post-closure phase (Table 5-12 of the PostSA [2]). b) Human health criteria for radiological exposure have been defined according to the Nuclear Safety and Control Act and Regulations. The regulatory radiological dose limit for public exposure is 1 mSv/yr (Radiation Protection Regulation SOR/2000-203). Section 6.5.2 of the PostSA [2] provides the results of a family living in a household at the outfall of Perch Creek to the Ottawa River located at the mouth of Perch Creek which is 3 orders of magnitude below the regulatory dose limit. c) CNL's Operational groundwater monitoring program includes monitoring groundwater	Rejected with Follow-Up IR QC-2-03

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				are linked to the geological context of the site and not because of a continuous contamination of the site undetected to date d) Ensuring the frequent monitoring of concentrations at the swamp well and the mouth of Perch Creek to confirm that the mitigation measures will be effective, although the treatment of leachates should limit the risks exceeding the benchmark value for cadmium, mercury, barium and manganese during the period of operation of the NSDF e) Assessing the potential impacts of the project on sediment quality for all radioactive and non-radioactive COPCs, for sites identified as sediment accumulation areas in the Ottawa River under the influence of the waters flowing from Perch Creek. [Français] Le MDDELCC est de l'avis que les LNC devraient procéder à une nouvelle évaluation des effets résiduels de l'IGDPS sur la qualité de l'eau de surface et sur les sédiments de la rivière des Outaouais, notamment : a) En évaluant le devenir des descendants des chaînes de désintégration de l'uranium et du radium ayant une demi-vie supérieure à dix jours dans les eaux de surface b) En comparant les concentrations estimées à l'embouchure du ruisseau Perch, dans la rivière des Outaouais, avec les critères de qualité de l'air en vigueur au Québec c) En confirmant que les concentrations ambiantes plus élevées que les valeurs repères de l'aluminium, du cuivre et du fer dans les réseaux hydrographiques du lac et du ruisseau Perch ainsi qu'à l'embouchure du ruisseau Perch dans la rivière des	semiannually at locations upgradient and downgradient of waste management areas [3]. The monitoring program indicates that there are no significant releases of the metals identified (i.e. aluminum, copper and iron) from the WMA's in the Perch Lake watershed. CNL can confirm that ambient concentrations of aluminum, copper and iron that are higher than benchmark concentrations are linked to the geological context of the region and not due to CRL site releases. CNL is developing a characterization plan to improve our understanding of ambient background concentrations of naturally occurring metals and other non-radiological parameters at the CRL site. d) CNL's environmental monitoring program includes surface water quality monitoring at multiple locations in the Perch Lake watershed and at Perch Creek before discharge to the Ottawa River. A follow-up monitoring program specific to the NSDF will be developed and surface water quality monitoring parameters will be reviewed and updated as appropriate to confirm the effectiveness of mitigation measures. e) Impacts of the NSDF project on Perch Creek flow rates are predicted to be negligible as the footprint of the NSDF site is a small percentage of the footprint of the Perch Lake drainage basin. Accordingly no impact on sediment accumulation in areas of the Ottawa River under influence of waters flowing from Perch Creek is predicted. Section 5.4.1.5 of the revised EIS assesses potential impacts of the NSDF on hydrology. With regards to impacts on sediment quality. The Surface Water Quality Assessment for the operations phase [1] has confirmed that where will be no adverse effects on surface water quality for radiological and non-radiological constituents. Accordingly impacts on sediment quality are predicted to be negligible. References [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November. [2] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [3] CRL Groundwater Monitoring Program Annual Report for 2017, CRL-509249-ASR-2017, Revision 0, 2019 January.	

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				Outaouais sont liées au contexte géologique du site et non à une contamination continue du site non décelée à ce jour d) En assurant un suivi fréquent des concentrations au déversoir du marais et à l'embouchure du ruisseau Perch pour confirmer que les mesures d'atténuation mises en oeuvre seront efficaces, bien que le traitement des lixiviats devrait limiter les risques de dépassements de la valeur repère pour le cadmium, le mercure, le baryum et le manganèse pendant la période d'exploitation de l'IGDPS En évaluant les impacts potentiels du projet sur la qualité des sédiments pour l'ensemble des CPP radioactifs et non radioactifs, pour les sites identifiés comme zones d'accumulation des sédiments dans la rivière des Outaouais sous influences des eaux issues du ruisseau Perch.		
MDDELCC	FC-215	QC-19 CNL-ND386	Environmental Effects Section 5	[English] Although the EIS identifies the potential effects to aquatic biota from non-radiological contaminant releases into Perch Lake basin and the Ottawa River, these potential effects were not considered for benthic and pelagic invertebrates. The MDDELCC therefore request that CNL clarify whether sediment accumulation areas of metal and radionuclides in the Ottawa River are identified. Where appropriate, CNL should: a) Compare the measured concentrations with the sediment quality criteria in force in Québec b) Evaluate the bioaccumulation of contaminants in these organisms;	Areas of sediment accumulation where metals and radionuclides are elevated in the Ottawa River adjacent to the built-up area of the CRL site were identified under a comprehensive program to evaluate Ottawa River sediment contamination that was completed in 2014. The results of this work were published in several internal CNL reports, including a detailed quantitative Ecological Risk Assessment, which was also summarized in an open access journal publication [1]. There is a long-term verification monitoring program in place for Ottawa River Sediment adjacent to the CRL site. The Ottawa River shoreline has also been assessed adjacent to operationally affected areas of the site, however there has not been a specific focus on the mouth of Perch Creek. Predicted concentrations of radionuclides in surface water for the operations and post-closure phases are provided in [2] and [3] and summarized in Section 5.7.6.3 of the revised EIS. Predicted concentrations in Perch Creek are well below No Effect Concentrations. CNL will consider adding sediment monitoring stations in shoreline areas of the Ottawa River influenced by sediment accumulation from Perch Creek as part of the follow-up monitoring program for the NSDF. a) CNL has used sediment quality criteria from the Province of Quebec for the evalution of Ottawa River sediment conducted in 2014. The Environment Canada and Ministère du	Rejected with Follow-Up IR QC-2-04

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				c) Estimate the maximum concentrations of these radionuclides likely to be released to the mouth of Perch Creek d) Estimates the total radiotoxic risk, in µGy / h, for aquatic organisms likely to be exposed to these contaminants in the Ottawa River. This risk should be compared with the criteria in force in Quebec, rather than only benchmarks of CSA Standard N288.6-14 (2014) e) Determine, in the event of a radiotoxic risk, the mitigation measures that will be put in place to minimize the risk to ecological receptors exposed in the Ottawa River f) Describe the effects of alpha and beta radiation that may also be emitted by certain radionuclides g) Propose a follow-up of the evolution over time of the biodiversity of the benthic invertebrate populations h) Characterize radionuclides and metals likely to be emitted in fish taken from the Ottawa River. [Français] Les effets potentiels associés à la présence d'éléments non radiotoxiques issus du projet sur la biodiversité aquatique du bassin versant du ruisseau Perch et sur celle du littoral de la pointe aux Baptêmes dans la rivière des Outaouais ont été évalués. Toutefois, ces effets potentiels sur les invertébrés benthiques et pélagiques ne l'ont pas été. Le MDDELCC demande donc que les LNC précisent si des zones d'accumulation des sédiments de métaux et de radionucléides sont identifiées dans la	Développement durable, de l'Environnement et des Parcs du Québec: "Criteria for the Assessment of Sediment Quality in Quebec and Application Frameworks: Prevention, Dredging and Remediation"(http://planstlaurent.qc.ca/fileadmin/publications/diverses/Registre_de_dragage/Criteria_sediment_2007E.pdf) criteria were used to identify the contaminants of potential concern to be carried forward for the quantitative assessment. b) Bioaccumulation of contaminants was assessed in the 2014 assessment of Ottawa River baseline sediment conditions for radiological (cesium-137, strontium-90, cobalt-60) and non-radiological (mercury) constituents [1]. Studies conducted found that radionuclide concentrations in most benthic biota, including aquatic plants, mussels and crayfish were not related to sediment concentrations. Cesium-137 is the only radionuclide that biomagnifies at the site, and the only benthic taxa that bioaccumulate sediment-associated Cesium-137 are deposit feeding benthic invertebrates [1]. For Mercury, biomagnification of Methyl Mercury from sediments to ecological receptors was assessed using Biota-sediment accumulation factor models from the literature which were modified for the CRL site [1]. c) For the operations phase, maximum concentrations of radionuclides at the mouth of Perch Creek are provided in Tables 3-35 to 3-39 of [2]. The mouth of Perch Creek is referred to as Perch Creek Outlet (PCO) in the [2]. For the Post-closure phase, predicted concentrations for the Normal Evolution Scenario for each radionuclide in both Perch Creek and the Ottawa River are provided in Table 2-9 of [3]. d) As a nuclear facility, CNL is required to follow the Nuclear Safety Control Act and associated regulations, including operating the CRL site in accordance with the Site License and the License Conditions Handbook. The use of CSA Standard N288.6-12 [4] for environmental risk assessments is consistent with compliance verification criteria within the License Condition Handbook. As such ecological risk assessments for the NSDF Project have utilized benchmarks from CSA N288.6-14. **Ottawa River Sediment 2014** The Ecological Risk Assessment completed in 2014 and summarized in [1] includes an assessment of the radiotoxic risk of radiological contaminants in sediment to aquatic organisms (See Table 1 of [1]). Screening dose rate benchmarks from CSA Standard N288.6-14 [4] were used in the evaluation. **Post Closure Phase** The EcoRA [3] first performs a screening analysis to determine which radionuclides have a significant contribution to the biota dose rate (Section 2.4). A summary of the screening results are provided in Table 2-28 of [3]. The biota dose calculation is presented in Section 3.5. The selection of the biological dose rate benchmark is provided in Section 4.1 and Table 4-1. Calculated dose rates were divided by the corresponding dose rate benchmark to	

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				rivière des Outaouais. Le cas échéant, il conviendrait que les LNC : a) Compare les concentrations mesurées avec les critères de qualité des sédiments en vigueur au Québec b) Évalue la bioaccumulation des contaminants dans ces organismes; c) Estime les concentrations maximales de ces radionucléides susceptibles d'être rejetés à l'embouchure du ruisseau Perch d) Estime le risque radiotoxique total, en µGy/h, pour les organismes aquatiques susceptibles d'être exposés à ces contaminants dans la rivière des Outaouais. Ce risque devrait être comparé aux critères sélectionnés au Québec, plutôt qu'uniquement aux valeurs repères de la norme N288.6-14 de la CSA (2014) e) Détermine, en cas de risque radiotoxique, les mesures d'atténuation qui seront mises en oeuvre afin de limiter le risque pour les récepteurs écologiques exposés dans la rivière des Outaouais f) Décrive les effets des rayonnements alpha et bêta pouvant également être émis par certains radionucléides g) Propose un suivi de l'évolution de la biodiversité des populations d'invertébrés benthiques dans le temps Caractérise les radionucléides et les métaux susceptibles d'être émis dans les poissons prélevés dans la rivière des Outaouais.	determine a Screening Index (Table 5-1). If the Screening Index was greater than 1, the contaminant required more assessment or discussion. For all Post-Closure scenarios, there were no exceedances of the Screening Index benchmark of 1, and therefore no further study is required. e) The assessment of existing contamination in the Ottawa River has confirmed that there is no radiotoxic risk to ecological receptors [1]. There is also no predicted radiotoxic risk for the NSDF Project as summarized in Section 5.7.6.3 of the revised EIS. The ecological risk assessment performed demonstrates that the NSDF design sufficiently contains and isolates the inventory to allow for radiologic decay until the risk to the environment, including non-human biota, is sufficiently low. f) The exposure assessments include radionuclides potentially present in the environment and those potentially released from the NSDF. The assessments have included alpha and beta emitting radionuclides. No significant residual effects on biota or human health are predicted. g) Based on the information CNL has acquired to date as a result of extensive studies of the Ottawa River sediment and the local benthic invertebrate communities and populations and the negligible contribution of NSDF to Ottawa River contaminant loads, CNL does not believe a follow-up program to monitor benthic invertebrate population diversity is necessary at this time. h) The concentrations of radionuclides in Ottawa River fish are monitored annually by CNL as part of the Environmental Monitoring Program [5]. Radionuclide concentrations in fish tissue are provided in Table 5.4.7-15 of the EIS. Metals likely to be emitted from fish have been assessed in previous studies of Ottawa River sediment contamination [6]. Mercury is the only metal expected to be present in elevated concentrations in Ottawa River sediment near the CRL site. Predicted concentrations of mercury in fish tissue are provided in [1]. The human health risk from eating fish from the Ottawa River and engaging in any/all activities involving the Ottawa River has been assessed and is concluded to be safe. References [1] Bond, J., R. Silke, M. Stuart, J. Carr, D.J. Rowan, A Weight-of-Evidence Approach to the Assessment of Ecological Risk from Historical Contamination of the Ottawa River Sediments near Chalk River Laboratories., AECL Nuclear Review, 2015, 4(2): 155-170, 2015 December, (https://pubs.cnl.ca/doi/full/10.12943/CNR.2015.00048?mobileUi=0) [2] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November. [3] NSDF Ecological Risk Assessment, 232-121240-ASD-001, Revision 0, 2019 November.	

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					[4] CSA Standard N288.6-12 Environmental risk assessments at Class I nuclear facilities and uranium mines and mills [5] Environmental Monitoring in 2018 at Chalk River Laboratories. CRL-509243-ACMR-2018, Rev 0. Jan 2019. [6] CRL Ottawa River Sediment Remediation – Ecological Risk Assessment 175-121240-REPT-002, Rev 0, 2014 March	
MDDELCC	FC-216	QC-20 CNL-ND556	Environmental Effects Section 5	[English] In sections 5.7.4.6 and 5.7.4.7 of the EIS, characterization of the contaminated plume below the Perch Lake wetland is identified. Because the NSDF site is located 30 meters from the Perch Lake wetland and that there is already contamination at this location, CNL should specify how it will be possible to assess the actual contribution of a contamination originating from the NSDF. [Français] Aux sections 5.7.4.6 et 5.7.4.7 de l’ÉIE, il est précisé qu’un panache de contamination du milieu humide a été caractérisé. Puisque le site projeté de l’IGDPS est situé à 30 mètres du milieu humide du lac Perch et qu’il y a déjà une contamination radiologique à cet emplacement, les LNC devraient préciser comment il sera possible d’évaluer l’apport réel d’une contamination qui proviendrait de l’IGDPS.	As noted in Section 5.3.2.9 of the revised EIS, the base case environmental impacts are the result of early waste management practices which included burying low-level waste in sand trenches with no engineered barriers. Although appropriate risk management actions have taken place (i.e., interception and treatment of strontium-90 groundwater plumes), large scale remediation of the contamination sources may be necessary to ensure appropriate long-term management of this legacy waste. The NSDF Project design principles is based on containment and isolation of the low-level inventory from the environment including engineered barriers such as the base liner system which mitigates impacts to the surrounding groundwater. Therefore, it is anticipated that groundwater quality in the Perch Lake wetland will improve if the NSDF project is approved and environmental remediation of these historic waste management areas. Potential effects of NSDF Project on surface water and groundwater are assessed in Section 5.3 and 5.4 of the revised EIS respectively. Groundwater contamination in the Perch Lake wetland is limited to tritium and strontium-90. During the operations phase impacts on surface water and groundwater are limited to discharges of treated effluent from the Wastewater Treatment Plant to the Exfiltration Gallery and Perch Lake. With the exception of tritium, all radionuclides will meet Health Canada Drinking Water Guidelines [1]. The effluent discharge target for tritium is 360,000 Bq/L. This discharge target is well below the benchmark for protection of biota and will ensure that tritium concentrations in Perch Creek, which discharges to the Ottawa River, remains below the Health Canada drinking water guideline of 7000 Bq/L. Contribution of treated effluent releases to existing baseline conditions will be assessed through effluent verification monitoring and environmental monitoring. Effluent verification monitoring will document radiological and non-radiological releases from the WWTP. Groundwater monitoring will be conducted upgradient and downgradient of the exfiltration gallery to assess impacts on groundwater quality. A groundwater monitoring network has been installed downgradient of the ECM. Baseline data is currently being collected. Groundwater monitoring throughout the operations and Post-Closure phase will identify any impacts from the ECM.	Accepted

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					The conceptual monitoring program is described in Section 11 of the revised EIS. The follow-up monitoring plan is being developed and will be made available for review. Reference [1] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	
MDDELCC	FC-217	QC-21 CNL-ND512	Environmental Effects Section 5	[English] Given the geographical proximity of the project to the provincial boundary, the EIS should describe the potential residual effects of the NSDF on the accessibility and quality of resources for tourism and recreation, archaeological sites and the traditional use of land and resources of Quebec First Nations and Métis communities as well as the quality of life and public safety for Quebec municipalities. [Français] Considérant la proximité géographique du projet avec les frontières du Québec, les LNC devraient également décrire les effets résiduels potentiels de l'IGDPS sur l'accessibilité et la qualité des ressources destinées au tourisme et aux loisirs de plein air, sur les sites archéologiques et sur l'utilisation traditionnelle des terres et des ressources par les Premières Nations et les Métis au Québec.	The Regional Study Area (RSA) in the revised EIS for Land and Resource Use (Section 5.9.3.1) extends 8 km downstream of the Ottawa River, on both the Ontario and Quebec borders. For the Socioeconomic Environment (Section 5.10.3.1) has been expanded to include the Ottawa River on extended to City of Ottawa and the Region of Outaouais (Quebec), which encompasses the Pontiac Regional County Municipality (closest regional municipality to the NSDF Project) and the urban centre of Gatineau. Section 5.10 of the revised EIS provides a Socio-economic assessment of the project which includes quality of life. Measurement indicators for quality of life include air quality, noise and visual disturbances which are also relevant to tourism. The study area for the socio-economic assessment includes western Quebec (i.e. Pontiac, La Vallee-de La Gatineau, Les Collines-De L'Outaouais and Gatineau (see Figure 5.10.3-1 of the revised EIS)). No impacts on tourism or the quality of life in Quebec are expected as the project will not impact on Ottawa River quality, air quality or other environmental components in western Quebec. Potential effects on traditional use of land and resources of Indigenous peoples is assessed in Section 6.4 of the revised EIS. The NSDF Project is not predicted to have any terrestrial effects beyond the CRL site, and results of the aquatic environment assessment identify that measurable residual effects on aquatic biodiversity VCs are not predicted as a result of the NSDF Project. Traditional access to the Pointe au Baptême site along the Ottawa River will continue to occur and not be restricted because of the NSDF Project. There are no effects anticipated to archaeological resources outside of the NSDF site. Consequently, the NSDF Project is not expected to affect the traditional land and resource Valued Components.	Accepted
MDDELCC	FC-218	QC-22	Environmental Effects Section 5	[English] Considering the geographical proximity of the project with Quebec's borders, the proponent should describe the potential residual effects of the NSDF on quality of life and public safety in Quebec (and not only in Ontario). [Français] Considérant la proximité géographique du projet avec les frontières du Québec,	The RSA for the socio-economic assessment has been expanded to include western Quebec (i.e., the Pontiac, La Vallee-de La Gatineau, Les Collines-De L'Outaouais and Gatineau (see Figure 5.10.3-1 of the revised EIS)). No impacts on the quality of life and public safety are predicted. The Project will not impact Ottawa River quality, air quality or other environmental components in western Quebec.	Accepted

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				l'initiateur devrait décrire les effets résiduels potentiels de l'IGDPS sur la qualité de vie et la sécurité publique sur le territoire québécois (et non seulement en Ontario).		
MDDELCC	FC-219	QC-23 CNL-ND591	Environmental Effects Section 5	[English] The MDDELCC identified gaps in the human health assessment of the EIS with respect to the temporal boundary of the assessment, the model scenario, the identification of the contaminants and the exposure pathways. To complete the missing information, the MDDELCC request that CNL: a) Include the construction, closure and Post-Closure phases in the human health risk assessment b) Specify the type of cover that was used in the modeled scenario for the operation phase taking into account the fact that the final cover will only be installed after a fifteen year period c) Enhance the identification of the relevant contaminants in the identification of human health risks: • Considering non-radiological contaminants with chronic effects on human health • Justifying the choice not to include any organic contaminants; • Including polonium-210 and lead-210 (radiological progeny of radium-226) to the exposure scenario or justify why they were excluded d) Provide the toxicological properties of the relevant non-radiological contaminants, an essential step in the assessment of the human health risks; e) Justify why dust inhalation has not been identified as an exposure pathway for radiological contaminants	The Performance Assessment was originally a mix of pre-closure and post-closure safety analysis. CNL has revised this approach to simplify the scope having the Safety Analysis Report (SAR) [1] include only pre-closure safety, and the Post-Closure Safety Assessment (PostSA) [2] focus on the post-closure period. Within Section 5.8 of the revised EIS, the assessment of the NSDF Project on Human Health is split into the two different timeframes: • Operations and Closure Phase (Section 5.8.6.1.1.1 presents the methodology and Section 5.8.6.1.2.1 presents the results) • Post-closure Phase (Section 5.8.6.1.2.1 presents the methodology and Section 5.8.6.1.1.2 presents the results) a) Both the SAR [1] (human health assessment during operations and closure phase) and the PostSA [2] (human health assessment during post-closure phase) are Technical Supporting Documents that have been submitted to the CNSC as part of the EIS package, thus the documents are is available to federal and provincial agencies. b) In the modeling of the human health assessment (dose to worker), the assessment did not take credit for any cover. This is conservative since as the cell is constructed, interim covers are placed over the waste to limit infiltration. Details of the type of cover, more specifically the components of the final cover system, are described in Section 3.4.1.9 of the revised EIS. The assumptions and input parameters to support the calculation of the airborne emissions, in sufficient detail to support independent validation, can be found within the appendices of the SAR [1]. c) Section 5.8.6.2 of the revised EIS has been updated to present the non-radiological exposure assessment on human health. During the operations and closure phase the main supporting information is from modeling completed for the surface water quality [3]. During the post-closure phase the main supporting information is from the PostSA [2]. Section 5.8.6.2.1.1 of the revised EIS discusses how non-radiological contaminants for the human health assessment during the operations and closure phase were determined. Organics compounds were not carried forward for the surface water quality assessment as they are generally present in trace amounts with no obvious source in the waste inventory. In the revised approach for radiological assessment of the NSDF Project on human health, the PostSA [2] included Po-210 and Pb-210 (Table 5-9 of [2]). d) CNL has limited the chemical characteristics of the waste inventory (including toxicity) by requiring waste to meet the land disposal and leachate requirements of Ontario's Regulation 347, General – Waste Management. The restrictions on waste characteristics are documented in the Waste Acceptance Criteria [4]. e) The revised approach to human health assessment in the SAR [1] provides an evaluation of	Accepted

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				f) Use toxicological reference values in the human health risk assessment at the toxicological characterization step g) Re-evaluate the occupancy rate of the land estimated at 8% for receivers located in the cottages nearby when assessing the exposure. This rate is low and not sufficiently "conservative" to be used for risk assessment purposes h) Include age groups in the exposure assessment, where the assessment of risks for non-radiological contaminants with dose thresholds will be achieved; i) Carry out a dose calculation for non-radiological contaminants, which is necessary to the exposure assessment, where the risk characterization has been carried out on the basis of the toxicological properties of the contaminants j) Provide radiation doses associated with the exposure of children and infants, since the dose limit of 1 mSV/yr does not apply to these age groups [Français] Le MDDELCC a identifié des lacunes dans l'évaluation de la santé humaine de l'EIE en ce qui concerne les limites temporelles de l'analyse, le scénario modélisé, l'identification des contaminants et les voies d'exposition. Pour compléter l'information manquante, le MDDELCC demande que les LNC : a) Incluent la phase de construction, de fermeture et toute la phase post-fermeture dans l'évaluation des risques pour la santé humaine; b) Précisent le type de couverture qui a été utilisé pour le scénario modélisé pour la phase d'exploitation, compte tenu du fait que la couverture finale sera installée après un délai de quinze ans;	all airborne emissions. An operational scenario includes airborne suspension of radiological contaminants as dust during waste placement operations within the engineering containment mound. f) As documented in Section 5.8.6.2.1 of the revised EIS, a screening level risk assessment has been performed for the human health assessment. Section 5.8.6.2.1.3 of the revised EIS presents the guidelines values to assess the effects from non-radiological contaminants on human receptors. g) As per Section 5.8.6.1.1.3 of the revised EIS, the closest public receptor was chosen to represent the off-site dose. This receptor is the Quebec cottager/resident across the Ottawa River, approximately 3 km from the SSA. Traditionally, cottagers are assumed to spend 8% of their time in the cottage area, for the purposes of dose calculations. CNL received feedback from a nearby cottage resident which indicated that the cottage was being used as a full-time residence. As a result, the cottage resident is treated as having the same occupancy factor as any other Potential Critical Group, which is conservatively assumed to be 100%. Local food and water consumption rates are based on the Canadian Standards Association (CSA) N288.1-14 (CSA Group 2014). h) As per Section 5.8.6.1.1.3 of the revised EIS, as well as Section 5.2.4.3.2 of the PostSA [2], during the post-closure phase the receptors age groups included an adult, a child and an infant. Section G.2.3 of the Safety Analysis Report [1], during the operations phase the receptors examined included an adult and an infant (i.e. 1 yr old child). Consumption rates for the various age groups are based on the Canadian Standards Association (CSA) N288.14 [5]. i) An assessment of risks for non-radiological contaminants was not necessary since the predicted concentrations of non-radiological contaminants were below their respective guidelines or generally at or below the local background concentrations. These results are summarized in Section 5.8.6.2.2 of the revised EIS. j) Dose calculations are carried out for radiological contaminants utilizing critical receptors such as children and infants. Section 5.8.6.1.1.3 of the revised EIS provides a discussion of receptor selection for both the operations and closure phase as well as the post-closure phase. References [1] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September. [2] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November. [3] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Rev 0., 2019 November. [4] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September.	

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				c) Bonifient l'identification des contaminants concernés dans l'identification du danger pour la santé humaine : • En considérant les contaminants non radiologiques qui ont des effets chroniques sur la santé humaine • En justifiant le choix de ne retenir aucun contaminant organique • En incluant le polonium 210 et le plomb 210 (descendants radiologiques du radium 226) au scénario d'exposition ou en expliquant pourquoi ils ont été exclus d) Fournissent les propriétés toxicologiques des contaminants non radiologiques concernés, une étape essentielle de l'évaluation du danger pour la santé humaine e) Justifient pourquoi l'inhalation de poussière n'a pas été identifiée comme voie d'exposition pour les contaminants radiologiques f) Utilisent les valeurs toxicologiques de référence lors de l'évaluation des risques à l'étape de la caractérisation toxicologique g) Réévaluent le taux d'occupation du territoire évalué à 8 % pour les récepteurs situés dans les chalets à proximité lors de l'évaluation de l'exposition. Ce taux est peu élevé et pas suffisamment « conservateur » pour être utilisé aux fins d'évaluation du risque h) Incluent des groupes d'âge dans l'évaluation de l'exposition, lorsque l'évaluation des risques pour les contaminants non radiologiques avec seuil de dose sera réalisée i) Effectuent un calcul de dose pour les contaminants non radiologiques, ce qui est nécessaire à l'évaluation de l'exposition, lorsque la caractérisation des risques aura	[5] CSA N288.1-14: Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities. March 2014.	

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				été réalisée en fonction des propriétés toxicologiques des contaminants Fournissent les doses de rayonnement associées à l'exposition des enfants et des nourrissons, puisque la limite de dose de 1 mSV/an ne s'applique pas à ces groupes d'âge.		
MDDELCC	FC-220	QC-24 CNL-ND518	Accidents and Malfunctions Section 6	[English] CNL refers to several technical reports in order to support the choice of criteria and parameters used as well as the scenarios considered. However, they are not available. In order to complete his analysis, the MDDELCC requests that CNL: a) Provide the Performance Assessment document as well as the modeling used in the development of the accident and malfunction scenarios, taking into account the identification of potential impacts in the province of Quebec; b) Clarify whether the assessment has considered all reasonable accident and malfunction scenarios of technological or natural origin with the potential for significant effects on human health, on-site or off-site, and where appropriate, on the basis of which criteria. It would also be necessary to identify if mitigation measures as well as radiological and non-radiological risks were considered and to determine the exposure pathways and exposure doses; c) Clarify the potential effects of these accident and malfunction scenarios on human health; d) Indicate the planned mitigation measures that will reduce or eliminate risks to human health; e) Indicate whether the proposed prevention, preparedness, response and recovery	Accidents and Malfunctions of the NSDF Project for the construction, operations and closure phase are assessed within the Safety Analysis Report (SAR) [1] and summarized within Section 7 of the revised EIS. In the post-institutional control period, there will be no workers or activities on-site, and as such there is no possibility for accidents or malfunctions to occur. Disruptive events during the post-closure phase, such as human intrusion, are evaluated in the Post-closure Safety Assessment (PostSA) [2] but presented in Section 5.7 and 5.8 of the revised EIS. In response to the specific information requests CNL provides the following: a) The Performance Assessment was originally a mix of pre-closure and post-closure safety analysis. CNL has revised this approach to simplify the scope having the Safety Analysis Report (SAR) include only pre-closure safety, and the Post-Closure Safety Assessment (PostSA) focus on the post-closure period. As noted in Section 7 of the revised EIS, accidents and malfunctions would occur in the pre-closure phase of the NSDF Project and are identified, characterized and evaluated in the NSDF Safety Analysis Report [1]. The revised approach has taken into consideration the nearest off-site receptor is located in Quebec approximately 3 km from the CRL site. The dose consequence to the off-site receptor is expected to be very low. This Technical Supporting Document has been submitted to the CNSC as part of the EIS package, thus it is available to federal and provincial agencies. b) Section 7.2 of the revised EIS has been expanded to include detail on the systematic and comprehensive approach used to identify the major hazards and postulated initiating events. The SAR has addressed all reasonable accident and mal-function scenarios for the construction, operations and closure phases. Hazard identification and Analyses were conducted and documented in the SAR [1]. The hazard analyses were conducted to ensure that all possible hazards were represented and considered. The focus of the hazard analysis is on the potential accident conditions involving the hazards associated with the NSDF design and operations. In general, the hazard analysis process consisted of: • Systematically evaluate hazards, develop accident sequences/scenarios, and identify administrative and engineered controls. • Qualitatively assess the frequency and consequence/severity for the mitigated hazard or event.	Accepted

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				measures in the Emergency Protection Program take into account these scenarios; f) Clarify whether the accident scenarios considered a failure or accident at the wastewater treatment plant; g) Indicate why some scenarios (e.g. earthquake) are not considered for the operation and closure phases of the project. [Français] Les LNC font référence à plusieurs rapports techniques afin d'appuyer le choix des critères et paramètres retenus ainsi que les scénarios considérés. Toutefois, ils ne sont pas disponibles. Afin de compléter son analyse, le MDDELCC souhaite que l'initiateur : a) Fournisse le document intitulé « Performance Assessment for Near Surface Disposal Facility to support the Environmental Impact Statement » ainsi que les modélisations utilisées lors de l'élaboration des scénarios d'accidents et de défaillances en prenant soin d'identifier les impacts potentiels en territoire québécois b) Précise s'il a considéré les scénarios raisonnables de défaillances et d'accidents d'origine technologique ou d'origine naturelle ayant les plus importantes conséquences potentielles sur la santé humaine, sur le site ou en dehors du site et, le cas échéant, sur la base de quels critères. Il serait également nécessaire de préciser si les mesures d'atténuation ainsi que les risques radiologiques et non radiologiques ont été considérés et de déterminer les voies d'exposition et les doses d'exposition retenues	- The frequency and consequence/severity is combined to determine the risk ranking of the mitigated hazard or event. - Identify mitigation measures or safeguards for the hazard. The hazard analyses assessed hazards/events that have radiological, industrial (conventional) and environmental consequences. The risk matrix, risk ratings, frequency ratings and severity ratings used in the hazard analyses is documented in the SAR [1]. Following this hazard identification and analysis, a systematic and comprehensive approach was used in the SAR to identify and assess the major hazards and potential initiating events associated with the design and operations of the NSDF. The major hazards and potential initiating events are quantitatively and qualitatively assessed and an assessment of the mitigation measures/safeguards for the hazards are (Section 14 of SAR [1]). c) As summarized in Table 7.3.2-1 of the revised EIS, there are no residual effects to human health as a result of accident and malfunction scenarios assessed. d) Mitigation measures for the human health hazards are discussed in Section 14 of the SAR [1] and also identified during the hazard identification and analysis. Table 7.3.2-1 of the revised EIS summarizes the mitigation measures. e) If an accident or malfunction situation occurs, CNL has procedures in place that address requirements for immediate response and post-event clean-up or remediation. Of note, CNL's Emergency Preparedness Program (described in Section 3.5.2.5 of the revised EIS) has been designed for immediate response to emergency situations. f) Accident scenarios were considered for the Wastewater Treatment Plant and are assessed in Section 14 of the SAR [1] and summarized in Section 7.3.3 of the revised EIS. These scenarios include tank loss of containment and radiological exposure to workers; an internal fire resulting in increased radiological exposure to both on-site and off-site receptors was also assessed. g) Many events, such as seismic events, are taken into account in the design basis of NSDF, thus when the event occurs there is no consequence to assess. For example the design of the ECM is robust enough to withstand a significant seismic event (i.e., 1 in 10,000 years). Beyond design basis accidents (i.e. seismic event of greater probability than 1 in 10,000 years), are qualitatively assessed in the Section 14 of the SAR [1] as a consequence of failure to determine the radiological dose consequence in support of the seismic design basis. Reference [1] Near Surface Disposal Facility Safety Analysis Report, 232-508770-SAR-002, Revision 0, 2019 September.	

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				c) Précise les effets potentiels de ces scénarios d'accidents et de défaillances sur la santé humaine d) Indique les mesures d'atténuation prévues qui permettront de réduire ou d'éliminer les risques pour la santé humaine e) Indique si les mesures de prévention, de préparation, d'intervention et de rétablissement prévues dans le programme des mesures d'urgence tiennent compte de ces scénarios f) Précise si le scénario d'accidents qui viserait une défaillance ou un accident à l'usine de traitement des eaux usées a été considéré g) Indique pourquoi certains scénarios (ex. : séisme) ne sont pas envisagés pour les phases d'exploitation et de fermeture.		
MDDELCC	FC-221	QC-25 CNL-ND536	Accidents and Malfunctions Section 6	[English] In order to complete the information presented, the proponent should describe the alert scheme and the procedures for disseminating and updating these procedures for transboundary populations, including those of the MRC Pontiac and municipalities that could be concerned. It should also: a) Invite stakeholders involved in the deployment of emergency measures in Quebec to participate in the emergency planning and periodic emergency exercises mentioned on page 6-26 of the draft study. impact; b) Clarify whether financial assistance is provided by the NCBs to assist municipalities in deploying their contingency plan in the event of a spill or emergency. (e.g., purchase of equipment, supply of drinking water, etc.); c) Provide programs for environmental protection, emergency measures and fire	Emergency response is coordinated through individual municipalities and the Provincial government. Canadian Nuclear Laboratories has longstanding relationships with these government bodies, and with different agencies within the Federal government, to ensure that emergency resources are properly deployed in the unlikely event of an incident related to CNL's activities. In case of an accident or emergency, CNL provides leadership and works closely with regional municipalities and responsible Provincial and Federal agencies, to implement the complementary emergency preparedness programs required to address the incident. In response to the specific requests, CNL provides the following: a) Canadian Nuclear Laboratories has developed the necessary emergency preparedness programs required by the CRL Site License and works closely with regional municipalities and relevant Provincial and Federal agencies to develop complementary emergency preparedness programs, through regular meetings and simulation exercises, to ensure that all emergency practices and standards are aligned. b) Canadian Nuclear Laboratories provides funding to local Municipalities (both in the province of Quebec and Ontario), to enable the establishment of emergency preparedness capabilities. Municipalities are expected to utilize this funding to pay for their normal emergency preparedness costs e.g., training, preparation of drills and exercises, attendance at meetings, public alerting system maintenance and testing, and equipment, facilities and supplies related to Emergency Planning as well as decontamination material for reception centres. c) CNL's Management System includes programs for emergency measures are provided as	Accepted

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				protection. [Français] Afin de compléter l'information présentée, l'initiateur devrait décrire le schéma d'alerte et les modalités de diffusion et de mise à jour de ces procédures pour les populations transfrontalières, y compris celles de la MRC de Pontiac et des municipalités qui pourraient être concernées. Il devrait également : a) Inviter les parties prenantes impliquées dans le déploiement de mesures d'urgence au Québec à participer à la planification des mesures d'urgence ainsi qu'aux exercices d'urgence périodiques mentionnés à la page 6-26 de l'ébauche d'étude d'impact; b) Préciser si une aide financière est prévue par les LCN afin d'aider les municipalités à déployer leur plan de mesures d'urgence en cas de déversement ou d'urgence. (ex.: achat de matériel, approvisionnement en eau potable, etc.); c) c. Fournir les programmes de protection de l'environnement, de mesures d'urgence et de protection contre les incendies.	part of the development of complementary emergency preparedness programs.	
MDDELCC	FC-222	QC-26	Cumulative Effects Section 7	[English] The MDDELCC would like the proponent to demonstrate whether the proposed project will result in an improvement or deterioration of the water quality of the Ottawa River in the medium and long term compared to the status quo (historical waste stored on the CRL site).) and if it poses risks of accidents. It should also assess whether the importation of waste from other CNL sites and whether commercial waste	Most of the bulk wastes considered for the proposed NSDF are currently in the various legacy waste management areas at the CRL site. The current configuration of this historic waste is either without engineered containment or past its original intended design life. CNL performs environmental monitoring of these legacy waste management areas and takes the appropriate risk management actions have taken place (i.e., interception and treatment of strontium-90 groundwater plumes). Moving these bulk wastes into an engineered facility that provides containment for a few hundred years in alignment with modern practices, represents an improvement in waste management practices, is a reduction to potential environmental releases from the legacy waste management areas and is progress towards the clean-up of the CRL site. Releases from the NSDF have been considered for the entire assessment timeframe	Accepted

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				will have a significant negative impact on the water quality of the Ottawa River. [Français] Le MDDELCC souhaite que l'initiateur démontre si le projet proposé entraînera à moyen et à long termes une amélioration ou une dégradation de la qualité de l'eau de la rivière des Outaouais en comparaison au statut quo (déchets historiques entreposés sur le terrain des LCR) et s'il pose des risques d'accidents. Il devrait également évaluer si l'importation de déchets provenant d'autres sites appartenant aux LNC et si les déchets commerciaux auront un impact significatif négatif sur la qualité de l'eau de la rivière des Outaouais.	of 10,000 years, whereas, the long-term safety modeling of the legacy waste management areas has not been performed. Section 5.7.6.1.2.2 of the revised EIS summarizes the effects of the NSDF Project on ambient radioactivity and ecological health for the post-closure phase. The calculated peak environmental concentrations in water are low in the context of environmental effects. For example, as calculated in the PostSA [1], the peak concentration of tritium in surface water (which will eventually flow to the Ottawa River) during the post-closure phase is 0.000055 Bq/L, as compared to the Maximum Acceptable Concentration of 7,000 Bq/L of tritium in drinking water (Health Canada 2019), demonstrating that there is no deterioration of the Ottawa River water quality in the medium or long term. (Note that the inventory of waste that will be placed in the NSDF from all sources (on-site and off-site) is used in these calculations.) As noted above, while the long-term safety modeling of the legacy waste management areas has not been performed, it is reasonable to conclude that releases to the Ottawa River from them would not be lower and would likely be higher than from the NSDF. References [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019. November	
MDDELCC	FC-223	QC-27 CNL-ND289	Cumulative Effects Section 7	[English] Since the waste that will be buried in the NSDF will come mainly from the operation and decommissioning of the CRL site, including the radioactive waste that is currently stored there, the proponent should specify: a) whether the proposed decommissioning of infrastructure at the CRL site will be authorized separately; b) how legacy waste will be sorted; and c) whether contaminated soils will also be excavated and placed in the NSDF [Français] Puisque les déchets qui seront enfouis dans l'IGDPS proviendront principalement des activités d'exploitation et de déclassement du site des LCR, notamment les déchets radioactifs	The NSDF will provide a safe, permanent solution at the CRL site for the disposal of low level radioactive waste (LLW), and will replace the current CNL practice of placing waste in interim storage. In response to specific concerns CNL provides the following: a) Decommissioning of infrastructure at the CRL site is a separately managed process [1], controlled in accordance with the Site License and the License Conditions Handbook. Through the implementation of this process, CNL ensures that facilities and sites, after operations are completed, are prepared for re-use or rendered to a predetermined end state condition meeting all compliance and regulatory requirements. b) All waste intended to be emplaced in the NSDF, including legacy waste, shall have sufficient characterization data to ensure compliance with the WAC [2]. CNL's waste characterization process which ensures characterization plans are developed for waste streams according to the specific data objectives [3]. c) Environmental remediation of historically contaminated soils will be consistent with CNL's remediation process. The remediation process includes an approach for determining remedial options using a risk based approach. Generally speaking, CNL anticipates contaminated soils to be excavated and placed in the NSDF where absence of engineered containment of radioactivity poses an unacceptable risk to the public or environment. Similar to the decommissioning of infrastructure, environmental remediation activities are subject to separate licensing decisions by the CNSC.	Accepted

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				qui y sont actuellement entreposés, l'initiateur devrait préciser : a. Si le projet de déclassement des infrastructures des LCR fera l'objet d'une autorisation distincte; b. Comment les déchets historiques seront triés; c. Si les sols contaminés seront également excavés et enfouis dans l'IGDPS.	References [1] Decommissioning and Demolition Program Description Document, 900-508300-PDD-001, Revision 1, 2018 November. [2] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September. [3] Waste Characterization Management Control Procedure 900-508600-MCP-001, Revision 0, 2018 March (e-Doc 5806555).	
MDDELCC	FC-224	QC-28 CNL-ND561	Section 9	[English] MDDELCC request that CNL present the potential impacts of extreme weather events on its project, including the integrity of the NSDF design, and in particular, assess the potential for contamination of the Ottawa River in the case of flooding. [Français] MDDELCC demande que les LNC présentent les impacts potentiels des évènements météorologiques extrêmes sur son projet, notamment sur l'intégrité de l'IGDPS, et qu'il évalue le potentiel de contamination de la rivière des Outaouais en cas d'inondation.	In addition to assessing the effects the NSDF Project potentially has on the environment, the EIS also takes into account how the environment could adversely affect the NSDF Project in Section 10 of the revised EIS. This included an evaluation of how climate change, severe weather and other environmental events may interact with and potentially alter the condition and function of the NSDF Project, such that these events result on effects on the environment or public safety. Due to the recognized long timeframe of the NSDF Project as a permanent disposal facility for low-level waste, the magnitude and severity of environmental events were taken into account. For example, natural hazards such as extreme weather caused by climate change, flooding, tornados, forest fires, seismic events and glaciation were all assessed. To ensure the effects on the environment are minimized, the design basis of the NSDF accounts for the expected environmental conditions of the site. For the specific events noted in the comment, the design features which mitigate against their consequences include: Extreme rainfall events are considered in the design of the wastewater collection and treatment systems. The storage capacity and maximum flow rate of the wastewater treatment plant was based on two back-to-back 100 year, 24-hour storm events. Within the ECM features such as drainage, ditches, culverts and surface water management ponds have been designed appropriately for peak flows that accounted for climate change. Flooding of the Ottawa River as well as nearby creeks and wetlands has been taken into consideration in the siting of the NSDF Project. The base of the proposed NSDF is located approximately 160 metres above sea level which is approximately 50 metres above the current water levels of the Ottawa River. Other design features provide additional mitigation to flooding including the topographical slopes of the ECM. The NSDF Project incorporates design features to minimize its effect on the environment during facility operation as well as into the post-closure phase thus, residual effects from the effects of the environment on the NSDF Project are not significant.	Accepted
MDDELCC	FC-225	QC-15	Section 5	[English]	As noted in the comment environmental monitoring will be completed as required during the post-closure phase - specifically during the institutional control period. The purpose of the	Rejected with Follow-Up IR QC-2-05

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		QC-29 QC-30 CNL-ND588	Section 10 Monitoring	According to the draft EIS, the monitoring carried out during the post-closure stage of the NSDF Project will confirm the proper functioning of the cover and the absence of surface water quality degradation. Specifically, the MDDELCC request clarification regarding: a) The proposed measures in the event of a failure of the cover to limit contamination of the surrounding waters; b) If tree growth will be controlled beyond the post-closure phase; c) Passive access control plans at the site (e.g., physical barriers, additional layer of soil, signage, etc.) ensuring that the site will remain, even in the absence of any active monitoring after the operating phase. The MDDELCC also requests that CNL consider the following additions to the proposed environmental monitoring program for the operations phase of the NSDF: a) Identification of shorelines of the Ottawa River that are areas of sediment accumulation under the influence of the waters of Perch Creek and the addition of the sediment stations in these areas for both initial baseline characterization as well as ongoing monitoring during the operations phase. The concentrations of all COPCs should be quantified; b) Identification of the parameters to be included in the environmental monitoring, with at a minimum, the parameters for which exceedances have been modeled as well as the radionuclides which may be released into the surrounding waters (e.g., cadmium, copper, iron, mercury,	monitoring is to confirm that the final cover is functioning as intended and to demonstrate compliance with the environmental assessment predictions. Canadian Nuclear Laboratories provides the following clarifications: a) During the institutional control period CNL will implement an inspection and maintenance plan to confirm the integrity of the cover (See Section 3.2.4.1). Monitoring during the institutional control period will confirm the performance of the containment system, and if necessary, remedial actions will be taken. Examples of mitigation measures are included in Section 11.2 of the revised EIS. In the event of cover failure, a mitigation plan will be implemented to limit contamination of the surrounding waters. In the event of a failure of the cover mitigation measures may include repair of the ECM cover, placement of a new cover on the ECM or implementation of groundwater treatment systems. b) As noted in the Section 3.2.4.1 of the revised EIS, trees will not be allowed to establish on the final cover. c) Institutional controls will be implemented to limit access to the NSDF site (Section 3.2.4.2). Institutional controls include administrative and legal controls, and may also include certain physical controls (e.g., fences and gates, signage). Canadian Nuclear Laboratories has reviewed the proposed additions to the environmental monitoring program for the operations phase, and responds as follows: a) CNL will consider the addition of sediment monitoring stations downstream of Perch Creek. That said, the NSDF project impacts on Perch Creek flow rates and sedimentation in the Ottawa River is expected to be negligible; the Site Study Area affects a relatively small area (5.1%) of the watershed draining to Perch Creek (Section 5.4.1.9 of the EIS). Concentrations of COPC's have been quantified in surface water quality assessment of the EIS. No adverse effects on surface water quality in the Ottawa River are expected (See Section 5.4.2 of the EIS and [1]). b) The conceptual follow-up monitoring plan for the project is described in Section 11 of the EIS. A detailed follow-up monitoring plan for the NSDF site will be developed and made available for review. The environmental monitoring plan including parameter identification and monitoring frequency will follow the requirements of CSA N288.4 Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills and CSA N288.7 Groundwater protection programs at Class I nuclear facilities and uranium mines and mills. Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	

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				aluminum, barium, manganese and uranium). [Français] Selon l'ébauche de l'étude d'impact, la surveillance réalisée pendant l'étape de post-fermeture du projet d'IGDPS permettra de confirmer le bon fonctionnement de la couverture et l'absence d'altération de la qualité des eaux de surface. Le MDDELCC demande que les LNC précisent : a. Les mesures prévues dans le cas où une défaillance de la couverture serait observée, afin de limiter la contamination des eaux environnantes; b. Si la croissance des arbres sera contrôlée au-delà de l'étape de post-fermeture; c. Les plans de contrôle d'accès passifs au site (barrières physiques, végétation urticante, couche supplémentaire de sol, marquage, etc.) assurant que le site va rester sécuritaire, même en l'absence de toute surveillance active après la période d'exploitation. Le MDDELCC demande également aux LNC d'envisager les ajouts suivants au programme de surveillance environnementale proposé pour la phase d'exploitation de l'IGDPS: a. Identification des plages de la rivière des Outaouais qui sont des zones d'accumulation de sédiments sous l'influence des eaux du ruisseau Perch et de l'ajout des stations de sédimentation dans ces zones pour la caractérisation de intiale du milieu ainsi que pour la surveillance continue pendant la phase d'exploitation. Les concentrations de tous les CPP devraient être quantifiées;		

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				b. Identification des paramètres qui devraient être inclus dans ce programme de surveillance environnementale, avec au minimum les paramètres pour lesquels des dépassements ont été modélisés, ainsi que les radionucléides susceptibles d'être libérés dans les eaux des milieux récepteurs (ex. : cadmium, cuivre, fer, mercure, aluminium, baryum, manganèse et uranium).		
Ontario Ministry of the Environment and Climate Change (MOECC)	FC-226	CNL-ND86	2.5.3 Facility Design – Site Location	The site location and physical setting consists of exposed bedrock and permeable overburden materials. This setting does not provide natural protections and the site will rely on engineered controls to contain the contamination.	A documented site selection process was followed as described in Section 2 of the EIS. The location of the NSDF is appropriate for its function as a LLW disposal site and the engineered barriers have been designed to work with the site characteristics. It is located in a well understood and comparatively low seismic zone and is considered to be within the Canadian Shield; a stable rock formation. The proposed ECM is to be constructed on or near the bedrock. This further mitigates the effects of a seismic event, as bedrock is unlikely to oscillate or become displaced during a seismic event. The local seismic characteristics were used to design the ECM. The ECM and berms have been designed to maintain their containment functions for up to a 1-in-10 000 year seismic event. As a result of the seismic assessment, optimizations were made during the design phase to mitigate the potential for liquefaction. A process known as "remove and replace", is used to stabilize the base of the berm. The local sandy soil is being removed and replaced by specific soils which have a better capacity for compaction and allow for water to drain out of it more effectively. The NSDF site is in the Perch Lake basin, an extremely well understood and characterized plot of land. Due to early waste management practices, portions of the Perch Lake basin have been impacted with groundwater plumes of radioactivity. The area has been used to study the mobility of radionuclides in groundwater and the overburden and this site knowledge has been incorporated in the design. For example, during the site selection process the NSDF site was preferred to the alternate site since it is located along a bedrock ridge that forces water naturally away from the Ottawa River and the groundwater transit time to the Ottawa River from the was also longer in duration than the alternate site. The site is located far above the maximum calculated Ottawa River flood levels for the area. Specifically, the lower point of the ECM is at 160 metres above sea level (mASL), while the maximum flood level due to upstream dam breaks is calculated to be about 122 mASL (Section 10.1.2 of revised EIS). Therefore, flooding of the Ottawa River cannot adversely affect the integrity of the NSDF or its barriers.	Accepted

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					In the post-closure phase, the site characteristics and how they affect the design were considered as part of the Features, Events, and Processes (FEPs) screening process [1]. The FEPs are screened and assessed on an individual basis, which help guide the development of the scenarios in the PostSA. The effect of the local environment on the project, are considered through the FEPs process. The PostSA models the hypothetical release from the Facility, hundreds of years into the future when degradation of the barriers is plausible, and continues the assessment for 10,000 years. The release rates of contaminants from the Facility lead to acceptable environmental concentrations and dose consequence to both the public receptors and non-human biota through a combination of the natural and synthetic barriers, coupled with the natural attenuation of the geosphere and surrounding environment. Reference [1] Post-Closure Safety Assessment, 232-509240-ASD-004, Revision 0, 2019 November.	
MOECC	FC-227	CNL-ND 105	Facility Design – Wastewater Treatment Plant	Policy status of receiving waters – Based on the data presented in Appendix 5.4-2, Perch Creek (at the Perch Creek Weir, midway between the outlet of Perch Lake and the Ottawa River) may be considered a Policy 2 receiver for total phosphorus, iron, aluminum and copper (existing water quality may not meet the PWQO / CWQG). Provincial policy would be to prevent further deterioration of water quality with respect to these parameters, except under specific circumstances. The existing concentrations of lead, barium and manganese (identified as COPC) are unknown or are not well defined. While there is no APV or PWQO exist for manganese, barium has an APV of 2.3 mg/L. Lead has an interim hardness-dependent PWQO of 1, 3 or 5 µg/L. Based on available hardness data, an Objective of 1 µg/L likely applies. Treatment Targets and BV, as they compare to water quality guidelines, are summarized above.	In both discharge scenarios assessed in the EIS, projected aluminum, copper, iron, and phosphorus concentrations exhibited consistent exceedances above the treated effluent discharge target under an average annual flow condition at all assessment nodes, which were attributed to relatively high existing baseline concentrations [1]. Of these parameters, only total phosphorus showed a slight increase immediately downstream of the NSDF Project (i.e., at ESW under discharge scenario 1), but from Perch Lake and further downstream, modelled concentrations remained similar to existing baseline conditions. In summary: • All modelled Aluminum concentrations for both discharge scenarios remained consistent with the existing baseline concentrations. These modelled concentrations were lower than the Ottawa River concentration. • All modelled Copper concentrations through the Perch Creek remained similar to existing baseline concentrations. • The projected Iron concentrations at each of the assessment nodes remained consistent with baseline concentrations. • All projected Total Phosphorus concentrations below Perch Lake watershed remained similar to existing baseline concentrations. As each of the modelled parameter concentrations are consistent with existing baseline concentrations downstream of Perch Lake, any load contribution in these parameters to the Ottawa River from the Perch Creek watershed to the Ottawa River is therefore expected to remain consistent with existing conditions. That is, any incremental increase in these parameters as a result of the NSDF Project is expected not to be measurable in the Ottawa River. Potential for risk to the receiving environment remains similar to existing conditions.	Accepted

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					The modelling assessment used a flow-weighted averaging approach to generate existing baseline condition data in Perch Lake for lead, barium and manganese; baseline data for these parameters were available for the other assessment nodes in the Perch Lake watershed. Existing baseline condition data for the other assessment nodes (e.g., ESW, PL2, PCW, OR) were derived from available monitoring data. The flow weighting approach used available measured data from the assessment nodes and their relative inflows to Perch Lake to generate an existing baseline input to the model for Perch Lake. CNL undertook a baseline survey of Perch Creek in 2018; measured data for these parameters from that survey provided a basis for comparison to the model input concentrations. These comparisons are provided in the footnotes to the results tables for these parameters. In summary, barium and manganese concentrations were very similar between the flow-weighted average and 2018 field data (13 µg/L vs 17 µg/L and 56 µg/L vs 64 µg/L, respectively) , but lead concentrations were slightly higher in the 2018 survey (2.9 µg/L v. 8 µg/L). A higher degree of confidence was assigned to the flow-weighted averaging approach to generate existing baseline condition data in Perch Lake compared to the 2018 baseline data. Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	
MOECC	FC-228	CNL-ND106	Facility Design – Wastewater Treatment Plant	Golder reports that 'anticipated effluent concentrations' were used to model the expected influence of effluent discharge under scenarios 1 and 2 (as opposed to the higher concentrations listed as Treatment Targets, or effluent limits, which are not provided). Anticipated effluent concentrations are based on treatment system performance on a pilot scale (i.e., high effluent quality under ideal conditions). It is unlikely that the model results reflect the "worst case scenario" for the effects of discharge. Modelling of discharge at the full effluent strength being proposed (i.e., effluent limits or Treatment Targets, equivalent to the worst quality that could be expected under conditions that would be considered acceptable based on the proposed project) is not an unreasonable expectation.	The surface water quality modelling assessment has been updated. Modelling of discharge at full effluent strength (i.e., effluent discharge target) as recommended by the reviewer has been conducted (see Section 5.4.2.6.1 of the revised EIS and Section 2.5 of [1]). Modelling of discharge at effluent discharge target levels represent the worst quality that could be expected. Reference [1] CNL, Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	Accepted

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MOECC	FC-229	CNL-ND107	Facility Design – Wastewater Treatment Plant	Seasonal / annual variability in flows may not be adequately captured by the model. It is my understanding that modelling work was undertaken using average annual flows (1969-1980) (with the exception of monthly flow data for a limited number of locations). Low flows have the potential to limit the ability of receiving waterbodies to assimilate contaminants by affecting dilution rates. Modelling of the effects of effluent discharge under low flow conditions (i.e., lowest annual flow from data record or, preferably, seasonal low flows or 7Q20)) would provide a higher level of confidence with respect to the potential for adverse effects. In addition, as noted with respect to the radiological assessment, higher than average precipitation may result in increased leachate generation and larger volumes of effluent discharged. Conditions deviating from the average should be considered.	There were insufficient long-term data and limited data resolution to run a frequency analysis for 7Q20. Additionally, the 7Q20 is not necessarily a typical recurrence interval to evaluate hydrological regime effects to water quality. The treated effluent discharge target concentrations and the average hydrological conditions have been used to provide an estimate of reasonable expectations, which are bound by conservatism in the modelling. It is expected that under low flow conditions the volume of contact water and leachate generated from the NSDF would correspondingly be less than average conditions	Accepted
MOECC	FC-230	CNL-ND108	Facility Design – Wastewater Treatment Plant	The commenter indicates that toxic metals such as beryllium, cobalt, fluorine and thallium were omitted from the study due to lack of projected effluent concentrations. Organic compounds were also excluded on the basis that the model is unable to capture processes of decay and/or bioaccumulation. The possible concentrations of most of these parameters in both effluent and in receiving waters are unknown. This data gap is a concern due to potential toxicity and/or cumulative effects not captured within this impact assessment.	Canadian Nuclear Laboratories has reviewed and expanded the list of non-radiological Contaminants of Potential Concern (COPCs) included in the surface water quality assessment (See Section 5.4.2.6.1.4 of the revised EIS and reference [1]). Cobalt and Thallium have been included in the surface water quality assessment. The complete list of COPC assessed include: • major ions [sodium, potassium, calcium, magnesium, chloride, sulphate, fluoride], • nutrients [nitrate, nitrite, ammonia, and total phosphorous], and • metals [aluminum, antimony, barium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, tin, uranium, vanadium, and zinc]. Organics compounds were not carried forward for the surface water quality assessment as they are generally present in trace amounts with no obvious source in the waste inventory. See Section 3.4.2.2 and Section 5.4.2 of the revised EIS and [1]. The concentration of organic compounds in the wastewater prior to treatment in the WWTP is expected to be low. The WWTP has been designed to be flexible and able to treat a wide range of contaminants. The	Accepted

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					WWTP incorporates granulated activated carbon (GAC) and this is expected to be highly effective at removing any organic compounds that are expected to be in the wastewater (see Table 3.4.2-3 of the revised EIS). CNL will sample the leachate before treatment begins to determine what treatment strategy is required for the wastewater. The treated effluent goes to a Final Effluent Tank where it is sampled and the sample is analysed prior to discharging the treated effluent. If the treated effluent does not meet the effluent discharge targets, it would be returned to the beginning of the WWTP process and go through the treatment process again to remove the species that exceed the effluent discharge targets. References [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November. [2] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	
MOECC	FC-231	CNL-ND109	Section 5.4.2.7.2.1	Model results are summarized in section 5.4.2.7.2.1 of the report. In some cases, model outputs are not logical. These results should be more adequately qualified within the report. The reviewer's observations are summarized below: • Cadmium: Golder reports background concentrations exceeding the CWQG for ESW (0.107 µg/L) and Perch Lake (0.126 µg/L, estimate) and expected treated effluent concentration of 0.273 µg/L. Under Scenarios 1 and 2, concentrations of Cd at ESW are increased. A smaller increase is noted downstream from ESW at PL2. In Perch Lake; however, the model appears to indicate that water quality is improved by discharge conditions (from 0.126 to 0.036 - 0.038 µg/L), despite the relatively higher effluent concentration. • Copper: as above, model outputs for Perch Lake are not logical. The background value cited for Perch Lake (13.9 µg/L (exceeding PWQO/CWQG and APV)) seems very high compared to upstream (PL2) and downstream (PCW) background values.	CNL has updated the surface water quality assessment to include a more comprehensive set of parameters, new baseline surface water quality data, and updated effluent discharge scenarios (i.e., effluent discharge to exfiltration gallery and direct effluent discharge to Perch Lake). Baseline data for Barium and Manganese has been collected. The updated Surface Water Quality Assessment including all parameters assessed is provided in [1]. A subset of these have been included in the revised EIS (Section 5.4.2.6). Reference [2] provides historical and new baseline water quality for the Perch Lake and Perch Creek watershed. Baseline concentrations for Perch Lake are based on a flow-weighted concentration using all available upstream data sources. The benchmark value for Phosphorous has been corrected. The CWQG value of 0.01 mg/L applicable for meso/eutrophic lakes is used in the assessment (i.e., as the effluent discharge target and for evaluation of projected surface water concentrations). References [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November. [2] Characterization of Water and Sediments from and around Perch Lake, 232-121221-REPT-002, Revision 0, 2018 September.	Accepted

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				• Total phosphorus (TP): The BV cited (5 mg/L) reflects the apparent unit error described elsewhere in this memo. The predicted concentrations are extremely high compared to the PWQO for phosphorus (0.03 mg/L) and the guidance framework forming the CWQG (0.01-0.1 mg/L for meso- through eutrophic lakes). Based on the model results reported, I disagree with Golder's assessment that the potential for increased algal blooms and eutrophication is negligible under the modelled scenarios. As with Cu and Cd, the values assumed for TP in Perch Lake are not reasonable to the reviewer (concentrations of TP within Perch Lake are reported to improve from a background of 0.19 mg/L to 0.04 – 0.05 mg/L following discharge of effluent with a TP concentration of 1.7 mg/L under Scenarios 1 and 2). No data is available for concentrations of Barium or Manganese in receiving waters. It is unclear what assumptions were made in deriving receiving water concentrations for modelling the effect of effluent / leachate.		
MOECC	FC-232	CNL-ND422	5. 3 Environmental Effects – Geological and Hydrological Environment	The presented conceptual model of groundwater flow and leachate migration is dependent on the NSDF being located entirely within the Perch Lake Basin. It is reported that the location of the groundwater divide to the east of the ECM along the escarpment boundary is not well understood. Additional investigation should be conducted to confirm the location of the current and future groundwater divide.	CNL has conducted additional studies to confirm the location of the groundwater flow divide. Groundwater flow modelling has included a sensitivity analysis to evaluate uncertainty in the position of the groundwater flow divide and the effect of this uncertainty on the predicted groundwater flow paths (See Section 4.4.1, Sensitivity Run 4 of [1]). Additional groundwater monitoring wells along the location of the groundwater divide have also been installed to provide further confirmation on location of the divide (See Section 5.3.2.4.2.1 of the revised EIS). The groundwater flow sensitivity analysis and additional monitoring data support the location of the groundwater divide and predicted groundwater flow path from the NSDF towards Perch Creek. Reference	Accepted

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					[1] Groundwater Flow Modelling of the Near Surface Disposal Facility, 232-509249-REPT-001, Revision 5, 2019 July.	
MOECC	FC-233	CNL-ND 423	5. 3 Environmental Effects – Geological and Hydrological Environment	It is my understanding that groundwater monitoring conducted to date in the vicinity of the proposed ECM is very limited, with two data points collected over less than a one year period in many areas. This level of groundwater data is significantly deficient in assessing the groundwater conditions. Longer term monitoring in the area of the ECM is strongly recommended to better understand groundwater conditions in this area. Data loggers allow for the continuous measurement of groundwater elevations and would provide considerably more detail than manual water level measurements. An essential component of the proposed design is that the ECM be constructed above the current and future groundwater elevation. As built drawings and cross sections have not been provided and I cannot confirm that the proposed design will be above the long-term groundwater table.	Data loggers were installed in 20 wells in Fall 2016 at the NSDF site for providing continuous measurements of groundwater elevations. Data collection and analysis is ongoing. The hydrograph data has been included in the revised EIS (Appendix 5.3-1) along with an assessment of the data. The data was used to further evaluate the groundwater flow model as documented in Section 5.3.2.4.2.1 of the revised EIS. The groundwater flow modelling has been calibrated using the new groundwater elevation data. Modelling predications take into account high water table conditions and confirms that the ECM will remain above the water table. Note that As built drawings cannot be provided at this time since the project is at a conceptual phase at this time of the EIS. Figure 5.3.1-8 of the revised EIS provides the stratigraphy and water table along the flow path from the ECM to the groundwater discharge location at Perch Creek. Figure 5.3.12B through to 5.3.2-2D of the revised EIS provide cross-section of the ECM showing current and future grade elevations along with current and project groundwater table elevations. Note. Regarding construction of the ECM above the groundwater table elevation. The position of the ECM above the groundwater table elevation is important for installation of the clay liner during the construction phase. The position of the groundwater table above the base of the ECM does not affect the performance of the ECM during operations or post-closure.	Accepted
MOECC	FC-234	CNL-ND424	5.3 Environmental Effects – Geological and Hydrological Environment	Groundwater and contaminant migration times and discharge concentrations have been determined using numerical modeling; however, the details of this modeling have not been provided, and I cannot confirm the validity of the methods and outputs. I cannot confirm the validity of the reported 10 to 12 year travel time from the ECM to Perch Creek, as inadequate information has been provided.	Details on groundwater modelling are provided in [1]. CNL has revised the groundwater transit time predications for the flow path from the ECM to Perch Creek in the revised EIS. The groundwater transit time to the nearest surface water body is estimated to be between 5 to 15 years with an average transit time of approximately 7 years (See Section 2.5.5.4). Regarding the validity of the travel time from the ECM to Perch Creek, CNL has conducted studies on contaminant migration from the legacy WMAs adjacent to the NSDF site for several decades. Contaminant migration rates observed for tritium support the predicted travel times for the flow path from the ECM to the Perch Creek [1]. Reference	Accepted

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					[1] Groundwater Flow Modelling of the Near Surface Disposal Facility. 232-509249-REPT-001, Revision 5, 2019 July.	
MOECC	FC-235	CNL-ND425	5.3 Environmental Effects – Geological and Hydrological Environment	Leachate quality has been estimated based on leachate quality at other similar sites. This approach is reasonable; however, I cannot confirm if the provided values are realistic and conservative. The constituents and concentrations of leachate parameters are site specific and are subject to significant uncertainty. I note that not all hazardous compounds listed as acceptable components of mixed waste (i.e., insecticides, herbicides, pesticides) appear in the leachate parameter list. The list of leachate parameters assessed by the monitoring program should include all contaminants of concern contained in wastes deposited at the site.	Canadian Nuclear Laboratories recognizes the uncertainty in basing leachate quality estimates for non-radiological constituents on leachate quality at other sites. The leachate estimates for the non-radiological constituents provided in the 2017 March EIS were the maximum concentrations observed over a 20 year monitoring period at CRL which included legacy WMAs having no engineered barriers. As such, the intent was to capture conservative estimates of potential leachate concentrations. CNL has developed an inventory of non-radiological Contaminants of Potential Concern (COPC) for the NSDF facility [1]. The following criteria were used to derive the inventory: • The COPC inventory was based on constituents that are in common use at CNL and could be expected to be present in the wastes received at the NSDF facility. • COPC inventory was calculated by multiplying the Maximum Leachable Quantity limit (from O.Reg. 347), or federal and provincial soil quality guidelines, by the maximum estimated volume of mixed waste in the NSDF (2.0% of 1.0E+6 m^3). • COPC that do not have a hazard, an O.Reg. 347 limit, or a soil quality guideline will not affect the safety of the NSDF. Adopting maximum regulatory concentration limits as the non-radiological inventory criterion provides a margin to address uncertainty. Adherence to the O.Reg. 347 limits for the waste will ensure that leachate concentrations do not become hazardous. This COPC inventory was used to derive leachate concentrations which would be transferred to the WWTP. For COPC's where quantitative inventory estimates were not available, groundwater monitoring data was used to estimate leachate concentrations. See also Section 3.4.2.2. Although there is some uncertainty in the non-radiological inventory, the WWTP has sufficient flexibility that the operations can adapt and batch sampling/release ensures control that all effluent discharge targets can be met. Reference [1] Near Surface Disposal Facility (NSDF) Non-Radiological Inventory of Constituents of Potential Concern (COPC), 232-508600-TN-007, Revision 3, 2019 August.	Accepted
MOECC	FC-236	CNL-ND434	Section 5.7	Anticipated flow during construction and operational periods are not specifically addressed in the report. It is the experience in	Anticipated flows and mitigation measures during the construction and operations periods are addressed in Table 5.4.1-13 of the revised EIS.	Accepted

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				this region that, during construction that requires the clearing of large areas of land, runoff rates may increase relative to predevelopment levels. This increases the risk of sediment laden water overwhelming E&SC measures / SWMP and being released to downstream areas. The resulting increased flow to downstream areas may also result in scouring and/or erosion in the receiving watercourse. In the case of SWMP 1, the receiving area is known to be contaminated by other site operations, as described in the report (e.g., Section 5.7, Figure 5.7.4-11). If disturbed (erosion or scouring of stream banks and wetland areas) as a result of excessive flows, there is potential for contaminated soils and sediments to be mobilized from the East Swamp Wetland and stream corridor, and transported to downstream areas. It should be confirmed that flows from each SWMP will be controlled to pre-development levels through all phases of the project.	The supporting analysis on surface water flows is provided in [1]. During the construction phase, the construction contractor will implement erosion and sediment control measures to mitigate the effects of soil erosion and sediment transport. During the operations phase, surface water management is provided for the ECM and the larger NSDF footprint. Surface water from all external areas will be conveyed by ditches, swales and culverts to surface water management ponds that will address water quality and water quantity criteria, established for the wetland receiving waters and, ultimately, Perch Creek. The current surface water management pond footprints, reflect the overall storage required to control Post-Closure flows for the 2 year through to 100 year rainfall events at the site during all phases of the project. Reference [1] Surface Water Management Plan, 232-508600-PLA-002, Revision 1, 2019 February.	
MOECC	FC-237	CNL-ND435	5.4.1.7.2 Environmental Effects – Surface Water Environment	Table 5.4.1-10 shows that, while flow from SWMP 2 and 3 does appear to be controlled to below pre-development levels in the Post-Closure period, modelled flow from SWMP 1 is three to four times pre-development levels under various model scenarios. Total run off from the site is also increased, driven by the predicted increase in runoff from the catchment of SWMP 1. While Golder reports a 1 ha increase in drainage area for SWPM 1, the relative change in drainage area pre- and post-development is not clear. The apparent discrepancy in the discussion of pre- and post-development flows and reported model results should be addressed.	CNL acknowledges that post development flows for Surface Water Management Pond (SWM Pond) 1 are appreciably more than pre-development levels. The SWM Ponds are designed so that flows are controlled to prevent erosion rates in the receiving wetlands due to increased discharge rates. Specifically the SWM Ponds are designed to manage flows from 1:2 year, 1:5 year and 1:100 year storm events. Since the submission of the draft EIS, the surface water management plan has been updated [1]. The assessment of total flows from the site under pre-development and controlled post-development has subsequently been reflected in the revised design (See Section 5.4.1.6.2 of the revised EIS). Reference [1] Surface Water Management Plan, 232-508600-PLA-002, Revision 1, 2019 February.	Accepted

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				It is notable that SWMP 1 includes areas designated for Site and Worker Parking, Vehicle Decontamination Area (fully enclosed), Operations Centre, Admin Building, WWTP and WWTP outfall (Figure 3.7.1-1). These impervious surfaces likely contribute to increased runoff to SWMP 1. Additional measures may be required to control post development (i.e., operational phase) flows from the catchment area of SWMP 1.		
MOECC	FC-238	CNL-ND436	5.4 Environmental Effects – Surface Water Environment	The MOECC encourages enhanced level treatment for new developments (80% TSS removal). Given the potential for sediment-bound contaminants to be transported off-site with suspended solids (i.e., chlorinated organic compounds (PCBs), metals (iron, arsenic, etc.), and nutrients (total phosphorus)), the reviewer encourages consideration of enhanced level treatment, as opposed to the basic level treatment (60% TSS removal) proposed. The provision of higher levels of treatment for TSS may be prudent given the water quality considerations discussed herein (i.e., known elevated concentrations of chlorinated organic compounds (PCBs), metals (iron, arsenic, etc.), and nutrients (total phosphorus) on CRL property, which may be transported with sediments).	CNL acknowledges MOECC's comment encouraging enhanced level treatment (80% TSS removal). Enhanced level treatment is not possible for all three surface water management ponds (SWMP) because of the restricted footprint of the NSDF site. CNL notes that SWMP #1 will meet 80%, SWMP #2 will provide 76% TSS removal (Normal level Treatment) and SWMP #3 will provide 60% TSS removal (Basic level treatment) during the construction phase (See Section 5.4.1.6.2.1 of revised EIS). The surface water management ponds discharge to wetlands which function as a sediment trap that will provide additional treatment prior to stormwater reaching any watercourses (e.g., East Swamp Stream, Perch Creek). There is no direct discharge to fish habitat from the SWMPs, as such, basic treatment is considered protective of the environment. The surface water management ponds will be monitored to ensure that discharges meet environmental protection criteria and confirm that the ecological function and structure of the wetland system is maintained. Re elevated concentrations of PCB's and hazardous metals (i.e., arsenic) in stormwater. The NSDF will not be accepting hazardous chemical wastes. Waste emplaced in the NSDF will meet the intent of land disposal and leachate requirements specified in the Ontario Environmental Protection Act, Regulation 347. Elevated concentrations of PCB's and hazardous metals in stormwater are therefore not expected.	Accepted
MOECC	FC-239	CNL-ND437	5.4 Environmental Effects – Surface Water Environment	Should the project proceed, a stormwater management system should be established prior to any substantial clearing of the site. This is to protect against increased runoff and sedimentation during construction.	Table 5.4.1-13 of the revised EIS includes an outline of erosion and sediment control measures that will be implemented during construction. The measures will include the use of erosion control blankets, as needed, to control erosion on steep slopes and check dams in ditches and swales. Section 3.4.4.5 of the revised EIS also includes an outline of surface water management collection, conveyance treatment and discharge. Erosion and sediment control measures are also provided in this section. This includes the surface water management ponds will be	Accepted

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					constructed, firstly, to serve as interim sediment control facilities during construction and then as surface water management facilities during the operations and post-closure periods. Both the ECM and external areas; including the WWTP, parking lots, administrative and maintenance buildings, and laydown areas will all be subject to erosion and sediment control measures during construction.	
MOECC	FC-240	CNL-ND438	5.4.1.6.1.2 Environmental Effects – Surface Water Environment	The assessment of anticipated effects of effluent discharge on site hydrology appears limited to average annual precipitation levels. Consideration of the range of conditions likely to be encountered would be more informative.	CNL acknowledges seasonal and annual variability in effluent discharge rates. The WWTP treated effluent discharge system are designed for the peak flows. The effluent management strategy has been revised to include provision for discharge of treated effluent directly to Perch Lake when water table conditions are high and therefore the capacity of the exfiltration gallery is limited (See Section 3.4.2.6).	Accepted
MOECC	FC-241	CNL-ND439	5.4 Environmental Effects – Surface Water Environment	Possible leakage of leachate and or discharge of inadequately treated effluent during the operational and institutional control phases (up to 2400) were not considered in the potential effects surface water quality. The report states that this is based on the redundancy incorporated into the engineering of the containment mound. Is this an oversight?	Possible leakage of leachate and or discharge of inadequately treated effluent during operations is addressed through the following measures: During the operations phase, the effluent will be monitored prior to release. Effluent that does not meet discharge targets will be recycled for further treatment (Table 3.4.2-3 of revised EIS). The possibility for leachate leakage from the ECM is accounted for through redundancy in design of the ECM base liner. A leachate collection system and a leak detection system is part of the design for the base liner of the ECM (Section 3.4.1.4 of revised EIS). During the closure phase, the placement of the final cover will prevent any infiltration into the ECM thereby eliminating leachate generation. Groundwater monitoring along the perimeter of the ECM during operations and institutional control phases will provide for further monitoring of potential leaks from the containment mound. Section 5.3.2.8 outlines the proposed monitoring and follow-up for groundwater. Table 11.0-1 also summarizes the conceptual monitoring program for the EA Follow-Up program for the NSDF Project, including groundwater monitoring.	Accepted
MOECC	FC-242	CNL-ND440	5.4 Environmental Effects – Surface Water Environment	Sampling provisions are expected to be provided at the discharge point. Golder reports that leachate will be sampled to confirm compliance with effluent requirements prior to discharge. It is not clear what contingencies may be implemented in instances where water does not meet effluent requirements.	The release of treated effluent from the wastewater treatment plant is a controlled batch release process. This means the treated effluent will be monitored prior to release to the environment to confirm that effluent discharge targets are met. In the event that effluent discharge targets are not met, the effluent will be recycled for further treatment. Table 3.4.2-3 of the revised EIS, the flexibility of the WWTP is discussed. Although the design of the plant targeted the removal of specific contaminants, there is sufficient capabilities within the design systems to adjust. For example, addition of ion exchange columns to	Accepted

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					selectively remove contaminants from wastewater, in the event of higher than anticipated contaminant concentrations or unanticipated contaminants in influent.	
MOECC	FC-243	CNL-ND441	5.4 Environmental Effects – Surface Water Environment	The Treatment Target identified for cadmium, copper, lead, and zinc exceed the Province of Ontario's Aquatic Protection Values (APV), sometimes by a significant margin (i.e., the Treatment target given for cadmium is 1.5 mg/L, compared to the APV of 0.00021 mg/L). No treatment target is listed for mercury (as discussed by Golder within the report). The anticipated concentration of mercury in leachate exceeds the APV. Ontario's APVs are considered to provide a reasonably conservative level of protection for most aquatic organisms from the migration of contaminated groundwater to surface water resources. Concentrations in excess of APVs may indicate potential for impacts to surface water features and aquatic life. Furthermore, some of these contaminants have the potential to accumulate in sediments through various processes, and/or bioaccumulate in aquatic biota. This is not addressed in the report.	The updated effluent discharge targets [1], are based on protection of aquatic life and are gathered from a variety of sources including the Canadian Council of Ministers of the Environment and Ontario Provincial Water Quality Objectives (PWQOs). If both Federal and Provincial criteria were available, the lower value was used to define the discharge target (See Section 3.4.2.5.1). A discharge target for mercury has been included. Predicted mercury concentrations in wastewater meet the effluent discharge target (Table 3.4.2-3). The effluent discharge targets for non-radiological constituents have been updated [1]. The inventory of non-radiological Constituents of Potential Concern (COPC) has been updated [2]. The chemical characteristics of waste emplaced in the NSDF will meet the intent of land disposal and leachate requirements specified in the Ontario Environmental Protection Act, Regulation 347. References [1] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October. [2] Near Surface Disposal Facility (NSDF) Non-Radiological Inventory of Constituents of Potential Concern (COPC), 232-508600-TN-007, Revision 3, 2019 August.	Accepted
MOECC	FC-244	CNL-ND442	5.4 Environmental Effects – Surface Water Environment	The Treatment Targets for cadmium, copper, lead, zinc, iron and total phosphorus exceed PWQO and/or CWQG. These are considered conservative values, intended to be protective of the aquatic organisms, through all life phases and with indefinite exposure. In wetland-rich environments, these guidelines should be used with caution.	The revised effluent discharge targets have been revised and no longer exceed either PWQO or CWQG. The updated effluent discharge targets for non-radiological constituents are based on protection of aquatic life and are gathered from a variety of sources including the Canadian Council of Ministers of the Environment and Ontario Provincial Water Quality Objectives (PWQOs). If both Federal and Provincial criteria were available, the lower value was used to define the discharge target (See Section 3.4.2.5.1). Further information can be found in the NSDF Effluent Discharge Targets [1]. CNL recognizes the MECP (formerly OMOECC) comment on the sensitivity of wetland-rich environments and notes that the effluent discharge will not be directly to a wetland – it will be to an exfiltration gallery on the NSDF site or direct discharge to Perch Lake (see Section 3.4.2.6). Reference [1] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	Accepted

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MOECC	FC-245	CNL-ND443	5.4 Environmental Effects – Surface Water Environment	Golder makes multiple references to site-specific effluent limits and effluent requirements (as being criteria different from Treatment Targets), but those limits do not appear to be provided within the report. The site-specific effluent limits are reportedly based on the CRL Acceptability Criteria for Routine and Non-Routine Discharge of Liquids to Stormwaters, however, that report is not provided and has not been reviewed by this office.	The effluent treatment targets are no longer based on the CRL Acceptability Criteria for Routine and Non Routine Discharge of Liquids to Stormwater. References to 'site specific effluent limits' have been removed from the EIS. The updated NSDF effluent discharge targets for non-radiological constituents are based on protection of aquatic life for chronic exposure and are primarily from the Canadian Water Quality Guidelines (CWQG) and Ontario Provincial Water Quality Objectives (PWQOs). The primary sources for the discharge targets are provided in [1]. If both Federal and Provincial criteria were available, the lower value was used to define the discharge target (See Section 3.4.2.5.1 of revised EIS). The NSDF radiological discharge targets are based on drinking water guidelines with one exception (i.e., tritium). Tritium releases will be managed by packaging high inventory tritium wastes so that the tritium concentration in Perch Creek will not exceed the drinking water guideline of 7,000 Bq/L (Section 3.4.2.5.1 of revised EIS). Further information can be found in the NSDF Effluent Discharge Targets [1]. Reference [1] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	Accepted
MOECC	FC-246	CNL-ND444	5.4 Environmental Effects – Surface Water Environment	Benchmark Values (BV), which the reviewer understands to represent acceptable water quality for the CRL site, exceed PWQO and/or CWQG in some cases (e.g., aluminum, lead, mercury, and zinc). Please provide justification.	The presentation of results and evaluation of surface water quality modelling results has been revised (See EIS Section 5.4.2.6.1.6 and Section 3.1 and 3.2 of [1]). Surface water modelling results are evaluated using the following criteria: • Change from existing baseline conditions; • Comparison against effluent discharge targets; and • Comparison against Risk Benchmarks for non-radiological constituents and No Effects Concentrations for radiological benchmarks. The effluent discharge targets and risk benchmarks/No Effect Concentrations are described below. **The Effluent Discharge Targets** For non-radiological constituents, these are based on protection of aquatic life for chronic exposure and are primarily from the Canadian Water Quality Guidelines (CWQG) and Ontario Provincial Water Quality Objectives [2]. As noted above, if both CWQG and PWQO guidelines were available, the lower value was used.	Accepted

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					For radiological constituents, the effluent discharge targets are the Health Canada Drinking Water Guidelines with one exception, tritium, where a site specific target was derived (See Section 3.4.2.5.1). **Risk Benchmarks and No Effect Concentrations** The Risk Benchmarks are applied to non-radiological constituents and represent lowest observable effect levels for acute exposure conditions. These values are sourced from Canadian Water Quality Guidelines, Provincial guidelines and the literature. The sources are provided in Table 5.4.2-5 of the EIS. The No Effect Concentrations are for radionuclides and are derived from radiation benchmark dose of 400 uGy/hr for aquatic biota. No effects at the population level are expected for the No Effect Concentrations. The No Effect Concentrations are provided in Table 5.4.2-6. Exceedance of Risk Benchmarks or No Effect Concentrations, do not necessarily indicate that effects would occur, but instead indicates the potential for effects. References [1] CNL, Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November. [2] CNL, Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	
MOECC	FC-247	CNL-ND445	5.4 Environmental Effects – Surface Water Environment	Some BV have been established through independent study (i.e., Ecological Effect Review and Ecological Risk Assessment). While these values are generally similar to or less than the Province's APV, there are some notable differences (e.g., BV for Boron, Lead, and Polychlorinated Biphenyls (PCB) exceed Ontario's APV). Please provide justification.	As provided in response to FC-246, the presentation and evaluation of surface water modelling results has been revised. FC-246 includes the updated evaluation criteria. With regard to concentrations of metals at the CRL site, background concentrations for selected metals at the CRL site, are often elevated above conservative guidelines such as Canadian Water Quality Guidelines for chronic exposure and protective of the most sensitive type of organisms. CNL is preparing plans for further evaluation of background concentrations of metals at the CRL site. The CRL Environmental Risk Assessment provides a comprehensive evaluation of potential impacts from current conditions. This risk assessment was updated in 2019 and can be found on the CNL website: https://www.cnl.ca/site/media/Parent/Env_Risk_Assessment_2019_Full_REV_0.pdf	Accepted

Federal / Provincial Department	Reference Number	Old Reference	Report Section	Reviewer Comment	2019 CNL Dispositions	Accepted/Rejected
MOECC	FC-248	CNL-ND446	5.4.2.7.1.4 Environmental Effects – Surface Water Environment	There appears to be a unit error in the BV listed for total phosphorus. The listed value 4-100 mg/L is cited as being based on the CWQG. The CWQG for total phosphorus is 4-100 µg/L. This apparent error is carried throughout the report, water quality modelling and appendices. This may affect the interpretations provided within the water quality assessment (discussed in comment below).	CNL acknowledges the error. The Canadian Water Quality Guideline (CWQG) for total phosphorous of 0.01 mg/L is applied in the updated surface water quality assessment [1]. The CWQG value is used both as the effluent discharge target and to evaluate projected surface water concentrations in surface water. Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	Accepted
MOECC	FC-249	CNL-ND447	5.4 Environmental Effects – Surface Water Environment	The manner in which existing water quality is presented within Appendix 5.4-2 does not permit detailed review (summary data only). It appears that only annual maximum values are presented, as opposed to ranges, means or nth percentile values. These tables also appear to contain multiple unit errors, transcription errors, errors in calculated 5-year average, or in some cases lack of calculated 5-year average, which further complicates any meaningful review.	Appendix 5.4-2 has been removed. A summary of existing baseline water quality in the Perch Lake watershed is provided in Table 5.4.2-5 of the revised EIS. The table provides a range of values observed for selected locations relevant to the assessment for period 2010 to 2018. Baseline concentrations for specific locations (e.g., streams within the Perch Lake watershed, Perch Lake and the Ottawa River), are provided in the surface water quality assessment [1]. Details on baseline data specific to each constituent assessed is provided in the discussion of results for that constituent. Reference [1] CNL, Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	Accepted
MOECC	FC-250	CNL-ND448	5.4 Environmental Effects – Surface Water Environment	Within Tables 4 through 11 of Appendix 5.4-2, where a parameter is below the detection limit, the detection limit is often not indicated. Without knowledge of detection limits it is unknown if "<SRI" indicates good water quality. It is not uncommon for detection limits to exceed relevant water quality guidelines, even within this dataset.	Appendix 5.4-2 has been removed. CNL acknowledges the reviewers comment that detection limits can exceed relevant water quality guidelines. Updated baseline concentrations for all non-radiological and radiological parameters for surface water quality modelling is provided in Section 3.1 and 3.2 of [1]. A summary of baseline surface water quality data is also provided in Section 5.4.2.4 (non-rad) and 5.7.4.5 (rad) of the EIS. Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	Accepted
MOECC	FC-251	CNL-ND449	5.4 Environmental Effects – Surface Water Environment	The parameter list is not consistent between stations (Tables 4 through 11 of Appendix 5.4-2). In most cases, no data are provided for Barium or Manganese. Data are also lacking for Arsenic (at Perch Creek Weir), Uranium (at ESW), and PCBs (MAR, MSC, Perch Lake Input 4,	In the updated surface water quality assessment, barium (Table 3-4 of [1]), manganese (Table 3-17 of [1]), and uranium (Table 3-32 of [1]) have been included. Organics such as PCBs were not included in the model as they are only presence in trace concentrations. Measured concentrations of PCBs in the Perch Lake water shed are provided in the characterization of water and sediments from and around Perch Lake (Figure 3-17 of [2]).	Accepted

Federal / Provincial Department	Reference Number	Old Reference	Report Section	Reviewer Comment	2019 CNL Dispositions	Accepted/Rejected
				SSW (South Swamp Weir)). Barium, manganese, and arsenic are considered COPC.	Existing condition data for each of the assessment nodes were developed using available data for locations in the Perch Lake watershed for these parameters. These data for the assessment nodes are included in the surface water quality assessment [1]. Arsenic was not included in the updated assessment. Although arsenic is classified as a COPC in some locations at the CRL Site and a parameter included in the environmental monitoring program at locations that include the Perch Creek watershed assessment nodes, annual average concentrations are typically below reporting limits. Measured concentrations of arsenic are provided in the characterization of water and sediments from and around Perch Lake (Figure 3-12 of [2]). CNL also notes that predicted arsenic concentrations in untreated wastewater are well below effluent discharge targets (See Table 3.4.2-3 of the EIS). Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November. [2] Characterization of Water and Sediments from and Around Perch Lake, 232-121221-REPT-002, Revision 0, 2018 September 28.	
MOECC	FC-252	CNL-ND450	5.4 Environmental Effects – Surface Water Environment	Golder reports that no background data is available for the body of Perch Lake. The concentration of COPC in Perch Lake has been estimated based on cumulative inputs to the Lake (PL-1 through PL5); however, no data are presented within the appendix for PL-3 or PL-5. Several possible issues with the predicted parameter concentrations in Perch Lake are noted in the discussion below. It is my understanding that the outlet of Perch Lake (PLO) is monitored, but water quality data for this location are also lacking in Appendix 5.4-2.	Background surface water and sediment quality data was collected at four locations within the body of Perch Lake in the summer of 2018 [1]. Surface water and sediments were analyzed for a complete suite of metals, inorganics, organics and selected radiological constituents. Additional baseline data for radiological and non-radiological constituents expected to be present in NSDF treated effluent, was also collected at monitoring stations in the Perch Lake watershed (e.g., Perch Lake Inlet #1, #2, #4, Perch Creek Weir and East Swamp Stream Weir). MOECC notes that no surface water quality data were collected at Perch Lake Inlet 3 and Perch Lake Inlet 5. Data is not provided for these inlets as they are not impacted by CNL Operations. With regards to Perch Lake Outlet, Perch Lake Outlet is monitored for tritium and gross beta. Monitoring results are provided in Table 5.7.4-8 of the revised EIS. The baseline data relevant to the surface water quality assessment is provided in [2]. A sub-set of this data is provided in EIS Section 5.4.2. References	Accepted

Federal / Provincial Department	Reference Number	Old Reference	Report Section	Reviewer Comment	2019 CNL Dispositions	Accepted/Rejected
					[1] Characterization of Water and Sediments from and around Perch Lake, 232-121221-REPT-002. Revision 0, 2018 September. [2] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November.	
MOECC	FC-253	CNL-ND451	5.4 Environmental Effects – Surface Water Environment	Golder has determined the potential concentration of radionuclides in the East Swamp Stream expected as a result from discharge from the WWTP based on predicted effluent volumes (based on average annual precipitation), treatment targets for radionuclides (Table 3.5.3-1) and dilution a dilution factor of 12.5 within the East Swamp Stream (based on flow in the stream of 72000 m3/year). It is not clear if the flow value for the East Swamp Stream represents average annual flow or low flow conditions. Conservative analysis would include consideration of low flow conditions (i.e., 7Q20 or other suitable low flow statistic) to assess the reasonably foreseeable 'worst case scenario' (i.e., concentrations of radiological parameters which may occur within the swamp under lower flow / lower dilution conditions). Conversely, higher than average precipitation may result in higher than average leachate generation and larger volumes of effluent discharged. Conditions deviating from the average should be considered.	Average annual flow were used for East Swamp and all other streams in the Perch Lake basin for the surface water quality modelling (Section 5.4.2.6.1.3 of revised EIS). There were insufficient long-term data and limited data resolution to run a frequency analysis for 7Q20. Additionally, the 7Q20 is not necessarily a typical recurrence interval to evaluate hydrological regime effects to water quality. The treated effluent discharge target concentrations and the average hydrological conditions have been used to provide an estimate of reasonable expectations, which are bound by conservatism in the modelling. Under low flow conditions, the volume of contact water and leachate generated from the NSDF would correspondingly be less than average conditions.	Accepted
MOECC	FC-254	CNL-ND452	5.4 Environmental Effects – Surface Water Environment	Under current conditions, the concentration of PCBs in surface water appears to exceed the PWQO and APV at the Perch Creek Weir, as well as at PL2 (inflow to Perch Creek, downstream of proposed discharge), and East Swamp Stream. Data from other monitoring locations are often lacking (Appendix 5.4-2), and may not be available.	CNL acknowledges there were transcription errors in some tables of Appendix 5.4-2. Appendix 5.4-2 has been removed from the EIS however replaced with the Surface Water Quality Assessment Technical Supporting Document [1]. The ECM will not receive chemically hazardous wastes (Section 3.3.3.3 of revised EIS). All wastes placed into the mound will meet the intent of land disposal and leachate requirements specified in the Ontario Environmental Protection Act, Regulation 347. This is a requirement of the WAC [2].	Accepted

Federal / Provincial Department	Reference Number	Old Reference	Report Section	Reviewer Comment	2019 CNL Dispositions	Accepted/Rejected
				While PCBs are not identified as a constituent of potential concern by Golder and the Treatment Target for PCBs is equal to the PWQO (0.001 µg/L) (in most cases, this is equal to laboratory detection limits), the potential for discharge of PCBs and/or remobilization of PCBs from existing deposits is a concern (as noted above, effluent limits are not provided and may differ from Treatment Targets). PCB's are considered a hazardous substance by the Province of Ontario. Provincial policy is to prevent the release of PCBs. It should be confirmed that the effluent limit for PCBs will be less than or equal to the laboratory detection limit (i.e., non-detect) for effluent from the WWTP. Given the factors that may exacerbate the release and/or re-suspension of PCBs from contaminated areas within the receiving waterbodies (discussed above), the BV of 189 µg/L (>10,000-times the APV for PCBs) is a concern.	The WAC [2] includes the requirement that no PCB contaminated wastes are accepted in the NSDF. Specifically, materials containing PCBs at a concentration equal to or greater than fifty parts per million by weight whether the material is liquid or not, and materials containing PCBs at concentrations less than 50 parts per million by weight that are leachate toxic waste are not permitted for disposal in the NSDF. Because PCBs will only be present in trace amounts, with no source in the waste inventory, they were not carried forward for analysis in the surface water quality assessment (Section 5.4.2.6.1.4 of revised EIS). With regards to effluent limits for PCB's, effluent discharge limits will be accepted by CNSC once the facility begins operation. The effluent discharge target proposed for PCB's is the Provincial Water Quality Objective (0.001 µg/L) (See Table 3.4.2-3 of the EIS). Reference [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November. [2] Near Surface Disposal Facility Waste Acceptance Criteria, 232-508600-WAC-003, Revision 0, 2019 September.	
MOECC	FC-255	CNL-ND453	Section 5.4.2.5 Environmental Effects – Surface Water Environment	Uranium is known to occur at high concentration both within receiving waterbodies (ESW and PL2) and elsewhere on the CRL property, associated with contaminant plumes from legacy sources (discussed above). As with Mercury, it does not appear that Uranium (as a non-radiological parameter) has been assessed with respect to the anticipated concentration in wastewater, nor is a Treatment Target for Uranium provided. Clarification should be provided with respect to the anticipated concentrations of parameters in wastewater that are known to occur at high concentrations on the CRL site, as reported by Golder (Section 5.4.2.5).	The uranium values in the 2015 Environmental Monitoring Report and transcribed to Appendix 5.4-2 were incorrect. Uranium concentrations in Perch Lake in 2015 were well below the CWQG and also below the detection limit of 0.08 µg/L. Appendix 5.4-2 has been removed from the EIS. Updated baseline uranium concentrations are provided in Table 5.4.2-5 of revised EIS and [1]. CNL notes that this table also includes mercury. Uranium as a non-radiological parameter has been included in the surface water quality assessment of the revised EIS [1]. The Ontario Provincial Water Quality objective of 5 µg/L is used an Effluent Discharge Target [1]. Uranium isotopes are included as radiological constituents (Table 3.4.2-2 of revised EIS). With regards to parameters in wastewater that are known to occur at high concentrations on the CRL site. Screening criteria for inclusion of parameters in the surface water assessment included high background concentrations (Section 5.4.2.6.1.4). These parameters included barium, copper, lead, selenium, and silver.	Accepted

Federal / Provincial Department	Reference Number	Old Reference	Report Section	Reviewer Comment	2019 CNL Dispositions	Accepted/Rejected
					References [1] Surface Water Quality Assessment for the Near Surface Disposal Facility, 232-03710-REPT-007, Revision 0, 2019 November. [2] Near Surface Disposal Facility Effluent Discharge Targets, 232-106499-REPT-002, Revision 0, 2019 October.	
MOECC	FC-256	CNL-ND454	5.4 Environmental Effects – Surface Water Environment	The potential for thermal impacts is not addressed within the Environmental Impact Statement. Thermal impacts may occur through the discharge of relatively warmer water (i.e., water stored in SWMP) to cold water streams. The nature of receiving streams with respect to thermal habitat should be confirmed, given that groundwater discharge to the streams/creeks on site is known to occur.	The EIS has been revised to assess thermal effects from discharge of treated effluent to Perch Lake (Section 5.4.2.5.2). The surface water management ponds discharges are to the adjacent wetlands and will be dispersed by level spreaders to achieve even flow distribution (Section 3.4.4.5.5). There are no direct discharges from the surface water management ponds to fish habitat.	Accepted
MOECC	FC-257	CNL-ND582	Section 5.5.6 Monitoring and Follow up program	Limited details have been provided regarding the proposed groundwater monitoring program. A suitable groundwater monitoring program should contain monitoring locations in upgradient and downgradient areas in all relevant geological sequences, and should include the analysis of all relevant radiological and non-radiological leachate parameters.	An EA Follow-Up Monitoring program is under development for the NSDF Project. Section 5.3.2.8 outlines the proposed monitoring and follow-up for groundwater. Table 11.0-1 also summarizes the conceptual monitoring program for the EA Follow-Up program for the NSDF Project, including groundwater monitoring. The conceptual monitoring program will be developed into detailed monitoring and follow-up programs as the project progresses through the environmental assessment process, which may influence the nature, frequency and locations of monitoring. Groundwater monitoring for the NSDF will be compliant with the new CSA N288.7-15 Standard for Groundwater Protection at Nuclear Facilities. Monitoring parameters, sampling frequency and locations will meet the requirements of the new CSA Standard. CNSC, as the regulatory authority for the project, will coordinate the review of the follow-up monitoring program with other interested Federal and Provincial agencies. Input from the public and Indigenous people will also be considered.	Accepted

Table 2: *CNL Responses to Federal-Provincial Information Requests based on the Revised Environmental Impact Statement (EIS) for the proposed Near Surface Disposal Facility (NSDF) Project*, 232-509220-055-000, Revision 1, 2020 December.

CNL Responses to Federal-Provincial Information Requests based on the Revised Environmental Impact Statement (EIS) for the proposed Near Surface Disposal Facility (NSDF) Project

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
CNSC-2-01	FC-2 FC-3	Section 10.3	**Agency Information Request - Change to an Environmental Component due to Radiological Contaminants** ***Question:*** CNL should either: a) Provide a rationale for choosing a design basis earthquake (DBE) with a significant probability of exceedance for the selected assessment time frame. In providing that rationale, CNL should take into consideration the impact to human health and the environment should a more severe event occur. Effects of a more severe earthquake has been bounded in disruptive event scenarios (e.g., enhanced erosion, damage to berm) or in defense-in-depth scenarios (series of landslides). However, the normal evolution scenario should be revisited, by including liner, cover and berm failure due earthquakes more severe than the DBE. Or b) Define a different DBE with a lower probability of occurrence, and revisit the stability, seismic and liquefaction analyses of the ECM system, and modify its design if the need arises. ***Context:*** CNSC staff's original Information Requests (IRs), FC-02 and FC-03, are with respect to seismicity and its effects on the containment and isolation capability of the engineered containment mound (ECM), for the protection of human health and the environment. Seismic activity can affect the structural integrity of the berm, liner and cover systems. It can also result in liquefaction of the underlying sand overburden, resulting in foundation failure and loss of containment. ***Rationale:*** Section 10.3 of the revised EIS indicates that the ECM and its components were designed to withstand a 10,000 year earthquake, which is selected as the DBE. Furthermore, liquefaction analysis shows that under the DBE, saturated sands may liquefy, and Canadian Nuclear Laboratories (CNL) proposes to remove and replace that liquefiable materials with compacted fill. The Post-Closure Safety Assessment (PostSA, 3rd iteration to Near Surface Disposal Facility Project, 232-509240-ASD-004, 4.1.1) of the proposed NSDF defines an assessment time frame of 10,000 years. The chosen DBE has an annual probability of exceedance of 1/10000, which results in a probability of exceedance of 63% in 10,000 years (1-[1-1/10000]10000). This probability of exceedance is significant. However, in the normal evolution scenario for the PostSA (revised EIS subsections 5.7.6.1.1.2; 5.8.6.1.2.2) it is assumed that the cover and liner gradually degrade and the berm will remain fully functional. The PostSA also states that in the normal evolution scenario: *"Within the 10,000 year assessment timeframe, seismic activity is not expected to affect the safety function of the cover, liner and berm".* **CNL Response** CNL recognizes responses to CNSC staff's original Information Requests (IRs) FC-2 and FC-3 have introduced some confusion between the two time periods of "design life" of the ECM and the "assessment timeframe" of the Engineered Containment Mound (ECM). CNL would like to provide the following clarification: - From the International Atomic Energy Agency (IAEA) Safety Glossary [1], the design life is the period of time during which a facility or component is expected to perform according to the technical specifications to which it was produced. For the NSDF ECM the design life is 550 years. - From REGDOC 2.11 [2], "The assessment of future impacts of radioactive waste on the health and safety of persons and the environment encompasses the period of time during which the maximum impact is predicted to occur." The period of time during which the maximum impact is predicted to occur is referred to as the assessment timeframe and for the NSDF CNL is proposing an assessment timeframe of 10,000 years. The assessment timeframe is also expected to encompass the design life of the facility; thus, it also contemplates beyond design basis events. Within the Post-closure Safety Assessment, CNL demonstrates that there are no impacts to human health and the environment if more severe events than a design basis seismic event were to occur. Although the Post-closure Safety Assessment is still under	EIS	Section 10.3 (Seismic Events)	Removal of text.	Accepted

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			technical assessment by CNSC staff as part of the licensing application, the Post-closure Safety Assessment is a bounding safety assessment adequately supporting the EIS. CNL provides the following revised responses on the original CNSC staff IRs: FC-2 Revised Response: This comment is addressed in Section 10.3 of 2019 revised EIS. CNL has conservatively chosen a 1 in 10,000 year earthquake as the Design Basis Earthquake (DBE) for the ECM for the ECM's 550 year design life. This is the earthquake in the CSA N289.1 [3] standard that is to be applied to the design of a nuclear power plant. The adoption of this size of earthquake is considered conservative because the inventory of radioactive material in the NSDF is significantly less than the radioactive inventory of a nuclear power plant; thus, the consequence of exceeding the DBE at the NSDF site during the 550 year design life is much less than the consequence of exceeding a DBE at an operating power reactor if the safety and containment systems do not mitigate the event as designed. The DBE is commensurate with the design life and the risk associated with the ECM. An analysis of liquefaction potential was completed and indicated that the DBE may cause liquefaction in the saturated native sand to silty sand soils underlying the ECM perimeter berm resulting in unacceptable vertical and horizontal displacements. Based on this, CNL has added additional mitigation to limit the potential for liquefaction. CNL notes that the engineered solution for liquefaction mitigation removes and replaces the liquefiable soils with compacted engineered fill. This ensures that the ECM maintains containment in the event of a DBE. Further details on Soil Liquefaction and Liquefaction Mitigation can be found in Section 2.3.1.8.2 of the NSDF Design Description [4]. FC-3 - Revised Response This comment is addressed in Section 10.3 of 2019 revised EIS. Seismic design of the ECM is in accordance with CSA Group (CSA) Standard N289.1 [3]. A 10,000-year frequency of occurrence for the DBE is used. This is the earthquake in the CSA N289.1 [3] standard that is to be applied to the design of a nuclear power plant. The adoption of this size of earthquake is considered conservative because the inventory of radioactive material in the NSDF is significantly less than the radioactive inventory of a nuclear power plant; thus, the consequence of exceeding the DBE at the NSDF site during the 550 year design life is much less than the consequence of exceeding a DBE at an operating power reactor if the safety and containment systems do not mitigate the event as designed. The DBE is commensurate with the design life and the risk associated with the ECM. The other NSDF structures (e.g., WWTP) have an approximate design life of 55 years and the seismic design is in accordance with the National Building Code of Canada ([5]). These structures are considered of "high importance" for purposes of NBCC [5], resulting in a 2,475 year frequency of occurrence for the DBE commensurate with the design life and the risk associated with these structures. ***Changes to the EIS:*** The following modifications (~~strikethroughs~~ indicate text to be removed) will be made to the Final EIS to incorporate the information above: **Section 10.3** "The design of buildings and other conventional structures for the NSDF Project was based on a NBCC [5]) design basis earthquake ~~associated~~ with a ~~2% probability of exceedance in 50 years (~~2,475-year frequency of occurrence~~)~~. However, the seismic design of the ECM was based on a design basis earthquake ~~associated~~ with a ~~0.5% probability of exceedance in 50 years (~~10,000-year frequency of occurrence~~)~~ as defined by Canadian Standards Association Standard N289.1-18[3]." ***References:*** [1] IAEA (International Atomic Energy Agency) Safety Glossary, 2018 Edition. Available at: https://www.iaea.org/publications/11098/iaea-safety-glossary-2018-edition [2] CNSC. 2018. REGDOC 2.11, Framework for Radioactive Waste Management and Decommissioning in Canada. Available at: http://nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc2-11/index.cfm				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			[3] CSA Group (Canadian Standards Association Group). 2018. CSA N289.1-18: General Requirements for Seismic Design and Qualification of Nuclear Power Plants”. [4] AECOM (AECOM Canada Ltd.). 2019. Design Description. Canadian Nuclear Laboratories Document No. 232-503212-DD-001, Revision 1. 2019 May. [5] NRCC (National Research Council Canada). 2015. National Building Code of Canada 2015. NRCC 56190. Available at: https://nrc.canada.ca/en/certifications-evaluations-standards/codes-canada/codes-canada-publications/national-building-code-canada-2015				
CNSC-2-02	FC-06	Section 2.5 (Alternative	**Agency Information Request - Change to an environmental component due to hazardous contaminants**	**EIS**	New Sections 2.5.2.1 (Ongoing	Additional information.	

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
		Means for Carrying Out the Project)	***Question:*** CNL is requested to provide a narrative that clearly describes how the ECM will substantively reduce the long-term environmental risks to the CNL site and the Ottawa River compared to decommissioning each waste area in situ. CNL is also requested to identify and describe any alternative means that were considered, but determined not to be technically and economically feasible, and the rationale as to why they were determined not to be feasible should be documented in this section. ***Context:*** CNSC staff's original IR (FC-06) remains only partially addressed. Section 2.1.3 of the 2019 revised EIS indicates that an above ground waste facility with engineering barriers is an improvement on the current state of legacy waste at the sites. However, the nitrate pit, the ACS pit, the thorium pit, the bulk storage, and the waste management areas (WMAs) B to H will not be transferred into the NSDF and will remain sources of contamination. ***Rationale:*** As requested in the original IR (FC-06), CNL was requested to provide a narrative that clearly describes how the ECM will significantly reduce the environmental risks at the CNL site compared to implementing engineering covers on each WMAs to limit the releases to the environment. In addition, this section of the EIS is silent on whether other alternative means were considered but determined not to be technically and economically feasible, for example, the status quo option. Any alternative means that were considered, but determined not to be technically and economically feasible, should be identified and described, and the rationale as to why they were determined not to be feasible should be documented in this section. Please identify whether any other options were considered, particularly those that may have been suggested by stakeholders and the public, and provide a rationale as to why they were determined not to be feasible. **CNL Response** CNL would like to clarify that while NSDF is a key enabling facility to the clean-up of the CRL site, the determination of which WMAs will undergo full remediation (i.e., waste excavated and transferred into NSDF) has not been made. Thus, wastes within the WMAs referred to in the request may be transferred into NSDF. The remediation process, which includes an activity to determine remedial alternatives and select a remedial approach, is captured in CNL's Decommissioning and Demolition Program Description Document [1]. In the alternatives evaluation for a specific WMA, a range of alternatives from full remediation to in-situ management through implementation of an engineered cover will be evaluated. This alternatives evaluation would need to demonstrate the preferred remedial approach could satisfy all regulatory and licensing requirements including those specified within REGDOC-2.11.1 Volume III (Assessing the Long-Term Safety of Radioactive Waste Management) [2]. As per the most recent revision of the Comprehensive Decommissioning Plan (CPDP), the large-scale remediation projects, including the WMAs and impacted areas on the CRL site, are intended to be been brought forward to align with the proposed availability of NSDF [3]. For example the conceptual schedule for the remediation of several WMAs currently impacting groundwater quality on the CRL site (i.e., WMA A, the Liquid Dispersal Area and WMA B sand trenches) have been advanced as much as 10 to15 years from the previous version and strategy. These historic WMAs have minimal to no engineered barriers to contain the inventory. Although the releases and groundwater impact from these WMAs is currently being managed, the risk of future releases and environmental impacts the inventory poses could be substantially reduced through improved containment and isolation of the source term. NSDF is a purpose built disposal facility wherein the engineered containment mound design life of 550 years has been established to meet the required time period to allow for radiologic decay of the waste inventory. As noted in Section 2.3 of the 2019 revised EIS, continuing to build additional temporary storage systems at the CRL site for LLW is not consistent with modern waste management principles. In accordance with *Canada's Radioactive Waste Policy Framework* (Government of		Waste Storage), 2.5.2.4 (Very Low Level Waste Disposal Facility) and 2.5.3.3 (Shallow Cavern)		
				EIS	Sections 2.5.2.3 (Geologic Waste Management Facility) and 3.3.1 (Waste Types, Volumes and Inventory)	Additional information or clarification	

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			Canada 2015), the waste producers and owners of radioactive waste are responsible for the funding, organization, management and operation of disposal facilities required for their wastes. As such CNL does not consider the current status quo as technically feasible as it is not aligned with national policies. Other options that have been suggested by the public and stakeholders that were determined not to be technically or economically feasible include: • Shallow cavern or intermediate-depth cavern, • A separate VLLW facility, • Several options corresponding to ongoing waste storage (or status quo) such as: o Rolling stewardship/monitored retrievable storage, o The use of bunkers and storage buildings, o “Do nothing” scenario. ***Changes to EIS:*** The following modifications (additions in red and text removals ~~strikethrough~~) will be made to the Final EIS to incorporate the information above: **New EIS Section 2.5.2.1:** ***2.5.2.1 Ongoing Waste Storage*** **2.5.2.2.1 Technical Feasibility** When developing the NSDF Project, CNL also considered maintaining the status quo which would involve the continued use of ongoing or interim waste storage. This could involve the existing configuration of the CRL waste management areas which includes the use of bunkers and storage buildings as well as rolling stewardship or monitored retrievable storage. However, as noted in Section 2.3 of the EIS, continuing to build additional temporary storage systems at the CRL site for LLW is not consistent with modern waste management principles. In accordance with *Canada’s Radioactive Waste Policy Framework* (Government of Canada 2015), the waste producers and owners of radioactive waste are responsible for the funding, organization, management and operation of disposal facilities required for their wastes. As such CNL does not consider the ongoing waste storage as technically feasible as it is not aligned with national policies. Furthermore, the historic WMAs have minimal to no engineered barriers to contain their inventory. Although the releases and groundwater impact from these WMAs is currently being managed, the risk of future releases and environmental impacts the inventory poses could be substantially reduced through improved containment and isolation of the source term. Leaving the historic WMAs in their current configuration as an alternative to LLW disposal is not technically feasible as it is unlikely to satisfy regulatory and licensing requirements for long-term waste management, specifically those specified within REGDOC-2.11.1 Volume III (Assessing the Long-Term Safety of Radioactive Waste Management) [2]. **EIS Section 2.5.2.3 (formerly Section 2.5.2.2 in the 2019 revised EIS):** A GWMF provides an alternative to the NSDF Project as proposed (CNL 2016a). GWMFs are designed for the long-term management of LLW, ILW and HLW. Wastes are processed and packaged for disposal in intermediate to deep underground repositories in stable geological formations **New EIS Section 2.5.2.4:** ***2.5.2.4 Very Low Level Waste Disposal Facility*** **2.5.2.4.1 Technical Feasibility** Very-low-level waste is a considered a subcategory of LLW as per CSA standard for the nuclear industry N292.0-19 General Principles for the Management of Radioactive Waste and Irradiated Fuel. CNL previously considered the development of a VLLW disposal facility at the CRL site and implemented a trial to demonstrate the viability of segregation and storage of VLLW [4]. The trial demonstrated that the fraction of the total LLW that could be segregated as VLLW was disproportionate to the time, effort and storage requirements that were expended to realize any net benefit from the work. In addition, the LLW with higher activity that is segregated from the VLLW will still require a separate LLW disposal facility. Therefore, the development of a VLLW disposal facility does not meet the Project purpose which recognizes the need for a LLW disposal facility and a VLLW disposal facility is not considered technically feasible.				

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			2.5.2.4.2 Economic Feasibility The planned cost of developing a VLLW disposal facility is expected to be similar to the cost of developing a LLW disposal facility (i.e., the current NSDF Project); however, a VLLW disposal facility would require additional time and effort to segregate and manage the VLLW from the rest of the LLW [4]. The development of a LLW disposal facility (inclusive of VLLW) would eliminate duplication of effort, time, dose and facility construction, operation and closure costs and would enable reduction of Canada's liabilities earlier than it would have if a small percentage of the total inventory had been segregated and disposed separately. Therefore, the development of a separate VLLW disposal facility is not considered economically feasibility when compared to the cost savings associated with the development of a LLW facility that is inclusive of VLLW. **New EIS Section 2.5.3.3:** ***2.5.3.3 Shallow Cavern*** **2.5.3.3.1 Technical Feasibility** Another type of NSDF includes the disposal of LLW in shallow caverns. However IAEA guidance [5] recognizes that in the siting process of a near surface disposal facility, the facility design ought to consider the hydrogeological characteristics of the siting location. The groundwater table at the host site should be deep, well below the base of the cavern, to ensure that the cavern does not flood and release radionuclides to the environment. As such shallow caverns were eliminated from consideration for CNL's LLW facility design primary due to the CRL site characteristics. In the Site Study Area, average groundwater depths range from 0.06 meters below ground surface (mbgs) to 15.95 mbgs, with an average of 4.81 mbgs under normal conditions, and 3.61 mbgs during seasonal high conditions (5.3.2.1.2.1). Near-surface caverns constructed in, or near the water table, are at a very high risk of immediate flooding, and are therefore not appropriate or technically feasible for the disposal of radioactive waste. Furthermore, no single cavern could be excavated to meet the volume of 1,000,000 m^3, resulting in multiple caverns and multiple designs to suit the localized hydrogeology. Wastes placed into shallow caverns on the CRL site are more likely to come into contact with groundwater very quickly, providing a very short flow path for the migration of radionuclides into the environment. Thus, the shallow cavern facility design at the CRL site does not align with IAEA guidance [5], and is therefore not suitable or technically feasible. **EIS Section 3.3.1:** A large portion of the waste inventory planned for disposal in the ECM will come from waste stored temporarily in the CRL waste management areas (WMA). However, the determination of which WMAs will undergo full remediation (i.e., waste excavated and transferred into the NSDF Project) has not been made. The remediation process, which includes an activity to determine remedial alternatives and select a remedial approach, is captured in CNL's Decommissioning and Demolition Program Description Document [1]. In the alternatives evaluation for a specific WMA, a range of alternatives from full remediation to in-situ management through implementation of an engineered cover will be evaluated. This alternatives evaluation would need to demonstrate the preferred remedial approach could satisfy all regulatory and licensing requirements including those specified within REGDOC-2.11.1 Volume III (Assessing the Long-Term Safety of Radioactive Waste Management) [2]. As per the most recent revision of the Comprehensive Decommissioning Plan (CPDP), the large-scale remediation projects, including the WMAs and impacted areas on the CRL site, are intended to be been brought forward to align with the proposed availability of the NSDF Project. For example, the conceptual schedule for the remediation of several WMAs currently impacting groundwater quality on the CRL site (i.e., WMA A, the Liquid Dispersal Area and WMA B sand trenches) have been advanced as much as 10 to 15 years from the previous version and strategy. These historic WMAs have none to minimal engineered barriers to contain the inventory. Although the releases and groundwater impact from these WMAs is currently being managed, the risk of future releases and environmental impacts the inventory poses could be substantially reduced through improved containment and isolation of the source term. The NSDF Project is a purpose built disposal facility wherein the ECM design life of 550 years has been established to meet the required time period to allow for radiologic decay of the waste inventory. ***References:***				

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				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			[1] Decommissioning and Demolition Program Description Document. Canadian Nuclear Laboratories Document No. 900-508300-PDD-001, Revision 1. 2018 November. [2] CNSC. 2018. REGDOC-2.11.1, Waste Management, Volume III: Assessing the Long-Term Safety of Radioactive Waste Management. 2018 May. Available at: http://nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc2-11-1-v3/index.cfm) [3] Comprehensive Preliminary Decommissioning Plan, Canadian Nuclear Laboratories Document No. CPDP-508300-PDP-001, Revision 4. 2018 March. [4] Critical Review of the Canadian Nuclear Laboratories Very Low Level Waste Strategy, Canadian Nuclear Laboratories Document No. 225-508600-021-000, Revision 0. 2016 September. [5] IAEA. 2014. Near Surface Disposal Facilities for Radioactive Waste. Specific Safety Guide SSG-29. Vienna AT: International Atomic Energy Agency. Accessed July 2017. ISBN: 978-92-0-114313-6. Available at: http://www-pub.iaea.org/books/iaeabooks/10567/Near-Surface-Disposal-Facilities-for-RadioactiveWaste-Specific-Safety-Guide				
CNSC-2-03	FC-27	Section 3.7 (Section 3.4.4.55 and 3.4.2 in the 2019 revised EIS)	**Agency Information Request - 100 year storm & probability of exceedance** ***Question:*** CNSC staff reiterate that the 100-year design storm is too low. CNL is requested to address the concern by selecting a design storm with a higher return period and a corresponding contingency plan to address exceeding storm events. 1. When selecting the proper design storm for the operation and closure phase, CNSC staff expect CNL to take into consideration: (a) The *US NRC NUREG-2175, Guidance for Conducting Technical Analyses for 10 CFR Part 61* which states: "*Because of the risks associated with the flooding and/or release of low-level wastes during the period of vulnerability when wastes may not be covered or protected, the staff concludes that the probable maximum flood (PMF) and the probable maximum precipitation (PMP) provide acceptable bases for the design of flood protection features. Although use of the PMF is clearly acceptable for the operational design of low-level waste facilities, its use is not required. On a case-by-case basis, the staff will review site designs that are based on floods less than a PMF. The acceptability of using such floods must be documented by the applicant. The analyses must conclusively document the integrity of the site, particularly in light of the uncertainties associated with the magnitude and occurrence of rare floods.*" (b) The design storm should be selected such that the exceedance probability is reasonably low throughout the operational and closure period. The exceedance probability, or the probability of an event larger than the design event with a return period of "T" happening at least once during the design period (operation and closure) "L" can be calculated by: P=1-(1-1/T)^L See reference, e.g., http://stream1.cmatc.cn/pub/comet/HydrologyFlooding/flood/comet/hydro/basic/FloodFrequency/print_version/02-statistical_rep.htm For L=80 years: P=1-(1-1/T)^80 T(Years) P(%) 100 63.4 200 39.4 500 18.1 1000 9.5 10000 1.0 2. CNSC staff expect that the contingency plan on flooding should be developed based on the selected design storm to manage excessive water and sediment caused by storms higher than the design storm. The lower the return period of the design storm, the higher demand is needed in the contingency plan. ***Context:***	EIS	Section 10.1.2 (Extreme Rainfall Events, Snowmelts and Flooding)	Additional clarification or information	Accepted

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			CNSC staff's original IR (FC-27) was that the 100 year design storm for surface water management, e.g., the stormwater management ponds, is too low since the probability of having at least one exceedance in 50 years is over 40%. CNL's revised EIS remains unchanged on the design storm part. CNSC staff consider CNL's response inadequate. ***Rationale:*** CNL's response to CNSC staff's original IR is as follows: "*The management of surface water runoff from the ECM [engineered containment mound] has both a contact and non-contact component: design of the contact component uses runoff volumes to address wastewater treatment plant (WWTP) requirements and uses back-to back 100-year storm events as the design criteria; the non-contact component uses peak flows from the 100-year+ climate change event to address runoff from the ECM cover in down-chute design and runoff volumes from the 100-year event to address storage and pumping requirements within the ECM for those areas not covered (section 3.2 of Surface Water Management Plan [1]). The ditches can convey the 100-year + climate change flow and for most cases they can also convey the probable maximum precipitation design flow (section 7.3.1 of [1]*]." The response and revised EIS still do not address CNSC staff's concern on using the 100-year storm as the design storm, for the following reasons: 1. Considering the very high probability (over 40%) of storm events exceeding a 100-year storm over 50 years of operation and an even higher probability if the closure period is included, the heavier storms may occur often which means that the contingency plan will be triggered frequently to handle excessive water. Moreover, there is no discussion on how to deal with excessive water caused by heavy rains in the contingency plan. 2. For the non-contact water storage and pumping requirements, there is no discussion of potential structure damage to be caused by higher than 100-year storms. CNL does not specify the maximum storm event the facilities such as the stormwater management ponds, can handle before overflow or structure failure would occur. 3. For contact water management, there is no discussion of potential structure damage or release of contaminants into the environment to be caused by higher than 100-year storms. In addition to the concern on low design storm criterion, the calculation of capacity based on one storm event needs more consideration. While the leachate amount is directly related to the storm, it also depends on the filtration rates and pre-existing water content conditions in the waste cells and there is a time delay from the time of the storm and the peak of the leachate rate. A more appropriate method is to calculate the capacity based on hydrological process modeling of the water budget over a long time period, usually by Monto Carlo simulation of precipitation, evaporation, etc. 4. CNL does not discuss quantitatively the sediment issues. CNL does not assess the potential heavy erosion of the cover and berm under extreme storms. The report, *'What-If' Hazard Analysis For The Near Surface Disposal Facility 232-508770-Ha-001, Revision 0,* indicates "No consequence identified" for "Ground subsidence and erosion". The consequences of flooding due to heavy precipitation, snow melt, etc., is "Potential delay in operations. No release to the environment". 5. The low design storm would mean very limited capacities of the stormwater ponds to catch sediments resulting from heavy storms eroding the ECM. In *US NRC NUREG-1200, Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility*, it states that: "*The NRC staff expects erosive processes (fluvial and eolian) to be the most likely of all of the disruptive processes to impact the long-term stability of most disposal facilities. Therefore, the NRC staff recommends licensees develop robust erosion control designs using durable materials, as discussed in section 5.3. Robust erosion control designs are usually developed based on the consideration of low-probability events, such as the PMP and corresponding PMF (NRC, 2002b).*" --- **CNL Response** Different design scenarios were used collectively for the NSDF storm management system to evaluate how it meets design requirements such as quality control, quantity control and structural integrity [1] [2]. In order to meet different requirements that ensure the safety and integrity of the facility, the design inputs and assumptions used in the features of the surface water management plan were not modelled using any single storm event (i.e., 100-year storm). Instead, a number of design storm				

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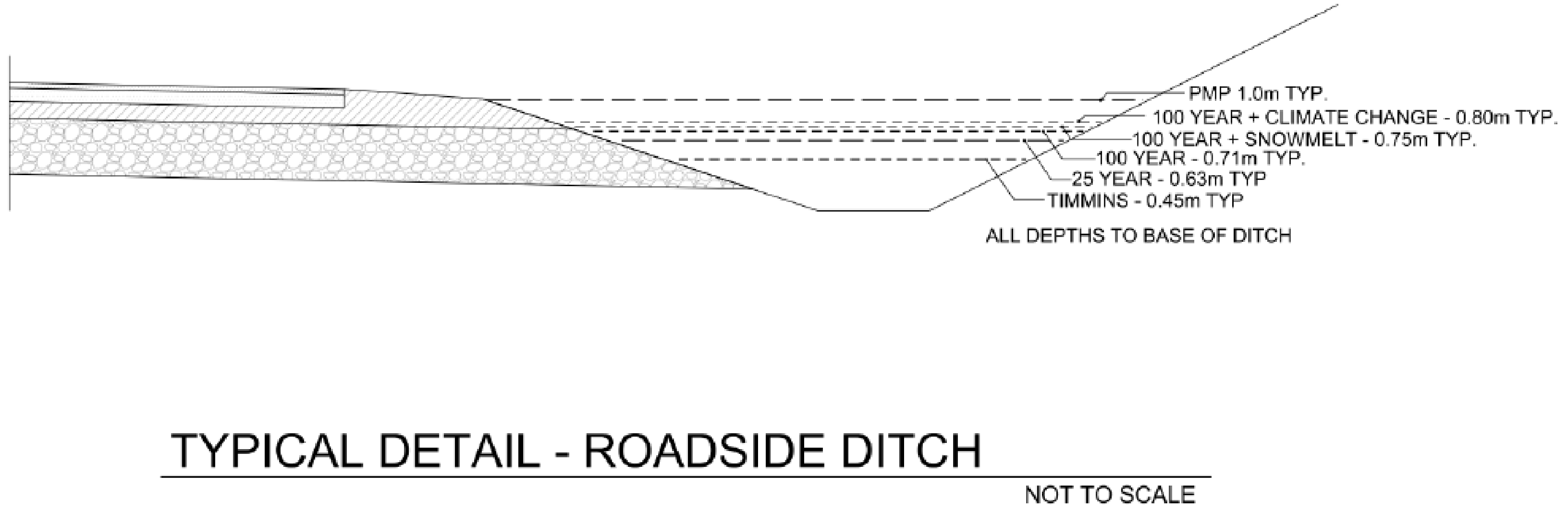
			scenarios along with the 100-year storm have been considered in the designs of NSDF surface water management features including: - peak flows for several return periods from 2-year up to 100-year storm events; - regional storms (i.e., Timmins Storm); - peak averages; and - Probable Maximum Precipitation (PMP) events. An example of varying water levels from different design storms expected in a typical roadside ditch is shown in Figure 1:  *Figure 1: Typical Roadside Ditch Cross Section showing water depths during different Design Storm Events* Based on Canadian safety guidelines relevant to the operation of NSDF and the Chalk River Laboratories (CRL) site, all NSDF water collection and conveyance systems (including the final cover) are designed to resist erosion, safely convey flows, and maintain structural integrity during design scenarios up to a PMP storm event (Section 3.4.4.5 in the 2019 revised EIS). The use of a PMP for the NSDF Project can arguably provide a scenario with a greater return period than a 100-year storm based on its definition [3]: "*There is a finite limit on the atmosphere's ability to produce rain at any given location due to climate, topography and atmospheric moisture limits. The concept of a finite limit for precipitation from a single storm event is called the Probable Maximum Precipitation (PMP). The exceedance probability of the PMP by its nature is almost zero (i.e., it is an improbable event). In practice, the PMP exceedance probability and estimated return periods are in the range of 1 in 10,000 years to 1 in 1,000,000 years.*" A recent study that incorporated a detailed Probable Maximum Precipitation (PMP) review [3] identified the draft Ministry of Natural Resources (MNR) 2006 PMP event (24-hour, 596 mm) as the most appropriate PMP event for Ontario. While this approach would be appropriate for the NSDF Project design [1] [2], the 12-hour 570 mm PMP event was selected for the NSDF site assessment because it produces a peak flow which is 12% higher than the 24-hour distribution. In doing so, a conservative design analysis was used to evaluate the safety of the NSDF surface water management system.				

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			The contact water and non-contact water ponds within the Engineered Containment Mound (ECM) (internal ponds) are designed to contain runoff, with remaining freeboard, resulting from back-to-back 100-year events superimposed on top of maximum monthly rainfall and snowmelt. The volume of precipitation generated from this scenario is considerably larger than that estimated from a 100-year storm with additional flow volume due to climate change projections (approximately 25% increase). The pumps and equalization tanks of the wastewater treatment plant (WWTP) – which handle treatment of contact water – have excess capacity to convey and store a greater volume of water than that generated from two back-to-back 100-year storm events. These features of the WWTP enable the contact water ponds to be emptied so that they are available to collect additional run-off from subsequent storm events. The ponds within the ECM are expected to overflow during larger events (such as a PMP storm); however, all of the water which falls into the ECM will be contained within the ECM by the berm during the event. The berm ultimately prevents contact water (precipitation that has come into contact with waste which have yet to be treated by the WWTP) to be released into the environment. In the event that the contact water ponds do overflow, there is a possibility that contact water will mix with non-contact water in the ECM as well. When water level indicators show possible overtopping in the contact water pond within the ECM, non-contact water pumps will be shut off until all water contained within the ECM can be treated by the WWTP. This emergency mitigation measure prevents any potentially contaminated water within the ECM to overflow and be released into the surrounding environment during an extreme precipitation event. All contact water within the ECM is treated at the WWTP which is designed to meet requirements established by the Ontario Ministry of Environment and Climate Change (MOECC) in order to limit hazardous constituents in effluent to ultimately protect the receiving watercourses/waterbodies. Outside of the ECM, the three surface water management ponds (SWMPs) and conveyance structures are expected to attenuate flows produced by extreme precipitation from 100-year storms (with snowmelt and climate change considered) and regional storms (i.e., Timmins Storm). The SWMPs are expected to weather extreme events and successfully attenuate flows throughout the NSDF construction, operation, and post-closure project phases under normal operations. During severe weather events, it is expected that flows will exceed the design capacity of some sewers and culverts. Should this occur, runoff water can still be safely contained and conveyed to the SWMPs by features such as ditches, road embankments and site topography. The influent flows during these severe events will cause water levels in the SWMPs to exceed the limit of their primary piped outfall structures. Should this occur, each pond has a secondary (concrete and rip-rap weir) outflow constructed into the sidewall that is designed to convey the flows generated from a PMP event, a scenario greater than a 100-year storm event. The Surface Water Management Plan [1] provides preliminary guidance on contingency measures required for the NSDF to remain robust during a hypothetical PMP storm event. The contingency plan will be developed to reflect the final construction and specific site operations as the NSDF is constructed. NSDF operational activities to mitigate heavy rainfall events are described in [4]. Since the PMP storm produces more extreme precipitation scenarios (i.e., accommodating a greater return period) than the 100-year storm as discussed above, the basis of the surface water management system incorporates conservative approaches to the safety and design of the NSDF. Water quality control of the SWMPs, primarily for solids settling, is based on more frequent, smaller storms (Section 3.4.4.5.1). The guideline for removal of solids/sediments in the SWMP from Ontario MOECC is determined by the permanent pool volume of the pond, the drainage area, and percent imperviousness of the catchment [5]. That is, the capacity of each SWMP to contain sediments due to erosion is not dependent on the particular size of a storm event. There is a point where additional solids settling becomes negligible with increasing pond volume; this must be balanced with environmental effects due to large volumes of stagnant water (such as high temperature or low oxygen concentrations). During extreme events (e.g., 100-year storms or PMP), the design basis of the ECM's barriers (e.g., berm) are sufficiently robust to contain large volumes of precipitation and mitigate massive structural erosion. In all, while the use of a 100-year storm as a single design input is too low, the use of different scenarios into the design assessment enable the features of the surface water management system to remain robust during hypothetical events more extreme than a 100-year storm (i.e., a PMP event). ***Changes to the EIS:*** The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: **EIS Section 10.1.2:**				

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			The NSDF Project uses different design criteria to size contact and non-contact surface water management systems. The different criteria reflect the different potential for significant environmental effects. For example, the contact water management and the non-contact water management systems are sized for the back-to-back, 24-hour, 100-year storm (the most rigourous criterion), because, this is a large volume of potentially contaminated water and would cause the most adverse effects if it was released to the environment. The NSDF water collection and conveyance systems are typically designed to resist erosion, safely convey flows and maintain structural integrity during peak flows generated from various design storms up to a PMP storm event. Major non-contact surface water systems (e.g., surface water management ponds and major conveyance systems) are designed for a single 100-year storm plus 25%, reflecting the lower level of environmental risk from high volumes of uncontaminated water. The design of the non-contact water ponds is consistent with the typical standard for surface water management pond design in Ontario and typically applies to all land development projects in the Province. Minor non-contact water systems (e.g. minor ditches and culverts) are designed for a 25-year storm, supplemented by overland flow routes for larger storm events, reflecting the lowest level of environmental risk from low volumes of uncontaminated water. During the Operations phase, the strategy for wastewater treatment of contact water (Section 3.4.2 Wastewater Treatment) is based on optimizing public and environment protection by defining an approach to wastewater treatment that uses best available technology that is economically achievable, and is capable of meeting or exceeding regulatory requirements. Another important design consideration is the maximum wastewater flow rate that must be received and processed by the wastewater treatment plant. The maximum flow rate was determined by evaluating the expected contact water volume that would be produced during two back-to-back 100-year, 24-hour storm events. Under these conditions, it is expected that a maximum of approximately 4,700 m^3 of contact water would be produced, and that this contact water would be removed from the ECM at a maximum rate of approximately 100 m^3/hr. This was selected as a worst-case design condition for determining the required volume of wastewater collection tanks. The contact water ponds are expected to overflow during events larger than a 100-year storm (such as a PMP storm), however all of the water which falls will be contained within the ECM berm during the event so that no contact storm water, that is storm water that has come into contact with waste, will escape into the surrounding environment. In the event that the contact water ponds do overflow, there is possibility that contact water will mix with non-contact water in the ECM. In order to avoid release of any potentially contaminated water outside of the ECM boundary during this scenario, when water levels suggest there is a possibility of overtopping in the contact water pond, the non-contact water pumps would be shut off or flows diverted back into the ECM until all of the contained water can be treated by the wastewater treatment plant. ***References:*** [1] AECOM (AECOM Canada Ltd.). 2019. Surface Water Management Plan. Canadian Nuclear Laboratories Document No.232-508600-PLA-002, Revision 1. 2019 February [2] AECOM (AECOM Canada Ltd.). 2019. Surface Water Modelling and Evaluation. Canadian Nuclear Laboratories Document No. B1551-503212-TN-001, Revision 1. 2019 January [3] amec (amec NSS Ltd.). 2011. OPG's Deep Geologic Repository for Low & Intermediate Level Waste – Maximum Flood Hazard Assessment. Available at: https://iaac-aeic.gc.ca/050/documents_staticpost/17520/49820/flood.pdf) [4] AECOM (AECOM Canada Ltd.). 2019. Operations and Maintenance Plan – Near Surface Disposal Facility, Canadian Nuclear Laboratories Document No. 232-508220-PLA-006, Revision 0. 2019 September. [5] MOE (Ontario Ministry of Environment). 2003. Stormwater Management Planning and Design Manual. March 2003. ISBN 0-7794-2969-9, PIBS 4329e. Queen's Printer for Ontario, 2003. Available at: https://www.ontario.ca/document/stormwater-management-planning-and-design-manual-0				
CNSC-2-04	FC-36 FC-38 FC-40 FC-149 FC-150 FC-152 FC-153 FC-154 FC-155 FC-158	Section 6	**Agency Information Request – Indigenous Physical and Cultural Heritage** ***Question:*** **A. FC-36 + FC-149 + FC-150 + FC-152 + FC-153 + FC-154 + FC-155 + FC-158** Provide a complete description of CNL's engagement with each of the First Nation and Métis groups identified in table 6.2.2-1 regarding potential impacts to Indigenous and/or treaty rights. This information must include what interests, concerns, and/or feedback were raised by each Indigenous group, as well as how CNL addressed these.	EIS IER	Section 6 (Indigenous Interests) Engagement Activities Tables (2015 October – 2020 June)	Revision of Section 6, including new Section 6.2.4 Revision of IER to include detailed engagement activities tables and Summary of	Accepted

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			- Examples of discussion topics include but are not limited to archeological sites and artifacts (FC-152), traditional use of land and resources (including trapping, hunting, gathering and fishing) (FC-149, FC-153), Pointe-au-Baptême (FC-154), environmental monitoring (FC-158). - Clarify if all the First Nation and Métis groups identified in table 6.2.2-1 were engaged on the topics listed above. - Provide details in the EIS and/or IER on which First Nation and Métis groups provided feedback through engagement to the end of December 2019. Include the additional information in the relevant sections of the EIS and IER. Alternatively, please clarify why the end of March or April 2019 is a cutoff time for information provided. **B. FC-38** Provide additional information on Indigenous engagement regarding valued components (VCs). - Clarify how the Indigenous VCs in table 6.3.2-1 were selected. - Clarify which First Nation and Métis groups provided input or feedback on the selection of Indigenous VCs listed in table 6.3.2-1. **C. FC-40** Provide additional information on the lifestyle survey referred to in section 6.6 of the revised EIS, including the following: - Methodology used to develop the survey to ensure it was representative of First Nation and Métis peoples. - Whether groups were consulted on the development and/or results of the survey; if not, provide a rationale. **D. Assumption statements FC-149 + FC-153** Clarify if assumptions made about Indigenous peoples, and included throughout sections 6.2 and 6.4 of the revised EIS have been validated through engagement activities with First Nation and Métis groups? If not, provide a rationale. ***Context:*** CNL states: "*The Indigenous Engagement Report [1] has been revised and is a Technical Supporting Document to the EIS. Section 4 of this report [1] provides further information on Indigenous engagement.*" Indigenous Engagement Report, Section 4.5 "Feedback Received" states: *"Indigenous interests are considered any interests that CNL is generally aware of or that have been expressed to CNL during engagement with identified Indigenous communities."* CNL also states: *"A new section 6 has been included in the revised EIS, to consolidate and summarize the major areas of assessment relevant to Indigenous peoples into one single section."* ***Rationale:*** There is very little detail included in the revised EIS and/or Indigenous Engagement Report (IER) on discussions had and feedback received from each Indigenous community and how this feedback was taken into consideration in the revised documents. As per the requirements/guidance in REGDOC-3.2.2, *Indigenous Engagement*, CNL should demonstrate that through its engagement activities it had discussions with all identified First Nation and Métis groups regarding potential impacts to Indigenous and/or treaty rights, as well as potential impacts as per the requirements of *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and has tracked and addressed any interests / concerns / feedback. This has not been demonstrated in the revised/new sections of the EIS or in the responses to CNSC staff original IRs FC-36, FC-38, FC-40, FC-149, FC-150, FC-152, FC-153, FC-154, FC-155, and FC-158. **Addendum A – CNSC-2-04**		Summary of Interests and Concerns Tables	Interests and Concerns tables	

			A. FC-36 + FC-149 + FC-150 + FC-152 + FC-153 + FC-154 + FC-155 + FC-158 These sections only provide high-level information. Section 6.2.4 only provides information regarding Algonquin's of Ontario (AOO) and Métis Nation of Ontario (MNO). Table 6.2.5-1 provides a list of topics of interest for MNO and Algonquin Anishinabeg Nation Tribal Council (AANTC), no concerns/issues are provided. There is also no information on how CNL addressed feedback and whether any feedback from Indigenous groups was incorporated in the EIS and/or IER and if so, where. Also to note that while AANTC is included in this table, there is little mention of AANTC in the rest of the EIS and/or IER (assessment, land use, Indigenous interests) etc. • Table 6.2.4 1 includes several meetings entitled "Environmental Stewardship Council Meeting" and a meeting entitled "Meeting with Clare Cattrysse and CNSC". Please provide more information and rationale on how these meetings are related to engagement with Indigenous communities on the proposed NSDF project. • In Section 4.5 of the IER, "Feedback Received" includes a definition of "Indigenous interest." Please define "generally aware". What due diligence was used to ensure CNL was aware of all potential Indigenous interests in the project area to ensure fulsome and accurate information was provided through the assessments on impacts to Indigenous interests? (To note this information is also included in Section 6.2 of the EIS) • Provide details in the EIS and/or IER on which First Nation and Métis groups provided feedback through "formal and informal consultation activities", what the feedback was and how it was addressed by CNL. • In section 6, where CNL describes the potential interactions of the NSDF Project with trapping, hunting, gathering and fishing activities, it does not provide information or validation that CNL has attempted to or gathered any details regarding traditional land use activities in close proximity to the CRL property directly from all identified First Nation and Métis groups. While it incorporated information received from the MNO TKLUS, it still uses assumptions in the text regarding land use by Métis citizens. It also does not provide any information on engagement activities with the seven (7) Williams Treaties First Nations and/or AANTC and/or its member First Nations. • (FC-150) CNSC staff noted in the previous IR that it "will be important for CNL to clarify in the final EIS if there is any active hunting or trapping in the adjacent PE025 and PE002 trap lines, as well as on adjacent private (patent) lands, specifically if they are being used by any of the identified Aboriginal groups." Section 6.4.4.1.2.1 only provides information regarding AOO and MNO. Table 6.2.2-1 identifies First Nation and Métis groups with potential interest in the project that are not included in the information provided in Section 6.4.4.1.1. Please clarify if all the First Nation and Métis groups identified in Table 6.2.2-1 were engaged on this topic. If so, please provide the details on this engagement, including what issues, concerns, and/or feedback raised by each Indigenous group, as well as how CNL addressed these. If not, please provide a rationale. • (FC 155) The information provided in the response on the engagement with Curve Lake First Nation cannot be located in the EIS and/IER. Provide a rationale as to why Section 6.4.1 only refers to Métis and Algonquin peoples. Please ensure the information provided on the engagement with Curve Lake First Nation is included in the EIS and/or IER. • A number of First Nation and Métis groups, including the AOO, Kitigan Zibi Anishinabeg Nation and the AANTC, have expressed an interest in being engaged in on-going monitoring activities for the NSDF Project and CRL site in general, especially as it relates to their traditional land use activities (e.g., fishing). The response and EIS and/IER only provide high-level information and no reference to which First Nation and Métis groups were involved in the discussions. • Section 6.4.6 states , "A couple of the Indigenous communities have indicated that they think their citizens have negative perceptions associated with harvesting near the CRL site which results in not using an area (KnowHistory2019)." The source quoted is the MNO IK study, this will only indicate concerns of Métis Nation citizens, despite the sentence stating, "a couple of the Indigenous communities…" Please clarify which communities this sentence refers to. • Provide more information in the EIS and/or IER on discussions had with and feedback provided by interested First Nation and Métis groups on environmental monitoring activities specific to the NSDF Project and the CRL site more generally is included in the final EIS. **B. FC-38** Section 6.3 Valued Components, identifies the AOO and MNO, however, does not include information in relation to engagement and feedback on valued components with the other First Nation and Métis groups identified with potential interest in the project as per list identified in Table 6.2.2-1, such as the 7 Williams Treaties First Nations and/or the Algonquin Anishinabeg Tribal Council and/or its member First Nations.				

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			• Please clarify if all First Nation and Métis groups identified in Table 6.2.2-1 were engaged on this topic. If so, please provide the details on this engagement, including what issues, concerns, and/or feedback raised by each Indigenous group, as well as how CNL addressed these. If not, please provide a rationale. • In addition to the MNO TKLUS study, what other methods of obtaining feedback and from which First Nation and Métis groups, influenced the identification of the "Indigenous VCS" that are capture in Table 6.3.2-1? • Please explain why this VC section does not include information in relation to engagement and feedback on valued components with all of the First Nation and Métis groups identified with potential interest in the project, including the 7 Williams Treaties First Nations and/or the Algonquin Anishinabeg Nation Tribal Council and/or its member First Nations. While the section does mention the Algonquin's of Ontario and the Métis Nation of Ontario, it does not provide detailed information on engagement and feedback on valued components with these groups. • Please clarify if the final list of NSDF VCs included in Table 6.3.2-1 were shared with the First Nation and Métis groups identified with potential interest in the project and what feedback was provided. If so? How was the feedback addressed by CNL? If not, please provide a rationale. • Please clarify which First Nation and Métis groups have conducted TKLUS, or plan to complete a TKLUS, and how that influenced (or potentially will influence) the identification of the "Indigenous VCS" that are captured in Table 6.3.2-1 and to support the NDSF project as stated by CNL in Section 6.3. **C. FC-40** It appears the survey did not take into account the lifestyles of First Nation and Métis peoples, as they did not engage with the First Nation or Métis groups within the area. This survey also assumes that First Nation and Métis peoples only obtain "local foods" from farmers market, local farms and/or grown on their own property. This does not take into consideration harvesting of traditional foods (hunting/fishing/gathering). CNL should ensure that First Nations and Métis populations are adequately represented in the Human Health Risk Assessment and that dose estimates reflect their consumption rate. • Please provide more detail on the methodology used to develop this survey. If First Nation and Métis lifestyles were to be a focus of the survey and conclusions, how did the methodology ensure that First Nation and Métis peoples would be accurately reflected? • Please provided more detail on the results of the lifestyle survey. Include information such as how many people identified as First Nations? How many people identified as Métis? How many people overall participated in the survey? What questions were used to ensure that First Nation and Métis lifestyles would be reflected accurately in the survey results? • Please clarify if the survey results and conclusions were shared with First Nation and Métis groups with interest in the project, as identified in Table 6.2.2-1. If so, what feedback was provided and how was it addressed by CNL? If not, please provide a rationale. • Please clarify if First Nation and Métis groups with interest in the project, as identified in Table 6.2.2-1 were consulted on the development of the survey. If not, please provide a rationale. • Please provide a rationale as to why First Nation and Métis groups with interest in project were not surveyed. • Please clarify why the *Life Style Surveys: Preliminary Local Food Fraction Findings*, only Indicates First Nation and Non-First Nation participant categories? How are Métis participants included in the results? • Please clarify which First Nation and Métis groups provided input or feedback on the draft EIS to refine the human health risk assessment to ensure conservative representation. Please provide details on which First Nation and Métis groups provided feedback, what feedback provided and how it influenced the hunter/recreational receptor within the Post-closure Safety Assessment. **D. Assumption statements FC-149 + FC-153**				

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			Section 6.4.4.1 – includes information that appears to be from existing reports/agreement/websites and does not indicate if and how the information was validated directly with the communities/groups through engagement activities and feedback. In Section 6.4.4.1 the use of “it is likely”, “there could be”, “it seems reasonable” etc. is common. Very few source documents/resources are identified for these statements. • Please provide details in the EIS and/or IER on whether the information included in the paragraphs where “it is likely”, “there could be”, “it seems reasonable” etc. is used was provided to First Nations and Métis groups for validation and/or feedback? If so, which groups and what feedback was provided? If not, please provide a rationale as to why it was not shared with groups and how these assumptions were validated. **CNL Response** CNL has revised Section 6 of the NSDF EIS and has included it with this IR submission for CNSC staff information to aid in the review of this IR (Enclosure A). At a high level, this section was revised to update information on engagements up to the end of June 2020, to address this IR (insufficient information, valued components, lifestyle survey, and assumption statements), as well as to include the updates outlined in CNSC-2-16 (Socio-economic). **1. Insufficient Information** • A revised series of tables (Enclosure B) will be included in the revised Indigenous Engagement Report (IER) that includes a complete description of CNL’s engagement with each of the Indigenous communities or organizations identified in Table 6.2.2-1 regarding potential impacts to Indigenous and/or treaty rights. o CNL has re-structured the Indigenous Engagement Section 6.2, and more specifically 6.2.4, of the EIS to organize and describe engagements and how CNL continues to engage with each Indigenous community or organization so as to better describe the purpose of the engagement and the nature of the discussion. • As of the end of June 2020, CNL has undertaken verification process (as outlined in Section 6.2.4 of the NSDF EIS – Enclosure A) with the identified Indigenous communities and organizations or have made ongoing attempts to engage with non-responsive Indigenous communities and groups. CNL utilized all available information from October 2015 to June 2020 to conduct this verification and be in a position to finalize the EIS and submit to the Responsible Authority for the next steps in the EA process. Although the opportunity still exists for the Indigenous communities and organizations to continue involvement, the ongoing updates will be incorporated in to the IER as the living document. CNL has also created a new series of tables (Enclosure C) to be included in the revised IER. These tables include lists of interests, concerns, and/or feedback which were raised by each Indigenous organization, as well as how CNL addressed these, verification and next steps. o Interests and concerns with the following Indigenous communities and organizations have been included in the series of tables in Enclosure C: Algonquins of Ontario (AOO); Algonquins of Pikwàkanagàn First Nation (AOPFN); Métis Nation of Ontario (MNO); Algonquin Anishinabeg Tribal Council (AANTC); Kitigan Zibi Anishinabeg First Nation; Keboawek First Nation, Williams Treaties First Nations; Anishinabek Nation; and, Mohawks of Bay of Quinte First Nation. o These tables amalgamate: the formally submitted comments as part of the Environmental Assessment process, formally submitted comments and questions to CNL outside of the formal EA process, and summaries of topics that have been discussed between CNL and each Indigenous community or organization during engagements up until 2020 June. o The tables identify the general topic, the key interest/concern, how CNL is addressing the interest/concern, how CNL has verified with the applicable Indigenous community or organization that the interest/concern is resolved, and identification of next steps. The tables also indicate which specific comments are included under each interest/concern category. o These tables also reflect the evolving relationship between each Indigenous community or organization and CNL. o This information has been summarized in a narrative within the revised Section 6.2.4 for each Indigenous community or organization. • The interests and concerns vary among the different Indigenous communities and organizations and CNL has directed its engagement to address and answer all raised questions individually. For example, some Indigenous communities and organizations have focused on subjects, such as the cultural significance of Pointe-au-Baptême, while others are focused on environmental protection and preservation of the Ottawa River. Topics including potential effects to Indigenous and/or treaty rights, archeological sites and artifacts, traditional use of land and				

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			resources (including trapping, hunting, gathering and fishing), , and environmental monitoring have been discussed with the Indigenous communities or organizations listed above but not all Indigenous communities or organizations have expressed the same concern with all these topics. ○ CNL has attached draft dispositions to the formal comments received in the 2017 draft EIS (Enclosure D). These draft dispositions were shared individually with the Indigenous organizations and communities in 2020 May to ensure that CNL has adequately addressed all interests or concerns; an offer to meet or discuss the dispositions was extended to these Indigenous organizations and communities as well. CNL continues to update these draft responses pending feedback from the respective indigenous group and final version will be submitted in accordance with Step 29 of the NSDF Administrative Protocol (Table 1 of Appendix A) ○ CNL notes that since 2015, it has continued to provide all identified Indigenous communities and organizations with NSDF Project information and offers them to engage at various levels of interest with the NSDF Project. • The EIS will be updated to include information until at least the end of June 2020. The IER remains a living document and will be revised to accompany the Final EIS (Step 31 o the NSDF Administrative Protocol (Table 1 of Appendix A) and to again with CNL's Commission Members Document prior to the Commission Hearing to include the most up to date information possible. **2. Valued Components** • Additional information on Indigenous engagement regarding Valued Components (VCs) has been included in Section 6.3.1.1. The text in red has been added: "The NSDF Project occurs within the general area of the AOO Land Claim (Figure 6.3.1-1), where negotiations with the Crown have occurred since 1991. It also overlaps the Mattawa/Lake Nipissing Traditional Harvesting Territory for the MNO. Discussions with Williams Treaty First Nation communities and AANTC member's communities have also indicated that traditional harvest occurs in the general area near the sites." • To date, only the Métis Nation of Ontario have completed a Traditional Knowledge and Land Use Study (TKLUS) that was used as a direct input into the VCs. The AOO is undertaking an Algonquin Knowledge and Use Study, which as of 2020 June is not complete and CNL has not received any preliminary results from it. Once received by CNL, results from this study will be included in revisions to the IER. • Section 6.3.2 (Results) has been updated to clarify how the Indigenous VCs in table 6.3.2-1 were selected. ○ VCs for the NSDF EIS were presented by CNL in project engagements to the AOO (which included invites to Algonquins of Pikwàkanagàn First Nation members), MNO, and Kitigan Zibi First Nation. These Indigenous communities and organizations expressed an interest in learning more about the NSDF project VCs. ○ With the exception of the MNO, there was little in the way of comments from other Indigenous communities or organizations on the specific VCs that were used in the assessment. The MNO took a significant interest in the VCs and requested that CNL provide the funding for a VC workshop (which CNL did). The results of this workshop are appended to their TKLUS. CNL and MNO have spent a significant resources discussing MNO feedback and considerations on the VCs, as demonstrated through the engagements outlined with the MNO in Enclosure B. ○ The existing Table 6.3.2-1 was prepared to demonstrate how Indigenous input, particularly from the MNO influenced and was consistent with the VCs that CNL selected. This was discussed with the MNO at working session on 2019 April 23, and MNO Committee members indicated that they were satisfied with the VC explanation. The table has been updated to reflect that it was specifically MNO that provided specific feedback on the Indigenous VCs. ○ Suggested Change to EIS (p. 6-17): (text changes in strikeout and red) "For example, ~~Indigenous communities~~ the MNO through their TKLUS study have identified moose, deer and bear as VCs due to traditional harvesting of these specific biota, while CNL has selected hunting as a VC to protect Indigenous traditional resource use. Turkey, grouse and partridge have also been identified as potential VCs and CNL selected the Ruffed grouse (*Bonasa umbellus)* as it is an indicator species that can sufficiently represent the health of populations of other game birds. A number of species of plants have been noted as important resources for gathering, from which CNL selected all traditionally gathered species as a VC. Cranberries were highlighted as a particularly important resource, so CNL selected reed as it is an indicator species and a measure of habitat quality for cranberries. Finally, CNL selected surface water quality				

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			as a VC as it reflects water quality of the Ottawa River as well as lakes and streams on the CRL site, along with the health of many species of interest to all Indigenous communities that have provided feedback on the NSDF Project. Surface water quality is an intermediate component that can capture any potential changes in the natural environment on which other VCs depend. Air quality and geology are other intermediate components that can assess Indigenous concerns for air and soil quality. ○ Protection of the Ottawa River/water resources has been raised as a concern by all Indigenous communities or organizations that have provided input on the NSDF project, formally or informally. This is reflected in Table 6.3.2-1 through the inclusion of VCs for hydrology, surface water quality, fish habitat, fish species and fishing ○ Kitigan Zibi First Nation has indicated the importance of the Blanding's Turtle, which was included as a terrestrial Valued Component as it is a SARA-listed species (Section 5.6.2 of EIS). **3. Lifestyle Survey** • CNL has removed the reference to the lifestyle survey from the EIS as this survey was not specific to only Indigenous Peoples, although the survey did ask respondents to self-identify as First Nations or Métis. The lifestyle survey report provided data on consumption of locally grown food, game, and wildlife that are used in the calculation of the derived release limits (most critical receptor living near the CRL site). The removal of reference to this study has not impacted any EIS conclusions or pathway modelling completed. • CNL notes for the Post-Closure Safety Assessment, a conservative hunter/gatherer self-sufficient Indigenous receptor, was included. This receptor was assumed to be an Indigenous person (including adults and children) who obtained all their food through hunting and gathering in the area. It was also assumed that this person would have increased consumption of fish and wild game, and would also consume local mushrooms and berries. CNL utilized an Aboriginal Lifestyle Characterization report completed for the Nuclear Waste Management Organization, endorsed by the Assembly of First Nations, as the basis for the self-sufficient Indigenous receptor. • The MNO provided written feedback (2020 February) that the inclusion of the self-sufficient Indigenous receptor provides the MNO with some assurance of the ongoing safety of the NSDF Project which is a key component of perceptive based effects. • CNL has begun discussions with AOPFN for contribution agreement that would include the AOPFN to completing a Harvest and Diet study related to the NSDF project. The results of this study would be included in revisions to the IER and compared to assumed consumption habits in the Post SA. **4. Assumption Statements** • In 2016 CNL sent letters to the identified Indigenous communities and organizations requesting information on traditional land and resource use in the area surrounding the CRL site. CNL sent letters again in May 2020 asking relevant questions again to verify assumptions CNL made in lieu of having responses or direct input from the various Indigenous communities and organizations. • CNL has developed verification tables (Enclosure C) to address the concerns of the CNSC staff with respect to the verification of statements of comments by Indigenous organizations and the associated responses by CNL. These tables include a general topic, the interest/concern from the Indigenous community or organization, how CNL is addressing the interest/concern, how CNL has verified with the applicable Indigenous community or organization that the interest/concern is resolved, and identification of next steps. Based on providing earlier versions of these tables to the CNSC staff and the exchanges between the two organizations, CNL understands they address the question as to any assumptions made by CNL with respect to engagement. • CNL has reviewed the EIS to examine the use of assumption statements and update the language used to be factual with information CNL has received and/or verified by Indigenous communities and organizations. • If assumption statements have been used, the context of the assumption statements is provided.				

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			<u>Addendum A – CNSC-2-04</u> • ***FC-36 + FC-149 + FC-150 + FC-152 + FC-153 + FC-154 + FC-155 + FC-158*** *CNSC Comment: These sections only provide high-level information. Section 6.2.4 only provides information regarding Algonquin's of Ontario (AOO) and Métis Nation of Ontario (MNO). Table 6.2.5-1 provides a list of topics of interest for MNO and Algonquin Anishinabeg Nation Tribal Council (AANTC), no concerns/issues are provided. There is also no information on how CNL addressed feedback and whether any feedback from Indigenous groups was incorporated in the EIS and/or IER and if so, where. Also to note that while AANTC is included in this table, there is little mention of AANTC in the rest of the EIS and/or IER (assessment, land use, Indigenous interests) etc.* • *Table 6.2.4 1 includes several meetings entitled "Environmental Stewardship Council Meeting" and a meeting entitled "Meeting with Clare Cattrysse and CNSC". Please provide more information and rationale on how these meetings are related to engagement with Indigenous communities on the proposed NSDF project.* • *In Section 4.5 of the IER, "Feedback Received" includes a definition of "Indigenous interest." Please define "generally aware". What due diligence was used to ensure CNL was aware of all potential Indigenous interests in the project area to ensure fulsome and accurate information was provided through the assessments on impacts to Indigenous interests? (To note this information is also included in Section 6.2 of the EIS)* • *Provide details in the EIS and/or IER on which First Nation and Métis groups provided feedback through "formal and informal consultation activities", what the feedback was and how it was addressed by CNL.* • *In section 6, where CNL describes the potential interactions of the NSDF Project with trapping, hunting, gathering and fishing activities, it does not provide information or validation that CNL has attempted to or gathered any details regarding traditional land use activities in close proximity to the CRL property directly from all identified First Nation and Métis groups.* • *While it incorporated information received from the MNO TKLUS, it still uses assumptions in the text regarding land use by Métis citizens. It also does not provide any information on engagement activities with the seven (7) Williams Treaties First Nations and/or AANTC and/or its member First N (FC-150) CNSC staff noted in the previous IR that it "will be important for CNL to clarify in the final EIS if there is any active hunting or trapping in the adjacent PE025 and PE002 trap lines, as well as on adjacent private (patent) lands, specifically if they are being used by any of the identified Aboriginal groups." Section 6.4.4.1.2.1 only provides information regarding AOO and MNO. Table 6.2.2-1 identifies First Nation and Métis groups with potential interest in the project that are not included in the information provided in Section 6.4.4.1.1. Please clarify if all the First Nation and Métis groups identified in Table 6.2.2-1 were engaged on this topic. If so, please provide the details on this engagement, including what issues, concerns, and/or feedback raised by each Indigenous group, as well as how CNL addressed these. If not, please provide a rationale.* • *(FC 155) The information provided in the response on the engagement with Curve Lake First Nation cannot be located in the EIS and/IER. Provide a rationale as to why Section 6.4.1 only refers to Métis and Algonquin peoples. Please ensure the information provided on the engagement with Curve Lake First Nation is included in the EIS and/or IER. A number of First Nation and Métis groups, including the AOO, Kitigan Zibi Anishinabeg Nation and the AANTC, have expressed an interest in being engaged in on-going monitoring activities for the NSDF Project and CRL site in general, especially as it relates to their traditional land use activities (e.g., fishing). The response and EIS and/IER only provide high-level information and no reference to which First Nation and Métis groups were involved in the discussions.* • *Section 6.4.6 states , "A couple of the Indigenous communities have indicated that they think their citizens have negative perceptions associated with harvesting near the CRL site which results in not using an area (KnowHistory2019)." The source quoted is the MNO IK study, this will only indicate concerns of Métis Nation citizens, despite the sentence stating, "a couple of the Indigenous communities…" Please clarify which communities this sentence refers to.* • *Provide more information in the EIS and/or IER on discussions had with and feedback provided by interested First Nation and Métis groups on environmental monitoring activities specific to the NSDF Project and the CRL site more generally is included in the final EIS* **<u>CNL Response</u>**				

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			CNL has re-organized Section 6.2 of the EIS to better provide a narrative description of the engagement with each individual Indigenous community or organization (details in Enclosure B). The summarized feedback in the revised Section 6.2.4 provides a narrative on engagements, interests, concerns and/or feedback, and how CNL continues to engage with each Indigenous community and organization to better describe the nature of the discussion and to focus on interests raised by each of the communities or organizations. The verification tables in Enclosure C have been organized based on the topics raised by each individual Indigenous community or organization, and include how CNL is addressing the interest/concern, how CNL has verified with each Indigenous community or organization that the interest/concern is resolved and potential next steps. As a result, the text in the tables and in the summarized feedback reflect the interests/concerns brought to the attention of CNL. These interests have been generally provided in writing, such as in the form of comments submitted to the CNSC as responsible authority under the formal EA process or directly to CNL. CNL has also made best efforts to capture discussions that may have only been verbally articulated. • Table 6.2.4.1 from the 2019 draft EIS has been removed and a more detailed table divided by community specific engagements will be added to the revised IER. The revised series of engagement tables in the IER (Enclosure B), include information and rationale on how meetings are related to engagement with each Indigenous community or organization. A new table (Table 6.2.4-1 has been included in the Section 6 of the EIS that summarizes the number of engagement touchpoints, comments submitted, meetings/tours, funding received, TKLUS studies, and discussions on Long Term Relationship Agreements. A narrative summary of engagements with each Indigenous community or organization is found in the revised Section 6.2.4 (Enclosure A). • The series of verification tables (Enclosure C) will be reflected in Section 4.5 of the revised IER, outlining the due diligence that was used to ensure that CNL was aware of all potential Indigenous interests in the project area to ensure that fulsome and accurate information was provided through the assessments on effects to Indigenous interests. This has also been reflected in the revised Section 6.2.4 of the EIS (Enclosure A). The feedback section in the revised Section 6.2.4 is organized now community by community – so each community has its own feedback section. • Section 6.2.4 of the EIS has been updated (Enclosure A) to include a summary by Indigenous organization or community on feedback received, whether it was formal (e.g., 2016 Project Description or 2017 Draft EIS comments) or informal (e.g., feedback received during engagements or outside the formal EA process), and how it was addressed by CNL. This section includes feedback received from: AOO; AOPFN; MNO; AANTC; Kitigan Zibi Anishinabeg First Nation; Keboawek First Nation, Williams Treaties First Nations; Anishinabek Nation; Mohawks of Bay of Quinte First Nation. The verification table (Enclosure C) that will be included in the IER outlines in more detail feedback from each Indigenous organization or community and how CNL addressed the interest or concern. • CNL has attempted to gather information on traditional use near the NSDF site from all identified Indigenous communities and organizations. Requests for traditional use information has been made in letters, presentations, and through direct discussions. CNL has described traditional use for Indigenous communities and organizations where information about it is documented in existing: reports, studies, database, etc.; or where that information has been provided verbally in meetings and other communications. This information has been summarized in Section 6.4.4.1.1 of the EIS (Enclosure A). To date, only the Métis Nation of Ontario have completed a TKLUS and it has been summarized in Section 6.4.4.1.1. The AOO is undertaking a TKLUS, which as of 2020 June is not complete and CNL has not received any preliminary results from the study. • To date, no Indigenous person, organization, or community has identified the PE025 and PE002 traplines as belonging to an Indigenous person. CNL has made requests for traditional use information in letters, presentations, and through direct discussions. The MNRF, which manages Ontario’s trapline system, does not provide such information to CNL due to privacy concerns. As portions of these traplines occur on Provincial Crown land, it is reasonable to conclude that hunting by Indigenous or non-Indigenous people may occur there. CNL notes that the possession of a trapline in Ontario does not give the trapline-holder any specific hunting rights. Most of the Traditional Land Use Regional Study Area is occupied by the CRL site, Garrison Petawawa and private land, with only a few isolated parcels of Crown land. Hunting is not permitted within the CRL site nor within the Garrison Petawawa. To date, no Indigenous community or organization has indicated that they are hunting or trapping on the limited Crown land or private land within the RSA. However, as CNL has stated the opinion is that there is high likelihood of Indigenous peoples fishing in the Ottawa River area of the RSA. • Section 6.4.2.8.6 of the EIS has been updated to include information on Curve Lake First Nation engagements, key interests and concerns, how CNL has been and is currently addressing feedback/concern, verification, and identification of next steps up to the end of June 2020. This information will also be included in the revised IER, along with the detailed table (Enclosures B & C) that includes Curve Lake First Nation.				

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			• Enclosure C includes details on interests/concerns with each Indigenous community or organization and identifies those Indigenous communities or organizations that have expressed an interest in being engaged in on-going monitoring activities for the NSDF project. This has also been summarized in revised Section 6.2.4 of the EIS (Enclosure A).
			• The sentence in Section 6.4.6 of the EIS has been updated to clarify that this source was the MNO (red and strikethrough). "The MNO, through their TKLUS, ~~A couple of the Indigenous communities~~ have indicated that they think their citizens have negative perceptions associated with harvesting near the CRL site which results in not using an area (KnowHistory 2019). CNL's Public Information Program and enhanced engagement with Indigenous peoples is meant to address these negative perceptions by providing educational opportunities and sufficient factual information. CNL will continue to work with organizations to address any of these negative perceptions."
			• Enclosure C includes details on interests/concerns with each Indigenous community or organization and identifies those Indigenous communities and organizations that have expressed an interest in being engaged in on-going monitoring activities for the NSDF project. This has also been summarized in the revised Section 6.2.4 (Enclosure A).
			B. FC-38
			Section 6.3 Valued Components, identifies the AOO and MNO, however, does not include information in relation to engagement and feedback on valued components with the other First Nation and Métis groups identified with potential interest in the project as per list identified in Table 6.2.2-1, such as the 7 Williams Treaties First Nations and/or the Algonquin Anishinabeg Tribal Council and/or its member First Nations.
			• *Please clarify if all First Nation and Métis groups identified in Table 6.2.2-1 were engaged on this topic. If so, please provide the details on this engagement, including what issues, concerns, and/or feedback raised by each Indigenous group, as well as how CNL addressed these. If not, please provide a rationale.*
			• *In addition to the MNO TKLUS study, what other methods of obtaining feedback and from which First Nation and Métis groups, influenced the identification of the "Indigenous VCS" that are capture in Table 6.3.2-1?*
			• *Please explain why this VC section does not include information in relation to engagement and feedback on valued components with all of the First Nation and Métis groups identified with potential interest in the project, including the 7 Williams Treaties First Nations and/or the Algonquin Anishinabeg Nation Tribal Council and/or its member First Nations. While the section does mention the Algonquin's of Ontario and the Métis Nation of Ontario, it does not provide detailed information on engagement and feedback on valued components with these groups.*
			• *Please clarify if the final list of NSDF VCs included in Table 6.3.2-1 were shared with the First Nation and Métis groups identified with potential interest in the project and what feedback was provided. If so? How was the feedback addressed by CNL? If not, please provide a rationale.*
			• *Please clarify which First Nation and Métis groups have conducted TKLUS, or plan to complete a TKLUS, and how that influenced (or potentially will influence) the identification of the "Indigenous VCS" that are captured in Table 6.3.2-1 and to support the NDSF project as stated by CNL in Section 6.3.*
			CNL Response
			• CNL clarifies all First Nations and Metis groups identified with potential interest in the project were given an opportunity to engage on Valued Components however as summarized in the revised Section 6.2.4 (Enclosure A), and detailed in Enclosure C, only the MNO, AANTC and Kitigan Zibi First Nation have formally indicated interest in Valued Components. A description of how CNL engaged with Indigenous communities and organizations on the VCs and how feedback was incorporated into the EIS is provided below:
			  • CNL provided capacity funding to the MNO to conduct a Valued Components (VC) workshop which was submitted to CNL in 2019 January. Findings from the VCs study have been incorporated into the EIS Section 6.3).
			  • The AOO identified the need for traditional knowledge to be incorporated into the EIS and is conducting an Algonquin Knowledge and Land Use Study. Kitigan Zibi First Nations has indicated the importance of the Blanding's Turtle, which was included as a terrestrial Valued Component as it is a SARA-listed species (Section 5.6.2 of EIS).
			  • VCs for the NSDF EIS were presented by CNL during project engagements to the: AOO (which included invites to Pikwàkanagàn members), MNO, and Kitigan Zibi First Nation, as these Indigenous communities and organizations expressed interest in learning more about the NSDF VCs.				

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			• The final list of VCs for the NSDF Project were included in the 2019 draft EIS and IER, both of which were shared with identified Indigenous communities and organizations in December 2019. • As summarized in the revised Section 6.2.4 (Enclosure A) and detailed in Enclosure C, the MNO and AANTC have both formally indicated interest in Valued Components. Based on verbal discussions with the AOO, the AOO has an interest in VCs but from the perspective of the entire CRL site and environmental monitoring. CNL expects that the AOO may describe this in more detail in the future. In their late May 2020 submission, AOPFN has also indicated an interest in VCs. CNL to date has not received feedback from other Indigenous communities or organizations on the selected VCs. CNL is committed to updating the IER going forward as more information on valued components is received. • VCs for the NSDF EIS were presented by CNL during project engagements to: the AOO (which included invites to Pikwàkanagàn members), MNO, Kitigan Zibi, and the AANTC. Except for the MNO, there was little in the way of comments on the specific VCs that were used in the assessment. The MNO took a significant interest in the VCs and requested that CNL provided the funding for a VC workshop. The results of this workshop are appended to their TKLUS. Kitigan Zibi has indicated the importance of the Blanding's Turtle, which was included as a terrestrial Valued Component as it is a SARA-listed species (Section 5.6.2 of EIS). The final list of VCs have also been included in the 2019 revised draft EIS and IER, both of which were shared with identified Indigenous communities and organizations in December 2019. • To date, only the MNO has completed a TKLUS. The AOO identified the need for traditional knowledge to be incorporated into the EIS and is conducting an Algonquin Knowledge and Land Use Study. It is currently not known when this study may be complete. Results of this study, or any other TKLUS that may be completed by any other Indigenous organization or community, will be included in revisions to the IER. ***C. FC-40*** *It appears the survey did not take into account the lifestyles of First Nation and Métis peoples, as they did not engage with the First Nation or Métis groups within the area. This survey also assumes that First Nation and Métis peoples only obtain "local foods" from farmers market, local farms and/or grown on their own property. This does not take into consideration harvesting of traditional foods (hunting/fishing/gathering).* *CNL should ensure that First Nations and Métis populations are adequately represented in the Human Health Risk Assessment and that dose estimates reflect their consumption rate.* • *Please provide more detail on the methodology used to develop this survey. If First Nation and Métis lifestyles were to be a focus of the survey and conclusions, how did the methodology ensure that First Nation and Métis peoples would be accurately reflected?* • *Please provided more detail on the results of the lifestyle survey. Include information such as how many people identified as First Nations? How many people identified as Métis? How many people overall participated in the survey? What questions were used to ensure that First Nation and Métis lifestyles would be reflected accurately in the survey results?* • *Please clarify if the survey results and conclusions were shared with First Nation and Métis groups with interest in the project, as identified in Table 6.2.2-1. If so, what feedback was provided and how was it addressed by CNL? If not, please provide a rationale.* • *Please clarify if First Nation and Métis groups with interest in the project, as identified in Table 6.2.2-1 were consulted on the development of the survey. If not, please provide a rationale.* • *Please provide a rationale as to why First Nation and Métis groups with interest in project were not surveyed.* • *Please clarify why the Life Style Surveys: Preliminary Local Food Fraction Findings, only Indicates First Nation and Non-First Nation participant categories? How are Métis participants included in the results?* • *Please clarify which First Nation and Métis groups provided input or feedback on the draft EIS to refine the human health risk assessment to ensure conservative representation. Please provide details on which First Nation and Métis groups provided feedback, what feedback provided and how it influenced the hunter/recreational receptor within the Post-closure Safety Assessment.* **CNL Response** CNL has removed the reference to the lifestyle survey from the EIS as this survey was not specific to only Indigenous Peoples, although the survey did ask respondents to self-identify as First Nations or Métis. The lifestyle survey report provided data on consumption of locally grown food, game and wildlife that are used in the calculation of the DRL's (most critical receptor living near the CRL site). CNL notes for the Post-Closure Safety Assessment, a				

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			conservative hunter/gatherer self-sufficient Indigenous receptor was included. This receptor was assumed to be an Indigenous person (including adults or children) who obtained all their food through hunting and gathering in the area. It was also assumed that this person would have increased consumption of fish and wild game and would also consume local mushrooms and berries). CNL utilized an Aboriginal Lifestyle Characterization report completed for the Nuclear Waste Management Organization, endorsed by the Assembly of First Nations, as the basis for the self-sufficient Indigenous receptor. The MNO provided written feedback (February 2020) that the inclusion of the self-sufficient Indigenous receptor provides the MNO with some assurance of the ongoing safety of the NSDF Project which is a key component of perceptive based effects. CNL has begun discussions with AOPFN for contribution agreement that would include the AOPFN to completing a Harvest and Diet study related to the NSDF project. The results of this study would be included in revisions to the IER and compared to assumed consumption habits in the Post SA. Detailed responses are not provided to the bullets above because of the removal of the reference/use of the survey in the EIS. ***D. Assumption statements FC-149 + FC-153*** *Section 6.4.4.1 – includes information that appears to be from existing reports/agreement/websites and does not indicate if and how the information was validated directly with the communities/groups through engagement activities and feedback. In Section 6.4.4.1 the use of "it is likely", "there could be", "it seems reasonable" etc. is common. Very few source documents/resources are identified for these statements.* • *Please provide details in the EIS and/or IER on whether the information included in the paragraphs where "it is likely", "there could be", "it seems reasonable" etc. is used was provided to First Nations and Métis groups for validation and/or feedback? If so, which groups and what feedback was provided? If not, please provide a rationale as to why it was not shared with groups and how these assumptions were validated.* **CNL Response** CNL has developed verification tables (Enclosure C) to address the concerns of the CNSC staff with respect to the verification of statements of comments by Indigenous organizations and the associated responses by CNL. These tables include a general topic, the interest/concern, how CNL is addressing the interest/concern, how CNL has verified with the applicable Indigenous community or organization that the interest/concern is resolved, and identification of next steps. Based on providing earlier versions of these tables to the CNSC staff and the exchanges between the two organizations, CNL understands they address the question as to any assumptions made by CNL with respect to engagement. CNL has also reviewed the EIS to examine the use of assumption statements and update the language used to be factual with information CNL has received and/or verified by Indigenous communities and organizations. If assumption statements have been used, the context of the assumption statements is provided. See revised Section 6 in Enclosure A.				
CNSC-2-05	FC-40 FC-46	Section 5.2.1	**Agency Information Request - Change to an environmental component due to hazardous contaminants** ***Question:*** CNL is requested to justify why the 2017 and 2018 emission data (Table 5.2.1-5) is representative (bounding) of future emissions within the local study area of the CRL site. Although the 2017/2018 data are more recent, the emissions are lower than the 2014 emissions which were used in the previous version of the EIS. Further, what sources were removed to account for the lower emissions? Is it reasonable to assume that they would not be present during the construction or operations phases of the proposed project? ***Context:*** CNSC staff's original IR (FC-46) requested that the background data in the main EIS (Table 5.2.1-5) align with the background data in the Atmospheric Environment Technical Supporting Document (TSD) (Table 3). CNSC staff have reviewed and determined that CNL's response is adequate. The changes have been made in the revised EIS and the Atmospheric Environment TSD. In the previous revision of the EIS (2017), emission data from 2014 was used. In this revision, updated emission data from 2017 and 2018 were used. It is noted that the emission data from 2014 for SO$_2$, SPM, PM$_{10}$, Pb and Hg were higher than the 2017 and 2018. What	EIS	Table 5.2.1-5 (Air Emission Total for Industries within 25 km of the Local Study Area), Section 5.2.1.4.2.1 (Applicable Criteria -Existing Emissions)	Table 5.2.1-5 will be revised to include CRL airborne emissions for the five-year period 2014 to 2018. Text will be expanded to describe CNL's initiative to reduce Airborne and Greenhouse Gas Emissions.	Accepted

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activities account for the differences in the emission data? How was it determined that the lower emission data for 2017 and 2018 is representative of future emissions within the local study area of the Chalk River Laboratories (CRL) site?

Rationale:
Clarification is needed to demonstrate that the emission data for 2017 and 2018 is bounding compared to the higher emission data from 2014.

CNL Response

The Chalk River Laboratories (CRL) site emission data presented for 2018 includes a marked decrease in SO_2, particulate matter (SPM, PM_{10}), lead and mercury over the 2014 site emissions as a direct result of the full switch over to natural gas from #6 fuel oil for the CRL Powerhouse in 2017. The switchover to natural gas was a CNL initiative to reduce greenhouse gas emissions and airborne contaminants such as lead, mercury, SO_2 and particulate matter from the CRL site. The switchover started in the latter half of 2017 and was completed in 2018. Powerhouse emissions are expected to remain at the current levels and are representative or bounding of future emissions within the local study area of the CRL site thus represent the new baseline [1]. A brief overview of the CRL Powerhouse and conversion to natural gas is provided below.

The Powerhouse provides water and steam for heating and compressed air to buildings onsite, and serves as the distribution center for electricity to the site. Historically, steam for heating of most buildings on site and some minor process applications has been produced in the Powerhouse in large industrial boilers using #6 fuel oil. Prior to the 2017 conversion, the boilers typically consumed approximately 10,000,000 L of # 6 fuel oil annually. Going forward it is expected that only a fraction (~1%) of #6 fuel oil will be burned for back-up fuel to maintain the boiler's capability in case required. Burning #6 fuel oil results in emissions of NPRI Part 1 substances (notably lead (Pb) and Hg), NPRI Part 4 substances (Criteria Air Contaminants such as SO_2, SPM, PM_{10}) as well as Greenhouse Gas (GHG) emissions to the atmosphere. The transfer to natural gas has significantly reduced these emissions for the CRL site.

Since the Powerhouse fuel source has been completed converted to natural gas, it is reasonable to assume the previously reported 2014 emissions would not be present during the construction or operations phase of the NSDF project.

Changes to EIS:
The following modifications (new text in red) will be made to the Final EIS to incorporate the information above:

Table 5.2.1-5: *Air Emission Totals for Industries within 25 km of the Local Study Area* will be expanded in the EIS and is provided below to show CRL airborne emissions for the five year period from 2014 to 2018.

Table 2.5.1-5 Air Emission Totals for Industries within 25 km of the Local Study Area

Company Name	Distance to the NSDF Project[(a)] (km)	Direction from the NSDF Project	Emissions						
			Contaminant	Units	2014	2015	2016	2017	201
Canadian Nuclear Laboratories	1	North	NOx	tonnes	65.124	62.421	58.478	67.955	52.
			SO_2	tonnes	223.901	200.373	240.393	182.076	10.
			CO[(c)]	tonnes	8.463	8.386	8.250	11.048	9.9
			SPM	tonnes	33.098	29.067	49.148	38.980	14.
			PM_{10}	tonnes	19.220	17.248	23.684	19.268	5.3
			$PM_{2.5}$	tonnes	10.523	9.627	11.260	9.736	2.2
			Hg	kg	0.145	0.132	0.122	0.104[(d)]	0.0
			Pb	kg	2.042	1.963	1.778	1.222	0.1

Department of National Defence	16	Southeast	NOx	tonnes	37.537	37.983	24.020	24.463	—
			SO_2	tonnes	—	—	—	—	—
			CO	tonnes	35.391	34.523	35.869	38.701	—
			SPM	tonnes	—	—	—	—	—
			PM_{10}	tonnes	2.200	4.374	3.610	9.972	—
			$PM_{2.5}$	tonnes	1.459	2.579	2.350	5.806	—
			Hg	kg	—	—	—	—	—
			Pb	kg	20.404	19.517	21.200	24.500	—

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			Note: All emissions taken from ECCC 2018a [2] unless otherwise noted a) Distance from the SSA centroid b) NPRI database is current up to 2017 reporting year. CNL Emissions for 2018 taken from CNL 2019c [1]. No available data for DND emissions in 2018 c) CO emissions provided by CNL d) CNL did not report Hg emissions to NPRI in 2017. Emissions taken from CNL 2019c — = Data Not available; SPM = suspended particulate matter; $PM_{2.5}$ = particulate matter less than 2.5 μm (microns) in diameter; PM_{10} = particulate matter less than 10 μm (microns) in diameter; CO = carbon monoxide; NO_2 = nitrogen dioxide; SO_2 = sulphur dioxide; Pb = lead; Hg = mercury. **Section 5.2.1.4.2.1 (Applicable Criteria), subsection Existing Emissions Sources** There are two industrial facilities, the CRL main campus and the Department of National Defence, that report indicator compounds and pollutant releases, disposals, and transfers for recycling under Part 1A to the National Pollutant Release Inventory within 25 km of the Local Study Area (LSA) [2]. The only facility within the LSA is the CRL main campus. These emissions contribute to the local air quality and the consideration of effects from the NSDF Project. The reporting facilities and emission totals are summarized in Table 5.2.1-5. In general, these sources are minor contributors of the non-radiological indicator compounds, with the exception of the lead emissions from the Department of National Defence. CNL baseline emissions of indicator compounds (SO_2, SPM, PM_{10}, Pb and Hg) have decreased appreciably starting in 2017. The reduction of these emissions and greenhouse gas emissions is the direct result of the full switch over to natural gas from #6 fuel oil for the CRL Powerhouse, the facility providing most of the heating for building on the CRL Site. The switchover was a CNL initiative to reduce emissions from the CRL site. ***References:*** [1] CNL. 2019. Effluent Verification Monitoring at Chalk River Laboratories in 2018. Canadian Nuclear Laboratories Document No. CRL-509254-ACMR-2018, Revision 0. 2019 April. [2] ECCC. 2018. National Pollutant Release Inventory Pollution Data and Reports. Updated September 13, 2018. Accessed August 2019. Available at: https://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=B85A1846-1				
CNSC-02-06	New IR		**Agency Information Request - Change to an environmental component due to radiological contaminants** ***Question:*** CNL is requested to describe how an ECM above ground surface, deeper excavation and waste conditioning have been considered in the alternative means assessment, proposed design of the project and/or through other analyses associated with the project. If not, provide rationale for why these considerations were not assessed. ***Context:***	EIS	New Section 2.5.9 (2.5 Alternative Means for Carrying Out the Project)	Additional information	Accepted

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			As presented in the revised EIS, the design of an ECM above ground surface for the proposed NSDF for the disposal of low-level waste at the CRL site is not sufficiently justified although CNL declares that a comprehensive analysis of alternatives was undertaken for the facility location, type, and design, as well as approach for treatment of wastewater to meet the needs of the NSDF Project. ***Rationale:*** Near surface disposal facilities are suitable for the disposal of low-level waste as noted by international nuclear industry guidance (IAEA SSG-29). However, an ECM above ground surface will likely experience higher risks through exposure to the potentially detrimental external natural processes and events (e.g., seismic events, erosion, physical instability of the site/mound) affecting the disposal facility, which may degrade the containment and isolation capacity over shorter periods of time. Although the effects of many natural processes and events can be mitigated during operation, passive controls will be relied upon in the post-closure period. An NSDF with an above ground ECM might need more active controls post-closure of the facility, e.g., longer period of monitoring, surveillance, and inspections, than an NSDF without an above ground ECM. The purpose of the project is to develop a disposal facility for the long-term management of 1,000,000 m^3 of low level waste (LLW), produced mainly from past or future operations of Atomic Energy Canada Limited (AECL) and CNL. Table 3.3.1-3 in the revised EIS indicates that 80,338,934 kg organic wastes will be buried directly in the NSDF, which could account for a significant portion of the total waste in volume. Directly burying the organic wastes in the NSDF will have a number of considerations such as the need for more storage capacity of the NSDF, heterogeneity of the buried wastes, potential gas generation, (differential) settlements of the buried wastes that could damage the cover system, etc. In the revised EIS, no assessment was conducted on whether waste conditioning, for example, incineration of the organic wastes, could be beneficial to the proposed project. In addition, as shown in figures 5.3.2-2B and 5.3.2-2C of the revised EIS, part of the constructed base liner will be under the groundwater. In the revised EIS, no assessment was conducted on whether excavating deeper into the bedrock to construct the NSDF cells would be more beneficial to the proposed project as this could reduce the footprint of the project and potentially remove the above ground mound. **CNL Response** In relation to the near surface disposal designs referenced in IAEA guidance (SSG-29) [1], CNL considers the NSDF design to be a hybrid disposal method as an engineered structure constructed below the ground surface but with a portion of extending above ground. The suggested “above ground surface” and “deeper excavation” are variations of the engineered containment mound (ECM) design and were evaluated as part of the design optimization completed for NSDF [2]. Design optimization is an important component of the design iteration process and is completed at the 30% design stage prior to progressing into the 60% design phase, as recognized within CNL’s Design Authority and Design Engineering program [3]. Within the optioneering study, three floor elevation options were developed and evaluated including: a lower ECM floor elevation, a higher floor elevation and a mid-floor elevation. The mid-level floor elevation was selected, because this configuration is compliant with design requirements. The NSDF Design Requirements document [4] identifies constraints or requirements imposed on the design which include (but is not limited to) the capacity to dispose of up to 1,000,000 m^3 and remain within the identified footprint of the selected NSDF site respecting setbacks from the wetlands or other environmentally sensitive areas. Other more specific functional requirements of the ECM related to this information request include: • The overall design of the ECM will be compatible with CRL site topography. The geometric profile and height of ECM shall be designed to ensure that ECM is not visible either from the Ottawa River, Plant Road or CRL campus. • The base of the ECM (i.e., top of the primary liner) shall be designed to maintain a minimum of 1.5 m above the seasonal high groundwater table. The purpose of keeping a geometric profile compatible of the CRL site topography is to ensure the facility evolves uniformly with its surroundings. As noted in the comment, an ECM completely above the existing grade will likely experience higher risks through exposure to the potentially detrimental external natural processes and events (e.g., seismic events, erosion, physical instability of the site/mound) affecting the disposal facility, which may degrade the containment and isolation capacity over shorter periods of time.					

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			With respect to the groundwater elevation requirement, although the ECM could be constructed into the groundwater table, an under-drain system would be required to maintain the shallow groundwater table below the base liner system. The under-drain system would require a passive groundwater control system that requires minimal maintenance and consideration for possible climate change over the next 500 years, thus introducing design and construction complexities. Furthermore several comments from the public expressed concerns with respect to the overall height of the facility which led to CNL's commitment that the facility would not be visible from the Ottawa River (see Appendix R of [5]). The public has also repeatedly expressed concerns with respect to protection of the groundwater, thus the requirement to design and construction of an ECM above the groundwater elevation table is aligned with public feedback. Waste conditioning, such as the reduction of organic waste through incineration, has not been considered as part of the alternative means assessment. The environmental assessment is a planning tool for a proposed project, as such conservative and bounding waste estimates have been projected and assessed. In relation to the overall waste volume of NSDF, the amount of organics is relatively small. Waste stream projections estimated about 10% of the total ECM waste volume will be comprised of organics. The vast majority of the waste will be soils and the majority of organics present is wood waste from facilities decommissioning. The volume of highly compressible and decomposable organic waste is anticipated to be negligible at less than 1% compared to the total waste volume of the ECM [6]. Gas generation and potential (differential) settlement from the forecasted organic wastes have been accounted for and demonstrated as negligible in [7] and [8], respectively. Figure 5.3.2-2B and Figure 5.3.2-2C of the revised EIS, show that the interpolated water table conditions for 2017 January and 2017 May. The 2017 January water table elevation is representative of average conditions, whereas the 2017 May water table elevations are higher and representative of conditions following the spring melt. The construction of the ECM will eliminate the recharge to groundwater under the footprint of the ECM and lead to a drop in the water table elevation. Figure 5.3.2-2D of the revised EIS, shows the predicted water table elevation and that the design criteria to maintain a minimum of 1.5 m between the top of the primarily line and seasonal high water table are met. In the incorporation of this response into the EIS, "deeper excavation" will be discussed as "ECM below existing grade" thus encompassing the lower ECM floor elevation option from [2]. Similarly "above ground surface" will be discussed as "ECM above existing grade" thus encompassing the higher ECM floor elevation option from [2]. The "mid-range grade" represents the current NSD design and mid-floor elevation option from [2]. ***Changes to the EIS:*** The following modifications (additions in red) will be made to the Final EIS to incorporate the information above: **New EIS Section 2.5.9:** **2.5.9 Final Grade of the Facility** In relation to the near surface disposal designs referenced in IAEA guidance (SSG-29) [1], CNL considers the NSDF design to be an engineered structure constructed just below the grade but extending above the existing grade. However, variations in the final grade of the facility and the subsequent ECM floor elevation were evaluated as part of the design optimization completed for the NSDF Project [2]. Three different final grade alternatives were developed and evaluated to determine the preferred ECM floor elevation including: 1. ECM Below Existing Grade; 2. ECM Above Existing Grade; and 3. Mid-range Grade. The NSDF Design Requirements [4] also includes the following specific functional requirements of the ECM: • The overall design of the ECM will be compatible with CRL site topography. The geometric profile and height of ECM shall be designed to ensure that ECM is not visible either from Ottawa River, plant road or CRL campus. • The base of the ECM (i.e., top of the primary liner) shall be designed to maintain a minimum of 1.5 m above the seasonal high groundwater table. **2.5.9.1 ECM Below Existing Grade**				

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				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			The first alternative for the ECM design establishes the floor elevation to keep berm below the sight line from the CRL campus and to ensure the final ECM maintains the existing grade of the surrounding area (i.e., the ECM would be below grade). **2.5.9.1.1 Technical Feasibility** As noted above, one of the NSDF Design Requirements [4] is that the base of the ECM cannot go into the groundwater table. Even if the ECM floor were decreased to sit directly on top of the groundwater table at the NSDF Project site, the areal extent of the ECM would also need to increase to ensure that the required storage capacity of 1,000,000 m^3 can be met while also maintaining the existing grade of the surrounding area. However, additional space at the NSDF Project site is constrained and the ECM cannot be expanded further without encroaching on adjacent wetlands. Therefore, an ECM that maintains the existing grade of the surrounding area cannot meet the required storage capacity for the NSDF Project and is not technically feasible. **2.5.9.2 ECM Above Existing Grade Alternative** The second alternative for the ECM design establishes the floor elevation above bedrock which would result in a final facility grade above the existing grade of the surrounding area. **2.5.9.2.1 Technical Feasibility** As noted above, one of the NSDF Design Requirements [4] is to ensure that the ECM is not visible either from the Ottawa River, Plant Road or the CRL campus. If the ECM floor was situated on top of the bedrock at the NSDF Project site, the areal extent of the ECM would also need to increase to ensure that the required storage capacity of 1,000,000 m^3 can be met while ensuring the top of the ECM is not visible from the Ottawa River. However, additional space at the NSDF Project site is constrained and the ECM cannot be expanded further without encroaching on adjacent wetlands. Therefore, the above grade alternative cannot meet the required storage capacity for the NSDF Project and is not technically feasible. **2.5.9.3 Mid-range Grade Alternative** The third alternative for the ECM design establishes the ECM floor elevation partially into the bedrock and approximately 1.5 m above the groundwater table following completion of construction. The final facility grade is above the existing grade of the surrounding area; however it would not be visible from the Ottawa River, Plant Road or the CRL campus. **2.5.9.3.1 Technical Feasibility** This alternative would require excavation and blasting of bedrock to keep the berm heights lower and the elevation of the top of the ECM near the ridgeline at an elevation approximately 3 m below the sight line from the CRL campus. This design accommodates all NSDF design requirements and satisfies the storage capacity required and thus has been deemed technically feasible. **2.5.9.4 Summary** Of the three alternatives assessed for the ECM floor elevation and final grade of the facility, two of the alternatives (i.e., maintaining the existing grade and above grade alternatives) cannot meet the NSDF design requirements as well as accommodate the 1,000,000 m^3 of LLW storage capacity within the NSDF footprint which reflects the required wetland setbacks. Therefore, the ECM below the existing grade and ECM above existing grade alternatives have been deemed technically not feasible. The mid-range grade alternative was selected as the preferred ECM design, because this alternative is compliant with design requirements and can meet the required storage capacity. ***References:*** [1] Near Surface Disposal Facilities for Radioactive Waste, IAEA SSG-29, 2014. [2] Design Concept Decision (Optioneering Study) for the Engineering Containment Mound, Support Facilities, and Utilities, 232-503212-DCD-001, Revision 0, 2016 December 31. [3] Design Authority and Design Engineering, 900-508120-PDD-001, Revision 2, 2019 September. [4] Design Requirements, 232-503212-DR-001, Revision 2, 2019 April. [5] Stakeholder Engagement Report, 232-513400-REPT-002, 2019 November. [6] Waste Characterization Report, 232-508600-REPT-002, Revision 4, 2020 February. [7] Radon and Other Landfill Gas Modelling and Evaluation, 232-503212-TN-001, Revision 1, 2018 October. [8] Base Liner and Final Cover Performance and Life Cycle Evaluation, 232-508600-TN-006, Revision 1, 2019 September.				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
CNSC-02-07	New IR	Section 7.4	**Agency Information Request - Change to an Environmental Component, Blasting** ***Question:*** CNL is requested to consider the malfunction of detonators used for blasting as a potential conventional occupational hazard and assess its impact on workers safety and the environment. ***Suggestions for Mitigation:*** Develop procedures in the Blasting Plan to adequately handle the malfunction of detonators for rock blasting. ***Context:*** The potential conventional occupational hazards that relate to blasting are considered in section 7.4 of the revised EIS. However, in table 7.4.1-1, only the conventional hazard of overblasting is assessed. There is a potential hazard of malfunction of detonators used for blasting, which is not assessed in section 7.4. ***Rationale:*** Rock blasting will be required to complete site preparation activities for the proposed NSDF Project site (figure 3.2.1-1). Malfunction of detonators will pose risks to worker safety and have potentially adverse environmental effects as explosives in the undetonated boreholes would be left in place. **CNL Response** CNL has considered the malfunction of detonators used for rock blasting as a potential conventional occupational hazard and assessed its impact on workers safety and the environment. Procedures will be developed in the blasting safety plan in accordance with [1] and [2] to ensure the malfunction of detonators for rock blasting is adequately handled. ***Change to EIS:*** The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: **Table 7.4.1-1 of Section 7.4 of the EIS will be revised to include the following assessment:**	EIS	Section 7.4 (Conventional (non-radiological) Accidents and Malfunctions), Table 7.4.1-1 (Assessment of Key Potential Conventional Accidents and Malfunctions During Construction)	Hazard assessment of malfunction of detonators used for blasting.	Accepted

<table>
<tr><th rowspan="2">Reference #</th><th rowspan="2">Link to IR#1 (Original IR package)</th><th rowspan="2">EIS Section</th><th rowspan="2">Information Request & Response</th><th colspan="3">Documents Impacted by the Response to IR</th><th rowspan="2">Accepted/ Rejected with request for follow-up information</th></tr>
<tr><th>Document Name</th><th>Section/Figure/ Table Impacted by Response</th><th>Scope of New Information</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Conventional Hazard</th><th>Scenario</th><th>Mitigation</th><th>Potential Health and Environmental Effects After Mitigation</th></tr>
<tr><td rowspan="2">Malfunction of detonators used for rock blasting</td><td>Malfunction of non-electronic detonator during rock blasting.
The detonator malfunction could be the result of:
Manufacture defect.
Pinch or tear in the shock tube during the placement of blasting mats.
Improper tie-in hookup or missed detonator during tie-in hookup.
Damaging the shock tube during the loading operation.</td><td>Blasting Plan.
Blasting Safety Plan.
Blasting system notification and detonator redundancies.
Visual inspection of blasting tie-in sequence and shock tube condition prior to placing blasting mats.
In the event of a primary detonator malfunction, immediate blasting using the redundant secondary detonator will occur.
Barriers for access restrictions.
Blasting mats.</td><td rowspan="2">The potential health effect to the worker is negligible.
The potential environmental effects are negligible and there is no release to the environment.
There is no linkage pathway to the public and non-human biota as effects are localized and are negligible.</td></tr>
<tr><td>Malfunction of electronic detonator during rock blasting.
The detonator malfunction could be the result of:
Manufacture defect.
Pinch or tear in the leg wire or the trunk line during the placement of blasting mats.
Improper tie-in hookup or missed detonator during tie-in hookup.
Damaging the leg wire during the loading operation.</td><td>Blasting Plan.
Blasting Safety Plan.
Blasting system notification and detonator redundancies.
Testing of the electronic detonators and circuit prior to blast initiation.
Testing of the electronic detonators and circuit prior to, during and after placing blasting mats.
In the event of a primary detonator malfunction, immediate blasting using the redundant secondary detonator will occur.
Barriers for access restrictions.
Blasting mats.</td></tr>
</table>

<i>References:</i>
[1] <i>Occupational Health and Safety Act, R.S.O. 1990, c. O.1, Onatrio Regulation 213/91, Construction Projects, Part IV Explosives</i>. Available at: https://www.ontario.ca/laws/regulation/910213
[2] AECOM (AECOM Canada Ltd.). 2020. NSDF Civil Specification (Rock Blasting Section 31 23 33.04). Canadian Nuclear Laboratories Document No. 232-10200-SP-001, Revision 1. 2020 May.
</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CNSC-2-08</td><td>New IR</td><td>Section 3.4.1</td><td>Agency Information Request - Clarification of foundation for the ECM berm EIS Section 3.4 – Project Components and Activities

<i>Question:</i>
CNL is requested to clarify whether the berm will be constructed directly on bedrock or will be underlined with a layer of soil, and correct the inconsistent information in the EIS.</td><td>EIS</td><td>Figure 3.4.1-1 (Cross Section of Engineered Containment Mound)</td><td>Change label “silty sand imp” to “bedrock”</td><td>Rejected with Follow Up IR CNSC-3-01</td></tr>
</table>

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			Context: Inconsistent information with respect to the construction of the ECM berm is provided in the revised EIS. ***Rationale:*** On page 3-32, it is stated that all overburden material will be removed in the area beneath the ECM berm, and the berm will be constructed on bedrock. However, figure 3.4.1-1 shows that a soil layer named "silty sand imp" directly underlines the berm **CNL Response** CNL confirms that the statement on page 3-32 is correct, all overburden material will be removed in the area beneath the ECM berm, and the berm will be constructed on bedrock. A design change was made to ensure no liquefaction will take place as described on page 3-41 of the EIS. The design change involved removing the identified liquefiable soils underlying the berm and replacing the soils (down to bedrock) with compacted engineered granular				

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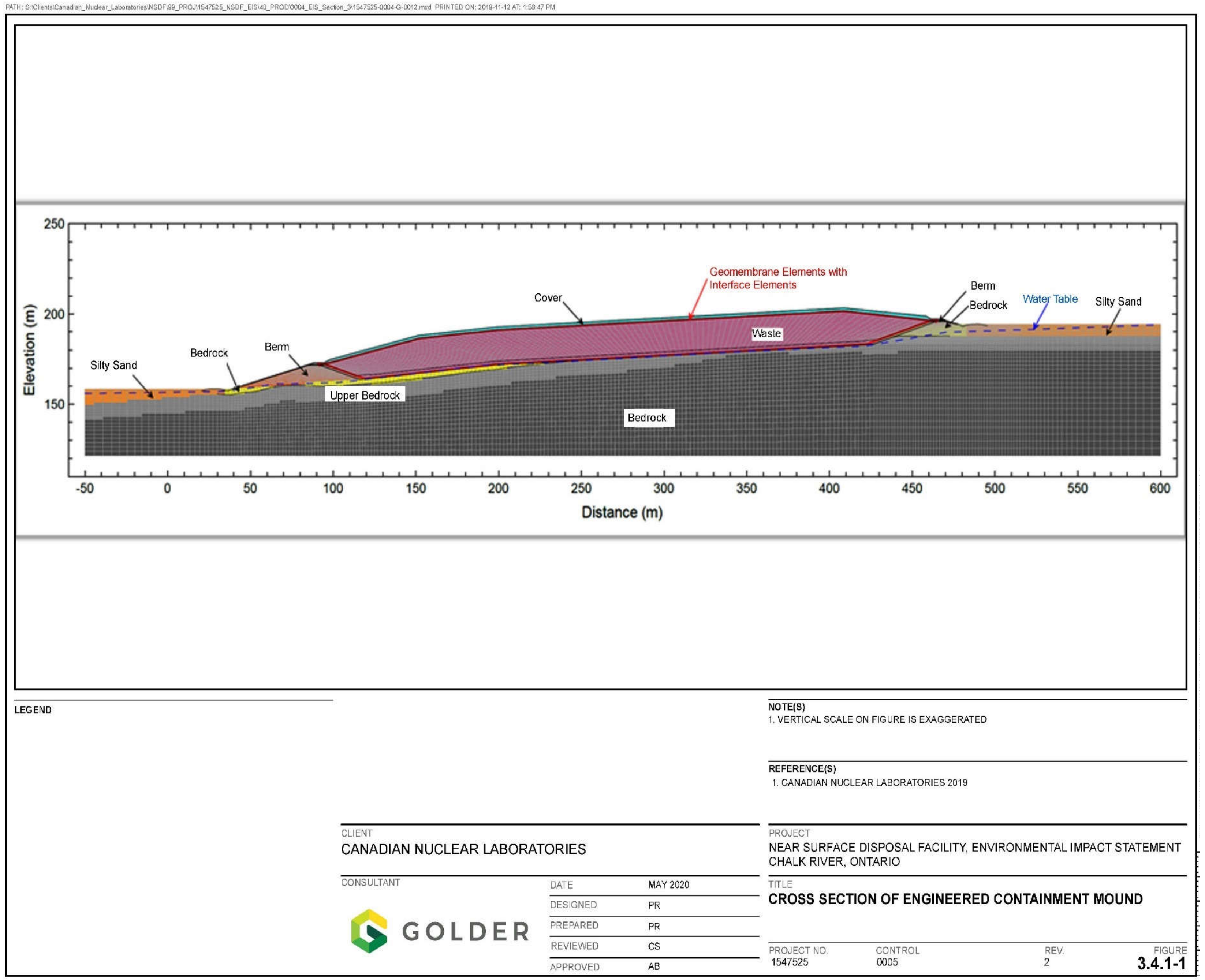
			fill material (Section 2.3.1.8.2 of [1]). 				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			Change to EIS: The label "silty sand imp" in Figure 3.4.1-1 of the Final EIS will be revised to "bedrock" in order to correct the inconsistent information in the EIS. ***References:*** [1] AECOM (AECOM Canada Ltd.). 2019. Design Description. Canadian Nuclear Laboratories Document No 232-503212-DD-001. Revision 1. May 2019.				
CNSC-2-09	New IR	Section 10.3	**Agency Information Request - Change to an environmental component due to radiological contaminants** ***Question:*** The inconsistency between the revised EIS, the supporting PostSA, and the stability and seismic analyses need to be resolved, since the presence of water mounding in the waste will affect the stability of the different components and subcomponents of the ECM, as well as the liquefaction potential of the sand layers of the liner. CNL should provide complementary stability and seismic analyses to those reported in: 1. Slope stability Analysis, Rev.1, 232-503212-REP-011. 2. Base liner and final cover evaluation and optimization, Rev.1, 232-508600-TN-002. 3. Seismic Analysis, Rev.2, 232-503212-REPT-015. These supplementary analyses should consider the presence of water mounding within the ECM, and its consequence on the liquefaction potential of different sand layers in the base liner, and on the static and seismic stability of the ECM, its components and sub-components. ***Context:*** Protection of human health and the environment relies on the multiple barrier system of the ECM, the main components of which are the cover, base liner, berm and the geosphere (revised EIS, section 3.4.1). The structural integrity of the cover, liner and berm for both the operational and post-closure periods has been demonstrated by a series of stability analyses and seismic analyses. The revised EIS uses these analyses to support the assumed life-time and robustness of those components. ***Rationale:*** Section 3.4.1 of the revised EIS indicates that water will mound in the waste in the post-closure period. However, the stability and seismic analyses assume that the waste will remain dry. **CNL Response** As per the Design Requirements [1], "*The design (service) life of the engineered containment mound (ECM) shall exceed the period of time during which contaminants may be generated at concentrations that could have an unacceptable impact if they were to be discharged from the site. This is known as the contaminating life span*." The ECM has a design life of 550 years, specifically the ECM has been designed to provide containment of wastes over a design service life extending to 500 years after closure. The remaining radioactivity present in the NSDF after the 500-year design life is limited to long-lived radionuclides present at total radioactivity concentrations comparable to naturally occurring background concentrations. The risk of the presence of these long-lived radionuclides has been studied in detail in the Post-Closure Safety Assessment [2]. Within the Post-Closure Safety Assessment, CNL demonstrates that there are no impacts to human health and the environment if more severe events than a design basis seismic event were to occur. Although the Post-Closure Safety Assessment is still under technical assessment by CNSC staff as part of the licensing application, the Post-closure Safety Assessment is a bounding safety assessment sufficiently supporting the EIS. The Post-Closure Safety Assessment conservatively assumes cover degradation rates faster than the design basis, thus examining water mounding in the waste shortly after the 300-year Institutional Control phase which is earlier than actually anticipated based on the design life. The performance of the ECM is examined in this way to provide the most cautious approach to calculate dose consequences thus will be inconsistent with stability and seismic analysis to some degree. The Post-Closure Safety Assessment 's conceptual model of cap performance and degradation has assumed the cap degraded by 37% at the end of the 550-yr design life [2]. The model then assumes the	EIS	Section 10.3 (Seismic Events)	Additional information.	Accepted

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	**Section/Figure/ Table Impacted by Response**	**Scope of New Information**	
			cap degrades quickly beyond the design life and is fully degraded after 650 year which are conservative assumptions leading to a cautious scenario of overtopping between 450 year and 4100 year [3]. Evidence that these assumptions are conservative comes from the testing program on the HDPE geomembranes that was undertaken as part of the NSDF project [3]. The testing program provided scientific evidence to demonstrate geomembrane candidates have a predicted service-life greater than 1200 years, thus exceeding the design life of 550 years. The assumptions of the ECM stability and seismic analyses are valid for the ECM design life, where the ECM passive structures (i.e., perimeter berm, base liner system, and final cover system) exist as-constructed and are therefore functioning per design intent. This seismic analysis assumes that the ECM sand layers are not susceptible to liquefaction or seismically induced pore-pressure buildup since the ECM sand layer components will be installed in a controlled manner with a high level of compaction. As such these components will be similar to dense sand deposits, which are generally not susceptible to liquefaction. ***Changes to EIS:*** The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: **EIS Section 10.3** An analysis of liquefaction potential was completed and indicated that the 10,000-year design seismic event scenario may cause liquefaction in the saturated native sand to silty sand soils underlying the ECM resulting in unacceptable vertical and horizontal displacements. Based on this, CNL has added additional mitigation to limit the potential for liquefaction. Overburden soils beneath the ECM containment berm will be excavated down to the top of the bedrock, extending horizontally from beneath the containment berm to a distance at which the slopes of the containment berm intersect the bedrock surface. The removed overburden soils then can be replaced with backfill material in multiple lifts. Each lift can be compacted to the desired density using vibratory roller compactors. The edges of excavation can be sloped back temporarily to provide stability. Dynamic compaction could also be used in select areas of the construction site where the existing grade is relatively flat and in the limited areas where proximity of the existing wetlands would require the use of sheet piling or other temporary excavation support. This excavation and replace method can produce a high-quality ground mass with high density and desired permeability. Since the sand layer components of the ECM will be installed in a controlled manner with a high level of compaction, the sand layer components will be similar to dense sand deposits, which are generally not susceptible to liquefaction. ***References:*** [1] AECOM (AECOM Canada Ltd.). 2019. Design Requirements. Canadian Nuclear Laboratories Document No. 232-503212-DR-001, Revision 2. 2019 April. [2] Arcadis and Quintessa (Arcadis Canada Inc. and Quintessa Ltd.). 2019. Postclosure Safety Assessment for the NSDF Project. Canadian Nuclear Laboratories Document No. 232-509240-ASD-004, Revision 0. 2019 November. [3] R. Kerry Rowe Inc. 2019. Near Surface Disposal Facility Geomembrane Relative Performance Report – Public Version (Redacted). Canadian Nuclear Laboratories Document No. 232-503212-REPT-024, Revision 0. 2019 February.				
CNSC-2-10	New IR	Section 5.3	**Agency Information Request - Change to an environmental component due to radiological contaminants** ***Question:*** The background information in section 5.3 of the revised EIS should be completed to accurately reflect the information in the supporting references (particularly the Geological Waste Management Facility Integrated Geosynthesis Report, including but not limited to #1 – 3 in Context section). The hydrogeology model should consider the structural data known for the site. Please demonstrate how a fractured bedrock surface will impact the analysis of the geological and hydrogeological VCs. Furthermore, considering the 10,000 year PostSA assessment time frame, the baseline information from the site that is relevant for the NSDF extends to the upper bedrock. The relevant baseline information must be clearly summarized in the EIS, and integrated into the predictive models of the site's future evolution. ***Context:*** Section 5.3 is incomplete. Geological features as documented in (for example) the Geological Waste Management Facility Integrated Geosynthesis Report (the Geosynthesis Report), which forms part of the reference information used to support the revised EIS, presents	**EIS**	Section 5.3.1.4.2.1 (Regional Geological Conditions)	Updated to include a description of the two dykes and the fracture zones as described in historical data sources, including the Geologic Waste Management Facility (GWMF) Integrated	Rejected with Follow Up IR CNSC-3-02

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			information that appears not to have been considered in the revised EIS, and must be considered. The characteristics of the geosphere underlying the NSDF footprint is part of the existing environment and could impact the predictions about project environmental effects. For instance: 1. In the Geosynthesis Report, figure 2-16a diabase dyke appears to cross in to the (unmarked) NSDF footprint; figure 2-37 also shows a major EW trending magnetic anomaly that appears to cross into the NSDF footprint. 2. The results of the lineament study, depicting surface structures at the proposed NSDF site are not considered or depicted. 3. Figure 2-42 in the Geosynthesis Report depicts fracture zones of “confirmed and probably categories” – why aren’t these presented in the EIS? There are fracture zones that transect the proposed footprint of the NDSF. 4. Furthermore, why isn’t this information used in the groundwater modelling? The model should be based on realistic and available site information. ***Rationale:*** Geological information on the site, particularly on the structural geology of the upper bedrock, has not been integrated into the revised EIS. This information (#1 – 3 in “Context” section above) may affect the pathway analysis for the geology and hydrogeology VCs. Surface bedrock structures known to exist in the footprint of the NSDF should be used in the hydrogeological model for the site. The PostSA for the NSDF defines an assessment time frame of 10,000 years. This long time frame needs to be supported by models and information (e.g., #1 – 3 above) including the geological environment. This information (the baseline geological environment) should be accurately represented in the EIS. **CNL Response** The hydrogeological model has considered the structural data known for the site. The structural features identified in [1] have not been incorporated into the hydrogeological model for reasons provided below. The fractured bedrock has been incorporated into the hydrogeological model through treatment of the bedrock as an equivalent porous media based on hydraulic conductivity testing of bedrock at 24 locations within the site study area (see Section 5.3.2.4.2 of the EIS). The studies performed by the previous Geologic Waste Management Facility (GWMF) project are documented in two reports: *CNL’s Geologic Waste Management Facility Integrated Geosynthesis* [1] and *CNL’s Geologic Waste Management Facility Descriptive Geosphere Site Model* [2]. Data presented in these reports forms the basis of the current geological and hydrostratigraphic interpretations within the regional site study area (RSA) (Section 5.3.1.4.1 of the EIS). The structural and lithological information specifically concerning NSDF site (i.e., the site study area (SSA) and the local study area (LSA) in the EIS) presented in [1] and [2] contain significant uncertainties regarding real existence, location and 3-D geometry of structural elements and conclusive mineralogical composition of lithological elements. These uncertainties are based on the different scales of work and objectives of the two projects (GWMF and NSDF). The scope of work and data collection of the GWMF project is focused on the bedrock characterization of CRL site and surrounding areas to assess its suitability to host a deep geological repository (DGR) at depths from 500 to 1,000 meters below ground level (mbgl), whereas NSDF data is specific for NSDF site and limited to shallower depths. The focus of the studies differ because of scale, areas of interest, depth within the geological setting and as such different sampling and mapping methods are applied. The utilization on a smaller scale of data and interpretations designed for a larger scale brings associated uncertainties. These uncertainties can be summarized as the lack of direct (borehole data and/or surface data) and indirect (geophysical data) evidence of the real existence, spatial location and attitude of the two structural features (southern diabase dyke and fracture zone Feature # 17) interpreted by GWMF project as potentially located in the NSDF SSA and other interpreted fracture zones potentially located in the NSDF LSA. The three-dimensional geometry of these features in the NSDF site area is considered conceptual. In similar fashion, the lithological elements described by the GWMF project for the NSDF site area are a generalized extrapolation based on data from boreholes located relatively distant from the NSDF site.			Geosynthesis (IG) report [1]	
				EIS	Section 5.3.1.4.2.4 (Local and Site Area Geological Conditions)	Updated to include a description of Feature #17 as described in historical data sources, including the Geologic Waste Management Facility (GWMF) Integrated Geosynthesis (IG) report [1]	

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			Based on these facts it is considered that the extent of the usefulness of this information for the NSDF site specific studies does not go beyond a general framework of potential location and orientation of structural elements and interpreted lithological elements. Specific considerations in the context of the development of the hydrogeological model are detailed as follows: • The underlying presence of the southern diabase dyke in the NSDF SSA cannot be confirmed due to the lack of direct and indirect evidence. However, its existence in or proximity to the NSDF LSA is confirmed. Given the low permeability of the diabase dykes relative to that of the host rock and their location below ground level, the potential presence of the southern diabase dyke in the NSDF SSA, as well as its confirmed presence in the NSDF LSA, is not considered to have potential as an enhanced groundwater flow path and therefore was not incorporated in the hydrogeological model; • The interpreted fracture zone (Feature #17) is located in the southern portion of the NSDF SSA and is orientated perpendicular to the direction of groundwater flow, thus limiting its potential as a preferential groundwater flow pathway. As such, Feature # 17 was not explicitly considered in the hydrogeological model. • The lineament analyses performed by the GWMF project for the NSDF site (i.e., the SSA and LSA) provide an indication of the potential presence of major structures. But, due to the lack of direct and indirect evidence, they do not provide the specific information regarding spatial location, attitude, structural properties and hydraulic properties of potential fracture zones associated to these lineaments that could be incorporated into the hydrogeological model. • The NSDF site specific borehole data include 24 borehole locations in the site study area where boreholes extended up to 13.9 m into bedrock (see [3]). Structural bedrock information recorded in the borehole logs of the NSDF specific boreholes does not indicate the presence of an extensive fracture zone. • The fractured nature of bedrock and groundwater flow through bedrock is considered in the hydrogeological model by treatment of bedrock as an equivalent porous media. Hydraulic conductivity for bedrock as determined from hydraulic conductivity testing at 24 locations as described in Section 5.3.2.4.2 of the EIS. Results of hydraulic conductivity testing in shallow bedrock at the NSDF site is in broad alignment with hydraulic conductivity measurements in shallow bedrock at other locations on the CRL site. • The hydrogeological model for bedrock has incorporated the relevant baseline information from the CRL site and is considered representative of groundwater flow conditions over the 10,000-year timeframe of the Post-Closure Safety Assessment. **A detailed response to reviewer's items # 1 to 4 follows:** (Note: All referenced figures in the discussion below are from [1], [4] or [7] and are included in this table to support the discussion. However, the NSDF Project footprint (i.e., SSA and LSA footprints) has been overlaid on Figure 2 [4], Figure STF-Map 7, Figure 4-19 [7] and Figure 2-42 in [1]. 1. Two structural features presented in the GWMF three-dimensional sub-regional scale geological model version 2 [4] are interpreted by the GWMF project as potentially located in the NSDF SSA: • The southern diabase dyke (Feature # 7) and, • Feature # 17. Figures 1, 2 and 8 in [4] show these features and their location relative to the NSDF SSA and LSA. These features were not included in the information presented in Section 5.3 of the EIS and they were not used in the development of the groundwater model. The rationale supporting this decision was based on the following: • The southern diabase dyke (Feature #7): The underlying presence of the southern diabase dyke in the NSDF SSA cannot be confirmed; however, its existence in or in the surroundings of the NSDF LSA is confirmed. Given the low permeability of the dykes relative to that of the host rock, and their location below ground level observed at borehole intersections from previous studies, it is concluded that the potential presence of the southern diabase dyke in the NSDF SSA, as well as its confirmed presence in or in the surroundings of the NSDF LSA, does not indicate potential for an enhanced groundwater flow pathway and therefore was not included in the hydrogeological model. Diabase Dykes at CRL Property – History and Evidences Two E-W trending post-orogenic Neoproterozoic diabase dykes (i.e., the northern and southern dykes), present at the Chalk River Laboratories (CRL) site are part of the Grenville dyke swarm that extends from the Georgian Bay-Lake Timiskaming region to at least north of Montreal (see Figure 2-36 in [1]). The swarm consists of steeply dipping, east-west trending dykes. The northern and southern diabase dykes are proven at the CRL site by borehole intersections from CR-, FS- and CRG-series boreholes, strong magnetic geophysical signature and dispersed outcrop exposures and in floats/boulders (mainly near				

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			Maskinonge Lake). The northern and southern dykes dip steeply north (~70°), range in true width between about 15 and 40 m and appear to be relatively continuous across the property. They have lower permeabilities (10^{-21} m^2 and 10^{-18} m^2 in borehole intersections in boreholes CRG-3 and CRG-6, respectively) than the host rockmass and thus have the potential to act as relatively impermeable flow barriers (aquitards). The decreased permeability is attributed to the ubiquitous distribution of fracture fillings in most fractures. This earlier observation is confirmed by tests done for the Geologic Waste Management Facility (GWMF) project, as shown in Table 2-10 in [1]. Airborne and ground magnetometer surveys were performed at CRL site. An airborne magnetic survey performed by the Geologic Survey of Canada (GSC) [5] showed two linear highs in the magnetic field indicating the approximate location of the two diabase dykes. This airborne magnetic survey did not cover the eastern side of CRL site where NSDF SSA is located (see Figure 2-37 in [1]). Geological modelling indicates that the diabase dykes dip at moderately steep angles between 65º and 75º toward the north and vary in true width along strike from 7 m to a maximum of 47 m. Details may be found in [6] and [7]. Ground and airborne geophysical anomalies (VLF-EM and magnetic) were interpreted by Raven Beck Environmental Ltd. for Siting Task Force (STF) in 1994 [8]. The magnetic anomaly traces show the approximate location of the two diabase dykes at the CRL site (see Figure STF-Map 7). In this figure the end of the anomaly corresponding to the southern diabase dyke is located south of the NSDF SSA boundary. No magnetic anomaly was identified in the NSDF SSA. There is no recorded geophysical anomaly, outcrop exposure or presence of floats/boulders in the NSDF SSA that can be correlated to the presence of the southern diabase dyke. For modelling purposes both dykes were extended towards the East and they were terminated in the Mattawa Fault and their surfaces expressions were slightly modified by the GWMF project. This is the reason why the southern dyke is currently interpreted as underlying the NSDF site. The diabase dykes are presented as features # 6 and # 7 in the 3D sub-regional scale geological model-Version 2 (Section 2.5.5.3 in [1] and [4]) (see Figure1, Figure 2 and Figure 8 in [4]). A considerable vertical distance below ground level is observed from borehole intersections of the southern dyke (ranging from 280 mbgl in CR-6 to 926 mbgl in CRG-3). • Feature # 17 : This feature, categorized as “possible” in the 3D sub-regional scale geological model version 2 (Section 2.5.5.3 in [1] and [4]), is a suspected structural feature that was assigned an ESE-WNW (105/285°azimuth) trend, a length of 1,100 m and width of 10 m. A clearly defined structural control parallel to this feature observed in the LiDAR image and in air photos, and field mapping data obtained in the southern section of the feature, provided the rationale to include it in the geological model. A dip direction of 70° towards the NE is assumed due to the field mapping data. In the vicinity of the NSDF site this suspected structural feature is supported by a defined structural control and geophysical anomaly. The absence of direct evidence prevents correlating this lineament with a proven discontinuity in the rock mass. However the NSDF site specific borehole data provided by [3] does not indicate the presence of an extensive fracture zone. Further, the interpreted orientation of the fracture zone Feature #17 is perpendicular to the direction of groundwater flow, thus limiting its potential as a preferential groundwater flow pathway. As such, Feature # 17 was not explicitly considered in the hydrogeological model and instead the upper portion of the bedrock was represented using an equivalent porous media with higher permeability to reflect the generally weathered / fractured nature of the upper bedrock. 2. The lineament studies for the CRL site and surrounding area were performed by: • The Canadian Fuel Waste Management Program (CNFWMP) (1977-1983); • Raven Beck Environmental Ltd. for STF (1994); and • GWMF Project (2015). The lineament studies performed by the Canadian Fuel Waste Management Program (CNFWMP) (1977-1983) covered only the area around the Maskinonge Lake Study Area and are not related to the NSDF site due to distance. The lineament study performed by Raven Beck Environmental Ltd. in [8] over the CRL site presents interpreted lineaments based on analysis of air photo and linear geophysical anomalies (ground and airborne VLF-EM and magnetic anomalies) (see Figure STF-Map 7 below). Based on this study major fracture and fault zones were interpreted by Raven Beck Environmental Ltd., with a definition of fracture and fault zones based on a ranking of probability (see Figure 4-19 in [7]). The defined fracture zones ranked as (1) “confirmed” or “very high probability” and (2) “high probability” were adapted by the GWMF project in the development of the property-scale three-dimensional geological model (see Figure 2-42 in [1]). There are no (1) “confirmed” or “very high probability” fracture zone in the vicinity				

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			of the NSDF site area (SSA and LSA). There is only one “high probability” fracture zone in the southern section of the NSDF SSA. This feature (Feature # 17) was re-categorized in 2015 as “possible” as part of the three-dimensional sub-regional scale model-version 2 (section 2.5.5.3 in [1] and [4]) and the reasons for not considering it in the NSDF hydrogeological model are described above (see discussion of Feature # 17 in #1 above). The same reasons apply for not including other interpreted features in the NSDF LSA (see Figure 2-42 in [1] and Figure STF-Map 7 below). 3. Lineament analyses specifically concerning the NSDF site area (SSA and LSA) performed by the GWMF project and its predecessors provide an indication of the potential presence of major structures. However, in the absence of bedrock exposures and confirmed borehole intersections, these studies are limited to assigning a trend and length to the lineament. Detailed knowledge of geometry and structural properties is not available and geometry of these features in 3-D are considered conceptual. Based on this fact and on the different scale of work (sub-regional scale and property scale) of the GWMF project compared to NSDF site specific scale, it is concluded that lineament studies performed by the GWMF project and predecessors provide a framework for the general orientation of potential fracture zones and their potential locations, but they do not provide any specific data or information regarding spatial location, attitude and characteristics that relevant for the NSDF site specific needs. Based on the conceptual nature of the interpreted features due to the lack of direct evidence, the lineament analyses performed by the GWMF project and its predecessors do not provide any conclusive data or information applicable to the NSDF site. Therefore, potential linear fracture zones derived from these lineament studies were not included in the hydrogeological model. The bedrock is conceptualized as an equivalent porous medium. Hydraulic conductivity of bedrock is determined from hydraulic conductivity testing conducted as part of hydrogeological investigations in [3]. The same source ([3]) is recommended for any additional required structural information regarding the NSDF site area. 4. The structural and lithological information specifically concerning the NSDF site (SSA) and close surrounding areas (LSA) presented in the GWMF Integrated Geosynthesis (IG) report [1] is not used in the NSDF site groundwater modelling due to the uncertainties described above. The level of uncertainty associated to this information prevents considering it realistic and valuable for NSDF site specific needs. Features interpreted by the GWMF project as being potentially located in the NSDF site area were not integrated into predictive models (used for evaluation of the future evolution of the NSDF site in the 10,000 year timeframe Post-Closure Safety Assessment), due to the previously described level of uncertainty regarding real existence, spatial location, attitude, structural properties and lithological characteristics; and, the lack of specific data or information relevant to the NSDF site. Therefore, it is considered that these features do not represent any potential impact in the natural processes that could affect the NSDF site in the long term 10,000-year timeframe Post-Closure Safety Assessment. ***Changes to EIS:*** Section 5.3.1 of the Final EIS will be expanded to provide a more complete discussion of structural data provided in historical data sources, including the Geologic Waste Management Facility (GWMF) Integrated Geosynthesis (IG) report [1]. Specifically, Section 5.3.1.4.2.1 (Regional Geological Conditions) will be updated to include the description of the two dykes and the fracture zones described above and Section 5.3.1.4.2.4 (Local and Site Area Geological Conditions) will be updated to include additional details on Feature #17 described below. Further, as discussed below, the additional information described does not affect the hydrogeological model for the NDSF site. Therefore, no changes were made to the EIS with respect to the hydrogeological model. ***References:*** [1] CNL. 2016. Geologic Waste Management Facility Integrated Geosynthesis Report: Phase I. Canadian Nuclear Laboratories Document No. 361101-10260-REPT-004, Revision 0. 2016 March. [2] CNL. 2016. Geologic Waste Management Facility Descriptive Geosphere Site Model Report: Phase I. Canadian Nuclear Laboratories Document No. 361101-10260-REPT-005, Revision 0. 2016 March. [3] Amec Foster Wheeler Ltd. 2017. Multidisciplinary Subsurface Investigation Phase 1. Canadian Nuclear Laboratories Document No. 232-10180-REPT-003, Revision 1. 2017 April.				

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[4] CNL. 2015. Three-Dimensional Sub-Regional Scale Geological Model – Version 2, Canadian Nuclear Laboratories Document No. 361101-10120-REPT-020, Revision 0. 2015 January.
[5] Geological Survey of Canada. 1992. Airborne geophysical survey of the Chalk River AECL research area, Ontario. Natural Resources Canada, Siting Task Force. Open File Report 2638, STF Tech. Bib. No. 334.
[6] Hayles Geoscience Surveys Ltd. 2009. Ground magnetic surveys at Chalk River, Ontario. 2009 July.
[7] Preliminary geological synthesis of the Chalk River Laboratories property, Canadian Nuclear Laboratories Document No. 361101-10120-REPT-010, Revision 2, 2011.
[8] Raven Beck Environmental Ltd. 1994. Bedrock geological mapping and studies of the Chalk River Laboratories property, Deep River, Ontario. Natural Resources Canada, Siting Task Force, STF Tech. Bib. No. 338A, 86.

Figures:

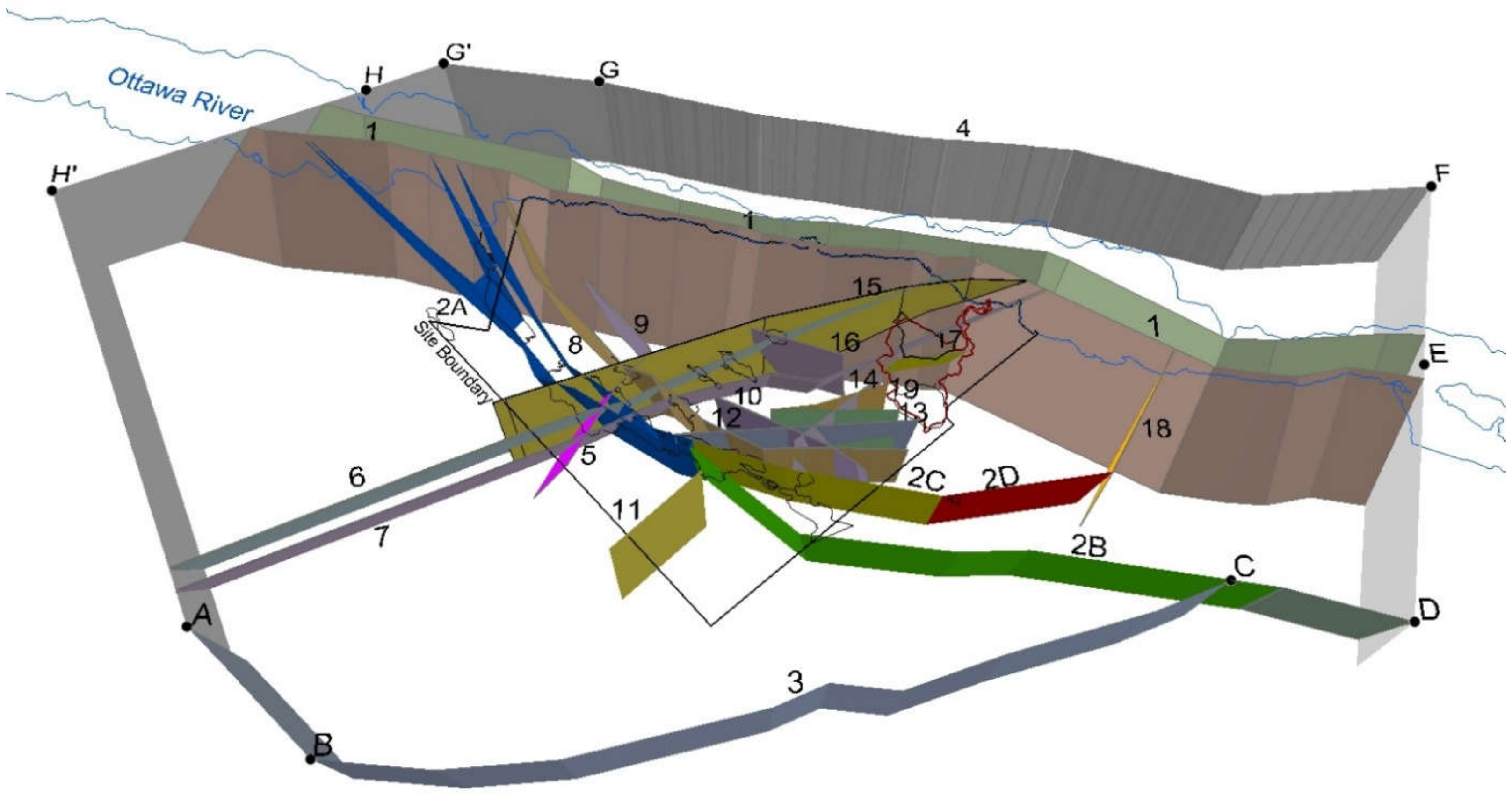

Figure 2 in [4] including NSDF boundary (SSA) and LSA: Three-Dimensional View Showing Boundaries and Structures for the 3D Sub-Regional Scale Geological Model V-2 [4] and CRL Property Boundaries.

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			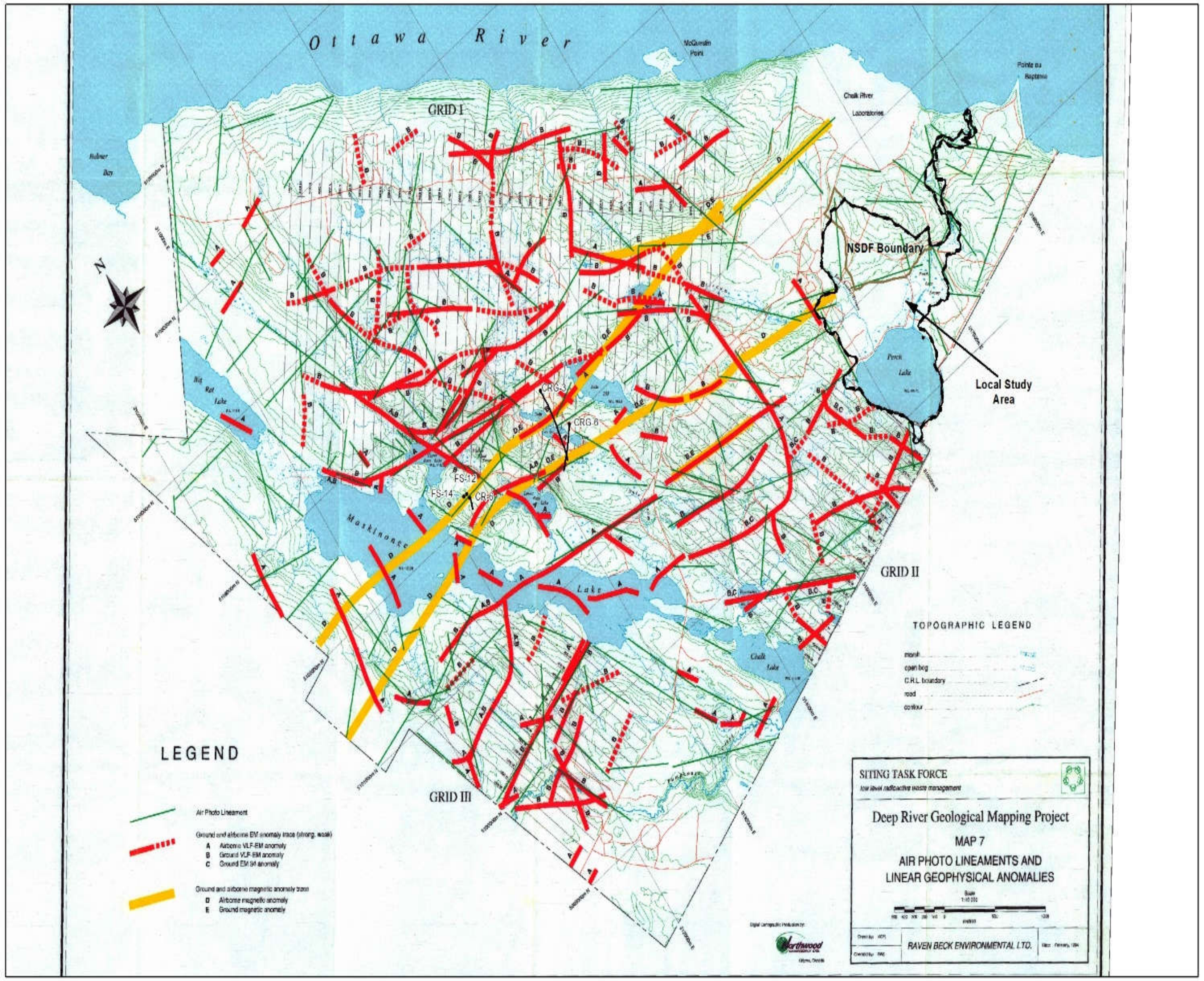 Figure STF-Map 7 including NSDF boundary (SSA) and LSA (In Table 2-11 in [1], figure (f)).				

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			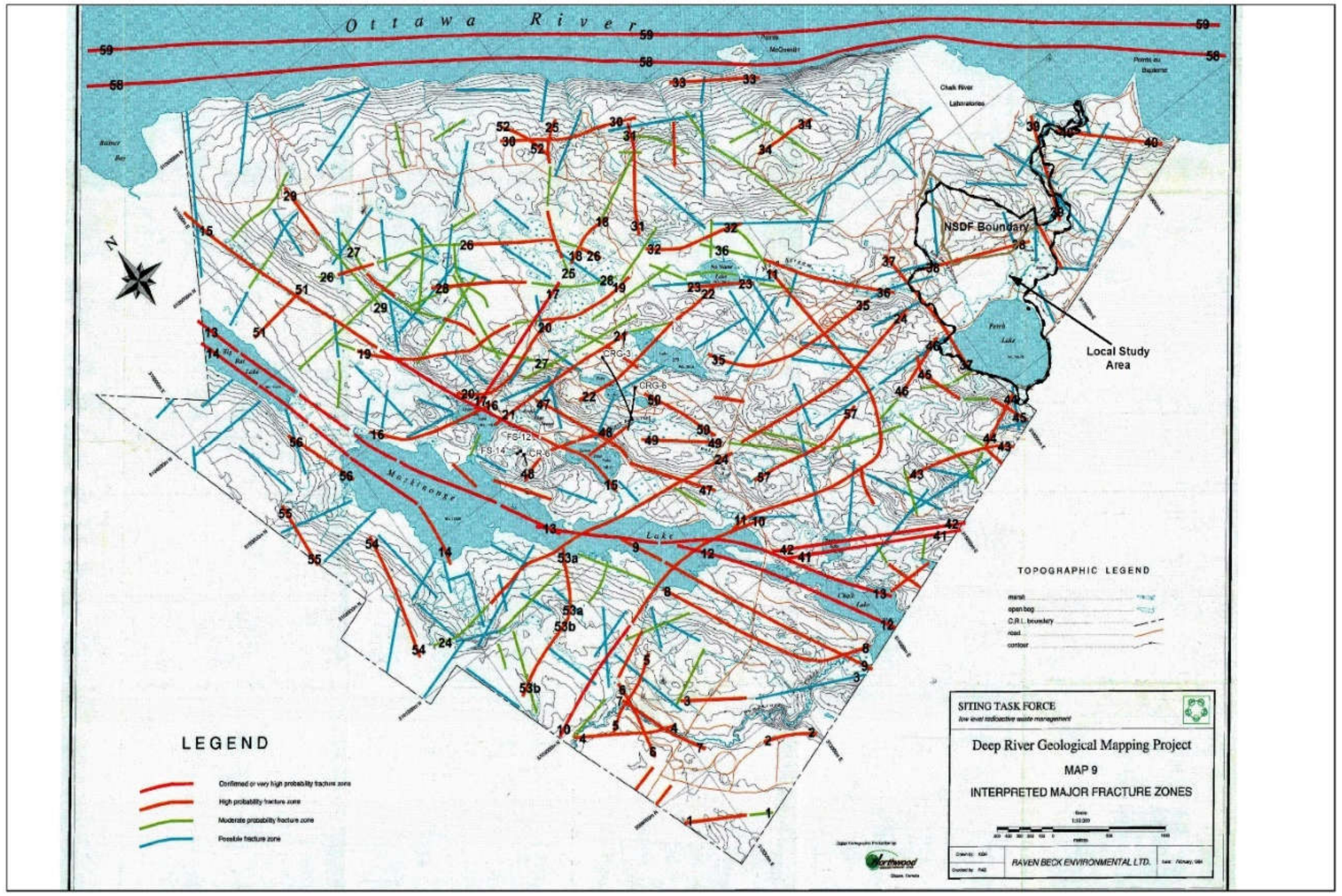 **Figure 4-19 in [7] including NSDF boundary (SSA) and LSA: Map of the CRL Property Showing Interpreted Major Fracture and/or Fault Zones Based on Analysis of Multidisciplinary Data (from [8]).**				

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			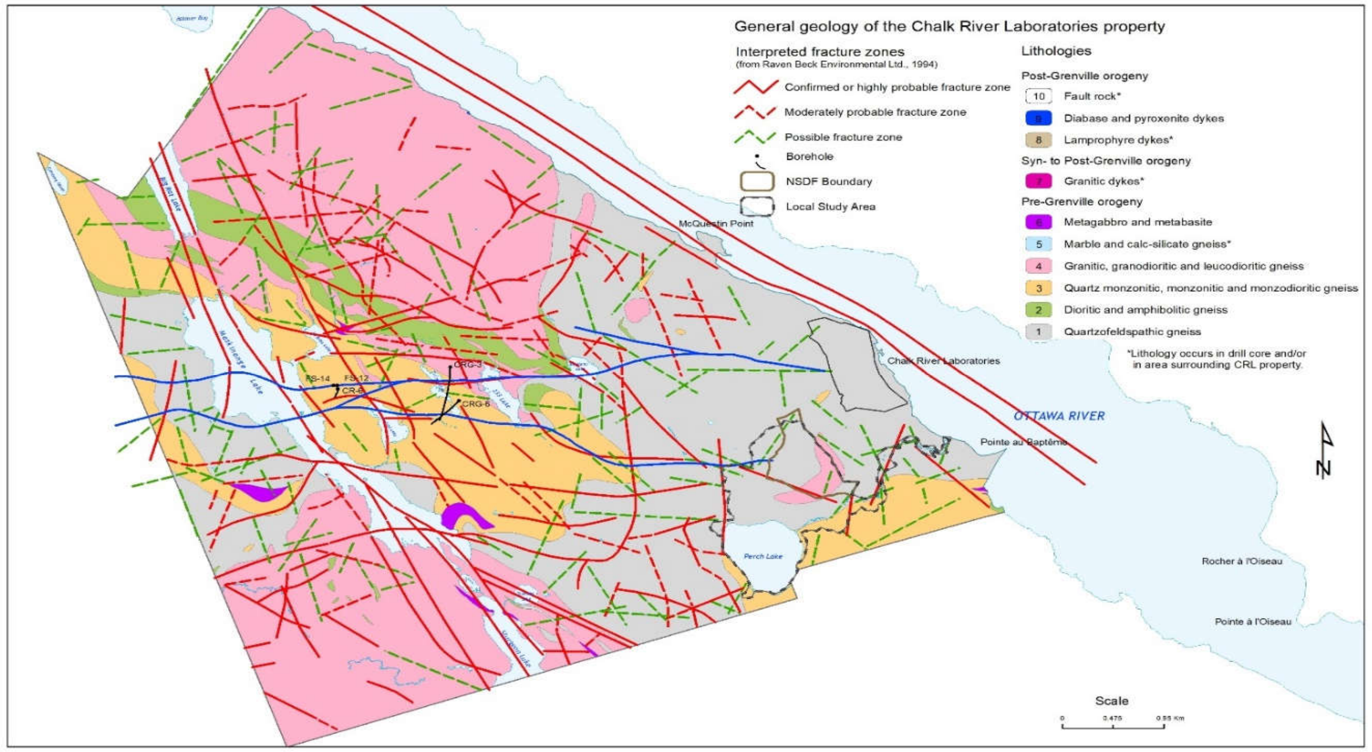 **Figure 2-42 in [1] including NSDF boundary (SSA) and LSA: Fracture Zones of Confirmed and Probable Categories Interpreted on the CRL Site in studies done for the Siting Task Force (1994) [8].**				
CNSC-2-11	New IR	Section 4.0	**Agency Information Request - Public and Stakeholder Engagement** ***Question:*** CNL is requested to conduct an evaluation on their public engagement activities. The purpose of this assessment is to identify the effectiveness of their engagement activities, confirming that full consultation has occurred with target audiences. The assessment should also demonstrate how CNL has responded to the public's changing need for information as the project has progressed, and demonstrate that they have engaged in a two-way dialogue with target audiences. To the extent practicable, there should be a demonstration that CNL has sought and obtained, where possible, validation from stakeholders that their concerns and issues have been adequately addressed. ***Context:*** CNL has provided a summary of all outreach and engagement that has been conducted in support of the proposed NSDF Project. CNL also provided a summary of feedback heard during engagement sessions, including key themes, and how this feedback was incorporated into the revised EIS. However, there is no formal evaluation as to the outcomes and impacts of the engagement sessions, and how this has influenced CNL engagement activities. There is also no evaluation as to whether engagement activities have been successful in achieving CNL corporate public information program objectives. ***Rationale:*** Section 2.2.6 of REGDOC-3.2.1, *Public Information and Disclosure* describes the requirement for a program evaluation and improvement process. The evaluation process may include surveys of the surrounding communities to gauge changes in public interest, or satisfaction with the information provided.	EIS	NEW Section 4.1.1 (Evaluation) Section 4.2.10 (Social Media)	Additional information.	Rejected with Follow Up IR CNSC-3-03

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				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			CNL Response The NSDF project established communication objectives as outlined in Section 2 of the Stakeholder Engagement Report (SER) [1] as well as Section 4.1 of the revised EIS. These objectives are used to measure the effectiveness of communication activities as well as the evolving nature of the communication program of the NSDF Project. At all events and activities, CNL evaluates several public engagement indicators including: participant satisfaction, audience representation, increased understanding of the NSDF project, and increased project understanding of community and stakeholder issues. In May 2020, the NSDF Project performed a self-assessment of all public communication and engagement activities related to the project that have taken place thus far. Recommendations from this assessment are intended to improve project engagements; however it also identified several good practices where CNL has responded to the public's changing need for information as the project has progressed. Several examples include: • The introduction of infographics enabled the technical but crucial aspects of the NSDF Project to be framed in a simpler format that can be easily understood by an audience with varying technical backgrounds. Infographics are discussed in Section 4.2.6 of the EIS. • Public information sessions within the community have evolved to project webinars which are broadcast over the internet to reach more diverse audience demographics over a wider geographic region (i.e., anyone who has access to a web browser and internet connection). Due to the increase in attendance of the webinars in comparison with the traditional public information sessions within the community, CNL determined that stakeholders were receptive of webinars as a new method of engagement and the NSDF Project responded by committing to quarterly webinar updates. The audience is able to ask questions during the webinar in a "chat space" and the webinars are also archived on the CNL YouTube page. Project webinars are discussed in Section 4.2.2 of the EIS. • Feedback from the public indicated that there was an interest in regular technical public engagements versus technical meetings upon request. Bi-monthly Breakfast Briefings were introduced in April 2019 in CNL's host community of Deep River; in February 2020, this evolved to also include a bi-monthly breakfast briefing in Pembroke. Breakfast Briefings included a presentation of updates of the NSDF Project followed by audience question and answer period as well as time to informally discuss technical or scientific aspects of the NSDF Project with its Subject Matter Experts "over breakfast". These technical public engagement meetings and public breakfast briefings provide a platform for two-way communication between CNL and its stakeholders to discuss the NSDF Project. Breakfast briefings are discussed in Section 4.2.1.54 of the EIS. • Since the release of the revised Draft NSDF EIS in December 2019, CNL has been contacting intervenors who provided technical comments on the 2017 Draft EIS offering to meet one on one. The purpose of these meetings is to share CNL's draft responses to their comments and discuss if their concerns or issues have been addressed. Feedback received from these meetings are incorporated to the final responses to the comments thus serving as a validation exercise with stakeholders. One-on-one meetings with intervenors is discussed as for the Fiscal Year 2020/2021 under Section 5 of the SER [1]. • External webpage and social media analytics also provide CNL with data to improve web content and adapt to how users are accessing the information online. Analytics are reviewed (i.e., milestones, announcements) at least every six months. Very early in the NSDF project's planning phase, CNL determined that the CNL company Facebook page is the most frequently visited and used social media platform where NSDF Project information was accessed and criticized (e.g. comments, likes, shares, etc.); thus the use of this platform for the project was increased. Social media is discussed in Section 4.2.10 of the EIS. • In all public engagement endeavours, CNL contact details (e.g., website, telephone, email) are provided along with mechanisms of feedback submission available on the CNL webpage (www.CNL.ca). This provides individuals and groups to voice their concerns throughout all phases of the NSDF Project. All public feedback related to the NSDF Project are received by CNL Communications who collaborate with the NSDF Project to determine effective and proactive resolutions on a case by case basis. Public feedback is reviewed every six months to analyze trends in comments and inquiries to assist in planning future engagement activities. Through the use of various flexible modes of communication and public engagement, CNL has been able to engage a wider audience (demographically, geographically) who may have a stake in the development of the NSDF Project. By enabling two-way dialogue and implementing these engagement mechanisms in the planning of the NSDF Project, CNL was able to adapt and respond to stakeholders' changing need for information. The NSDF Project's routine self-assessment of its public engagement activities as well as public feedback will enable CNL to continuously evaluate the effectiveness of its engagement efforts. To this end, similar self-assessments will be routinely conducted every six months at all project phases of the NSDF to gauge public feedback of the NSDF Project developments.				

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			Changes to EIS: The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: **NEW Section 4.1.1 Evaluation:** The engagement objectives discussed above in Section 4.1 are used to measure the effectiveness of communication activities as well as the evolving nature of the communication strategy of the NSDF Project. At events and activities, CNL evaluates several public engagement indicators including: level of participant satisfaction, audience representation, level of engagement with SMEs, level of understanding of the NSDF Project, and level of increased project understanding of community and stakeholder issues. Through the use of various flexible modes of communication and public engagement, CNL has been able to engage a wider audience (demographically and geographically) who may have a stake in the development of the NSDF Project. By enabling two-way dialogue and implementing these accessible engagement mechanisms in the planning of the NSDF Project, CNL was able to adapt and respond to stakeholders' changing need for information. The NSDF Project's routine self-assessment of its public engagement activities as well as public feedback will enable CNL to continuously evaluate the effectiveness of its engagement efforts. **Section 4.2.10 -** first paragraph: Social media is used to inform, educate, promote awareness for all CNL activities including NSDF Project events and to receive feedback on the NSDF Project. CNL has used web-based analytics to determine how online users utilize different CNL company social media platforms. This enables CNL to assess which platforms are more effective in engaging the largest audience (followers) and the widest geographic reach (location) while also evaluating the overall usefulness of social media as a medium of public dialogue. Seven videos covering topics such as "why the NSDF?", "responsible water management" and Project updates have been uploaded to YouTube. The videos have been added in an effort to make information and technical information more accessible. Facebook is CNL's largest platform, where the company sees the strongest engagement through "comments, shares and likes" of posts. When CNL wished to raise the profile of project events or information, "boosted" posts were used to target by location and demographics. "Boosted" posts are paid posts through Facebook. Twitter has not been used as broadly as Tweets have been found to receive very little traction, and CNL has a comparatively much larger Facebook following. While numbers are significantly larger on LinkedIn, the demographics are far more industry based, rather than general public. Therefore, CNL utilizes LinkedIn, but in a much lower capacity than Facebook to ensure engagement is a balanced approach with general public in comparison to those actively part of the nuclear industry. See Table 4.2.10-1 for follower/subscriber numbers ***References:*** [1] CNL. 2019. Stakeholder Engagement Report – Near Surface Disposal Facility. Canadian Nuclear Laboratories Document No. 232-513400-REPT-002, Revision 0. 2019 November. [2] CNL. 2019. Public Information Program for Canadian Nuclear Laboratories. Canadian Nuclear Laboratories Document No. CW-513430-REPT-001, Revision 5. 2019 July.				
CNSC-2-12	New IR	Section 5.8.6.2.2.1	**Agency Information Request - Change to an environmental component due to hazardous contaminants** ***Question:*** CNL is requested to justify the change in the model parameters (L_o and k) in estimating emissions from the decomposition of waste. CNL should provide further clarification in the EIS and supporting materials for how these parameters were determined and confirm that they are adequately conservative. ***Context:*** The emissions due to the decomposition of waste were assumed to be 252,000 m^3/year. This value is an increase from the assumed value of 39,000 m^3/year that was used in the 2017 version of the EIS. It was noted that the parameters for L_o and k were revised and are based on the 2018 version of the Landfill Gas Management Plan. ***Rationale:***	EIS	Section 5.8.6.2.2.1 (Non-radiological Exposure Assessment - Application Case Results - Operations)	Additional clarification and information.	Accepted

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			The information in the Landfill Gas Management Plan provides two references as validation for the site-specific factors derived for this assessment. The value for L_o, in particular, is below the range of L_o factors provided in the listed references. Further clarification should be provided for how the parameters for L_o and k were determined and whether or not they are adequately conservative. **CNL Response** Since the 2017 version of EIS, there has been changes to the design assumptions for mass of organics in the engineered containment mound (ECM). Specifically, the revised estimate for the mass of organics was projected to be 10% of the total ECM waste mass in comparison to the previous estimate of 3%. In addition, a more conservative estimate (increase in moisture) was used for the waste moisture content "k" and L_o was increased to reflect the higher content of wood. The vast majority of the organic material forecaseted is wood waste from facilities decommissioning and smaller amounts of highly compressible and decomposable organic waste. The revised waste composition reflects the reality that more wood waste will be disposed in the NSDF from decommissioning of existing on-site structures. The methane generation rate factor "k" is based primarily on the moisture content of the waste, the availability of nutrients for microorganisms that break down the waste, the pH of the waste and the temperature of the waste mass. The methane generation capacity factor "L_o" is based primarily on the type and composition of the waste placed in the facility. Thus k and L_o are used to estimate future landfill gas generation rates and are composite numbers that reflect the overall composition of the waste in the landfill. As such if the overall composition or projected volumes of the waste change, the k and L_o values change accordingly. This led to the revised landfill gas estimates in the Landfill Gas Management Plan [1] and Radon and Other Landfill Gas Modelling Evaluation [2]. The NSDF site-specific composite k and L_o factors were calculated by multiplying the percent mass of each of the anticipated organic constituents in the landfilled waste by the k and L_o factors specific to each waste type (recommended in the Environment Canada 2005 [3] and National Council for Air and Stream Improvement, Inc. [4]) as cited in Section 3.3 of Radon and Other Landfill Gas Modelling Evaluation [2], and then summing the individual products to arrive at composite k and L_o values representative of the total waste mass. The cited sources and, therefore, the k and L_o values derived using data from the cited sources, are considered conservative because the cited data represents the bio-chemical methane potential (BMP) of the specific wastes under conditions ideal for the decomposition of those wastes; in other words, the volume of gas that would be generated if all of the organic material in the waste could be completely decomposed. Conditions in landfills are not ideal for waste decomposition because the design and operating practices used for modern landfills (including the NSDF) result in an in-place waste mass that is too dry to support optimal decomposition and, therefore, landfill gas generation processes. In addition, the use of intermediate cover materials (generally low permeability soils) during waste placement creates compartmentalization within the waste mass which prevents any moisture in the waste from moving freely and distributing the nutrients necessary to support an optimal decomposition process. Achieving complete decomposition of the organic materials in the landfill and realizing the maximum landfill gas generation rate requires more moisture than is typically found in modern landfills. As a result, the real-world landfill gas generation rates are less than the maximum calculated rates. ***Changes to the EIS:*** The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: **EIS Section 5.8.6.2.2.1** sixth paragraph: The peak generation rates of landfill gases occur at the time, 1 year after closure of the ECM (year 51), and the landfill gases and peak generation rates are (AECOM 2018d): • The total Landfill gases generation rate is 251,700 m^3/yr out of which: ○ Methane generation rate is 125,800 m^3/yr. ○ Carbon dioxide generation rate is 125,800 m^3/yr. The values stated above are conservative because the rates were determined based on wastes under conditions ideal for the decomposition where all of the organic material in the waste could be completely decomposed. Conditions for the NSDF will not be ideal for				

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			waste decomposition as the design and operating practices will result in an in-place waste mass that is too dry to support optimal decomposition. ***References:*** [1] AECOM (AECOM Canada Ltd.). 2018. Landfill Gas Management Plan. Canadian Nuclear Laboratories Document No. 232-508600-PLA-003, Revision 1. 2018 August. [2] AECOM. 2018. Radon and Other Landfill Gas Modelling Evaluation. Canadian Nuclear Laboratories Document No. 232-503212-TN-001, Revision 1. 2018 November. [3] National Council for Air and Stream Improvement, Inc. (NCASI). 2005. Calculation Tools for Estimating Greenhouse Gas Emissions from Wood Product Facilities, Version 1.0. Available at: https://ghgprotocol.org/sites/default/files/Wood_Products.pdf [4] National Council for Air and Stream Improvement, Inc. (NCASI). 2005. Calculation Tools for Estimating Greenhouse Gas Emissions from Pulp and Paper Mills. Version 1.1. Available at: https://ghgprotocol.org/sites/default/files/Pulp_and_Paper_Guidance.pdf				
CNSC -2-13	New IR	Section 5.2 and Atmospheric TSD	**Agency Information Request - Changes to an environmental component due to hazardous contaminants** ***Question:*** CNL is requested to justify the change in the dust control efficiency and comment on how the revised value is sufficiently conservative. CNL should provide further clarification in the EIS and supporting materials to explain why two different control efficiencies were used in the assessment (i.e., 75% for fugitive dust from stockpiles and 85% for on-road vehicles). ***Context:*** Table 4-5 of the Atmospheric Environment TSD indicates that the dust control efficiency was assumed to be 85%. Previously, this value was assumed to be 75%. What is the justification for this change? How was it determined that this dust control efficiency of 85% is sufficiently conservative? Further, a control efficiency of 85% was used to estimate emissions from on-road vehicles (unpaved road dust); however, a control efficiency of 75% was used for estimating fugitive dust from stockpiles. What is the justification for the use of different control efficiencies in the assessment? ***Rationale:*** For clarity, CNL is requested to justify the changes made in the assumed control efficiency for dust and provide justification why this change is adequately conservative. **CNL Response** Selecting a control efficiency value requires balancing conservatism and accuracy based on available information. The original control efficiency of 75% for on-road vehicles was conservatively selected based on information available at the time. As the project has developed from conceptual to detailed design and CNL's Dust Management Plan [1] was developed, a more accurate, yet still conservative value of 85% was selected. The control efficiencies used in the assessment were based on values in the Western Regional Air Partnership (WRAP) Fugitive Dust Handbook [2], Environment and Climate Change Canada's Road dust emissions from unpaved surfaces: guide to reporting [3] and information in CNL's Dust Management Plan [1]. Dust from storage piles will generally be controlled using water or chemical sprays, or where standard dust suppressants may be inadequate, covers may be used [1]. From the WRAP Fugitive Dust Handbook the efficiency of these methods is 90%. A control efficiency value of 75% was used for conservatism and due to the large area of the stockpiles. According to the Dust Management Plan [1], speed limits and restricted access of vehicles will be enforced to control dust from the unpaved roads while road watering and/or dust suppressants will also be used as necessary. Using values from the WRAP Fugitive Dust Handbook,	**N/A**			Accepted

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			the combination of these controls can be as high as 96%. However, since road watering and/or dust suppressants will be used as needed, a conservative value of 85% was used. A control efficiency of 85% for on-road vehicles is commonly used in assessments of similar sites with dust management plans in place. ***Changes to the EIS:*** No changes to the EIS or Air Quality Assessment Technical Support Document (TSD) are required. ***References*:** [1] AECOM. 2018. Dust Management Plan. Canadian Nuclear Laboratories Document No. 232-03700-PLA-001. Revision 1. August 2018. [2] Countess Environmental. 2006. WRAP Fugitive Dust Handbook. Accessed April 2020. Available at: https://www.wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf [3] ECCC (Environment and Climate Change Canada). 2017. ECCC Road dust emissions from unpaved surfaces: guide to reporting. Updated March 9, 2017. Accessed April 2020. Available at: https://www.canada.ca/en/environment-climate-change/services/national-pollutant-release-inventory/report/sector-specific-tools-calculate-emissions/road-dust-unpaved-surfaces-guide.html				
CNSC-2-14	New IR	Section 5.2.1.7	**Agency Information Request - Changes to an environmental component due to hazardous contaminants** ***Question:*** NL is requested to provide the assumptions used in modeling the passive vents as area sources to ensure that they are valid and adequately conservative. Table 5.3 should be revised accordingly. ***Context:*** The passive vents are assessed as area sources instead of point sources. This is a change from the 2017 version of the EIS. The area source summary data for the passive vents is absent from section 5.2 of the Air Quality Technical Supporting Document (TSD) (table 5.3). ***Rationale:*** The assumptions used to model the passive vents as area sources were not provided in the revised (2019) EIS. These values should be provided to ensure that they are valid and adequately conservative. **CNL Response** The modelling approach using an area source to represent all emissions from the decomposition of waste in the engineered containment mound (ECM) is more conservative than dividing the emissions between an area source (ECM cover) and points sources (passive vents) because point sources would have better dispersion than the area source, resulting in lower point of impingement (POI) concentrations. Assumptions for estimating the total emissions from the ECM are presented in Section 4.3.1.1 of the Air Quality TSD [1], along with rationale for not separating the emissions from the ECM into an area source for the cap and point sources for the passive vents. Further discussion regarding the emissions from the passive vents being included in the ECM area source is presented in Section 5.2.4.1 and Section 5.2.4.2 of the Air Quality TSD [1] and Section 5.2.1.7 of the EIS. Therefore, no changes are required to Table 5.3 and the results of the air quality assessment are not impacted. ***Changes to the EIS and Air Quality TSD:*** The following modifications will be made (new text in red and deleted text as ~~strikethrough~~) to the Air Quality TSD [1] and the Final EIS to further clarify that emissions from the ECM are conservatively modeled using an area source: **EIS Section 5.2.1.7:** The ECM was modelled as an area source that summed emissions from the ECM cap, the passive vents, material handling and vehicle exhaust. Modelling the ECM emissions as an area source assumes that emissions are being released from the entire area, however in reality emissions will only be emitted from discrete areas on the source.	**EIS**	Section 5.2.1.7 (Prediction Confidence and Uncertainty)	Additional clarification	Accepted
				Air Quality TSD	Section 4.3.1.1 (Engineered Containment Mound Cover and Passive Vents) and Section 5.2.4.2 (Area Sources)	Additional clarification	

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			Air Quality TSD Section 4.3.1.1: It is assumed the majority of emissions generated from the decomposition of waste will emit via the passive vents with the remaining amount through the ECM cover. However, for conservatism in the modelling assessment, it was assumed that ~~the~~ all emissions generated from the decomposition of waste are ~~only~~ solely emitted through the ECM cover. This is a conservative assessment as emissions through the passive vents (as point sources) would have better dispersion than through the area source used to represent the ECM cover. **Air Quality TSD Section 5.2.4.2:** The emissions from the ECM area source include ~~working face of the ECM, including~~ the non-road vehicle activities (tailpipe exhaust and material transfers) occurring in the ECM and the total emissions generated from the decomposition of waste that would, in reality, be released through both the passive vents and the ECM cover ~~itself were included in the ECM source area~~. ***References:*** [1] Golder (Golder Associates Ltd.). 2019. Air Quality Assessment for the Near Surface Disposal Facility, Technical Supporting Document. Canadian Nuclear Laboratories Document No. 232-03710-REPT-008, Revision 0. 2019 November.				
CNSC-2-15	New IR	Section 5.10	**Agency Information Request - Socio-economic conditions** ***Question:*** CNL is requested to revise the EIS section accordingly to reflect the paragraph 5(2)(b) of CEAA 2012 requirements in relation to socio-economic conditions. ***Context:*** As required under paragraph 5(2)(b) of CEAA 2012, the EIS should provide a description and analysis of how changes to the environment caused by the project could affect health and socioeconomic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, as they pertain to non-Indigenous peoples. That is to say, the EIS should describe the indirect socio-economic effects that occur as a result of a change that the project may cause to the environment. While section 5.10 Socio-Economic Environment of the revised EIS provides specific discussion and analysis, there is no clear linkage in the descriptions of the VCs and effects pathway analysis between the indirect effect and the direct environmental effect. ***Rationale:*** Please provide clarification and describe, in the "Socio-economic Environment" assessment, the linkages between the indirect socio-economic effects and the project related changes to the environment that result in these indirect effects on socio-economic conditions. **CNL Response** The socio-economic impact assessment includes both direct effects on socio-economic valued components (VCs) (e.g., the Labour Force VC as affected by potential employment opportunities) and indirect socio-economic effects related to a change in the environment (e.g., the Quality of Life VC as affected by changes in air and noise emissions). CNL acknowledges that the requirements under the *Canadian Environmental Assessment Act CEAA, 2012* (CEAA 2012, in particular, paragraph 5(2)(b)) focus on indirect socio-economic effects that result from environmental change. In addition to indirect socio-economic effects, the scope of the NSDF socio-economic impact assessment was expanded to include potential direct socio-economic effects given these effects are of interest to stakeholders and Indigenous groups. For example, stakeholders and Indigenous communities and peoples expressed interest in opportunities for economic benefits during engagement activities. These opportunities are considered as part of the Labour Market, Economic Development and Government Finances VCs. Further, many of the direct socio-economic effects are positive in direction and their inclusion in the EIS allows CNL to highlight some of the beneficial effects of the NSDF Project. Indirect effects on the socio-economic environment for the NSDF Project are primarily in the form of nuisance effects such as increased noise or dust or effects on the visual landscape. These effects are framed to define the Quality of Life VC and they are linked as such to environmental change from the NSDF Project throughout the socio-economic assessment. Table 5.10.5-1 of the Final EIS will summarize	EIS	Section 5.10 (Socio-Economics), Section 5.10.5.1 (Project Interactions and Mitigation – Methods) Table 5.10.5-1 (Pathways Analysis for Socio-economic Valued Components)	Additional text to further define direct/indirect effects. Additional text in table 5.10.5-1 to clarify nature of primary/secondary pathways – add to the "Pathways Assessment" column.	Accepted

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			the pathway analysis for all the socio-economic VCs assessed. The text in the pathway assessment column of Table 5.10.5-1 will be updated in the Final EIS to identify which pathways are indirect socio-economic effects related to changes in the environment as a result of the NSDF Project. ***Changes to the EIS:*** The following modifications (additions in red) will be made to the Final EIS to incorporate the information above: **EIS Section 5.10.2 (Table 5.10.2-2):** • Quality of Life can be indirectly affected by changes in air quality, ambient noise, increases in traffic volume and visual disturbances (nuisance effects) **EIS Section 5.10.5.1:** After incorporation of mitigation, potential pathways were evaluated into the following categories using scientific knowledge, logic, experience with similar developments, and the effectiveness of environmental design features and mitigation. ■ **No linkage:** The pathway is removed by environmental design features or mitigation such that the NSDF Project would not be expected to result in a measurable environmental change to measurement indicators identified for socio-economic VCs relative to Base Case values, and therefore would have no residual effects to socio-economic VCs. ■ **Secondary pathway:** The pathway could result in a measurable minor change to measurement indicators identified for socio-economic VCs, but would have a negligible residual effect on socio-economic VCs relative to Base Case values and is not expected to contribute cumulatively to other NSDF Project effects or to the effects of other previous, existing or reasonably foreseeable developments to cause a significant direct or indirect effect. ■ **Primary pathway:** The pathway is likely to result in an environmental change to measurement indicators identified for socio-economic VCs relative to the Base Case that could contribute to residual direct or indirect effects on socio-economic VCs. Environmental design features and mitigation that have been or could be incorporated into the NSDF Project to eliminate and/or reduce adverse effects to socio-economic VCs were considered. Potential pathways that were completely removed due to implementation of environmental design or mitigation were not assessed further. Pathways that were assessed to be secondary and demonstrated to have a negligible residual effect to socioeconomic VCs through simple qualitative or semi-quantitative evaluation of the pathway were also not advanced for further assessment. These effects can be considered either direct or indirect in nature e.g. effects on residents' quality of life may occur as a consequence of an increase in nuisance effects that may occur from increases in noise or dust as a direct result of project works. Primary pathways were carried forward for more detailed quantitative and qualitative effects analysis to characterize the residual effects of the NSDF Project on socio-economic VCs (Section 5.10.6). **EIS Section 5.10.5.1 (Table 5.10.5-1):** • Table 5.10.5-1 (Pathways Analysis for Socio-economic Valued Components): Additional text will be added to Table 5.10.5-1 to clarify nature of primary/secondary pathways in the "Pathways Assessment" column. An updated version of Table 5.10.5-1 is provided in Attachment CNSC-2-15. ***References:*** N/A				
CNSC-2-16	New IR		**Agency Information Request - Socio-Economic Conditions – Indigenous** ***Question:*** CNL is requested to revise the EIS section accordingly to reflect the paragraph 5(1)(c) CEAA 2012 requirements in relation to socio-economic conditions with respect to Indigenous peoples. CNL is also requested to clearly delineate between those that are related to paragraph 5(1)(c) CEAA 2012 requirements vs. those that were identified as issues and concerns raised by Indigenous groups. For additional context and rationale as well as details, see Addendum B. ***Context:***	EIS	Section 6.5 (Indigenous Socio-Economic), Section 6.6.5.2 (Project Interactions and Mitigation) Table 6.5-15 (Pathways	Additional text to further define direct/indirect effects. Additional text in Table 6.5-15 to clarify nature of primary/secondary pathways – add to the	Accepted

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			As required under paragraph 5(1)(c) of the CEAA 2012, the EIS should describe the effects of any changes the project may cause to the environment, with respect to Indigenous peoples, on health and socioeconomic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. While Section 6.5 Indigenous Socio-economic Environment of the revised EIS provides specific discussion and analysis, there is no clear linkage in the descriptions of the VCs and effects pathway analysis between the indirect socio-economic effect and the direct environmental effect. ***Rationale:*** Please provide clarification and describe, in the “Indigenous Socio-economic Environment” assessment, the linkages between the indirect socio-economic effects and the project related changes to the environment that result in these indirect effects on socio-economic conditions with respect to Indigenous peoples. In addition, provide the distinction between those that are related to paragraph 5(1)(c) CEAA 2012 requirements vs. those that were identified as issues and concerns raised by Indigenous groups. ***Addendum B – CNSC-2-15*** **Indigenous Socio-Economic Environment** • Page 6-44 states, “information and areas of interest raised by Indigenous communities during engagement that influenced the scope of the Indigenous socio-economic assessment are summarized in Table 6.5-1. A full record of engagement activities is available in Section 6.2. Other general areas of interest and questions raised during the Indigenous engagement that pertain to the Indigenous socio-economics assessment (if any) are documented in **Appendix 4.0-22 Formal Indigenous Feedback.”** CNSC staff have not been able to locate “Appendix 4.0-22 Formal Indigenous Feedback”. This is also the only reference to this appendix in the revised EIS, there isn’t another reference found throughout Section 6. CNL is requested to provide the reference. • Table 6.5-1 only identifies one area of interest, “Indigenous communities have expressed an interest in the employment and contracting opportunities associated with NSDF or CNL more generally”. CNL is requested to explain how this relates to the paragraph 5(1)(b) requirements of CEAA 2012? • Page 6-45 states, “the assessment endpoint of Indigenous governance challenges pertains to the incremental change that the NSDF Project would have **on the organizations that manage Indigenous communities**.” CNL is requested to clarify what is meant by “the organizations that manage Indigenous communities”. Page 6-48 states, “CNL identifies all the Indigenous communities and organizations it is engaging within Table 6.5-4 (Section 6.5.4.1) but only provides detailed information on physical Indigenous communities within 100 km of the NSDF Project site. There are several reasons for this. First, there are a number of AOO and MNO communities within 100 km of the site but except for Pikwakanagan these are not physical communities (that is communities such as First Nations Reserves that are governed by Indigenous peoples and with physical infrastructure managed by such organizations). They therefore have different socio-economic characteristics (i.e., the population is dispersed over a wider area) and they are not reliant on the same set of infrastructure or decision-making processes, which can be key socio-economic considerations. Second, Statistics Canada Census information can be found for the Algonquins of Pikwakanagan First Nation Reserve (and other populated reserves) but is not available at an organizational level for other AOO or MNO communities. Third, information on all the Indigenous communities and organizations is provided in Section 3 of the IER. Fourth, First Nation Reserves beyond 100 km were not considered to be potentially affected from a socio-economic perspective except as potential economic beneficiaries. For these reasons, the RSA for Indigenous socio-economic was defined as 100 km.” CNL is requested to provide clarification on these statements and validation of this methodology. Was this section on socio-economic effects discussed with all identified Indigenous groups with potential interest in the project? **CNL Response** The Indigenous socio-economic effects assessment includes both direct effects on socio-economic valued components (VCs) (e.g., the Economy and Employment VC as affected by potential employment opportunities) and indirect socio-economic effects related to a change in the environment (e.g., Indigenous Resident Use and Enjoyment of the Property as affected by changes in air and noise emissions). CNL recognizes that CEAA 2012 is clear in 5(1)(c) that the EIS should describe the effects of any changes the project may cause to the environment, with respect to Indigenous peoples, on health and socioeconomic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. More succinctly, the definition of environmental effects requires consideration of changes to the environment caused by a project that in turn may affect Indigenous peoples with respect to health and socioeconomic conditions, physical and cultural		Analysis for Indigenous Socio-economic Valued Components)	“Pathways Assessment” column.	
					Section 6.5	Addition of Resource Industries as a new VC. Text proposed will be similar to as explained in this IR.	
					Table 6.5-1	Add text explaining that Indigenous communities/organizations identified concerned about their capacity and decision-making and how this was added as a VC.	

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			heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. The scope of the NSDF socio-economic impact assessment was expanded to include potential direct socio-economic effects given these effects are of interest to stakeholders and Indigenous communities and peoples. For example, during engagement activities both stakeholders and Indigenous communities and peoples expressed interest in opportunities for economic benefits. These opportunities are considered as part of the Economy and Employment VC. Further, many of the direct socio-economic effects are positive in direction and their inclusion in the EIS allows CNL to highlight some of the beneficial effects of the NSDF Project. The VCs as described in Section 6.5 of the EIS are those based on potential changes to the socio-economic environment directly from the project itself, with the exception of the VC "Indigenous resident – use and enjoyment of private property", where there could be indirect socio-economic effects as a result of a change from the Project on the environment (i.e., noise or dust). The text in the pathway assessment column of Table 6.5-15 will be updated in the Final EIS to identify which pathways are indirect socio-economic effects related to changes in the environment as a result of the NSDF Project. An updated version of Table 6.5-15 is provided in Attachment CNSC-2-16. **Potential Socio-economic Effects Related to a Change from the Project on the Environment.** Any project potentially has direct effects on the environment that may in turn produce indirect socio-economic effects related to Indigenous peoples. The potential effects on traditional land and resource use are described in Section 6.4 of the EIS. However, this assessment could potentially ignore indirect socio-economic effects on resource-based uses that are of a more commercial nature (undertaken by Indigenous peoples) and which could be affected by direct changes to the environment. The most typical resource-based use activities undertaken by Indigenous peoples that can have a commercial component to them include trapping and commercial fishing (and possibly gathering). It is also possible that Indigenous peoples participate in or operate resource-based tourism enterprises that could be potentially impacted by changes to the environment. The text provided below for each resource industry will be added to Section 6.5 of Final EIS. Also, resource industries have been added to Table 6.5-15 of the Final EIS (updated table provided in Attachment CNSC-2-16). Trapping is one resource-based activity that has both a traditional and commercial aspect to it. Most Indigenous trappers trap for personal and cultural reasons as well as for the financial benefit of selling the furs. Trapping is by no means a lucrative enterprise but can produce some income to offset a trapper's costs and time. As previously indicated, the two traplines near the CRL site have not been identified as traplines registered to Indigenous peoples. Furthermore, as described in the traditional and resource use section no effects on trapping are expected (see Table 6.4.5.2.1). Therefore, there would be no effect on trapping whether it occurs for personal, cultural and/or commercial basis. Commercial fishing is another resource-based activity that could be affected by direct changes to the environment. Indigenous people do maintain some commercial fish licenses for inland waters in Ontario. However, there is currently no commercial fishery on the Ottawa River. Historically there likely was a commercial sturgeon fishery on the Ottawa River and members of the MNO in their TKLUS indicated that they had historically at one point participated in a commercial fishery. As described in the EIS, no adverse effect is predicted on the fishery for the Ottawa River: "Results of the aquatic environment assessment (Section 5.5) identify that measurable residual effects on aquatic biodiversity VCs are not predicted as a result of the NSDF Project. Therefore, neither fishing nor the consumption of fish resources will be affected by the NSDF Project." Because there is no commercial fishery (Indigenous or not) there is no linkage pathway and it would not be included in a pathway analysis. Gathering (as a commercial activity) could be a resource activity that could be affected by direct changes to the environment. The most common gathering resource that does have a commercial component to it is blueberry picking. Other gathering activities might have a commercial component to them such as gathering other plant materials for food or craft use. Gathering is a common activity undertaken by Indigenous peoples. Section 6.4.4.1.2 of the 2019 revised EIS describes the likelihood of gathering in the study areas: "The SSA and the LSA are located within the CRL site and gathering in this area would be prohibited by CNL. Gathering could occur within the RSA. It is possible there may be some gathering along the shoreline of the Ottawa River, adjacent to the CRL site. Indigenous peoples may collect plants and other materials on Crown lands and public waterways without restrictions. There also could be some gathering activities on Crown or private land within the RSA. While no Indigenous organization has indicated that gathering occurs within the RSA, it is possible				

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			that the activity is or has been undertaken by some individuals at some point in time". As indicated in Table 6.4.5.-1 of the EIS, "Terrestrial effects are limited to the CRL site which encompasses the LSA and is restricted access. Therefore, no gathering activities will be affected by the NSDF Project." That assessment of no effect is consistent whether the activity is commercial or not. The final resource-based activity that could be affected by direct changes to the environment, could be resource-based tourism such as sport fishing or hunting or eco-tourism. Such commercial activities would not be rights based but could be operated by Indigenous peoples. CNL is unaware of any such enterprises operating in the study areas but it is possible. As indicated in Section 5.5 of the EIS, terrestrial effects are limited to the CRL site and "results of the aquatic environment assessment identify that measurable residual effects on aquatic biodiversity VCs are not predicted as a result of the NSDF Project. Therefore, neither fishing nor the consumption of fish resources will be affected by the NSDF Project." With respect to more eco-tourism based activities the NSDF project would not result in any changes to the visual environment on the Ottawa River as the NSDF site situated in-land from any public access or viewing. As such, no effect would be predicted. To address the above potential indirect effects on the socio-economic environment with respect to Indigenous peoples an additional VC and sub-section is proposed for Section 6.5 of Final EIS (Section 6.5.4.7) that would be referred to as "Resource Industries". CNL notes that to date questions about the commercial nature of these resources industries have not been asked by Indigenous communities or organizations. **Rationale for Expansion of Socio-Economic Assessment Beyond Section 5(1)(c) Requirements** As previously indicated, with respect to the existing VCs within Section 6.5 the 2019 revised EIS that would be potentially affected by the project directly for the Indigenous Socio-Economic Environment are: Decision-Making, Population and Demographics; Economy and Employment; Housing and Infrastructure; and, Indigenous Resident Use and Enjoyment of the Property. As explained, previously the last VC could also be affected by indirect effects to the environment such as noise or dust. The text provided below will be added to Section 6.5.2 of the Final EIS. The VC, "Decision-Making" was included to address concerns about administrative capacity to address the projects. Early on and during the engagement process for both the NSDF and NPD projects, a couple Indigenous groups did raise questions about capacity to participate in both the NPD and NSDF projects. Quite specifically, significant funding was requested by the Métis Nation of Ontario to CNL to participate in the projects. As well, specific funding has been provided to Algonquins of Ontario to assist in consultation and to supplement funding for the Algonquin Knowledge and Land Study. These comments have not been formally made through the consultation process but were made directly to CNL. While the provision of funding was the most direct answer to the question raised did add the VC on Decision-Making to document this issue. CNL will document that this VC was added based on Indigenous input. The VC, "Economy and Employment" was added as a result of direct engagement with Indigenous communities and peoples. Opportunities for economic benefits associated with the NSDF project have been identified by Indigenous groups. Comments have been received on this topic from the Algonquins of Ontario, Algonquins of Pikwakanagan, Métis Nation of Ontario and Kitigan Zibi. These comments aren't restricted to the NSDF project but are made more generally for CNL operations. Therefore, it was readily apparent to CNL to include a VC with respect to Economy and Employment. Population and Demographics and Housing and Infrastructure were two other VCs that CNL assessed even though when the assessment was undertaken there was no comment on these areas by Indigenous Groups. To date, CNL has not received comments on these VCs. Sections 6.5.4.1 and 6.5.4.6 allow for an enhanced understanding of the Indigenous population near the NSDF site and in a much broader regional population. The VC "Indigenous resident – use and enjoyment of private property" was added has also been added. Section 6.5.4.6 to describe based on Census data the Indigenous population in Renfrew County and the adjacent census divisions of Nipissing (Ontario), Témiscamingue (Quebec) and Pontiac (Quebec).				

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			CNL notes that in its response to CNSC-2-04, a revised Section 6 will be included as part of the IR and will include the above noted changes. **Addendum B Questions** 1. Appendix 4.0-22 was referenced in error. ***Change to the EIS:*** The text will be revised to reference Section 6.5.2 (Table 6.5-1) of Final EIS 2. As explained above, the Indigenous Socio-Economic Impact Assessment has been expanded beyond the definition of CEAA 2012 to include potential direct effects of the project on Indigenous peoples. CNL's opinion was that it should more explicitly deal with this specific interest raised by Indigenous peoples. 3. Organizations that manage Indigenous communities is meant to include the administration and elected officials of any Indigenous community. For a First Nation this would be the elected Council and staff. For a broader based Indigenous organization such as the AOO or the MNO this includes their staff and elected representatives. CNL will update Section 6.5.2 of Final EIS to better explain this. 4. The overall Environmental Assessment approach and methodology is described in Section 5.1 of the 2019 revised EIS. The assessment approach for the Indigenous socio-economic environment followed this approach and is found in Section 6.5 of the 2019 revised EIS. The VCs for the Indigenous Socio-Economic Environment are: Decision-Making, Population and Demographics; Economy and Employment; Housing and Infrastructure; and, Indigenous Resident Use and Enjoyment of the Property. As CNSC has pointed out this is a broader interpretation of potential effects on the Indigenous socio-economic environment than CEAA 2012 requires. As the text indicates, detailed information on population, housing and economic characteristics is generally readily available for First Nations in Canada as they are surveyed directly through the Census of the Population. Therefore, data is readily available for Algonquins of Pikwakanagan. There are no other First Nation physical communities within 100 km of the NSDF Project site. One of the reasons why "physical communities" is emphasized is that First Nations maintain responsibility for hard and soft services within their community and the intention of profiling them specifically is to examine as to whether they would be affected by the NSDF Project. CNL conservatively began with the assumption that any physical communities beyond 100 km would not be affected by the NSDF Project. As the assessment points out there is no effect on these VCs, so expanding this area even further would not result in any different conclusion. As the text indicates the other Algonquins of Ontario communities are located in the Ottawa Valley however these Algonquins of Ontario communities do not have the responsibility for physical services such as housing, roads, infrastructure that would be the case of Algonquins of Pikwakanagan. These other Algonquins of Ontario communities and Métis Nation of Ontario citizens that may live in reasonable proximity to the CRL site are dependent on organized and unorganized municipal authorities for services. CNL also wants to emphasize that this assessment focuses on the potential direct socio-economic effects and it is not meant to characterize traditional land and resource use which is described in Section 6.4 of the 2019 revised EIS. That section describes traditional land and resource use by all the Indigenous groups that have participated in the EIS and where background information is available. Therefore, it recognizes significant Indigenous use throughout the Ottawa Valley. With respect to the question: *"CNL is requested to provide clarification on these statements and validation of this methodology. "Was this section on socio-economic effects discussed with all identified Indigenous groups with potential interest in the project?"* The overall Environmental Assessment approach for the NSDF project meets CEAA 2012 requirements. Detailed information on population, housing and economic characteristics is generally readily available for First Nations in Canada as they are surveyed directly through the Census of the Population. CNL provided the 2019 revised EIS and the Indigenous Engagement Report [1] to identified Indigenous Groups in 2019 December. Validation with the identified Indigenous Groups is ongoing, and being further detailed under the response to IR CNSC-2-04. ***References:*** [1] CNL. 2019. Indigenous Engagement Report – Near Surface Disposal Facility. Canadian Nuclear Laboratories Document No. 232-513130-REPT-001, Revision 3. 2019 November.				
ECCC-2-01	FC-52	Section 3.4.1.9.2, 3.4.2.1	**Agency Information Request - Contact and non-contact water ponds in the ECM, Linked to FC-52** ***Question:***	EIS	New Section within 3.4.4.5 (Surface Water	Additional information and clarification.	Accepted

<table>
<tr><th rowspan="2">Reference #</th><th rowspan="2">Link to IR#1 (Original IR package)</th><th rowspan="2">EIS Section</th><th rowspan="2">Information Request & Response</th><th colspan="3">Documents Impacted by the Response to IR</th><th rowspan="2">Accepted/ Rejected with request for follow-up information</th></tr>
<tr><th>Document Name</th><th>Section/Figure/ Table Impacted by Response</th><th>Scope of New Information</th></tr>
<tr><td></td><td></td><td></td><td>CNL is requested to describe how, during operations, both temporary contact and non-contact water ponds within the ECM will interact with each other including:
1. How these two structures will be kept independent of each other and the leachate system?
2. How these water structures will avoid contamination from the operations adjacent to them?

Context:
In section 3.4.1.9.2 (page 3-47) of the revised EIS, CNL states that the “interim cover is used so that runoff from these areas of the ECM is non-contact water that will be directed to the temporary non-contact water pond inside the ECM.” It was also noted in section 3.4.2.1 (page 3-54) that “contact water is collected in temporary contact water ponds or equivalent structures on a lined portion of the cell floor.” It was further explained that these contact water ponds would be moved within the ECM as necessary to support operations.

Rationale:
It is important to understand whether there are both contact and non-contact water ponds within the ECM. Non-contact water will be routed to the stormwater management ponds, whereas, contact water will be routed to the Wastewater Treatment Plant (WTP). Potential effects on different receiving environments will be dependent upon where the effluent is routed.

CNL Response
Water in the engineered containment mound (ECM) is managed differently based on one of the categories listed below [1]:
• Leachate is water that has percolated through the waste, contained by the base liner system, and collected in the leachate collection system (LCS). Leachate is automatically pumped from the LCS sumps to the wastewater treatment plant (WWTP)
• Contact water is surface runoff water that has come in contact with waste but does not enter the LCS. The contact water is collected in contact water ponds within the ECM and pumped to the WWTP
• Non-contact water is surface runoff water that has not come in contact with waste. The non-contact water is collected in non-contact water ponds within the ECM (separate from contact water ponds) and is pumped to the ECM perimeter ditches and drains to surface water management ponds #2 & #3

• Contact and non-contact water will be kept independent from the leachate collection system (LCS) by installing a 1 mm geomembrane (sacrificial liner) over the entire ECM (Phase 1 & 2) and berm sideslopes prior to the start of operations. For Phase 1, the liner is installed above the completed base liner system. The exception in Phase 1 is in the active waste cell where the liner is not installed to allow leachate to enter the LCS. For Phase 2, the liner is installed on the unfinished but graded ECM floor.
Contact and non-contact water ponds will be kept independent from each other by the ridge and valley configuration (herringbone-shape) in the base liner and use of temporary berms (stated as berms in the following text).
The cells are oriented so that the ridge and valleys will naturally direct water to ponds located at the low point of each cell. The ponds will be positioned along the south edge of the ECM for Phase 1. See Attachment ECCC-2-01 for illustration.
In addition, berms will be installed along the cell ridges in the area of the ponds to provide the necessary pond structure, volume and provide separation for:
• the active disposal cell from the adjacent contact water pond
• the contact water pond from the adjacent non-contact water ponds, and
• each of the non-contact water ponds
Phase 2 will be separated from Phase 1 by the ECM access road which keeps Phase 2 independent from Phase 1 and prevents inflow of contact water. Phase 2 non-contact water will drain to an internal control pond located at the north west corner of the ECM.
Non-contact water ponds will avoid contamination from adjacent operations by means of berms and the ridge and valley configuration of base liner geometry stated above.
Cross contamination will be limited between contact and non-contact water ponds by the following design features:
• ponds will be positioned at the low points of each cell to provide a predictable drainage path;
• ponds have been sized for the back to back 100-year, 24 hr storm event with 0.5 m freeboard based on the maximum cell area to prevent overtopping;
• berms between ponds have been designed with a 3:1 slope to provide the necessary containment structure; and</td><td></td><td>Management Collection, Conveyance, Treatment and Discharge)</td><td></td><td></td></tr>
</table>

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			• ponds will be individually lined with an additional 2 mm geomembrane anchored to the berms to form a water tight structure for each cell. The contact water pond on the other hand, will not avoid contamination from adjacent operations (active waste cell). The purpose of the contact water pond is to receive contaminated water from the waste handling area as well as the adjacent waste disposal cell. The design and waste placement objectives [2] promote flow to the contact water pond by: • installation of the sacrificial liner in the waste handling cell; • compacting the surface of the waste to maximize its in-place density to reduce infiltration; and • grading the waste in the active waste cell (minimum 2% slope) towards the contact water pond. Further details on the management of water and operation of the ECM are described below using the beginning of Cell 1 operation as an illustrative example: • During operations, any stormwater falling on the active cell (Cell 1) is considered contact water. The waste placed in the active cell will be sloped towards the contact water pond located at the lower end of Cell 2 so that runoff on top of the placed waste will be directed towards it. Water that infiltrates the waste will become leachate. • The temporary storage and waste receiving and processing area (TSWRPA) is constructed on the upper portion of Cell 2 adjacent to the ECM access road and any stormwater falling on it is considered contact water. Most of Cell 2 is utilized as either the TSWRPA or the contact water pond. All stormwater within Cell 2 is collected in the contact water pond. Cell 2 remains unopened (will not receive waste), with the sacrificial liner in place, to direct all stormwater over the base liner system into the contact water pond (and does not enter the LCS). • Water from both the contact water pond and the leachate collection system is pumped to the leachate extraction box on top of the berm and from there is transferred to the WWTP for treatment. • Ponds will also be constructed at the lower end of Cells, 3, 4, 5, and 6. These ponds will act as non-contact water ponds as stated above. The water collected in these ponds will be pumped into the perimeter ditch at the outer edge of the ECM to be transferred into the stormwater management ponds. • Active operations (Cell 1) will be separated from the non-contact ponds in Cells 3, 4, 5, and 6 by Cell 2, which contains the TWSRPA and the contact water pond so that there is always an inactive cell between active operations and the non-contact water ponds. ***Changes to the EIS:*** A new section and figure (Attachment ECCC-2-01) (rendering of contact and non-contact water ponds) will be included within Section 3.4.4.5 Surface Water Management, Collection, Conveyance, Treatment and Discharge. The new section will be titled: ECM Water Management. This section will focus on the non-contact and contact ponds within the ECM and include information outlined in the response to this IR. The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: **NEW Section 3.4.4.5.1 ECM Surface Water Management** Contact and non-contact water ponds will be kept independent from each other by the ridge and valley configuration (herringbone-shape) in the base liner and use of temporary berms. The cells are oriented so that the ridge and valleys will naturally direct water to ponds located at the low point of each cell. The ponds will be positioned along the south edge of the ECM for Phase 1 as shown in Figure (Attachment ECCC-2-01). In addition, berms will be installed along the cell ridges in the area of the ponds to provide the necessary pond structure, volume and provide separation for: • Active disposal cell from the adjacent contact water pond; • Contact water pond from the adjacent non-contact water ponds; and • Each of the non-contact water ponds. Phase 2 will be separated from Phase 1 by the ECM access road which keeps Phase 2 independent from Phase 1 and prevents inflow of contact water. Phase 2 non-contact water will drain to an internal control pond located at the north west corner of the ECM. Non-contact water ponds will avoid contamination from adjacent operations by means of the following design features: • Ponds will be positioned at the low points of each cell to provide a predictable drainage path;				

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			- Ponds have been sized for the back to back 100-year, 24 hr storm event with 0.5 m freeboard based on the maximum cell area to prevent overtopping; - Berms between ponds have been designed with a 3:1 slope to provide the necessary containment structure; and - Ponds will be individually lined with an additional 2 mm geomembrane anchored to the berms to form a water tight structure for each cell. The non-contact water collected in the ECM non-contact water ponds is pumped to the ECM perimeter ditches and drains to surface water management ponds 2 and 3 which are discussed in subsequent sections. The purpose of the contact water pond is to receive contaminated water from the waste handling area as well as the adjacent waste disposal cell. The design and waste placement objectives [2] promote flow to the contact water pond by: - Installation of the sacrificial liner in the waste handling cell; - Compacting the surface of the waste to maximize its in-place density to reduce infiltration; and - Grading the waste in the active waste cell (minimum 2% slope), towards the contact water pond. As discussed in Section 3.4.2 the contact water collected in the ECM contact water ponds is pumped to the WWTP for treatment prior to discharge to the environment. ***References:*** [1] AECOM (AECOM Canada Ltd). 2019. Design Description. Canadian Nuclear Laboratories Document No. 232-503212-DD-001, Revision 1, 2019 May. [2] AECOM. 2019. Waste Placement and Compaction Plan. Canadian Nuclear Laboratories Document No. B1550-508600-PLA-001, Revision 2, 2019 October.				
ECCC-2-02	FC-52		**Agency Information Request - Fish and Fish Habitat** ***Question:*** Given that Perch Lake Swamp wetland complex should not be used as part of the surface water treatment system to remove TSS, CNL is requested to provide the additional mitigation measures that will be taken to prevent adverse effects from effluent being released. ***Context:*** In terms of surface water management, two routes will be used: - Route 1 – the Surface Management Pond 1 and the exfiltration gallery is proposed to discharge to the East Swamp wetland, which flows into Perch Lake. Surface Water Management Pond 1 is designed for 80% Total Suspended Solids (TSS) removal. - Route 2 - Both Surface Water Management Ponds 2 and 3 will discharge to the Perch Lake Swamp wetland complex, which flows into Perch Lake and Perch Creek. Surface Water Management Pond 2 and 3 are currently designed to only provide 76% and 60% TSS removal respectively. CNL states, "the *wetland also has a sediment trapping function that will provide additional treatment to ultimately enhance level of treatment for adjacent streams (e.g. East Swamp Stream and Perch Creek)*" (page 3-71). It should be noted, that due to the presence of fish, the Perch Lake Swamp wetland complex should not be used as part of the surface water treatment system to remove additional TSS. ***Rationale:*** CNL is considering applying sandstone mixture instead of road salt on the NSDF Project site. This mixture could increase the amount of TSS entering the surface water management ponds. Any surface runoff from the project site (with potential blasting residues) will be directed to the surface water management ponds. However, blasting activities and the removal of waste rock during the construction phase could increase dust deposition and could increase trace metals that may be attached to TSS. When effluent is discharged to the exfiltration gallery or directly to Perch Lake, it may carry these residues which could have an adverse impact on the receiving environments.	EIS	Section 3.4.4.5.1 (Surface Water Management Ponds)	Removal of text, additional information and clarification.	

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			CNL Response The Perch Lake wetland complex will not be used as part of the surface water treatment system to remove additional Total Suspended Solids (TSS). The EIS will be revised to clarify that the wetlands will not be used as a trapping system for sediment. Surface water management ponds will be monitored for TSS (or Turbidity as a surrogate of TSS) as part of the Environmental Assessment Follow-up Monitoring Program (EAFMP) for compliance with CNL's environmental protection program requirements for stormwater quality (see Table 11.0-1 (EAFMPs for the NSDF) of the 2019 revised EIS). The CNL Environmental Protection Program limits on TSS in stormwater discharges are 25 mg/L for a monthly average and 125 mg/L for a daily limit [1]. Discharges to the Exfiltration Gallery and Perch Lake are for treated effluent from the Wastewater Treatment Plant only. Surface Water Management Ponds discharge via outfall structures on the NSDF site. Further explanation on the setting and surface water management are provided below. **Setting** The Surface Water Management Ponds (SWMPs) as noted by the reviewer are predicted to achieve Enhanced Protection levels, that is, 80% Total Suspended Solids (TSS) for Surface Water Management Pond 1 discharging to East Swamp Wetland; Normal protection levels (76%) and basic protection levels (60%) TSS removal for SWMPs 2 and 3, which discharge into Perch Lake wetland. Enhanced protection level of 80% could not be achieved for SWMPs 2 (76%) and 3 (60%) due to constraints on the footprint and depth of these ponds. However, CNL provides the clarification these ponds do not discharge directly to watercourses providing habitat for small-bodied species, and indirect discharge into downstream habitats that may support fish was determined to be unlikely. Therefore, enhanced mitigation was not considered critical. Figure 1 shows the location of watercourses in proximity to the SWMPs. The nearest watercourse to SWMP 2 is Perch Creek, located approximately 150 m from the outlet structure. The nearest wetland habitats along the margins of Perch Creek that may support small-bodied fish species during high (spring) flows are over 125 m from the outlet structure. The nearest watercourse to SWMP 3 is East Swamp Stream, located approximately 200 m from the outlet structure. East Swamp Stream is an intermittent stream, often dry during summer months and provides only marginal habitat for small-bodied fish. The outlet structures for SWMPs 2 and 3 are approximately 35 m from the perimeter of the NSDF site. SWMP 2 and 3 are adjacent to forested wetlands as shown in Figure 2 and are only seasonally wet.				

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			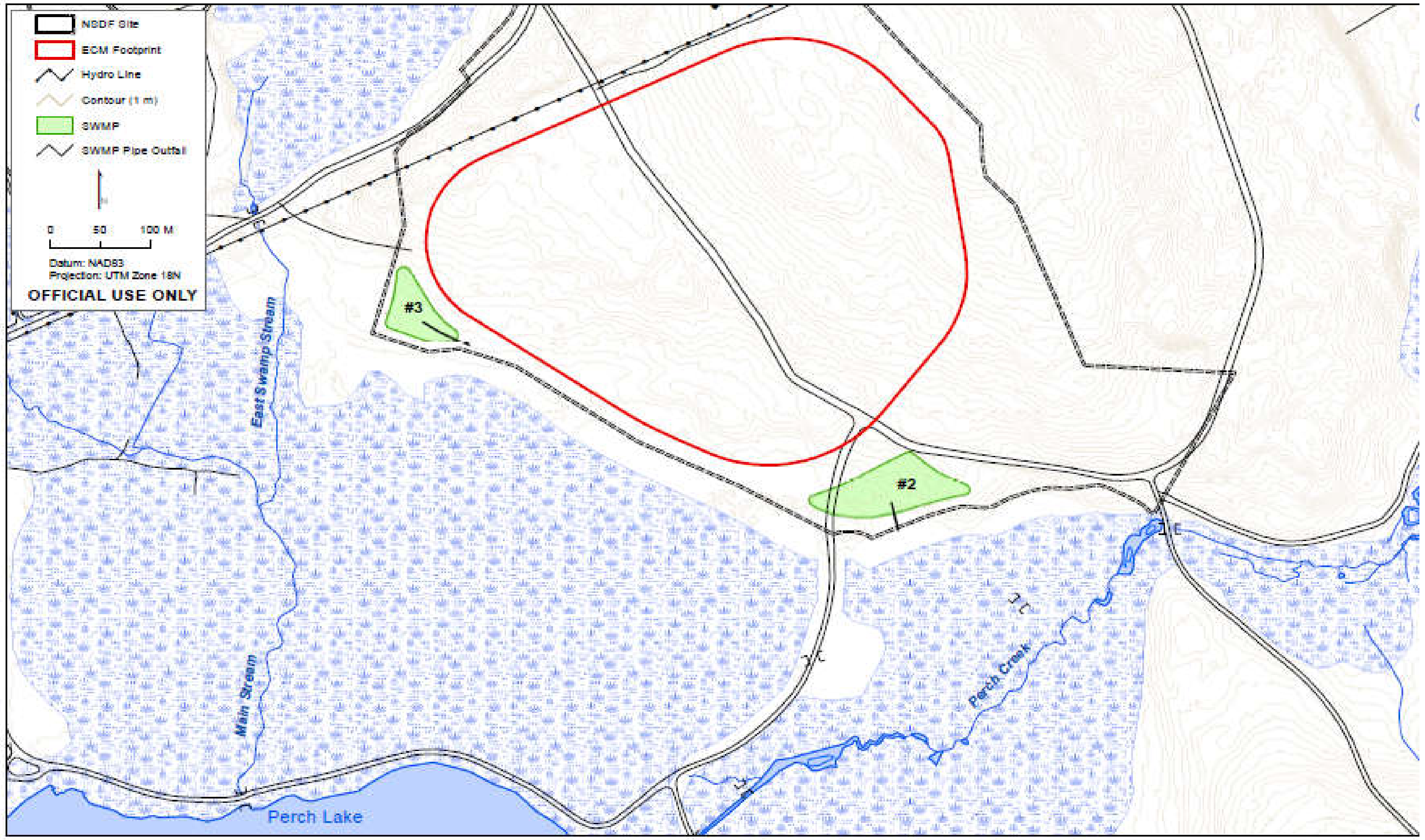 **Figure 1: Location of Watercourses relative to Stormwater Management Ponds 2 and 3**				

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			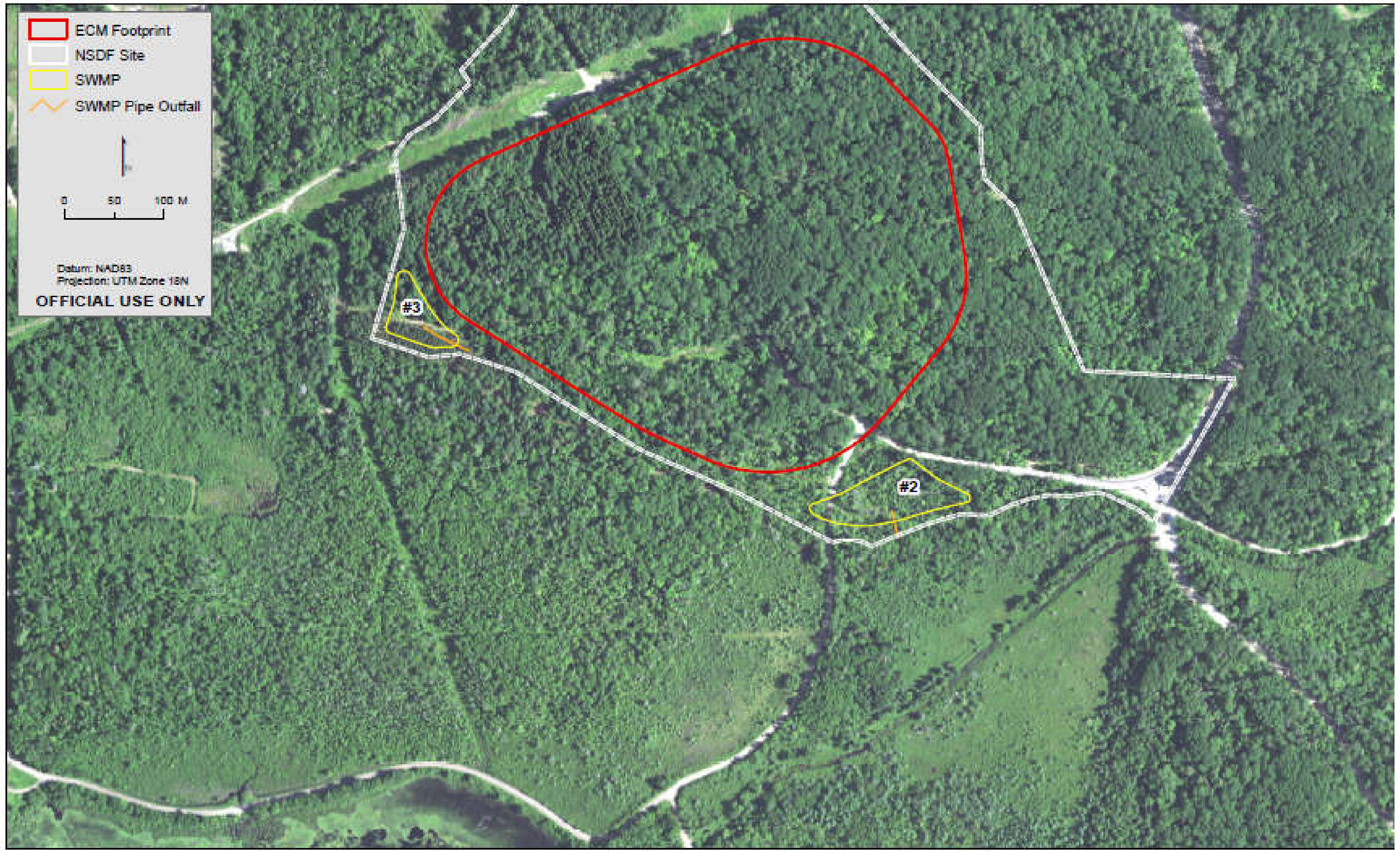 **Figure 2: Air photo showing forested region downgradient of Surface Water Management Ponds 2 and 3** **Additional Mitigation Measures and Monitoring for Surface Water Management Ponds** • Mitigation measures that will be implemented upstream and downstream of the surface water management ponds to minimize sediment loading will include: ○ During normal operation, the immediate outflow from the SWMPs is through a bottom-draw, perforated pipe under a clearstone blanket. The perforated pipe is connected to a dual basin manhole, before being conveyed by gravity to a flow spreader consisting of a concrete berm and rip-rap swale. This piped outflow is easily adaptable if monitoring data or certain operations suggest additional mitigation is required. ○ The facility is designed to resist heavy erosion during severe storm events. Conveyance structures such as ditches and swales are vegetated, lined in rip-rap and contain check-dams and similar structures to trap sediment and reduce flow velocity. ○ The impervious area of the SWMP catchments during operation and post-closure is relatively small. Geotextile and granular liners as well as vegetation cover will reduce the amount of solids entering the system from these surfaces. In addition, operational practices such as sweeping sand off asphalt surfaces, granular sealing of road shoulders and gravel surfaces and various dust suppression measures will reduce solids loading into the SWMP influent.				

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			• The surface water management pond outfall structures are within the NSDF site boundary and provide for approximately 35 m of dispersed overland flow and infiltration before the stormwater reaches the edge of the wetland. The edge of the wetlands are forested and only seasonally wet, providing additional distance for the stormwater to travel and infiltrate before reaching East Swamp Stream located 200 m from SWMP 3 outfall, Perch Creek marsh habitat located 125 m from SWMP 2 outfall, and Perch Creek located 150 m from SWMP 2 outfall. • CNL's Environmental Protection Program has a limit of 25 mg/L for total suspended solids in effluent discharges for a monthly average and 125 mg/L for a daily sample [1]. These limits will ensure protection of aquatic biota in the event that the stormwater reaches fish habitat. The water quality of the surface water management ponds will be monitored as part of CNL's Effluent Verification Monitoring program and reported as part of EAFMP. **Management of Surface Water Runoff from Blasting** During the construction phase which includes the blasting activities, run-off from the NSDF site to the adjacent wetlands will be controlled using a variety of techniques which are summarized in Management Practices and Mitigation provided in Table 5.4.2-7 of the EIS such as silt fences, use of check dams in ditches and possibly temporary surface water management ponds. The contractor will be responsible for providing mitigation plans that describe specific controls being implemented and compliance monitoring requirements for the construction activities being conducted. Some of the relevant contractor submittals for stormwater control and waterborne contamination include: blasting plan, dust management plan and stormwater management plan. Release of trace metals associated with blasting activities was identified in Table 5.3.1-4 and Table 5.4.2-7 of the EIS as a potential pathway for soil and surface water. No appreciable quantities of metals are expected from blasting of bedrock thus impacts are predicted to be negligible. ***Changes to the EIS:*** The following modifications (additions in red and text removals ~~strikethrough~~) will be made to the Final EIS to incorporate the information above: **EIS Section 3.4.4.5.1:** The target non-contact water quality objective is provided by Ontario Ministry of the Environment, Conservation and Parks in their *Stormwater Management Planning and Design Manual* (MOE 2003), which suggests a 60% total suspended solids (TSS) removal that provides a basic water quality treatment for discharge to a receiving wetland. Surface water management pond 1 will provide 80% TSS removal, surface water management pond 2 will provide 76% TSS removal and surface water management pond 3 will provide 60% TSS removal. ~~The wetland also has a sediment trapping function that will provide additional treatment to ultimately enhance level of treatment for adjacent streams (e.g., East Swamp Stream and Perch Creek).~~ Mitigation measures will be implemented upstream and downstream of the surface water management ponds to minimize sediment loading. These will include: • Design of the facility to resist heavy erosion during severe storm events. Conveyance structures such as ditches and swales will be vegetated, lined in rip-rap and contain check-dams and similar structures to trap sediment and reduce flow velocity. • The impervious area of the SWMP catchments during operation and post-closure is relatively small. Geotextile and granular liners as well as vegetation cover will reduce the amount of solids entering the system from these surfaces. In addition, operational practices such as sweeping sand off asphalt surfaces, granular sealing of road shoulders and gravel surfaces and various dust suppression measures will reduce solids loading into the SWMP influent. The surface water management pond outfall structures are within the NSDF site boundary and provide for approximately 35 m of dispersed overland flow and infiltration before the stormwater reaches the edge of the wetland. The edge of the wetlands are forested and only seasonally wet, providing additional distance for the stormwater to travel, pond and infiltrate before reaching East Swamp Stream located 200 m from SWMP 3 outfall and Perch Creek located 150 m from SWMP 2 outfall. The surface water management ponds will be monitored for total suspended solids as described in Table 11.0-1 to ensure compliance with Environmental Protection Program requirements for total suspended solids in effluent discharge. ***References:*** [1] CNL. 2014. CRL'S Non-radioactive Effluent Limits. Canadian Nuclear Laboratories Document No. CRL-509244-PRO-001, Revision 0. 2014 October.				

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ECCC-2-03	FC-52	Section 5.3.1.5.2.2	**Agency Information Request - Fish and Fish Habitat (Linkage to FC-52)** ***Question:*** CNL is requested to provide information that demonstrates the acid rock drainage and metal leaching potential of the proposed blast rock and describe any proposed mitigation to manage potential leaching. ***Context:*** During the construction phase of the project, CNL states that approximately 170,000 m^3 of blasted rock is anticipated in order to excavate the project site. However, there is no discussion on whether these rocks have been assessed for acid rock drainage and metal leaching potential or where the rock will be stockpiled. Should the blast rocks remain at the CRL site, what is the long-term impact on water quality? ***Rationale:*** The blast rock can also have potential impacts through its long-term weathering and as dust/blast debris. It is important to understand whether the blast rock has the potential to generate acid rock drainage as it could have adverse effects on water quality. **CNL Response** Bedrock in the vicinity of the NSDF is primarily comprised of quartzofeldspathic and diorite gneiss. Mineralogically, the rocks are comprised of quartz, potassium and plagioclase feldspars, hornblende, clinopyroxene, biotite and garnet as major minerals [1]. These minerals are generally considered to have low potential for acid rock drainage and leachability [2, 3]. Iron sulphide minerals (e.g., pyrite, pyrrhotite), which would indicate potential for acid rock drainage, have been identified through previous studies as alteration minerals formed through low-temperature fracture infilling in deep bedrock boreholes at the Chalk River Laboratories (CRL) site. One occurrence of pyrite was noted in the logs of boreholes at the NSDF site (PH17-008) at a depth of approximately 14 m, which is approximately 2m deeper than the excavation horizon [1]. Given the relatively low occurrence of the sulphide minerals and the relative stability of the constituent minerals of the rock the potential for metal leaching and acid rock drainage is anticipated to be low and any potential adverse effects on water quality are negligible. The excavated rock is intended to be used as construction material for the berm around the perimeter of the engineered containment mound (ECM), situated above the water table. The interior portion of the berm (from the berm crest inwards) will be covered with a base liner and cover system that will limit infiltration through the material. CNL notes that a Blasting Plan will be developed by the Construction Contractor after that contract has been awarded since it is required to be prepared by qualified individuals. The Blasting Plan will follow ‘Fisheries and Oceans Canada (DFO) Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters’ [4] and ‘Ontario Provincial Standard Specification (OPSS) in the document OPSS 120 – General Specification for Use of Explosives (OPS 2014)’ [5], as well as standard best management practices to minimizing the transport of blasting residuals into downstream waterbodies. Although the Blasting Plan is not available at this phase of the NSDF Project, CNL has specified requirements in technical specifications to the Construction Contractor. ***Changes to the EIS:*** The discussion above will be added as a new secondary pathway in Table 5.3.1-4 and Section 5.3.1.5.2.2 of Final EIS. The following modifications (new text in red) will be made to the Final EIS to add the secondary pathway to Section 5.3.1.5.2.2: ■ **Storage and use of blasted rock may result in metal leaching and acid rock drainage** Due to the stable nature of the bedrock constituent minerals it is anticipated that the potential generation of metal leaching, acid rock drainage and any potential adverse effects on water quality are negligible. Bedrock in the vicinity of the NSDF is primarily comprised of quartzofeldspathic and diorite gneiss. Mineralogically, the rocks are comprised of quartz, potassium and plagioclase feldspars, hornblende, clinopyroxene, biotite and garnet as major minerals [1]. These minerals are generally considered to have low potential for acid rock drainage and leachability [2,3].	EIS	Table 5.3.1-4 (Pathways Analysis for Geology Valued Components) and Section 5.3.1.5.2.2 (Secondary Pathways)	Inclusion of a metal leaching and acid rock drainage secondary pathway	Accepted

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			Iron sulphide minerals (e.g., pyrite, pyrrhotite), which would indicate potential for acid rock drainage, have been identified through previous studies as alteration minerals formed through low-temperature fracture infilling in deep bedrock boreholes at the CRL site. One occurrence of pyrite was noted in the logs of boreholes at the NSDF site (PH17-008) at a depth of approximately 14 m, which is approximately 2m deeper than the excavation horizon [1]. Given the relatively low occurrence of the sulphide minerals and the relative stability of the constituent minerals of the rock the potential for metal leaching and acid rock drainage is anticipated to be low. The excavated rock is intended to be used as construction material for the berm around the perimeter of the ECM, situated above the water table. The interior portion of the berm (from the berm crest inwards) will be covered with a base liner and cover system that will limit infiltration through the material. A Blasting Plan will be developed by the Construction Contractor after that contract has been awarded since it is required to be prepared by qualified individuals. The Blasting Plan will follow 'DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters' [4] and 'Ontario Provincial Standard Specification (OPSS) in the document OPSS 120 – General Specification for Use of Explosives (OPS 2014)' [5], as well as standard best management practices to minimizing the transport of blasting residuals into downstream waterbodies. Although the Blasting Plan is not available at this phase of the NSDF Project, CNL has specified requirements in technical specifications to the Construction Contractor. Therefore, based on the discussion above, this pathway was determined to have negligible residual effects on geology. ***References:*** [1] CNL. 2016. Geologic Waste Management Facility Integrated Geosynthesis Report: Phase I. Canadian Nuclear Laboratories Document No. 361101-10260-REPT-004, Revision 0. 2016 March. [2] Jambor, J. L. 2003. Mine Waste Mineralogy and Mineralogical Perspectives of Acid-Base Accounting. *Environmental Aspects of Mine Wastes*. (eds. J. L. Jambor, D.W. Blowes, and A.I.M. Richie) Mineralogical Association of Canada, vol. 31, 117-145 [3] Jambor, J.L., J.E. Dutrizac, L.A. Groat et M. Raudsepp. 2002. Static Tests of Neutralisation Potentials of Silicate and Aluminosilicate Minerals. *Environmental Geology,* vol 43, 1-17. [4] Wright, D.G., Hopky, G.E. 1998. Guidelines for the use of explosives in or near Canadian fisheries waters. Canadian technical report of fisheries and aquatic sciences 2107. Department of Fisheries and Oceans (DFO). Available at: https://www.racerocks.ca/wp-content/uploads/2015/09/DND-explosive-guidelines.pdf [5] Ontario Provincial Standard Specification (OPSS). OPSS 120 – General Specification for Use of Explosives, 2014 November. Available at: http://www.raqsa.mto.gov.on.ca/techpubs/ops.nsf/0/a97b9868eb1f53028525808200629106/$FILE/OPSS.PROV%20120%20Nov2014.pdf				
ECCC-2-04	FC-52	Section 5.4.1.5.2.2	**Agency Information Request - Surface Water Management Ponds discharge locations, Linked to FC-52** ***Question:*** CNL is requested to clarify the proposed location for each of the three surface water management pond discharge locations and spreaders in relation to nearby wetlands and describe how the effluent will enter into the wetlands. ***Context:*** On page 5-249 (section 5.4.1.5.2.2 of the revised EIS), CNL first states that "the major flow system for all three surface water management ponds, will outlet to adjacent wetland and will be dispersed by level spreaders that will provide an even flow distribution to the wetlands with an approximately wide dispersal pattern". However, this paragraph then states that the "current three surface water management ponds outlet locations are limited by the site boundary (greater than 5 m required) so that there is no discharge from the spreader directly to the wetlands". The two statements seem contradictory.	EIS	Section 5.4.1.5.2.2 (Secondary Pathways)	Additional clarification.	Accepted

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			Rationale: It is important to understand whether the surface water management ponds will be discharging to the wetlands and at what rate as this may result in water quality effects in nearby streams. **CNL Response** The two sentences referenced in the comment (text on page 5-249, Section 5.4.1.5.2.2 of the 2019 revised EIS) are actually referencing two separate locations, which is unclear since the term “outlet” is used in both. The first sentence is referring to the wetlands which will receive the surface water discharge, and the second sentence is describing the actual, physical outlet structures (level spreaders and weirs) of the surface water management ponds (SWMPs). During normal operation the effluent flow from the three SWMPs is through a bottom draw, perforated pipe outlet. The outlet is connected to a dual-basin manhole structure which controls pond elevation, after which the effluent (2-year through 100-year flow) is conveyed by gravity to a flow spreader (consisting of a concrete curb and rip-rap covered swale). The spreader distributes flow from the piped outlet to a natural overland flow path from the spreader to the downstream wetland. During periods of extreme flows (i.e., greater than the 100-year storm event with snowmelt, peak monthly rainfall and projected increases due to climate change considered), effluent discharges via a concrete weir structure, as part of the SWMP berm, and is further conveyed in a rap-rap lined channel to the site footprint limit where a natural overland flow path conveys flow to the adjacent wetland. The flow spreader and riprap overflow channel discharge points are located adjacent to the SWMPs and are within the NSDF site footprint (approximately 5 m or more from the site boundary). The NSDF site boundary at these locations approximately follows the 30 m wetland buffer at East Swamp for SWMP-1 and Perch Lake Swamp for SWMP-2 and SWMP-3. This allows for approximately 35 m of dispersed, overland flow and infiltration before discharged stormwater reaches the edge of the wetland and, eventually, Perch Lake and the Perch Creek watercourse. The edge of these wetlands is forested and only seasonally wet, providing additional distance for effluent stormwater to travel, pond and infiltrate before reaching a permanent or fish-bearing watercourse. The nearest watercourse to SWMP 2 is Perch Creek, located approximately 300 m from the outlet structure. The nearest watercourse to SWMP 1 and SWMP 3 is East Swamp Stream, located approximately 150 m from the outlet structures. East Swamp Stream is an intermittent stream, it dries out in summer months and provides only marginal fish habitat. Figure 1 below (which is a simplified version of Figure 3.1.1-1 in the 2019 revised EIS) shows the location of the wetlands and watercourses in relation to the SWMPs. For clarity, the approximate locations of the SWMP outlet structures and the direction of flow are shown in Figure 2 below (which is also Figure 3.4.4-1 of the 2019 revised EIS).				

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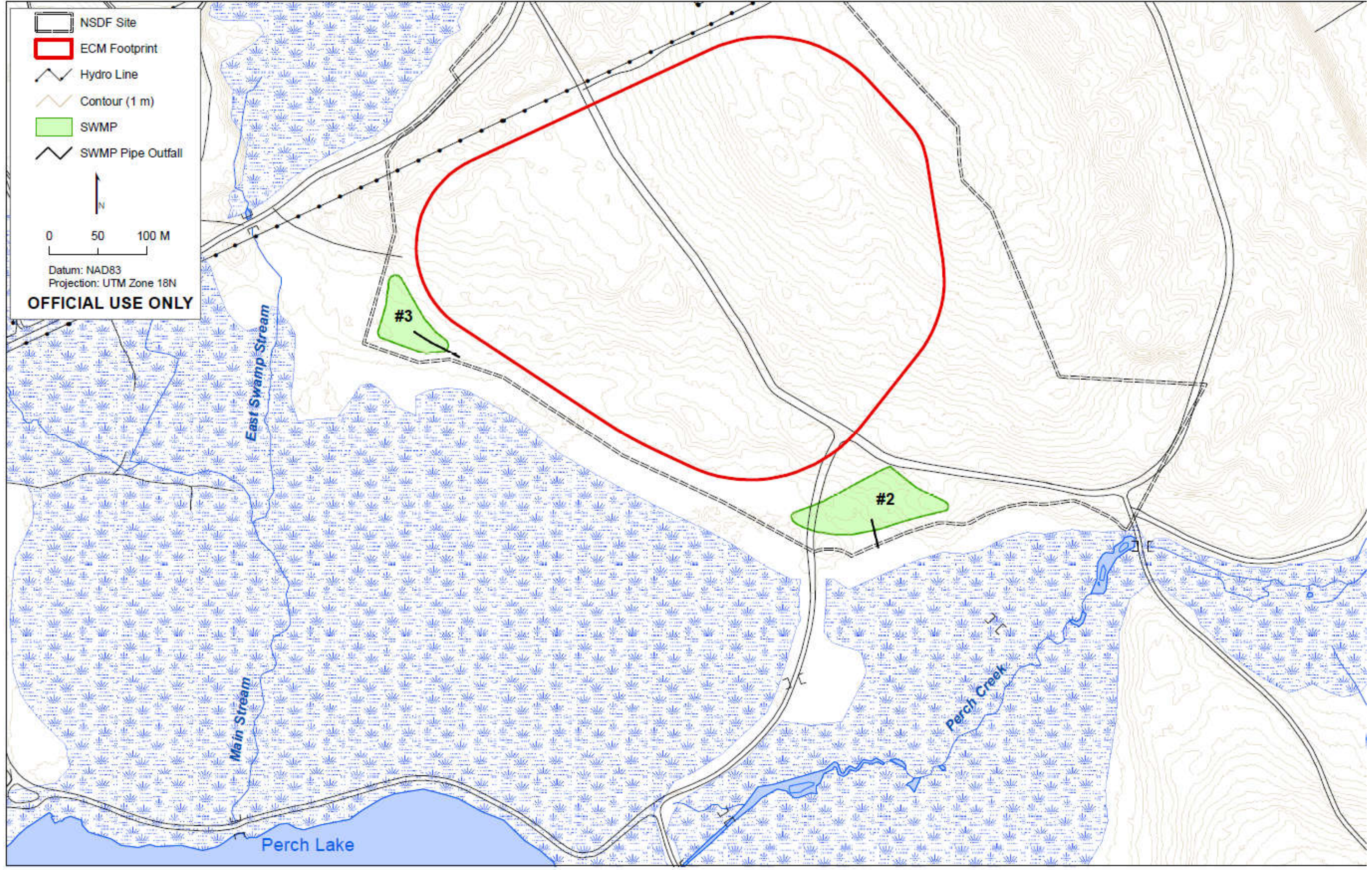
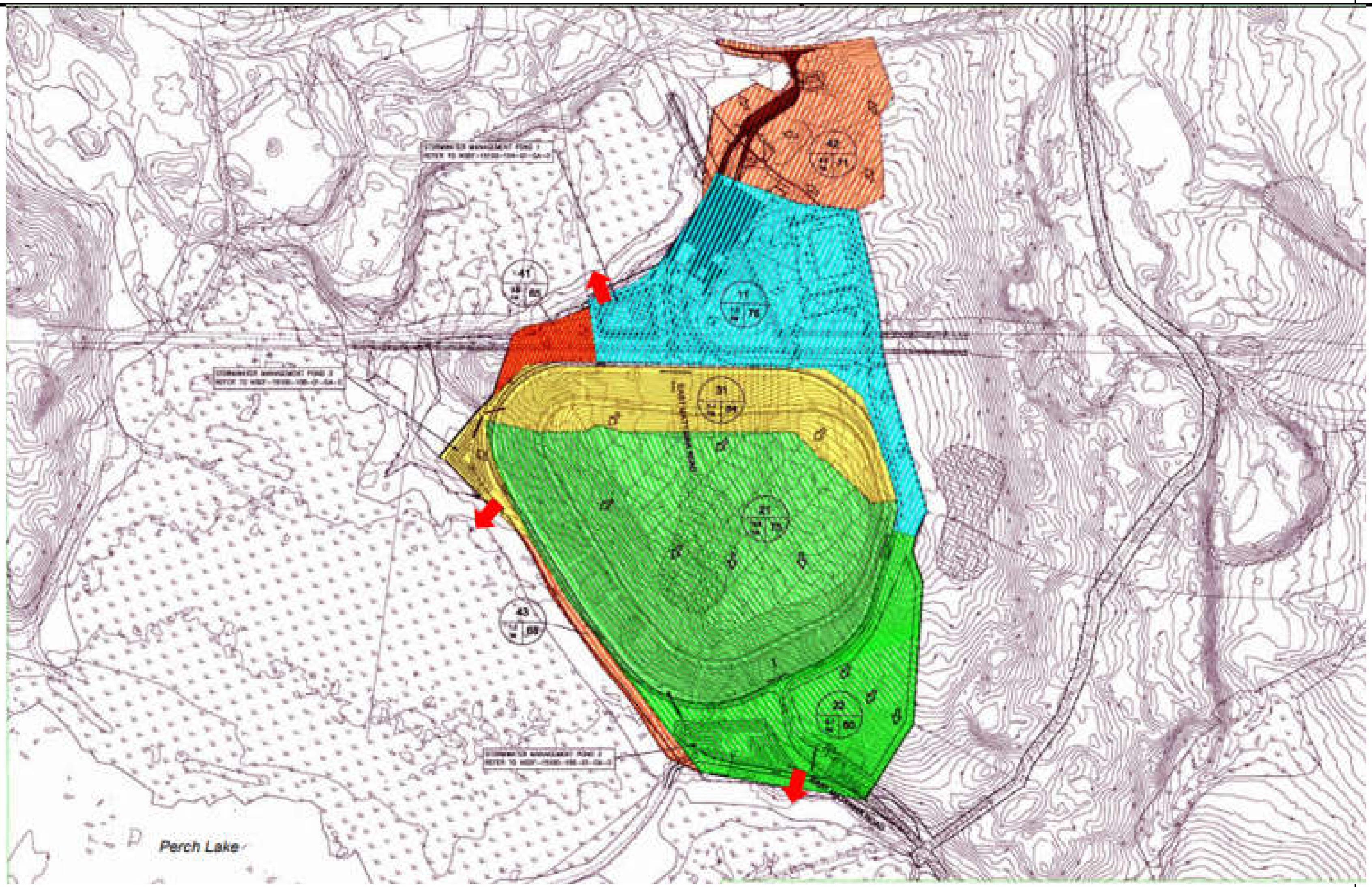
			 Figure 2: Location of SWMPs in relation to adjacent wetlands and watercourses				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			 **Figure 3: SWMP pond discharges (red arrows) and post-closure catchment areas** ***Changes to the EIS:*** The following modifications (new text in red and deleted text as ~~strikethrough~~) will be made to the Final EIS to incorporate the above information: **EIS Section 5.4.1.5.2.2**, paragraph on top of page 5-249 will be revised to the following: The major flow system for all three SWMPs, which manage non-contact water, discharge on the NSDF Project site and from there flow into the adjacent wetlands. The SWMP outlet structures are located within the NSDF Project site boundary and are 5 m or more from the edge of the site, which in these locations follows a 30 m setback from the wetland. Flows from the SWMPs are dispersed by level spreaders that provide an even, flow distribution with an appropriately wide dispersal pattern before travelling 35 m or more overland to the edge of the wetland. ~~will outlet to the adjacent wetland and will be dispersed by level spreaders that will provide an even flow distribution to the wetland with an appropriately wide dispersal pattern. Current SWMPs outlet locations are limited by the site boundary (greater than 5 m separation~~				

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			~~required) so that there is no discharge from the spreader directly to the wetland. Local topography between the level spreader and the wetland, as well as any setbacks, has influenced the location of the on-site level spreader.~~ ***References:*** N/A				
ECCC-2-05	FC-68	Section 3.4.2.1	**Agency Information Request - Fish and Fish Habitat** ***Question:*** CNL is requested to clarify the base drainage volumes directed towards the WTP versus the combined base drainage with the 16% increase. CNL is also requested to revise Table 2 accordingly and provide further information that accounts for all wastewater that will be treated by the WTP. ***Context:*** In the last paragraph of Section 4.1 of the Leachate and Wastewater Characterization Report (page 11), CNL states: “*For an assumed 15,000 m^2 maximum cell surface area, this equates to 1,800 m^3 of water, or about a 16% increase in the annual volume shown in the second to last column of Table 2.*” This 16% increase does not appear to be reflected in Table 2. It is unclear as to how it affects the accumulated volume of effluent going to the WTP. ***Rationale:*** CNL should account for all wastewater that will be treated by the WTP. This could have impact on the design of the WTP, its ability to treat the effluent, and the quality of the effluent to be discharged into the receiving environment. **CNL Response** CNL confirms that all wastewater to be treated by the Wastewater Treatment Plant (WWTP) has been accounted for in the WWTP design. The purpose of Table 2 (reproduced as Table 3.4.2-1 in the 2019 revised EIS) is to provide the average (i.e. base drainage) volumes of wastewater that will be treated by the WWTP. As noted in Section 1.1 of [1], “The wastewater volumes in this report are developed for the purpose of determining the long-term average wastewater volumes that are used to establish the flow-rate design capacity of the WWTP.” The 1,800 m^3/16% increase in annual volume is the amount of wastewater generated by an extreme weather event (specifically, the 100 year, 24 hour storm) that is not considered to occur during an average year; thus, it is not included in Table 2. Extreme rainfall events are discussed in Section 10.1.2 of the 2019 revised EIS and a summary of the design features and mitigation for extreme rainfall events is presented in Table 10.6-1 of the 2019 revised EIS. The WWTP has been designed with sufficient capacity to treat the both the average (base drainage) volume of wastewater expected and the volume of wastewater generated (4710 m^3) from back-to-back 100-year, 24 hour storm events (see section 3.4.2.1 the 2019 revised EIS), which bounds the 1,800 m^3 noted in the comment. The wastewater is treated in batches and each batch of treated effluent is sampled and analysed prior to discharge to ensure the treated effluent meet the effluent discharge targets even when treating the wastewater produced from an extreme rainfall event. ***Changes to the EIS:*** The following modifications (new text in red and deleted text as ~~strikethrough~~) will be made to the Final EIS to incorporate the above information: Section 3.4.2.1 and Table 3.4.2-1 will be revised to clarify that the volumes under discussion are long term averages used to establish the flow-rate design capacity of the WWTP. The text in red below will be added to Section 3.4.2.1:; “The ~~total~~ average annual volume of wastewater expected to require treatment is about 11,000 m^3.” The title of Table 3.4.2-1 will be revised as per the red text below: “Table 3.4.2-1: Average Annual Wastewater Volumes Generated Over the Life of the Engineered Containment Mound”	**EIS**	Section 3.4.2.1 (Wastewater Quality) and Table 3.4.2-1 (Wastewater Volumes Generated Over the Life of the Engineered Containment Mound)	Additional clarification.	Rejected with Follow Up IR ECCC-3-01

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				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			References [1] AECOM (AECOM Canada Ltd.). 2019. Leachate and Wastewater Characterization Report. Canadian Nuclear Laboratories Document No. B1551-508600-REPT-001, Revision 3, 2019 May.				
ECCC-2-06	FC-68	Section 3.4.2. 6	**Agency Information Request - Fish and Fish Habitat** ***Question:*** CNL is requested to develop criteria and a schedule that will be used to determine when the effluent from the WTP will be discharged to the exfiltration gallery and when it will be discharged directly to Perch Lake. In the event that an extreme weather event is discharged from both the Stormwater Management Pond 1 and the exfiltration gallery (with its normal treated effluent): 1. What is the possibility of flooding the adjacent WMAs? 2. If flooding occurs (#1 above), what is the impact on the East Swamp Wetland (ESW) and ultimately Perch Lake? ***Context:*** CNL has indicated that the treated effluent (from the WTP) will be discharged to the exfiltration gallery or Perch Lake depending on specific site conditions. However, there is no discussion on when the effluent will be discharged to either of the two locations. These discharge points are in separate receiving environments. ***Rationale:*** There is a lack of clarity with respect to when CNL anticipates releasing effluent through either of the two pathways (i.e., is this driven by site conditions, seasonality, or other factors). CNL should account for all wastewater that will be treated by the WTP. This could have an impact on the design of the WTP, its ability to treat the effluent, and the quality of the effluent to be discharged into the receiving environment. ECCC is also concerned that during a major storm event, the combined effluent discharge from the Stormwater Management Pond 1 (including effluent from its spillway) and the exfiltration gallery might result in a flood event in the ESW. If such an occurrence should take place, there is a potential that water could enter the four WMAs adjacent to the ESW and result in untreated effluent reaching the ESW. **CNL Response** Treated effluent produced by the wastewater treatment plant (WWTP) is discharged to the Perch Lake watershed, either through an exfiltration gallery and/or by pumping the effluent to Perch Lake via a transfer line. The preferred discharge location is the exfiltration gallery as it provides a longer transit time to the Ottawa River and therefore additional decay of shorter lived radionuclides, for example tritium, as it has a relatively short half-life of 12.3 years. Although discharge to the exfiltration gallery provides a longer transit time to the Ottawa River, for both discharge pathways human health and aquatic environment are protected. Tritium concentrations in Perch Creek which discharges to the Ottawa River are predicted to remain below the drinking water guideline of 7000 Bq/L. Evaluation of the infiltration capacity of overburden in the vicinity of the exfiltration gallery has shown that under high water table conditions the capacity of the exfiltration gallery is not sufficient to accept all of the effluent discharge from the WWTP if it is operating at maximum treatment capacity. Therefore, discharge to Perch Lake via the effluent transfer line was introduced into the design. The capacity of the exfiltration gallery depends on the elevation of the groundwater table, which fluctuates seasonally and after wet weather events. Groundwater monitoring wells will be installed in proximity to the exfiltration gallery to monitor water table elevations. The real time groundwater monitoring data will be used to control the effluent batch discharge to the exfiltration gallery [1]. Under high water table conditions when the exfiltration gallery capacity is reached, effluent will be routed directly to Perch Lake. Real time groundwater elevation data collected at the monitoring location closest to the exfiltration gallery indicates that the water table elevation under spring conditions is within 0.4 m of grade; under summer conditions the water table is markedly lower at approximately 1.6 m below grade.	EIS	Section 3.4.2. 6 (Wastewater Treatment Plant Treated Effluent Discharge Systems)	Section 3.2.4.6 will be expanded to clarify that the exfiltration gallery is the main effluent discharge route and conditions under which effluent will be routed to Perch Lake	Accepted

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			The rise in groundwater table predicted by the groundwater flow model assuming 50% of the annual wastewater volume is discharged to the exfiltration gallery over a four-month period is approximately 1 m. There is uncertainty in this estimate due to simplifications in the groundwater model regarding the discharge scenario (e.g. continuous discharge for the groundwater flow model versus batch discharge in practice) and uncertainties in the model itself. Effluent discharge to the exfiltration gallery versus Perch Lake will be determined using the following criteria: • The water table elevation at the exfiltration gallery must remain 1 m below grade. • Real time groundwater monitoring for wells adjacent to the exfiltration gallery will provide groundwater table elevation data and determine when discharge to the exfiltration gallery is acceptable It is anticipated that under spring conditions, all effluent will be discharged to Perch Lake; under summer conditions when the water table is more than 1 m below grade and the volume of wastewater generated (and therefore effluent treated) is lower, it is anticipated that discharge to the exfiltration gallery will be the primary discharge route. Flooding of the waste management areas (WMAs) under extreme weather conditions, from combined discharge to the exfiltration gallery and stormwater management pond discharges is not considered a credible scenario for several reasons: 1. The elevation in the East Swamp Wetland varies from about 163 masl at the southern extents up to about 167 masl in the area adjacent to the proposed Stormwater Management Pond 1. The normal outlet from the proposed pond is 169.5 masl and the emergency overflow elevation from the pond is 171 masl. There is there plenty of vertical separation between the wetland and the pond outlets so that the pond will operate normally without backwater effects on the outlet pipes, even during extreme events. The East Swamp is directly connected to the Perch Lake Swamp, even if the culvert connection between the East and Perch Lake Swamps is blocked, water can spill over the access road at approximately 163 masl, reducing the potential for flooding within the East Swamp. 2. The WMA's are located in upland areas 5 to 10 meters above the East Swamp Wetland (see topographic map Figure 5.2.1-5 and cross-section through WMA A shown in 5.3.1-8). 3. The anticipated effluent treatment volumes represent a minor component of the flow through the East Swamp Wetland. 4. Under high water table conditions all effluent discharge would be routed to Perch Lake. Flooding of the East Swamp wetland is not a likely scenario as noted above. Under high water table conditions all effluent discharge would be routed to Perch Lake. If the culvert connection between the East and Perch Lake Swamps were blocked, water can spill over the access road reducing the potential for flooding within the East Swamp. **Change to the EIS:** The following modifications (new text in red and deleted text as ~~strikethrough~~) will be made to the Final EIS to incorporate the information above: Section 3.2.4.6 of the EIS will be expanded to describe when effluent from the WWTP will be discharged to the Exfiltration gallery and when it will be discharged directly to Perch Lake. ***3.4.2.6 WWTP Treated Effluent Discharge Systems*** The NSDF's WWTP treated effluent discharge systems are designed for the peak flow from the WWTP. The preferred option is to discharge the treated effluent from the WWTP to the exfiltration gallery as this provides a longer transit time to the Ottawa River then discharge to Perch Lake. ~~unless the groundwater elevations are determined to be too high. When this occurs the second option is to discharge the treated effluent to Perch Lake.~~ Under high groundwater elevation conditions, discharge to the Exfiltration Gallery is not possible and the treated effluent will be routed to Perch Lake. Figure 3.1.1-1 shows the two potential discharge locations. The estimated annual volume of the treated effluent to be discharged is approximately 11,000 m^3. The exfiltration gallery design and transfer line to Perch Lake are described in Sections 3.4.2.6.1 and 3.4.2.6.2 below.				

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			Groundwater monitoring in proximity to the exfiltration gallery has indicated that groundwater elevation under spring conditions is near ground level. Groundwater flow modelling has also indicated that under high seasonal groundwater conditions discharge to the exfiltration gallery will result in flooding at the exfiltration gallery. It is therefore anticipated that under spring conditions all effluent will be discharged to Perch Lake to ensure that the water table remains below grade at the exfiltration gallery and there is no flooding. Under summer conditions when the water table is lower and the volume of wastewater generated is lower, effluent will be routed to the exfiltration gallery. Real time groundwater monitoring wells will be installed in proximity to the exfiltration gallery and provide water table elevation. The water table elevation data will be used to determine when the treated effluent can be discharged to the exfiltration gallery. ***References*** [1] AECOM (AECOM Canada Ltd.). 2019. Design Description. Canadian Nuclear Laboratories Document No. 232-503212-DD-001, Rev 1, 2019 May				
ECCC-2-07	FC-81	Section 5.5.4.1	**Agency Information Request - Fish and Fish Habitat** ***Question:*** CNL is requested to provide any additional information regarding the physical condition of the fish caught during the surveys conducted in 2017 and 2018. Any data available should be updated into the baseline study to help characterize the fish health and any possible effects from chronic exposure to radiological and non-radiological contaminants in the Perch Lake basin. In addition, CNL is requested that when routine fish sampling and reporting (either compliance monitoring or as post-EA decision monitoring) is carried out, that the frequency or prevalence of diseases should be assessed. This assessment should determine whether there are any possible effects from the chronic exposure of radiological and non-radiological contaminants that could be attributed to the contaminants flowing into the Perch Lake basin. ***Context:*** In response to ECCC's original IR (FC-81), CNL has committed to conducting additional fish surveys in the Perch Lake basin to provide an updated analysis of the fish population in the basin. The request was also for CNL to justify its original conclusion that "*there is no evidence to suggest that current Chalk River Laboratories operations are negatively affecting the aquatic environment*". The revised EIS (section 5.5.4) does describe the results of new fish surveys conducted at Perch Lake watershed. The document also presented additional data from surveys in 2017 and 2018 (both in the EIS and in baseline studies). Within these documents the diversity and abundance of the fish species caught by various methods is reported in addition to fish tissue data from the 2018 study. The conclusion presented in the disposition table states that "*there have been no significant changes to fish community structures that could be attributed to CRL operations"*. However, fish community structure is not the only indicator of effects on fish communities. Though the fish community structure may not be indicating an adverse effect, section 4.5.2.4 of the Environmental Risk Assessment of Chalk River Laboratories Report (2019) showed that there were some Risk Quotients greater than 1 for fish in Perch Lake under existing conditions. Additional information should be provided to help determine the effects of chronic exposure to radiological and non-radiological contaminants in the Perch Lake basin. ***Rationale:*** There are a number of metrics/methods that can be used to evaluate the effect of stressors on fish. These include meristics analysis, population aging and reproductive condition as well as gross observations of physical condition such as the presence of disease (tumors/lesions etc.). It is assumed that when the individual specimens were measured and weighed, there would have been opportunities to examine their physical condition. Information that helps quantify the above indicators may further assist in understanding the impacts of both radiological and non-radiological contaminants in the Perch Lake watershed. **CNL Response** At the time of the 2017/2018 fish survey, the inspection of physical characteristics of individual fish caught (other than length and weight) was not documented as part of the baseline study for the NSDF Project [1]. Therefore, there is no available baseline data of physical	EIS	Section 5.5.4.1 (Description of the Environment – Methods)	Additional statement	Accepted

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			conditions of individual fish (e.g., gross observations of tumors, lesions, etc.). During the 2017/2018 fish survey [1], the objectives were to: determine fish species present in the lake, take measurements where possible, and collect enough fish biomass samples from each species to conduct the radiological and non-radiological analyses required to determine concentrations of contaminants of potential concern (COPC) in tissue. The biomass collected to fulfill this need were small (i.e., the fish were not abundant in Perch Lake) and primarily derived from brown bullhead and pumpkin seed species. The limitation of fish sampling was due to the small fish population in Perch Lake. Perch Lake is very shallow and it is primarily due to this physical characteristic, and not the presence of COPCs, that Perch Lake cannot support an abundant fish population. Furthermore, the colonization of the northern pike species since the 1980s along with depressed oxygen concentrations in the water column during the winter have strongly influenced the fish community of Perch Lake. For example, the introduction of the pike led to the virtual extirpation of yellow perch fish population while chub, minnows, and pearl dace populations have greatly diminished. Any impairment in fish community structure in Perch Lake appear to be driven by the combination of these physiohydrological and hydrochemical factors as well as fish population imbalances which are natural stressors and not attributed to Chalk River Laboratories (CRL) activities. Typically, the characterization of changes in fish community structure in addition to measurement of COPC in fish tissue (and their comparison to established COPC limits/standards) in the manner conducted in the baseline study [1], is appropriate to measure the ecological health of fish in the environment. CSA Group (CSA) standard N288.4-10 [2] indicates the objective of biological effects monitoring: to monitor for the organism responses that might be attributed to exposure to the contaminant and/or physical stessor(s) of interest. While responses at the cellular or molecular level can be measured as biomarkers of exposure, responses at the higher ecological level (at the community or population level) are more relevant as long-term indicators of biological effect. The evaluation of the community structure of fish as an indicator of baseline fish conditions – as was done in the recent fish survey in Perch Lake [1] – is therefore appropriate to determine the long-term impacts of contaminants present in Perch Lake. The results of the survey at Perch Lake [1] showed no major changes to fish productivity and community structure over time and suggests that the historical effects of past operations on water quality do not endanger the fish community and population in Perch Lake (Section 5.5.4.2.2 in the 2019 revised EIS). Several COPCs had risk quotients (RQs) >1 in the streams flowing into Perch Lake, at the Outlet of Perch Lake and in Perch Creek as well as in upstream wetlands [3]. In most cases this was the result of COPC concentrations exceeding local background concentrations and Provincial/Canadian guidelines. Exceedances of background or guidelines does not directly translate to harmful effects, but indicates that further assessment is needed to determine potential adverse effects. The accumulation of COPC in surface water can be attributed to the typically high organic matter content of wetlands, which is very efficient at retaining and exporting contaminants. This is often reflected in the brown water of streams that drain these wetlands - brownish orange because of their high organic content (humic and fluvic acids). Contaminants can bind to organic matter particulates (as colloids). As a result, these stream waters may have elevated COPC concentrations. Consequently, both impacted and reference (non-contaminated) streams can have elevated COPC concentrations. However, since the COPC are largely bound to organic matter, they are not readily bioavailable. As such, elevated concentrations of COPC which can translate to RQ>1 may not necessarily result in adverse health effects on fish. For example, high survival of fathead minnows in a sixty-day *in situ* toxicity study with specimens placed in Perch Lake and Perch Creek demonstrated that water at these locations is not toxic to fish [4]. Routine environmental monitoring at CRL indicates that the potential risk to negatively affect fish as a result of present surface water conditions are deemed low (Section 5.5.4.2.2 of the 2019 revised EIS) and NSDF Project activities are not predicted to have detrimental impacts on aquatic biota. The environmental risk assessment, which assesses potential environmental impacts from operations at the CRL site, occurs on a five-year cycle and will continue the long-term assessment of the risk of fish exposure to contaminants in the surface water environment (including Perch Lake) at the CRL site. The CRL Environmental Risk Assessment (ERA) [3] conducted in accordance with CSA N288.6 [5], and incorporated into the 2019 revised EIS, has demonstrated that no significant changes to fish community structures have occurred which can be attributed to CRL operations. CNL recognizes, through its publication of the ERA for the CRL site, that surface water quality of the Perch Creek and Perch Lake Watershed continues to be affected by past operations of the waste management areas (WMAs). Measurement endpoints, such as survival, growth, and reproduction, are directly related to population abundance and community structure, and can be used to show possible effects resulting from exposure to COPCs (e.g., estimated total doses; or combined dose in the case of radiological contaminants, compared to benchmark values, resulting in a Risk Quotient (RQ)).				

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			As part of the Environmental Assessment Follow-Up Monitoring Program (EAFMP) for the NSDF Project and the Environmental Risk Assessment of the CRL site (5-year period), the potential risk to fish in the watershed surrounding the NSDF Project site will continue to be assessed and mitigation measures will be implemented as they become necessary. Particular attention is paid should the risk to adversely impact fish communities in the Perch Lake basin change due to an increase in concentration of COPCs beyond acceptable water quality guidelines for the protection of aquatic biota. **Changes to the EIS:** The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: **EIS Section 5.5.4.1 Methods:** As justification of the method used in the 'Description of the Environment' The baseline study conducted as part of this EIS focuses on methods which assess the conditions of fish in Perch Lake at the community level by examining changes to community structure. As such, the description of fish habitat, communities, and species present in the Perch Creek and Perch Lake watershed of the RSA takes into account a community-based approach in assessing the potential residual effects of the NSDF Project on aquatic biodiversity. This conventional approach is appropriate to determine the long-term ecological effects of contaminants to non-human biota (CSA N288.4-10). ***References:*** [1] CNL. Characterization of Fish Collected from Perch Lake, 2018 July to 2018 August, 232-121221-401-001, Revision 0, 2018 December [2] CSA Group (Canadian Standards Association). 2010. N288.4-10: Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills. [3] Canadian Nuclear Laboratories. Environmental Risk Assessment of Chalk River Laboratories, ENVP-509220-REPT-003, Revision 0, 2019 January. [4] Gagnaire, B., C. Adam-Guillermin, A. Festarini, I. Cavalié, C. Della-Vedova, C. Shultz, S.B. Kim, H. Ikert, C. Dubois, S. Walsh, F. Farrow, D. Beaton, E. Tan, K. Wen and M. Stuart. 2017. Science of the Total Environment 599-600: 597-611 [5] CSA Group (Canadian Standards Association Groups). 2012. CSA N288.6-12: Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills.				
ECCC-2-08	FC-87	Section 5.6	**Agency Information Request - Link to FC-87/Linked to Regulatory Permits / Authorizations** ***Question:*** CNL is requested to evaluate all of the existing waste management areas (WMAs) and adjacent areas with respect to use by migratory birds and species at risk. This analysis should include relevant mapping for each site and the proposed mitigation measures, and be reflected in the EIS accordingly. ***Context:*** Not all of the existing 18 WMAs and adjacent areas have been evaluated with respect to their use by migratory birds and species at risk. However, it is known that the substrate within these WMA sites will be relocated to the NSDF. The excavation of these sites may have impacts on wildlife including migratory birds and species at risk listed on the *Species At Risk Act* (SARA). This disposition is relevant to themes common to the EIS, such as: presence/absence of terrestrial species at risk, potential environmental effects of the project, and proposed mitigation. Therefore, CNL should include all relevant information on these topics in this IR response in the EIS. When existing documents such as published reports, baseline data or survey results are referenced, please: • Specify which portion of the information or data in the document applies to the NSDF Project. • Explain how it applies, and any assumptions, limitations or differences. • Distinguish factual evidence from inference. • Note any limitations on inferences or conclusions that can be made.	N/A			Accepted

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				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			Rationale: Figure 5.6.4-15 “Bat Habitat Availability and Distribution in the RSA – Base Case” and figure 5.6.4-17 “Blanding’s Turtle Habitat Availability and Distribution in the RSA – Base Case” both clearly show that the WMA sites overlay with known species at risk habitat. It is also likely other species at risk and migratory birds are utilizing the property within each of the WMAs as habitat (or other uses). The removal of the substrate will result in an impact(s) (i.e., habitat loss) to these species. There is also the possibility of these animals accessing the site during the excavation and transfer process potentially resulting in direct mortality. These interactions should be considered, assessed and mitigated. **CNL Response** Environmental remediation of the existing Waste Management Areas (WMAs) on the Chalk River Laboratories (CRL) site are not within the scope of the NSDF Project [1]. The timelines for the remediation of some of these WMA, several of which are still in operation, is over many years (or decades). The CRL site is a complex nuclear site wherein the CRL site license requires CNL to have a preliminary decommissioning plan which includes a conceptual schedule for the decommissioning of nuclear facilities and remediation of WMAs [2]. CNL is required to review and update the CRL site preliminary decommissioning plan every 5 years as well as provide a detailed decommissioning plan to the CNSC prior to execution of decommissioning or remediation for a licence listed facility. Specifically, all work on the Chalk River site is subject to the Chalk River site operating licence granted by the CNSC and other regulatory approvals. The remediation process, including the approach for determining remedial options is captured in CNL’s Decommissioning and Demolition Program Description Document [3]. As noted above the remediation of the WMAs would be subject to separate licensing decisions by the CNSC thus discussion of the remediation options has not been included in the 2019 revised EIS. Changes to listed species and habitat descriptions may occur before the actual remediation is undertaken. Therefore, it would be difficult at this time to have a thorough review of Species at Risk (SAR) impacts from these remediation activities. However, CRL is registered under ISO-14001. Our environmental policy states: *“We review the impacts of our activities, facilities, projects, services and products on the environment”.* For non-routine work, this review is conducted through CNL’s environmental review process. Since CRL is located on Federal lands, step 1 of this process is to determine whether the particular project would be subject to a section 82 review under the Impact Assessment Act. Regardless of whether a particular project is subject to the *Impact Assessment Act* (IAA), the review process is the same. CNL assesses all potential environmental impacts and implements appropriate mitigation measures, including request for a SAR permit where required. Where an impact to a species at risk is noted and the project is subject to section 82, a notification letter will be sent to Environment and Climate Change Canada (ECCC) as per section 79 of the SAR Act. This review process cannot be conducted effectively until it is determined how and when the remediation projects will be conducted. At this time, the details of the remediation of the WMAs and timing is unknown and it would be extremely difficult to determine the appropriate mitigation measures. For information, the WMAs at CRL are small areas in nature (See Table 1 below) and their habitat varied. Some WMAs are composed of maintained grassy area while others are maintained less frequently but preference is given to keep the vegetation short to prevent any uptake of radioactivity by the aerial structures of the plants. Nevertheless, SAR presence identified within any of the WMAs is recorded in CNL’s database to be used when conducting an environmental review and proper mitigation measures are put in place when appropriate. Although no specific surveys are conducted within the WMAs, due to radiological hazards, species at risk presence could be recorded from nearby passive recorders for example or from staff authorized to conduct some characterization work. For this reason, CNL has a good understanding of the use of the WMAs by SAR and is in a position to provide an adequate review once the area is identified for remediation. Please note that for some species, for example the Blanding’s turtle, the WMAs would not qualify as suitable habitat because they fall under the unsuitable habitat as defined in the species’ Recovery Strategy [4]: “Any man-made structure (e.g., houses, urban areas, docks, boat launches), any habitat type that does not correspond to the biophysical attributes of suitable habitat (Table 3) is considered unsuitable habitat.” But if or when work is scheduled in WMAs consideration is always part of the Environmental Review and data is continually collected on species at risk presence around the CRL site.				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
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			For the reasons provided above, CNL believes that evaluation of all existing WMAs and adjacent areas with respect to use by migratory birds and species at risk is not warranted at this time as remediation of the existing WMAs is outside of the scope of NSDF project.				

Table 1: List of Waste Management Areas and respective description

Waste Management Area	Area	Status	Description
WMA “A”	1.2 hectare	Non-operating	WMA A is located within the Perch Lake basin. Fenced area with short grass and no trees.
WMA “B”	14 hectare	Operating	WMA B is located within the Perch Lake basin. Fenced area with short grass interspersed with waste storage structures. Only a small cluster of trees near the north end
WMA “C”	4.2 hectare	Non-operating	WMA C is located in the Maskinonge Lake basin. Fenced area wit short grass and no trees.
WMA “D”	1.3 hectare	Operating	WMA D is located within the Perch Lake basin. Fenced gravel area with above ground waste storage structures. No vegetation.
WMA “E”	0.55 hectare	Non-operating	WMA E is located within the Perch Lake basin. WMA E is not fenced, however there is gate for access. Short grass and no trees.
WMA “F”	2 hectare	Non-operating	WMA F is not fenced, and is located near the drainage divide between the Chalk Lake basin and the Maskinonge Lake basin. Short grass and with trees on the western and southern slopes.
WMA “G”	0.49 hectare	Operating	WMA G is located in the Perch Lake basin. Fenced gravel area with above ground waste storage structures. No vegetation.
WMA “H”	3.4 hectare	Operating	WMA H is located in the Perch Lake basin. Fenced gravel area with above ground waste storage structures ar sea container storage. No vegetation.
WMA “J”	1.6 hectare	Operating	WMA J is a fenced area. Sandy area with a weather shield structu over the open area of the landfill. No vegetation.
Chemical Pit and RP1 (Other LDAs)	0.79 hectare	Non-operating	Fenced area is located in the Perch Lake basin with grass over roc and concrete debris pile.

<table>
<tr><th rowspan="2">Reference #</th><th rowspan="2">Link to IR#1 (Original IR package)</th><th rowspan="2">EIS Section</th><th rowspan="2">Information Request & Response</th><th colspan="3">Documents Impacted by the Response to IR</th><th rowspan="2">Accepted/ Rejected with request for follow-up information</th></tr>
<tr><th>Document Name</th><th>Section/Figure/ Table Impacted by Response</th><th>Scope of New Information</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td>RP2 (Dispersal Pit)</td><td>0.88 hectare</td><td>Non-operating</td><td>Fenced area is located in the Perch Lake basin with grass over pit run.</td></tr>
<tr><td>Laundry Pit</td><td>0.2 hectare</td><td>Non-operating</td><td>Fenced area is located in the Perch Lake basin of a sandy soil pit with grass and no trees.</td></tr>
<tr><td>ACS Pits</td><td>0.35 hectare</td><td>Non-operating</td><td>The ACS Pits are located in the Maskinonge Lake Basin. Fenced area of a sandy soil backfilled pits with grass.</td></tr>
<tr><td>Nitrate Plant</td><td>0.75 hectare</td><td>Non-operating</td><td>The Nitrate Plant is located in the Maskinonge Lake Basin. Fenced area with trees and rock/concrete debris piles.</td></tr>
<tr><td>Thorium Pit</td><td>0.01 hectare</td><td>Non-operating</td><td>The Thorium Nitrate Dispersal Pit is located in the Maskinonge Lake Basin. Fenced area of a sandy soil backfilled pit with grass.</td></tr>
</table>

<i>Changes to the EIS:</i>
No changes to the EIS are required.

<i>References:</i>
[1] Record of Decision on the Scope of Environmental Assessments for Three Proposed Projects at Existing Canadian Nuclear Laboratories' Facilities, 2017 March 8. Available at: http://suretenucleaire.gc.ca/eng/the-commission/pdf/Record%20of%20Decision%20-%20CNL%20Scope%20of%20EA%20Factors%202017.pdf
[2] Canadian Nuclear Laboratories (CNL). Comprehensive Preliminary Decommissioning Plan, CPDP-508300-PDP-001, Revision 4, 2018 March.
[3] Decommissioning and Demolition Program Description Document, 900-508300-PDD-001, Revision 1, 2018 November.
[4] Environment and Climate Change Canada. 2018. Recovery Strategy for the Blanding's Turtle (<i>Emydoidea blandingii</i>), Great Lakes/St. Lawrence population, in Canada. <i>Species at Risk Act</i> Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. viii + 59 pp. Available at: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/blandings-turtle-2018.html
</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">ECCC-2-09</td><td rowspan="2">FC-109</td><td rowspan="2">Section 5.6</td><td rowspan="2">Agency Information Request - Linked to regulatory permits / authorizations

<i>Question:</i>
CNL is requested to investigate acquiring and/or protecting suitable habitat for Blanding's turtles at the CRL site or elsewhere in case a SARA permit is required and habitat compensation becomes necessary.

<i>Context:</i>
Within table 5.6.5-1 (page 5-473) of the revised EIS under the column "Management Practices and Mitigation Actions" it notes measures to address the loss of Critical Habitat, specifically: <i>"Critical Blanding's turtle habitat will be assessed annually to ensure no significant loss at CRL and to determine compensation measures initiated at CRL or elsewhere".</i>

It should be noted that if a SARA permit is required it may necessitate further mitigation measures due to the impacts to the loss of critical habitat for Blanding's turtles.

<i>Rationale:</i>
A SARA permit may be required for the project and may include the need for additional compensation measures (on or off site) to meet the preconditions under section 73(3) b) of SARA: <i>"all feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals".</i>
ECCC is currently reviewing the impacts from the project to the identified (but not yet protected) critical habitat as detailed in the final Blanding's Turtle Recovery Strategy and will be determining whether a SARA permit may be needed.</td><td>EIS</td><td>Table 5.6.5-1 (Pathways Analysis for the Terrestrial Biodiversity Valued Components)</td><td>Clarify that nest mounds and culverts compensate for removal of BT habitat for NSDF under "Management Practices and Mitigation Actions" or elsewhere.</td><td>Accepted</td></tr>
<tr><td>EIS</td><td>Section 5.6.7.8.1 (Blanding's Turtle, Residual Effects Analysis, <i>Habitat Availability)</i></td><td>Added text regarding the Blanding's Turtle Road Mortality Plan</td><td></td></tr>
</table>

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			CNL Response CNL recognizes that the construction of the NSDF Project will result in the destruction of 26 hectares (ha) of critical Blanding's turtle habitat that is defined in the *Species At Risk Act* (SARA) Recovery Strategy for the species [1]. Therefore, CNL will be required to apply for a SARA permit and implement measures to compensate for the removal of this habitat area. In considering options to mitigate potential impacts of habitat removal, CNL determined that a like-for-like habitat replacement at the Chalk River Laboratories (CRL) site (i.e., acquiring a new area at the CRL site/off-site for permanent protection) will not be sufficiently protective of turtle habitat to achieve the objectives of the Recovery Strategy for the Blanding's Turtle species [1]. The CRL site is approximately 3,800 ha in size and is home to a local population of Blanding's turtles. The presence of several wetlands and distribution of Blanding's turtle population already identify a large proportion of the CRL property (3,300 ha of the total 3,800 ha property surface area) as critical habitat for the species [1]. The remaining area of the site not identified as critical habitat is primarily unsuitable habitat (e.g., developed areas, roads, and waste management areas). That is, the area of potential critical habitat for Blanding's turtles within the CRL site is already designated and protected as critical habitat for the species. CNL has identified that road mortality from vehicle collisions is a major threat to the survival of the Blanding's turtle species at CRL. A population viability analysis (Dr. Gabriel Blouin-Demers' team) demonstrated that if the current road mortality rate remains unchanged (equal to two females every ten years), the extinction risk is 100% where the mean time of extirpation is 57 years [2]. Furthermore, the presence of roads such as Plant Road represent mobility barriers which fragment turtle habitat home range and restrict seasonal nesting migration patterns [3, 4, 5]. As such, it is practical for any mitigation measure that proposes to protect turtle habitat and population to focus on improving the connectivity of existing turtle habitat. With these considerations in mind and since roadways will continue to be utilized across the site for the NSDF Project, CNL has concluded that replacing the 26 ha to be destroyed (i.e., a like-for-like replacement) will not improve the Blanding's turtle's population nor promote their reproduction and resilience. The compensation measures for Blanding's turtle's habitat that will be implemented for the NSDF Project will therefore focus on increasing the abundance of the local CRL population by promoting the connectivity, integrity, and safety of existing habitat within the property. Additionally, CNL anticipates that compensation measures will have a positive effect on the local Blanding's turtle population. The compensatory measures which will be implemented for the NSDF Project will meet medium-term and long-term population and distribution objectives defined in the species' Recovery Strategy [1]: *The* long-*term (~50 years) population and distribution objectives include:* • *To increase abundance and maintain, and if possible increase, the area of occupancy of the Blanding's Turtle, Great Lakes/St. Lawrence population in Canada.* • *To ensure the viability of Blanding's Turtle local populations where they occur in Canada.* In support of these long-term population and distribution objectives, medium-term objectives (~10-15 years) include maintaining the local known Blanding's Turtle populations. The Blanding's Turtle Road Mortality Mitigation Plan [6] was prepared with the Ontario Ministry of Natural Resources (OMNR) categorization and patterns of road mortality in order to improve the general site conditions for the small turtle population at CRL. The Blanding's Turtle Road Mortality Mitigation Plan include mitigation measures implemented in four key areas: driver awareness; installation of permanent exclusion fencing; creation of nesting mounds; and replacement of culverts. For example, the location of culverts to be replaced were chosen based on the sensitivity of habitat to disturbance as defined by OMNR categorization [7] (see below). With knowledge of species distribution and movement patterns of Blanding's turtles across the CRL site, CNL was able to refine the area defined as critical habitat by Environment and Climate Change Canada (ECCC) (i.e., using habitat categorization established by the OMNR [7]). The Blanding's turtle habitat identification utilized for the terrestrial assessment of the NSDF Project is aligned with the following categorization by the OMNR: • *Category 1: Nest and the area within 30 m or Overwintering sites and the area within 30 m. These habitat have the least tolerance to disturbance compared to Category 2 or 3.*				

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			• *Category 2: The wetland complex (i.e. all suitable wetlands or waterbodies within 500 m of each other) that extends up to 2 km from an occurrence, and the area within 30 m around those suitable wetlands or waterbodies. Category 2 habitat are moderately tolerant of disturbance.* • *Category 3: Area between 30 m and 250 m around suitable wetlands/waterbodies identified in Category 2, within 2 km of an occurrence. Category 3 habitat are most tolerant to disturbance; these are considerably resilient.* CNL acknowledges that the 26 ha of habitat area to be removed for the NSDF Project are identified as Category 3 habitat but the provisions initiated in 2019 as part of the Blanding's Turtle Road Mortality Mitigation Plan [6] will be applied to Category 1 and 2 habitat – habitats which are considerably more susceptible to damage from anthropogenic disturbance. Compensatory measures to be implemented during the NSDF Project will therefore focus on the protection of existing habitat which are not only more vulnerable but will also become more critical after the removal of Category 3 habitat. These measures are part of management practices and mitigation actions and are incorporated in the EIS terrestrial environment assessment (Table 5.5.5-1). These include: • Protection and diligent maintenance of key habitat currently used by the small CRL population (Category 1 and Category 2 habitat) in accordance to the OMNRF guidelines [7]. • Increase in habitat connectivity between Category 1 and 2 habitat through the installation of four additional culverts and appropriate wildlife fencing. This will increase availability of habitat on each side of Plant Road that would otherwise be inaccessible to a large group of individuals. • Protection of adult turtles from road mortality by connecting relevant habitat based on their functionality and species' needs. • Addition and maintenance of several nesting mounds and exclusionary fencing. Nesting mounds reduce the requirements for females to travel in order to reach nesting areas. Some mounds will be created in 2020 for all culverts to be replaced and additional mounds to be created once the other set of culverts are to be replaced. To improve the chance of successful nesting, wire-screen cages will be deployed over areas were eggs have been laid. The wire used will be wide enough to allow hatchlings to freely move out of the cage while preventing predators from destroying the nests. An additional 25 cages will be constructed and deployed in 2021 and beyond. These nest cages will be designed according to guidelines adapted from Gillingwater (2008) [8] and Ratnaswamy et al. (1997) [9]. Nest cages will be deployed during the nesting season (May 15 to June 30) and weekly inspections of the cages will be completed from the end of the nesting period through to the end of the hatchling emergence period (July 1 to October 15). Cages will be retrieved prior to May 15 of the following year. These artificial nesting mounds will be monitored for use by turtles during the nesting period using methods adapted from provincial protocols [10]. Nest mound maintenance (e.g., vegetation removal) will also be completed during nest mound inspections, if females are not present. Combined together, these measures will discourage adult turtles from using the road network (i.e., individuals crossing the road) thereby significantly reducing road mortality at the CRL site during the construction and operation of the NSDF Project. This reduction in road mortality will contribute to ECCC medium-term objective: to maintain the presence of the local Blanding's turtle population. Additionally, increasing the connectivity of various habitat will promote the mobility of Blanding's Turtles as they carry out critical activities throughout their life stages (e.g., nesting, overwintering, commuting, dispersal, and food search). These compensatory mitigation measures, despite not being equivalent to a like-for-like mitigation of the removal of habitat area, will promote species population resilience (e.g., connectivity will help overcome habitat fragmentation due to Plant Road traffic [3]). **Changes to the EIS:** The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: **EIS Section 5.6.7.8.1 Residual Effects Analysis, *Habitat Availability*:** CNL will add the following paragraph to Section 5.6.7.8.1: The measures included in the Blanding's Turtles Road Mortality Mitigation Plan serve to compensate for the removal of 26 ha of critical turtle habitat due to NSDF project construction by: increasing connectivity of habitat on either side of Plant Road using culverts, promoting turtle abundance through protection of nesting mounds and installation of exclusionary fencing. These compensatory measures are designed to meet the species population and distribution objectives outlined in the Recovery Strategy for the Blanding's Turtles. (to cite:				

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			Environment and Climate Change Canada. 2018. Recovery Strategy for the Blanding’s Turtle (*Emydoidea blandingii*), Great Lakes/St. Lawrence population, in Canada. *Species at Risk Act* Recovery Strategy Series. Environment and Climate Change Canada, Ottawa).” **EIS Section 5.6.5.2 (Table 5.6.5-1):** Under the column “Management Practices and Mitigation Actions”, where measures addressing critical Blanding’s turtle habitat, CNL will add the following for clarification: The Blanding’s Turtle Road Mortality Mitigation Plan includes provisions which will compensate for the removal of a portion of critical Blanding’s turtles habitat near Perch Lake. The installation of nesting mounds as well as culverts are proposed to increase habitat connectivity and providing adequate nesting areas in close proximity to current habitat to limit movement requirements for nesting females. ***References:*** [1] Environment and Climate Change Canada. 2018. Recovery Strategy for the Blanding’s Turtle (*Emydoidea blandingii*), Great Lakes/St. Lawrence population, in Canada. *Species at Risk Act* Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. viii + 59 pp. Available at: https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_blandings_turtle_e_proposed.pdf [2] Hawkins, E. 2016. Demography, Movement Patterns, and Habitat Selection of Blanding’s Turtles at Canadian Nuclear Laboratories in Chalk River, Ontario. University of Ottawa. Master’s Thesis. 100 pages Available at: https://mysite.science.uottawa.ca/gblouin/theses/thesis_2016_Hawkins.pdf [3] Proulx, C.L., G. Fortin and Gabriel Blouin-Demers. 2014. Blanding’s Turtle (*Emydoidea blandingii*) avoid crossing unpaved and paved roads. Journal of Herpetology. **48**: 267-271. Available at: https://mysite.science.uottawa.ca/gblouin/articles/093_2014_bt_road.pdf [4] Millar, C.S. and G. Blouin-Demers. 2011. Spatial ecology and seasonal activity of Blanding’s Turtle (Emydoidea blandingii) in Ontario, Canada. Journal of Herpetology. **45**: 370-378. Available at: https://mysite.science.uottawa.ca/gblouin//articles/058_2011_bt_mvt.pdf [5] Hasler, C.T., K. Robinson, N. Stow, and S.R. Taylor. 2015. Population size and spatial ecology of Blanding’s Turtle (*Emydoidea blandingii*) in South March Highlands, Ottawa, Ontario, Canada. Canadian Journal of Zoology. **93**: 509-514. Available at: https://www.researchgate.net/publication/276433875_Population_size_and_spatial_ecology_of_Blanding's_Turtle_Emydoidea_blandingii_in_South_March_Highlands_Ottawa_Ontario_Canada [6] Golder. 2018. Blanding’s Turtle Road Mortality Mitigation Plan. Canadian Nuclear Laboratories Document No. CRL-03710-REPT-002, Revision 0. 2019 November. [7] OMNR. General Habitat Description for the Blanding’s Turtle (Emydoidea blandingii) Available at: https://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_ghd_bln_trtl_en.pdf [8] Gillingwater, S. D. 2008. Effectiveness of Nest Protection and Artificial Egg Incubation for Turtles in Ontario. Upper Thames Conservation Authority. 32 pp. Session presentation given on March 19, 2008 at the Toronto Zoo Turtle Stewardship and Management Workshop, March 17-19, 2008 Available at: http://www.torontozoo.com/adoptapond/pdfs/tmp-gillingwater-eggprotection.pdf [9] Ratnaswamy, M.J., R. J. Warren, M. T. Kramer, and M. D. Adam. 1997. Comparisons of lethal and nonlethal techniques to reduce raccoon depredation of sea turtle nests. Journal of Wildlife Management. **61**: 368-376. [10] Ontario Ministry of Natural Resources and Forestry (OMNRF). 2015. Survey Protocol for Blanding’s Turtle (Emydoidea blandingii) in Ontario. Species Conservation Policy Branch. Peterborough, Ontario. ii + 16 pp. Available at: https://www.ontario.ca/page/survey-protocol-blandings-turtle-ontario				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
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ECCC-2-10	FC-112	Section 5.5	**Agency Information Request - Fish and Fish Habitat** ***Question:*** CNL is requested to update table 5.5.5-1 and the project timing to include restrictions on in-water work that include turtles. ***Suggestions for mitigation and follow-up measures (as applicable):*** In-water work should not occur between September 15 and April 15 to avoid impacts on hibernating turtles. ***Context:*** Within table 5.5.5-1 (page 5-338) of the revised EIS under the column “The Management Practices and Mitigation Actions” it notes timing restrictions on in-water work that are specific to aquatic species (i.e., fish) but does not consider the impacts on overwintering turtles: *“Work will be completed within the timing window of July 16 to March 14 to avoid spawning and egg/larval developmental periods for spring spawning fish species (DFO 2013; MNR 2013); the construction duration is anticipated to be short term (i.e., <30 days)”* Due to the presence of Blanding’s turtles within the project site, all in-water activities must also examine the potential effect pathways on in-water works for this species. ***Rationale:*** Turtles tend to hibernate over the fall through to spring seasons and the proposed construction of the discharge pipe could directly impact them. Perch Lake and the adjacent wetlands provide suitable overwintering (hibernating) habitat for turtles. Turtles are highly immobile during the overwintering period, therefore it is possible that if turtles are within the construction area they could be killed as a result of excavation. **CNL Response** No Blanding’s turtles have been either reported by employees or by staff while travelling on the Perch Lake ring road. For this reason, CNL is confident that Blanding’s turtle do not hibernate within the Perch Lake. Having said that, CNL recognizes that notwithstanding Blanding’s turtle, other turtle species are likely overwintering in Perch Lake. Generally, the turtle’s active season is defined in Renfrew County as	EIS	Table 5.5.5-1 (Pathways Analysis for Aquatic Biodiversity Valued Components)	Table 5.5.5-1 will specify avoiding in-water work from Oct 1 to April 15 to protect overwintering habitats of turtles.	
				EIS	Table 5.6.5-1 (Pathways Analysis for the Terrestrial Biodiversity Valued Components)	Table 5.6.5-1 will specify avoiding in-water work from Oct 1 to April 15 to protect overwintering habitats of turtles.	

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			extending from April 15 to October 15 [1], after which date, turtles are known to have reached hibernacula. CNL is confident that the active terrestrial period for turtles ranges from May 01 to September 30 at the Chalk River Laboratories (CRL) site. To accommodate a conservative timeframe of the turtles' seasonal cyclic habits and maximize protection of their habitat, CNL confirms in-water work should not occur between October 01 and April 15 to avoid impacts on hibernating turtles. Section 5.2 (specifically, Table 5.5.5-1) in the Final EIS will specify avoiding all in-water work from October 01 to April 15 in order to protect the overwintering habitat of turtles near Perch Lake. Please note that the fish spawning period also restricts in-water work between March 15 to July 15. Two different species of turtles have been detected over the past 10 years in the surroundings of Perch Lake; the Midland Painted Turtle and the Snapping Turtle. Both species were reported mainly by the CNL species at risk reporting system and from trapping initiatives. CNL recognizes the potential for both species to be hibernating at the Chalk River Laboratories (CRL) site. The Perch Lake environment corresponds to the hibernation characteristic as described in the Snapping turtle management plan [1]: water shallow enough to let the turtle reach the surface to breathe, but deep enough so the water will not freeze to the bottom; a location that is likely to freeze over later in the season and thaw earlier in the spring; a thick layer of mud in which the turtle can bury itself; and additional submerged cover, such as a floating mat of vegetation, roots, stumps, branches or logs, a muskrat dwelling or an overhanging bank [1]. Although the Blanding's turtle could overwinter within temporary wetlands adjacent to more permanent water bodies, graminoid shallow marsh areas of larger wetlands, non-vegetated vernal pools, etc. [2], its preferred overwintering sites are generally located within permanent wetlands (e.g., bogs, fens, marshes) and other habitats with unfrozen shallow water [2]. This type of habitat corresponds to the habitat where Blanding's turtle individuals have been detected at the CRL site during our telemetry study with the University of Ottawa but not to the Perch Lake environment. The fish community in Perch Lake is composed of Brown bullhead (*Ictalurus nebulosus*), Lake chub (*Couesius plumbeaus*), Northern Pike (*Esox lucius*), Pumpkinseed (*Lepomis gibbosus*), Pearl dace (*Semotilus margarita*), Yellow Perch (*Perca flavescens*), Bluntnose minnow (*Pimetheles notatus*), Fathead minnow (*Pimetheles promelas*), and Creek chub (*Semotilus atromaculatus*). This information was collected over the years by CNL staff and is summarized in a report [4]. Aquatic species at risk have not been previously recorded within Perch Lake or downstream in Perch Creek. The spawning period of the fish species listed above is defined as March 15 to July 15 as per the Fisheries and Oceans Canada (DFO) guidelines [5]. Turtles may use the Perch Lake and surrounding wetlands as overwintering habitat during the period from Oct 01 to April 15, as previously mentioned. In order to avoid the critical fish spawning period while protecting turtle overwintering habitats, CNL recommends any in-water work to be scheduled to occur within a timeframe from July 16 and October 01. **Changes to the EIS:** The following modifications (new text in red and deleted text as ~~strikethrough~~) will be made to the Final EIS to incorporate the information above: **EIS Section 5.5.5.2 (Table 5.5.5-1):** Under the column "Management Practices and Mitigation Actions": ~~Work will be completed within the in-water work~~ All in-water work will target the timing window of July 16 to ~~March 14~~ October 1 to avoid critical fish spawning and egg/larval development periods for spring spawning fish species (DFO 2013; MNR 2013) while being protective of turtle overwintering habitats in and around Perch Lake. The construction duration is anticipated to be short term (i.e. <30 days). **EIS Section 5.6.5.2 (Table 5.6.5-1):** Under the column "Management Practices and Mitigation Actions": All in-water work will target the timing window of July 16 to October 1 to avoid critical fish spawning and egg/larval development periods for spring spawning fish species (DFO 2013; MNR 2013) while being protective of turtle overwintering habitats in and around Perch Lake. The construction duration is anticipated to be short term (i.e. <30 days). **EIS Section 5.6.7.8.1:** This species shows site fidelity to wetlands that are used as overwintering habitat and to areas that are used for nesting year after year. Therefore, the movements of this species from overwintering areas to nesting areas could be disrupted by the development of the NSDF Project. However, despite a two-year telemetry study and considerable search effort in and around the SSA (Section 5.6.4.9.2), no	EIS	Section 5.6.7.8.1 (Blanding's Turtle, Residual Effects Analysis)	Indicate October 01 and April 15 as a relevant period during Blanding's Turtle overwintering. Clarify that turtle active period is to range from April 15 to October 15	

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			evidence of Blanding's turtle occurrence or movement through the SSA has been recorded. The local change in connectivity may therefore affect only a small portion of the regional population, namely individuals that overwinter around Perch Lake and that travel northwards through the SSA during the active period (May 01 to Sept. 30). These individuals would have to travel around the outside of the fence if they need to move around the SSA to reach locations they require to carry out their life history requirements such as foraging, thermoregulation and nesting. If Blanding's turtles use the SSA as a movement corridor between habitats, the NSDF Project will increase travel distances. **EIS Section 5.6.7.8.1:** Site clearing is not expected to cause Blanding's turtle mortality because it will be performed in the winter when individuals are hibernating and wetlands (i.e., potential hibernation habitat) will be affected only by the addition of the transfer line to Perch Lake. Additionally, to avoid negative interactions with nesting turtles, road grading and levelling activities will not be completed during the turtle nesting season (May 15 to September 30). In addition, in-water work will not occur between October 1 and April 15 to avoid adverse effects to hibernating turtles. ***References:*** [1] Environment and Climate Change Canada. 2020. Management Plan for the Snapping Turtle (*Chelydra serpentina*) in Canada. *Species at Risk Act* Management Plan Series. Environment and Climate Change Canada, Ottawa, iv + 40 p. Available at: https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/mp_snapping%20turtle_e_proposed.pdf [2] Environment and Climate Change Canada. 2018. Recovery Strategy for the Blanding's Turtle (*Emydoidea blandingii*), Great Lakes/St. Lawrence population, in Canada. *Species at Risk Act* Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. viii + 59 pp. Available at: https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_blandings_turtle_e_proposed.pdf [3] Ontario Ministry of Natural Resources and Forestry. 2016. 2016 revisions to Forest management conserving biodiversity at the stand and site scales. Available at: https://www.ontario.ca/page/2016-revisions-forest-management-conserving-biodiversity-stand-and-site-scales#section-1 [4] Canadian Nuclear Laboratories. 2017. Ichthyofauna Survey Data for Perch Lake, Toussaint Lake, Main Stream, and East Stream. Canadian Nuclear Laboratories. ENVP-509200-021-000. 9pp. [5] Fisheries and Oceans Canada (DFO). 2013. Ontario Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat. Available at: http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/on-eng.html.				
ECCC-2-11	New IR	N/A	**Agency Information Request - Fish and Fish Habitat** ***Question:*** CNL is requested to provide: 1. Confirmation of whether dewatering activities from the Waste Management Areas (WMAs) will be required, and if required, whether the dewatered effluent will be treated by the Water Treatment Plant (WTP). 2. The volume of effluent to be dewatered and what contaminants, if any, and their concentrations are contained in the effluent from each of the 18 WMA sites (including mapping). 3. An update on the design of the WTP and the predicted discharge quality of the effluent based on information collected in 1) and 2) above, if necessary. ***Context:*** Throughout the revised EIS, CNL mentions that LLW from the 18 WMAs will be excavated, sorted, in some cases packaged, moved and then stored in the ECM. However, there is no discussion on whether there will be dewatering activities (and/or the proposed mitigation measures) for each of these WMAs when the LLW is excavated. The only discussion could be found related to this concern was on page 5-266 where it states: "*The Perch Creek and Perch Lake Watershed represents the LSA for this project because most of the drainage from the SSA will be directed to the Perch Creek and Perch Lake Watershed. Additionally, this watershed contains many of the site's operating waste management areas; in particular, the waste management areas of the earliest vintage in the evolution in waste storage practices at CRL, including the Liquid Dispersal Areas. Because of its history, this basin is the most historically affected region of the CRL site.*" However, this discussion only applies to 4 of the 18 WMAs. ***Rationale:***	N/A			Accepted

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			It is important to understand whether there will be dewatering activities from all of the WMAs and whether this effluent will be treated by the WTP. This could have impacts on the design of the WTP, its ability to treat the effluent, and the quality of the effluent to be discharged into the receiving environment. **CNL Response** Dewatering activities associated the environmental remediation of existing Waste Management Areas (WMAs) on the Chalk River Laboratories (CRL) site are not within the scope of the NSDF Project [1]. The timelines for the remediation of some of these WMA is over many years (or decades), several of which are still in operation. It unknown at this time to what extent dewatering activities would be required during the remediation of the WMAs until the remediation plans are developed. The CRL site is a complex nuclear site wherein the CRL site license requires CNL to have a preliminary decommissioning plan which includes a conceptual schedule for the decommissioning of nuclear facilities and remediation of WMAs [2]. CNL is required to review and update the CRL site preliminary decommissioning plan every 5 years as well as provide a detailed decommissioning plan to the CNSC prior to execution of decommissioning or remediation for a licence listed facility. Specifically, all work on the CRL site is subject to the site operating licence granted by the CNSC and other regulatory approvals. Further to this, Chalk River Laboratories is registered under ISO-14001. The CNL Environmental Policy states: *“We review the impacts of our activities, facilities, projects, services and products on the environment”.* For non-routine work, this review is conducted through our environmental review process, which includes assessment of the management of any wastewater generated. Since CRL is located on Federal lands, step 1 of this process is to determine whether the particular project would be subject to a section 82 review under the *Impact Assessment Act* (IAA). Regardless of whether a particular project is subject to the IAA, the review process is the same. As part of the environmental review process for any project at CRL, CNL will assess and determine the appropriate requirements for dewatering. CNL has a procedure which provides the appropriate disposition route for any liquid generated [3]. The dewatered effluent would be sampled and sent to the appropriate discharge route depending on the nature of the contaminants. Furthermore, the WMAs at the CRL site have been constructed in elevated areas and are generally located well above the water table. For example, WMA A is located several meters above the water table as shown in the cross section in Figure 5.3.1-8 of the the 2019 revised EIS. Although the WMA’s are generally located above the water table, dewatering may be required for remediation of contaminated soil below the WMA’s and or to remove water accumulation in excavation areas from rainfall and snowmelt. With regards to the specific requests for information: 1. The NSDF Waste Water Treatment Plant (WWTP) has been purpose designed for the operation of the NSDF, taking in to consideration WWTP flow rates, waste inventory and the design and behavior of the engineered containment mound (ECM) (Section 3.4.2.2). If future uses of the WWTP are explored (i.e., treatment options for dewatering WMAs) a case specific analysis would have to be conducted and demonstrated that the NSDF WWTP could still operate within its design basis with the primary objective of supporting NSDF, while providing additional capacity from wastewater elsewhere. However, the NSDF WWTP would not be the only option considered in the environmental review process for future remediations. Other options may include the use of on-site skids or treatment using existing water treatment systems at the CRL site. 2. The volume of effluent to be dewatered and what contaminants would require water treatment at the WMA’s are unknown at this time. The remediation of these areas are unknown and planned over many years (or decades). However, as outlined above, the environmental review process, which includes assessment of the management of any wastewater generated, would be undertaken prior to any remediation work, which is outside of the scope of the NSDF project. An update on the design of the WTP and the predicted discharge quality of the effluent based on information is not necessary, as outlined above. The design of the WWTP is highly flexible with respect to treatability of quantity and quality of wastewater, applying the Best				

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			Available Technology and ensuring redundancy within the design capacity. Thus NSDF's WWTP is a reasonable option to treating the dewatered effluent from remediation of WMAs if determined necessary in the future. ***Changes to the EIS:*** No changes to the EIS are required. ***References:*** [1] Record of Decision on the Scope of Environmental Assessments for Three Proposed Projects at Existing Canadian Nuclear Laboratories' Facilities, 2017 March 8. Available at: http://suretenucleaire.gc.ca/eng/the-commission/pdf/Record%20of%20Decision%20-%20CNL%20Scope%20of%20EA%20Factors%202017.pdf [2] Canadian Nuclear Laboratories (CNL). Comprehensive Preliminary Decommissioning Plan, CPDP-508300-PDP-001, Revision 4, 2018 March. [3] Acceptability Criteria for Routine and Non-routine discharge of Liquids at Canadian Nuclear Laboratories Sites, 900-509200-MCP-005.				
HC-2-01	FC-21 FC-163 FC-168 (HC-3, HC-6, HC-13)		**Agency Information Request – Indigenous Peoples' health /Socio-economic conditions** ***Question:*** CNL is requested to update the traffic-construction noise assessment to reflect the assumptions in the revised EIS, section 5.10.5.2.2, specifically: 1. truck traffic occurring on average 16 hours a day, 6 days a week, for the construction phase [9 months per year for two years] 2. a breakdown of existing and predicted truck trips per hour for receptors along Plant Road and Highway 17, specifying occurrences during night-time hours (or clarify if nighttime traffic will not occur) 3. recalculate the %HA (i.e., percent highly annoyed) in the noise assessment for receptors along Plant Road, and with the addition of receptors along Highway 17 (or justify why receptors along Highway 17 have not been included in the noise assessment), to include the updated assumptions and applicable penalties (e.g., inclusion of 10dB night-time adjustment) as per Health Canada's guidance (HC, 2017) and ISO 1996-1:2016, *Acoustics — Description, measurement and assessment of environmental noise.* Note that newer models may provide more accurate predictions than ORNAMENT for receptors located less than 15m from the road (e.g., residential houses along Plant Road). Reference: Health Canada, 2017. *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise.* Cat.: H129-54/3-2017E-PDF, ISBN: 978-1-100-19258-1, Pub.: 160331. ***Context:*** CNL's 2018 NSDF Project Construction-Related Road Traffic Report includes an assumption that truck traffic will mainly occur during daytime hours, or over a period of 15 hours, 7 days a week and during 8 months of construction (for two years). However, Section 5.10.5.2.2 of the revised EIS and CNL's response to FC-168, indicates trucks will run an average of 16 hours per day, and may run for up to 18 hours a day, 6 days a week during 9 months of construction (for two years). A 16 or 18 hour a day construction phase suggests trucks will be running during night-time hours (i.e., between the hours of 10pm and 7am) and as the number of days of operations have been reduced from 6 to 7, this means a higher number of trucks will be running over each day. Additionally, in Table 5.10.10-1 of the revised EIS, CNL has indicated that trucks will be scheduled to "avoid peak traffic times to the extent possible". Based on the reported maximum vehicle traffic per day in the 2018 NSDF Project Construction-Related Road Traffic Report, the project would require 10 peak hours of vehicle traffic per day to achieve the reported AADT (i.e., annual average daily traffic) of 8,210. If the 10 peak hours of traffic are avoided, this results in the majority of construction traffic occurring at night. Alternately, if the 8,210 vehicles are evenly spread across the currently assumed 22 non-peak hours, this represents an average of 299 vehicles per hour.	Noise Impact Study of Canadian Nuclear Laboratories Near Surface Disposal Facility Project Construction-Related Road Traffic on Human Receptors	Sections 3.0 and 4.0	Updated based on new assumptions and noise modelling results	Rejected with Follow Up IR HC-3-01
				Environmental Impact Statement for the NSDF Project; Section 5.10 Socio-economic Environment	Section 5.10.4.2.9 Section 5.10.5.2.2	Updated based on new assumptions and noise modelling results	

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Furthermore, the 2017 Traffic Study data appears to be based on the peak hours on a single day of monitoring data (May 17th, 2017), which is not an appropriate method of estimating traffic volume. The existing traffic volume on Plant Road may be over-estimated, as evidenced by the supporting photos in the report which all show Plant Road as currently being almost entirely devoid of traffic.

Rationale:
Truck traffic in the evening and overnight may result in higher increases in annoyance than currently predicted, particularly given that existing traffic appears to be comprised of personal vehicles that produce substantially less noise disturbance than trucks.

Additionally, a 5% change in the volume of traffic along Highway 17 (section 5.10.5.2.2) can be noticeable to nearby receptors if these vehicles are different than existing traffic and are using the roadway during times when previously there had been lower or no traffic.

CNL Response

The 2018 Noise Impact Study (NIS) focussed on receptors along Plant Road. Plant Road is a two-lane paved road, primarily used as a conduit for employee traffic to the Chalk River Laboratories (CRL) site as it is the only access route. CRL employs approximately 2,850 employees. There are also other contractors on site, as well as daily deliveries to and from the CRL site. There is a community of approximately 35 buildings on Plant Road, including both residences and businesses, between Highway 17 and the CRL site, with no other types of noise sensitive receptors (i.e., schools, hospitals). There is also traffic associated with a small municipal landfill accessed from a side road just before the CRL site.

The method of estimating the existing Annual Average Daily Traffic (AADT) along Plant Road (i.e., assuming that peak hour traffic is equivalent of 10% of the total AADT) was taken from the Institute of Transportation Engineers (ITE) Traffic Engineering Handbook [2] and was based on the best available data. Given the thousands of employees travelling to and from site on a daily basis, along with other contractors, the AADT is expected to be a reasonable representation of the traffic expected on Plant Road.

Noise modelling of the potential impacts of Project traffic noise on receptors along Plant Road was updated based on the assumption that Project-related truck traffic can occur during the nighttime period (i.e., 10 pm to 7 am). It was assumed that up to 80 one-way truck trips could occur during the nighttime period. As the total number of Project truck trips is expected to be 400 per day (i.e., 200 one-way Project shipments), the remaining 320 truck trips were modelled during the daytime period. Project employee-related traffic volumes were updated based on new information to 225 one-way trips per day.

Based on this information, Project information and assumptions presented in the original NIS, the following summarizes the existing and future (with the Project) heavy truck volumes on Plant Road:

- Existing:
    - Daytime: 82 heavy truck trips
    - Nighttime: 82 heavy truck trips
- Future (with the Project):
    - Daytime: 402 heavy truck trips
    - Nighttime: 162 heavy truck trips

A review of receptor locations along Plant Road between Highway 17 and the CRL site was undertaken using publicly readily available imagery to determine the distances between the road centerline and the front façade of the homes. It was determined that the minimum distance was 15 m, and therefore noise predictions at shorter distances (i.e., 5 m and 10 m) were not carried out. As such, ORNAMENT is still considered to be an appropriate modelling algorithm to use. In accordance with accepted practices, the road centerline was used to represent the two directions of travel.

Noise modelling of the potential impacts of Project traffic noise on receptors along Highway 17 between Petawawa and Deep River was also completed. Two modelling scenarios were developed: one assumes that all Project vehicles travel from the south (i.e., from Petawawa) and the other assumes that all Project vehicles travel from the north (i.e., from Deep River). Existing AADTs were established based on

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			published Ontario Ministry of Transportation (MTO) 2016 traffic data [3]. It is typical to adjust traffic volumes based on a growth rate of approximately 2% per year but for the purposes of this assessment a conservative approach was taken and no growth was considered. It was assumed that the truck percentage breakdown of existing vehicles on Highway 17 were 5% medium trucks and 8% heavy trucks [4]. The speed limit on Highway 17 between Petawawa and Deep River ranges from 60 to 90 km/hr. A review of publicly available imagery was completed to determine the minimum distance between the road centerline and the front façade of the homes along Highway 17 between Petawawa and Deep River. The minimum identified distance between the road centerline and the front façade of a home was 25 m between Petawawa and Chalk River and 20 m between Chalk River and Deep River. All other traffic-related assumptions and methodology used in the original NIS remained unchanged. The calculation of the percentage of highly annoyed people (%HA) followed the calculation methodology provided in Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise* [1] consistent with the original 2018 NIS. The noise modelling results indicate that with 80 truck trips occurring during the nighttime period, the change in %HA with the addition of the Project at a receptor along Plant Road, 15 m from the road centerline, is 6.2%. When considering the cumulative effects, with the addition of 60 truck trips and 80 employee vehicle trips associated with other projects, the predicted change in %HA at a receptor along Plant Road is 6.5%. The noise modelling results along Highway 17 between Petawawa and Chalk River indicate that with 80 truck trips occurring during the nighttime period, the change in %HA with the addition of the Project at a receptor located 25 m from the road centerline is 4.5%. When considering the cumulative effects, with the addition of 60 truck trips and 80 employee vehicle trips associated with other projects, the predicted change in %HA at a receptor located 25 m from the road centerline is 4.7%. The noise modelling results along Highway 17 between Chalk River and Deep River indicate that with 80 truck trips occurring during the nighttime period, the change in %HA with the addition of the Project at a receptor located 20 m from the road centerline is 4.7%. When considering the cumulative effects, with the addition of 60 truck trips and 80 employee vehicle trips associated with other projects, the predicted change in %HA at a receptor located 20 m from the centerline is 4.9%. As per the predicted noise levels presented in the updated NIS, the existing noise levels at receptors along Highway 17 and Plant Road are elevated due to traffic noise and do not meet the requirements for a quiet rural area as defined in the Health Canada Guidance (i.e., below 45 dBA L_{dn}) [1]. Therefore, the 10 dB penalty for a quiet rural area was not considered in the %HA calculation. The conclusions of this noise pathway in the EIS will remain unchanged in that the NSDF Project is expected to have a negligible residual effect on quality of life related to noise emissions. ***Changes to EIS:*** The updated NIS is provided as Attachment HC-2-01. Sections 5.10.4.2.9 and 5.10.5.2.2 of the EIS will be updated based on the updated noise modelling and to ensure there is consistency between the assumptions used in the updated NIS (Attachment HC-2-01) and the EIS. The following modifications (additions in red and text removals ~~strikethrough~~) will be made to the Final EIS to incorporate the information above: **EIS Section 5.10.4.2.9** The major arterial Highway that connects the NSDF Project to the LSA communities and other regions of Ontario is Highway 17. Highway 17 is the longest highway in Ontario, spanning 1,964 km in a southeasterly direction from Kenora to Arnprior, Ontario. In 2016, annual average daily traffic counts found that traffic levels between the Village of Chalk River and Deep River ~~ranged from 6,700 and 8,150~~ were 7,950 vehicles per day (MTO 2016). Traffic volumes ~~increases~~ further south along Highway 17 around Petawawa and Pembroke ~~and~~ ranged from ~~7,100~~7,300 to ~~9,800~~8,750 vehicles per day (MTO 2016). Traffic volumes increase beyond Pembroke towards Ottawa.				

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			EIS Section 5.10.5.2.2 ■ **The NSDF Project could affect ambient noise levels due to construction traffic.** Noise propagation ~~transmission~~ will be mitigated by the topography as the NSDF Project is situated on the lower side of the hill adjacent to East Mattawa Road (Figure 3.1.1-1 NSDF Site Layout). Changes in ambient noise levels from activities on the NSDF Project site are not expected to be detected in the LSA communities, due to the distance from the NSDF Project site (i.e., Village of Chalk River is the nearest local community and is located 7 km west of the NSDF site). Noise-level changes often considered in an environmental assessment include noise-induced sleep disturbance, noise complaints and long-term high annoyance. For the NSDF Project, a qualitative assessment of the acoustic environment was carried out based on the separation distance between the NSDF Project site and the nearest dwelling. In accordance with the Ontario Ministry of Environment, Conservation and Parks ~~Ontario Ministry of the Environment and Climate Change~~ guideline NPC 300 [5], dwellings include permanent and/or seasonal residences. Communities in the vicinity of the NSDF Project site are shown on Figure 5.10.3-1, which includes the nearest residences on the Quebec side of the Ottawa River, approximately 3 km from the NSDF Project site. Based on this separation distance, a detailed assessment is not typically required by the Ontario Ministry of the Environment and Climate Change. In addition, based on the Health Canada guidance [1], a less extensive assessment may be warranted if noise levels at all receptors are not expected to result in a change in long-term high annoyance exceeding 6.5%. The haulage route for transportation of site preparation and construction equipment, and construction materials will be via public roads to the CRL site (e.g., Highway 17 and Plant Road). Plant Road is a two lane paved road, primarily used as a conduit for employee traffic to the CRL site as it is the only access route. As discussed in Section 5.10.4.2, CRL employs approximately 2,850 employees and there are also contractors working on-site and daily deliveries to and from the CRL site. There is a community of approximately 35 buildings on Plant Road, including both residences and businesses, between Highway 17 and the CRL site, with no other types of noise sensitive receptors (i.e., schools, hospitals). There is also traffic associated with a small municipal landfill accessed from a side road just before the CRL site. The hours of operation for truck transport is typically 6 days per week, with 16-hour days but may vary between 12 and 18 hours per day depending on Project activities. Based on estimates of truck deliveries to the NSDF Project site during the 24-month construction period, it is anticipated there will be approximately an additional 200 shipments per day during the 9-month construction season ~~(i.e., approximately 15 trucks per hour)~~. This represents an increase of approximately 5% to 6% (assuming each inbound trip results in an outbound trip) over existing traffic volumes on Highway 17 at Deep River. The additional construction personnel requirements are expected to result in an additional 300 inbound and outbound trips to the site daily. It is estimated that there will be 10 trucks per day during operations (i.e., less than 1 truck per hour). ~~This results in approximately 15 trucks per hour during construction and less than 1 truck per hour during operations for the daytime period.~~ In addition, it is assumed that construction workers will travel to the NSDF Project site from the local commercial accommodations using their own personal vehicles. The transport vehicles will pass through the Town of Chalk River. This level of activity is not expected to result in a change in long-term high annoyance exceeding 6.5%. Similarly, the noise levels associated with these truck movements are not expected to increase day-night noise levels (L_{dn}) above 75 dBA (the level at which noise complaints may include strong appeals to authorities to stop noise [1]) ~~and are not expected to result in noise induced sleep disturbance. Noise transmission will be mitigated by the topography as the NSDF Project site is situated on the lower side of the hill adjacent to East Mattawa Road.~~ Transportation of equipment and construction materials will be scheduled during normal business and daylight hours to the greatest extent possible to limit inconvenience to local residents. In addition, notifications of peak traffic periods will be distributed to local residents in the Village of Chalk River. In the noise assessment, it was assumed that up to 40 of the 200 shipments could occur during the nighttime period (i.e., 10 pm to 7 am). Overall, the increase in transport vehicles is considered negligible in comparison to current traffic levels on the roads (personal vehicle traffic for over 2,000 employees and transport vehicles) to support operation of the CRL site. The change in long-term high annoyance is between ~~2.8~~6.2% at ~~0.02 km~~15 m and ~~0.5~~2.3% at ~~0.5 km~~60 m along Plant Road and 4.7% at 20 m and 2.7% at 60 m along Highway 17. The effect of increased traffic on noise levels at receptors along Highway 17 and Plant Road is considered to ~~be a slight but discernible~~ result in a small but noticeable change when compared to existing levels of traffic from current employees and operations at CRL. The predicted change in %HA is less than 6.5% and as such, this potential project-environment interaction is considered to have a negligible				

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			residual effect on quality of life. The detailed results of the noise effect study are presented in *Noise Impact Study of CNL NSDF Project Construction-Related Road Traffic on Human Receptors* [6]. Canadian Nuclear Laboratories (CNL) is committed to organizational transparency, ensuring that Indigenous peoples, the general public, local communities, elected and appointed government officials and other industry stakeholders are properly informed about activities carried out at CNL sites. This commitment is met through the company's Public Information Program [7], a communications program that was developed to build public awareness and trust, and to encourage transparent and proactive communication with its various stakeholders. CNL's Public Information Program includes specific communications to stakeholders, public access to information related to routine activities, radiological and non-radiological emissions, and non-routine items or events at the different sites managed by CNL. Accordingly, CNL will notify local communities of the start of NSDF Project construction. CNL proactively provides information regarding business activities and environmental remediation management projects. Notification is done through email, letter and face-to-face meetings to ensure appropriate distribution of information. ***References:*** [1] *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise.* Cat.: H129-54/3-2017E-PDF, ISBN: 978-1-100-19258-1, Pub.: 160331, Health Canada, 2017. Available at: https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-noise.html [2] *Traffic Engineering Handbook Seventh Edition*, ITE (Institute of Transportation Engineers), 2016. Available at: https://www.worldcat.org/title/traffic-engineering-handbook/oclc/1062288366 [3] *Provincial Highway Traffic Volumes*, Ontario Ministry of Transportation, 2016. Available at: http://www.raqsb.mto.gov.on.ca/techpubs/TrafficVolumes.nsf/fa027808647879788525708a004b5df8/88c66a2279555c798525788d0048cca4/$FILE/Provincial%20Highways%20traffic%20Volumes%201988-2016.pdf [4] *Environmental Guide for Noise*, Ontario Ministry of Transportation, 2006 Available at: https://collections.ola.org/mon/20000/277908.pdf [5] Ontario Ministry of the Environment. 2013. Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning NPC-300. PIBS 9588e. Available at https://www.ontario.ca/page/environmental-noise-guideline-stationary-and-transportation-sources-approval-and-planning [6] Golder Associates Ltd. 2020. Noise Impact Study of CNL NSDF Construction-Related Road Traffic on Human Receptors. Canadian Nuclear Laboratories Document No. 232-03710-REPT-002. Revision 1. May 2020. [7] CNL. 2019. Public Information Program for Canadian Nuclear Laboratories. Canadian Nuclear Laboratories Document No. CW-513430-REPT-001, Revision 5. 2019 July. Available at: https://www.cnl.ca/site/media/Parent/PIP-rev5.pdf				
HC-2-02	FC-169 (HC-14)	Sections 5.10, 11.2	**Agency Information Request - Indigenous / Socio-economic** ***Question:*** CNL is requested to present a formalized complaint-response plan that describes how complaints will be received (e.g., website, telephone #, etc.), response time, and method(s) for resolution, including additional mitigation measures if required. Health Canada recommends that any complaints resolution process span all project phases, including construction, operations and closure, as noise effects may be present during any of these phases. ***Suggestions for mitigation and follow-up measures:*** CNL may inform all people who may be affected by project-related noise (both Indigenous and non-Indigenous people) in advance of any changes in sound level that may occur (beyond just the start of construction). This type of communication has historically been shown to be effective to address concerns related to noise. ***Rationale:*** Although an established communication and notification system appears to be in place, a clear complaints resolution process has not been described. **CNL Response**	EIS	Section 5.10.9 (Monitoring and Follow-up) Table 11.0-1 (Environmental Assessment Monitoring and Follow-up Programs Proposed for the NSDF Project) Section 11.2 (Adaptive Management)	Additional information and clarification.	Accepted

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			Canadian Nuclear Laboratories (CNL) recognizes that the NSDF project will include activities throughout its different phases (construction, operations, and closure) which can trigger complaints from surrounding communities. CNL recognizes that local residents (both Indigenous and non-Indigenous) may be affected by project-related noise disturbances caused by construction-related NSDF activities. While the NSDF Project planning strives to avoid adverse impacts on the socio-economic components (e.g., noise) valuable to the local population during the construction phase, CNL recognizes that concerns may arise from changes in sound levels which may occur beyond the construction phase of the NSDF. CNL implements the Public Information Program (PIP) [1] which is applicable for all CNL activities including the NSDF Project. The PIP includes a formalized complaint-response plan which CNL currently, and will continue to implement. The PIP describes how complaints will be received (e.g., website, telephone #, etc.), response time, and method(s) for resolution. CNL is committed to organizational transparency, ensuring that Indigenous Peoples, the general public, local communities, elected and appointed government officials and other industry stakeholders are properly informed about activities carried out at CNL sites. The PIP is a communications program that was developed to build public awareness and trust, and to encourage transparent and proactive communication with its various stakeholders in accordance with regulatory guidance from the CNSC in REGDOC 3.2.1 (*Public Information and Disclosure*) [2]. CNL's PIP includes specific communications to stakeholders, public access to information related to routine activities as well as new projects such as the NSDF Project, and ensures community input is sought, received and action is taken to respond to these inputs. Section 4.1 (Questions and Issues Management) of CNL's PIP is currently being revised (May 2020) to include a 30 day response initiation. The PIP provides a platform for the public to voice their concerns related to NSDF activities and for CNL to address and develop resolutions to these concerns; the process includes: • Corporate Communications receives issues and concerns through the formal feedback submission on the CNL website (www.CNL.ca), emails, phone calls, and social media platforms; • All NSDF project-related issues and concerns (including complaints about noise disturbances) received are forwarded to the NSDF Project for resolution; • The NSDF Project address and resolve concerns about the Project on a case-by-case basis. Resolution may include further mitigation of NSDF site activities and/or the CNL internal improvement action process; • Throughout this process, CNL will maintain two-way dialogue between the stakeholder and the NSDF Project until the issue is resolved; and • All inquiries are tracked and resolution or responses are recorded once completed. Mitigation measures will include the notification of NSDF Project construction commencement via door-to-door delivery of letters, where stakeholders will be have the opportunity to voice their questions or concerns about activities related to the NSDF Project construction commencement. As part of the notification, the letter will include all CNL contact details (e.g., website, telephone, email etc.) to provide clear direction on how to contact CNL if they have questions, concerns or complaints related to the NSDF Project. A web link to a Feedback Form that is currently on the NSDF webpage on www.CNL.ca will also be included in the notification and will outline the above process of when an issue or concern is submitted. **Changes to EIS:** The following modifications (new text in red and text removals ~~strikethrough~~) will be made to the Final EIS to incorporate the information above: **EIS Section 5.10.9:** Recognizing people's interest in understanding and participating in decisions that affect them, CNL will proactively seek, engage and support meaningful discussion on issues and opportunities related to the NSDF Project as part of the Public Information Program (PIP) [1], which can be found on the CNL website (www.CNL.ca). The PIP includes specific communications to stakeholders and public access to information related to routine activities as well as new projects such as the NSDF Project. These measures are meant to mitigate questions				

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			and complaints regarding CNL activities, as well as ensure community input is sought, received and action is taken to respond to these inputs. The PIP also provides a platform for the public to voice their concerns related to NSDF Project activities and for CNL to address and develop resolutions to these concerns; the process includes: • Corporate Communications receives issues and concerns through the formal feedback submission on the CNL website (https://www.cnl.ca/contact us), emails (communications@cnl.ca), phone calls (1-800-364-6989), and social media platforms (e.g., Facebook and Twitter); • All NSDF project-related issues and concerns (including complaints about noise disturbances) received are forwarded to the NSDF Project for resolution; • The NSDF Project address and resolve concerns about the Project on a case-by-case basis and resolution may include further mitigation of NSDF site activities; • Throughout this process, CNL will maintain two-way dialogue between the stakeholder and the NSDF team until the issue is resolved; • All inquiries are tracked and resolution or responses are recorded once completed. ~~(e.g., notification of residents before construction commences and complaint resolution mechanisms as mitigation)~~. CNL will continually evaluate both the process and the outcome of the ongoing engagement and communication activities to address and manage issues as they arise. The level and nature of engagement with the communities will depend on feedback received. **EIS Table 11.0-1:** **Conceptual Monitoring Program for Section 5.10 Socio-economic Environment** CNL will proactively seek, engage and support meaningful discussion on issues and opportunities related to the NSDF Project as part of the Public Information Program (PIP) [1], which can be found on the CNL website (www.CNL.ca). CNL, as part of the PIP, will ~~(e.g.,~~ notify ~~ication of~~ residents of NSDF project construction commencement via door-to-door delivery of letters, where stakeholders will be have the opportunity to voice their questions or concerns about activities related to the NSDF Project construction commencement. As part of the notification, the letter will include all CNL contact details (e.g., website, telephone, email etc.) to provide clear direction on how to contact CNL if they have questions, concerns or complaints related to the NSDF Project. A web link to a Feedback Form that is currently on the NSDF webpage on www.CNL.ca will also be included in the notification and will outline the above process of when an issue or concern is submitted. CNL will continually evaluate both the process and the outcome of the ongoing engagement and communication activities to address and manage issues as they arise. **Conceptual Monitoring Program for Section 6 Indigenous Interests – Traditional Land and Resource Use** • CNL will proactively seek, engage and support meaningful discussion on issues and opportunities related to the NSDF Project as part of the Public Information Program (PIP) [1], which can be found on the CNL website (www.CNL.ca). CNL, as part of the PIP, will ~~(e.g.,~~ notify ~~ication of~~ residents of NSDF project construction commencement via door-to-door delivery of letters, where stakeholders will be have the opportunity to voice their questions or concerns about activities related to the NSDF Project construction commencement. As part of the notification, the letter will include all CNL contact details (e.g., website, telephone, email etc.) to provide clear direction on how to contact CNL if they have questions, concerns or complaints related to the NSDF Project. A web link to a Feedback Form that is currently on the NSDF webpage on www.CNL.ca will also be included in the notification and will outline the above process of when an issue or concern is submitted. CNL will continually evaluate both the process and the outcome of the ongoing engagement and communication activities to address and manage issues as they arise. **EIS Section 11.2 Adaptive Management -** To be added at the end of the second last paragraph: Some aspects of the adaptive management which may require revised mitigations can come from public input and feedback related to NSDF activities. As an example, the residual effects of changes in ambient noise due to construction and road traffic may affect the quality of life of local residents (Indigenous and non-Indigenous) near the NSDF site. Through the Public Information Program (PIP) [1], which provides a platform for two-way dialogue between CNL and its stakeholders, CNL is able to record feedback and concerns from the general public about the NSDF as it progresses through the construction, operations, closure, and post-closure period. While the PIP can provide a short-term complaints response plan, marked changes can be recorded in follow-up monitoring as trends throughout the NSDF phases. Adaptive measures can then be developed and implemented as part of follow-up monitoring to permanently mitigate concerns.				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			EIS Section 11.3: Recognizing people's interest in understanding and participating in decisions that affect them, CNL will proactively seek, engage and support meaningful discussion with the public and Indigenous peoples on issues and opportunities related to the NSDF Project, including the environmental assessment monitoring and follow-up programs, through CNL's Public Information Program (PIP) [1], which can be found on the CNL website (www.CNL.ca). The PIP includes specific communications to stakeholders and public access to information related to routine activities as well as new projects such as the NSDF Project. These measures are meant to mitigate questions and complaints regarding CNL activities, as well as ensure community input is sought, received and action is taken to respond to these inputs. The PIP also provides a platform for the public to voice their concerns related to NSDF Project activities and for CNL to address and develop resolutions to these concerns; the process includes: • Corporate Communications receives issues and concerns through the formal feedback submission on the CNL website (https://www.cnl.ca/contact us), emails (communications@cnl.ca), phone calls (1-800-364-6989), and social media platforms (e.g., Facebook and Twitter); • All NSDF project-related issues and concerns (including complaints about noise disturbances) received are forwarded to the NSDF Project for resolution; • The NSDF Project address and resolve concerns about the Project on a case-by-case basis and resolution may include further mitigation of NSDF site activities; • Throughout this process, CNL will maintain two-way dialogue between the stakeholder and the NSDF team until the issue is resolved; • All inquiries are tracked and resolution or responses are recorded once completed. CNL will continually evaluate both the process and the outcome of the ongoing engagement and communication activities to address and manage issues as they arise. ***References:*** [1] Public Information Program for Canadian Nuclear Laboratories, CW-513430-REPT-001. Revision 5. July 2019. *(currently under revision)* Available at: https://www.cnl.ca/site/media/Parent/PIP-rev5.pdf [2] Public Information and Disclosure, REGDOC-3.2.1, 2018 May. Available at: https://nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc3-2-1/index.cfm				
QC-2-01	FC-206 (QC-8e)	Section 3.4.2.5.1	**Agency Information Request - Changes to an environmental component due to radiological contaminants** ***Question:*** 1. CNL is requested to justify why no treatment method is used to reduce the activity of tritium in wastewater. *2.* In order to ensure the sustainability of the water treatment installation in relation to the achievement of treatment targets, CNL is requested to explain how it will be able to adjust the wastewater treatment process in the event of more stringent discharge standards for the life of the facility, particularly for tritium present in water. ***Context:*** CNL does not fully address the question raised in the original IR (QC-8e). The MELCC requested that CNL describe the existing treatment methods to reduce tritium activity in wastewater. ***Rationale:*** The revised EIS in Section 3.4.2.5.1 states that tritium has an adjusted release limit relative to other radiological contaminants. While the release limit for other radiological contaminants is set relative to values derived from Health Canada's Drinking Water Guidelines, the release limit for tritium is set so that the value of the Guidelines is met not at the effluent, but at the discharge point of Perch Creek in the Ottawa River. CNL does not justify this difference, other than mentioning that there is a lack of treatment technology for tritium in water. The technologies used to remove tritium in heavy water from nuclear reactors could perhaps be adapted to the treatment of wastewater. For	EIS	Section 3.4.2.5.1 (Effluent Discharge Targets)	Additional clarification and information.	Accepted

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			example, research by Ontario Hydro (Sood, SK, Woodall et al., 1997) has identified a new, more compact and affordable technology for the decontamination of heavy water from CANDU-6 reactors. **CNL Response** While in principle it is possible to treat wastewater at the low tritium concentration of the effluent discharge target using modern technologies such as isotope separation (e.g., see https://www.ans.org/news/article-82/cnl-technologies-for-heavy-water-detritiation/ for a recent article regarding CNL's detritiation technology), it is not cost effective. Like any separation process, when the concentration of the contaminant (tritium in this case) is dilute it means a larger volume of feed water contaminated with tritium must be processed. As a result, the equipment is larger resulting in it being impractically expensive. Normally, plants to remove tritium operate at tritium feed concentrations several orders of magnitude higher than the effluent discharge target concentration for tritium in the wastewater treatment plant (WWTP). For comparison, in the example above CNL is looking at the conceptual feasibility for a tritium removal plant at the CRL site with a tritium feed concentration in heavy water five orders of magnitude higher than the NSDF effluent discharge target. It should be noted that in this case generating a commercial asset (heavy water) supports the feasibility of performing the tritium removal. Due to the impracticality of treating the wastewater to remove tritium, CNL has instead placed stringent limits on the total amount of tritium that can be placed in the NSDF (see Table 3.3.1-2 of the 2019 revised EIS and on the tritium concentration in individual waste shipments (see Table 3.3.3-1 of the 2019 revised EIS. By placing stringent controls on the amount of tritium being placed in the NSDF, emissions from the WWTP will meet the tritium effluent discharge targets. Thus, no treatment method is necessary to reduce the activity of tritium in the wastewater since it is instead controlled through means to isolate the source. For radionuclides and non-radionuclide constituents other than tritium, the WWTP has been designed using best available technology that is economically achievable to provide a large amount of flexibility in treating the wastewater to remove radionuclides and non-radionuclide constituents. Flexibility is provided in a number of ways: 1. The ability to modify the type and/or amounts of chemicals to precipitate radionuclides and non-radionuclide constituents. 2. The ability to modify the type of ion exchange resins used, including the use of ion selective resins if required. 3. The ability to layer multiple types of ion exchange resin within a single vessel to increase the number of different resins within a treatment train. 4. Two separate processing trains for the treatment of wastewater. These trains can be run simultaneously and can be configured to use different treatment chemicals or ion exchange resins. 5. The ability to recirculate off-specification effluent for retreatment, facilitated by a large storage capacity for wastewater. The options noted above do not require any physical plant changes. Implementing different technologies as required through physical changes to the WWTP provides further flexibility. The ability to make adjustments to the waste water treatment process either with or without physical changes to the plant will ensure the sustainability of the WWTP In the event that the effluent discharge target for tritium needed to be reduced, CNL has options to meet more stringent requirements. These options include: reducing the inventory of tritium allowed in the NSDF, reducing the concentration of tritium in waste shipments, the use of leachate controlled packages for wastes that currently do not require this type of packaging and the use of storage and decay for tritium. All of these options have operational and economic implications so decisions about what strategy to use would be situation dependent. The NSDF will operate for 50 years, and CNL will continue to evaluate and apply technical improvements or innovations where warranted as part of our adaptive management during the operating life of the facility. ***Changes to the EIS:*** The following modifications (new text in red, ~~strikethough~~ deleted text) will be made to the Final EIS to incorporate the information above:				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			EIS Section 3.4.2.5.1, last paragraph in “Radiological Constituents”: Due to the impracticality of treating the wastewater to remove tritium, CNL has instead placed stringent limits on the total amount of tritium that can be placed in the NSDF (see Table 3.3.1-2 EIS) and on the tritium concentration in individual waste shipments (see Table 3.3.3-1). By placing stringent controls on the amount of tritium being placed in the NSDF, emissions from the WWTP will meet the tritium effluent discharge targets. The discharge target for tritium of 360,000 Bq/L is based on maintaining tritium concentrations in Perch Creek which discharges to the Ottawa River, below the drinking water guideline of 7,000 Bq/L. Thus, no treatment method is necessary to reduce the activity of tritium in the wastewater since it is instead controlled through means to isolate the source. ~~A special adjustment for the discharge target for tritium was made due to the lack of economical treatment technologies at the predicated concentrations and its propensity to disperse rapidly in the environment.~~ ***References:*** N/A				
QC-2-02	FC-208 (QC-10b)	Section 3.3.1.3	**Agency Information Request - Changes to an environmental component due to radiological contaminants** ***Question:*** CNL is requested to justify the assertion in the response to QC10b by providing the values of natural background concentrations used to reach this conclusion. ***Context:*** Decreased performance of the technical characteristics of the ECM. ***Rationale:*** In their response to the original IR (QC10b), CNL states that: "At the end of the modeled institutional monitoring period of 300 years, the radioactivity concentration in the waste is similar to the natural background concentrations." However, Table 3.3.1-2 of the revised EIS shows that several of the radionuclides that would be stored in the NSDF site have a half-life significantly longer than the planned institutional control period. **CNL Response** CNL acknowledges that the proposed inventory for NSDF includes several long-lived radionuclides as shown by Table 3.3.1-2 of the 2019 revised EIS. Long-lived radionuclides are included in the NSDF inventory as they are intrinsically part of the radiological fingerprints of waste streams at Chalk River Laboratories (CRL) and other CNL sites. It is not technically or economically feasible to separate the long-lived radionuclides from the waste streams. However, the concentrations of long-lived radionuclides that are proposed in the NSDF reference inventory are in limited concentrations consistent with CSA Group (CSA) and International Atomic Energy Agency (IAEA) guidance ([1] & [2], Sections 2.2(4) of [1] and 2.24 of [2], for example). The substantial decrease of radioactivity concentrations in the first 100 years after the facility has been closed (as shown in Figure 3.3.1-2 of the revised 2019 EIS is the result of the decay of the shorter-lived radionuclides. The remaining radioactivity present in the NSDF after the 300-year Institutional Control period is the limited inventory of long-lived radionuclides. The risk of the presence of these long-lived radionuclides has been studied in detail in the Post-Closure Safety Assessment [3]. The calculated dose consequence and environmental concentrations meet the dose acceptance criteria and environmental quality standards, respectively, thus do not pose an unacceptable risk to the public or environment. Although not all radionuclides proposed in the NSDF inventory are Naturally Occurring Radioactive Materials (NORM), the purpose of comparing the NSDF total radioactivity concentration to the total natural background concentrations is to build confidence that the long-term hazard is acceptably low. This comparison provides an analogy by recognizing that, in general, long-lived radionuclides already exist in the environment without being a hazard. In response to the specific request, a study of the surface soil from the proposed NSDF site was performed in 2017 by CNL’s Environmental Monitoring Branch [4]. Concentrations of total beta, gross alpha, and Cesium-137 were analyzed in 36 samples from across the NSDF footprint. The sum of the total beta, gross alpha, and Cesium-137 activity concentrations across each sample ranges between about 0.7 Bq/g to 1.3 Bq/g. The radionuclides currently present on the proposed NSDF footprint are	EIS	Section 3.3.1.3 (Waste Inventory)	Additional clarification and information.	Accepted

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			NORM such as Potassium-40, Carbon-14, and the uranium and thorium decay chains. The natural background also includes Cesium-137 from atmospheric atomic weapons testing. There is no requirement to meet background radioactivity levels in a disposal facility. The radiological inventory proposed for the NSDF, combined with the facility design, must ensure that doses to the public and risk to the environment remains below the regulatory limits. The revised 2019 EIS and the supporting safety assessments [3] [5] perform these analyses and conclude that the dose to receptors and risk to the environment do meet regulatory criteria. ***Changes to the EIS:*** The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: **EIS Section 3.3.1.3**: The NSDF Project will contain only LLW. NSDF will not contain high level radioactive wastes such as used nuclear fuels nor intermediate level waste such as irradiated reactor core components. LLW contains primarily short-lived radionuclides and restricts the amount of long-lived radionuclides; thus, isolation and containment are only required for periods of time up to a few hundred years. Long-lived radionuclides are included in the NSDF inventory as they are intrinsically part of the radiological fingerprints of waste streams at CRL and other CNL sites. It is not practical, technical, or economical, to separate the long-lived radionuclides from the waste streams, especially since many of the waste streams are in the form of soil and building debris. However, the concentrations of long-lived radionuclides that are proposed in the NSDF reference inventory are limited, consistent with CSA N292.0[1] and IAEA GSG-1 [2] guidance. The ECM design life of 550 years has been established to meet the required time period to allow for radioactive decay of the waste inventory, illustrated on Figure 3.3.1-2. The radioactivity concentration in the ECM decreases about 2,000 times in the first 100 years, and begins to approach background levels of concentration shortly thereafter. The radionuclides currently present on the proposed NSDF footprint are Naturally Occurring Radioactive Material (NORM) such as Potassium-40, Carbon-14, and the uranium and thorium decay chains [4]. The natural background also includes Caesium-137 from atmospheric atomic weapons testing. Although not all radionuclides proposed in the NSDF inventory are NORM, the purpose of comparing the NSDF total radioactivity concentration to the total natural background concentrations is to build confidence that the long-term hazard is acceptably low. This comparison provides an analogy by recognizing that long-lived radionuclides already exist in the environment without being a hazard. There is no requirement to meet background radioactivity levels in a disposal facility. The radiological inventory proposed for the NSDF, combined with the facility design, must ensure that doses to the public and risk to the environment remains below the regulatory limits. Radiological dose and environmental risk as a result of these long-lived radionuclides are discussed in Sections 5.7 and 5.8. ***References:*** [1] CSA N292.0:19. General Principles for the Management of Radioactive Waste and Irradiated Fuel. CSA Group. 2019. [2] IAEA General Safety Guide (GSG)-1. Classification of Radioactive Waste. IAEA (International Atomic Energy Agency). 2009. Available at: https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419_web.pdf [3] Post-Closure Safety Assessment for the NSDF Project. Canadian Nuclear Laboratories Document No. 232-509240-ASD-004, Revision 0. Arcadis and Quintessa (Arcadis Canada Inc. and Quintessa Ltd.) 2019 November. [4] Analysis of Surface Soil Samples from the Proposed Near Surface Disposal Facility Site, 232-121270-TD-004, Revision 0. CNL. October 2017. [5] Ecological Risk Assessment (EcoRA) for the NSDF Project. Canadian Nuclear Laboratories Document No. 232-121240-ASD-001. Revision 0. Arcadis (Arcadis Canada Inc.). November 2019				
QC-2-03	FC-214 (QC-18a)	N/A	**Agency Information Request - Change to an environmental component due to radiological contaminants** ***Question:*** CNL is requested to explain the source of the “traces” of isotopes of uranium and radium which will be present in the treated effluent: 1. What is the volume of stored materials of which these isotopes will come from? 2. What is the activity, toxicity and longevity of these isotopes? 3. What are the potential impacts of these isotopes?	N/A			Accepted

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			Context: Considering that only low level waste would be buried, why does CNL specify that *"only traces [of isotopes of uranium and radium] will be present in the treated effluent"*? ***Rationale:*** What are the volumes of stored materials of which these "traces" will come from the treated effluent? CNL should also discuss the activity, toxicity and longevity of these isotopes in relation to the fact that they may possibly exceed the impacts of low level waste. **CNL Response** The NSDF contains low level radioactive waste (LLW) only, as defined by International Atomic Energy Agency (IAEA) GSG-1[1] and the CSA Group (CSA) N292 [2]. LLW can contain small concentrations of longer-lived radionuclides, such as isotopes of uranium and radium. It is not technically or economically feasible to separate uranium contamination from soil and building debris, which make up the majority of the NSDF waste streams. See Section 2.2(4), 2.24, and 2.27 of IAEA GSG-1 [1] for more details and context about the classification of LLW. By “trace” CNL means the very small to negligible concentrations of uranium and radium. For example, the Uranium-238 concentration in the forecasted waste is 0.08 Bq/g, which is approximately the same as the average concentration in soils in North America of 0.07 Bq/g [3], although it is important to note that this value can vary significantly depending on the local geology. The amount of uranium and radium that is present in the treated effluent is proportional to the amount of uranium and radium that is able to migrate into the leachate. During the operations phase, the waste is only in contact with water/precipitation for relatively short periods of time. This fact, combined with uranium and radium’s relatively low solubility in water, means that only small amounts will make it to the leachate collection system and sent to the Wastewater Treatment Plant (WWTP) for treatment. The small amounts that exist in the in the wastewater are then processed through the WWTP, and reduced further. Therefore, the concentration of uranium and radium in the treated effluent is also very low. 1. The entire 1,000,000 m^3 of waste has the potential to contain small amounts of uranium and other long-lived radionuclides. The majority of the uranium and radium isotopes by volume are found in the environmental remediation (soil) wastes. By closure of the facility, the environmental remediation soils are expected to account for about 360,000 m^3. 2. The amount of activity and the half-lives of the radioisotopes contained in the NSDF is found in Table 3.3.1-2 of the 2019 revised EIS. The radioactivity concentrations of the effluent are found in Table 3.4.2-2 of the 2019 revised EIS. The radiotoxicity of each individual isotope is dependent on the concentration, exposure pathway, and the receptor. If the anticipated concentrations in the effluent are below screening level concentrations (i.e., drinking water quality guidelines and environmental quality concentrations) no further risk assessment is warranted. Section 5.4.2.6 of the 2019 revised EIS describes the surface water quality modelling methodology and the screening process. Radiological contaminants were screened based on the following: • The predicted treated effluent concentration for a radionuclide was greater than 1% of the No Effect Concentration (NEC) for that radionuclide. • Where NEC were not available for a radionuclide, screening was based on human exposure factors consistent with the post-closure safety assessment. • Radionuclides of public interest or site focus. Uranium and radium were screened out of the assessment since the treated effluent concentrations were below 1% of the NEC thus were not evaluated further for radiological impacts.				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			3. Meeting effluent discharge targets is considered to be protective of the public and environment, and therefore no additional assessment of potential impacts is required. For example, the calculated concentration of radium entering the WWTP is 0.00064 Bq/L, which is 0.1% of the effluent discharge criteria of 0.5 Bq/L. Uranium isotopes have comparably low concentrations, presented in Table 3.4.2-2 of the revised 2019 EIS. The concentrations are much lower than the discharge criteria (and screening criteria), therefore the potential radiological impact of uranium and radium from effluent discharges is expected to be negligible, and not assessed further. Although uranium is screened out from a radiological point of view, uranium as a metal is included in the surface water quality assessment due to its known toxicity to aquatic life. Discharge targets for non-radiological contaminants are sourced from federal and provincial guidelines for the protection of aquatic biota. For Uranium, the Ontario Guideline value of 5 µg/L for protection of aquatic biota is used as the effluent discharge target. The Ontario guideline was selected as it is more restrictive than the federal guideline value of 15 µg/L. Surface water modelling is described in Section 3.1 (Table 3-32) of the technical support document for the surface water quality assessment [4]. Predicted uranium concentrations in Perch Lake watershed and Ottawa River are well below the federal and provincial guidelines for protection of aquatic biota. No discernable change in Ottawa River uranium concentrations are predicted. ***Changes to the EIS:*** No changes are proposed to the Final EIS. ***References:*** [1] IAEA General Safety Guide (GSG)-1, Classification of Radioactive Waste. IAEA (International Atomic Energy Agency). 2009. Available at: https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419_web.pdf [2] CSA N292.0:19 General Principles for the Management of Radioactive Waste and Irradiated Fuel. CSA Group. 2019. [3] Uranium Fact Sheet. Health Physics Society. December 2018. Available at: https://hps.org/documents/uranium_fact_sheet.pdf [4] Surface Water Quality Assessment for the Near Surface Disposal Facility, Technical Supporting Document. Canadian Nuclear Laboratories Document No.232-03710-REPT-007 Revision 0. Golder Associates Ltd.2019 November.				
QC-2-04	FC-215 (QC-19)	Section 5.7	**Agency Information Request - Change to an environmental component due to radiological contaminants** ***Question:*** 1. CNL is requested to compare the concentrations estimated at the mouth of Perch Creek, in the Ottawa River, with the criteria applicable in Quebec for water quality, since the expanded study area includes part of the Quebec province. These criteria are available on the following website: http://www.environnement.gouv.qc.ca/eau/criteres_eau/index.asp 2. An ecological risk assessment was carried out for sediments in the Ottawa River by Bond and his collaborators in 2015. However, it is not clear whether this risk assessment also takes into account the exposure of aquatic organisms to radionuclides in surface waters. CNL should validate and confirm whether the risk assessment includes exposure of aquatic organisms to radionuclides in surface water. Otherwise, CNL is requested to justify this exclusion. 3. CNL is requested to present the results of the long-term sediment verification program for the affected area. 4. The total radiotoxic risk, in µGy/h, for aquatic organisms likely to be exposed to radioactive PPCs must be compared with the criterion applicable in Quebec, since part of the Ottawa River is located there. Quebec has retained a maximum increase of 10µGy/hr compared to ambient levels. This criterion is already exceeded for crustaceans and bivalve mollusks, due to historical contamination. Therefore, care should be taken not to add additional contamination and to take the necessary mitigation measures for this purpose. ***Context:*** CNL's response to the original IR (QC-19) indicates that the predicted concentrations of radionuclides in surface water for the operational and post-closure phases are summarized in section 5.7.6.3 of the revised EIS. In addition, the concentrations predicted in Perch Creek are much lower than the concentrations without effect. ***Rationale:***	EIS	Section 5.7.6.1.2.2 (Application Case Results, Post-Closure Phase) Section 5.7.6.3.1 (Application Case Results, Operations and Closure Phases, Aquatic Environment) (Table 5.7.6-6 – Comparison of Risk Benchmark Values to Maximum Predicted Surface Water Concentrations for Each Parameter for All Modelled	Additional clarification and information.	Accepted

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			No comparison was made with the water quality criteria applicable in Quebec. **CNL Response** 1. **Operations and Closure Phase:** Table 5.7.6-6 of the Final EIS will be updated to include the Quebec guidelines for non-radionuclide parameters [1] and is provided below. The Quebec guidelines for the compounds assessed in the EIS for the operations and closure phases are equal to or greater than the benchmarks used in the EIS (i.e., aluminum, phosphorus and manganese), or are equal to or greater than the maximum predicted concentrations in surface water (i.e., barium, selenium and zinc), for all compounds except copper, iron, lead, and silver. For copper, the Quebec criteria of 1.3 µg/L is lower than the selected risk benchmark of 2.0 µg/L. However, given that the maximum predicted concentration of 8.4 µg/L exceeds both the selected risk benchmark and the Quebec criteria, there would be no change to the conclusions of the EIS should the Quebec criteria have been used for copper, because concentrations at all nodes would continue to exceed its applicable benchmark. Note that copper was not associated with unacceptable risk given that its predicted concentrations were within the normal range of background levels. Please refer to Section 3.1 of the Surface Water Quality Technical Supporting Document [2] for further discussion on the overall conclusions related to copper. Maximum modelled concentrations of iron (1,580 µg/L), lead (1.36 µg/L), and silver (0.7 µg/L) at the Perch Creek Outlet (PCO) are greater than criteria applicable in Quebec for these water quality parameters during the operations and closure phases; however, these maximum predicted concentrations are lower than existing baseline concentrations (1,650 µg/L), lead (2.1 µg/L), and silver (1.0 µg/L) developed for PCO for the assessment based on the average concentrations measured at Perch Creek Weir (PCW) from 2010 to 2018. Existing baseline concentrations at PCW were assigned to PCO because existing baseline data at PCO were not available. This is a reasonable assumption since PCO is located a short distance downstream of PCW, and the Perch Creek does not receive any further supplemental inflows in the reach between PCW and PCO. Therefore, consideration of the Quebec water quality guideline for non-radiological parameters does not change the conclusions reached in the EIS for the operations and closure phases. **Post-closure Phase:** Table 2-30 of the EcoRA will be updated to include the Quebec guidelines for non-radionuclide parameters [1] and is provided below. Non-radionuclides carried forward for consideration in the EcoRA included aluminum, copper, lead and uranium [3]. With respect to surface water quality, predicted total maximum concentrations (predicted incremental + background) of these constituents were compared to CCME and Ontario MOE water quality criteria in the screening process. Quebec's aluminum and uranium criteria are less conservative or equal to those applied in the EcoRA. While the Quebec criteria for copper and lead are more conservative than the criteria used in the EcoRA screening process, total maximum concentrations of copper and lead exceeded the criteria used in the EcoRA. While potential residual effects due to aluminum, copper and lead exposure were identified in the EcoRA for aquatic and terrestrial receptors, these exposures were overwhelmingly dominated by background exposures and were not the result of incremental releases from the Project (with the exception of extreme scenarios 4, 14 and 15) [3]. Therefore, consideration of the Quebec surface water guidelines for non-radiological parameters does not change the conclusions of the EcoRA nor the conclusions reached in the EIS for the post-closure phase. 2. The 2015 Ottawa River Sediment Ecological Risk Assessment [4] provides an assessment of historical river bed contamination at the CRL Process Outfall located several hundred meters upstream of the point where Perch Creek discharges to the Ottawa River. There is no spatial overlap between the historical contamination at the Process Outfall and Perch Creek. The 2015 Ottawa River Sediment Ecological Risk Assessment [4] did account for the exposure of aquatic organisms to radionuclides in surface water. Radionuclide concentrations in surface water were calculated from measured sediment concentrations using distribution coefficients drawn from International Atomic Energy Agency (IAEA) guidance. Water concentrations are not the main source of risk to aquatic biota justifying the use of sediment activity as the primary input for calculating the dose to biota. Measured sediment activity and		Scenarios and Locations)		
				EcoRA	Section 2.4.3 (Table 2-30) Section 4.1 (Table 4-1) Table 5-1 and Table 5-2	Additional clarification and information.	

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
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biota tissue concentrations (by radionuclide) are used to derive any missing data (e.g., water concentrations) with a transfer model. Internal and external dosimetry models and measured/calculated whole/body concentrations in receptors are used to determine internal and external exposures.

3. The results of the long-term sediment verification program in the Ottawa River is available in 2016 Ottawa River Sediment Verification Monitoring Report [5].

4. There is no spatial overlap between the Perch Creek outfall to the Ottawa River and the region of historical contamination at the Process Outfall. The NSDF Project will not contribute any significant additional dose exposures to aquatic biota in the Ottawa River. Predicted radiation exposure to aquatic biota from the NSDF Project will be less than Province of Quebec dose criteria of 10 µGy/hr above ambient for the Ottawa River for the Operations, Closure and Post-Closure phases as described below.

Operations and Closure Phase: For the operations and closure phases, the effect of discharge of wastewater treatment plant (WWTP) treated effluent on aquatic biota was evaluated by comparing predicted radionuclide concentrations in surface water in the Ottawa River against no effect concentrations for radionuclides. The no effect concentrations are derived from a radiation benchmark of 400 µGy/hr for aquatic biota and are provided in Table 5.4.2-6 of the revised EIS for those radionuclides that screened into the surface water quality assessment (i.e., Carbon-14, Cesium-137, Cobalt-60, Gross Beta as Strontium-90 and Tritium). Screening criteria for including a radionuclide in the surface water quality assessment was that the predicted treated effluent concentration exceed 1% of the No Effect Concentration (i.e., Carbon-14, Cobalt-60), the radionuclide is elevated above background concentrations in the Perch Lake watershed (i.e., Cesium-137, Gross Beta, Tritium) or the radionuclide is of particular interest to the public (tritium).

The predicted concentrations for the Ottawa River for each of the radionuclides that screened into the assessment are negligible (less than 7 Bq/L for Tritium and less than 1 Bq/L for all other radionuclides). Predicted concentrations for radionuclides are provided in Section 3.2 of the Surface Water Quality Assessment Technical Support Document [2]. Accordingly the radiation dose to aquatic biota for the Ottawa River is predicted to be negligible, much less than the Province of Quebec criteria of 10 µGy/hr.

Post-closure Phase: The radiological dose benchmarks used to determine consequences of radiological exposure for non-human biota in the EcoRA [3] were based on the criteria from Canadian Standards Association (CSA N288.6-12) Standard for Environmental Risk Assessment [6]. These radiological dose benchmarks used in the EcoRA and the EIS (Section 5.7.6.1.2.2) are also consistent with UNSCEAR (2008) [7]: 100 µGy/hr for terrestrial biota and 400 µGy/hr for aquatic biota.

Quebec's criterion (10 uGy/hr = 0.24 mGy/d) [1] is 40 times lower than the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR, 2008) criterion for aquatic biota (400 uGy/hr = 9.6 mGy/d) [7]. Applying the more conservative Quebec benchmark results in screening index (SI) values less than 1 in the Ottawa River (See Table 1 below). Therefore, consideration of the Quebec radiological benchmark for aquatic organisms in the Ottawa River does not change the conclusions reached in the EcoRA.

Table 1 Radiological Risk Screening Index Results for Aquatic Receptors in the Ottawa River.

Scenario	Ottawa River (Receptor 1)					
	Aquatic Vegetation	Benthic Fish	Benthic Invertebrates	Pelagic Fish	Zooplankton	Green Frog (tadpole)
Benchmark (mGy/d)	0.24	0.24	0.24	0.24	0.24	0.24
(1) Normal Evolution Scenario (NES) and (9) Dose Optimization: Confidence in Land Use Restrictions						
Total Dose (mGy/d)	6.46E-08	3.03E-07	1.28E-08	3.03E-07	1.28E-08	3.03E-07
SI (-)	2.69E-07	1.26E-06	5.33E-08	1.26E-06	5.33E-08	1.26E-06
(1a) NES Sensitivity Analysis: Inventory Sensitivity						

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	

Total Dose (mGy/d)	9.52E-04	4.34E-03	6.27E-04	4.34E-03	6.27E-04	7.22E-06	
SI (-)	3.97E-03	1.81E-02	2.61E-03	1.81E-02	2.61E-03	3.01E-05	
(1b) NES Sensitivity Analysis: Institutional Control Sensitivity							
Total Dose (mGy/d)	6.46E-08	3.03E-07	1.28E-08	3.03E-07	1.28E-08	3.03E-07	
SI (-)	2.69E-07	1.26E-06	5.33E-08	1.26E-06	5.33E-08	1.26E-06	
(1c) NES Sensitivity Analysis: Sorption Coefficient Sensitivity							
Total Dose (mGy/d)	3.27E-04	1.12E-03	4.35E-04	1.12E-03	4.35E-04	2.97E-06	
SI (-)	1.36E-03	4.67E-03	1.81E-03	4.67E-03	1.81E-03	1.24E-05	
(1d) NES Sensitivity Analysis: Geosphere – Rapid Transit to Perch Creek							
Total Dose (mGy/d)	6.97E-08	3.29E-07	1.37E-08	3.29E-07	1.37E-08	3.29E-07	
SI (-)	2.90E-07	1.37E-06	5.71E-08	1.37E-06	5.71E-08	1.37E-06	
(1e) NES Sensitivity Analysis: Enhanced Degradation of Cover and Liner							
Total Dose (mGy/d)	1.09E-07	5.38E-07	2.05E-08	5.38E-07	2.05E-08	5.38E-07	
SI (-)	4.54E-07	2.24E-06	8.54E-08	2.24E-06	8.54E-08	2.24E-06	
(1f) NES Sensitivity Analysis: Global Warming – Reduced HER							
Total Dose (mGy/d)	5.36E-08	2.51E-07	1.06E-08	2.51E-07	1.05E-08	2.51E-07	
SI (-)	2.23E-07	1.05E-06	4.42E-08	1.05E-06	4.38E-08	1.05E-06	
(3) Disruptive Event: Human Intrusion, House with Basement – Resident (Chronic)							
Total Dose (mGy/d)	6.46E-08	3.03E-07	1.28E-08	3.03E-07	1.28E-08	3.03E-07	
SI (-)	2.69E-07	1.26E-06	5.33E-08	1.26E-06	5.33E-08	1.26E-06	
(4) Disruptive Event: Enhanced Corrosion Case							
Total Dose (mGy/d)	8.07E-08	3.04E-07	1.88E-08	3.04E-07	1.86E-08	3.04E-07	
SI (-)	3.36E-07	1.27E-06	7.83E-08	1.27E-06	7.75E-08	1.27E-06	
(5) Disruptive Event: Localized Cover Failure							
Total Dose (mGy/d)	5.61E-08	2.58E-07	1.14E-08	2.58E-07	1.14E-08	2.58E-07	
SI (-)	2.34E-07	1.08E-06	4.75E-08	1.08E-06	4.75E-08	1.08E-06	
(6) Disruptive Event: Localized Liner Failure							
Total Dose (mGy/d)	7.35E-08	3.25E-07	1.76E-08	3.25E-07	1.74E-08	3.25E-07	
SI (-)	3.06E-07	1.35E-06	7.33E-08	1.35E-06	7.25E-08	1.35E-06	
(7) Disruptive Event: Damage to Berm							
Total Dose (mGy/d)	6.59E-08	3.09E-07	1.31E-08	3.09E-07	1.31E-08	3.09E-07	

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
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SI (-)	2.75E-07	1.29E-06	5.46E-08	1.29E-06	5.46E-08	1.29E-06
(8) Dose Optimization: Wastes Grouted into Steel Liners						
Total Dose (mGy/d)	6.45E-08	3.03E-07	1.28E-08	3.03E-07	1.28E-08	3.03E-07
SI (-)	2.69E-07	1.26E-06	5.33E-08	1.26E-06	5.33E-08	1.26E-06
(11) Defence-in-Depth: Role of Geosphere						
Total Dose (mGy/d)	9.08E-08	3.70E-07	1.65E-08	3.70E-07	1.65E-08	3.70E-07
SI (-)	3.78E-07	1.54E-06	6.88E-08	1.54E-06	6.88E-08	1.54E-06
(12) Defence-in-Depth: Role of Cover						
Total Dose (mGy/d)	1.74E-07	8.71E-07	3.31E-08	8.71E-07	3.30E-08	8.71E-07
SI (-)	7.25E-07	3.63E-06	1.38E-07	3.63E-06	1.38E-07	3.63E-06
(13) Defence-in-Depth: Role of Base Liner						
Total Dose (mGy/d)	6.39E-08	2.67E-07	1.63E-08	2.67E-07	1.61E-08	2.67E-07
SI (-)	2.66E-07	1.11E-06	6.79E-08	1.11E-06	6.71E-08	1.11E-06
(14) Defence-in-Depth: Series of Landslides						
Total Dose (mGy/d)	1.33E-07	3.11E-07	5.26E-08	3.10E-07	5.15E-08	3.11E-07
SI (-)	5.54E-07	1.30E-06	2.19E-07	1.29E-06	2.15E-07	1.30E-06
(15) "What-If": Human Intrusion, Mass Excavation and Farming [1]						
Total Dose (mGy/d)	9.48E-04	2.12E-03	4.12E-03	2.12E-03	4.12E-03	2.38E-05
SI (-)	3.95E-03	8.83E-03	1.72E-02	8.83E-03	1.72E-02	9.92E-05
(17) "What-If": Permanent Bathtub [1]						
Total Dose (mGy/d)	7.40E-08	3.04E-07	1.55E-08	3.04E-07	1.54E-08	3.04E-07
SI (-)	3.08E-07	1.27E-06	6.46E-08	1.27E-06	6.42E-08	1.27E-06

Notes:
Bold – value exceeds the SI benchmark value of 1.
(1) There are no criteria for 'What-If' scenarios and thus screening index (SI) values are only provided for perspective.

Changes to the EIS:
The following modifications (new text in red, ~~strikethroughs~~ indicate text to be removed) will be made to the respective documents to incorporate the information above:

EIS Section 5.7.6.3.1 (Operations and Closure Phase):
Comparison of the predicted concentrations of the ten Contaminants of Potential Concern (COPCs) to the selected risk benchmark values as well as the water quality criteria set by the Quebec Ministry of Environment (MELCC) is shown in Table 5.7.6-6.

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
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Table 5.7.6-6: Comparison of Risk Benchmark Values to Maximum Predicted Surface Water Concentrations for Each Parameter for All Modelled Scenarios and Locations

Parameter	Risk Benchmark Values (µg/L)	Quebec Criteria (µg/L)	Maximum (µg/L)	Scenarios with Exceedances	Locations with Exceedances of Risk Benchmark Values
Aluminum	100	100	631	Scenario 1 Scenario 2	■ East Swamp weir (local ambient, all stats) ■ Perch Lake Inlet 2 (local ambient, all stats) ■ Perch Lake (local ambient, all stats) ■ Perch Creek weir (local ambient, 95th and max) ■ Ottawa River (local ambient)
Barium	110	38	18.8	None	None
Copper	2	1.3	8.4	Scenario 1 Scenario 2	All nodes (ambient, all stats)
Iron	3,400	**1,300**	2,870	None	None
Lead	7	**0.17**	5.9	None	None
Manganese	120	260	2,300	None	None
Phosphorus	—	—	120	None – phosphorus is considered non-toxic	None – phosphorus is considered non-toxic
Selenium	20	5	1.28	None	None
Silver	4.1	**0.1**	1.047	None	None

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Zinc	120	17	7.91	None	None

Bold = Quebec criteria (http://www.environnement.gouv.qc.ca/eau/criteres_eau/index.asp) is more stringent than Risk Benchmark Value
µg/L = micrograms per litre; — = no value.

The predicted concentrations for the non-radiological COPCs in the discharge from the WWTP were compared to the benchmark values derived for the NSDF Project and to local ambient water quality at the six water quality nodes (see Section 5.4.2.6.2). The predicted concentrations of all the parameters measured, with the exception of aluminum and copper, met their respective benchmark values at all sampling nodes. The Quebec guidelines for the compounds assessed in the EIS for the operations and closure phases are equal to or greater than the benchmarks used in the EIS (i.e., aluminum, phosphorus and manganese), or are equal to or greater than the maximum predicted concentrations in surface water (i.e., barium, selenium and zinc), for all compounds except copper, iron, lead, and silver.

Section 5.7.6.1.2.1 (Operations and Closure Phase):
Waterborne Effluent – Operations Phase
The surface water quality modelling confirms that environmental concentrations of contaminants are below the No Effect concentrations for protection of aquatic biota for radiological contaminants with the exception of one parameter, gross beta as Strontium-90. Existing gross beta concentrations are elevated at East Swamp Stream. The elevated concentrations are associated with an existing Strontium-90 groundwater plume in the area (Section 5.7.4.6). Surface water quality modelling indicates that the impacts on baseline concentrations are negligible (see Table 5.4.2-14). No further assessment is therefore required. For the methods and numerical results of the surface water modelling, refer to Section 5.4.2.

By ensuring that releases and subsequent environmental concentrations are below the relevant guidelines or are below levels that would result in potential adverse effects on aquatic life, there will be no adverse effects to biota during the operations phase of the NSDF Project. Therefore, a quantitative assessment of radiological dose to biota is not required.

The predicted concentrations for the Ottawa River for each of the radionuclides that screened into the assessment are well below No Effect Concentrations based on 400 uGy/hr radiation benchmark used in the assessment. Accordingly, radiation doses to Aquatic Biota in the Ottawa River are also predicted to be well below the Province of Quebec criteria of 10 µGy/hr.

EIS Section 5.7.6.1.2.2 Post Closure Phase:
Ecological risks are assessed by estimating the total dose rate received by an ecological receptor and comparing it to the selected benchmark values. The recommended radiological dose benchmarks used in the EcoRA are consistent with UNSCEAR (2008) and consist of 100 µGy/hr (2.4 mGy/d) for terrestrial biota and 400 µGy/h (9.6 mGy/d) for aquatic biota. A safety factor of 10 was applied to the selected benchmark values for species at risk to assess risks at the individual as opposed to population level. It is noted that part of the Ottawa River is located in the Province of Quebec, whose criteria for aquatic biota (10 µGy/hr) is 40 times lower than the benchmarks recommended by CSA N288.6-12 (CSA 2012). For species located in the Ottawa River, the Quebec benchmark has been applied.

Changes to the EcoRA:

EcoRA Section 2.4.3 Table 2-30:

Contaminant	Surface Water (µg/L)	Soil (mg/kg dw)	Sediment (mg/kg dw)
	CCME$^{(1)}$/Quebec$^{(7)}$ (Perch Creek & Ottawa River)	CCME$^{(2)}$	CCME$^{(3)}$
Aluminum	100 $^{(1)(7)}$	NV	NV
Copper	2$^{(1)}$ (Perch Creek) 1.3 $^{(7)}$ (Ottawa River)	63	35.7
Lead	1$^{(1)}$ (Perch Creek)	140	35.0

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	0.17[7] (Ottawa River)		
Uranium	15[1] (Perch Creek) 14[7] (Ottawa River)	23	NV
	MECP[4]	MECP[5]	MECP[5]
Aluminum	75	NV	NV
Copper	5	92	16
Lead	1	120	31
Uranium	5	2.5	104.4[6]

Notes:
CCME – Canadian Council of Ministers of the Environment (on-line summary table of environmental quality guidelines accessed October 2019)
MECP – Ontario Ministry of the Environment, Conservation and Parks
NV – no value available
(1) Water quality guidelines for the protection of freshwater aquatic life, long-term concentration; aluminum value for pH ≥6.5; copper and lead values for hardness unknown.
(2) Soil quality guidelines for the protection of environmental and human health for residential/parkland use.
(3) Sediment quality guidelines for the protection of freshwater aquatic life, interim sediment quality guideline (ISQG).
(4) Provincial water quality objectives (OMOE 1994); aluminum for pH >6.5 to 9.0.
(5) Table 8 – Generic Site Condition Standards for Use within 30 m of a Water Body in Potable Groundwater Condition (OMOE 2011b); soil for residential/parkland/institutional/industrial/commercial/communityproperty use; groundwater and sediment for all types of property use.
(6) Lowest effect level (LEL) for uranium derived using weighted method in Table I of Thompson *et al.* (2005) applied to radionuclide releases to the environment from uranium mining and milling activities in Canada.
Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC). Surface Water Quality Criteria. Retrieved from the MELCC webpage: http://www.environnement.gouv.qc.ca/eau/criteres_eau/index.asp; uranium criterion for a hardness of 20-100 mg/L $CaCO_3$

EcoRA Section 4.1:
The recommended radiological dose benchmarks from CSA N288.6-12 (CSA 2012) were used in this study. For more information on the rationale for selecting these benchmarks, the reader is referred to the CSA (2012) document. It is noted that part of the Ottawa River is located in the Province of Quebec, whose criteria for aquatic biota (10 uGy/hr) is 40 times lower than the benchmarks recommended by CSA N288.6-12 (CSA 2012). For species located in the Ottawa River, the Quebec benchmark has been applied.

EcoRA Table 4-1:

Major Biota Group	Organism	Dose Rate Benchmark
Aquatic Vegetation	Reed	9.6 mGy/d (Perch Creek) 0.24 mGy/d (Ottawa River)
Pelagic Invertebrate Community	Zooplankton	9.6 mGy/d (Perch Creek) 0.24 mGy/d (Ottawa River)
Benthic Invertebrate Community	Benthic Invertebrates	9.6 mGy/d (Perch Creek) 0.24 mGy/d (Ottawa River)
Benthic Fish	Bluntnose Minnow, Brown Bullhead	9.6 mGy/d (Perch Creek) 0.24 mGy/d (Ottawa River)
Pelagic Fish	Northern Pike	9.6 mGy/d (Perch Creek) 0.24 mGy/d (Ottawa River)
Amphibians	Green Frog (tadpole)	9.6 mGy/d (Perch Creek) 0.24 mGy/d (Ottawa River)
Aquatic Based Birds	Belted Kingfisher, Great Blue Heron, Mallard	9.6 mGy/d (Perch Creek) 0.24 mGy/d (Ottawa River)

<table>
<tr><th rowspan="2">Reference #</th><th rowspan="2">Link to IR#1 (Original IR package)</th><th rowspan="2">EIS Section</th><th rowspan="2">Information Request & Response</th><th colspan="3">Documents Impacted by the Response to IR</th><th rowspan="2">Accepted/ Rejected with request for follow-up information</th></tr>
<tr><th>Document Name</th><th>Section/Figure/ Table Impacted by Response</th><th>Scope of New Information</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td>Aquatic Based Mammals</td><td>Moose</td><td>2.4 mGy/d</td></tr>
<tr><td>Terrestrial Vegetation</td><td>Red Maple</td><td>2.4 mGy/d</td></tr>
<tr><td>Soil Invertebrates</td><td>Earthworm</td><td>2.4 mGy/d</td></tr>
<tr><td>Terrestrial Based Birds</td><td>Purple Finch, Ruffed Grouse</td><td>2.4 mGy/d</td></tr>
<tr><td>Terrestrial Based Small and Large Mammals</td><td>Meadow Vole, Short-tailed Shrew, Black Bear, White-tailed Deer</td><td>2.4 mGy/d</td></tr>
<tr><td colspan="3">Species at Risk</td></tr>
<tr><td>Aquatic Reptiles</td><td>Snapping Turtle</td><td>0.96 mGy/d (Perch Creek)
0.024 mGy/d (Ottawa River)</td></tr>
<tr><td>Terrestrial Based Birds</td><td>Canada Warbler, Eastern Whip-poor-will</td><td>0.24 mGy/d</td></tr>
<tr><td>Terrestrial Based Small and Large Mammals</td><td>Little Brown Myotis, Eastern Wolf</td><td>0.24 mGy/d</td></tr>
</table>
<p>EcoRA Table 5-1 and 5-2: the revised tables are captured in Attachment QC-2-04 (provided below).</p>
<p><i>References:</i>
[1] Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC). Surface Water Quality Criteria. Retrieved from the MELCC webpage: http://www.environnement.gouv.qc.ca/eau/criteres_eau/details.asp?code=S0949
[2] Surface Water Quality Assessment for the Near Surface Disposal Facility, Technical Supporting Document. Canadian Nuclear Laboratories Document No. 232-03710-REPT-007. Revision 0. November 2019.
[3] NSDF Ecological Risk Assessment, 232-121240-ASD-001, Revision 0, 2019 November.
[4] CRL Ottawa River Sediment Remediation – Ecological Risk Assessment, 175-121240-REPT-002, Rev 0, 2014 March
[5] 2016 Ottawa River Sediment Verification Monitoring Report, 175-509247-REPT-001, Rev 0, 2017 February.
[6] CSA Standard N288.6-12 Environmental risk assessments at Class I nuclear facilities and uranium mines and mills
[7] UNSCEAR. 2008. Sources and Effects of Ionizing Radiation. Volume II. Scientific Annexes C, D, and E. ISBN-13: 978-9291-142280-1. United Nations. April 2011. Accessed November 2019. Available at: http://www.unscear.org/docs/publications/2008/UNSCEAR_2008_Annex-E.pdf</p>
</td><td></td><td></td><td></td><td></td></tr>
<tr><td>QC-2-05</td><td>FC-225 (QC-15)</td><td>Section 5.7.6.3</td><td>
<p>Agency Information Request - Change to an environmental component due to radiological components</p>
<p><i>Question:</i>
CNL is requested to determine whether certain beaches on the Ottawa River are areas of sediment accumulation under the influence of the waters of Perch Creek.</p>
<p><i>Context:</i>
The original IR (QC-15) was partially addressed in responses provided by CNL to IRs QC-19 and QC-29.</p>
<p><i>Rationale:</i>
CNL should determine whether certain beaches on the Ottawa River are areas of sediment accumulation under the influence of the waters of Perch Creek. If so, these beaches should be added to the initial characterization of the environment.</p>
<hr>
<p>CNL Response</p>
<p>The characterization of radioactivity in sediments of the Ottawa River was conducted to establish ambient conditions describing the environment surrounding the NSDF Project site. As part of the current Chalk River Laboratories (CRL) environmental monitoring program (site-wide monitoring), CNL conducts routine radiological characterization of sand collected at beaches along the Ottawa River to support assessment of dose to the public. The results of these monitoring programs were incorporated into the baseline characterization (i.e., the initial characterization of ambient conditions) of the environment for the NSDF Project as discussed in Section 5.7.4.8 of the 2019 revised</p>
</td><td>NA</td><td></td><td></td><td>Accepted</td></tr>
</table>

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				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			EIS. Samples of beach sand are collected from nine public beach sites along both the Ontario and Quebec sides of the Ottawa River for analysis of gamma emitting radionuclides. These include two beaches upstream of the CRL Site (one is on the Quebec side: Cook's Cove), both sides of Pointe-au-Baptême at the CRL Site Boundary, and five beaches downstream of the site (three are on the Quebec side: Oiseau Point, King's Beach, and Fort William) [1]. Pointe-au-Baptême is located a few hundred meters downstream of the mouth of Perch Creek and is the closest beach to the mouth of Perch Creek; it is thus, the closest beach that can be potentially impacted by radiological contaminants migrating from the NSDF site. All beach samples are collected in the summer months during periods of relatively low water level. At each monitoring location, a composite sample of surface sand (0-3 cm deep) is collected. Dried sand samples are analyzed for a suite of gamma-emitting radionuclides. Of these there are radionuclides that are pure gamma emitters, there are also gamma emitters that emit alpha and beta energy as well. Although CNL does not conduct additional analysis on the beach sand samples under normal circumstances, if abnormal results were obtained via gamma analysis, there would be a review of which radionuclides where abnormal and additional analysis would be completed as appropriate. The follow-up analysis could include a gross alpha and/or gross beta analysis if the gamma spec indicated that the higher than normal measurement were from radionuclides that were also alpha/beta emitters. Typically, the only radionuclides that are measured above the detection limit are Cesium-137 and Potassium-40. As documented in Section 7.2 of CNL's Annual Compliance Monitoring Report [1], Potassium-40 is by far the most dominant radionuclide present. This radionuclide is a naturally occurring, with similar (variable) levels measured upstream of CRL, at the CRL site boundary and downstream of the CRL site, all at around background levels. Cesium-137 is a beta/gamma emitter and is detected at higher levels at the CRL site boundary versus upstream and downstream locations. Cesium-137 is an artifact of CRL operations. This radionuclide is trending down and in 2018 was nearing alignment with some of the higher background measurements obtained at the upstream and downstream locations. CNL does not plan to conduct further analysis of sediment accumulation under the influence of the waters of Perch Creek since no adverse effects on Ottawa River water quality (Section 5.4.2 of the 2019 revised EIS – and by extension, Ottawa River sediment – are predicted to occur as a result of NSDF activities. The NSDF Environmental Assessment Follow-up Monitoring Plan (EAFMP) will verify the predictions in the EIS regarding the effects of NSDF activities on surface water quality in the Perch Lake and Perch Creek watersheds and the Ottawa River. The beach sand monitoring that is part of routine environmental monitoring of off-site locations as discussed above will continue to monitor any changes to radioactivity in beach sands along the Ottawa River including Pointe-au-Baptême, the closest beach to the mouth of Perch Creek. The results of these monitoring programs (EAFMP, CRL site-wide monitoring) will be reported in the annual environmental monitoring report. ***Changes to the EIS:*** No changes are proposed to the Final EIS. ***References:*** [1] Environmental Monitoring in 2018 at Chalk River Laboratories, CRL-509243-ACMR-2018, Rev 0. Canadian Nuclear Laboratories. 2019 June				
QC-2-06	New IR	Section 2.5.7.6.1	**Agency Information Request - Fish and fish habitat** ***Question:*** CNL is requested to present and describe this marshland development project on the periphery of the NSDF site. ***Context:*** Development of a marsh on the periphery of the NSDF site. ***Rationale:*** During the presentation made by CNL to the MELCC on December 4, 2019, it was mentioned that the creation of a marsh built on the periphery of the site was considered, specifically to manage issues related to precipitation. This project does not appear in the documents provided.	EIS	Section 2.5.7.6.1 (Effluent Strategy Focus Group)	Add additional info to better clarify the intent of the use of components of the artificial wetlands.	Accepted

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			CNL Response As outlined in Section 2.5.7.6.1 of the 2019 revised EIS, as an outcome of an effluent discharge focus group session that was held in June 2019, the NSDF Project is exploring an artificial wetland as a supplemental component of the wastewater treatment system, which would further mitigate residual effects predicted on surface water quality as discussed in Section 5.4.2 of the 2019 revised EIS. The NSDF project team is now discussing design options with Ducks Unlimited Canada to incorporate artificial wetland components into the exfiltration gallery and non-contact stormwater discharge systems. The use of the artificial wetland is considered design optimization – that is, the current design of the NSDF is such that objectives for effluent treatment and the stormwater ponds as outlined in the EIS can be met. The use of an artificial wetland could further enhance the current design as an improvement to the proposed treated effluent exfiltration gallery and stormwater ponds. The artificial wetland, if considered feasible, would be built within the footprint of the NSDF project. An artificial wetland acts in the same in principle, but has a number of benefits, when compared to a traditional effluent or stormwater management system, such as: increased retention of contaminants and turbidity, enhanced retention time for radioactive decay of treated effluent compared to discharge to Perch Lake, buffered effluent flow rates and lower maintenance costs. Today, many municipalities and industries across Canada are converting their existing stormwater infrastructure into naturalized systems, and new development projects are more frequently using artificial wetlands as a way to promote low-impact and sustainable solutions in construction. The evaluation of the use of the artificial wetland is still in early stages. However, the results of the environmental assessment are not reliant on the use of the artificial wetland and therefore has not been included as part of the design or as mitigation in the EIS. CNL is committed to continuing to share information on progress of the consideration of the use of artificial wetland components with Province and Quebec and other stakeholders as more information becomes available. ***Changes to the EIS:*** The following modifications (new text in red and deleted text as ~~strikethrough~~) have been made to the Final EIS to incorporate the information above: **Section 2.5.7.6.1**: Specifically, ~~the NSDF Project is exploring an artificial wetland as a supplemental component of the treatment system,~~ the NSDF project is discussing design options with Ducks Unlimited Canada to incorporate artificial wetland components into the exfiltration gallery and non-contact stormwater discharge systems. The use of the artificial wetland is considered design optimization – that is, the current design of the NSDF is such that objectives for effluent treatment and the stormwater ponds as outlined in the EIS can be met. The use of an artificial wetland could further enhance the current design as an improvement to the proposed treated effluent exfiltration gallery and stormwater ponds, which would further mitigate residual effects predicted on surface water quality as discussed in Section 5.4.2. The artificial wetland, if considered feasible, would be built within the footprint of the NSDF Project. ~~An artificial wetland would enhance removal of constituents from the treated effluent prior to release to the natural environment. The artificial wetland also provides enhanced retention time for radioactive decay of treated effluent compared to discharge to Perch Lake.~~ ***References:*** **N/A**				
QC-2-07	New IR		**Agency Information Request - Change to an environmental component due to radiological contaminants** ***Question*** 1. CNL should add to Table 5.2.10-4 Quebec's standards and criteria for atmospheric quality. 2. CNL should justify why the extended study area of the dispersion of atmospheric contamination is not centered on NSDF, which will be the generator of atmospheric dispersions.	EIS	Section 5.2.1.4.2.1 (Applicable Criteria); Table 5.2.1-4 (Provincial and Federal	Added Quebec standards and criteria and footnote	Accepted

Reference #	**Link to IR#1 (Original IR package)**	**EIS Section**	**Information Request & Response**	**Documents Impacted by the Response to IR**			**Accepted/ Rejected with request for follow-up information**
				Document Name	**Section/Figure/ Table Impacted by Response**	**Scope of New Information**	
			Context & Rationale: Figure 5.2.1-1 of the revised EIS illustrates that the dispersion of atmospheric contamination affects the territory of the province of Quebec. **CNL Response** 1. CNL acknowledges that the modelled dispersion of atmospheric contamination incorporates a portion of the territory of the province of Quebec. As such, updates to the Final EIS will include the appropriate Ministère de l'Environnement et de la Lutte contre les changements climatiques du Québec (MELCC) standards and criteria [1] in Table 5.2.1-4, under Section 5.2.1.4.2.1 (Applicable Criteria) of the EIS and Table 3-1, under Section 3.1.2 (Applicable Guidelines) of the Air Quality Assessment of the NSDF technical supporting document (TSD). 2. The Regional Study Area (RSA) was centered on the Local Study Area (LSA), which represents the CRL property boundary, to capture the cumulative effect by including the entire LSA, the village of Chalk River to the west and parts of Quebec to the east and northeast. The selection of the spatial boundaries for the NSDF air quality assessment is based on the consideration of human and ecological receptors which may be negatively impacted by changes in air quality. The distance from the NSDF Project to the nearest receptors within the LSA boundary is sufficiently great such that the point of impingement (POI) concentrations, used to assess the compliance of a facility's emissions and contribution to air pollution, are confidently expected to decrease with increasing distance from the LSA and beyond the RSA. Therefore, any potential receptors in Quebec are expected to experience concentrations lower than those presented in the EIS which are reported at the LSA boundary as it as it represents the highest ground level concentrations of contaminants expected outside the CRL site. ***Changes to the EIS:*** The following modifications (new text in red) will be made to the Final EIS and the Air Quality Assessment TSD to incorporate the information above: • EIS Section 5.2.1.4.2.1, Air Quality Assessment TSD Section 3.1.2: A summary of the applicable Ontario, Quebec, and federal objectives and criteria are listed in Table 5.2.1-4. • Furthermore, the following footnote will be added to the EIS and TSD: Odour concentration must be 1 odour unit or less 98% of the time and 5 units or less 99.5 % of the time. Predicted concentrations above the 1 odour unit criteria are permitted up to 175 hours per year and predicted concentrations above the 5 odour unit criteria are permitted up to 44 hours per year. • The following reference will be added to the Section 13.5.2 of the EIS and the Reference bibliography of the Air Quality Assessment TSD: MELCC (Ministère de l'environnement et de la lutte contre les changements climatiques du Québec). 2018. Quebec atmospheric quality standards and criteria, version 6, Quebec, ISBN 978-2-550-82698-9 (on-line). Available at http://www.environnement.gouv.qc.ca/air/criteres/index.htm ***References*** [1] MELCC (Ministère de l'environnement et de la lutte contre les changements climatiques du Québec). 2018. Quebec atmospheric quality standards and criteria, version 6, Quebec, ISBN 978-2-550-82698-9 (on-line). Available at http://www.environnement.gouv.qc.ca/air/criteres/index.htm		Regulatory Air Quality Criteria)		
				Air Quality Assessment for the Near Surface Disposal Facility technical supporting document	Section 3.1.2 (Applicable Guidelines) Table 3-1, references	Added Quebec standards and criteria, footnote and reference	
				EIS	Section 13.5.2 (References)	Reference for MELCC listed above to be added	
QC-2-08	New IR	Section 10.1.2	**Agency Information Request - Climate Change** ***Question:***	EIS	Section 10.1.2 (Extreme Rainfall Events,	Additional clarification or information.	Accepted

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				Document Name	Section/Figure/ Table Impacted by Response	Scope of New Information	
			1. CNL is requested to show the links between the regime of the tributary waters of the watershed and the integrity of the proposed NSDF, using the climate models consulted. The latter should make it possible to identify the vulnerabilities of the waterways and dams upstream of the Chalk River site. 2. CNL is requested to demonstrate that the risk factors associated with precipitation peaks in the 1-100 year and 1-1000 year cycle have been examined and taken into account. 3. It is known that out of the ordinary events (hundred and millennial floods) have occurred recently on Lake Superior. Also, in Gatineau, two floods over a hundred years have been observed in three years. CNL should adjust the assessment to this reality in order to better reflect future climatic conditions. CNL must also present and discuss the adjusted results. ***Context and Rationale:*** The MELCC questions the taking into account of projections linked to climate change, including extreme events anticipated on the 0-100 and 0-1000 year scales. --- **CNL Response** 1. CNL has evaluated the integrity of the proposed NSDF for extreme climate conditions for the Upstream Ottawa River Watershed and the Upstream Perch Lake watershed. The analysis is provided below. The base of the Engineered Containment Mound (ECM) is located above flood elevations for both scenarios. **Upstream Ottawa River Watershed –** CNL has calculated a design basis flood for the Chalk River Laboratories (CRL) site which considers the vulnerabilities of waterways and dams upstream of the site [1] [2]. The design basis flood considers failure of the two hydroelectric dams located upstream of the Chalk River Laboratory site on the Ottawa River and extreme precipitation events described below. The maximum predicted flood level at Chalk River is 122 metres above sea level (masl) [1] and is 38 m below the base of the ECM having an elevation of approximately 160 masl. The two hydroelectric dams located upstream of CRL are des Joachim Generating Station (429 MW) at Rolphton and the Otto Holden Generating Station (240 MW) at Mattawa. The combined failure of the two dams due to seismic failure has a probability of occurrence of 1.0×10^{-4} per year (1 in 10,000-year event). The Design Basis Flood level considers failure of both upstream dams in combination with: - 1 in 10,000-year precipitation event, the probable maximum precipitation (PMP), - Snowmelt from a 1 in 100-year snow accumulation. The 1 in 10,000-year precipitation event coupled with snowmelt from a 1 in 100-year snow accumulation has a probability of occurrence of $1.0\times^{-6}$ per year (1 in a million year event). The analysis of the flood level at Chalk River for the simultaneous failure of the hydro-electric dams and precipitation events is provided in references [1] and [2]. The flood level at Chalk River is based on the ability of the Ottawa River to drain away the surge of sudden excess flows due to dam failure in addition to flows due to the precipitation and snow melt. The design basis flood which considers failure of upstream dams and extreme precipitation (1 in 10,000-year maximum precipitation event and snow melt from 1 in 100 year snow accumulation event), demonstrates that the NSDF is not vulnerable to failure of upstream waterways and dams, with the base of the NSDF located 38 m above the design basis flood elevation. **Upstream Perch Lake Watershed –** The Perch Lake Watershed is approximately 730 ha (7,300,000 m^2) upstream of the Perch Creek Weir and the footprint of Perch lake is 46 ha (460,000 m^2). In addition to typical 1 in 100-year events for the assessment of the stormwater mitigation and conveyance measures for the NSDF, CNL also modelled a 1 in 100-year event plus a 25% factor to account		Snowmelts and Flooding)		

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			for climate change and a 100-year event accompanied by 1 m of snowmelt. A 100-year event (118 mm of precipitation) with 1 m snow melt (100 mm of potential runoff) results in 218 mm of total potential runoff. If for some catastrophic reason the outlet at Perch Creek was completely blocked and all of the 218 mm of potential runoff, from a 100-year event with 1 m snow melt, was stored in the basin it would result in approximately 1,591,000 m^3 of runoff. If this was stored/stacked only on the footprint of Perch Lake (46 ha), the resultant increase of water level would be approximately 3.5 m, which would result in water levels of approximately 159.5 masl, based on a lake level of 155.95 masl. In this scenario the water would not be confined to the limits of the lake and after 2 m of water level rise the water would inundate the majority of the adjacent wetlands, which would add a significant additional storage, likely close to doubling the footprint of the flooded area. The resultant water level would therefore be approximately 158 masl which would be at about the elevation of the ring road at the south corner. This scenario is not realistic as the outlet to Perch Creek is not expected to ever be completely blocked (especially to that elevation) and as a result the storm event runoff would be continually discharging from the watershed, therefore not being stored within Perch Lake. Further, there is a relatively steep slope within Perch Creek which will not be impacted by increased water levels within the Ottawa River such as during an upstream dam failure. The above bounding scenario indicates that the integrity of the NSDF would not be impacted by flooding in the Perch Lake watershed from extreme precipitation events. 2. Various design storm scenarios have been considered for the design of NSDF surface water management systems ranging from 1- in 2-year storms to probable maximum precipitation events. Risk factors associated with exceedance of design storm scenarios have been considered and contingencies identified in the event that design storm events are exceeded. Contingencies include measures to ensure no release of contaminated water from the ECM to the environment. The following topics are addressed in the response below: • Design basis storms considered in the design of the NSDF; • Risk Factors associated with contact water ponds inside the ECM; and • Risk Factors associated with surface water management ponds outside the ECM. **Design Basis Storms –** A number of design storm scenarios in addition to the 100- year storm have been considered for the design of NSDF surface water management features including: • peak flows for several return periods from 2-year up to 100-year storm events; • regional storms (i.e., Timmins Storm); • peak averages; and • Probable Maximum Precipitation (PMP) events. A recent study that incorporated a detailed PMP review [3] identified the draft MNR 2006 PMP event (24-hour, 596 mm) as the most appropriate PMP event for Ontario. This approach was judged to be also appropriate for the NSDF design [4] [5]. Conservatively, the 12-hour 570 mm PMP event was selected for the NSDF site flow assessments because it produces a peak flow which is 12% higher than the 24-hour distribution. The use of a PMP for the NSDF Project can arguably provide a scenario with a greater return period than a 100-year storm based on its definition [3]: "*There is a* finite *limit on the atmosphere's ability to produce rain at any given location due to climate, topography and atmospheric moisture limits. The concept of a finite limit for precipitation from a single storm event is called the Probable Maximum Precipitation (PMP). The exceedance probability of the PMP by its nature is almost zero (i.e., it is an improbable event). In practice, the PMP exceedance probability and estimated return periods are in the range of 1 in 10,000 years to 1 in 1,000,000 years*." Different design storms were used as part of the NSDF design analysis [4] [5] to evaluate different design requirements (such as quality control, quantity control and structural integrity), as such there is no single storm event that is used for design analysis of any one feature. An example of varying water levels from different design storms expected in a typical roadside ditch is shown in Figure 1 below.				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/ Rejected with request for follow-up information
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			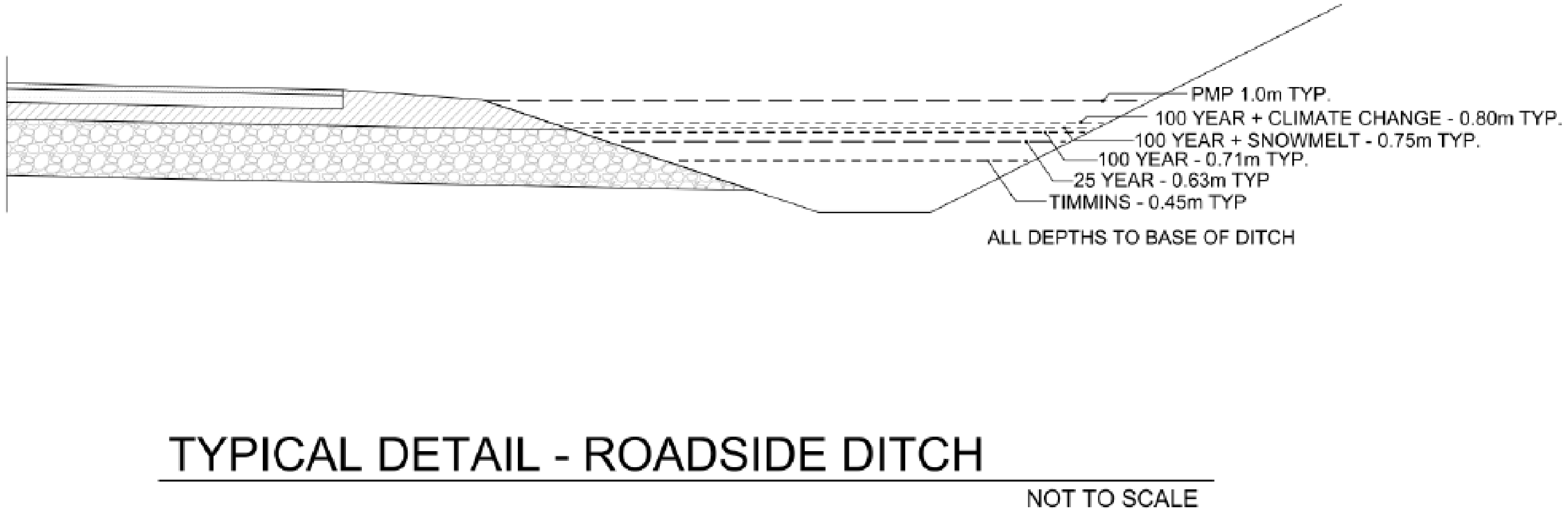 **Figure 4: Typical Roadside Ditch Cross Section showing water depths during different Design Storm Events** All NSDF water collection and conveyance systems, including the final cover, are typically designed to resist erosion, safely convey flows and maintain structural integrity during peak flows generated from various design storms up to a PMP storm event. The technical analyses on the design regarding safety and integrity of the facility during storm events conforms to referenced guidance provided from US NRC NUREG 2175. **Risk Factors with Contact Water Ponds inside of the ECM –** The design of the ECM includes contact water ponds for collection of water that has potentially come into contact with waste and is contaminated, and non-contact water ponds for collection of clean water that has not come into contact with waste. The contact water and non-contact water ponds within the ECM are designed to contain runoff, with remaining freeboard, resulting from back-to-back 100-year events superimposed on top of maximum monthly rainfall and snowmelt. This amount is considerably larger than a 100 year plus climate change event (approximately 25% increase). The pumps and equalization tanks of the wastewater treatment system are also sized to convey and store the volume of water, with capacity remaining, from the back-to-back 100-year storm events, emptying the contact water ponds so that they are available to collect additional run-off from subsequent storm events. The contact and non-contact ponds are expected to overflow during larger events (such as a PMP storm), however all of the water which falls into the ECM will be contained within the ECM during the event. The berm ultimately prevents contact water (precipitation that has come into contact with waste which have yet to be treated by the wastewater treatment plant (WWTP)) from being released into the environment. In the event that the contact water ponds do overflow, there is possibility that contact water will mix with non-contact water in the ECM. In order to avoid release of any potentially contaminated water from the ECM during this scenario, when water levels suggest there is a possibility of overtopping in the contact water pond, the non-contact water pumps would be shut off or flows diverted back into the ECM until all of the contained water can be treated by the waste water treatment plant. **Risk Factors with Surface Water Management Ponds outside the ECM –** The Surface Water Management Ponds (SWMP) collect clean surface water runoff from outside of the ECM during operations and also runoff from the final cover during the post-closure phase. They are designed to mitigate storm water peak runoff flows and improve the quality of the runoff (i.e., removal of Total Suspended Sediments [TSS]). The SWMPs are designed to control runoff and attenuate flows to pre-development conditions from each of the: • 100-year 24-hour precipitation event,				

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			- 100-year 24-hour precipitation event with snow melt; - 100-year 24-hour event with climate change considered (i.e., increasing 100-year precipitation event by 25%); and - the regional design storm (Timmins Event) to be below that expected during the same event under current site conditions to mitigate impacts downstream such as flooding and erosion. The SWMPs and upstream conveyance features (including the final cover during the post closure period) are also designed to safely convey water from larger storms (such as the PMP event) without sustaining significant damage. This prevents high TSS loading in the pond influent, and more importantly protects the covered waste within the ECM from being exposed so that there is no risk of contamination being released out of the ECM. The quality control functions of the SWMP are primarily based on removal efficiencies for TSS which are based on long term performance, ensuring that quality impacts to downstream watersheds are mitigated during the day-to-day and frequent events rather than focusing on a specific larger, infrequent design storm event. Settling of sediments is the primary action for removal of TSS and for ponds the design criteria it is more heavily focused on the permanent pool volume in the pond to achieve this action, rather that the extended detention storage above this level. 3. CNL is aware of flooding observed in Gatineau and elsewhere along the shores of the Ottawa River in recent years. The base of the ECM is well above Ottawa River flood elevation and above credible flood elevations that could occur with the Perch Lake watershed as discussed in the response above. A number of design storm scenarios along with the 100-year storm have been considered in the designs of NSDF surface water management features. As noted in the response above, contingency measures to prevent the release of contaminated water to the environment are in place in the event that design storm events are exceeded. For example, the contact and non-contact ponds are expected to overflow during larger events (such as a PMP storm); however, all of the water which falls into the ECM will be contained within the ECM by the berm during the event. Accordingly, further assessment of storm events and flood conditions is not planned. ***Changes to the EIS:*** The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: **EIS Section 10.1.2:** - Add the following text to the second last paragraph: "When the potential failure of the two upstream dams is considered combined with a 1 in 10,000-year precipitation event and snow melt from 1 in 100-year snow accumulation, the flood elevation is 122 masl for the portion of the Ottawa River adjacent to the CRL site. Therefore, the ECM is above the Ottawa River flood level." - Add the following text to the end of Paragraph 3: "The contact water ponds are expected to overflow during events larger than a 100-year storm (such as a PMP storm), however all of the water which falls will be contained within the ECM berm during the event so that no contact storm water, that is storm water that has come into contact with waste, will escape into the surrounding environment. In the event that the contact water ponds do overflow, there is possibility that contact water will mix with non-contact water in the ECM. In order to avoid release of any potentially contaminated water outside of the ECM boundary during this scenario, when water levels suggest there is a possibility of overtopping in the contact water pond, the non-contact water pumps would be shut off or flows diverted back into the ECM until all of the contained water can be treated by the WWTP." ***References:*** [1] Design Basis Flood (DBF) Level for CRL Site Reconciliation of 2016 and 1999 Dambreak Flood Information, CRL-508770-TN-002, Rev 1, 2017 October [2] Design Basis Flood Levels and the NRU Safety Analysis Report, CRL-508770-TN-001, Revision 0, 2014 July. [3] OPG's Deep Geologic Repository for Low & Intermediate Level Waste – Maximum Flood Hazard Assessment. Available at: https://iaac-aeic.gc.ca/050/documents_staticpost/17520/49820/flood.pdf				

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			[4] Surface Water Management Plan. Canadian Nuclear Laboratories Document No.232-508600-PLA-002, Revision 1. AECOM Canada Ltd. (AECOM). 2019. [5] Surface Water Modelling and Evaluation. Canadian Nuclear Laboratories Document No. B1551-503212-TN-001, Revision 1. AECOM Canada Ltd. (AECOM). 2019.				

Attachment CNSC-2-15

The following modifications (additions in red) will be made to the Final EIS.

Table 5.10.5-1: Pathways Analysis for Socio-economic Valued Components

Project Activity	Valued Component	Effects Pathways	Project Design Features and Policies	Pathway Assessment
Employment of personnel, procurement of goods and services, and expenditures from the NSDF Project	Labour Force	Direct and indirect employment requirements may affect employment and income with the local and regional study areas.	■ Canadian Nuclear Laboratories (CNL) employment opportunities that may arise due to Project activities will be posted on the vendor portal on www.cnl.ca website.	Primary (Potential socio-economic effects are not related to a change from the Project on the environment)
	Economic Development	The NSDF Project may provide contracting and supplier opportunities to local and regional businesses.	■ CNL will competitively procure material and services for the NSDF Project.	Primary (Potential socio-economic effects are not related to a change from the Project on the environment.)
	Government Finances	The NSDF Project may contribute to government finances through the payment of property taxes.	■ Payment of taxes.	No Linkage
Employment of personnel, use of services and infrastructure for NSDF Project	Housing and Accommodations	The NSDF Project could increase pressure on commercial accommodations.	■ None	Primary (Potential socio-economic effects are not related to a change from the Project on the environment).
		Changes in housing demand with respect to LSA housing supply and capacity to meet demand.	■ The construction workforce will be housed in accommodations in the Town of Deep River and the surrounding areas.	No Linkage
	Services and Infrastructure	Changes in demand for community services (health, education, protective and emergency services) with respect to the capacity of LSA services to meet the demand.	■ Continued implementation and maintenance of compliance with all applicable health and safety standards and CNL's existing environmental, safety and security programs.	Primary (Potential socio-economic effects are not related to a change from the Project on the environment)
Employment of personnel, use of services and infrastructure for NSDF Project	Services and Infrastructure	Changes in demand for community infrastructure (e.g., domestic waste management) with respect to capacity of infrastructure to meet demand.	■ Use of existing waste management infrastructure and facilities on the CRL site where possible. Disposal of materials at appropriate licensed waste management facilities with capacity where off-site disposal of contractor construction waste is required.	Secondary (Potential indirect socio-economic effects could occur as a result of changes not related to the environment).
		The NSDF Project could increase road degradation due to increased traffic volume from the transportation of workers, supplies and equipment.	■ Coordinate transportation of equipment and materials during construction to avoid peak traffic times to the extent possible.	Primary (Potential socio-economic effects are not related to a change from the Project on the environment)

Table 5.10.5-1: Pathways Analysis for Socio-economic Valued Components

Project Activity	Valued Component	Effects Pathways	Project Design Features and Policies	Pathway Assessment
Employment of personnel, use of services and infrastructure for NSDF Project (continued)	Quality of Life	The NSDF Project could affect air quality through the generation of emissions and fugitive dust.	■ Implementation of CNL's procedure for *Management and Monitoring of Emissions*, which includes operational control monitoring and verification monitoring. ■ Implementation of the *Dust Management Plan* developed for the NSDF Project, which includes appropriate management techniques to control dust generated by the NSDF Project.	Secondary (Potential indirect socio-economic effects could occur as a result of a change from the Project on the environment [i.e., dust])
		The NSDF Project could affect ambient noise levels due to construction traffic.	■ Noise transmission will be mitigated by the topography as the NSDF Project site is situated on the lower side of the hill between Foundation Road and Emergency Route #3.	Secondary (Potential indirect socio-economic effects could occur as a result of a change from the Project on the environment [i.e., noise])
		The NSDF Project could affect ambient noise levels due to blasting activities.	■ Blasting activities will be done by a qualified person and in accordance with the Blasting Plan to be developed by the contractor, indicating the type of explosives used and the method of detonation.	Secondary (Potential indirect socio-economic effects could occur as a result of a change from the Project on the environment [i.e., noise])
		The NSDF Project could have a negative effect on visual aesthetics.	■ The visual effect of the NSDF Project site will be limited as the line of sight will be obscured by hilly topography and the surrounding tree line.	Secondary (Potential indirect socio-economic effects could occur as a result of a change from the Project on the environment [i.e., effects to the visual landscape])
	Public Safety	Public's potential exposure to physical hazards associated with the NSDF Project.	■ The NSDF Project will follow the CRL security requirements, physical security plans, and health and safety programs.	No Linkage

LSA = Local Study Area.

Attachment CNSC-2-16

The following modifications (additions in red) will be made to the Final EIS.

Table 6.5-15: Pathways Analysis for Socio-economic Valued Components

Project Activity	Valued Component	Effects Pathways	Project Design Features and Policies	Pathway Assessment
Employment of personnel, procurement of goods and services, and expenditures from the NSDF Project during construction and operations	Economy and employment	Direct and indirect employment requirements may affect employment and income with the local and regional study areas including for Indigenous peoples. The NSDF Project may provide contracting and supplier opportunities to Indigenous local and regional businesses.	CNL employment opportunities that may arise due to NSDF Project activities will be posted on the www.cnl.ca website. CNL will competitively procure material and services for the NSDF Project. CNL is working with Indigenous communities on employment and contracting opportunities.	Secondary (Potential socio-economic effects are not related to a change from the Project on the environment)
	Housing and infrastructure	The NSDF Project could increase pressure on Indigenous commercial accommodations.	None	No Linkage
		There could be changes in housing demand with respect to LSA housing supply and capacity to meet demand.	The construction workforce will be housed in accommodations in the Town of Deep River and the surrounding areas.	No Linkage
		There could be changes in demand for community infrastructure (e.g., domestic waste management) with respect to capacity of infrastructure to meet demand.	Existing waste management infrastructure and facilities on the CRL site will be used where possible. Disposal of materials at appropriate licenced waste management facilities with capacity where off-site disposal of contractor construction waste is required.	Secondary (Potential socio-economic effects are not related to a change from the Project on the environment).
		There could be changes in demand for Indigenous community services with respect to the capacity of LSA services to meet the demand.	CNL will continue to implement and maintain compliance with all applicable health and safety standards and its existing environmental, safety and security programs.	No Linkage
		The NSDF Project could increase road degradation due to increased traffic volume from the transportation of workers, supplies and equipment.	CNL will coordinate transportation of equipment and materials during construction to avoid peak traffic times to the extent possible.	No Linkage
	Decision-making	Involvement with the NSDF Project may require more time on the part of Indigenous governance bodies.	CNL and CNSC have provided funding for Indigenous communities and organizations to participate in the NSDF Project. This funding is intended to address any capacity challenges.	Secondary (Potential socio-economic effects are not related to a change from the Project on the environment).
Employment of personnel, use of services and infrastructure for NSDF Project during construction and operation (continued)	Indigenous resident – use and enjoyment of private property	The NSDF Project could affect air quality through the generation of emissions and fugitive dust.	CNL will implement its Procedure for Management and Monitoring of Emissions, which includes operational control monitoring and verification monitoring. CNL will implement the *Dust Management Plan* (AECOM 2018) developed for the NSDF Project, which includes appropriate management techniques to control dust generated by the NSDF Project.	Secondary (Potential indirect socio-economic effects could occur as a result of a change from the Project on the environment [i.e., dust])
		The NSDF Project could affect ambient noise levels due to construction traffic.	Noise transmission will be mitigated by the topography as the NSDF Project site is situated on the lower side of the hill between Foundation Road and Emergency Route #3.	Secondary (Potential indirect socio-economic effects could occur as a result of a change from the Project on the environment [i.e., noise])
		The NSDF Project could affect ambient noise levels due to blasting activities.	Blasting activities will be done by a qualified person and in accordance with the Blasting Plan to be developed by the contractor, indicating the type of explosives used and the method of detonation.	Secondary (Potential indirect socio-economic effects could occur as a result of a change from the Project on the environment [i.e., noise])

Table 6.5-15: Pathways Analysis for Socio-economic Valued Components

Project Activity	Valued Component	Effects Pathways	Project Design Features and Policies	Pathway Assessment
		The NSDF Project could have a negative effect on visual aesthetics.	The visual effect of the NSDF Project will be limited as the line of sight will be obscured by hilly topography and the surrounding tree line.	Secondary (Potential indirect socio-economic effects could occur as a result of a change from the Project on the environment [i.e., effects to the visual landscape])
		Indigenous peoples could potentially be exposed to physical hazards associated with the NSDF Project.	The NSDF Project will follow the CRL security requirements, physical security plans, and health and safety programs.	No Linkage
Construction, operations, closure, post-closure (institutional control)	Resource Industry - Trapping	There could be changes in access to trapping activities or number of furs taken.	Access to the LSA and CRL site is restricted; therefore, there are no trapping activities undertaken within the LSA or within the CRL site outside of the LSA. There is potential trapping identified in the southern portion of the RSA in the Garrison Petawawa property and two trapline areas in the western portion of the RSA. To date, these have not been identified as traplines belonging to Indigenous peoples. While terrestrial effects are limited to the CRL site, which is restricted access, CNL will work to consult with the trappers to understand any concerns should they be raised. The RSA has been expanded to include a reach of the Ottawa River extending 8 km downstream of CRL where trapping of aquatic species may take place. Results of the aquatic environment assessment (Section 5.5) identify that measurable residual effects on aquatic biodiversity VCs are not predicted as a result of the NSDF Project. Therefore, trapping of aquatic species will not be affected by the NSDF Project.	Secondary (Potential indirect socio-economic effects could occur as a result of a change from the Project on the environment)
Construction, operations, closure, post-closure (institutional control)	Resource Industry – Gathering	There could be changes in access to gathering activities or in quality and quantity of gathering activities.	Terrestrial effects are limited to the CRL site which encompasses the LSA and is restricted access. Therefore, no gathering activities will be affected by the NSDF Project.	No Linkage

Table 6.5-15: Pathways Analysis for Socio-economic Valued Components

Project Activity	Valued Component	Effects Pathways	Project Design Features and Policies	Pathway Assessment
Construction, operations, closure, post-closure (institutional control)	Resource Industry – Resource Based Tourism (commercial fishing, hunting and eco-tourism).	There could be changes in access to fishing, hunting and activities or in the quality and quantity of fishing activities. Changes could potentially affect resource-based tourism.	Terrestrial effects are limited to the CRL site boundary, which encompasses the LSA and is restricted access; therefore, no hunting activities of terrestrial species will be affected by the NSDF Project. Terrestrial wildlife will be excluded from the SSA by a six foot high chain link perimeter fence that will remain through post closure. Ecological health will be protected through implementation of mitigation including: ▪ CNL's procedure for Management and Monitoring of Emissions, which includes operational control monitoring and verification monitoring ▪ Basing the strategy for wastewater treatment on optimizing public and environmental protection by defining an approach to wastewater treatment that uses the best available technology that is economically achievable and capable of meeting regulatory requirements. The RSA overlaps a small portion of the Ottawa River, where fishing activities may take place. Results of the aquatic environment assessment (Section 5.5) identify that measurable residual effects on aquatic biodiversity VCs are not predicted as a result of the NSDF Project. Therefore, neither fishing nor the consumption of fish resources will be affected by the NSDF Project.	No Linkage
		The NSDF Project could have a negative effect on visual aesthetics.	The visual effect of the NSDF Project will be limited as the line of sight will be obscured by hilly topography and the surrounding tree line.	No Linkage

Attachment ECCC-2-01

Attachment HC-2-01

Attachment QC-2-04

The following modifications (in red) have been made to the EcoRA to incorporate the information above

Table 5-1 Radiological Risk Screening Index Results for Aquatic Receptors in the Ottawa River and Perch Creek

Scenario	Ottawa River (Receptor 1)						Perch Creek (Receptor 2)					
	Aquatic Vegetation	Benthic Fish	Benthic Invertebrates	Pelagic Fish	Zooplankton	Green Frog (tadpole)	Aquatic Vegetation	Benthic Fish	Benthic Invertebrates	Pelagic Fish	Zooplankton	Green Frog (tadpole)
Benchmark (mGy/d)	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
(1) Normal Evolution Scenario (NES) and (9) Dose Optimization: Confidence in Land Use Restrictions												
Total Dose (mGy/d)	6.46E-08	3.03E-07	1.28E-08	3.03E-07	1.28E-08	3.03E-07	4.93E-05	2.32E-04	9.97E-06	2.31E-04	9.76E-06	2.32E-04
SI (-)	2.69E-07	1.26E-06	5.33E-08	1.26E-06	5.33E-08	1.26E-06	5.13E-06	2.41E-05	1.04E-06	2.41E-05	1.02E-06	2.41E-05
(1a) NES Sensitivity Analysis: Inventory Sensitivity												
Total Dose (mGy/d)	9.52E-04	4.34E-03	6.27E-04	4.34E-03	6.27E-04	7.22E-06	7.28E-01	3.31E+00	4.84E-01	3.31E+00	4.82E-01	6.02E-03
SI (-)	3.97E-03	1.81E-02	2.61E-03	1.81E-02	2.61E-03	3.01E-05	7.58E-02	3.45E-01	5.04E-02	3.45E-01	5.02E-02	6.27E-04
(1b) NES Sensitivity Analysis: Institutional Control Sensitivity												
Total Dose (mGy/d)	6.46E-08	3.03E-07	1.28E-08	3.03E-07	1.28E-08	3.03E-07	4.93E-05	2.32E-04	9.97E-06	2.31E-04	9.76E-06	2.32E-04
SI (-)	2.69E-07	1.26E-06	5.33E-08	1.26E-06	5.33E-08	1.26E-06	2.05E-04	9.67E-04	4.15E-05	9.63E-04	4.07E-05	9.67E-04
(1c) NES Sensitivity Analysis: Sorption Coefficient Sensitivity												
Total Dose (mGy/d)	3.27E-04	1.12E-03	4.35E-04	1.12E-03	4.35E-04	2.97E-06	2.50E-01	8.59E-01	3.35E-01	8.59E-01	3.35E-01	2.34E-03
SI (-)	1.36E-03	4.67E-03	1.81E-03	4.67E-03	1.81E-03	1.24E-05	2.61E-02	8.94E-02	3.49E-02	8.94E-02	3.49E-02	2.44E-04
(1d) NES Sensitivity Analysis: Geosphere – Rapid Transit to Perch Creek												
Total Dose (mGy/d)	6.97E-08	3.29E-07	1.37E-08	3.29E-07	1.37E-08	3.29E-07	5.32E-05	2.51E-04	1.06E-05	2.51E-04	1.04E-05	2.51E-04
SI (-)	2.90E-07	1.37E-06	5.71E-08	1.37E-06	5.71E-08	1.37E-06	5.54E-06	2.62E-05	1.11E-06	2.62E-05	1.09E-06	2.62E-05
(1e) NES Sensitivity Analysis: Enhanced Degradation of Cover and Liner												
Total Dose (mGy/d)	1.09E-07	5.38E-07	2.05E-08	5.38E-07	2.05E-08	5.38E-07	8.31E-05	4.11E-04	1.58E-05	4.11E-04	1.56E-05	4.11E-04
SI (-)	4.54E-07	2.24E-06	8.54E-08	2.24E-06	8.54E-08	2.24E-06	8.65E-06	4.28E-05	1.64E-06	4.28E-05	1.63E-06	4.28E-05
(1f) NES Sensitivity Analysis: Global Warming – Reduced HER												
Total Dose (mGy/d)	5.36E-08	2.51E-07	1.06E-08	2.51E-07	1.05E-08	2.51E-07	4.09E-05	1.92E-04	8.21E-06	1.91E-04	8.04E-06	1.92E-04
SI (-)	2.23E-07	1.05E-06	4.42E-08	1.05E-06	4.38E-08	1.05E-06	4.26E-06	2.00E-05	8.55E-07	1.99E-05	8.38E-07	2.00E-05
(3) Disruptive Event: Human Intrusion, House with Basement – Resident (Chronic)												
Total Dose (mGy/d)	6.46E-08	3.03E-07	1.28E-08	3.03E-07	1.28E-08	3.03E-07	4.93E-05	2.32E-04	9.97E-06	2.31E-04	9.76E-06	2.32E-04
SI (-)	2.69E-07	1.26E-06	5.33E-08	1.26E-06	5.33E-08	1.26E-06	5.13E-06	2.41E-05	1.04E-06	2.41E-05	1.02E-06	2.41E-05
(4) Disruptive Event: Enhanced Corrosion Case												
Total Dose (mGy/d)	8.07E-08	3.04E-07	1.88E-08	3.04E-07	1.86E-08	3.04E-07	3.49E-05	9.33E-05	9.41E-06	9.31E-05	9.23E-06	9.33E-05
SI (-)	3.36E-07	1.27E-06	7.83E-08	1.27E-06	7.75E-08	1.27E-06	3.63E-06	9.72E-06	9.80E-07	9.70E-06	9.61E-07	9.72E-06
(5) Disruptive Event: Localized Cover Failure												
Total Dose (mGy/d)	5.61E-08	2.58E-07	1.14E-08	2.58E-07	1.14E-08	2.58E-07	4.29E-05	1.97E-04	8.92E-06	1.97E-04	8.71E-06	1.97E-04
SI (-)	2.34E-07	1.08E-06	4.75E-08	1.08E-06	4.75E-08	1.08E-06	4.47E-06	2.05E-05	9.30E-07	2.05E-05	9.07E-07	2.05E-05
(6) Disruptive Event: Localized Liner Failure												
Total Dose (mGy/d)	7.35E-08	3.25E-07	1.76E-08	3.25E-07	1.74E-08	3.25E-07	5.61E-05	2.49E-04	1.41E-05	2.48E-04	1.33E-05	2.49E-04
SI (-)	3.06E-07	1.35E-06	7.33E-08	1.35E-06	7.25E-08	1.35E-06	5.84E-06	2.59E-05	1.46E-06	2.59E-05	1.39E-06	2.59E-05
(7) Disruptive Event: Damage to Berm												
Total Dose (mGy/d)	6.59E-08	3.09E-07	1.31E-08	3.09E-07	1.31E-08	3.09E-07	5.04E-05	2.36E-04	1.02E-05	2.36E-04	9.98E-06	2.36E-04
SI (-)	2.75E-07	1.29E-06	5.46E-08	1.29E-06	5.46E-08	1.29E-06	5.25E-06	2.46E-05	1.06E-06	2.46E-05	1.04E-06	2.46E-05
(8) Dose Optimization: Wastes Grouted into Steel Liners												
Total Dose (mGy/d)	6.45E-08	3.03E-07	1.28E-08	3.03E-07	1.28E-08	3.03E-07	4.93E-05	2.32E-04	9.97E-06	2.32E-04	9.76E-06	2.32E-04
SI (-)	2.69E-07	1.26E-06	5.33E-08	1.26E-06	5.33E-08	1.26E-06	5.13E-06	2.42E-05	1.04E-06	2.41E-05	1.02E-06	2.42E-05
(11) Defence-in-Depth: Role of Geosphere												
Total Dose (mGy/d)	9.08E-08	3.70E-07	1.65E-08	3.70E-07	1.65E-08	3.70E-07	6.94E-05	2.85E-04	1.45E-05	2.83E-04	1.26E-05	2.85E-04
SI (-)	3.78E-07	1.54E-06	6.88E-08	1.54E-06	6.88E-08	1.54E-06	7.23E-06	2.97E-05	1.51E-06	2.95E-05	1.31E-06	2.97E-05
(12) Defence-in-Depth: Role of Cover												

Scenario	Ottawa River (Receptor 1)						Perch Creek (Receptor 2)					
	Aquatic Vegetation	Benthic Fish	Benthic Invertebrates	Pelagic Fish	Zooplankton	Green Frog (tadpole)	Aquatic Vegetation	Benthic Fish	Benthic Invertebrates	Pelagic Fish	Zooplankton	Green Frog (tadpole)
Benchmark (mGy/d)	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Total Dose (mGy/d)	1.74E-07	8.71E-07	3.31E-08	8.71E-07	3.30E-08	8.71E-07	1.33E-04	6.66E-04	2.55E-05	6.65E-04	2.52E-05	6.66E-04
SI (-)	7.25E-07	3.63E-06	1.38E-07	3.63E-06	1.38E-07	3.63E-06	1.38E-05	6.93E-05	2.66E-06	6.93E-05	2.63E-06	6.93E-05
(13) Defence-in-Depth: Role of Base Liner												
Total Dose (mGy/d)	6.39E-08	2.67E-07	1.63E-08	2.67E-07	1.61E-08	2.67E-07	4.88E-05	2.05E-04	1.31E-05	2.04E-04	1.23E-05	2.05E-04
SI (-)	2.66E-07	1.11E-06	6.79E-08	1.11E-06	6.71E-08	1.11E-06	5.08E-06	2.13E-05	1.37E-06	2.13E-05	1.28E-06	2.13E-05
(14) Defence-in-Depth: Series of Landslides												
Total Dose (mGy/d)	1.33E-07	3.11E-07	5.26E-08	3.10E-07	5.15E-08	3.11E-07	9.29E-05	2.36E-04	3.51E-05	2.36E-04	3.48E-05	2.36E-04
SI (-)	5.54E-07	1.30E-06	2.19E-07	1.29E-06	2.15E-07	1.30E-06	9.68E-06	2.46E-05	3.66E-06	2.45E-05	3.63E-06	2.46E-05
(15) “What-If”: Human Intrusion, Mass Excavation and Farming [1]												
Total Dose (mGy/d)	9.48E-04	2.12E-03	4.12E-03	2.12E-03	4.12E-03	2.38E-05	7.27E-01	1.62E+00	3.18E+00	1.62E+00	3.18E+00	1.84E-02
SI (-)	3.95E-03	8.83E-03	1.72E-02	8.83E-03	1.72E-02	9.92E-05	7.58E-02	1.69E-01	3.31E-01	1.69E-01	3.31E-01	1.92E-03
(17) “What-If”: Permanent Bathtub [1]												
Total Dose (mGy/d)	7.40E-08	3.04E-07	1.55E-08	3.04E-07	1.54E-08	3.04E-07	5.65E-05	2.32E-04	1.22E-05	2.32E-04	1.17E-05	2.32E-04
SI (-)	3.08E-07	1.27E-06	6.46E-08	1.27E-06	6.42E-08	1.27E-06	5.88E-06	2.42E-05	1.27E-06	2.41E-05	1.22E-06	2.42E-05

Notes:

Bold – value exceeds the SI benchmark value of 1.

(1) There are no criteria for ‘What-If’ scenarios and thus screening index (SI) values are only provided for perspective.

Table 5-2 Radiological Risk Screening Index Results for Aquatic Based Receptors (small home range)

Scenario	Ottawa River (Receptor 1)				Perch Creek (Receptor 2)			
	Belted Kingfisher	Great Blue Heron	Mallard	Snapping Turtle *	Belted Kingfisher	Great Blue Heron	Mallard	Snapping Turtle *
Benchmark (mGy/d)	0.24	0.24	0.24	0.024	0.024	0.24	0.24	0.024
(1) Normal Evolution Scenario (NES) and (9) Dose Optimization: Confidence in Land Use Restrictions								
Total Dose (mGy/d)	1.54E-10	8.69E-10	5.94E-09	3.76E-11	1.31E-07	7.76E-08	3.24E-07	2.08E-07
SI (-)	6.42E-10	3.62E-09	2.48E-08	1.57E-10	1.37E-08	8.08E-09	3.38E-08	2.17E-07
(1a) NES Sensitivity Analysis: Inventory Sensitivity								
Total Dose (mGy/d)	1.17E-05	2.16E-03	8.83E-04	9.81E-06	9.07E-03	3.82E-02	1.73E-01	8.09E-03
SI (-)	4.88E-05	9.00E-03	3.68E-03	4.09E-05	9.45E-04	3.98E-03	1.80E-02	8.43E-03
(1b) NES Sensitivity Analysis: Institutional Control Sensitivity								
Total Dose (mGy/d)	1.54E-10	8.69E-10	5.94E-09	3.76E-11	1.31E-07	7.76E-08	3.24E-07	2.08E-07
SI (-)	6.42E-10	3.62E-09	2.48E-08	1.57E-10	1.37E-08	8.08E-09	3.38E-08	2.17E-07
(1c) NES Sensitivity Analysis: Sorption Coefficient Sensitivity								
Total Dose (mGy/d)	5.91E-06	5.96E-04	4.04E-04	5.32E-06	4.59E-03	2.86E-02	1.39E-01	4.19E-03
SI (-)	2.46E-05	2.48E-03	1.68E-03	2.22E-05	4.78E-04	2.98E-03	1.45E-02	4.36E-03
(1d) NES Sensitivity Analysis: Geosphere – Rapid Transit to Perch Creek								
Total Dose (mGy/d)	1.67E-10	8.76E-10	5.95E-09	3.82E-11	1.41E-07	8.28E-08	3.35E-07	2.10E-07
SI (-)	6.96E-10	3.65E-09	2.48E-08	1.59E-10	1.47E-08	8.62E-09	3.49E-08	2.19E-07
(1e) NES Sensitivity Analysis: Enhanced Degradation of Cover and Liner								
Total Dose (mGy/d)	2.68E-10	8.03E-10	5.00E-09	3.11E-11	2.19E-07	1.18E-07	3.28E-07	1.70E-07
SI (-)	1.12E-09	3.35E-09	2.08E-08	1.30E-10	2.28E-08	1.23E-08	3.42E-08	1.77E-07
(1f) NES Sensitivity Analysis: Global Warming – Reduced HER								
Total Dose (mGy/d)	1.28E-10	8.15E-10	5.58E-09	3.03E-11	1.10E-07	6.62E-08	2.88E-07	1.71E-07
SI (-)	5.33E-10	3.40E-09	2.33E-08	1.26E-10	1.15E-08	6.89E-09	3.00E-08	1.78E-07
(3) Disruptive Event: Human Intrusion, House with Basement – Resident (Chronic)								
Total Dose (mGy/d)	1.54E-10	8.69E-10	5.94E-09	3.76E-11	1.31E-07	7.76E-08	3.24E-07	2.08E-07

Scenario	Ottawa River (Receptor 1)				Perch Creek (Receptor 2)			
	Belted Kingfisher	Great Blue Heron	Mallard	Snapping Turtle *	Belted Kingfisher	Great Blue Heron	Mallard	Snapping Turtle *
Benchmark (mGy/d)	0.24	0.24	0.24	0.024	0.024	0.24	0.24	0.024
SI (-)	6.42E-10	3.62E-09	2.48E-08	1.57E-10	1.37E-08	8.08E-09	3.38E-08	2.17E-07
(4) Disruptive Event: Enhanced Corrosion Case								
Total Dose (mGy/d)	1.57E-10	6.00E-10	4.07E-09	2.12E-10	6.70E-08	5.15E-08	3.97E-07	1.92E-07
SI (-)	6.54E-10	2.50E-09	1.70E-08	8.83E-10	6.98E-09	5.37E-09	4.13E-08	2.00E-07
(5) Disruptive Event: Localized Cover Failure								
Total Dose (mGy/d)	1.32E-10	8.48E-10	5.84E-09	4.06E-11	1.14E-07	6.95E-08	3.20E-07	2.20E-07
SI (-)	1.38E-11	8.83E-11	6.09E-10	4.23E-11	1.19E-08	7.24E-09	3.33E-08	2.29E-07
(6) Disruptive Event: Localized Liner Failure								
Total Dose (mGy/d)	1.66E-10	7.80E-10	5.29E-09	1.11E-10	1.43E-07	8.63E-08	3.83E-07	7.40E-07
SI (-)	6.92E-10	3.25E-09	2.20E-08	4.63E-10	1.49E-08	8.99E-09	3.98E-08	7.71E-07
(7) Disruptive Event: Damage to Berm								
Total Dose (mGy/d)	1.57E-10	9.30E-10	6.40E-09	4.04E-11	1.32E-07	7.76E-08	3.12E-07	2.16E-07
SI (-)	6.54E-10	3.88E-09	2.67E-08	1.68E-10	1.38E-08	8.08E-09	3.25E-08	2.25E-07
(8) Dose Optimization: Wastes Grouted into Steel Liners								
Total Dose (mGy/d)	1.54E-10	8.70E-10	5.94E-09	3.75E-11	1.31E-07	7.77E-08	3.24E-07	2.08E-07
SI (-)	1.61E-11	9.06E-11	6.19E-10	3.91E-11	1.37E-08	8.09E-09	3.38E-08	2.17E-07
(11) Defence-in-Depth: Role of Geosphere								
Total Dose (mGy/d)	1.87E-10	8.86E-10	5.98E-09	6.43E-11	1.60E-07	9.24E-08	3.59E-07	1.91E-06
SI (-)	7.79E-10	3.69E-09	2.49E-08	2.68E-10	1.66E-08	9.62E-09	3.74E-08	1.99E-06
(12) Defence-in-Depth: Role of Cover								
Total Dose (mGy/d)	4.30E-10	1.03E-09	6.18E-09	5.62E-11	3.44E-07	1.77E-07	3.52E-07	3.02E-07
SI (-)	1.79E-09	4.29E-09	2.58E-08	2.34E-10	3.58E-08	1.84E-08	3.67E-08	3.15E-07
(13) Defence-in-Depth: Role of Base Liner								
Total Dose (mGy/d)	1.38E-10	8.53E-11	4.73E-10	1.29E-10	1.22E-07	7.62E-08	3.80E-07	7.94E-07
SI (-)	5.75E-10	3.55E-10	1.97E-09	5.38E-10	1.27E-08	7.93E-09	3.96E-08	8.27E-07
(14) Defence-in-Depth: Series of Landslides								
Total Dose (mGy/d)	1.76E-10	1.54E-09	1.10E-08	1.07E-09	1.44E-07	1.13E-07	9.84E-07	2.88E-07
SI (-)	7.33E-10	6.42E-09	4.58E-08	4.46E-09	1.50E-08	1.18E-08	1.02E-07	3.00E-07
(15) “What-If”: Human Intrusion, Mass Excavation and Farming [1]								
Total Dose (mGy/d)	5.61E-05	9.27E-03	4.37E-03	5.36E-05	4.34E-02	3.10E-01	1.51E+00	4.16E-02
SI (-)	2.34E-04	3.86E-02	1.82E-02	2.23E-04	4.52E-03	3.23E-02	1.57E-01	4.33E-02
(17) “What-If”: Permanent Bathtub [1]								
Total Dose (mGy/d)	1.53E-10	9.18E-10	6.45E-09	9.27E-11	1.27E-07	7.32E-08	2.92E-07	4.21E-07
SI (-)	6.38E-10	3.83E-09	2.69E-08	3.86E-10	1.32E-08	7.63E-09	3.04E-08	4.38E-07

Notes:

Bold – value exceeds the SI benchmark value of 1.

(1) There are no criteria for ‘What-If’ scenarios and thus screening index (SI) values are only provided for perspective.

* Species at Risk.

Table 3: *Canadian Nuclear Laboratories Reponses to Federal-Provincial Review Team Third Round Information Requests on the Revised Draft NSDF EIS*, 232-509220-055-000, Revision 0, 2020 December.

Canadian Nuclear Laboratories Reponses to Federal-Provincial Review Team Third Round Information Requests on the Revised Draft NSDF EIS

Reference #	Link to IR	Project Effects Link	Reference to EIS, appendices, or supporting documentation (if applicable)	Context and Rationale	Information Requirement	Suggestions for mitigation and follow-up measures (as applicable)	Requires Technical Discussion	CNL Response	Accepted/Rejected
CNSC-3-01	CNSC-2-08	Change to an environmental component due to hazardous contaminants	Figure 3.4.1-1	Minor comment related to the figure.	Please revise the figure to combine the yellow “Bedrock” layer with the grey “Upper Bedrock” layer as “Upper Bedrock”.	N/A	No	Figure 3.4.1-1 (Attachment CNSC-3-01) has been revised to combine the yellow “Bedrock” layer in the region directly below the downhill berm with the grey “Upper Bedrock” layer as “Upper Bedrock”. The revised figure shows that the berms will be constructed directly on bedrock. For clarity, the yellow region below the ECM floor is relabeled “Fine Embankment Fill Material” and indicates where a portion of the ECM floor will not be constructed directly on bedrock.	Accepted
CNSC-3-02	CNSC-2-10	Change to an environmental component due to radiological contaminants	Section 5.3	CNSC staff requested the completion of the geology information in section 5.3 of the EIS. CNL’s response indicates their intention to add information to relevant sections of the EIS – including a more complete discussion of the structural data from historical sources. The text itself was not provided (similar to what was done for other IRs) in the response. The scope of the new information that CNL has committed to including (at the end of the written response), seems to extend beyond the specific features indicated in the scope of new information column entry, which alone would not address the request to complete the information in section 5.3. CNL’s response also indicates that reports [1] and [2] informed the basis of the current geological and hydrostratigraphic interpretations within the regional area. The arguments presented for excluding structural information in the modeling, based on an absence of information and uncertainty are inadequate. If there is uncertainty associated with a bedrock feature, then it should be investigated.	With respect to the “Changes to the EIS”, please provide the text in section 5.3.1 that will be added for CNSC staff to verify and review. Also, please clarify that the scope of the information to be included in the EIS to address this IR will extend beyond that which is identified in the “scope of new information” column. For issue 3 and 4 (numbered in CNL’s detailed response), the responses raise concerns relating to the screening out of conceptual and potential fracture zones, based on an absence of evidence approach. Please provide evidence that including linear fracture zones (which seemingly could exist on the site) would not change modeling prediction results.	N/A	No	CNL has attached (Attachment CNSC-3-02-A) the revised Section 5.3.1 for CNSC staff to review and verify. This section was updated based on CNL’s disposition to CNSC-2-10, ECCC-2-03, and recent discussions with CNSC staff and extends beyond what was identified in the scope of new information column of CNSC-2-10. For example, CNL has included: • more information in Section 5.3.1.4.1 on site characterization work for the NSDF. • enhanced Section 5.3.1.4.2.1 to include more regional geologic characteristics such as descriptions of the diabase dykes, lineament studies, a possible fracture zone (Feature #17), modelling that was done to assess the implications of the possible presence of a fracture zone, and seismic and micro-seismic monitoring currently being done at the CRL site. • enhanced Section 5.3.1.5.2.2 with the analysis of the secondary pathway – storage and use of blasted rock may result in metal leaching and acid rock drainage. To address CNSC staff comment on concerns relating to the screening out of conceptual and potential fracture zones, and the requested evidence that including linear fracture zones would not change modeling prediction results, CNL has conducted additional hydrogeology models (Attachment CNSC-3-02-B). These models have been developed to examine what-if scenarios that take into account the hypothetical existence of potential geological features within the NSDF SSA. The results show that the presence of the geological features have negligible effect on the groundwater travel times between the ECM and downgradient receptors (i.e., Perch Creek) for post closure scenarios where the liner and cover of the ECM were compromised. This is reflective of the fact that the primary groundwater flow pathway is situated in the overburden.	Rejected with Follow Up IR CNSC-4-01
CNSC-3-03	CNSC-2-11	Public and Stakeholder Engagement	Section 4.0	CNSC staff requested that CNL conduct an evaluation of their public engagement activities.	In the “Changes to the EIS”, please include more detailed information to the text (as per the information given in the CNL response) so that the EIS text provides more context as to how CNL has validated their conclusions on the effectiveness of their public engagement activities. Where available, please provide	N/A	No	CNL evaluates public engagement activities and makes changes based on this evaluation. For instance, the data generated from public feedback is used to increase the project’s understanding of public opinion on the project. Specifically, all written feedback from the public was categorized by theme or topic. Early in the project timeline, the top theme was the perceived risk to human health and the environment. Knowing this was a key area of public interest helped CNL to generate communications that addressed this area of public concern.	Accepted

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					evidence or examples to support and substantiate these conclusions. For example, in the “Changes to the EIS”, CNL indicates that at public events and activities, several public engagement indicators are evaluated. Please provide examples of the results of these analytics to support and demonstrate the conduct of such an evaluation at these events and activities. Lastly, CNL’s response is silent on whether their evaluation process includes, or may in the future include, surveys of the surrounding communities to gauge changes in public interest, or satisfaction with the information provided. Please address this element.			CNL also measured the quality of communications activities and products. For example, CNL measured participant satisfaction via use of exit surveys at project public events. This exit survey data was compiled and mined for themes both negative and positive. From this CNL understood that approximately 30% of respondents (who took the time to complete a survey) were positive about engagement efforts. Respondents also indicated a desire for presentations. In 2018, CNL conducted a third party survey across Renfrew and Pontiac County, which included questions on the proposed NSDF Project. One of the questions asked if survey participants had heard of the NSDF project, from which 46.5% of those surveyed indicated that they had heard of the project. CNL will be conducting a follow-up third party survey this fiscal year to further measure key indicators, such as awareness and interest in CNL projects. Recently, CNL conducted a self-assessment to assess the public communication and engagement activities that have taken place to date in support of CNL’s engagement on the NSDF Project. One goal of this self-assessment was to meet the regulatory requirement to evaluate engagement techniques for the project. The self-assessment found that CNL has largely met the goals of its communication objectives, which were designed to align stakeholder engagement with regulatory communication, licensing requirements and best-practice in stakeholder communications. However, communication is not static and it continues to evolve, communication goals will continue to be measured along with analysis of public opinion. Knowing to what extent local communities understand and trust CNL’s communication is essential to verify the path of CNL’s ongoing stakeholder engagement strategy in support of the NSDF Project. A summary of the objectives and activities to support the NSDF project will be included in the revised EIS, as outlined below. *Changes to EIS:* The following modifications (new text in red) will be made to the Final EIS to incorporate the information above: NEW Section 4.1.1 Evaluation: The engagement objectives discussed above in Section 4.1 are used to measure the effectiveness of communication activities as well as the evolving nature of the communication strategy of the NSDF Project through events and activities. CNL evaluates several public engagement indicators including: level of participant satisfaction, audience representation, level of engagement with subject matter experts, level of understanding of the NSDF Project, and level of increased project understanding of community and stakeholder issues. Through the use of various flexible modes of communication and public engagement, CNL has been able to engage a wider audience (demographically and geographically) who may have a stake in the development of the NSDF Project. By enabling two-way dialogue and implementing these accessible engagement mechanisms in the planning of the NSDF Project, CNL was able to adapt and respond to stakeholders’ changing need for information. The NSDF Project’s routine self-assessment of its public engagement activities, as well as public feedback, will enable CNL to continuously evaluate the effectiveness of its engagement efforts. CNL has provided a summary evaluation of the NSDF communication program against each of the objectives in Section 4.1. Objective 1: Initiating and maintaining two-way communication channels between CNL and host communities and stakeholder groups, determining the best methods for communicating project information and facilitating input at appropriate junctures in the project schedule.	

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								CNL has initiated and maintained a progressive number of communication channels between CNL host communities and stakeholder groups. Since CNL first initiated dialogue on the Near Surface Disposal Facility (NSDF) at an Environmental Stewardship Council (ESC) meeting in 2015 October, CNL has adapted and evolved techniques for communicating project information and facilitating input. Two early techniques included providing regular updates at ESC meetings and hosting public information sessions in local communities. Updates to the ESC have been consistently maintained at each of the three annual ESC meetings over the past four years. In response to public feedback, public information sessions which were originally held in seven local communities in 2016, were expanded geographically to include two more communities, Arnprior and L'Isle-aux-Allumettes (Chapeau). Finally, the format of the public information evolved in 2018 into an online webinar, held on a quarterly basis. This adaption was in response to continued interest in having more information available in French, in Quebec and in the Ottawa-Gatineau region. The newer online webinar format ensures accessibility for stakeholders in a wide range of places and for both French and English speaking stakeholders. Other feedback on engagement techniques emphasized the need to create ongoing channels of communications with the local community of scientific experts. In response, CNL established semi-monthly Breakfast Briefings in Deep River and more recently Pembroke, as well. CNL has also coordinated a focus group on effluent discharge to evaluate the project's plan. CNL has started to offer one on one meetings with intervenors, with simultaneous translation if applicable. The feedback that was used to evolve these techniques was obtained through both comments on the draft EIS and through feedback shared directly with CNL, through surveys, email and the online feedback forms. Both hard copy and online feedback forms have been provided while email has also been a common tool used by stakeholder's to engage with CNL and the NSDF Project. Feedback continues to be provided through CNL's ever expanding email distribution list (used to disseminate information, project milestones and timeline activities), social media, media, telephone, ESC, Ottawa Valley Economic Development, council meetings, meetings with Service Clubs and at public events. CNL continues to receive, track and assess feedback for future planning. Objective 2: Developing meaningful, user-friendly information and communication products geared for host communities and stakeholders, ensuring accessible and current information on project activities. CNL has developed a variety of simple, user-friendly communications products that are accessible and meaningful to a broad audience in both official languages. One example of this is the first NSDF overview infographic, which was posted online in 2017 and still has the highest number of downloads of all online NSDF content, after the draft Environmental Impact Statement (EIS). This was developed to address public concern that messaging around the NSDF was too technical. The infographic helped to simplify an overview of the project. Due to the popularity of this infographic, CNL produced three additional infographics to help tell the story of the proposed NSDF. The use of video was also essential to user-friendly and accessible communications. Online webinars were posted to YouTube. CNL created three videos on themes that were discerned from public feedback, including a video on what would happen to	

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								water effluent. One way CNL tested that the video – Water Management within the NSDF – was accessible, was by showing it to the ESC as a focus group to determine how useful and user-friendly the product was. Another innovative way that CNL has communicated the NSDF Project includes the use of physical models. CNL had three different physical models created to support stakeholder understanding of the facility. In 2017, scale models of both the base and cover liners were created and used at public information sessions, public events and CNL's Open House in 2017. A third model, which was a 3D rendition of the proposed facility, went on a "tour" through the local communities with a residency at municipal offices in Deep River, Laurentian Hills and Petawawa, where the public could view what the proposed facility would look like. In order to address accessibility feedback, document repositories have been functionally created by providing the EIS at local libraries and municipal offices. Online content has also been updated and continually refreshed and reorganized, while at the same time maintaining old content to ensure transparency with stakeholders. CNL has consistently been responsive to feedback on online content. One comment early in the project was that the posters used at public information sessions should be made available online. All public open house posters are now posted to CNL's external website. To ensure ease of understanding and user-friendliness and provision of meaningful information, CNL also adheres to internal and external standards on communications. Communications products like presentations align with CNL Corporate Branding Guidelines. Communication activities are audited annually through CNL's environmental protection program's ISO: 14001 certification. Objective 3: Demonstrating CNL's long-term commitment and approach to safely and cost-effectively reducing Canada's nuclear legacy liabilities. To demonstrate CNL's long-term commitment and approach to safely and cost-effectively reducing Canada's nuclear legacy liabilities in relation to the NSDF Project, CNL has focused on refining its messaging. To this end, CNL has attempted to share the story of why the NSDF is needed and how it is part of the solution to safely reducing Canada's nuclear legacies. To this end, some communication focused on the relationship between the revitalization of the Chalk River Laboratories and its connection with the necessary remediation of the site and the NSDF Project. In the context of the NSDF Project, CNL has provided more information on existing waste management practices and planned initiatives (such as the Integrated Waste Strategy) to communities and stakeholder groups than ever before. Information on current waste storage and waste management has been woven into presentations, posters and online content related to the NSDF Project. Site tours related to the NSDF Project, that have included members of the public, elected officials and media, visit legacy waste management areas as well as the proposed NSDF site, to provide perspective that the NSDF Project is an enabling facility to help with remediation of impacted areas at the CRL site. Objective 4: Informing and educating host communities and stakeholders about nuclear decommissioning, environmental remediation and radioactive waste management. At both a basic level and a technical level, CNL has informed and educated host communities and stakeholders about environmental remediation and radioactive waste management. In particular, presentations prepared for stakeholder groups have included detail on existing waste management practices at CNL as well as information on what types of waste are proposed to be disposed of in the NSDF.	

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								An infographic CNL produced (which is available online) also responds to questions on what kinds of waste is destined for the proposed NSDF. CNL has also shared information on what specific impacts the NSDF would have on the public in terms of radiation dose. This has been achieved with a user-friendly “peak dose” graphic used in presentations with stakeholder groups and other communications products. Some public feedback on the Project has showed that project communications and information need to be simple and clear enough for non-technical audiences to understand. CNL has strived to make language and communications tools as accessible as possible. For instance, the use of video and infographics has encouraged wide understanding of the Project. Another way that CNL attempts to share information with a broad audience is through annual public events and activities. CNL regularly attends events like DownTown Connect in Pembroke and Petawawa Showcase, the Ottawa Valley’s largest home show. Local high school students get a chance to learn about CNL’s waste management practices and how the proposed NSDF fits into the long-term plan on the annual Take Our Kids to Work Day event at Chalk River Laboratories. At annual public events in the community, CNL representatives regularly share updates on the NSDF Project and use communications products, such as the base and cover liner models and 3D models. There has also been public feedback that has shown a strong interest in having technical and scientific information about the Project made available to the public. One way that CNL has addressed this is to have third party expertise provide information on the project. Dr. Kerry Rowe from Queen’s University was invited to share details on the testing his laboratories performed on the material used for construction of the liners. Dr. Rowe shared a presentation at one of the semi-monthly Breakfast Briefings in Deep River. A video with Dr. Rowe discussing the NSDF was also posted online to the NSDF webpage and CNL’s YouTube channel. Objective 5: Meeting all regulatory-based communication and engagement requirements. CNL has aligned its stakeholder engagement strategy with regulatory requirements. CNL began stakeholder engagement in support of the NSDF Project in 2015 October when CNL leadership introduced the project at the final ESC meeting for that year. By the end of 2016, engagement activities were fully underway. For more than four years CNL has modelled its engagement on the regulatory requirements found in REGDOC-3.2.1 Public Information and Disclosure as well as other CNSC guidance, such as the Generic Guidelines for the Preparation of an Environmental Impact Statement. The goals of CNL’s stakeholder engagement program, outlined in the Near Surface Disposal Facility Stakeholder Engagement Report 232-513400-REPT-002, are aligned with both the REGDOC-3.2.1 and CNL’s Public Information and Disclosure Program.	
ECCC-3-01	ECCC-2-05	Fish and fish habitat	Section 3.4.2.1	According to the response’s example to IR ECCC-2-01 and Attachment ECCC-2-01 (rendering of contact and non-contact water ponds), most of Cell 2 (the adjacent cell to the one that is being used for the placement of the waste) is utilized as either the temporary storage and waste receiving and processing area or the contact water pond. Also that all stormwater within Cell 2 is	Please clarify whether a cell area of 6,000 m^2 or 15,000 m^2 is used for Cell 2 to calculate the volume of contact water to be collected and treated by the wastewater treatment system. Also, please revise Table 2 accordingly and provide further information that accounts for all wastewater to be treated by the WTP.	N/A	No	Wastewater volumes are based on a maximum open area in the Engineered Containment Mound (ECM) of 21,000 m^2 (cell area of 15,000 m^2 plus the adjacent temporary storage and waste receiving and processing area of 6000 m^2) that could contain waste and thus, generate leachate and contact water. The rendering attached to ECCC-2-01 provides an illustrative example of the general layout of the active cell in Cell 1 and the adjacent temporary storage and waste receiving and processing area and contact water pond in Cell 2. In this example, the total open cell area of Cells 1 and the adjacent temporary storage and waste receiving and processing area will be managed to not exceed 21,000 m^2.	Accepted

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				collected in the contact water pond. However, in Section 4.1 of the Leachate and Wastewater Characterization Report (page 10), it states that there is a 6,000 m^2 temporary waste storage pad within the footprint of the ECM, and water from this storage pad will also require treatment as contact water. ECCC is of the understanding that for the purposes of modelling, each ECM cell is assumed to have a maximum cell area of 15,000 m^2. Also, CNL should account for all wastewater to be treated by the WTP. This could have impact on the design of the WTP, its ability to treat the effluent, and the quality of the effluent to be discharged into the receiving environment.				Stormwater in the remaining ECM area will be directed to non-contact water ponds by means of sacrificial liners, temporary berms, and portable pumps/piping. Waste water volumes in Table 2 [A-1] are based on a cell area of 15,000 m^2 plus a maximum 6000 m^2 adjacent temporary storage and waste receiving and processing area; therefore, Table 2 does not need to be revised. CNL confirms that Table 2 accounts for all sources of wastewater to be treated by the WWTP. The sources include ECM leachate, ECM contact water, and decontamination water from the support buildings. Reference: [A-1] Leachate and Wastewater Characterization, B1551-508600-REPT-001, Revision 3, 2019 May.	
HC-3-01	HC-2-01	Indigenous Peoples' health / Socio-economic conditions	May 2020 Noise Impact Study (NIS)	i) The NIS did not include worked examples of percent highly annoyed (%HA) calculations and Health Canada cannot validate that the baseline %HA and change in %HA calculations are appropriate. Worked calculations should be provided showing all applied parameters and adjustments such as: a. Source characteristics, and b. Durations modelled (e.g., were noise levels calculated over 9 months/year for the construction phase or were total traffic volumes averaged over 12 months which would include 3 months with no additional construction traffic). ii) There is a lack of clarity on the number of vehicle trips used in modelling. Although CNL's response to HC-2-01 indicates "It was assumed that up to 80 one-way truck trips could occur during the nighttime period. As the total number of Project truck trips is expected to be 400 per day (i.e., 200 one-way Project shipments), the remaining 320 truck trips were modelled during the daytime period. Project employee related traffic volumes were updated based on new information to 225 one-way trips per day", it is not clear in Table 1 of the NIS if one-way trips or round trips were used in modelling. The total number of	To allow verification of the revised NIS findings, please provide: i) Worked examples of %HA calculations, ii) a: Model input/output spreadsheets, b: A summary table that lists the number and timing of one way and return trips for each type of vehicle (project and non-project-related traffic) on both Plant Road and project Highway 17 for both baseline and future conditions included in modelling, iii) Revised %HA calculations with consideration of speed changes along Highway 17, or provide justification that the use of a consistent 90 km/h speed would not change the %HA calculations, and iv) Justification for the use of a receptor height of 4.5 meters. If receptors are one-storey buildings, %HA should be recalculated using a receptor height of 1.5 meters.	Additional mitigation measures should be considered where change in %HA values meet or exceed 6.5. *Health Canada, 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise. Cat.: H129-54/3-2017E-PDF, ISBN: 978-1-100-19258-1, Pub.: 160331.	No	i) Please find attached (Attachment HC-3-01) a spreadsheet that provides a %HA calculation example and the input data associated with the traffic noise modelling. The first worksheet of the spreadsheet summarizes the traffic noise modelling inputs. All inputs for the traffic noise modelling are also presented in Tables 1 through 4 of the Noise Impact Study (NIS) [A-2]. In accordance with Health Canada guidance [A-3], an adjustment for road traffic is not typically warranted as the emissions associated with the road traffic are not expected to be audibly tonal or impulsive. Accordingly, there were no adjustments for source characteristics applied to the modelled traffic noise for the %HA calculation. The noise modelling considered traffic volumes representative of a predictable worst-case 24-hour period during construction and assumed it occurs daily over the entire duration of the construction program, which would result in a conservative assessment. The fluctuation in traffic volumes associated with various phases of construction was conservatively not considered as the maximum traffic volumes were used. ii) It is acknowledged that the use of 'one-way' in the response to HC-2-01 could be a source of confusion. The sentences quoted here should read "It was assumed that up to 40 Project shipments, resulting in a total of 80 truck trips, could occur during the nighttime period. As the total number of Project truck trips is expected to be 400 per day (i.e., 200 Project shipments to the CRL Site), the remaining 320 truck trips were modelled during the daytime period. Project employee-related traffic volumes were updated based on new information to 225 trips to the CRL Site (and 225 trips from the CRL Site) per day". Please refer to the NIS [A-2], where this information is more clearly presented. Table 1 of the NIS outlines the Project-related truck trips going to the CRL site each day. Tables 2, 3 and 4 of the NIS outline all project and non-project related traffic volumes that were used as inputs into the noise modelling. These numbers represent all trips on a given road (i.e., vehicles travelling in either direction). For example, the total traffic on Plant Road is 9060 vehicle trips per day, calculated from the sum of the existing vehicle trips of 8210, two times the Project employee vehicles of 225 (i.e., 450) and two times the Project shipments of 200 (i.e., 400) (e.g., 9060 = 8210 + 450 + 400).	Rejected with Follow Up IR HC-4-01

Reference #	Link to IR	Project Effects Link	Reference to EIS, appendices, or supporting documentation (if applicable)	Context and Rationale	Information Requirement	Suggestions for mitigation and follow-up measures (as applicable)	Requires Technical Discussion	CNL Response	Accepted/Rejected
				vehicle trips along these routes is important to clarify in order to ensure noise levels have not been underestimated at the nearest receptor locations. Additionally, some sections of the revised draft EIS lack clarity with respect to vehicle traffic (i.e. are the values one-way or return vehicle passes). For example, in response to HC-2-01 it says “[t]he additional construction personnel requirements are expected to result in an additional 300 inbound and outbound trips to the site daily”. It is not clear if this is 300 inbound and 300 outbound or 300 total (150 inbound and 150 outbound) trips. Providing model input/output spreadsheets as well as summary table of vehicle trips along all assessed road segments would provide clarification on this topic. iii) On page 3 of the NIS, it is stated that “traffic was assumed to be predominantly free-flowing along the roadways and did not include specific inputs for vehicles accelerating or decelerating”. However, in response to HC-2-01 it is stated that “[t]he speed limit on Highway 17 between Petawawa and Deep River ranges from 60 to 90 km/hr.” Traffic will be required to change speeds along Highway 17, and particularly with respect to large trucks which may be required to brake/gear down in order to travel slower by specific receptor locations. It is unclear how the assessment considers what impact this may have on noise levels at these locations. iv) In the NIS methodology section, a receptor height of 4.5 meters was selected to “conservatively” represent the second storey of a dwelling in the noise modelling, without justifying that this represents the dwelling types along Highway 17 and Plant Road. Given the proximity of the nearest residences to the centerline of the roadways (15-25 meters), it would be more conservative to evaluate noise levels at a height of 1.5 meters above ground as this would				When it is stated that there are (for example) 225 inbound and outbound trips per day, it means that there are 225 inbound and 225 outbound trips per day (i.e., 450 total trips per day). iii) Assessing free-flowing traffic noise is common practice in typical noise assessments. The US Federal Highway Administration (FHWA) traffic noise guidance [A-4] states that “The “worst hourly traffic noise impact" occurs at a time when truck volumes and vehicle speeds are the greatest, typically when traffic is free flowing and at or near level of service C conditions.“ It is acknowledged that there are existing speed changes along Highway 17, which are expected to be posted in accordance with MTO requirements where operators are notified in advance of the speed change. The posted speed limit will not be altered as a result of this Project, and it is expected that current and future operators will follow the posted signage and there should not be abrupt speed changes. It is expected that future practices of operators will be consistent with current operator practices. The modelling considered the vehicle speed as 90 km/hr for the entirety of the Highway 17 traffic assessment. This resulted in a more conservative approach than considering vehicles travelling at lower speeds, as predicted noise levels are higher with increasing speed and the change in %HA is greater at 90 km/hr. iv) It is acknowledged that, for a given distance from the centreline of a roadway, a receptor 1.5 m high is slightly closer to the road centreline than one that is 4.5 m high. However, based on other factors that influence the predicted noise levels, modelling receptors at a height 4.5 m results in predicted levels that are marginally higher than those that would be calculated for a receptor that is 1.5 m in height and located at the same distance from the road centreline. When compared to predicted levels at a height of 1.5 m, the predicted levels at a height of 4.5 m are typically higher due to less attenuation from ground absorption. For example, for the segment of Highway 17 between Chalk River and Deep River, the predicted Project day-night noise level (Ldn) at 20 m is 72.1 dBA at 4.5 m and 71.9 dBA at 1.5 m. The predicted Project Ldn at 60 m is 64.7 dBA at 4.5 m and 64.0 dBA at 1.5 m. Therefore, using a receptor height of 4.5 m results in a conservative assessment. References: [A-2] Golder Associates Ltd. Noise Impact Study of Canadian Nuclear Laboratories Near Surface Disposal Facility Project Construction-related Road Traffic on Human Receptors. 232-509220-055-000, 2020 May. [A-3] Health Canada. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise. 2017. [A-4] Federal Highway Administration. Highway Traffic Noise: Analysis and Abatement Guidance. 2011.	

Reference #	Link to IR	Project Effects Link	Reference to EIS, appendices, or supporting documentation (if applicable)	Context and Rationale	Information Requirement	Suggestions for mitigation and follow-up measures (as applicable)	Requires Technical Discussion	CNL Response	Accepted/Rejected
				be representative of the main floor of a single storey home, which would be closer to the noise source than 4.5 meters.					

Table 4: *Canadian Nuclear Laboratories Reponses to Federal-Provincial Review Team Fourth Round Information Requests on the Revised Draft NSDF EIS*, 232-509220-021-000, Revision 0, 2020 December.

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/Rejected
				Document Name	Section/Figure/Table Impacted by Response	Scope of New Information	
CNSC-4-01	**CNSC-3-02B**	Section 5.3	**Context & Rationale** CNL's response also indicates that reports [1] and [2] informed the basis of the current geological and hydrostratigraphic interpretations within the regional area. The arguments presented for excluding structural information in the modeling, based on an absence of information and uncertainty, are inadequate. If there is uncertainty associated with a bedrock feature, then it should be investigated. **Information Requirement** With respect to **CNSC-3-02B** (the new groundwater model): 1. With a fracture zone in the bedrock, the groundwater modelling needs to be re-calibrated to match the measured hydraulic heads etc. However, CNL has kept all of the parameters from the original calibrated model. The calibration process, if it had been done, would have had two outcomes that could have been used to demonstrate the usefulness of the modeling exercise: (a) if there is indeed a set of reasonable calibrated parameters to make a good match, CNSC staff would be more confident in the results of the new modeling; (b) if calibration efforts were made and it was not possible to find a match, then it would help demonstrate the unlikelihood of the existence of a connected fracture zone in the bedrock. 2. The dose should be calculated using the new groundwater flow results to demonstrate the impacts of the fracture zone. **CNL Response:** 1. Inclusion of a hypothetical bedrock fracture zone (e.g. higher permeability zone) in the EIS groundwater flow model initially simulated significantly lower (up to 7 m) groundwater elevations than those observed at groundwater monitoring locations in the vicinity of the ECM. Recalibration of this model was reasonably achieved through a reduction in hydraulic conductivity of the bedrock units and the fracture zone, as well as an increase in the recharge rate applied in the ECM area. The adjustments made to model input parameters were considered reasonable based on measured values. This recalibration resulted in simulations that are comparable to the initial model calibration completed in support of the EIS. A simulation of the post closure scenario with the revised model (including the hypothetical bedrock fracture zone) was completed. This resulted in a minor change to the groundwater flow pathway, where a portion of groundwater released in the upper ECM area travelled through the fracture zone prior to reaching the overburden. The resulting groundwater travel times between the ECM and Perch Creek were similar with the hypothetical bedrock fracture zone included as compared to the EIS scenario (i.e., typically 7 to 10 years for the majority of groundwater particles, with the overall range of 5 to 15 years). The re-calibration and forecast simulation including the hypothetical fracture zone are documented in [1]. 2. As discussed above, the results of the recalibrated model show that the presence	EIS	Section 5.3.2.7	Addition of Text	Accepted

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/Rejected
				Document Name	Section/Figure/Table Impacted by Response	Scope of New Information	
			of a hypothetical fracture zone in the bedrock have negligible effect on the groundwater travel times between the ECM and downgradient receptors (i.e., Perch Creek). This is because the primary groundwater flow pathway is situated in the overburden, a shallow pathway that is not significantly impacted by a fracture zone in the bedrock. The existing Normal Evolution Scenario within the 3rd iteration Post-Closure Safety Assessment [2] utilizes a groundwater transit time of 7 years, thus is aligned with the results of [1]. Furthermore the 3rd iteration PostSA also includes a sensitivity analysis of a rapid transit to Perch Creek and concludes that the geosphere advective travel time does not have a significant impact on the fluxes of the radionuclides from the groundwater pathway to the creek. As such an additional dose calculation for the new groundwater flow results is not warranted since an undetected fracture zone does not impact the groundwater travel time nor does the geosphere travel time have an impact on the resultant dose to downgradient receptors. ***Changes to the EIS:*** The following text in red will be added to Section 5.3.2.7 of the Final EIS: To address the uncertainty associated with bedrock structures additional simulations investigated the presence of a hypothetical or undetected bedrock fracture zone in below the ECM in direct hydraulic connection with Perch Creek (as detailed in Golder, 2020a and 2020b). For the case where a hypothetical bedrock fracture zone was considered to exist under current conditions the resulting groundwater travel times between the ECM and Perch Creek were similar with the hypothetical bedrock fracture zone included as compared to the base post closure scenarios (i.e. typically 7 to 10 years for the majority of groundwater with an overall range of 5 to 15 years). Simulations completed to represent a future “activation” of a hypothetical bedrock fracture zone resulted in an earlier arrival time for a portion of the plume (i.e., an arrival time of approximately 2 to 15 years as opposed to 5 to 15 years for the base post closure scenario). References: [1] *CNL NSDF – Calibration of Groundwater Flow model including a Hypothetical Transmissive Bedrock Fracture Zone* 232-121221-021-000, 2020 October. [2] *Post-Closure Safety Assessment 3rd Iteration to the NSDF Project,* 232-509240-ASD-004, Revision 0, 2019 November.				
HC-4-01	**HC-3-01 i) and ii)**	May 2020 Noise Impact Study (NIS)	**Context** Health Canada recommended to provide worked examples of percent of highly annoyed (%HA) calculations in consideration of source characteristics and durations modelled (Round 3 IR, HC-3-01 i). The proponent provided worked examples of %HA calculations and the input data associated with the traffic noise modelling (see Attachment HC-3-01). The proponent also provided rationale for an exclusion of a noise level adjustment (i.e., emissions associated with the road traffic are not audibly tonal or impulsive) and durations of modeling (i.e., the worst-case traffic	EIS	5.10.9 and Section 11, Table 11.0-1 (Row “Section 5.10”, Column “Conceptual Monitoring Program”	Pre-construction traffic study	Accepted

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/Rejected
				Document Name	Section/Figure/Table Impacted by Response	Scope of New Information	
			volumes and associated noise emissions are assumed to occur over the entire duration of the construction phase). Additionally, Health Canada recommended to provide model input/output spreadsheets, and a summary table that lists the number and timing of one way and return trips for each type of vehicle (Round 3 IR, HC-3-01 ii). The proponent provided additional information on the predicted numbers of one-way traffic that are used for the noise modelling inputs in the NIS. **Rationale:** There remain uncertainties with the number and types of vehicles that travel along Plant Road and Highway 17 during daytime and night-time as the proponent's road traffic noise predictions are based on assumptions derived from "*published literature for typical traffic flows along different types of roads"* (NIS, pg.2). Traffic volumes in the study areas during the day, evening, and overnight hours may differ substantially from the typical traffic volumes and timing of traffic in published literature due to traffic volumes associated with shift-workers and night-time deliveries. Health Canada recommends to conduct a baseline traffic count and measurement of baseline sound levels. The measured values can support more accurate predictions of future traffic volumes, future sound levels and changes in %HA with a greater certainty. Additionally, change in %HA should comprise all applicable adjustments as per ISO 1996-1:2016, which includes: • Road traffic does not require an adjustment; • Regular impulsive sounds require a 5 dB adjustment; • Highly impulsive sounds require a 12 dB adjustment; • Evening sounds require a 5 dB adjustment; • Night sounds require a 10 dB adjustment; • Weekend day-time sounds require a 5 dB adjustment. ISO. 2016. ISO 1996-1:2016 Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures **Information Requirement** Health Canada recommends that the proponent provide a baseline traffic count and measured baseline sound levels at the nearest receptor locations, along Highway 17 and Plant Road, with all applicable adjustments as per ISO 1996-1(2016). Parameters for the baseline traffic count include the number and timing (i.e., per hour) of one-way and return vehicle trips for each vehicle type (i.e., project and non-project related traffic) with specific occurrences during nighttime hours. Including measured results will provide greater certainty in traffic noise predictions. ISO 1996-1:2016 Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures. **Suggestions for Mitigation and Follow-up Measures** Additional mitigation measures should be considered where change in %HA values meet or exceed 6.5 as per section 6.4 and Appendix H of Health Canada's guidance				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/Rejected
				Document Name	Section/Figure/Table Impacted by Response	Scope of New Information	
			(2017). Health Canada, 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise. **CNL Response:** Completing a baseline noise monitoring program would mainly provide information for calibrating the noise modelling for the specific location where the noise monitoring was completed. The Ontario Ministry of Transportation (MTO) issued a guidance document, 'Environmental Guide for Noise' (the Noise Guide) dated October 2006 where the MTO discourages the use of field measurements as the MTO feels field measurement programs, "can be inconsistent, unreliable and only represent a 'snapshot' with respect to a L_{eq}(24hr) situation". Accordingly, CNL is of the opinion that the recommendation to complete a baseline noise monitoring program is useful as it would only provide a representation of the noise levels during the Environmental Assessment Follow-up Monitoring Program (EAFMP). Through experience from similar projects across Ontario, Canada and globally, where off-site road traffic may be the most significant noise source at off-site receptors, typically additional adjustments as per ISO 1996-1:2016 are not required during the pre-project assessment phase. The current approach taken in the NSDF Environmental Impact Statement (EIS) for assessing the potential noise impacts was in accordance with the MTO and Ministry of the Environment, Conservation and Parks (MECP) typical requirements using the available information at the time of assessment. The assessment of Highway 17 used information from the MTO, which is responsible for Highway 17, whereas the assessment of Plant Road used data from a traffic study completed by a third party independent traffic consultant as well as information from the major user of the roadway (i.e., CNL). The approach taken utilized the best available information at the time of the assessment and is consistent with other similar projects completed across Ontario – those regulated by municipal, provincial, and federal bodies. Baseline noise monitoring from past projects that were completed at discrete locations was not effective in assisting the calibration of a noise model prepared for the respective project's traffic corridor. Using the best available corridor-specific traffic data is often the most effective method to help establish baseline/future noise levels; this was the approach taken for the NSDF Project noise assessment. However, to help address HC's recommendation, CNL will complete a traffic count study along Highway 17 and Plant Road as part of the EAFMP. Furthermore due to the ongoing COVID-19 pandemic, as well as ongoing construction activities along Plant Road, the results of a traffic count study conducted at present will not appropriately represent the expected baseline traffic levels/patterns during NSDF Project construction. It is proposed that a traffic count study be completed during the 'pre-construction phase' of the Project. The noise modelling results can be verified at that time and, if required, additional mitigation will be implemented for the Project.				

Reference #	Link to IR#1 (Original IR package)	EIS Section	Information Request & Response	Documents Impacted by the Response to IR			Accepted/Rejected
				Document Name	Section/Figure/Table Impacted by Response	Scope of New Information	
			Updates to EIS Text Proposed: The following text will be added to Section 5.10.9 and Section 11, Table 11.0-1 (Row "Section 5.10", Column "Conceptual Monitoring Program") of the EIS: As part of the Environmental Assessment Monitoring and Follow-up Program (EAFMP), with respect to the noise assessment, a traffic count study will be completed along Highway 17 and Plant Road as a pre-construction activity. Traffic counts will be obtained along each of Highway 17 and Plant Road to establish an Annual Average Daily Traffic (AADT) count in accordance with accepted practices. The study will consider Highway 17 due north and south of Plant Road. Average hourly distribution will be established for each of Highway 17 and Plant Road. The gathered traffic count data will be used to verify the noise modelling result and additional mitigation will be implemented for the Project as they become necessary.				

Table 5: *Supplemental Response to CNSC-2-04 - CNL Responses to the CNSC Staff Review of the December 2020 Final EIS,* 232-509220-021-000, Revision 0, 2021 June.

Reference #	Link to IR#1 (Original IR Package)	EIS Sections	IR and Response	Review of December 2020 Final EIS [1]	CNL Response to CNSC Staff Review of December 2020 Final EIS [1]	Accepted/Rejected with request for further information
CCSN-2-04	**FC-36** **FC-38** **FC-40** **FC-149** **FC-150** **FC-152** **FC-153** **FC-154** **FC-155** **FC-158**	**Section 6**	**CNSC staff Information Request – Indigenous Physical and Cultural Heritage *Question:*** **A. FC-36 + FC-149 + FC-150 + FC-152 + FC-153 + FC-154 + FC-155 + FC-158 (INCOMPLETE December 2020 Final EIS)** Provide a complete description of CNL's engagement with each of the First Nation and Métis groups identified in table 6.2.2-1 regarding potential impacts to Indigenous and/or treaty rights. This information must include what interests, concerns, and/or feedback were raised by each Indigenous group, as well as how CNL addressed these. Examples of discussion topics include but are not limited to archeological sites and artifacts (FC 152), traditional use of land and resources (including trapping, hunting, gathering and fishing) (FC-149, FC-153), Pointe-au-Baptême (FC 154), environmental monitoring (FC-158). ● Clarify if all the First Nation and Métis groups identified in table 6.2.2-1 were engaged on the topics listed above. ● Provide details in the EIS and/or IER on which First Nation and Métis groups provided feedback through engagement to the end of December 2019. Include the additional information in the relevant sections of the EIS and IER. Alternatively, please clarify why the end of March or April 2019 is a cutoff time for information provided. **B. FC-38 (Complete (With Question for CNL) December 2020 Final EIS)** Provide additional information on Indigenous engagement regarding valued components (VCs). ● Clarify how the Indigenous VCs in table 6.3.2-1 were selected. Clarify which First Nation and Métis groups provided input or feedback on the selection of Indigenous VCs listed in table 6.3.2-1. **C. FC-40 (COMPLETE December 2020 Final EIS)** Provide additional information on the lifestyle survey referred to in section 6.6 of the revised EIS, including the following: ● Methodology used to develop the survey to ensure it was representative of First Nation and Métis peoples. ● Whether groups were consulted on the development and/or results of the survey; if not,	**Regarding CNL Response** ***Question:*** **A. FC-36 + FC-149 + FC-150 + FC- 152 + FC-153 + FC-154 + FC-155 + FC-158** Chapter 6 of the EIS provides a summary of CNL's engagement with each of the First Nation and Métis groups regarding potential impacts to Indigenous and/or treaty rights, however when combined together with the IER TSD including Appendix H there is not an adequate level of detail or information to determine that all identified Indigenous groups were engaged on the following topics related to Project –specific impacts to Indigenous peoples including but not limited to: -archaeological sites and artifacts -traditional land use of land and resources (including trapping, hunting, gathering and fishing), -Pointe-au-Baptême cultural site, and environmental monitoring. The following is also not clear in the EIS: - which Indigenous groups provided feedback to CNL through engagement on the specific concerns raised; and what concerns Indigenous groups raised with respect to Project specific impacts/ effects to Indigenous groups and how CNL proposed to address these concerns as well as if and how CNL resolved these concerns to the greatest extent possible. Project specific impacts should be in the EIS and IER, and where there are site-wide or broader issues that go beyond the scope of the Project, CNL should highlight that there are processes underway to address these. The EIS and IER indicate August 31, 2020 as the cutoff time for the information provided. It is CNSC staff's understanding that CNL has been conducting engagement from September 01, 2020 until present and has been working to resolve outstanding issues and responding to Indigenous groups concerns. Recognizing that although there needed to be a cut-off date for the Final EIS, CNSC staff require the Final EIS and IER to contain enough information to show that CNL has engaged the identified Indigenous groups regarding their concerns, and issues, responded to the Indigenous groups and validated these responses so as to support their conclusions within the EIS with respect to effects and/or impacts to Indigenous peoples. In addition to the IRs, in April 2020, CNSC staff requested that CNL provide a table that contained concerns, issues and/or feedback from all identified Indigenous groups, responses to those concerns and validation of those responses. This information could come from a number of sources including	**Response to A:** Information on how CNL engaged with identified Indigenous communities and organizations are summarized for each Indigenous community and organization in Section 6.2.4 of the Final EIS [2]. Detailed information on those engagements can be found in the *Indigenous Engagement Report* (IER) [3], Appendices J.1 to Z.1. With regards to specific topics for engagement, including, but not limited to: - Archaeological sites and artefacts; - Traditional Land Use of land and resources (including trapping, hunting, gathering and fishing); - Pointe-au-Baptême cultural site; and - Environmental Monitoring. CNL has conducted three specific mail outs to each identified community and organization to gather information. Example letters are provided in Appendices B-D of the IER, which are also identified in Appendices J.1 to Z.1 (details) in the engagement tables. While CNL did not ask specifically about the Pointe-au-Baptême cultural site, CNL did ask about sites of ceremonial significance in proximity to the CRL site or cultural activities. Where an Indigenous community or organization has raised the above topics as an interest or concern, this is summarized in the "Feedback" and "Summary Discussion of Interests and Concerns" subsections of Section 6.2.4 of the Final EIS for each Indigenous community or organization, and further detailed in Appendices J.2 – Z.2 of the IER. For further clarity, CNL made the following revisions to the Final EIS: - A "Feedback" and "Summary Discussion of Interests and Concerns" section has been added for each Indigenous community and organization to Section 6.2.4: • The "Feedback" sub-section describes the specific topics of interest or concern each Indigenous community or organization has identified formally in writing and/or verbally to CNL. Each bullet point represents a general theme identified by each Indigenous community or organization. If CNL has not received any feedback from a community or organization, it is clearly stated in the Feedback section of the Final EIS. • The Summary of Interests and Concerns generally describes the interest or concern as raised and also	Accepted

Reference #	Link to IR#1 (Original IR Package)	EIS Sections	IR and Response	Review of December 2020 Final EIS [1]	CNL Response to CNSC Staff Review of December 2020 Final EIS [1]	Accepted/Rejected with request for further information
			provide a rationale. **D. Assumption statements FC-149 + FC-153 (INCOMPLETE December 2020 Final EIS)** Clarify if assumptions made about Indigenous peoples, and included throughout sections 6.2 and 6.4 of the revised EIS have been validated through engagement activities with First Nation and Métis groups? If not, provide a rationale. ***Context:*** CNL states: “*The Indigenous Engagement Report [1] has been revised and is a Technical Supporting Document to the EIS. Section 4 of this report [1] provides further information on Indigenous engagement.”* Indigenous Engagement Report, Section 4.5 “Feedback Received” states: *“Indigenous interests are considered any interests that CNL is generally aware of or that have been expressed to CNL during engagement with identified Indigenous communities.”* CNL also states: *“A new section 6 has been included in the revised EIS, to consolidate and summarize the major areas of assessment relevant to* the Final EIS and IER to contain enough information to show that CNL has engaged the identified Indigenous groups regarding their concerns, and issues, responded to the Indigenous groups and validated these responses so as to support their conclusions within the EIS with respect to effects and/or impacts to Indigenous peoples. In addition to the IRs, in April 2020, CNSC staff requested that CNL provide a table that contained concerns, issues and/or feedback from all identified Indigenous groups, responses to those concerns and validation of those responses. This information could come from a number of sources including Indigenous CNSC staff original IRs FC-36, FC-38, FC-40, FC- 149, FC-150, FC-152, FC 153, FC-154, FC- 155, and FC-158 **Addendum A – CNSC-2-04 (COMPLETE December 2020 EIS)** A. **FC-36 + FC-149 + FC-150 + FC-152 + FC-153 + FC-154 + FC-155 + FC-158** These sections only provide high-level information. Section 6.2.4 only provides information regarding Algonquin’s of Ontario (AOO) and Métis Nation of	Indigenous groups’ comments on the EIS, if available. Therefore CNSC requires the following from CNL: - Documentation for each Indigenous group that shows CNL’s engagement activities on all identified impacts/ effects to Indigenous groups, any concerns and issues raised by identified Indigenous groups with respect to the Project, CNL’s responses to those concerns and issues, including what commitments, mitigation, follow-up and monitoring is proposed and CNL’s validation with Indigenous groups of those responses. - For concerns raised by Indigenous groups with respect to the broader CRL Site, it would be beneficial if CNL could provide a summary of these concerns, as well as related responses and validation with each Indigenous group in an as complete as possible manner within the EIS and supporting documentation. However, CNSC staff recognize that at the time of the Final EIS these concerns may still be ongoing as they are broader issues that may not relate directly to the NSDF Project. For responses/concerns where there is not full agreement between CNL and the Indigenous group on its adequacy, CNL needs to clearly indicate in the EIS and/or IER the status of the response to the issue/concern and CNL’s path forward to try to continue to work with the Indigenous group to resolve or manage the concerns moving forward (site wide or for the project specifically) - Where CNL has not received responses or communications from Indigenous groups regarding the adequacy and appropriateness of the responses to their concerns, CNL must clearly summarize CNL’s efforts in this regard and the current status of the responses from Indigenous groups (i.e. CNL has not received a response from the Indigenous group to date regarding validation of the adequacy of CNL’s responses to their concerns raised to date). **B. FC-38** The response has been accepted. However, CNSC staff require information regarding how CNL intends to incorporate AOO’s review of the Final EIS including but not limited to the comments provided on the incorporation of AOO’s VCs. **C. FC-40** This response has been accepted. **D. Assumptions Statements FC- 149 +FC-153** The IR required that CNL demonstrate that where assumption statements were used they were validated with Indigenous groups. CNL’s response referenced Appendix H of the IER TSD;	discussed in summary form its response to the interest and discussions on the topic. This feedback section directly corresponds to Columns 2 (Key Interests and Concerns) and 3 (How CNL is addressing the Feedback/Concern) in the Tables of Interests which can be found in Appendices J.2 – Z.2 of the updated IER. - These Sections within 6.2.4 of the Final EIS and Appendices J.2 – Z.2 also identify if the interest/concern is a CRL site concern (not project specific), and identifies processes underway to address these (for example, CRL long-term relationship or Memorandum of Understanding (MOU) discussions). - Section 6.6 of the Final EIS has also been revised to provide more clarity on CNL’s Long-Term Relationship with Indigenous Peoples that are not specific to the NSDF Project. - The Final EIS has been updated to include information on engagements to the date of submission of the Final EIS (end of May 2021). - The Final EIS includes a “Verification” subsection in Section 6.2.4 for each Indigenous community or organization, which is also summarized above the Tables of Interests in Appendices J.2 – Z.2 of the IER. The verification does relate to the systematic process for verification outlined in Section 6.2.4.1. However, it does also include verification efforts that were made outside of this systematic process, including reviews by Indigenous communities and organizations of drafts of Section 6.2 and 6.4 of the Final EIS related to their community. As well, verification was also related to the NSDF Project commitments and agreement from Indigenous communities and organizations on the next steps. - For communities where no feedback has been provided, the verification section summarizes attempts for engagement opportunities. More details on these attempts are found in Appendices J.1 – Z.1 of the IER. - Appendices J.2 - Z.2 are tables of Key Interests and Concerns for each Indigenous Community and Organization. These appendices were revised to: • Identify under the “Key Interest or Concern” column how the interest was raised (EIS comment, technical comments, verbal discussions). • Provide better clarity in “How CNL is addressing the interest/concern” column if it is a CRL site issue. • A new column was added to identify “How the Interest or Concern is reflected in the EIS”. • The “Next Steps” column identifies the path	

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			Ontario (MNO). Table 6.2.5-1 provides a list of topics of interest for MNO and Algonquin Anishinabeg Nation Tribal Council (AANTC), no concerns/issues are provided. There is also no information on how CNL addressed feedback and whether any feedback from Indigenous groups was incorporated in the EIS and/or IER and if so, where. Also to note that while AANTC is included in this table, there is little mention of AANTC in the rest of the EIS and/or IER (assessment, land use, Indigenous interests) etc. ● Table 6.2.4 1 includes several meetings entitled “Environmental Stewardship Council Meeting” and a meeting entitled “Meeting with Clare Cattrysse and CNSC”. Please provide more information and rationale on how these meetings are related to engagement with Indigenous communities on the proposed NSDF project. In Section 4.5 of the IER, “Feedback Received” includes a definition of “Indigenous interest.” Please define “generally aware”. What due diligence was used to ensure CNL was aware of all potential Indigenous interests in the project area to ensure fulsome and accurate information was provided through the assessments on impacts to Indigenous interests? (To note this information is also included in Section 6.2 of the EIS). ● Provide details in the EIS and/or IER on which First Nation and Métis groups provided feedback through “formal and informal consultation activities”, what the feedback was and how it was addressed by CNL. ● In section 6, where CNL describes the potential interactions of the NSDF Project with trapping, hunting, gathering and fishing activities, it does not provide information or validation that CNL has attempted to or gathered any details regarding traditional land use activities in close proximity to the CRL property directly from all identified First Nation and Métis groups. While it incorporated information received from the MNO TKLUS, it still uses assumptions in the text regarding land use by Métis citizens. It also does not provide any information on engagement activities with the seven (7) Williams Treaties First Nations and/or AANTC and/or its member First Nations. ● (FC-150) CNSC staff noted in the previous IR that it	however, within the table, information was not provided and/ or it is not clear that CNL provided or flagged these specific sections for the Indigenous groups to review or worked directly with Indigenous groups to discuss the information in the EIS and/or IER specific to their communities to ensure that the information is accurate and appropriate. Please provide information that demonstrates that CNL has engaged and validated the use of assumption statements with identified Indigenous groups.	forward, consistent with the *NSDF Project Consolidated Commitment Lists* [4]. • Verification is no longer a column in the table, and the verification is summarized in the opening text of each Appendix. - CNL notes that Section 6.2 of the Final EIS and Section 4 of the IER are essentially identical in content. CNL does note that the AOO did provide a review of the IER on May 28, 2021 and text changes from AOO were incorporated into the IER with more detail related to the outcome of the May 28, 2021 meeting. **Response to B:** As noted in Section 6.2.4.2.4, the AOO submitted written comments on the 2020 Final EIS directly to CNL. CNL has responded in detail to each of the AOO comments and received written feedback from the AOO on CNL’s responses. Many of the comments were addressed from the AOO’s perspective however some were considered still in progress and some were considered as unresolved. CNL notes that for the comments that are in progress, CNL and AOO are working together to resolve and have agreed upon a path forward. CNL also notes that a number of the comments unresolved are related to the Rights Impact Assessment being conducted by the CNSC or a request outside the scope of Canadian Environmental Assessment Act (CEAA) 2012. CNL has incorporated the AOO feedback into the updated Final EIS (i.e., 2021 Final EIS) including Section 6.2 and 6.4 as well as other sections of the EIS as captured in the *Table of Changes from Revision 2 to Revision 4 of the NSDF EIS* [5]. Table 6.3.2-1 of the Final EIS was revised to included species of interest that were identified in both the AOO AKLUS and AOPFN AKLUS. The table was also updated to include moose, beaver and waterfowl as VC’s of interest to the AANTC. **Response to C:** No update required. **Response to D:** Overall, CNL has attempted to remove any assumption statements. As part of the verification process, CNL requested feedback from all identified Indigenous communities and organizations on assumptions CNL had made in the EIS with respect to traditional land use around the CRL site. As noted in Section 4.4 of the updated IER, formal letters were sent via registered	

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			“will be important for CNL to clarify in the final EIS if there is any active hunting or trapping in the adjacent PE025 and PE002 trap lines, as well as on adjacent private (patent) lands, specifically if they are being used by any of the identified Aboriginal groups.” Section 6.4.4.1.2.1 only provides information regarding AOO and MNO. Table 6.2.2-1 identifies First Nation and Métis groups with potential interest in the project that are not included in the information provided in Section 6.4.4.1.1. Please clarify if all the First Nation and Métis groups identified in Table 6.2.2-1 were engaged on this topic. If so, please provide the details on this engagement, including what issues, concerns, and/or feedback raised by each Indigenous group, as well as how CNL addressed these. If not, please provide a rationale. • (FC 155) The information provided in the response on the engagement with Curve Lake First Nation cannot be located in the EIS and/IER. Provide a rationale as to why Section 6.4.1 only refers to Métis and Algonquin peoples. Please ensure the information provided on the engagement with Curve Lake First Nation is included in the EIS and/or IER. A number of First Nation and Métis groups, including the AOO, Kitigan Zibi Anishinabeg Nation and the AANTC, have expressed an interest in being engaged in on-going monitoring activities for the NSDF Project and CRL site in general, especially as it relates to their traditional land use activities (e.g., fishing). The response and EIS and/IER only provide high-level information and no reference to which First Nation and Métis groups were involved in the discussions. • Section 6.4.6 states , “A couple of the Indigenous communities have indicated that they think their citizens have negative perceptions associated with harvesting near the CRL site which results in not using an area (KnowHistory2019).” The source quoted is the MNO IK study, this will only indicate concerns of Métis Nation citizens, despite the sentence stating, “a couple of the Indigenous communities…” Please clarify which communities this sentence refers to. Provide more information in the EIS and/or IER on discussions had with and feedback provided by interested First Nation and Métis groups on environmental monitoring activities specific to the NSDF Project and the CRL site more generally is		mail to all identified Indigenous communities and organizations inquiring about asserted rights, interests or activities members might undertake in the local or regional areas in proximity to the project. These letters are included in Appendices B, C and D of the IER. The “Verification” summary for each Indigenous community or organization, above the respective Table of Interest and repeated in the respective “Verification” subsections of Section 6.2.4 of the Final EIS, recognize if CNL received a response. In the absence of specific feedback from other Indigenous communities and organizations, traditional land and resource use is assumed wherever there are accessible lands, which is a conservative approach to the assessment and also to reflect the dynamic practice of traditional land and resource use by Indigenous Peoples in time and space. By making this assumption, it is more likely effects will be identified and assessed and potential use will be factored into project planning (Section 6.4.4.1.1 of the Final EIS). CNL has incorporated information from traditional land use and knowledge studies that have been completed by the Algonquins of Ontario (AOO), the Algonquins of Pikwakanagan First Nation (AOPFN) and Métis Nation of Ontario (MNO) and verified with these organizations and community the studies were reflected adequately in Section 6.4.4.1 of the Final EIS. CNL worked directly with the AOO and AOPFN, requesting their review of specific sections, including Section 6.4 (Traditional Land and Resource Use), to both verify that the content was appropriate (for example, details regarding where harvesting was occurring) and that the included information has accurately reflected the results of their respective traditional land use and knowledge studies. The “Engagement” and “Verification” summaries for the respective Indigenous communities and organizations recognize specific sections reviewed. Section 6.4.5.2 (Results) has been revised to include information on particular concerns raised with respect to traditional land and resource use project interactions and mitigation. CNL notes that Section 6.4 of the Final EIS (Traditional Land and Resource) and Section 6 of the IER (Traditional Land and Resource Use by Indigenous Peoples) are identical.	

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			included in the final EIS. **B. FC-38** Section 6.3 Valued Components, identifies the AOO and MNO, however, does not include information in relation to engagement and feedback on valued components with the other First Nation and Métis groups identified with potential interest in the project as per list identified in Table 6.2.2-1, such as the 7 Williams Treaties First Nations and/or the Algonquin Anishinabeg Tribal Council and/or its member First Nations. Please clarify if all First Nation and Métis groups identified in Table 6.2.2-1 were engaged on this topic. If so, please provide the details on this engagement, including what issues, concerns, and/or feedback raised by each Indigenous group, as well as how CNL addressed these. If not, please provide a rationale. ● In addition to the MNO TKLUS study, what other methods of obtaining feedback and from which First Nation and Métis groups, influenced the identification of the "Indigenous VCS" that are capture in Table 6.3.2-1? Please explain why this VC section does not include information in relation to engagement and feedback on valued components with all of the First Nation and Métis groups identified with potential interest in the project, including the 7 Williams Treaties First Nations and/or the Algonquin Anishinabeg Nation Tribal Council and/or its member First Nations. While the section does mention the Algonquin's of Ontario and the Métis Nation of Ontario, it does not provide detailed information on engagement and feedback on valued components with these groups. ● Please clarify if the final list of NSDF VCs included in Table 6.3.2-1 were shared with the First Nation and Métis groups identified with potential interest in the project and what feedback was provided. If so? How was the feedback addressed by CNL? If not, please provide a rationale. ● Please clarify which First Nation and Métis groups have conducted TKLUS, or plan to complete a TKLUS,			

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			and how that influenced (or potentially will influence) the identification of the “Indigenous VCS” that are captured in Table 6.3.2-1 and to support the NDSF project as stated by CNL in Section 6.3. **C. FC-40** It appears the survey did not take into account the lifestyles of First Nation and Métis peoples, as they did not engage with the First Nation or Métis groups within the area. This survey also assumes that First Nation and Métis peoples only obtain “local foods” from farmers market, local farms and/or grown on their own property. This does not take into consideration harvesting of traditional foods (hunting/fishing/gathering). CNL should ensure that First Nations and Métis populations are adequately represented in the Human Health Risk Assessment and that dose estimates reflect their consumption rate. • Please provide more detail on the methodology used to develop this survey. If First Nation and Métis lifestyles were to be a focus of the survey and conclusions, how did the methodology ensure that First Nation and Métis peoples would be accurately reflected? Please provided more detail on the results of the lifestyle survey. Include information such as how many people identified as First Nations? How many people identified as Métis? How many people overall participated in the survey? What questions were used to ensure that First Nation and Métis lifestyles would be reflected accurately in the survey results? • Please clarify if the survey results and conclusions were shared with First Nation and Métis groups with interest in the project, as identified in Table 6.2.2-1. If so, what feedback was provided and how was it addressed by CNL? If not, please provide a rationale. • Please clarify if First Nation and Métis groups with interest in the project, as identified in Table 6.2.2-1 were consulted on the development of the survey. If not, please provide a rationale. • Please provide a rationale as to why First Nation and Métis groups with interest in project were not surveyed.			

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			• Please clarify why the ***Life Style Surveys: Preliminary Local Food Fraction Findings***, only Indicates First Nation and Non-First Nation participant categories? How are Métis participants included in the results? • Please clarify which First Nation and Métis groups provided input or feedback on the draft EIS to refine the human health risk assessment to ensure conservative representation. Please provide details on which First Nation and Métis groups provided feedback, what feedback provided and how it influenced the hunter/recreational receptor within the Post- closure Safety Assessment. **D. Assumption statements FC-149 + FC-153** Section 6.4.4.1 – includes information that appears to be from existing reports/agreement/websites and does not indicate if and how the information was validated directly with the communities/groups through engagement activities and feedback. In Section 6.4.4.1 the use of “it is likely”, “there could be”, “it seems reasonable” etc. is common. Very few source documents/resources are identified for these statements. Please provide details in the EIS and/or IER on whether the information included in the paragraphs where “it is likely”, “there could be”, “it seems reasonable” etc. is used was provided to First Nations and Métis groups for validation and/or feedback? If so, which groups and what feedback was provided? If not, please provide a rationale as to why it was not shared with groups and how these assumptions were validated.			

References:
[1] *Near Surface Disposal Facility Environmental Impact Statement*, 232-509220-REPT-004, Revision 2, 2020 December.
[2] *Near Surface Disposal Facility Environmental Impact Statement*, 232-509220-REPT-004, Revision 3, 2021 May.
[1] *Indigenous Engagement Report - Near Surface Disposal Facility*, 232-513130-REPT-001, Revision 4, 2021 May.
[4] *NSDF Project Consolidated Commitment Lists*, 232-513440-REPT-0001, Revision 1, 2021 June.
[5] *Table of Changes from Revision 2 to Revision 3 of the NSDF Environmental Impact Statement*, 232-509220-021-000, 2021 May.