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Nov. 30, 2021

Sent by e-mail to: Lachlan.Maclean@iaac-aeic.gc.ca and iaac.boatharbour.aeic@iaac-aeic.gc.ca

Subject: Health Canada's Technical Review of the Proponent's Responses to the Round One (Part Two) Information Requirements for the Boat Harbour Remediation Project

Dear Lachlan MacLean:

Thank you for your email dated October 25, 2021 requesting Health Canada's technical review of the proponent's responses to the Round One (Part Two) Information Requirements (IRs) issued by the Impact Assessment Agency of Canada (IAAC) on May 11, 2021 for the Boat Harbour Remediation Project (BHRP). Health Canada is participating in the environmental assessment process as a Federal Authority under the *Canadian Environmental Assessment Act, 2012*.

Health Canada has reviewed the proponent's responses to IRs IAAC-32, 34, 35, 38, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62a/b, 63, 64, 65 and provided detailed technical comments for IAAC's consideration in the attached table. In summary, Health Canada identified the following major issues in the proponent's responses:

- Insufficient evaluation of potential health impacts associated with the sediment release into the Northumberland Strait and sediment resuspension in the Boat Harbor Effluent Treatment Facility areas during the post-remediation period;
- Insufficient information/rationale on how the freshwater wetlands and estuary sediments are delineated or how the remediation footprints are determined;
- Insufficient rationale/information to support the conclusion that contaminants of potential concern (COPCs) in fish and shellfish from the Northumberland Strait do not pose human health concerns;
- Inadequate screening of COPCs and evaluation of exposure pathways associated with



these COPCs;

- Inadequate evaluation of the health risks posed by air COPCs associated with diesel exhaust emissions; and
- Insufficient clarity about whether certain project-related activities are included in the quantitative noise effects assessment.

As per follow-up communications with IAAC, Health Canada's technical review on the proponent's additional responses to IRs IAAC-33, 36, 37, 39, 62c received on November 15, 2021 is underway and will be provided shortly once the department completes its review.

Should you have any questions regarding Health Canada's comments, please contact the undersigned.

Sincerely,

<Original signed by>

Chantal Roberge

National Director, Environmental Health and Internationally Protected Persons Programs
ROEB, Health Canada

cc:

Kathleen Buset, Director, Chemicals and Environmental Health Management Bureau,
Healthy Environments and Consumer Safety Branch (HECSB), Health Canada
Beverly Ramos-Casey, A/Atlantic Regional Manager, EHP, ROEB, Health Canada
Heather Jones-Otazo, A/Manager, Environmental Assessment and Contaminated Sites
(EACS) Division, HECSB, Health Canada
Ninon Lyrette, Senior Environmental Health Specialist, EACS, HECSB, Health Canada
Dae Young Lee, Impact Assessment Specialist, EHP, ROEB, Health Canada

Attachment: Health Canada's Technical Review of Response to (May 11, 2011)
Information Requirements – Boat Harbour Remediation Project

Health Canada’s Technical Review of Response to (May 11, 2021) Information Requirements – Boat Harbour Remediation Project

Use column 1 to link any new comments that arise from your review of the proponent responses to February 2021 IRs (now considered IR-1). Please continue to follow the naming scheme from IR-1 for any further potential IRs. For example, if in reviewing the response to the original IR (e.g. IR-53), you have an IR directed to the proponent, name it IR(2)-53. If multiple IRs arise from reviewing the response, use letters to demarcate further (e.g.: IR(2)-53a, IR(2)-53b, and so on).

The Agency believes that in some instances uncertainties can be resolved either through questions directed at the proponent, or by imposing follow-up measures to verify the proponents’ predictions. In these instances, the Agency would appreciate suggestions for follow-up measures in column 6 where there are uncertainties.

*As mandated by the Government of Canada, in order facilitate the online posting of tables in an accessible HTML format, please note the inclusion of column headers in each field. **Please leave this pre-entered information intact and include your entry on the line below it.** If you require additional rows, please copy and paste to maintain formatting.*

1	2	3	4	5	6	7
IR -1 Reference # (Original IR #)	IR #2 Number	Project Effects Link to CEAA 2012	Reference to EIS (including appendices)	Context and Rationale	Specific Question/ Proposed Follow-up Measure	Requires Technical Discussion
IR #: IAAC-32	IR Number: N/A	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent’s response to IRs Section 2.2.1, pdf p.104	Context and Rationale: Health Canada’s comment on the effectiveness of mitigation measures is sufficiently addressed.	Specific Question/ Request for Information: No further comment.	Requires Technical Discussion: No
IR #: IAAC-34	IR Number: IR(2)-34	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: Appendix A Figure 2, pdf p.255 Figure 3, pdf p.256 Figure 12, pdf p.273 The proponent’s response to IRs Section 2.2.3, pdf p.105	Context and Rationale: Insufficient information is provided about the boundaries of the Upland Areas. Additionally, the conceptual site model (CSM) has not been updated to include the operable pathways identified in the Boat Harbour stabilization lagoon (BHSL) and its associated basins. a) During the EIS review (February 2021), Health Canada recommended that the proponent clarify the boundaries of the Upland Areas and provide the locations of the soil and groundwater samples within the Upland Areas. The proponent’s response (Section 2.2.3) states that “Figure 2 of the HHERA [human health and environmental risk assessment] report (Appendix A of the EIS) provides a site plan showing the boundaries of the various areas assessed as part of the HHERA. The upland areas are considered to be the terrestrial areas of the Study Area where soil and groundwater samples were collected. Figures 2 and 3 of the HHERA (Appendix A of the EIS) provide the locations of the	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: a) Provide further clarification on the boundaries of the Upland Areas. Clarify whether the Upland Areas comprises all land-based areas within the orange dashed line in Figure 2 (Appendix A). b) Update the CSM for Human Receptors – Quantitative HHERA to include the operable exposure pathways identified for human receptors in the BHSL and its associated basins.	Requires Technical Discussion: No

				<p><i>soil and groundwater samples collected from the upland areas”.</i></p> <p>However, the response does not clearly define the boundaries of the Upland Areas. For example, it is not clear whether the boundaries of the Upland Areas include areas of the site, such as the south-east or north-west perimeters (Figures 2 and 3 of Appendix A).</p> <p>b) As part of the EIS review comments (February 2021), Health Canada queried as to why the Boat Harbour Effluent Treatment Facility (BHETF) areas (inclusive of the BHSL and associated basins) were not included in the CSM and whether operable exposure pathways exist in these areas. The proponent’s response (Section 2.2.3) clarifies that direct contact exposure is an operable pathway in the BHSL and associated basins. However, the response still does not address why the CSM for Human Receptors – Quantitative HHERA (Human Health and Ecological Risk Assessment) (Figure 12 of Appendix A, pdf p.273) excludes this pathway.</p>		
IR #: IAAC-35	IR Number: IR(2)-35	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: Appendix A Section 6.3, pdf p.161 Section 6.4, pdf p.163 Tables H-2.10 to H-2.22, pdf p.493 to 4947 The proponent’s response to IRs Table 7, pdf p.186 to 187	<p>Context and Rationale:</p> <p>There remain uncertainties associated with the exposure scenario and underlying assumptions used for the sediment direct contact pathway given the selected sub-chronic Toxicological Reference Values (TRVs).</p> <p>Uncertainties remain with intermittent, repeated annual exposures, especially with regards to sediment direct contact which, according to Table 7 of the proponent’s response, comprises the majority of exposure of the receptors in question. It is not clear from the assessment provided whether complete elimination of contaminants of potential concern (COPCs) is likely to occur in between exposure events, particularly as an increasing body burden of a COPC can act as an ongoing source of exposure in between exposure events. Information on the bioaccumulation potential and biological elimination half-life is required to assess the potential risks to human health from intermittent, repeated annual exposures to sediment contact for current and future users of the site. The Agency for Toxic Substances and Disease Registry’s sub-chronic TRVs, or Minimal Risk Levels (MRLs), are typically meant to be applied for a <u>single</u> period of exposure of specific duration: up to 14 days (acute MRL) and 15 to 364 days (intermediate MRL), and may not be protective of repeated exposures within these timeframes.</p>	<p>Specific Question/ Request for Information:</p> <p>Health Canada recommends that the proponent address the following comment in a revised project document:</p> <p>Discuss how the selected TRVs are appropriate for intermittent, repeated annual exposures on a chemical-specific basis, including by providing information on chemical half-lives, duration of the key study, and whether peak exposure or total concentration is driving toxicity using the tiered framework^{1, 2}.</p>	<p>Requires Technical Discussion:</p> <p>No</p>
IR #: IAAC-38	IR Number: N/A	Project Effects Link to CEAA 2012:	Reference to EIS:	<p>Context and Rationale:</p>	<p>Specific Question/ Request for Information:</p> <p>No further comment.</p>	<p>Requires Technical Discussion:</p> <p>No</p>

¹ Health Canada. 2021. Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA). Available at: https://publications.gc.ca/collections/collection_2021/sc-hc/H129-114-2021-eng.pdf.

² Harber et al. 2016. Framework for human health risk assessment of non-cancer effects resulting from short-duration and intermittent exposures to chemicals. Journal of Applied Toxicology, 36(9):1077-89.

		5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	The proponent's response to IRs Section 2.2.7, pdf p.109	Health Canada's comment on QA/QC analysis of field data from Dalhousie University is sufficiently addressed.		
IR #: IAAC-40	IR Number: IR(2)-40	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent's response to IRs Section 3, pdf p.25	Context and Rationale: Insufficient information/rationale is provided to address the sediment release into the Northumberland Strait and associated health impacts during the re-naturalization period. The proponent's response states, " <i>concentrations of COPCs in sediment of the BHETF, including the wetland and estuary areas, will be substantially lower following sediment remediation activities (removal and disposal in the containment cell). It is reasonable to conclude future concentrations of COPCs in country foods including marine biota would be equal to or less than current COPC concentrations and will not pose unacceptable risks to human health.</i> " However, this is not a valid rationale to exclude consideration of the potential adverse impacts of sediment release on the quality of country foods in the Northumberland Strait during the re-naturalization process. Country foods in the Northumberland Strait have been exposed to relatively small amounts of contaminants at elevated concentrations from wastewater and sediment from the BHETF via occasional discharges through a dam. However, during the re-naturalization process, country foods in the Northumberland Strait are anticipated to be exposed to larger amounts of the BHETF water and sediment (i.e., due to the dam removal) containing lower contaminant levels (i.e., due to the sediment remediation). Therefore, it remains unknown how the transport of water and sediment from the BHETF to the Northumberland Strait will change the overall contaminant levels in country foods and affect potential health risks associated with their consumption. Given the uncertainties associated with the current delineation of the wetland and estuary risk management areas (RMAs) and determination of the remediation footprints (see HC comments on IAAC-49/50), the assessment of potential human health risks posed by exposures to contaminated sediment released into the Northumberland Strait during the re-naturalization process should be re-evaluated based on the updated delineation and remediation footprints of the freshwater wetlands and estuary RMAs. Uncertainties with the quality of surface water, sediment and country foods in the Northumberland Strait following re-naturalization could be addressed through the implementation of follow-up monitoring	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: a) Evaluate the potential human health risks posed by exposures to contaminated sediment released into the Northumberland Strait during the re-naturalization process based on updated delineation and remediation footprints of the freshwater wetland and estuary RMAs. Consider all applicable exposure durations (i.e., acute, chronic and sub-chronic), exposure pathways (i.e., country food consumption, recreational water use, and any other relevant human exposure pathways), and COPCs that may bioaccumulate or biomagnify within the food web in the evaluation. b) Develop a detailed follow-up program, in consultation with Indigenous groups and stakeholders, to monitor changes to the quality of surface water, sediment and country foods relative to baseline/background conditions in the Northumberland Strait during the re-naturalization process, including information on: 1) the changes in contaminant levels in surface water/sediment/country food relative to baseline/background levels that would require implementation of additional mitigation/risk management measures; and 2) the mitigation /risk management measures to be implemented if monitoring results show that the contaminant concentrations of surface water/sediment/country food reach or	Requires Technical Discussion: No

				programs, which would ensure that people are not exposed to unacceptable levels of COPCs.	exceed the predetermined changes in contaminant levels identified in 1).	
IR #: IAAC-41	IR Number: IR(2)-41	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: Appendix A pdf p.5207 to 5214 The proponent's response to IRs Section 2.2.9, pdf p.111	Context and Rationale: Insufficient information/rationale is provided to address the resuspension of contaminated sediment after the dam removal and subsequent human exposure via the surface water exposure and country food consumption pathways in the BHETF. During the EIS review (February 2021), Health Canada noted that many sediment study areas with levels of dioxins/furans exceeding the proposed site-specific target level (SSTL) will not be remediated (Figures K-1 to K-8 of Appendix A). Concerns remain regarding the re-suspension and transport of this sediment following the removal of the dam (i.e., post-remediation), which may allow for sediment with elevated levels of COPCs to be transported to locations where impacts to receptors (e.g., recreational water users and country food consumers) may be possible in the BHETF. The proponent's response states that <i>"While there may be some elevated concentrations of contaminants above the SSTLs remaining, exposure to these elevated concentrations over extended periods of time would be unlikely and exposure is better characterized based on an average concentration characterized by the 95 percent UCLM."</i> However, given the uncertainties associated with the current delineation of the wetland and estuary RMAs and determination of the remediation footprints (see HC comments on IAAC-49/50), the assessment of potential human health risks should be updated considering the 'suspended sediment in surface water exposure pathway' based on the updated delineation of the freshwater wetland and estuary RMAs. Additionally, the proposed temporary measures to reduce the mobilization of suspended sediment during remedial dredging (e.g., installation of silt curtains and access restrictions to visitors) will not be effective in controlling re-suspension of contaminated sediment or mitigating associated human exposures/health effects in the BHETF during the post-remediation phase. Uncertainties about the predicted quality of surface water, sediment and country foods in the BHETF could be addressed through the implementation of follow-up monitoring programs, which would ensure that people are not exposed to unacceptable levels of COPCs.	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: a) Provide an updated quantitative risk assessment considering the 'suspended sediment in surface water exposure pathway' based on an updated delineation of the freshwater wetland and estuary RMAs (see HC comment on IAAC-49/50). b) Develop a detailed follow-up program, in consultation with Indigenous groups and stakeholders, to monitor changes to the quality of surface water and country foods relative to baseline/background conditions in the BHETF after the dam removal, including information on: 1) the changes in contaminant levels in surface water/country foods relative to baseline/background levels that would require implementation of additional mitigation/risk management measures; and 2) the mitigation /risk management measures to be implemented if monitoring results show that the contaminant concentrations of surface water/country foods reach or exceed the predetermined changes in contaminant levels identified in 1).	Requires Technical Discussion: No
IR #: IAAC-42 IAAC-43	IR Number: IR(2)-42/43	Project Effects Link to CEAA 2012:	Reference to EIS: Appendix A	Context and Rationale: Insufficient information is provided on persistent and bioaccumulative substances present in the sludge dewatering	Specific Question/ Request for Information:	Requires Technical Discussion: No

		<p>5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.</p>	<p>Table H-1.4, pdf p.4884 Table 3.3, pdf p.5287 to 5288 Table 5.5, pdf p.5638 Table 5.2, pdf p.5624 Figure 6, pdf p.5398</p> <p>Appendix F Table A1 and A4, Section 5.1.4, Attachment A and Attachment F, pdf p. 396, 415, 441, 448, 449, 500, 502, 510</p> <p>The proponent's response to IRs Section 2.2.10, pdf p. 111 Section 2.2.11, pdf p. 112 Table 2.6, pdf p.86 Table 2.19, pdf p.161</p> <p>Pilot Scale Testing Construction Report Attachment A of Appendix F Section 5.1.3, pdf p.415 Section 5.1.4, pdf p.415 Table 5.1, pdf p.406</p>	<p>effluent, and associated potential impacts to country food in the BHSL, estuary and Northumberland Strait. Additionally, it remains unclear whether the pilot scale Geotube study results are sufficiently reliable to evaluate potential risks to human health through recreational water use and country food consumption.</p> <p>a) and b) The proponent's response (Section 2.2.10) states that "<i>As the predicted concentrations of various COPCs in surface water (including bio accumulative substances) during project related activities are below guidelines for the protection of human health as well as ecological receptors, COPCs in surface water do not pose a risk to human health through direct ingestion or accumulation in country foods.</i>" However, as indicated by Health Canada during the EIS review (February, 2021), the water quality guidelines [i.e., both the surface water quality guidelines for aquatic life protection³,⁴ and recreational water quality guidelines defined by the proponent as 10x values of the drinking water quality guidelines⁵] are not appropriate criteria to address potential contaminants accumulation in country foods via the aquatic food web. Even if concentrations of bioaccumulative contaminants are predicted to be below the water quality screening criteria at the discharge point of the sludge dewatering effluent, these contaminants can be transported in the surface water flow to the Northumberland Strait, and their characteristics may allow for bioaccumulation in country foods.</p> <p>The Geotube dewatering effluent (i.e., effluent from the sludge dewatering process) quality from the Pilot Scale Study (Pilot Scale Testing Construction Report, pdf p.440 to 451) indicates the presence of multiple bioaccumulative chemicals, including mercury, cadmium, lead, and polycyclic aromatic hydrocarbons (PAHs). Additionally, multiple species of dioxins/furans were also detected in Geotube effluent samples. For example, the mass balance modelling in Table 5.2 predicts that the concentration of 2,3,7,8-tetrachlorodibenzofuran will increase in BHSL surface water during remediation.</p> <p>c) and d) As the Geotube effluent data has been used to model future water quality of the BHSL and estuary, as well as of discharge to the Northumberland Strait, the accuracy of the Geotube effluent quality data obtained during the pilot test is important for evaluating potential risks to human health through recreational water use and country food consumption. However, there are multiple inconsistencies concerning the Geotube effluent data shown in the Pilot Scale Testing Construction Report:</p> <ul style="list-style-type: none"> • The number of samples collected is not clear. 	<p>Health Canada recommends that the proponent address the following comments in a revised project document:</p> <p>a) Provide a discussion on the potential impacts of the sludge dewatering effluent quality, especially bioaccumulative chemicals, to human health through recreational water use and consumption of country food harvested in the BHSL, estuary and Northumberland Strait. Propose monitoring and mitigation measures for potential exposure pathways.</p> <p>b) Update the CSM for Exposure Assessment for Human Receptors – Waste Management to include an operable exposure pathway for consumption of country foods in the Northumberland Strait.</p> <p>c) Provide data for the pilot Geotube effluent samples in a separate table, with clear indications of the type of sample (e.g., removal in the wet, removal in the dry, or composite) and any criteria exceedances. Confirm the number and identity of the pilot Geotube effluent samples tested for TPH. Provide a summary and interpretation of criteria exceedances identified.</p> <p>d) Discuss the uncertainty associated with the Geotube effluent quality predictions, including QA/QC outliers for holding time exceedances and whether the pilot Geotube study results can be considered reliable for the purposes of predicting future Geotube effluent quality. Discuss whether the predicted effluent quality is expected to be adequately protective of human health from potential exposure to effluent contaminants in the BHSL, estuary and Northumberland Strait, and any related uncertainties.</p>	
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³ Nova Scotia. 2013. NSE Tier 1 Environmental Quality Standards (EQSs) for Surface Water. Available at : https://novascotia.ca/nse/contaminatedsites/docs/Table_3_Tier1_EQS_for_Surface_Water.pdf

⁴ Canadian Council of Ministers of the Environment. Canadian Water Quality Guidelines for the Protection of Aquatic Life. Available at: <https://ccme.ca/en/resources/water-aquatic-life>

⁵ Health Canada. 2020. Guidelines for Canadian Drinking Water Quality Summary Table. Available at: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf

			<p>Table 5.2, pdf p.410 Table 5.5, pdf p.416 Table A1, pdf p.441 Table A4, pdf p.448 Table 3, pdf p.510</p>	<ul style="list-style-type: none"> ○ The proponent’s response (Section 2.2.11) states, “<i>The summary of laboratory analytical results for WWTF grab samples collected during the pilot study is presented [...] in Table 1 (Forecasted Leachate Quality, also referenced in IAAC-13 ECCC Information Response).</i>” However, “<i>Table 1</i>” appears to reference Tables 2.6 and 2.19 of the proponent’s response and these tables still do not provide specific information about the number of samples collected or individual data for each Geotube sample. ○ Section 5.1.4 reports that concentrations of modified Total Petroleum Hydrocarbons (TPHs) in two of the three Geotube effluent samples are higher than the maximum Industrial Approval criteria. However, there appear to be five samples of pilot Geotube effluent, collected on different dates, showing TPH exceedances (Table 5.1, Table 5.2, Table 5.5, Table A1, and Table A4). ● The presentation of exceedances is not consistent. Section 5.1.3 states that analysis of the composite 1 sample from the Geotube dewatering effluent shows that the concentration of all metals are in compliance with the assessment criteria, whereas the same sample results in Table A4 show exceedances of both cadmium and aluminum. ● There are concerns with sample holding times and subsequent quality assurance and quality control (QA/QC). There appear to be many samples that were analyzed well past the required sample holding times (Table 3 of Appendix F). For example, multiple methylmercury holding times were exceeded by up to 36 days. However, no discussion is provided on the uncertainty associated with these QA/QC outliers, or the significance of using estimated chemical concentrations to inform risk management decisions. 		
<p>IR #: IAAC-44</p>	<p>IR Number: IR(2)-44</p>	<p>Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.</p>	<p>Reference to EIS: The proponent’s response to IRs Section 2.2.12, pdf p. 114 Table 8, pdf p. 190</p>	<p>Context and Rationale: Information regarding baseline data collection and analysis is missing or insufficient. Health Canada recommended (February 2021) that the proponent recalculate baseline noise levels to determine representative baseline conditions⁶ by excluding data recorded during periods of wind speeds exceeding 14 kilometers per hour, presence of precipitation or other natural sounds like wildlife. Furthermore, Health Canada requested that the proponent provide a rationale as to the representativeness of measured baseline levels of ambient noise at point of reception (POR) locations, and to provide additional information on the use of windscreens.</p>	<p>Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: a) Clarify which noise measurement data points in Table 8 were taken during periods of rain, and clarify which data points were disregarded due to inclement weather. b) Provide a description, and ideally a picture, of the windscreen used during the baseline monitoring program.</p>	<p>Requires Technical Discussion: No</p>

⁶ International Organization for Standardization. 2007. ISO 1996-2:2007, Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of environmental noise levels.

				<p>a) In the proponent’s response to IAAC-44, although it is indicated in the footnotes for table 8 that “<i>Measurements recorded during inclement weather (winds speeds greater than 14 km/h and/or rain) were disregarded</i>”, the table appears to include measurements recorded during periods of wind speeds exceeding or equal to 14 km/h), as indicated in the right-hand column. It is therefore unclear whether all baseline noise measurements taken during periods of inclement weather (wind speeds ≥ 14 km/h; precipitation) were disregarded from the baseline data set, or if only the measurements taken during periods of rain were removed.</p> <p>b) The proponent’s response indicated, “<i>WSP utilized a type 1 noise monitoring system equipped with a windscreen attached to the microphone and preamp which allows any changes in air pressure due to noise to pass through while reducing the turbulence that wind can create during the baseline monitoring program.</i>” Additional detail is needed for Health Canada to evaluate the appropriateness of noise modelling methods employed by the proponent.</p> <p>c) Footnote 3 of Table 8 states that “<i>Bolded data represents the lowest measured Leq during the respective monitoring time period.</i>” However, no data are bolded and it is therefore unclear what this footnote is referring to.</p>	<p>c) Clarify what bolded data in the footnote 3 of Table 8 is referring to.</p>	
<p>IR #: IAAC-45</p>	<p>IR Number: IR(2)-45</p>	<p>Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.</p>	<p>Reference to EIS: The proponent’s response to IRs Appendix C – Noise Model Output File, pdf p. 203-253 Section 2.2.16 Tables 2.13 and 2.14, pdf p. 122</p>	<p>Context and Rationale: Sample calculations and contour maps to support the quantitative noise assessment were not provided. During the EIS review (February 2021), Health Canada requested that the proponent “<i>Provide the quantitative noise assessment model output file and related calculations that were used to support the predicted noise levels, contour maps, %HA calculations, and other noise-related information in the EIS.</i>”</p> <p>a) The Noise Model Output File (Appendix C of the proponent’s response to IRs) appears to show the noise levels modelled separately for each noise source (e.g., construction on-site haul route, bulldozer, etc.) and for each POR. The proponent does not appear to provide any calculations demonstrating how these modelled levels were combined/summed to determine the overall predicted noise levels at each POR indicated in Tables 2.13 and 2.14 in Section 2.2.16 of the proponent’s response. Sample calculations should be provided to verify whether or not all noise sources were considered collectively or only individually.</p> <p>b) Contour maps for the updated assessment do not appear to have been provided. While these may not be necessary for the review of the noise assessment (since predicted noise levels were provided), they</p>	<p>Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document:</p> <p>a) Provide sample calculations demonstrating how the modelled levels for each noise source in the Noise Model Output File were combined/summed to determine the overall predicted noise levels at each POR indicated in Tables 2.13 and 2.14 in Section 2.2.16 of the proponent’s response.</p> <p>b) Consider providing noise contour maps of predicted noise levels for the updated assessment.</p>	<p>Requires Technical Discussion: No</p>

				provide a visual representation which may be useful during public consultations.		
IR #: IAAC-46	IR Number: IR(2)-46	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent's response to IRs Section 2.2.14, pdf p. 115-116	Context and Rationale: Mitigation/management measures for potential noise impacts from pile driving are not adequately addressed. During the EIS review (February 2021), Health Canada requested that the proponent clarify whether impulsive sounds produced by project activities would occur, and if so, to update the assessment/noise modelling, clarify whether it was considered in the %HA calculations as per ISO 1996-1:2003, and then provide information as to how it will be managed/mitigated. The proponent's response states that, "Pile driving would not occur at night (i.e., between 22:00 and 07:00-hours)" (pdf p. 115) and that no mitigation is required for noise generated by pile driving as "The noise levels due to the impulsive pile driving are 60 dBA/dBAI at the worst-case receptor (POR6) which is below the daytime 65 dBA NSL criteria and <6.5 percent HA..." (pdf p. 116). However, in the event of public complaints about pile driving-related noise, and project-related noise in general, additional mitigation and/or monitoring should be considered and implemented in order to reduce public annoyance. Note that, ideally, pile driving should not occur between 7pm and 7am, or on weekends to the extent possible, as this may lead to an increased number of complaints.	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: Consider the following with regards to potential noise impacts from project activities involving impulsive pile driving: a) Develop and implement additional mitigation and/or monitoring in the event of public complaints about pile driving and project-related noise in general; and b) Limit activities involving pile driving to the daytime hours, i.e. 7am to 7pm to reduce the likelihood of noise complaints.	Requires Technical Discussion: No
IR #: IAAC-47	IR Number: N/A	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent's response to IRs Section 2.2.15, pdf p.116	Context and Rationale: Health Canada's comment regarding the inclusion of low frequency noise in the quantitative noise assessment has been sufficiently addressed.	Specific Question/ Request for Information: No further comment.	Requires Technical Discussion: No
IR #: IAAC-48	IR Number: IR(2)-48 a)	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent's response to IRs Section 2.2.16, pdf p. 116-123 Table 2.14, pdf p. 122 Figures 7.3-5 and 7.3-6, pdf p. 176-177 EIS Volume IV of V	Context and Rationale: The number of truck trips included in the assessment does not appear to be adequately supported, and it is unclear whether or why some project activities are excluded from the quantitative noise assessment. During the EIS review (February 2021), Health Canada requested that the proponent describe all noise sources evaluated in the quantitative noise assessment, including the numbers of each type of equipment that will be used and location/proximity to receptors, time-period when the equipment will be generating noise, sources evaluated on a time-weighted basis and for what duration of time, and which receptor locations will be impacted.	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: a) Provide clarification on how the number of trucks trips/daytime hour was determined. Clarify which POR location(s) will be affected by the 'worst-case scenario', especially considering that some vehicles may be travelling along routes near Pictou Landing First Nation, which may increase noise in the community.	Requires Technical Discussion: No

			<p>Section 7.3.3.3, pdf p. 308 (7-272)</p>	<p>a) The proponent’s response lists the assumptions used to calculate truck trips per hour (pdf p. 119): 10 trucks/daytime hour during construction activities; 2 trucks/daytime hour during remediation; and 2 trucks/daytime hour during demolition activities. In the evaluation of noise impacts, construction, demolition and remediation are considered to occur simultaneously for what would appear to be a total of 14 truck trips/daytime hour. While the 10 truck trips/daytime hour during construction activities do include 2 truck trips per hour to support the bridge construction, it is unclear how the assumptions were used to calculate a total number of 10 truck trips per daytime hour for the construction/remediation/demolition activities, and at what POR location(s) the ‘worst-case scenario’ applies to.</p> <p>b) According to figures 7.3-5 and 7.3-6, dredging activities in the estuary do not appear to be included in the updated assessment as a noise source. This is particularly important given that the main source of project-related noise at night will be dredging, for which the impact to human health was determined as being moderate in the original noise assessment.</p> <p>c) In the original noise assessment (EIS Vol IV of V), a +5 dB adjustment for tonality was included, whereas there is no such adjustment in the updated assessment as per the proponent’s response (pdf p. 117). Based on Health Canada guidance (2017)⁷, which states that “<i>in situations where more than one source characteristic adjustment is applicable (e.g. impulsive or tonal), only the higher of the adjustments is used,</i>” it is assumed that the tonality adjustment has been removed as a result of the application of the +12 dB impulsive sound adjustment. However, it is unclear whether the +5 dB tonality adjustment was retained for the prediction of noise levels at PORs that are unaffected by impulsive pile driving noise and to which the +12 dB impulsive sound adjustment was not applied. This is particularly relevant for back-up alarms or other types of tonal noise from project-related activities.</p> <p>d) The proponent’s response states, “<i>Construction of access roads and vegetation clearing were not considered in the noise assessment as the project preparation and construction will only include upgrades to existing road networks which would not require any new roads</i>” (pdf p.119). It is unclear why these activities are excluded from the quantitative noise assessment as vegetation clearing and any upgrades to existing road networks can still involve activities that produce noise and any potential source(s) of noise should be included in the quantitative assessment.</p>	<p>b) Clarify whether noise from dredging in the estuary was included in the quantitative noise assessment. If not, update the noise assessment to include noise from dredging in the estuary. Alternatively, provide justification for why it should be excluded.</p> <p>c) Clarify whether the +5 dB adjustment for tonality was applied in the updated quantitative noise assessment for PORs that are unaffected by impulsive pile driving noise (i.e., to which the +12 dB adjustment was not applied). If it was not applied to those PORs, please revise the updated noise assessment accordingly. Note that all time-of-day adjustments and the quiet rural area adjustment are to be added to the highest of the applicable source adjustments in the updated noise assessment.</p> <p>d) Include “<i>construction of access roads and vegetation clearing</i>” in the quantitative noise assessment. Alternatively, provide additional justification for why this component was excluded from the quantitative noise assessment.</p> <p>Editorial comment: e) Correct Table 2.14 to include the baseline noise levels and all other associated noise data for POR9.</p>	
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⁷ Health Canada (2017). Guidance for Evaluating Human Health Impacts in Environmental Assessment. Available at: <https://publications.gc.ca/site/eng/9.832514/publication.html>

				Editorial comment: e) In Table 2.14 of the proponent’s response, the baseline noise levels for POR9 appear to be incorrect as they are indicated as zero. The other associated noise measures in the table for POR9 therefore appear to be incorrect as well.		
IR #: IAAC-48	IR Number: IR(2)-48 b)	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent’s response to IRs Section 2.2.13, pdf p. 115 Section 2.2.14, pdf p.115 Section 2.2.16, pdf p. 116 EIS Volume IV of V Section 7.3.3.5 EIS Volume V of V Section 9.1.1	Context and Rationale: <u>Additional advice for Proponent’s consideration</u> a) The proponent presents mitigation measures in the original EIS and also states in response to IAAC-48 (Section 2.2.16) that “[noise reduction] will be achieved by controlling noise with attenuation (the distance between a noise source and a receptor), vertical separation/blocked line of sight, best practices for construction/ demolition and equipment design where feasible” (pdf p. 116). The proponent also mentions in the original EIS that a Complaint Procedure Protocol will be put in place and, in response to IAAC-45 (Section 2.2.13), states that monitoring and regular checks will be completed as part of the Project Environment Protection Plan. Health Canada reiterates that all technologically and economically feasible mitigation measures should be considered to mitigate project noise impacts (including those on sleep disturbance) and implemented in the event of noise-related complaints. This information is provided for advice and is not required to inform Health Canada’s review. b) Health Canada notes that we recommended the use of the ISO 1996-1:2003 standard in IAAC-46 (which was referenced in the proponent’s response (Section 2.2.14), which has since been updated. Although this does not affect the proponent’s assessment, the most current version is: International Organization for Standardization (ISO). 2016. ISO 1996-1:2016. Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures. Geneva, Switzerland. Reference Number ISO 1996-1:2016. or https://www.iso.org/standard/59765.html	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: a) See Appendix H of Health Canada’s <i>Guidance for Evaluating Human Health Impacts in Environmental Assessment (2017)</i> ⁸ for additional suggestions on mitigation measures in order to reduce the noise from project-related activities to the extent technically and economically feasible. b) Consider referring to the updated version of the ISO standard (1996:1-2016).	Requires Technical Discussion: No
IR #: IAAC-49 IAAC-50 IAAC-52	IR Number: IR(2)-49/50/52	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Reference to EIS: The proponent’s response to IRs Section 2.5.3, pdf p.151 Appendix A	Context and Rationale: Insufficient information/rationale is provided on how the freshwater wetlands and estuary RMAs are delineated or how the remediation footprints are determined.	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comments in a revised project document:	Requires Technical Discussion: No

⁸ Health Canada (2017). Guidance for Evaluating Human Health Impacts in Environmental Assessment. Available at: <https://publications.gc.ca/site/eng/9.832514/publication.html>

		<p>Choose an item.</p>	<p>pdf p.5202, 5204, 5208, 5209, 5211</p>	<p>a) The proponent’s response includes only a short conclusive remark that “Multiple sampling programs have been conducted in the Study Area between 2018 and 2019, and through these sampling programs, the presence of COPCs has been sufficiently characterized and significant data gaps are not present”. No detailed information or clear rationale is provided to verify that the freshwater wetlands and estuary RMAs are sufficiently delineated. For example, RMA2 (Figure K-2 of Appendix K of Appendix A) and RMA5 (Figure K-5 of Appendix A) do not appear to be laterally delineated beyond 19-FSP2-SED-32 / 19-FSP2-SED-36 and FSP3-SED-12, respectively.</p> <p>b) Additionally, it remains unknown how the remediation footprints are determined. For example, it is unclear what methodology was used to determine the boundaries of sediment removal at FSP2-SED-12 of RMA3 (Figure K-3 of Appendix K of Appendix A) and FSP3-SED-7A of RMA5 (Figure K-5 of Appendix K of Appendix A). If waterbody perimeters are used as the boundaries of the sediment removal, a detailed rationale should be provided for the assumptions that “Impacts [are] assumed to extend to pond edges” and “Impacts [are] assumed to extend to marsh edges” (Tables K-1 and K-2 of Appendix K of Appendix A). To adequately address the uncertainties associated with determining the volume of impacted sediment for removal, many Canadian jurisdictions recommend:</p> <ul style="list-style-type: none"> • that the remediation footprint extends to the next ‘clean’ sample location (i.e., where the concentration of the contaminant is equal to or below the applicable site condition standard for the contaminant)⁹ or, • where a contaminant hot-spot is detected, a ‘step-out’ delineation technique should be used to refine the estimate of the impacted media volumes^{Error! Bookmark not defined., 10, 11}. <p>It remains unknown whether these approaches were used to determine the extent of the impacted sediment removal in all RMAs.</p> <p>c) Uncertainties in the delineation of the freshwater wetland and estuary RMAs could be addressed through the implementation of follow-up monitoring programs, which would ensure that people are not exposed to unacceptable levels of COPCs.</p>	<p>a) Provide an updated delineation of the freshwater wetlands and estuary RMAs. Alternatively, provide detailed information/rationale to support the existing delineation, including information on how the sediment sampling, including the locations and number of samples, and delineation approach are sufficiently protective of human health.</p> <p>b) Provide detailed information/rationale to support the proposed boundaries of the impacted sediment for removal in each RMA of the freshwater wetlands and estuary. Include detailed rationale on:</p> <ol style="list-style-type: none"> 1) why the impacts are not assumed to extend beyond the perimeters of the waterbodies; 2) why the remedial footprints are not required to extend to the next sample where the contaminant level is equal or below the SSSL; and 3) whether a ‘step-out’ delineation technique is used to refine the estimate of the impacted sediment volumes. <p>c) As part of the proposed confirmatory sampling plan, develop a detailed post-remediation monitoring plan for sediment in freshwater and estuary RMAs, including information on:</p> <ol style="list-style-type: none"> 1) the sediment sampling approach (including sampling locations and number of samples); 2) the methodology/approach used to determine whether the residual contaminant levels would require additional remediation to adequately protect human health from all potential exposure pathways considered; and 3) the methodology/approach used to delineate any additional remediation footprints, if applicable. 	
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⁹ Ontario. 2021. O. Reg. 153/04: RECORDS OF SITE CONDITION - PART XV.1 OF THE ACT. Available at: <https://www.ontario.ca/laws/regulation/040153>

¹⁰ Saskatchewan Ministry of Environment. 2015. GUIDANCE DOCUMENT: Impacted Sites. Available at: <http://www.environment.gov.sk.ca/Default.aspx?DN=125d335b-34c4-4072-8e1e-fb9408498231>

¹¹ British Columbia Ministry of Environment. 2009. TECHNICAL GUIDANCE ON CONTAMINATED SITES. Available at: <https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/technical-guidance/tg01.pdf>

IR #: IAAC-51	IR Number: IR(2)-51	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent's response to IRs Section 2.2.17, pdf p.124 Appendix A pdf p.169	Context and Rationale: Insufficient information is provided about the re-assessment and future use of the contaminated cattails in the BHETF. Health Canada understands that the proponent will harvest the contaminated cattails at RMAs 3 and 5, re-evaluate the contaminant levels to determine whether the harvested cattails are suitable for use as mulch/ soil amendment and, if their levels are unacceptable, dispose of the harvested cattails in the proposed containment cell. The proponent's response states that <i>"Based on the results of the HHERA, current concentrations of COPCs in plants do not result in unacceptable health risks to human and ecological health. The cattails are considered suitable for mulch/soil amendment and are not expected to require disposal in the containment cell"</i> . However, nickel was detected in a cattail sample and the calculated health risk of the Pictou Landing First Nation (PLFN) resident from consumption of nickel in traditional food plants [i.e., hazard quotient (HQ) of 0.2; Table 6.14, Appendix A, pdf p.169] was equal to Health Canada's maximum threshold for <i>"essentially negligible"</i> health risk (i.e., an HQ of 0.2), although this value could have been overestimated. Additionally, the calculated cancer risk of the PLFN resident from consumption of polycyclic aromatic hydrocarbons (PAHs) in traditional food plants [i.e., an incremental lifetime cancer risk (ILCR) of 0.6×10^{-5} ; Table 6.14, Appendix A, pdf p.169] approaches Health Canada's threshold for <i>"essentially negligible"</i> cancer risk (i.e., an ILCR of 1×10^{-5}). Considering the uncertainties associated with calculating the health risks, Health Canada recommends that the proponent develop detailed procedures for re-evaluating and using (or disposing) the harvested cattails.	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document. a) Develop a detailed work plan, in consultation with Indigenous groups and stakeholders, for the re-assessment and future use of the harvested cattails, including information on: <ol style="list-style-type: none"> 1) the contaminants to be analyzed; 2) the sampling approach, including the locations of sampling and the number of samples; 3) the criteria used to determine whether the harvested cattails can be used as mulch/ soil amendment or should be disposed; 4) the procedures for harvesting, transport and processing (or disposal) of the cattails; and 5) the updated air quality effects assessment considering the activities described in 2). 	Requires Technical Discussion: No
IR #: IAAC-53	IR Number: IR(2)-53	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent's response to IRs Section 2.2.18, pdf p.125	Context and Rationale: Insufficient information is provided on the groundwater quality monitoring program and risk management plan. Health Canada understands that the proposed monitoring of groundwater quality within the project site will continue until after the completion of the proposed BHETF remediation activities. If future monitoring shows exceedances of Health Canada's Guidelines for Canadian Drinking Water Quality, a potable water exclusion zone could be established as part of the provincial Contaminated Sites Regulation and Ministerial Protocol framework. However, the proponent's response does not elaborate on the groundwater quality monitoring program or additional mitigation/risk management measures. Given the possibility of local residents' use of	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document. a) Develop a detailed groundwater quality monitoring program, in consultation with Indigenous groups and stakeholders, to monitor changes to the groundwater quality relative to baseline/background conditions throughout all phases of the project, including information on: <ol style="list-style-type: none"> 1) the changes in contaminant levels in groundwater relative to baseline/background levels that would 	Requires Technical Discussion: No.

				<p>water wells as drinking water sources, detailed planning is recommended to adequately protect human health. Additionally, it remains unclear what the proposed potable water exclusion zone could be, how it could be applied for the project, and how it would affect the Indigenous and non-Indigenous peoples' rights to use groundwater wells in the area.</p>	<p>require implementation of additional mitigation/risk management measures; and</p> <p>2) the mitigation and risk management measures, including the proposed potable water exclusion zone, to be implemented if monitoring results show that the contaminant concentrations of groundwater reach or exceed the predetermined changes in contaminant levels identified in 1).</p> <p>b) Provide details about the establishment of a potable water exclusion zone, including information on:</p> <ol style="list-style-type: none"> 1) the regulatory basis of the process; 2) the roles and responsibilities of the stakeholders; 3) the available exposure control measures, including physical/engineering and/or administrative ones; and 4) the potential impacts on Indigenous rights to use the groundwater. 	
<p>IR #: IAAC-54 a)</p>	<p>IR Number: IR(2)-54 a)</p>	<p>Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.</p>	<p>Reference to EIS: The proponent's response to IRs Section 2.2.19, pdf p.125</p>	<p>Context and Rationale: Health Canada's comment to include the regional study area and to consider traditional land use receptors in the air quality assessment is sufficiently addressed.</p>	<p>Specific Question/ Request for Information: No further comment.</p>	<p>Requires Technical Discussion: No.</p>
<p>IR #: IAAC-55</p>	<p>IR Number: IR(2)-55</p>	<p>Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.</p>	<p>Reference to EIS: The proponent's response to IRs Section 2.2.20, pdf p.126 Appendix U Tables 3-1 to 3-3, pdf p.12 to 14</p>	<p>Context and Rationale: Insufficient rationale was provided for whether the use of elevated baseline levels of nitrogen dioxide (NO₂), sulphur dioxide (SO₂), and carbon monoxide (CO) can support an accurate estimation of the air emission contributions by project activities and the development of mitigation measures and follow-up monitoring.</p> <p>There remains uncertainty associated with the use of the elevated baseline air quality levels for NO₂, SO₂, and CO (Air Quality Impact Analysis report, Appendix U) that were established while a local air emission source (i.e., a Kraft pulp mill) was still operational. The use of elevated baseline levels may lead to an overestimation of the overall expected health risks. This approach may also 'dilute' or conceal the project's own impacts on air quality and lead to an underestimation of</p>	<p>Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document:</p> <ol style="list-style-type: none"> a) Provide a discussion on uncertainties associated with using elevated baseline levels for NO₂, SO₂ and CO and describe how the uncertainties are considered in assessing project impacts on air quality and associated human health risks. b) Develop a detailed air quality monitoring program, in consultation with Indigenous 	<p>Requires Technical Discussion: No</p>

				<p>air emission contribution by project activities in relation to baseline conditions. It is important that representative baseline data be used so that the project-related change in ambient air quality may be accurately assessed in relation to baseline levels, and for effective mitigation measures and follow-up monitoring to be proposed. An air quality monitoring program would allow verification of the predicted concentrations of COPCs given the uncertainty associated with the baseline conditions.</p>	<p>groups and stakeholders, to monitor changes to the air quality relative to baseline conditions throughout all phases of the project, including the information on:</p> <ol style="list-style-type: none"> 5) the changes in air contaminant levels relative to baseline/background levels that would require implementation of additional mitigation/risk management measures; and 6) the mitigation and risk management measures to be implemented if monitoring results show that the air contaminant concentrations reach or exceed the predetermined changes in contaminant levels identified in 1). 	
<p>IR #: IAAC-56</p>	<p>IR Number: IR(2)-56</p>	<p>Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.</p>	<p>Reference to EIS: The proponent's response to IRs Section 2.2.21, pdf p.127</p>	<p>Context and Rationale: The health risks posed by air contaminants associated with diesel exhaust (DE) emissions are not sufficiently assessed.</p> <p>During the EIS review (February 2021), Health Canada recommended that an assessment of the health risks associated with the constituents of DE emissions, such as diesel particulate matter (DPM), volatile organic compounds (VOCs) and PAHs, be conducted separately. In response, the proponent states that <i>"The health effects data published for DPM include the range of organic species (including PAH and VOCs) that make up DPM. For this reason, additional analyses of the inhalation impact of the individual compounds contained in DPM was not warranted"</i> (Section 2.2.21). However, the full breadth of adverse effects posed by project-associated PAHs and VOCs emissions are not likely to be captured by assessing the health effects of DPM only, given that the component(s) of DE emissions, which is the most toxicologically relevant to the development of lung cancer or other health effects¹², has not yet been identified. Moreover, PAHs and VOCs can also be emitted from sources other than diesel vehicles/machinery (e.g., gasoline vehicles).</p> <p>Additionally, the proponent asserts that the EIS provided only an evaluation of non-cancer health effects of DPM based on the short-term exposure guidance values. However, long-term exposure to DPM is associated with both cancer and non-cancer health effects¹². Most of the VOCs (e.g., formaldehyde, acetaldehyde, benzene, 1,3-butadiene) and PAHs are also considered to be carcinogenic at very low concentrations.</p>	<p>Specific Question/ Request for Information:</p> <p>Health Canada recommends that the proponent address the following comment in a revised project document:</p> <ol style="list-style-type: none"> a) Provide the predicted VOC and PAH concentrations as part of the Air Quality Modeling Results and compare the predicted concentrations against applicable health-based air quality criteria. If the predicted concentrations exceed air quality criteria, proceed to b) below. b) Provide quantitative analyses of PAHs and VOCs to assess the potential impacts on human health. Alternatively, should other assessment approaches, including the use of surrogates and/or a qualitative assessment, be more appropriate, provide a detailed rationale/explanation for any deviation from characterization/assessment approaches recommended in a), as well as an estimate of the uncertainty associated with the use of the alternative approaches. c) Provide an evaluation of carcinogenic risks from DE using one of the approaches 	<p>Requires Technical Discussion:</p> <p>No</p>

¹² Health Canada. 2016. Human Health Risk Assessment for Diesel Exhaust. Available at: https://publications.gc.ca/collections/collection_2016/sc-hc/H129-60-2016-eng.pdf

				<p>Health Canada recommends the following approaches and methods to assess the health impacts of the project-associated emissions of VOCs, PAHs and DPM:</p> <p><u>VOCs</u> It is recommended to assess specific aldehydes that are associated with DE, such as acetaldehyde, formaldehyde, 1,3-butadiene and acrolein, as well as benzene.</p> <p><u>PAHs</u> It is recommended to assess the cancer risks of human exposures to all potentially carcinogenic PAHs in a mixture rather than a single surrogate substance. A mixture analysis (weighted approach) allows for the determination of the cancer risks of PAHs based on benzo(a)pyrene [B(a)P] Total Potency Equivalents (TPE), or the sum of estimated cancer potency relative to B(a)P, in comparison to the appropriate health-based toxicological reference values (e.g., Health Canada’s Inhalation Unit Risk).</p> <p><u>DE</u> DE is a complex mixture of gaseous and particulate compounds, including DPM. It is recommended to follow one of the approaches below for a carcinogenic evaluation of DE:</p> <ol style="list-style-type: none"> 1) Conduct a quantitative assessment of an incremental cancer risk associated with DE using the unit risk (expressed in terms of diesel particulate) available from the California Environmental Protection Agency (California EPA)¹³ in combination with model estimates of exposure to DE. This approach provides insight as to the potential impacts a specific project would have in relation to risk associated with the diesel emissions; or 2) Provide a robust qualitative discussion on the carcinogenic risk of DE associated with the project. The discussion should include the following elements to ensure transparency: i) identification of the main sources of DE associated with the project and discussion of the relative importance of DE as a source of air pollution for the project; ii) recognition that DE has been declared a human carcinogen by Health Canada and international agencies including the International Agency for Research on Cancer (IARC, as part of the World Health Organization), the United States Environmental Protection Agency (US EPA) and the California EPA; iii) the 	<p>recommended to fully characterize the human health implications of the project.</p>	
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¹³ California Environmental Protection Agency. 1998. The Report on Diesel Exhaust. Available online at: <https://ww2.arb.ca.gov/sites/default/files/classic/toxics/dieseltac/de-fnds.htm>

				rationale for not undertaking a quantitative analysis of DE carcinogenic risk associated with project emissions.		
IR #: IAAC-57	IR Number: IR(2)-57	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent's response to IRs Section 2.2.22, pdf p.127 Environmental Impact Statement (EIS) Section 3.1.2, pdf p.116	Context and Rationale: It is unclear whether the air quality assessment considers potential air quality changes caused by trucks used for the transportation of excavated waste. The proponent's response states that <i>"Dredged material described in Scenario 4 (Shoreline Dredging) will not be transported by trucks but pumped by the hydraulic dredges to the containment cell"</i> and that <i>"There is no provision for dry shoreline excavation"</i> . However, the proponent's response does not provide an explanation for a contradictory description in the EIS (Section 3.1.2) where <i>"The shorelines of the ASB, BHSL, wetlands and estuary, and the settling basins, and effluent ditches (current and historical) would be mechanically excavated. The material would be loaded directly into a truck (if at shore) or barge (if on the water) and subsequently loaded into a truck for transport f or disposal in the containment cell ..."</i> .	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: a) Clarify whether trucks will be used to transport excavated waste as described in Section 3.1.2 of the EIS. b) If excavated waste will be transported by trucks, clarify whether any air quality modelling scenarios consider associated air contaminant emissions, or update the air quality effects assessment to include related air contaminant emissions.	Requires Technical Discussion: No
IR #: IAAC-54 b) IAAC-58	IR Number: IR(2)-54 a)/58	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent's response to IRs Section 2.2.23, pdf p.128	Context and Rationale: Insufficient rationale is provided for why air deposition of contaminants from DE emissions onto soil and country foods is not an operable pathway. The proponent's response states that <i>"While PAHs do make up a significant portion of DPM, the uptake of PAHs by plants is limited and not considered a viable exposure pathway"</i> . However, there still exists the potential for deposition of DE emissions (e.g., PAHs) onto soil and edible plant tissues, and subsequent exposure through direct contact with soil and/or consumption of contaminated plants. Air contaminants may directly deposit onto the surface of edible plant tissues, as well as accumulate internally through root uptake. Deposition of contaminants onto the surface of plant tissues and subsequent human consumption may be an operable exposure pathway depending on food preparation and preservation methods, such as washing, peeling, cooking (raw, boiled, fried, baked, grilled, etc.), used by local country food consumers. Health Canada recommends that the proponent address the uncertainties associated with the potential impacts of air contaminants	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: Provide an assessment of the potential for PAHs from project emissions to be deposited onto soil. Predict soil deposition values, expressed as B(a)P total potency equivalent, and compare against established soil quality criteria, such as the CCME Soil Quality Guidelines for the Protection of Human Health ¹⁴	Requires Technical Discussion: No

¹⁴ Canadian Council of Ministers of the Environment (CCME). Canadian Soil Quality Guidelines for the protection of Environmental and Human Health. Available at: <https://ccme.ca/en/res/polycyclic-aromatic-hydrocarbons-2010-canadian-soil-quality-guidelines-for-the-protection-of-environmental-and-human-health-en.pdf>

				deposition and subsequent human exposures based on screening of the predicted soil contaminant levels against established criteria.		
IR #: IAAC-59	IR Number: IR(2)-59	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS:	Context and Rationale: Health Canada’s comment on the atmospheric release of sediment contaminants is sufficiently addressed.	Specific Question/ Request for Information: No further comment.	Requires Technical Discussion: No
IR #: IAAC-60	IR Number: IR(2)-60	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent’s response to IRs Table 1.4, pdf p.37	Context and Rationale: No detail is provided about the landfill gas (LFG) monitoring plan. The proponent’s response states that “ <i>LFG monitoring will be included as part of post closure care of the containment cell. A LFG monitoring program will be included in the application submitted to NSE for the Industrial Approval Application</i> ”, and does not address Health Canada’s comment to consider certain air contaminants [e.g., VOCs and reduced sulfur compounds (RSCs)] in the post-closure LFG monitoring program.	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: Update the list of air contaminants for the LFG monitoring plan for the post-closure phase to include VOCs and RSCs emissions.	Requires Technical Discussion: No
IR #: IAAC-61	IR Number: IR(2)-61	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.	Reference to EIS: The proponent’s response to IRs Section 2.2.24, pdf p.128 Environmental Impact Statement (EIS) Table 7.2-4, pdf p.250 to 252	Context and Rationale: No additional information/rationale is provided to justify the proposed determination criteria for significance of adverse residual effects for air quality. The proponent’s response does not provide further details about the secondary determination criteria for significance of residual effects, such as “marginally exceeding” a guideline or threshold value, or “the range of natural variation” (Table 7.2-4 of EIS). The proponent should also acknowledge that the Canadian Ambient Air Quality Standards (CAAQS) are not protective of human health, except for the 1-hour SO ₂ value, and that adverse health effects may occur below these values.	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document: Update the determination criteria for significance of adverse residual effects for air quality, including clarification on: 1) the range of natural variation and marginal exceedance scale in relation to the baseline/background conditions and established air quality guidelines, respectively; 2) the “appropriate guideline or threshold value” that will be used to determine the magnitude of residual effects; and 3) how the guideline and threshold values would adequately protect human health.	Requires Technical Discussion: No
IR #: IAAC-62a), b) IAAC-63 IAAC-65	IR Number: IR(2)-62ab/63/65	Project Effects Link to CEAA 2012:	Reference to EIS: The proponent’s response to IRs	Context and Rationale:	Specific Question/ Request for Information:	Requires Technical Discussion: No

		<p>5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions Choose an item.</p>	<p>Section 2.2.25, pdf p.129 Section 2.2.26, pdf p.131 Appendix A Tables H-1.6 and H-1.7, pdf p.4893 and 4898 Table H-1.8, pdf p.4903 Tables H-1.10, H-1.11 and H-1.15, pdf p. 4909, 4911, 4916 Table H-1.15, pdf p. 4916</p>	<p>Insufficient rationale/information is provided to support the conclusion that COPCs in fish and shellfish from the Northumberland Strait do not pose human health concerns.</p> <p>Common issues with food contaminants are elaborated below.</p> <p><u>Insufficient rationale to support sediment screening and exclude aluminum, lead and manganese from further consideration in an assessment of health risks from consumption of shellfish</u> The proponent’s response (Section 2.2.25) states that “<i>Aluminum, lead, and manganese were not identified as COPCs in sediment within the Study Area (Freshwater Wetland Areas, the BHSL and Associated Basins, the Estuary, or the Northumberland Strait) as the concentrations of these metals were below applicable screening guidelines.</i>” However, the exposure point concentration (EPC) (i.e., 95% upper confidence limit of mean, or 95% UCLM) for manganese is greater than the sediment quality guideline value for human health protection¹⁵ or the 95% UCLM background concentration (Tables H-1.6 and H-1.7). While the EPCs for aluminum and lead are below the guideline values, screening out COPCs in country foods against sediment quality guidelines is not appropriate. Additionally, alternative screening criteria, such as background concentrations of lead or aluminum in sediment, are not provided for comparison.</p> <p>The proponent further states, “<i>In particular, the maximum concentrations of these three metals [aluminum, lead and manganese] in sediment samples collected from the Northumberland Strait in the vicinity of the shellfish sample locations were below human health screening values for direct contact (aluminum - 3100 mg/kg; lead – 3.7 mg/kg; and manganese – 440 mg/kg).</i>” However, the proponent’s conclusion is based on analytical data from only two samples of the Northumberland Strait sediment (Table H-1.8).</p> <p><u>Insufficient rationale to support that aluminum, lead and manganese in sediment are not bioaccumulative in shellfish</u> The proponent states that aluminum, lead and manganese “<i>are not considered to be bio-accumulative COPCs</i>”. However, there is evidence that lead partitions primarily to sediments and bioaccumulates in benthic organisms¹⁶, and no evidence is provided to support that aluminum and manganese are not bioaccumulative in shellfish.</p> <p><u>Insufficient rationale to support use of background levels for screening of aluminum, lead, manganese and dioxins/furans in shellfish (clams)</u></p>	<p>Health Canada recommends that the proponent address the following comment in a revised project document:</p> <p>a) Provide quantitative risk assessments of aluminum and manganese for consumers of shellfish (i.e., clams) harvested from the Northumberland Strait.</p> <p>b) Provide updated screening of arsenic, cadmium, lead, mercury, and dioxin/furans in fish and shellfish harvested from the Northumberland Strait against health-protective criteria for country food consumers addressing all the data issues that Health Canada noted. Update the quantitative risk assessment where a contaminant exceeds the health-protective criteria.</p> <p>c) In the absence of such a screening, provide a quantitative risk assessment of these contaminants (arsenic, cadmium, lead, mercury and dioxin/furans) for consumers of fish and shellfish harvested from the Northumberland Strait.</p>	
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¹⁵ Nova Scotia Minister of Environment. 2013. Nova Scotia Remediation Levels Protocol, Tables 4a/4b: Pathway Specific Standards for Agricultural/ Residential Soil (soil ingestion and dermal contact), Coarse. Available at: https://novascotia.ca/nse/contaminatedsites/docs/Table_4_-_Nova_Scotia_Tier_II_Pathway-Specific_Standards_PSS_for_Sediment_-_Freshwater_and_Marine.pdf

¹⁶ US Environmental Protection Agency. 2011. "Region 5 Superfund, Ecological Toxicity Information." U.S. Washington (DC): Environmental Protection Agency. Available at: <https://archive.epa.gov/reg5sfun/ecology/web/html/toxprofiles.html>

			<p>As noted by Health Canada during the EIS review (February 2021), contaminant concentrations in clam tissue from the project site are compared to “background concentrations” collected from crab, lobster and mussels, rather than from clam. It is not appropriate to determine COPCs or characterize potential health risks from consumption of contaminated clams by comparing the measures levels to the background data collected from crustacean shellfish and other bivalve species. No rationale is provided to support how the proposed background contaminant concentrations from crab, lobster, and mussels can support proper screening of contaminants in clam tissue and assessment of potential human health risks.</p> <p><u>Insufficient rationale to support screening of arsenic, lead, mercury and dioxins/furans in fish and shellfish</u></p> <p>During the EIS review (February 2021), Health Canada clarified that it is not appropriate to use the Canadian Guidelines for Chemical Contaminants and Toxins in Fish and Fish Products (or CFIA guidelines)¹⁷ as screening criteria for arsenic, lead, mercury and dioxins/furans in non-commercial fish and shellfish. The CFIA guidelines are developed to determine compliance of commercial foods for the Canadian general population and thus the underlying assumptions may not be directly applicable to the screening of country foods. No scientific rationale is provided to support how the use of the CFIA guideline values can adequately protect the health of Indigenous and non-Indigenous consumers of non-commercial fish and shellfish from the Northumberland Strait, including how their consumption patterns (e.g., serving size and consumption frequency) are comparable to the consumption patterns used in the development of the CFIA guidelines.</p> <p>Specific issues for each contaminant are also explained below.</p> <p><u>Arsenic</u></p> <p>The proponent assumes that the measured arsenic levels in whole fish, fish fillet and shellfish samples (Tables H-1.10, H-1.11 and H-1.15) are comparable to background concentrations as both levels are below the analytical detection limit. However, it remains unknown whether the sample measurements are truly different from background levels. Additionally, contrary to the proponent’s statement, background concentrations of COPCs in shellfish are not provided.</p> <p><u>Cadmium</u></p> <p>The proponent also assumes that cadmium levels in whole fish, fish fillet and shellfish samples (Tables H-1.10, H-1.11 and H-1.15) are</p>		
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¹⁷ CFIA (Canadian Food Inspection Agency). 2016. Fish Products Standards and Methods Manual. Appendix 3: Canadian Guidelines for Chemical Contaminants and Toxins in Fish and Fish Products. Available at: <https://inspection.canada.ca/food-safety-for-industry/archived-food-guidance/fish-and-seafood/manuals/standards-and-methods/eng/1348608971859/1348609209602?chap=7>

				<p>comparable to background concentrations, which is not properly supported, as explained above. Additionally, the detection limit (0.3 µg/g) appears to be far greater than the health-protective screening criteria value¹⁸ (0.0846 µg/g), which adds further uncertainty about the screening of cadmium.</p> <p><u>Lead</u> The proponent’s response (Section 2.2.26) states that “<i>In shellfish (clams) collected from Northumberland Strait, lead was detected at concentrations marginally greater than the human health guideline and background. Lead was not identified as COPC in sediment within the Study Area, lead is not associated with the historical activities of the BHETF, and lead is not considered bio-accumulative in sediment.</i>” However, the 95% UCLM (i.e., 1.592 µg/g) appears to be greater than the background concentration (i.e., 0.9 µg/g) although the two groups are not compared with a statistical test.</p> <p><u>Mercury</u> While the proponent’s response (Section 2.2.25) states that mercury was not detected in shellfish (clams), it appears that no clam samples were analyzed for mercury (Table H-1.15). The proponent’s response (Section 2.2.26) also states that “<i>Mercury was also not detected in any of the shellfish samples (crab, lobster, and mussels) collected by Dalhousie University from the Northumberland Strait. Mercury was not identified as a sediment COPC for the Study Area.</i>” Mercury levels do not appear to have been analyzed in crab, lobster, and mussels either (Table H-1.15).</p> <p><u>Dioxin/Furans</u> As the 95% UCLM of dioxins/furans in fish is provided only for the contaminated samples, but not for the reference samples (Table H-1-10), it is unclear whether the levels of dioxins/furans in fish are statistically comparable to background levels as stated by the proponent (Section 2.2.25). Additionally, the 95% UCLM of dioxins/furans in clams (2.104 µg/g) is greater than background level (0.965 µg/g) (Table H-1-15) and the two values are not compared with a statistical test.</p>		
IR #: IAAC-64	IR Number: IR(2)-64	Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Reference to EIS: The proponent’s response to IRs Section 2.2.27, pdf p.132	Context and Rationale: Further assessments of health risks of cadmium and vanadium from consumption of game organs are not provided. The proponent’s response (Section 2.2.27) states that “ <i>The discussion of the alternative absorption factors in Section 6.4.3.6 of the HHERA</i>	Specific Question/ Request for Information: Health Canada recommends that the proponent address the following comment in a revised project document:	Requires Technical Discussion: No

¹⁸ United States Environmental Protection Agency. 2019. Regional Screening Levels (RSLs) Calculator for Fish. Available at: https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

		<p>Choose an item.</p>		<p><i>(Appendix A of the EIS) provides support that assuming 100 percent absorption of the COPCs is an overly conservative approach given that the available absorption factors published in the literature indicate a lower absorption from oral exposure.</i> While the Health Canada-recommended absorption factor of 1.0 has been used to calculate the risk from the consumption of game organs, it appears that the identified risk has not been further addressed in the HHERA, or in the development of appropriate mitigation measures or assessment of residual effects, based on the argument that the use of an absorption factor of 1.0 is an “overly conservative” approach. Insufficient rationale has been provided to support this argument or why the proponent’s alternative approach of using the US EPA’s gastrointestinal absorption factors is more appropriate.</p>	<p>In the absence of an appropriate rationale to support the use of the proposed US EPA gastrointestinal absorption factors of less than 1.0, provide detailed information about mitigation measures, residual effects, and follow-up monitoring plan associated with the risk assessment results based on an absorption factor of 1.0 for cadmium and vanadium.</p>	
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