

Environmental Health Program (EHP) Atlantic Region Regulatory
Operations and Enforcement Branch
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February 8, 2021

Lachlan MacLean
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Sent by e-mail to: lachlan.macleam@canada.ca and iaac.boatharbour.aeic@canada.ca

Subject: Health Canada's technical review of the Environmental Impact Statement (EIS) for the Boat Harbour Remediation Project

Dear Lachlan:

Health Canada (HC) is participating in the environmental assessment review of the Boat Harbour Remediation Project as a Federal Authority under the *Canadian Environmental Assessment Act, 2012*.

As requested on December 17, 2020, HC has undertaken a technical review of the EIS for the Boat Harbour Remediation Project related to HC's areas of expertise: human health risk assessment (HHRA), contamination of country foods, air quality health effects, recreational and drinking water quality health effects, and human health impacts from noise.

In order to enable a more comprehensive review, analysis and understanding of potential human health effects of the Project, HC has provided technical comments and information requests in the attached Annexes.

HC offers the Impact Assessment Agency of Canada detailed comments in the attached table (Annex 2) for consideration. In summary, the following gaps in the proponent's analysis/information relative to the EIS guidelines remain:

- Clarification and revision of spatial boundaries used to assess potential health effects of the proposed project;
- Methodological issues with the risk characterization;
- Inadequate screening of contaminants of potential concern (COPCs) and evaluation of exposure pathways associated with these COPCs;
- Incomplete information on the proposed risk management approaches to be utilized in the project;
- Inadequate evaluation of potential impacts of project-related activities on human health; i.e. sediment transport;
- Inadequate evaluation of potential contaminants in country foods;
- Incomplete information on potential air contaminants, emission sources, human receptor locations, exposure pathways and associated health impacts;
- Incomplete information on the measurement of baseline noise levels, modelling inputs, and modelled noise levels and associated health impacts.



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HC is of the opinion that the EIS does not adequately describe the potential impacts of the remediation project on human health and provides insufficient information to support the conclusions presented in the EIS. The lack of Project-specific details and supporting evidence consequently limits a constructive evaluation of these conclusions.

Should you have any questions regarding HC's comments, please contact Maureen Robinson, who can be reached at Maureen.Robinson@canada.ca or 1-902-221-5606.

Sincerely,

<Original signed by>

Chantal Roberge
National Director, Environmental Health and Internationally Protected Persons Programs
Regulatory Operations and Enforcement Branch
Health Canada

cc: Beverly Ramos-Casey, A/Regional Manager-Environmental Health Program, Health Canada
Dae Young Lee, Environmental Assessment Specialist, Health Canada
Kathleen Buset, Manager, Healthy Environments and Consumer Safety Branch, Health Canada
Ninon Lyrette, Senior Environmental Health Assessment Specialist, Health Canada

Annex 1: Boat Harbour Remediation Project – Technical Review of Environmental Impact Statement (EIS) (February 8, 2021)

Questions	Responses/Comments
<ul style="list-style-type: none"> Has the proponent described all project components and activities in sufficient detail to understand all relevant project-environment interactions? If not, identify what additional information is needed. 	<p>No, HC is of the opinion that project components and activities were not described in sufficient detail. Additional information has been requested for several subject areas including but not limited to project-environment interactions that may impact surface water, country foods, air, and noise. See comments HC-HHRA-04, HC-HHRA-06, HC-HHRA-07, HC-RMP-01, HC-RMP-05, HC-AQ-03, HC-AQ-04, HC-AQ-05, HC-DW-01, HC-DW-02, HC-AE-03, HC-AE-05, HC-AE-06, HC-AE-07, and HC-AE-08 in Annex 2 for additional details.</p>
<ul style="list-style-type: none"> Were the study areas sufficient to predict potential effects from all relevant project-environment interactions, and to consider the effects within a local and regional context? 	<p>No, HC is of the opinion that the study areas were not sufficient to predict potential effects from all relevant project-environment interactions, and to consider the effects within a local and regional context. Study areas did not encompass all project-related impacts and as such may have excluded potential receptors and/or underestimated potential risks to human health. See comments HC-HHRA-03, HC-HHRA-04, HC-HHRA-07, and HC-AQ-01 in Annex 2 for additional details.</p>
<ul style="list-style-type: none"> Is the baseline information sufficient to characterize the existing environment, predict potential effects and obtain monitoring objectives? If not, identify what additional information is needed. 	<p>No, HC is of the opinion that baseline information was not sufficient to characterize the existing environment, predict potential effects and obtain monitoring objectives. See comments HC-AQ-02, HC-CF-01 and HC-AE-01 in Annex 2 for additional details.</p>
Alternatives Assessment	
<ul style="list-style-type: none"> Has the proponent adequately described the criteria it used to determine the technically and economically feasible alternative means? Has the proponent listed the potential effects to valued components (VCs) within your mandate that could be affected by the technically and economically feasible alternative means? Has the proponent adequately described why it chose each preferred alternative means? 	<p>HC does not provide comments on alternative means.</p>



Questions	Responses/Comments
<ul style="list-style-type: none">Are there other alternative means that could have been presented? If so, please describe.	
Environmental Effects Assessment	
<ul style="list-style-type: none">Has the proponent clearly described all relevant pathways of effects to be taken into account under section 5 of CEAA 2012?	No, HC is of the opinion that not all potential exposure pathways were considered in the assessment. See comments HC-HHERA-01, HC-HHERA-04, HC-HHERA-06, HC-HHERA-08, HC-HHRA-01, HC-HHRA-05, HC-RMP-04, HC-CF-04, and HC-AQ-06 in Annex 2 for additional details.
<ul style="list-style-type: none">Has the proponent identified all potential effects to VCs, including species at risk, within your mandate?	No, HC is of the opinion that the assessment of potential human health effects has not been thoroughly evaluated. See comments in Annex 2 for additional details.
<ul style="list-style-type: none">Were all potential receptors considered?	No, HC is of the opinion that traditional land users and residential receptors in the nearby communities that may potentially be impacted by the project activities are not sufficiently considered. See comments HC-CF-01, HC-AQ-01, and HC-AQ-09 in Annex 2 for additional details.
<ul style="list-style-type: none">Were the methodologies used by the proponent appropriate to collect baseline data and predict effects, why or why not?	No, HC is of the opinion that the EIS should provide further rationale or additional information related to selection of COPCs, emission sources, human receptor locations, and exposure pathways. See comments HC-AQ-03, 04 and 05 in Annex 2 for additional details.
<ul style="list-style-type: none">Has the proponent explicitly addressed the degree of scientific uncertainty related to the data and methods used within the assessment? If there are unaccounted for scientific uncertainties, describe them and indicate the options for increasing certainty in the predictions?	No, HC is of the opinion that the degree of uncertainty associated with data and methods are not properly addressed in several instances. See comments HC-HHERA-08, HC-RMP-03 and HC-RMP-04 in Annex 2 for additional details.
<ul style="list-style-type: none">Are the predicted effects described in objective and reasonable terms (e.g. beneficial or adverse, temporary or permanent, reversible or irreversible)?	No, HC is of the opinion that chronic and sub-chronic effects were not adequately evaluated. See comments HC-HHERA-05 and HC-HHRA-03 in Annex 2 for additional details.
<ul style="list-style-type: none">Has the proponent adequately assessed the potential cumulative environmental effects, including using appropriate temporal and spatial boundaries, examining physical activities	No, HC is of the opinion that the EIS did not sufficiently consider the potential cumulative impacts of other projects. See comments HC-AQ-01 and HC-AQ-11 in Annex 2 for additional details.

Questions	Responses/Comments
<p>that have been and will be carried out, and proposing mitigation and follow-up program requirements? Provide rationale.</p>	
<ul style="list-style-type: none"> Has the proponent adequately described the potential for environmental effects caused by accidents and malfunctions, including the types of accidents and malfunctions, their likelihood and severity and the associated potential environmental effects? If not, identify what additional information is needed. 	<p>Yes, HC is of the opinion that potential adverse environmental effects due to accidents and malfunctions appears to be adequately considered in various case scenarios.</p>
<ul style="list-style-type: none"> Are you satisfied with the proponent’s assessment of effects of the environment on the Project? 	<p>No, HC is of the opinion that it is unclear whether some of the major project activities (e.g., decommissioning of existing infrastructure, sediment re-suspension) were adequately considered in the assessment of effects of the environment on the Project.</p>
<ul style="list-style-type: none"> Has the proponent characterized the likelihood and severity appropriately? Provide rationale. 	<p>No, HC is of the opinion that the likelihood and severity of effects were not appropriately characterized as project components and activities were not described in sufficient detail to allow for such characterization.</p>
<ul style="list-style-type: none"> Has the proponent sufficiently described and characterized the project activities and components as they relate to federal decisions within your mandate? If not, identify what additional information is needed. 	<p>No, HC is of the opinion that the potential impacts to human health have not been sufficiently described and characterized. See comments in Annex 2.</p>
<ul style="list-style-type: none"> Are changes to the environment, as they relate to federal decisions within your mandate, sufficiently described? If not, identify what additional information is needed. 	<p>No, HC is of the opinion that effects on country foods, water and air quality were not sufficiently characterized.</p>
Mitigation	
<ul style="list-style-type: none"> Has the degree of uncertainty regarding the effectiveness of the proposed mitigation measures been described? If not, identify what information is needed. 	<p>No, HC is of the opinion that uncertainty regarding effectiveness of mitigation measures is not discussed (in many or all instances), and mitigation measures proposed in the EIS are generally not specific to allow for such a discussion.</p>

Questions	Responses/Comments
<ul style="list-style-type: none"> Is it clear how each proposed mitigation measure links to each potential pathway of effect? 	<p>No, HC is of the opinion that mitigation measures specific for each exposure pathway were not provided, therefore HC is unable to assess at this time. See comment HC-EIS-01 in Annex 2 for additional information.</p>
<ul style="list-style-type: none"> Would you propose different or additional mitigation measures? If so, provide a description of the mitigation measure(s), with rationale. 	<p>HC does not propose mitigation measures.</p>
<ul style="list-style-type: none"> Which of the proposed mitigation measures and/or project design elements do you consider to be necessary to reduce the likelihood of significant adverse environmental effects? Provide rationale. 	<p>HC is of the opinion that insufficient information has been provided to support the effectiveness of the mitigation measures proposed in the EIS. See comment HC-EIS-01 in Annex 2 for additional information.</p>
Residual Adverse Environmental Effects	
<ul style="list-style-type: none"> Are the identification and documentation of residual environmental effects described by the proponent adequate? If not, what are the aspects for which there is uncertainty and, where possible, indicate how these residual effects can be best described. If there is uncertainty, what are the options for increasing certainty? 	<p>No, HC is of the opinion that residual effects and uncertainty relating to sediment mobilization and remediation based on Exposure Point Concentration (EPC) are not adequately described. See comments HC-HHRA-05, HC-RMP-01, HC-RMP-02, HC-RMP-03, HC-RMP-05, HC-RMP-06, and HC-RMP-07 in Annex 2 for additional details.</p>
<ul style="list-style-type: none"> Did the proponent provide a sufficiently precise, ideally quantitative, description of the residual environmental effects related to your mandate? Identify any areas that are insufficient. 	<p>No, HC is of the opinion that sufficiently precise descriptions of residual effects were not provided for country food, recreational water, and drinking water impacts. See comments in Annex 2 for additional details.</p>
Determination of Significance	
<ul style="list-style-type: none"> Are the conclusions on significance in the EIS supported by the analysis that is provided? 	<p>No, HC is of the opinion that the conclusions on the significance of health impacts are not sufficiently supported as insufficient information was provided to support some of the conclusions. See comments in Annex 2.</p>
<ul style="list-style-type: none"> Are the proponent's proposed criteria for assessing significance appropriate? This includes how the criteria were characterized, ranked, and weighted. Provide rationale. Where the proponent has not used one of the Agency's recommended key criteria (magnitude, geographic extent, duration, frequency, 	<p>No, HC is of the opinion that the proponent's significance determination criteria for air quality changes are unclear. Additional assessment may also be required for noise, based on requested revisions.</p>



Questions	Responses/Comments
reversibility, and social/ecological context), has a rationale been provided?	
• Were appropriate methodologies used in developing the conclusions on significance?	HC is unable to comment at this time as the proponent's significance determination criteria for air quality changes are unclear.
• Do you agree with the proponent's analysis and conclusions on significance? Provide rationale.	HC provides comments on the methodologies used to determine significance only.
Monitoring and Follow-up	
• Does the proposed monitoring and follow-up program verify the predictions of the environmental assessment as they relate to section 5? Please explain additional monitoring or follow-up needed to address uncertainty in the effects assessment.	No, HC is of the opinion that the EIS should consider additional potential air contaminants and their emissions. Additionally, monitoring plans for country foods was not included
• Does the proposed monitoring and follow-up program verify the effectiveness of proposed mitigations as they relate to section 5? Explain additional monitoring or follow-up needed to address uncertainty in the proposed mitigation.	No, see previous question.
• Is the objective of the follow-up program clear and measurable?	No, details surrounding the follow-up-monitoring plan were not provided.
• Does the follow-up program include sufficient detail, and technical merit, for the Agency to achieve the stated objective through a condition (e.g. sufficient baseline dataset, monitoring plans, acceptable thresholds of change, contingency procedures)?	No, details surrounding the follow-up-monitoring plan were not provided.
• Are you aware of any federal or provincial authorizations or regulations that will achieve the same follow-up program objective(s)? If so, how do these achieve the objective(s)?	No.
Additional comments, views, advice	
• Provide any other comments.	

Annex 2: Boat Harbour Remediation Project – Technical Review of Environmental Impact Statement (EIS) (February 8, 2021)

ID	Project Effects Link to CEEA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
EIS General Comments					
HC-EIS-01	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	EIS, Table 7.3-1- <i>Mitigation Measures and Best Management Practices</i>	<p>Insufficient information has been provided to support the effectiveness of the mitigation measures proposed in the EIS.</p> <p>Mitigation measures aim to eliminate, reduce or control adverse environmental effects related to a project. The EIS should provide information describing the mitigation measures addressing operable pathways where unacceptable risks to human health have been identified. These proposed mitigation measures should reduce the risk to acceptable levels and the effectiveness of these mitigations measures should be adequately supported by science.</p> <p>The mitigation measures presented in the EIS (Table 7.3-1) do not provide sufficient detail. For example, the EIS notes that “<i>Control noise by maintaining separation distance between source and receptor and equipment design, where feasible</i>” however, there is no justification or rationale to support effectiveness. These mitigation measures are unable to be evaluated for adequacy as they lack necessary details, including:</p> <ul style="list-style-type: none"> the contaminants of potential concern (COPCs) and pathway of exposure targeted; the threshold value(s) of the COPCs at which mitigation is necessary (with applicable rationale as necessary); the mitigation measure(s) to be employed for each threshold/limit that is exceeded with evidence supporting its anticipated effectiveness; proposed monitoring activities to determine effectiveness of the proposed measure(s); and additional mitigation measures to be utilized as necessary to reduce the risk to human health to acceptable levels. <p>In addition to the mitigation measures proposed in Table 7.3-1 of the EIS, all technically and economically feasible mitigation measures should be implemented in order to reduce project impacts at all nearby receptor locations. Examples of commonly applied [EA project] mitigation measures and considerations for reduction of impacts may be found in Health Canada's guidance documents (listed in HC-01 of Annex 3).</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide additional supporting evidence for the effectiveness of proposed mitigation measures.</p> <p>b) Include additional applicable/relevant mitigation measures as per HC guidance, providing details on impacts/pathways mitigated and effectiveness”.</p>
HC-EIS-02	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	EIS- not included Risk Management Plan (Appendix K of Appendix A)	<p>Clarification on post-remedial confirmatory sampling plan</p> <p>The Risk Management Plan (RMP) of the Human Health Ecological Risk Assessments (HHERA) provides details on the areas and volumes of sediment requiring risk management in the Freshwater Wetlands and Estuary. Health Canada (HC) was unable to locate post-remedial confirmatory sampling plan(s) in the EIS submission and would recommend that such sampling be conducted to enable verification of remedial targets relating to sediment COPC concentrations.</p>	<p>Health Canada recommends the following be requested from the proponent:</p> <p>a) Clarification on if post-remedial confirmatory sampling plan(s) have been developed and will be submitted for review.</p>
Human Health Ecological Risk Assessments (HHERA)					
HC-HHERA-01	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	HHERA (Appendix A), Section 6.4.3	<p>Methodology issues with the calculation of the risk estimates associated with project-related exposure pathways.</p> <p>HC does not support the methodology used to adjust the target Hazard Quotient (HQ) for vanadium to 0.5 in the Risk Characterization section of the HHERA. In section 6.4.3</p>	<p>Health Canada recommends the following be requested from the proponent:</p> <p>a) Revise the risk estimates considering that project-related sources of exposure should achieve a HQ of ≤0.2. Alternatively, provide</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>of the HHERA, it is stated that “<i>Since vanadium was either not detected or detected at concentrations less than the guidelines for groundwater and surface water, exposure to vanadium through water is considered to be negligible. Therefore, exposure to water can be eliminated for vanadium. Vanadium is not volatile. Furthermore, vanadium was not identified as a COPC in soil and the Upland Study Area soil concentration is less than the background soil concentration. Furthermore, exposure to vanadium in airborne particulates is expected to be negligible for sediments. Therefore, exposure to air can also be eliminated for vanadium. Vanadium is also not expected to be associated with any consumer products at the Site. Therefore, the only applicable exposure media remaining at the Site for vanadium are sediment and food. Using the equation presented above, the target HQ value can be increased from 0.2 (100%/5 exposure media) to 0.5 (100%/2 exposure media) for assessing potential hazards at the Site from vanadium.</i>”</p> <p>While this methodology may be appropriate for adjusting the Soil Allocation Factor (SAF) (a numerical parameter used in site-specific target level calculations; per CCME (2006)), “<i>the soil allocation factor may be increased from 20% to a value given by: SAF = 100% / (number of applicable exposure media)</i>”), it is not an appropriate basis to adjust the target HQ. For example, although vanadium was “<i>not detected or detected at concentrations less than the guidelines for groundwater and surface water</i>”, it is not possible to ascertain that these concentrations represent an HQ of 0.2 unless the exposure pathways from these media have been deemed inoperable.</p> <p>A target HQ of ≤ 0.2 should be applied when background (i.e., off-site) exposures to the same substance may occur from other sources unrelated to the subject contaminated site and at locations other than the contaminated site. If these background exposures are not quantified (as is the case in this HHERA), they cannot be assumed to be absent. Therefore, applying a target HQ value of ≤ 0.2 minimizes the likelihood that total exposure (i.e., site + background) will exceed the toxicity reference value from all sources and locations to which a person may be exposed to the substance. When background exposures have been quantified, in addition to all on-site exposures, then a target HQ of 1.0 may be used to identify whether a potential risk may exist.</p>	<p>justification for the appropriateness of using a HQ >0.2 for a specific pathway.</p> <p>Reference: A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines. Canadian Council of Ministers of the Environment (CCME). 2006. http://cegg-rcqe.ccme.ca/download/en/351?redir=1611842640</p>
HC-HHERA-02	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	HHERA (Appendix A), Appendix H, Tables H-2-19 to H-2-22.	<p>Lack of consideration of non-soil on-site exposures in the Site-Specific Target Levels (SSTLs) derived for vanadium and dioxins/furans in sediment.</p> <p>The HHERA report identifies SSTLs for both vanadium and dioxins/furans Toxic Equivalent (TEQ) in sediment. The proponent has not included in the equation a consideration for non-soil on-site exposures identified in the HHERA. A SAF of 0.2 is recommended by CCME (2006) for soil in the default scenario for guideline development in order to allow for 80% of the remaining tolerable incremental exposure for other on-site exposures to air, water, food, and consumer products. Per CCME (2006), “<i>the soil allocations factor may be increased from 20% to a value given by: SAF = 100% / (number of applicable exposure media)</i>”.</p> <p>By not allocating residual risk for other site-related exposures to COPCs in the SSTL equation, there remains uncertainty regarding potential human health impacts resulting from total site-related exposures.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Include a numerical SAF in the SSTL equation to account for exposure to COPCs in other on-site media, or provide a detailed rationale why the current equation is sufficiently protective of human health.</p>

ID	Project Effects Link to CEEA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
HC-HHERA-03	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 3.2.3- Spatial and Temporal Boundaries Section 7.3.7 - Mi'kmaq of Nova Scotia	HHERA (Appendix A), Figure 1A, Sections 1 and 6, Figure 12.	<p>Clarification regarding the HHERA Study Area Boundaries</p> <p>The HHERA Study Area boundaries are not clearly identified. Figure 1A depicts a site footprint (orange dotted line) encompassing the Boat Harbour Stabilization Lagoon (BHSL), and the text in Section 1 and Section 6 state that environmental data collected from the BHSL was included in the HHERA dataset. However, the Conceptual Site Model (CSM) for Human Receptors at the Boat Harbour Effluent Treatment Facility (BHETF) (Figure 12) does not appear to include the BHSL study area.</p> <p>It is unclear which portion of the Study Area, and therefore which data is included, with respect to the scope of HHERA.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide a figure, which clearly outlines the Study Area boundaries with respect to the scope of the HHERA.</p> <p>b) Clarify whether environmental data collected from the BHSL was included in the HHERA dataset.</p>
HC-HHERA-04	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 3.2.3- Spatial and Temporal Boundaries Section 7.3.7 - Mi'kmaq of Nova Scotia	HHERA (Appendix A), Figure 12	<p>Identification of operable exposure pathways within the BHETF areas.</p> <p>The CSM for Human Receptors (Figure 12) does not include exposure to contaminants in any media in the BHETF areas (the BHSL and its associated basins, the Twin Settling Basins [TSBs] and Aeration Stabilizing Basin [ASB]). However, the spatial scope of the HHERA is indicated throughout the report to include the BHETF areas. The exclusion of these areas of the site from the CSM and from evaluation in this HHERA may underestimate potential risks to human health to future users of the site.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Identify whether operable exposure pathways exist in the BHETF areas or provide rationale why these areas were not included in the CSM.</p> <p>b) Provide a discussion as to how risk management decisions in the BHETF areas will be protective of human health, considering all potential exposures by future users of the BHETF areas of the site.</p>
HC-HHERA-05	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	HHERA (Appendix A), Sections 6.3 (Toxicity Assessment) and 6.4 (Risk Characterization), Tables H-2.10 to H-2.22 of Appendix H	<p>Underestimation of risks to human health associated with the use of sub-chronic toxicological reference values (TRVs)</p> <p>The use of sub-chronic TRVs may underestimate human health as the risks associated with 30-week-a-year exposures were not conducted according to HC DQRA guidance (HC, 2010).</p> <p>Sub-chronic TRVs for vanadium and dioxins/furans TEQ were applied in the HHERA to calculate risks from sediment direct contact to multiple receptors at the site. Site users are anticipated to be exposed to sediment on a less-than-ongoing basis (30 weeks a year, with repeated annual exposure), yet the country food exposures for the same COPCs were identified as chronic in the report (i.e., people may be exposed to COPCs through food consumption over a year, with repeated annual exposure). The proponent does not provide justification for designating the 30-week-a-year exposures as sub-chronic, although a sub-chronic TRV was applied. HC recommends that human exposures occurring over a period greater than 90 days be considered chronic (HC, 2010).</p> <p>Furthermore, for both chemicals, as the sub-chronic TRVs have different primary target organs than the chronic TRVs, it appears that the corresponding risk (in HQ units) is split between two toxic endpoints (immunological and developmental for dioxins/furans TEQ, and hematological and biochemical for vanadium), which will result in an underestimation of risk for exposure scenarios.</p> <p>Sub-chronic TRVs were also applied in the SSTL calculations presented in Table H-2-19 of Appendix H.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Apply a chronic TRV to evaluate ongoing chronic exposure, with risk estimates provided for the elevated total exposure over the summer months to all media (e.g., direct contact with sediments and food consumption). If risks for total exposure to all media are estimated to be above the target HQ, then it is recommended that risk management / mitigation strategies be proposed to mitigate the exposure.</p> <p>b) Consider including the chronic HC TRVs for vanadium and dioxins/furans TEQ in the SSTL calculations, or provide a rationale to support the TRV used to assess exposures and health risks from exposure to vanadium and dioxins/furans TEQ.</p> <p>Reference: Federal Contaminated Site Risk Assessment in Canada, Part V: Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals. Health Canada, 2010.</p>

ID	Project Effects Link to CEEA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
HC-HHERA-06	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	HHERA (Appendix A), Section 6.1.1.7, Section 4.3.4, Figure 12	<p>Lack of clarity regarding plant tissue as an operable exposure pathway in Uplands Area.</p> <p>The Problem Formulation section (Subsection 6.1.1.7, Plant and Berry Tissue COPCs) of the report states that <i>“the PLFN community is likely to collect and consume plants throughout the entire Site in the future.”</i> However, plant tissue data appears to have only been collected from the Freshwater Wetlands and the Estuary portions of the site (see section 4.3.4, Tissue Analytical Results), while no samples appear to have been collected from the Upland Areas.</p> <p>Moreover, the CSM (Figure 12) indicates that vegetation uptake of COPCs from contaminated soil (Source: Pulp Mill Air Emissions) is a viable transport pathway (<i>Transport Mechanism: Vegetation & Wild Game Uptake</i>), yet vegetation consumption is considered an inoperable exposure pathway due to <i>“COPC – None (no exceedances and bio-accumulative COPC limited and/or within background in Soil)”</i>.</p> <p>It is unclear whether this pathway (consumption of country food, i.e., plants) is inoperable in the Uplands Area given the statement that plants are likely to be collected and consumed throughout the site.</p> <p>It is also unclear whether plant tissues from the Uplands Area are contaminated, as no plant tissue samples have been collected.</p> <p>See HC-HHRA-01 for additional comments on the operability of exposure pathways.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Collect country food plant species from the Uplands Areas for analysis of relevant COPCs. The proponent may wish to consult with Pictou Landing First Nation (PLFN) on the appropriate species that should be sampled.</p> <p>b) Revise the country food exposure assessment to incorporate the Uplands Area data set, as applicable, and provide information on the operability of the country foods exposure pathway in the Uplands Area.</p>
HC-HHERA-07	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 3.2.3- Spatial and Temporal Boundaries Section 7.3.7 - Mi'kmaq of Nova Scotia	HHERA (Appendix A), Executive Summary, and throughout the report	<p>Identification of the Uplands Area boundaries and location of environmental sampling locations within these boundaries.</p> <p>The HHERA (Executive Summary and throughout the report) states that <i>“the main purpose of the SSI [Supplemental Site Investigation] and HHERA was to determine if remediation is also required in the surrounding Uplands Areas, Freshwater Wetlands and Estuary (including the outfall to the Northumberland Strait) as part of the Boat Harbour remediation project.”</i> However, none of the figures included in the report indicate the location or outline the Uplands Area boundaries. It is difficult to comment on the adequacy of the site characterization (e.g., sampling density) as the Uplands Area boundaries have not been identified.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Clearly identify the Uplands Area boundaries in a figure.</p> <p>b) Provide the locations of the environmental samples within the Uplands Areas in a figure (similar to what has been done for the Freshwater Wetlands and Estuary study areas).</p>
HC-HHERA-08	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	<p>HHERA (Appendix A), Section 6.4.3.6, Table 6.25 (Uncertainty Analysis)</p> <p>HHERA (EIS- Appendix A) Table H-1.12 Occurrence, Distribution, and Identification of Chemicals of Concern (COC) in Game Meat [...] (pdf p.4913)</p> <ul style="list-style-type: none"> Detection Frequency: 0/1 or 1/1 	<p>Clarification on the game [organ] ingestion rate and representativeness of game meat contaminant levels.</p> <p>Table 6.25 (Uncertainty Analysis) states that <i>“The assumptions that were applied in the HHRA are based on a heavy consumer rather than the average consumer”</i> and indicates that the corresponding health risk is likely overestimated.</p> <p>However, this is contradicted in Section 6.4.3.6 where the proponent qualitatively eliminates PLFN Resident Game Consumption of Organs as an exposure pathway, stating <i>“Based on the average game [organ] ingestion rate, the HQ values are less than 0.2.”</i> If the average game organ ingestion rate is applied instead of the 95th percentile</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Review the apparent contradiction between Table 6.25 and Section 6.4.3.6.</p> <p>b) Provide discussion of the level of uncertainty associated with ingestion exposures using the qualitative elimination of this exposure pathway.</p> <p>c) Provide detailed rationale on how data from a single game meat sample can adequately support a conservative estimation of relevant</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>ingestion rate, is it unclear how this results in an overestimation of potential human health risk for this receptor.</p> <p>Additionally, contaminant levels in game meat tissue were determined based on only one (1) sample. Data from a single sample are not sufficiently representative of chemical concentrations in game meat and not an appropriate source of information to be used to estimate the exposure levels and potential human health risks.</p>	<p>exposure levels and potential human health risks. Consider conducting additional sampling to support the estimate of exposure levels from game meat.</p>
HC-HHERA-09	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	HHERA (Appendix A), Section 1.3 (Page 15) HHERA (Appendix A), pg 58 Table C-1.13 of Appendix C-1	<p>Justification and additional information related to the Dalhousie University shellfish data incorporated in the HHERA</p> <p>Data from Dalhousie University was incorporated into the HHERA, including shellfish field data from the Northumberland Strait. However, the HHERA does not present a QA/QC analysis of the Dalhousie data, nor is there a discussion on the validity of using such data and/or any limitations associated with its quality and/or use in the HHERA.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide an analysis and discussion on QA/QC from the collection, analysis and interpretation of field data from Dalhousie to demonstrate the applicability for its use in the HHERA, noting any limitations and/or discrepancy in this data compared to data collected for this project.</p>
HC-HHERA-10	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	HHERA (Appendix A), Section 6.4.4	<p>Editorial Comment</p> <p>a) In Section 6.4.4, the last sentence on page 148 describing blood effects appears to describe biochemical effects ("<i>Furthermore, the HQ of biochemical effects...</i>") and appears to be identical to the last sentence of the subsequent paragraph.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Review the paragraph on blood effects and verify the accuracy of the statements pertaining to HQ evaluation.</p>
Project Related Activities-Human Health Risk Assessment (PRA-HHRA)					
HC-HHRA-01	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	PRA-HHRA (EIS- Appendix A) Figures 3.2 to 3.5	<p>The evaluation of some exposure pathways as "inoperable" may not be protective of human health.</p> <p>Figures 3.2 to 3.5 of the PRA-HHRA (Appendix A of the EIS) illustrate the CSMs for human receptors for the various project-related activities. The CSMs evaluated the identified exposure pathways to determine if they were operable or inoperable.</p> <p>Figure 3.5 of the PRA-HHRA depicts the CSMs for human receptors for Dam Removal related activities. For the source media "<i>Sediment</i>", the exposure pathways of "<i>Sediment Dermal Contact/Incidental Ingestion</i>" and "<i>Consumption of Country Foods</i>" were both identified as inoperable based on concentration of COPCs and not the potential for exposure. This rationale was also applied to other exposure pathways deemed inoperable.</p> <p>An exposure pathway is considered operable if (a) receptor(s) can be exposed to a COPC. Potentially operational pathways were eliminated in the PRA-HHRA CSM based on the concentration of the COPCs, not whether receptors could be exposed.</p> <p><i>"As multi-media HHRAs evaluate the exposure to a chemical from multiple pathways, a chemical retained as a COPC in one medium should also be evaluated in other media to obtain an estimate of potential risks associated with total exposure."</i> – Health Canada, 2019.</p> <p>As receptors may be exposed to COPCs through multiple pathways, the risk associated with human health should be based on the total exposure, as lower level exposures still contribute to the overall project-related exposure and risk to human health. For</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Revise and re-evaluate operability of the exposure pathways in the PRA-HHRA & the HHERA (see HC-HHERA-04 and 05), as applicable in accordance with Health Canada guidance.</p> <p>For additional information refer to: Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessments: Human Health Risk Assessment (Health Canada, 2019). https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-risk-assessment.html</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>example, sediment released in the re-naturalization process may impact recreational water use areas in the Northumberland Strait, within the harbour, and in the estuary, all of which may result in sediment dermal contact and/or accidental ingestion of potentially contaminated sediment that may pose a risk to human health.</p>	
HC-HHRA-02	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	<p>Section 3.2.3- Spatial and Temporal Boundaries</p> <p>Section 7.3.7 - Mi'kmaq of Nova Scotia</p>	<p>PRA-HHRA (EIS- Appendix A) Figure 3.1</p> <p>EIS, Figure 7.1-1</p> <p>Coastal Hydraulic Modelling Report (EIS- Appendix Z)</p>	<p>The spatial boundaries utilized in the Project Related Activities-Human Health Risk Assessment (PRA-HHRA) do not include all areas potentially impacted by project-related activities.</p> <p>The HHRA submitted by NS Lands for Conformity Review on March 27, 2020 did not evaluate potential risks to human health associated with project-related activities, as its purpose was to establish the remedial targets and not assess project related impacts. As a result of this, Health Canada's conformity review of the draft Environmental Impact Statement (EIS) for the Boat Harbour Remediation Project letter to IAAC dated April 17, 2020, comment HC-01 stated:</p> <p><i>"As there may be project-related impacts to human health, HC is of an opinion that the proponent should provide information regarding exposure potential for all relevant exposure pathways associated with project activities."</i></p> <p>According to Health Canada guidance:</p> <p><i>"[The] Spatial boundaries of an environmental assessment should encompass the entire area that may be impacted by the proposed project, not just the proposed project footprint." – Health Canada, 2019.</i></p> <p>And</p> <p><i>"The HHRA should clearly document the spatial boundaries for assessment in each medium, noting the amount and types of emissions as well as fate and transport of chemicals in the environment for each of the project phases. A proposed project may have multiple spatial boundaries depending on the environmental media of interest. Where pertinent, a smaller local study area (LSA) and a larger regional study area (RSA) should be delineated for each environmental medium that may be impacted." – Health Canada, 2019.</i></p> <p>The Coastal Hydraulic Modelling (CHM) Report from WSP Canada Inc. (2020) states:</p> <p><i>"A portion of suspended silt and clay exits the model domain into the Northumberland Strait, whereas sand tends to remain nearby the entrance channel. A total of approximately 270,000 m³ (in-situ, including porosity) of sediment, primarily silt and clay, is mobilized during the re-naturalization process of which approximately 140,000 m³ exits the model domain."</i></p> <p>As the CHM Report does not delineate the area potentially affected by the mobilization of 140,000 m³ of modelled sediment, the spatial extent of the project-related impacts has not been determined, therefore the RSA for the EIS may not be accurate.</p> <p>Additionally, the area of impact modelled in the CHM Report extends beyond the RSA identified in the PRA-HHRA. As project-related impacts on human health may extend beyond the RSA identified in the PRA-HHRA, the potential risks to human health associated with the project-related activities may not be fully evaluated.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Delineation of the potential project-related impacts from mobilized sediment.</p> <p>b) Revision of the spatial boundaries for the EIS if sedimentation modelling determines that potential project related effects extend beyond the current RSA for the EIS.</p> <p>c) Revision of the PRA-HHRA to expand spatial boundaries to include the potential impacts and potentially impacted receptors for all project related activities.</p> <p>For additional information refer to: Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessments: Human Health Risk Assessment (Health Canada, 2019). https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-risk-assessment.html</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>The spatial boundaries for the PRA-HHRA should encompass all project related impacts. The exclusion of potentially impacted areas and receptors may result in the underestimation of the risks to human health associated with the project.</p> <p>See HC-AQ-01 for additional comments on spatial boundaries.</p>	
HC-HHRA-03	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 3.2.3- Spatial and Temporal Boundaries Section 7.3.7 Mi'kmaq of Nova Scotia	EIS, Section 7.3.7.4.3 Coastal Hydraulic Modelling report (EIS- Appendix Z) Page 40	<p>Potential risks to human health were not evaluated based on chronic and sub-chronic exposure.</p> <p>Section 7.3.7.4.3 of the EIS states: <i>"The majority of potential effects from TSS will increase effects on other VCs, namely from the marine environment perspective, which are addressed in subsequent sections. It should be noted that the types of effects are considered temporary/short-term as the total TSS and turbidity from the dredging activity is expected to quickly return to background levels."</i> (p. 7-368)</p> <p>However, p. 40 of the WSP CHM report states: <i>"Over a period of 365 days, cumulative sediment transport rates show a net flux of sediment out of Boat Harbour, consisting of predominantly clay, and to a lesser extent silt. For the first 5-10 days, an initial spike in net outflux rates of approximately 150 tonnes/hr can be observed. This equals a volume of approximately 56.6 m³/hr when using a density of 2.65 tonnes/ m³. Net outflux rates decrease and stabilize after the initial spike, and after 150 days, an average net outflux of 4.5 tonnes/hr can be observed, which equals a volume of approximately 1.7 m³/hr."</i></p> <p>This suggests that impacts will occur in the medium- to long-term rather than only the short term, as stated in the EIS. The medium- to long-term duration suggested by the WSP CHM report may result in chronic or sub-chronic exposure to COPCs associated with these sediments that may impact recreational water users and country foods. Potential health risks associated with these chronic or sub-chronic exposures to COPCs were thus not evaluated and may contribute to overall underestimation of risks to human health.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Evaluate the potential risks to human health associated with exposure to potentially contaminated sediment released during the re-naturalization process for acute, chronic and sub-chronic exposure, as applicable.</p>
HC-HHRA-04	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	Coastal Hydraulic Modelling Report (EIS- Appendix Z) PRA-HHRA (EIS- Appendix A) EIS, Section 7.3.15.4.7	<p>The mobilization of sediment during re-naturalization was not sufficiently evaluated to assess potential human health risks due to recreational water use and country foods consumption.</p> <p>The CHM Report stated that 270,000 m³ (equivalent to 270,000,000 Liters) of sediment is expected to be released during the re-naturalization process.</p> <p>However, the EIS did not examine the potential impacts that the released sediment may have on recreational water use areas in the Northumberland Strait. Numerous recreational water use areas (including, but not limited to, the Caribou and Munroe's Island Provincial Park beaches, Lowden's Beach, the sandy beach areas to the right/east of the estuary, Chance Harbour Beach, Sinclair's Island Beach, etc.) are located in relatively close proximity to the project and impacts to these recreational water use areas may pose a risk to their users. Lighthouse Beach is the only beach that was included in the RSA for the PRA-HHRA.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Evaluate potential risks on human health associated with COPCs in sediment from the Dam Removal project-related activities including the country food and recreational water use pathways, as well as any other relevant human exposure pathways. COPCs that may bioaccumulate or biomagnify within food chains should also be evaluated.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>Additionally, the EIS & PRA-HHRA did not evaluate the potential impacts to country foods associated with the release of this sediment. The Northumberland Strait supports First Nation's food, social, ceremonial and commercial fisheries, as well as non-Indigenous fisheries. The release of this sediment may have a direct impact on marine organisms or may result in food chain impacts. The EIS & PRA-HHRA also did not evaluate the potential risks associated with COPCs in the sediment that may bioaccumulate or biomagnify within food chains. This evaluation is important as some COPCs associated with the remediation project are known to bioaccumulate and the modelling has determined that these sediments are expected to be primarily composed of clay and silt. As clay is high adsorptive, COPCs may be more likely to adhere to this substrate and be transport via released sediment.</p>	
HC-HHRA-05	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	PRA-HHRA: Figure 3.5, p. 2 Risk Management Plan (Appendix K) of the HHERA (EIS -Appendix A)	<p>Exposure pathways associated with the resuspension and transport of contaminated sediment into surface waters were not evaluated.</p> <p>PRA-HHRA Table 3.9 : Summary of Pathways for Human Health – Dam Removal Activities: <i>Suspended Sediment in Surface Water – Pathway not carried through</i> with rationale: <i>“Potential for sediment to be released during and post dam removal. COPCs in sediment currently exceed direct contact/ingestion but impacted sediment to be dredged prior to dam removal. [...]. Sediment potentially mobilized following dam removal will have concentrations of COPCs below remedial targets based on protection of human health through the direct ingestion/dermal contact pathway.”</i></p> <p>However, according to Figure K-1 to K-8 of the RMP (Appendix K of the HHERA (Appendix A of the EIS), remediation is not required for numerous samples that exceed the proposed SSTL for dioxins/furans TEQ (29 pg/g) based on the Exposure Point Concentration (EPC) risk management approach. This approach proposes to remove selected areas of sediment to reduce the EPC to just below the proposed SSTL, rather than remove all sediment exceeding the proposed SSTL.</p> <p>The rationale for not assessing the suspended sediment in surface water pathway provided in Table 3.0 of the PRA-HHRA is not supported by the RMP's EPC risk management approach, as concentrations above <i>“remedial targets based on protection of human health through the direct ingestion/dermal contact pathway”</i> will not be remediated. For example, the highest COPC concentration not requiring remediation based on the EPC risk management approach is dioxins/furans TEQ 61.9 pg/g, (Figure K-7 of the RMP) which is greater than twice the proposed SSTL. See HC-HHRA-01 for additional comment on operability of exposure pathways.</p> <p>Additionally, the PRA-HHRA did not fully evaluate potential risks to human health associated with the resuspension and transport of sediment contaminated with COPCs above the proposed SSTLs for dioxin/furans and vanadium, both within the project remediation footprint and beyond the spatial boundaries of the PRA-HHRA. This may have underestimated the potential health risks associated with project-related activities for receptors, i.e., recreational water users and country food consumers.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Assess the potential risks to human health associated with the resuspension and transport of sediment with COPC concentrations greater than the proposed SSTL.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
HC-HHRA-06	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	PRA-HHRA (EIS- Appendix A), Section 2.1.4	<p>Lack of consideration of bioaccumulative COPCs in the dewatering effluent may underestimate human exposure and associated health risks.</p> <p>As certain contaminants are highly bioaccumulative (e.g., methylmercury), their concentrations at the discharge point may not necessarily be a good indicator of the contaminant accumulation in country foods via the aquatic food chain. Therefore, even though their concentrations are below the screening criteria at the discharge point, their characteristics may allow for bioaccumulation at high levels in country foods and lead to potential adverse health effects.</p> <p>Section 2.1.4 states that the dewatering effluent will mix with the bulk water and subsequently will be “managed through natural attenuation.” It is unclear how persistent or bioaccumulative COPCs in the dewatering effluent are anticipated to attenuate in the natural environment or how they have been considered in the PRA-HHRA.</p> <p>Users of the site and the Northumberland Strait who partake in various aquatic activities including harvesting and consumption of seafood may be exposed to COPCs from the discharge of large volumes of dewatering effluent.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide additional discussion on the expected fate and transport of persistent and/or bioaccumulative substances from dewatering effluent as they relate to potential human exposure and subsequent adverse health effects.</p>
HC-HHRA-07	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	Section 5 of Appendix G (Surface Water Quality / Mass Balance Predictions) of PRA-HHRA (located at end of HHERA (Appendix A))	<p>Insufficient information on future surface water chemical concentrations to assess potential health effects.</p> <p>The proponent modelled future chemical concentrations of BHSL surface waters prior to off-site discharge. This water is understood to comprise effluent from the sludge dewatering process (i.e., Geotube® effluent), as well as groundwater and surface water entering the BHSL. Health Canada was not able to locate the water quality data used to represent the Geotube® effluent in this model.</p> <p>Please note that while Section 5.3 states “A summary of the pilot water treatment composite effluent samples is provided in Table 4 (attached),” Table 4 could not be located in the report.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Identify where the Geotube® effluent water quality pilot data is located in the EIS. If it is not included, then this data should be provided for review along with supporting QA/QC information such as sample collection methodology, number of samples collected, etc.</p> <p>b) Provide rationale for the representativeness of this data as a proxy for future Geotube® effluent water quality data.</p> <p>c) Indicate the location of relevant samples in the data tables provided (i.e. which table and the sample identifier), including Table 4, if relevant.</p>
Risk Management Plan					
HC-RMP-01	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 - Mi'kmaq of Nova Scotia	Risk Management Plan (Appendix K) of the HHERA (EIS- Appendix A)	<p>HC is unable to provide conclusive comments on the Risk Management Plan (RMP) as presented in the EIS.</p> <p>Through communication with the proponent (via email & committee updates), HC is aware that further sampling and delineation of the contaminants in the BHETF area have continued beyond the submission of the EIS and that this data has not been incorporated into the EIS.</p> <p>HC is unable to provide meaningful comments on the RMP until information related to the additional sampling and delineation is submitted for review, as:</p> <ul style="list-style-type: none"> • results from additional samples may impact the areas designated to be removed based on SSTL exceedance; 	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) The submission of a final RMP based on the results from additional sampling that has occurred since the submission of the EIS, including all relevant information to support the sampling, analysis and integration of these results into the RMP.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<ul style="list-style-type: none"> the EPC is an estimate of the average chemical concentration in an environmental medium; results from additional samples will affect the outcome of this calculation and may change the areas designated to be removed based on EPC calculations; and revisions of the RMP will be required. 	
HC-RMP-02	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	Risk Management Plan (Appendix K) of the HHERA (EIS -Appendix A)	<p>Clarification on which proposed risk management approach (SSTL or EPC) will be utilized for the remediation of each of the Risk Management Areas (RMAs).</p> <p>The RMP (Appendix K of the PRA-HHRA) proposes both the removal of contaminated material in the wetlands and estuary based on the SSTL and the EPC. It is not clear in the EIS which is the preferred method or which method the proponent intends to use.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide clarification on which proposed Risk Management approach (SSTL or EPC) will be utilized for the remediation of each of the RMAs.</p>
HC-RMP-03	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	Risk Management Plan (Appendix K) of the HHERA (EIS- Appendix A)	<p>The risk management approach of remediating wetland and estuary sediment to achieve an EPC just below the proposed SSTL does not assure adequate protection of human health.</p> <p>The RMP proposes to remediate areas based on EPC, to achieve an EPC below the SSTL of 29 pg/g for dioxins/furans TEQ in sediment in both the freshwater wetlands and the estuary. Samples with concentrations exceeding the SSTL are replaced with the SSTL (29 pg/g) until an EPC below the SSTL is achieved (using proUCL software). The values are shown in Table K-1.1 and Table K-2.1. and these are indicated by "Area Proposed for Sediment Removal based on EPC for Freshwater Wetland" on Figures K-1 to K-8 of the RMP. The RMP predicted post-remediation EPCs for the wetland sediment (28.92 pg/g) and for the estuary sediment (28.17 pg/g) are only slightly below the SSTL of 29 pg/g.</p> <p>EPCs are statistical estimates, and the practical application (in the field process) of removing impacted sediments to the target level is not precise.</p> <p>Neither the EIS, the HHERA, PRA-HHRA nor the RMP discuss any potential errors in the application of this risk management approach, within the calculations themselves or in the field application of this risk management approach. While page 1 of the RMP states: <i>"where vertical delineation samples are available, their D/F TEQ values are below the SSTL and therefore use of the SSTL in the post-risk management/remediation EPC calculation is considered to be a conservative approach."</i></p> <p>A systematic approach to incorporating a buffer into the RMP could protect against potential errors in statistical calculation and incomplete removal; thus providing additional assurance to the protection of human health.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide additional discussion on the potential uncertainties in the EPC based-approach, including uncertainty in the sampling approach, the calculations, and the field application of this remediation approach.</p> <p>b) Provide additional discussion on how uncertainty can be minimized in this remediation approach and the potential for incorporating a buffer into the RMP to help account for uncertainty.</p>
HC-RMP-04	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	Risk Management Plan (Appendix K) of the HHERA (EIS- Appendix A)	<p>The use of vegetation as a barrier to prevent sediment contact may be insufficient to protect human health.</p> <p>Page 4 of the RMP (Appendix K) of the HHERA (EIS -Appendix A) states: <i>"Risk Management Areas 3 (FSP2) and 5 (FSP5) are located within a densely vegetated cattail marsh. In their existing condition, the presence of the vegetation would act as a sufficient barrier to contact with the underlying impacted sediment (Figures K-3 and K-5). In its existing condition, the presence of the vegetation acts as a sufficient barrier to contact with the underlying impacted sediment. Therefore, two risk management alternatives are recommended for this area: 1)</i></p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Scientific evidence (e.g. published, peer-reviewed literature) to support the use of the risk management plan proposed for RMAs 3 & 5.</p> <p>b) Additional information to comprehensively describe the proposed monitoring plan, including but not limited to:</p>

ID	Project Effects Link to CEEA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p><i>monitor and maintain the existing vegetative cover, and 2) in the case where vegetative cover is absent or its future presence is affected by the BHETF Remediation Project (e.g. change in water levels), removal of the sediment is recommended. If monitoring and maintenance of the existing vegetative cover is undertaken as the preferred risk management measure to prevent contact with sediment, the vegetative mat material should be inspected on an annual basis to ensure that it remains intact and continues to function as a protective barrier for contact. Any observed deficiencies that could result in the underlying sediments being exposed and available for contact should be repaired as quickly as practical or alternative risk management measures implemented."</i></p> <p>Scientific evidence to support the effectiveness of this methodology in the risk management of contaminants was not provided.</p> <p>While it is stated in the RMP that the vegetation will be monitored to ensure it remains intact and continues to function as a protective barrier for contact, insufficient detail is provided for HC to evaluate the adequacy of this approach.</p> <p>Monitoring and maintaining vegetation cover to prevent contact with contaminated sediment and the removal of sediment in areas where vegetative cover is not sufficient to prevent contact, may not be adequately protective of human health for the following reasons:</p> <p>a) Assuming the vegetation is maintained in its current state, there are several potential pathways that may result in human exposure to COPCs in this sediment:</p> <ul style="list-style-type: none"> a. As the site is hydraulically connected with BH and will be hydraulically connected with the Northumberland Strait after the dam is removed, erosion over time may cause the sediment to be suspended in the water column and transported to other areas, including recreational water use areas in both BH and the Northumberland Strait. The RMP does not discuss sediment deposition modelling with respect to these impacted sediments. COPCs may also leach from the sediment into the surface water of BH. b. Additionally, vegetation growing in these wetlands may up-take contaminants from the sediment. This vegetation may be consumed directly by human receptors or contaminants may bioaccumulate or biomagnify in the food chain through this route; i.e. portions of cattails are edible and animals that may be hunted or trapped may feed on this vegetation. The RMP does not provide details to address this potential exposure pathway and does not discuss controls that would be in place to prevent exposure such as restricted site access, etc. c. Additionally, leaching of COPCs from sediment into groundwater may occur, and a groundwater monitoring plan for these RMAs was not provided in the RMP. As groundwater may be a future source of potable water on the site, a monitoring plan to determine if these RMAs are impacting groundwater may be necessary. <p>2. There is uncertainty concerning the future state of BH, the freshwater wetlands and the estuary once the site is returned to a tidal estuary. Future water levels and</p>	<ul style="list-style-type: none"> i. Rationale to support the frequency of annual inspection for the vegetative mat and how this approach is protective of human health. ii. Parties responsible for inspection, competencies/training required by persons responsible for inspection, inspection parameters and indicators, evaluation criteria, decision making matrix, and reporting structure and schedule. iii. Details regarding how maintenance of the vegetation will be conducted, with supporting scientific evidence <p>c) Additional information to address the exposure pathways identified in the "intact vegetation" scenario (#1).</p> <p>d) Additional information to address the exposure pathways identified in the "uncertainty of future state" scenario (#2).</p> <p>e) Additional information to address the questions raised in the "future sediment removal" scenario (#3).</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>salinity of water in portions of the site after tidal connectivity is restored are unknown. These future conditions may result in potential exposures as:</p> <ol style="list-style-type: none"> a. Changes in water level and salinity could impact the viability of the current vegetation in these wetlands. If this vegetation dies, contaminated sediment that was held by the roots of this vegetation may erode into the water. See 1(a) & 1(b) for further comments on this exposure pathway. b. A change in water levels may increase accessibility to these areas to recreational users, which may result in increased exposure to COPCs. The RMP does not discuss controls that would be in place to prevent potentially unacceptable exposure from increased accessibility. <p>3. If it is determined either initially or in the future that some areas of cattails are insufficient to prevent access to sediment, the RMP states that the sediment will be removed, however, the RMP does not address the following:</p> <ol style="list-style-type: none"> a. Removal of the sediment may result in contamination of the surrounding area and also result in potential impacts to human health similar to those identified in the PRA-HHRA for remedial activities; b. After the completion of the current remediation project, the containment cell will be capped, and as stated in the alternatives section of the EIS there are no other facilities currently in Nova Scotia that are approved to accept this waste, due to the levels of dioxins/furans (EIS p. 2-15). 	
HC-RMP-05	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	Risk Management Plan (Appendix K) of the HHERA (EIS- Appendix A), Figures K-1 to K-8 EIS, Figures 7.3-19 – 7.3-23	<p>Insufficient information was provided regarding the delineation of remediation areas in the RMP.</p> <p>Figures K-1 to K-8 of Appendix K of the PRA-HHRA (EIS -Appendix A) and Figures 7.3-19 – 7.3-23 of the EIS illustrate the proposed areas to be excavated for the wetlands and estuary based on both the SSTL and the EPC.</p> <p>Information to comprehensively support the delineation of the areas to be removed based on both EPC and SSTL for each RMA has not been provided. For example, :</p> <ul style="list-style-type: none"> • RMA 5 (Appendix K, Figure K-5) has relatively few sampling points to delineate the COPCs in the wetland. • Sample FSP3-SED-12* exceeds the dioxins/furans TEQ, and there are no additional samples north of this location. The area to be removed based on SSTL exceedances (blue line) does not appear to be supported by delineation of the contaminants. As additional samples beyond this point were not taken, it is unclear how the location of the area was determined to be inclusive of all areas exceeding the SSTL. • Similarly, the area to be removed based on EPC encompasses sample FSP3-SED-7A, and the next closest sample to the south of this sample does not exceed the proposed SSTL for dioxins/furans (FSP3-SED-4), however the line to delineate the EPC removal area has been drawn between these points with no evidence to support its location. 	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Revision of the RMP to include additional information to comprehensively support the delineation of the areas to be removed, based on both EPC and SSTL for each RMA.</p>
HC-RMP-06	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	Risk Management Plan (Appendix K) of the HHERA (EIS -Appendix A)	<p>The calculation of one EPC to represent all of the freshwater wetlands may not be adequately protective of human health. Statistics used to generate the freshwater wetland and estuary EPCs should consider measured differences in COPC distribution and concentrations as well as in relevant microenvironments.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide a rationale to support that the proposed freshwater wetland EPC would accurately represent measured differences in</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>Appendix K of the PRA-HHRA (EIS -Appendix A) is a RMP that proposes both the removal of contaminated material in the wetlands and estuary based on the SSTL and the EPC.</p> <p>According to the RMP (Appendix K of the HHERA), the freshwater wetlands and estuary EPCs for COPCs in sediment were based on the 95% UCL for dioxins/furans and vanadium; however, it is unclear if the presence of potential microenvironments was considered in the statistical analysis as HC was not able to locate that information in the documentation.</p> <p>Figures K-1 to K-8 of the RMP identify impacts concentrated in some of the freshwater wetland risk management areas in comparison to others and in some microenvironments within the freshwater wetlands and the estuary (i.e. "hot spots"). However, rationale was not provided to support whether a 95% UCL value to represent an EPC in sediment for the entire site would accurately represent measured differences in COPC distribution and concentrations between the various freshwater wetlands (risk management areas) and within discrete regions within those freshwater wetlands or within discrete regions of the estuary.</p> <p>It is recommended that statistics used to generate an EPC consider microenvironments and exposure patterns. Analysis of microenvironments would identify areas where elevated exposures may occur.</p> <p>The EPC is an estimate of the average chemical concentration in an environmental medium in a defined area. The defined area in the United States Environmental Protection Agency (US EPA) Guidance for calculating EPCs is referred to as an exposure unit. An exposure unit as defined by the US EPA is: <i>"the area throughout which a receptor moves and encounters an environmental medium for the duration of the exposure; an individual receptor is assumed to be equally exposed to media within all portions of the exposure unit over the time frame of the risk assessment, unless there is site-specific evidence to the contrary."</i></p> <p>Taking into account the site-specific differences between the various wetland areas, provide additional information to support the following assumption and how this assumption has been considered in deciding to use one EPC to represent all of the freshwater wetlands: <i>"..an individual receptor is assumed to be equally exposed to media within all portions of the exposure unit over the time frame of the risk assessment. "</i></p> <p>As there is not a current pattern of usage for the freshwater wetlands at the BHETF, please clarify how this assumption is supported.</p>	<p>COPC distribution and concentrations between the various freshwater wetlands.</p> <p>b) Provide a rationale to support that the proposed freshwater wetland and estuary EPCs would accurately represent measured differences within discrete regions (microenvironments) within freshwater wetlands and the estuary.</p> <p>c) Provide additional information to support how the use of one EPC to represent all of the freshwater wetlands supports the assumption that: <i>"...an individual receptor is assumed to be equally exposed to media within all portions of the exposure unit over the time frame of the risk assessment",</i> accounting for site specific differences between the various wetland areas (composition, layout, accessibility) and the lack of a current pattern of usage for the freshwater wetlands at the BHETF.</p> <p>Reference: Calculating Upper Confidence Limits For Exposure Point Concentrations At Hazardous Waste Sites. Office of Emergency and Remedial Response U.S. Environmental Protection Agency Washington, D.C., 2002.</p>
HC-RMP-07	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	Appendix K (Risk Management Plan) HHERA and PRA-HHRA (EIS-Appendix A)	<p>Insufficient information provided on the calculation of the EPCs utilized in the RMP.</p> <p>Health Canada is unable to fully assess the RMP as insufficient information was provided to support the calculation of the EPCs.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>Provide discussion, with supporting evidence: a) To support whether the number of sample measurements was sufficient to accurately characterize the site for the purposes of calculating the EPCs.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
					<p>b) To demonstrate that random sampling was utilized for the collection of samples (for each RMA).</p> <p>c) Regarding any potential bias introduced through sampling methodology.</p> <p>d) Regarding the vertical delineation of the sample measurements used for the EPC calculations.</p> <p>e) To support that samples used to calculate the EPC (for each RMA) were representative of “site-related” concentrations expected to be routinely contacted by receptors.</p>
Country Foods					
HC-CF-01	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7. Mi'kmaq of Nova Scotia	<p>HHERA (EIS- Appendix A) Table H-1.15 Occurrence, Distribution, and Identification of Chemicals of Concern (COC) in Shellfish (Clams) Tissue (PDF p.4916)</p> <p>HHERA (EIS- Appendix A) 6.1.1.12 Shellfish Tissue (p.118)</p> <p>HHERA (Appendix A), Section 5.2</p>	<p>Application of inadequate screening criteria to determine COPCs in fish and shellfish</p> <p>a) Concentrations of aluminum, lead and manganese in shellfish tissue collected from the Northumberland Strait at the outfall of the estuary were reported to be above the shellfish tissue screening guidelines and background levels (Appendix A, Table H-1.15 and Table C-1.12). These contaminants were not evaluated further in the HHERA as:</p> <ul style="list-style-type: none"> i) the distinct exceedances were observed only in three (3) out of ten (10) clam tissue samples and the contaminant levels of the remaining seven (7) samples were similar to or below the selected screening criteria or background concentrations (HHERA, section 6.1.1.12, p. 118), ii) aluminum and manganese are ubiquitous in sediment and their elevated levels are not necessarily related to the BHETF, and iii) the clam tissue samples were not depurated prior to laboratory analysis (i.e. contaminants in stomach could have been detected in addition to the ones truly accumulated in tissue). <p>However, aluminum and manganese concentrations in all ten (10) clam tissue samples were above their respective background concentrations. Additionally, high concentrations of aluminum, manganese and lead in clam samples are not consistently observed from the same samples and the analytical results, although limited in sample size, appear to be normally distributed. Therefore, the elevated contaminant concentrations in all clam tissue samples should be properly evaluated in the HHERA .</p> <p>b) The proponent screened samples based on health-based criteria for fish and shellfish, such as (1) Canadian Guidelines for Chemical Contaminants and Toxins in Fish and Fish Products [Canadian Food Inspection Agency (CFIA), 2014] or (2) guidelines calculated using the Regional Screening Levels Calculator for Fish [US Environmental Protection Agency (EPA), 2019]. The guidelines (1) were used to determine whether arsenic, lead, mercury and dioxins/furans be qualified as COPCs. However, the guidelines (1) are not valid screening guidelines for arsenic and lead in fish and shellfish as these values are specifically designed for fish protein, or a standardized concentrated product, described under B.021.027 of the <i>Food and Drug Regulations</i>, but not for the commonly consumed muscle tissue of</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <ul style="list-style-type: none"> a) Consider conducting additional sampling and analysis of shellfish samples to further determine representative concentrations of the trace elements in shellfish. HC also recommends calculating the exposure levels based on the most representative contaminant concentrations in country foods in consideration of country food preparation/consumption patterns of local consumers (e.g., depuration of clams prior to consumption, if this is applicable). b) Re-evaluate contaminant levels in country foods, including fish and shellfish samples utilizing valid screening criteria for arsenic, lead, dioxins/furans and mercury. Provide evidence based rationale supporting the selection of these screening criteria. c) Provide detailed rationale on how the proposed background contaminant concentrations from crab, lobster and mussels can support proper screening of contaminants in clam tissue and assessing potential human health risks. d) Report the correct use of screening guidelines for shellfish tissue. e) Clarify whether inputs from potentially impacted Indigenous groups (e.g. Mi'kmaq of Nova Scotia), communities and stakeholders were considered to identify the country food consumption practices, as well as to collect information on all potential: <ul style="list-style-type: none"> i) country food types/species, ii) COPCs from project-associated emissions, and iii) transport pathways of the COPCs into country foods. Determine COPCs in country foods based on a comparison to the levels observed at a reference site (i.e. background concentrations). In the absence of such background data, HC recommends the

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>finfish or shellfish. Health Canada also does not recognize the guidelines (1) as a safety standard for dioxins/furans in fish as the value does not consider the current approach to deriving dioxin/furan toxicity or concentrations.</p> <p>Furthermore, the guidelines (1) are developed to determine compliance of commercial foods and thus the underlying assumptions (e.g., consumption pattern) may not be directly applicable to screening of country foods. Therefore, the guidelines (1) for mercury is also not an appropriate screening criteria for the project.</p> <p>c) Contaminant concentrations in clam tissue from the project site were compared to “background concentrations”, if the site concentrations were above the screening guidelines. However, the background concentrations were collected from several shellfish tissues, including crab, lobster and mussels, rather than from clam (Appendix A, section 6.1.1.12, p. 118). It is inappropriate to determine COPCs or characterize potential health risks from consuming contaminated clams based on the background data collected from crustacean shellfish and other bivalve species.</p> <p>d) The HHERA states in Section 5.2, “For the HHRA, there are no screening guidelines available for plant, shellfish, and game tissue.” (p. 94). However, Section 6.1.1.12 states that collected shellfish samples were compared to screening guidelines.</p> <p>e) In Section 6.1.1, the guidelines (2) were calculated based on the risk thresholds [i.e. HQ of 0.2 or Incremental Lifetime Cancer Risk (ILCR) of 1 in 100,000] and daily food consumption rates from the First Nations Food, Nutrition and Environment Study (FNFNES), Results from Atlantic Region (University of Ottawa, 2014). Health Canada is uncertain why this approach was used to determine COPCs as it will produce the same result as conducting a full HHRA.</p>	<p>contaminants (i.e. aluminum, lead, manganese, and vanadium and lead in fish) be carried forward as COPCs to a full HHRA.</p>
HC-CF-02	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7. Mi’kmaq of Nova Scotia	HHERA (EIS- Appendix A) Table H-1.15 Occurrence, Distribution, and Identification of Chemicals of Concern (COC) in Shellfish (Clams) Tissue [...] (pdf p.4916) Range of Detection Limits / Human Health Screening Guidelines	<p>Inadequate screening of COPCs in country foods</p> <p>Several contaminants, including arsenic, cadmium, and mercury, were not included as COPCs in shellfish as their measured levels were determined to be non-detect (ND), or below the analytical limits of detection (LOD). For these contaminants, the health-based guideline values cannot serve as adequate screening criteria as the guideline values are also lower than the LOD. Alternative screening criteria, such as background concentrations, were not provided either. Although the measured concentration of a contaminant is below the LOD, if the LOD is higher than the background concentration or the health-based guideline value, the contaminant should be considered as a COPC and the potential health effects should be properly evaluated.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Include arsenic, cadmium, mercury and lead as COPCs for further assessments due to their potential toxicity to human health irrespective of the COPC screening results. Health Canada also recommends dioxins/furans be included as a COPC in the health risk assessment due to their potential to accumulate in country foods.</p>
HC-CF-03	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7. Mi’kmaq of Nova Scotia	HHERA (EIS- Appendix A) 6.4.3.6 PLFN Resident Consumption [...] Game Organs (p.143)	<p>Inadequate use of absorption factors in assessment of the country food exposure pathways</p> <p>The proponent’s EIS states it adopted an overly conservative oral absorption factor of 1.0, which is far higher than the US EPA’s gastrointestinal absorption factors for cadmium (0.025) and vanadium (0.026), and thus providing highly overestimated adverse health risks for the PLFN residents from consuming contaminated game organs.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide detailed rationale on how the proposed absorption factors of less than 1.0 for cadmium and vanadium can meet the specific requirements for an application to the present HHERA. Health Canada recommends that the proponent assume 100% of</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>Inadequate information has been provided to substantiate application of an absorption factor of less than 1.0 for cadmium and vanadium. Several factors should be considered to determine whether an absorption factor of less than 1.0 is applicable for a study. For example, the proponent must demonstrate that the absorption factor for the contaminated medium used in the critical study is substantially different from the exposure scenario considered in the present HHERA, or that the test species used in the critical study absorbs the contaminant to a much greater extent than the target population in the present HHERA.</p>	<p>contaminants present in animal tissues is bioavailable and absorbed by humans in the gastrointestinal tract through food ingestion (Health Canada, 2018).</p> <p><u>Reference</u> Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Country Foods (Health Canada, 2018) (https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-country-foods.html)</p>
HC-CF-04	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7. Mi'kmaq of Nova Scotia	<p>HHERA (EIS- Appendix A) 6.4.3 Quantitative Interpretation of Health Risks (p.138 -)</p> <p>HHERA (EIS- Appendix A) Table H-1.11 Occurrence, Distribution, and Identification of Chemicals of Concern (COC) in Fish (Fillet) Tissue [...] (pdf p.4911)</p> <ul style="list-style-type: none"> Detection Frequency: 0/0 	<p>Underestimation of potential exposure to contaminants in country food.</p> <p>a. The HHERA provided an assessment of a potential exposure level and associated health risks for each contaminant in each type of country food (plant, game organ, waterfowl) separately, instead of providing a combined exposure level from all operable country food exposure pathways and a total risk estimate for that contaminant. The approach may lead to an underestimation of potential health risks.</p> <p>b. Mercury concentrations in shellfish and fish fillet samples were not available for review. Mercury concentrations were presented in whole fish samples rather than in specific tissues/organs (e.g. muscle) that may be consumed by local consumers. In the absence of information on the mercury concentrations in specific tissues/organs of fish and other aquatic food species, health risks from consuming mercury-contaminated aquatic food species may be underestimated.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Assess, for each COPC, potential health risks associated with combined exposure from all country foods.</p> <p>b) Provide updated mercury exposure estimates and associated health risks based on the concentrations in shellfish fish tissues/organs that may be consumed by local consumers.</p>
HC-CF-05	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	EIS, Section 7.3.15.5	<p>Insufficient information provided on post-remediation country food monitoring</p> <p>Section 7.3.15.5 states: <i>"A post-remediation monitoring program of aquatic country foods (such as edible fish, shellfish, birds and/or aquatic plants) at the Site will be developed and implemented within the remediated sediment areas (aquatic areas) to ensure COPCs in biological tissue are consistent with background conditions in the area. The monitoring program will be developed in consultation with PLFN as well as other residents in the area to identify country foods that are likely to be harvested from the Site in the future. The monitoring program duration and frequency will be based on the types of country foods expected to be harvested as well as the types of organisms and plants that are observed to be re-colonizing the Site post-remediation."</i></p> <p>Post-remediation monitoring is recommended to ensure that concentrations of COPCs in <u>all</u> country foods do not pose a risk to human health, including terrestrial plants and animals, as well as avian species.</p> <p>While not all of the aspects of the monitoring plan can be developed at this time, additional components of the planned post-remediation monitoring should be provided in the EIS, including the plan to systematically assess the effectiveness of the remediation project, development of sampling methodology and determination of</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Development of a post-remediation monitoring plan of <u>all</u> country foods for inclusion in the EIS that:</p> <ol style="list-style-type: none"> Details how the post-remediation monitoring program plans to systematically assess the effectiveness of the remediation project; Identifies sampling methodology to be employed in the monitoring program; Identifies which COPCs should be analyzed in country food samples; Determines the required laboratory analysis to be utilized; Determines concentrations of each of the identified COPCs which may pose a risk to human health; and Establishes threshold action-levels based on COPC concentrations; which identifies actions to be employed in the event COPCs concentrations approach and/or exceed pre-determined thresholds.

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>necessary laboratory analysis. In addition, COPCs to be analyzed and COPC concentrations that may pose a risk to human health should also be identified. These concentrations should be used to create thresholds with corresponding actions to be employed in the event of COPCs approaching and exceeding these thresholds.</p>	
Air Quality					
HC-AQ-01	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 3.2.3. Spatial and temporal boundaries	<p>EIS, Section 7.3.1.2 Air Quality and Odour Boundaries (p.7-234)</p> <p>Appendix A, Section 3.1.1 Identification of Study Boundaries (p.15)</p> <p>EIS 7.1.1.1, Figure 7.1-1 (p. 7-7)</p> <p>Appendix A, Figure 3.1 (pdf p.5338) and Appendix U, Figures D-1 to D-3 (pdf p.104 to 106)</p> <p>Appendix U, Figures E-1 to E-13 (pdf p.112 to 124)</p>	<p>Inconsistent information on spatial boundaries and human receptor locations for the air quality assessment</p> <p>A RSA for the Air Quality Assessment was set to encompass all lands and water within 3 to 5 kilometers from the Site Study Area (SSA) perimeter (EIS Section 7.3.1.2 and Figure 7.1-1). However, the RSA for the atmospheric dispersion and deposition modelling, as well as for the human health risk assessment (PRA-HHRA), was reduced to an area within about 1 km from the SSA perimeter, or an approximate 2540 ha area around the SSA (Appendix A, Figure 3.1; Appendix U, D1 to D3). The reduced RSA includes human receptor locations only within the PLFN community, and along the Pictou Landing and Chance Harbour Roads (Appendix U, Figure D-1) and does not capture the project effects on receptors in nearby communities, such as Town of Pictou (est. pop. of 3,200) and Town of Trenton (est. pop. of 2,500). The RSA proposed in the EIS (i.e., 3 to 5 km boundary from the SSA) includes receptors in the two towns.</p> <p>Permanent residences appear to be used as the sole human receptor locations for the air quality modelling and PRA-HHRA. It remains unclear whether potential use of the RSA for traditional purposes (e.g. hunting, fishing, trapping, plant gathering, ceremonial or spiritual practices) have been considered in the air quality modelling and PRA-HHRA.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Clarify how the proposed RSA for the atmospheric dispersion and deposition modelling can capture potential adverse impacts on sensitive receptors in nearby communities. Consider potential human exposures through inhalation of air contaminants and ingestion of contaminated soil and country foods due to deposition of air quality contaminants.</p> <p>b) Clarify whether inputs from other potentially impacted Indigenous groups/communities, communities and stakeholders were considered in the development of the spatial boundaries and identification of human receptor locations for the air quality assessment and PRA-HHRA.</p>
HC-AQ-02	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.1.1. Atmospheric environment	<p>EIS, Section 7.1.2.1 Air Quality and Odour (p.7-8)</p> <p>Section 7.4.3.4.1.3 Cumulative Effects on Air Quality and Odour (p.7-737)</p> <p><i>“Construction activities for the BHRP are scheduled to commence in 2021 and have the potential to overlap with the construction phase for Northern Pulp’s proposed new effluent treatment facility.”</i></p> <p>Appendix U, Air Quality Baseline Review (WSP 2018), Tables 3-1 to 3 (p.12 to 14)</p>	<p>Use of potentially unrepresentative baseline air quality data</p> <p>The air quality data used to establish baseline levels do not reflect the current air quality conditions at the site. Baseline levels for particulate matter [total suspended particulates (TSP), respirable particulates of less than 10 microns (PM₁₀), fine particulates smaller than 2.5 microns (PM_{2.5}), metals, dioxins/furans and hydrogen sulfide (H₂S)] were established after the closure of the Northern Pulp’s kraft pulp mill (since Jan. 2020; EIS, Section 7.1.2.1). Baseline levels for other air pollutants, such as nitrogen dioxide (NO₂), sulfur dioxide (SO₂) and carbon monoxide (CO), were established based on monitoring data of two National Air Pollution Surveillance (NAPS) stations from 2016 to 2018 (i.e. when the kraft pulp mill was still operational) (Appendix U, Tables 3-1 to 3).</p> <p>The Proponent stated in Section 7.1.2.1 of the EIS that: <i>“(b)aseline data collection since early 2020 (after the Kraft Pulp Mill ceased operations) will represent baseline conditions without the Kraft Pulp Mill in operation”.</i></p> <p>However, baseline data collected after the closure of the kraft pulp mill may not accurately reflect the air quality conditions in the worst case scenario, as there exists the possibility that the pulp mill may resume its operations in the future and construction of a new effluent treatment facility (ETF) for the Northern Pulp’s kraft pulp mill may overlap with the project construction (7.4.3.4.1.3 Cumulative Effects on Air</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Justify how air quality monitoring data collected after the kraft pulp mill ceased operations are representative of the baseline conditions at human receptor locations and how the baseline data would adequately protect human health in support of the worst-case exposure scenario, including any cumulative effects of reasonably foreseeable future projects.</p> <p>b) Alternatively, provide baseline air quality data in consideration of both scenarios (i.e. with and without the pulp mill and new ETF operations) and an evaluation of potential health risks associated with the worst-case exposures to all COPCs in each scenario.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>Quality and Odour, p.7-737). Operations of the pulp mill and new ETF are most likely to elevate baseline air contaminant levels.</p> <p>Therefore, utilization of the baseline data after the pulp mill closure may underestimate the predicted air contaminant levels and associated human health risks. By contrast, the use of the elevated baseline data collected during the pulp mill operation may lead to an underestimation of the incremental health effects of the project emissions.</p>	
HC-AQ-03	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.2.1. Changes to the atmospheric environment	<p>EIS, Section 7.3.1.1 Predicted Changes to Air Quality and Odour (p.7-233)</p> <p>EIS Table 7.3-5 Comparison of Anticipated Air Quality Concentrations to Canadian Ambient Air Quality Standards (CAAQS) (p.7-232)</p> <p>Appendix U, Air Quality Impact Analysis (GHD 2020), Appendix E Air Modelling Results, Figures E-1 to E-18a (PDF p.111 to 131)</p> <p>EIS 7.3.1.1 Predicted Changes to Air Quality and Odour (p.7-226)</p> <p>EIS Table 7.3-1 Mitigation Measures and Best Management Practices (p.7-219 and 7-220)</p>	<p>Insufficient evaluation of common air contaminants associated with diesel exhaust (DE) emissions, such as PM_{2.5} and NO₂.</p> <p>DE emissions can be generated from project activities, such as transport truck traffic and operation of heavy equipment (excavators, haul trucks for transport of materials, earth moving equipment, wheel loaders, compactors, and dredge or equivalent) during the Access Road Construction (Scenario 1), Containment Cell Final Capping and Grading (Scenario 7), and to a lesser degree during the Cleanout of Existing Containment Cell (Scenario 2), and from the HWY 348 Bypass Construction (Scenario 6). For example, the EIS predicted elevated levels of PM_{2.5}, NO₂ and SO₂, which are commonly associated with DE emissions, near the human receptor locations within the PLFN and along the Pictou Landing Road (Appendix U, Figures E-4 to E-13).</p> <p>The proponent concluded that the predicted air contaminant levels are not likely to impact Local Study Area / Regional Study Area (LSA/RSA) during the construction phase partly because construction activities will be of short duration. However, any potential health effects should not be ruled out just because the effects are anticipated to last for a short period of time. There are potential adverse health effects associated with both short-term or long-term inhalation exposure to several air pollutants and this is the reason why CAAQS numerical values are in place for short-term (1 hr, 24h) and long-term (annual) exposure. Changes to air quality and associated health effects should be fully assessed for both short- and long-term exposures during all phases of the project.</p> <p>The CAAQS for PM_{2.5} and NO₂ should not be viewed as levels to pollute-up. PM_{2.5} and NO₂ are non-threshold air pollutants, meaning that health effects may occur at all levels of exposure including below the CAAQS. The CAAQS are numerical targets for air quality improvements across Canada. The Canadian Air Quality Management System (AQMS) explicitly recognizes that health effects occur below the CAAQS values, and proposes additional management levels in recognition of the health and environmental benefits that can be realized by taking actions to decrease or maintain background levels of air pollution.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Assess potential health risks associated with both short- and long-term exposures of PM_{2.5} and NO₂, for all phases of the project.</p> <p>b) Acknowledge that the CAAQS should not be considered as “pollute-up-to” levels. In order to minimize the health risks associated with these air pollutants any mitigation measures that can reduce PM_{2.5} and NO₂ emissions should be considered.</p> <p>Should an assessment be deemed unnecessary for any air pollutants, provide a detailed rationale/explanation for any deviation from recommended characterization/assessment approaches, as well as an estimate of the uncertainty associated with the use of the alternative approaches.</p>
HC-AQ-04	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.2.1. Changes to the atmospheric environment	<p>EIS, Section 7.3.1.1 Predicted Changes to Air Quality and Odour (p.7-225)</p> <p>EIS, Section 7.3.1.1 Predicted Changes to Air Quality and Odour (p.7-234)</p>	<p>Risk characterization of carcinogenic and non-carcinogenic health effects associated with air pollutants from DE emissions, such as polycyclic aromatic hydrocarbons (PAHs), volatile organic carbons (VOCs), and diesel particulate matter (DPM).</p> <p>The project-associated air pollutant emissions, especially DE emissions, may contribute considerably to elevated levels of PAHs, VOCs, and DPM in air. Although most of these DE components are considered carcinogens, the EIS provided only an evaluation of non-cancer health effects of DPM based on the short-term (1 hr) and long-term (annual) exposure values.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Assess potential health risks posed by additional air contaminants associated with DE emissions, such as PAH, VOCs, and DPM, during all phases of the project. Health Canada recommends the following approaches and methods to assess potential carcinogenic effects for these contaminants:</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
			Appendix U, Figures E-4 to E-13 (pdf p.115 to 124)	<p>The proponent did not carry forward air contaminants associated with DE, such as PAHs and VOCs, to the Air Quality Impact Analysis (EIS, Section 7.3.1.1) or Project-Related Activities Human Health Risk Assessment (PRA-HHRA) (Appendix A, Section 3.1.4.7) as the baseline levels of these contaminants were not affected by the Pilot Scale Remediation (PSR) activities. However, the PSR activities, such as Open Water Dredging (Scenario 3), Shoreline Dredging (Scenario 4), and Sludge/Sediment Dewatering (Scenario 5), may not accurately capture the effects of the major DE emission sources from project-related activities, such as transport truck traffic. Truck traffic volume is predicted to be the greatest (i.e. more than 100 trucks travelling on the access road every day) during the Containment Cell Final Capping and Grading (Scenario 7), however, potential impacts of such heavy truck traffic were not considered in the air quality study for the PSR. The large volume of truck traffic was evaluated only as a source of fugitive dust, such as ambient TSP, PM₁₀ and metals (EIS 7.3.1.1 p.7-234), and not properly investigated as a source of DE emissions.</p>	<p><u>VOCs</u> It is recommended to assess potential health risks of specific aldehydes associated with DE, such as acetaldehyde, formaldehyde, 1,3-butadiene and acrolein (non-carcinogenic effects), 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 mixture rather than a single surrogate substance. A mixture analysis (weighted approach) allows for 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>DPM</u> It is recommended to follow one of the approaches below to evaluate carcinogenic health effects associated with DPM:</p> <ul style="list-style-type: none"> • Conduct a quantitative assessment of an incremental cancer risk associated with DE using the unit risk and inhalation slope factor available from the California Environmental Protection Agency (CalEPA) 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; • 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 for the project and 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 international agencies including Health Canada, the International Agency for Research on Cancer (part of the World Health Organization (WHO)), the US EPA and the Cal EPA; iii) the rationale for not undertaking a quantitative analysis of DE carcinogenic risk for the project. <p>Should other assessment approaches, including the use of surrogates and/or a qualitative assessment, be deemed more appropriate, or should an assessment be deemed unnecessary for any air pollutants, provide a detailed rationale/explanation for any deviation from recommended characterization/assessment approaches, as well as an estimate of the uncertainty associated with the use of the alternative approaches.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
HC-AQ-05	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.2.1. Changes to the atmospheric environment	<p>Appendix U, Air Quality Impact Analysis (GHD 2020), Table 7.3-2 Air Quality Modelling Scenarios (p.6): Scenario 4, Sources.</p> <p>EIS, Section 3.1.2 Dredging (p.3-11)</p> <p>EIS, Section 7.3.9.4.2 Dredging – Project Activities and Wetlands Interactions and Effects and Mitigation Measures (p.7-423)</p> <p>EIS, Section 7.1.10.3 Human Health, Figure 7.1-54 (p.7-200)</p> <p>Appendix A Human Health Risk Assessment (GHD, 2020), Table 3.1 (p.16)</p> <p>Appendix U Air Quality Impact Analysis (GHD 2020), Table 1.2 (p.6)</p>	<p>Insufficient consideration of additional potential sources of air contaminant emissions</p> <p>a) The proponent categorized project activities into seven (7) different Scenario groups and identified air contaminant emission sources associated with each Scenario group. In Scenario 4 (Shoreline Dredging), air contaminants are assumed to be released from dredging pump diesel engines and exposed sediments during dredging due to shallow water levels. All sediment is assumed to be dredged or excavated in wet condition.</p> <p>The shorelines of the ASB, BHSL, wetlands and estuary, and the settling basins, and effluent ditches will be mechanically excavated and the material will be transported by trucks, to the containment cell. However, it remains unclear how many transport trucks are anticipated to operate in Scenario 4 or whether the trucks are considered as a DE emission source in the air quality assessment.</p> <p>b) Additionally, it is possible that the outer boundary of shoreline sediment can be excavated in dry condition allowing release of fugitive dust and volatilized sediment contaminants at much greater rates than predicted in Scenario 4 (i.e. based on an assumption that all sediment will be excavated in wet condition). It appears that some of the shoreline excavation areas within the remediation boundary (i.e. the current high water mark) are not submerged in water (EIS, Figure 7.1-54 Human Health Risk Assessment Study Area Boundaries, p.7-200).</p> <p>c) Decommissioning of the existing infrastructure, such as the wastewater effluent pipeline, treatment buildings and small structures (including Mobile Building Adjacent to Press Building; Storage Shed; Air Monitoring Shelter; Mobile Building belonging to CTS Electrical; Silo and Electrical Building; Point A Building; and Point C Building), berms, and a water dam, is anticipated to occur during a 4-year period (Year 2 to 6) [Appendix A Human Health Risk Assessment (GHD, 2020), Table 3.1 Project Activity and Period (p.16)]. However, it is unclear whether these activities are reflected in the Air Quality Impact Analysis [Appendix U Air Quality Impact Analysis (GHD 2020), Table 1.2 Air Quality Modelling Scenarios (p.6)]. None of the seven Air Quality Impact Analysis Scenarios have clearly included the infrastructure decommissioning activities. Additionally, other project activities in Table 3-1 cannot be easily identified in the air quality modelling scenarios (Table 1.2).</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Clarify how many transport trucks are anticipated to operate in Scenario 4 and whether DE emissions from the trucks are considered in the air quality assessment and PRA-HHRA.</p> <p>b) Provide further detail on how the proponent will ensure all shoreline sediments are excavated in wet condition. Alternatively, update the EIS and PRA-HHRA with consideration of the potential air emissions and associated health effects in a dry sediment excavation scenario.</p> <p>c) Clarify whether existing infrastructure decommissioning activities are considered in the Air Quality Impact Analysis.</p>
HC-AQ-06	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7. Mi'kmaq of Nova Scotia	<p>Appendix A Human Health Risk Assessment (GHD, 2020), Section 3.1.4.5.2 BHRP-Related Activities Scenario (p.38)</p> <p>PRA-HHRA (located at end of HHERA (Appendix A)), Section 3.3.1</p>	<p>Insufficient consideration of additional exposure pathways, such as atmospheric deposition of air pollutants from DE emissions onto soil and uptake by country food species.</p> <p>The project-associated truck traffic is predicted to generate fugitive dust, especially metals, which is likely to deposit onto nearby soils where edible plants may grow. The PRA-HHRA evaluated the potential health risks to residents from consuming edible plants contaminated via air deposition of metals. The entire SSA, except for the containment cell, will become accessible by PLFN residents during the post-remediation period.</p> <p>The PRA-HHRA did not consider contaminants resulting from truck traffic-related DE emissions, such as PAHs and DPM, which may deposit onto soils. There exists the potential for deposition of PAHs and DPM onto soil, edible plants and surface waters.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Evaluate the potential for atmospheric deposition of air pollutants from DE emissions, including PAHs and DPM, onto nearby soils and subsequent bioaccumulation by country food species (e.g., edible plants). Provide further rationale on why this is not an operable pathway.</p> <p>b) Identify the dust suppressant to be used at the site. If a chemical suppressant is intended as the dust suppressant at the site, provide a discussion on potential human exposures. If water is intended as the dust suppressant at the site, identify the source of the water.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>DPM also has the potential to adsorb other chemicals, which as a result may also settle onto soil, edible plants and surface waters.</p> <p>Additionally, dust suppression is identified as a best management practice that may be used to mitigate dust from construction and demolition activities. A July 2020 memo from GHD to the proponent, provided in Appendix A of the PRA-HHRA, states that the dust suppressant may be water, but further details about the source of water are not provided.</p> <p>See HC-AQ-01 for related comments</p>	
HC-AQ-07	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.2.1. Changes to the atmospheric environment	<p>EIS, Section 7.3.1.1 Predicted Changes to Air Quality and Odour (p.7-226)</p> <p>EIS, Table 7.3-3 Summary of Air Quality Modelling Results (p.7-230)</p> <p>Appendix Y, Section 5.1- Sediment Quality (p.49 to 53)</p>	<p>Insufficient consideration of volatilization of contaminants present in the sediment.</p> <p>Contaminants present in sediment can be released to air through volatilization process during wet excavation, dredging, and dewatering of sediment. The proponent considered only H₂S, dioxins/furans and petroleum hydrocarbons (PHC) as potential air contaminants from volatilization process and predicted emission rates based on <i>Models for Estimating Air Emission Rates from Superfund Remedial Actions</i> (US EPA. 1993).</p> <p>It remains unclear why other potential air contaminants, such as VOCs (1,2-dichlorobenzene and toluene), whose levels are also elevated in sediment and volatilization characteristics are similar to those of the selected contaminants, are not considered for further evaluation. As Appendix Y, Section 5.1- Sediment Quality- reported that concentrations of the following sediment contaminants were determined to be above ecological quality criteria for sediment or human health criteria for soil:</p> <ul style="list-style-type: none"> • Metals (exceeding provincial human health criteria for soil): aluminum, cadmium, iron, thallium, and vanadium • PAHs (exceeding the freshwater or marine sediment criteria): • PHC (exceeding the freshwater or marine sediment criteria): Fraction 1, 2, and 3 • VOC (exceeding the freshwater or marine sediment criteria): 1,2-dichlorobenzene and toluene • PCB (exceeding the freshwater sediment criteria): total PCBs • PCDD/PCDF (exceeding the freshwater or marine sediment criteria) 	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide detailed rationale on why atmospheric release of certain sediment contaminants, including but not limited to VOCs, through volatilization are not considered in further assessments.</p>
HC-AQ-08	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.2.1. Changes to the atmospheric environment	EIS, Section 7.3.1.1 - Predicted Changes to Air Quality and Odour (p.7-229)	<p>Predicted levels of air pollutants should be compared with the most stringent air quality criteria</p> <p>Section 7.3.1.1 - <i>Predicted Changes to Air Quality and Odour</i> of the EIS stated: <i>“The Project criteria which were established using the following three standards:</i></p> <ul style="list-style-type: none"> • <i>Nova Scotia Ambient Air Quality Criteria (Nova Scotia AAQC)</i> • <i>Canadian Ambient Air Quality Standards (CAAQS)</i> • <i>Ontario Ambient Air Quality Criteria (Ontario AAQC)</i> <p><i>– The Nova Scotia AAQS were the primary criteria used for ambient air quality assessment. Where there was no Nova Scotia AAQC for a compound of interest, then the applicable CAAQS was used. If there was no Nova Scotia AAQC or CAAQS for a compound of interest (or relevant averaging period), then the applicable Ontario AAQC was used.”</i></p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Compare revised predicted levels of project-associated air pollutants based on the most stringent air quality criteria of the CAAQS, Nova Scotia AAQC, and Ontario AAQC.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>The predicted levels of air pollutants were evaluated in comparison to the Nova Scotia Ambient Air Quality Criteria (Nova Scotia AAQC), followed by the CAAQS and Ontario AAQC. For an evaluation of predicted levels of common air pollutants, such as PM_{2.5}, NO₂, and SO₂, Health Canada is of the opinion that the CAAQS should be used, as they are one of the most stringent air quality criteria, especially for project emissions after 2025.</p>	
HC-AQ-09	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 9.2. Monitoring	<p>EIS, Section 9.2 - Monitoring Programs, Table 9.2-1 (p.9-11)</p> <p>EIS, Section 3.2.3.1- Waste Management (p.3-47)</p> <p>EIS, Table 9.1-1 (p.9-5)</p> <p>Appendix A- Human Health Risk Assessment (GHD, 2020), Section 3.1.2 Identification of Human Receptors (p.17)</p>	<p>Consideration of additional air pollutants in the follow-up monitoring program</p> <p>The Independent Ambient Air Monitoring Program (IAAMP) will continue to support monitoring of ambient air quality during the construction and operation phases until completion of major remediation activities. The IAAMP specifies four (4) air contaminants to be monitored in real-time (Table 9.2-1). Considering insufficient evaluation of project-associated DE contaminants, such as PM_{2.5} and NO₂, and their health effects at sensitive receptor locations (see HC-AQ-03), Health Canada recommends monitoring of PM_{2.5} and NO₂ at a frequency that is consistent with the averaging time period and the statistical form associated with the relevant air quality standard (i.e. CAAQS).</p> <p>It is unclear whether air contaminants of potential health concerns, including VOCs and Reduced Sulfur Compounds (RSCs) that may be released as part of Landfill Gas (LFG), will be monitored after the site closure (i.e. Containment Cell Final Capping and Grading). Although air contaminant emissions from the LFG are predicted to be smaller than those from construction and operation activities, it is prudent to continue air quality monitoring as the entire SSA, except for the containment cell, will become accessible for PLFN residents' recreational use after the remediation is completed (Appendix A, Section 3.1.2, p.17) and as the containment cell will not be decommissioned for an indefinite period (3.2.3.1 Waste Management, p.3-46).</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Continuously monitor ambient air concentrations of PM_{2.5} and NO₂ during all project phases to allow comparison with both the short- and long-term CAAQS. Health Canada recommends that the proponent develop reporting thresholds for air quality monitoring in consultation with potentially affected Indigenous communities.</p> <p>b) Develop long-term monitoring plans for air contaminants, including but not limited to VOCs and RSCs, released as part of LFG after the site closure. If not, provide detailed rationale on why air quality monitoring of these potential air contaminants is not required during the post-remediation phase.</p>
HC-AQ-10	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.5. Significance of residual effects	<p>EIS Table 7.2-4 Characterization Criteria for Residual Environmental Effects (p.7-215)</p> <p>EIS, Section 7.3.1.3 - Air Quality and Odour Standards or Thresholds for Determination of Significance (p.234)</p>	<p>Clarification of the criteria used for determination of significance of the adverse residual effects</p> <p>The magnitude of residual effects (Table 7.2-4) was determined partly based on whether the effects deviate from the baseline conditions within (or outside of) "the range of natural variation" or whether the effects "marginally" exceed the guideline values. It is unclear what the range of natural variation is and what the marginal exceedance scale is in relation to the baseline conditions and air quality guidelines, respectively. Furthermore, no explanation is provided on how the proposed judgement criteria were developed, or whether they are adequate to protect human health.</p> <p>The duration of residual effects was determined based on the amount of time for the effects to become reversible. For example, the long-term residual effect is reversible within a "defined length of time". However, it is unclear what the defined length of time is or whether it corresponds to the "2 percent of the time" that is used as part of significance determination criteria in Section 7.3.1.3.</p>	<p>Health Canada recommends the following be requested from the proponent:</p> <p>a) Provide further details on the criteria for determining significance of adverse residual effects, including the scale of deviation from the baseline levels or air quality criteria values and the amount of time for the residual effects to become reversible.</p> <p>b) Clarify how the proposed "low magnitude" significance criterion for residual air effects would adequately protect against human health considering some air contaminants are non-threshold and health effects may occur below the CAAQS (see HC-AQ-03)".</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
HC-AQ-11	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.6.3. - Cumulative effects assessment	EIS, Section 7.4.3.4.1.2 - Effects of Other Projects in the Area (p.7-735 to 735) EIS 7.4.3.4.1.3 Cumulative Effects on Air Quality and Odour (p.7-737)	<p>Inadequate assessment of cumulative effects</p> <p>The EIS stated that other currently operational industrial activities were unlikely to contribute to cumulative air quality effects. Section 7.4.3.4.1.3 of the EIS: <i>"The air quality and odour effects from the Michelin Canada tire manufacturing plant, Nova Scotia Power's Trenton Plant and the Advocate Printing facility are not anticipated to act in a cumulative nature with effects from the Project due to their distance from the Project..."</i></p> <p>However, the Northern Pulp's new ETF may have impacts on the air quality as the construction phase of the BHRP may overlap with that of the Northern Pulp's new ETF. The proponent concluded that significant cumulative effects to air quality are not expected with implementation of the proposed mitigation measures for both the BHRP and new ETF (EIS 7.4.3.4.1.3, p.7-737). The proponent appears to have determined significance of cumulative effects based on exceedance of the NS AAQC for CO, H₂S, NO₂, SO₂, and TSP and the CAAQS for PM_{2.5} and ozone (O₃). However, the predicted cumulative effects should be evaluated based on the most stringent air quality guideline values applicable (see HC-AQ-08).</p> <p>Additionally, it is not clear whether potential resumption of the Northern Pulp's kraft pulp mill operations was also considered in the cumulative effects assessment</p>	Health Canada recommends the proponent include the following revisions in the EIS: <ol style="list-style-type: none"> Evaluate the cumulative effects of project-associated air contaminant emissions based on the most stringent guideline values of the CAAQS, Nova Scotia AAQC and Ontario AAQC. Clarify whether potential resumption of the Northern Pulp' kraft pulp mill operations was considered in the cumulative effects assessment.
Drinking Water					
HC-DW-01	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	EIS: Section 4.4.1.2; Section 7.1.4.1.3; Section 7.3.6.2 PRA-HHRA (Appendix A): Section 3.1.4.2.2 PRA-HHRA (Appendix A), Section 3.1.4.2, human health screening table H.1.2	<p>Clarification required related to groundwater contamination and future use of groundwater.</p> <p>In Section 4.4.1.2 of the EIS, in Table 4.4-2 Comment and Responses from POH [Public Open House] #2, Nova Scotia Land's response to the public question: <i>"Will groundwater be protected?,</i> is recorded as being: <i>"We have tested groundwater at different points in the pre-remediation process and there are no signs of contamination. Best practices will be in place to ensure groundwater remains clean."</i></p> <p>However, Section 7.1.4.1.3 states: <i>"Groundwater samples exceeded the applicable provincial and/or federal groundwater criteria for some metals and general chemistry parameters."</i></p> <p>And</p> <p>Section 7.3.6.2 of the EIS states: <i>"The NSE Tier 2 Pathway Specific Standards (PSS) for groundwater discharging to surface water will be applied, as the future use of the Site will be non-potable for groundwater."</i></p> <p>PRA-HHRA Section 3.1.4.2.2 states: <i>"Should the addition of potable wells be proposed within the Site Study Area in the future, groundwater will need to be sampled and analyzed to confirm compliance with Health Canada's drinking water quality guidelines (Health Canada, 2020), as is standard practice for potable water supplies".</i></p>	Health Canada recommends the proponent include the following revisions in the EIS: <ol style="list-style-type: none"> Clarification on the state of groundwater in the BHETF project area, including future use as a potable source. Groundwater sampling results to date, represented on figure(s) of appropriate scale to show location and date of sampling. Any exceedance of applicable health-based criteria, such as the Canadian Drinking Water Quality Guidelines (CDWQGs), should be clearly indicated. Identify the source of the background information used to eliminate manganese in groundwater as a COPC in the PRA-HHRA, or provide rationale for its exclusion. This rationale should clearly explain whether exposure to elevated manganese in potable groundwater would be expected to pose potential health risks.

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>This latest statement suggests that potable wells could be considered for the site post-remediation, however this is in conflict to the statement made in Section 7.3.6.2 of the EIS.</p> <p>Additionally, The PRA-HHRA did not carry forward manganese in groundwater despite concentrations well over human health guidelines, according to human health screening table H.1.2. The PRA-HHRA report states in Section 3.1.4.2 that elevated manganese in groundwater on-site is likely related to natural geological conditions; however, background manganese concentrations were not provided. Given that the groundwater on-site has been identified as potable, the choice of background data used in this screening step could impact the chemicals carried forward into the human risk assessment, and could lead to an underestimation of health risk.</p>	
HC-DW-02	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	<p>EIS, Figure 7.3-16: Limit of Disturbance for Removal of the Pipeline Section at Indian Cross Point</p> <p>EIS, Table 7.3-274: Direct and Indirect Impacts of Pipeline Decommissioning Activities on Mi'kmaq of Nova Scotia.</p>	<p>Insufficient information provided regarding potential impacts of pipeline decommissioning activities on drinking water sources.</p> <p>Figure 7.3-16: <i>Limit of Disturbance for Removal of the Pipeline Section at Indian Cross Point</i> depicts the anticipated area of disturbance associated with removal of a portion of the effluent pipeline. This area overlaps with at least one residence property and is in close proximity to several others.</p> <p>Project-related activities associated with pipeline decommissioning may impact surface or groundwater drinking water sources and may pose a risk to human health; however, potential impacts to residential drinking water was not identified in Table 7.3-274: <i>Direct and Indirect Impacts of Pipeline Decommissioning Activities on Mi'kmaq of Nova Scotia</i> and also not included in the EIS or PRA-HHRA.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Discussion of the potential impacts from project-related activities associated with pipeline decommissioning on residential drinking water sources, including an assessment of any potential impacts to human health.</p>
Acoustic Environment					
HC-AE-01	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	<p>Section 7.1.2.4 - Noise (p. 7-19)</p> <p>Section 7.3.3.1 - Noise Boundaries (p. 7-270)</p>	<p>Use of noise guidelines/threshold from Nova Scotia Environment and Labour are not protective of impacts to health effects.</p> <p>The proponent uses the noise guidelines from the Nova Scotia Environment and Labour Publication "Guidelines for Environmental Noise Measurement and Assessment" (NSE guidelines) as thresholds for noise impacts:</p> <ul style="list-style-type: none"> • Daytime (07:00-18:59): 65 dBA • Evening (19:00-22:59): 60 dBA • Nighttime (23:00-06:59): 55 dBA <p>Health Canada does not use the NSE noise limits to assess potential human health-related noise impacts from projects.</p> <p>As per Health Canada's <i>Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise</i> (Health Canada, 2017) the WHO (WHO, 1999) recommends that, to protect against health effects of sleep disturbance, an indoor continuous LAeq of 30 dBA (equivalent to 45 dBA at the outdoor façade of the closest receptor when applying a 15 dBA outdoor-to-indoor transmission loss with windows partially open [US EPA, 1974; WHO, 1999]) should not be exceeded during the nighttime period, and that an indoor L_{Amax} of 45 dBA (equivalent to 60 dBA outdoors) should not be exceeded more than 10-15 times per night. WHO (2009) recommends</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Consider using the more conservative thresholds for assessing noise impacts on human health, especially impacts on sleep, as per Health Canada (2017).</p> <p>For additional information refer to: Health Canada's <i>Guidance for Evaluating Human Health Impacts in Environmental Assessments: Noise</i> (Health Canada, 2017). https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-noise.html.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				that the outdoor annual average for nighttime (Ln) not exceed 40 dBA. Health Canada also recommends that outdoor sound levels at receptors should not exceed 55 dBA for good speech comprehension (based on US EPA 1974).	
HC-AE-02	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.1.1 Atmospheric Environment	<p>Appendix W Noise Assessment Documentation, Section 2 Methodology (p. 2)</p> <p>Appendix W- Noise Assessment Documentation, Table 3.2-1 Results of Background Sound Level Measurements (p. 5 to 11)</p> <p>Appendix W - Noise Assessment Documentation, Section 3.1 Observations (p. 4)</p> <p>Appendix W - Noise Assessment Documentation, Section 2 Methodology (p.2)</p>	<p>Use of potentially inadequate baseline monitoring methodology and calculations of baseline noise levels</p> <p>Appendix W-Noise Assessment Documentation, Section 2 Methodology states: <i>“as per industry practices sufficient background data should encompass 48 hrs of monitoring data without interruption from precipitation or wind speeds in excess of 20 km/h, and within instruments operation tolerance as related to relative humidity and temperature”</i>.</p> <p>When measuring baseline noise levels, Health Canada recommends that wind speed should not exceed 14 km/hr, any free-field monitor and microphone should be sheltered from exposed areas, there should be no precipitation, and all applicable conditions as per ISO 1996-2:2007 should be met (Health Canada, 2017). Information on the type of windscreen(s) used or a description of the physical location of the monitor was not provided. Further, data in Table 3.2-1 indicates that some noise measurements used for the calculation of baseline noise levels were taken during moments of precipitation and/or when wind speeds exceeded 14 km/hr.</p> <p>Appendix W, Section 3.1 states: <i>“While WSP staff were on site during commissioning, and data checks, the following sources were audible in the general vicinity and were the most likely causes of background sound levels measured: (a) Wildlife;...”</i></p> <p>Section 6.2.1 of Health Canada (2017) states, <i>“sounds that are not generated by human activity (e.g. ocean, wind and animal noises) should not be included in determining a baseline sound level.”</i> It is unclear whether non-anthropogenic sounds were excluded from the reported baseline sound levels as wildlife was noted as one of the sources of background sound.</p> <p>Additionally, Appendix W, Section 2 also noted that the monitoring stations were deployed in November 2017 for one month. The Northern Pulp’s kraft pulp mill and ETF were in operation during this time. As the kraft pulp mill and the ETF have since ceased operation, baseline noise measurements may not represent current noise levels.</p> <p>The baseline noise levels used will impact the calculations used in the determination of the change in percent of highly annoyed (%HA). For example, a +10 dB adjustment should be applied to baseline (ISO 1996-1:2003; ANSI, 2005) as well as predicted noise levels for all project phases for a “quiet rural community”, which, in the calculation of %HA, is intended to produce a greater change in %HA than would occur with unadjusted noise levels, in order to account for an expected heightened sensitivity to noise (Health Canada, 2017). If current baseline noise levels are lower than those monitored and are more representative of a quiet rural area at some points of reception (PORs), an adjustment may be warranted in the %HA calculations.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Describe whether baseline noise monitoring was conducted as per ISO 1996-2:2007, and if not, provide a rationale for why it was not and whether the baseline noise monitoring results are valid/appropriate.</p> <p>b) Provide additional information on the appropriateness of windscreens used and the locations of the measurement equipment during the monitoring period (e.g., were they sheltered from the wind, the size of the windscreen, etc.). Include photographs, as appropriate.</p> <p>b) Recalculate the baseline noise levels excluding the data where wind speeds exceeded 14 km/h to determine representative baseline noise conditions.</p> <p>c) Provide additional information regarding whether or not natural sounds, including but not limited to wildlife sounds and precipitation, were included in the baseline sound levels. If included, provide justification for why it’s appropriate.</p> <p>d) Provide additional justification as to why measured baseline noise levels that were taken while the Kraft Mill plant and ETF were operational are representative of current baseline conditions at the selected PORs and the appropriateness of using this data to calculate future changes in %HA.</p> <p>f) If, based on guidance provided above, monitored baseline noise levels are not valid and do not appropriately represent current baseline noise levels, consider updating the baseline monitoring and noise assessment accordingly.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
HC-AE-03	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.2.1 Changes to the atmospheric environment	<p>EIS, Figure 7.3-2 - Point-Of-Reception & Operation Location Plan (p. 7-274)</p> <p>EIS, Section 7.3.3.5.4 - Bridge at Highway 348 (p. 7-281) and Section 7.3.3.5.7 - Dam (p. 7-287)</p> <p>EIS, Figure 3.1-8 - Pipeline (p. 3-20)</p> <p>EIS, Table 7.3-49 - Potential Interaction Between Pipeline Decommissioning and Noise and the Significance of the Resulting Potential Effects from the Interactions (p. 7-284)</p>	<p>Potential noise impacts likely underestimated resulting from exclusion of human receptors</p> <p>Section 7.3.3.5.4 and 7.3.3.5.7 indicate that the predicted noise levels during daytime construction activities affecting the local existing residential areas to the northwest and west (i.e., PLFN) as a result of works conducted on the bridge and dam, respectively, are dependent on a distance of ~500m between the receptors and the project works. However, it appears that human receptors not included as PORs in the noise assessment may exist in relative closer proximity to where certain project activities will take place. Review of local area maps indicate the presence of a structure, which appears to be a residential dwelling at 6792 Pictou Landing Road, within ~150m east of the Bridge/Dam activity area.</p> <p>Human receptors may also be located at 5408, 5423, and 5432 Pictou Landing Road, Trenton, which are all located along the haul route on Highway 348. These appear to be much closer (within ~150m) to the portion of the pipeline that will be removed than selected PORs and are likely to be impacted during certain project phases including, but perhaps not limited to, the removal of the pipeline section between Indian Cross point and Highway 348, and project-related truck traffic along the portion of the haul route on Highway 348.</p> <p>The noise assessment appears to exclude potential human receptors located in closer proximity to certain project activities than some selected PORs, which may lead to underestimation noise impacts on sensitive/residential receptors.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide clarification as to why the following human receptors were not considered in the noise assessment:</p> <ol style="list-style-type: none"> i. 6792 Pictou Landing Road, located within ~150m east of the Bridge/Dam 5 ii. 408, 5423, and 5432 Pictou Landing Road, Trenton, all located along the haul route on Highway 348. <p>b) Provide justification as to why the selected PORs are the most appropriate to include in the noise assessment.</p>
HC-AE-04	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.3.7 Mi'kmaq of Nova Scotia	EIS, Section 7.3.3 - Noise	<p>Modelling output file and calculations quantifying predicted noise impacts are required for Health Canada's validation of the noise assessment</p> <p>Health Canada has not yet received the proponent's model output file, which would support predicted noise levels, contour maps, %HA calculations, and other noise-related information provided in the EIS. Without the output, Health Canada cannot validate the results of the noise assessment, including the %HA calculations.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide model output file referenced in Health Canada's comments on the third conformity review of the revised draft Environmental Impact Statement (EIS) for the Boat Harbour Remediation Project, submitted on December 17, 2020 (see comment HC-04).</p> <p>b) Provide the %HA calculations (including inputs and outputs and adjustment factors used)</p> <p>c) If not included along with the modelling output file, provide:</p> <ol style="list-style-type: none"> i. whether the modelled noise levels are based on the "project only" or "project + baseline" scenario; and ii. whether the predicted noise levels are based on modelling of pre- or post-mitigation scenario.
HC-AE-05	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.2.1 Changes to the atmospheric environment	<p>EIS, Section 3.2.1.2 - Dredging (p. 3-38)</p> <p>EIS, Section 3.2.2.4 - Bridge at Highway 348 (p. 3-46)</p>	<p>Clarification on the assessment of impacts from potential impulsive noise sources</p> <p>Section 3.2.1.2 states: <i>"Construction of temporary access points is anticipated to use a crew of three -to six staff and -two to four pieces of heavy equipment, which would include the following: [...], and pile drivers (for bride abutments)."</i></p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Provide a discussion about whether there will be impulsive sounds produced by project-related activities, and if so:</p> <ol style="list-style-type: none"> i. whether it was considered in the noise modelling, and how;

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
		Section 7.3.7 Mi'kmaq of Nova Scotia	EIS, Section 7.3.3.3 - Predicted Changes to noise (p. 7-271)	<p>According to Health Canada (2017), impact pile driving is an internationally agreed upon example of a source of highly impulsive noise as listed in ISO 1996-1:2003. The EIS does not include discussion of potential impulsive noise or how it was/was not included in the noise assessment.</p> <p>For highly impulsive noise sources, ISO 1996-1: 2003 recommends an adjustment factor of +12 dB. However, model inputs only included a +5 dBA adjustment for tonal sources where applicable. In order to evaluate change in %HA it is necessary to apply all relevant sound character adjustments (regular impulsive, highly impulsive, high energy impulsive), as per ISO 1996-1:2016.</p>	<ul style="list-style-type: none"> ii. whether it was considered in the %HA calculation, and if so, whether it was done in accordance with ISO 1996-1:2003; and iii. how it will be managed/mitigated.
HC-AE-06	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.2.1 Changes to the atmospheric environment Section 7.3.7 Mi'kmaq of Nova Scotia	EIS, Section 7.3.3.2 - Predicted Changes to Noise (p. 7-271)	<p>Clarification on the assessment of impacts from potential low-frequency noise (LFN) and resulting vibrations</p> <p>Section 7.3.3.2 states: <i>“Due to large separation distance between the Site Study Area and the existing residential areas vibration is considered to have an insignificant impact beyond 30 m of any vibratory activity”</i></p> <p>LFN can travel longer distances with less attenuation than higher frequencies and may induce vibrations, however, this is not discussed in the EIS. It is unclear whether the proponent has made this conclusion – <i>“an insignificant impact beyond 30 m of any vibratory activity”</i> – based on an assessment of project-induced LFN.</p> <p>Significant LFN (i.e., above 65 dBC at receptors) should be evaluated using Health Canada guidance (Health Canada, 2017), which provides additional information on how LFN can be modelled/assessed and considered in %HA calculations in Appendix C.</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <ul style="list-style-type: none"> a) Provide a discussion about whether or not LFN may be created by project-related activities, and if so: <ul style="list-style-type: none"> i. whether it was considered in the noise modelling, and how; ii. whether it was considered in the %HA calculation, and if so, whether it was done in accordance with ANSI 2005 standards (see Appendix C of Health Canada, 2017); and iii. how it will be managed/mitigated.
HC-AE-07	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.2.1 Changes to the atmospheric environment Section 7.3.7 Mi'kmaq of Nova Scotia	EIS, Section 7.3.3.3 Predicted Changes to Noise (p. 7-273) EIS, Section 7.3.1.1 Predicted Changes to Air Quality and Odour, <i>PM Impacts – Scenario 1 and 7</i> (p. 7-232) EIS, Figure 7.3-2 Point-Of-Reception & Operation Location Plan (p. 7-274) EIS, Section 3.1.2 Dredging (p. 3-11) EIS, Section 3.2 - Project Activities, <i>Site Preparation and Construction</i> (p. 3-32) EIS, Section 3.2.1.2 Dredging (p. 3-38)	<p>Insufficient information on noise sources quantified in noise modelling</p> <p>Section 7.3.3 only lists four of the <i>“environmentally significant noise sources”</i> (i.e., 4 bulldozers, 4 excavators, 10 haul route trucks per hour during construction and 2 per hour during operation, and 3 dredging barges) that were included in the quantitative noise assessment and no other sources. It is unclear what other project-related noise sources were included in the noise assessment (e.g., diesel generators, other stationary equipment), whether worst-case scenarios (i.e. when all equipment for concurrent project activities is running simultaneously) were modeled for each POR during each project phase, and how and to what sources time-weighted adjustments (p. 7-272) were applied.</p> <p>It is unclear which project activities/phases are included in the assumed hourly number of trucks (i.e. how this number was derived) and which PORs will be affected by truck-related noise. While figure 7.3-2 indicates the main truck route and the section of Highway 348 occupied by the causeway as linear sources of noise, it is unclear whether the noise assessment includes other sections of the highway (e.g., section passing through PLFN community) as a linear source, given the project includes off-site disposal of demolition debris from project activities like bridge reconstruction and dam removal, and hauling of mechanically dredged materials from BHSL shorelines and estuary to the</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <ul style="list-style-type: none"> a) If this information is not included in the modelling output file (see HC-AC-04), provide a more detailed description of all of the noise sources that were evaluated in the noise assessment, i.e., the numbers of each type of equipment that will be used, their location and proximity to receptors, the time-period (i.e. daytime/evening/nighttime) when the equipment will be generating noise, which sources were evaluated on a time-weighted bases, and for what duration of time they were modelled, as well as which receptor locations were impacted. b) If this information is not included in the modelling output file (see HC-AC-04), provide sufficient information to clarify and support the assumption of 10 haul trucks per hour during day/evening/night periods for construction and 2 per hour during operational phase, and clarify whether these will have potential noise impacts on PORs located along stretches of Highway 348 not included as a linear noise source in figure 7.3-2.

ID	Project Effects Link to CEEA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
			EIS, Table 7.3-43 Potential interactions Between Wetland Management and Noise and the Significance of the resulting Potential Effects from the Interactions (p. 7-280)	<p>containment cell (as described in Section 3.1.2). The EIS also states in the Air Quality Assessment (Section 7.3.3.1) that more than 100 trucks may be travelling on the access road per day during containment cell final capping. It is unclear whether this truck traffic is relevant to the noise impact assessment and if so, whether it was considered.</p> <p>Sections 3.2 and 3.2.1.2 of EIS indicate that construction of access roads and/or clearing of vegetation may be required for dredging of BHSL and estuary shorelines and for dam demolition activities. It is unclear whether construction of access roads/vegetation clearing were considered for those project components in the noise assessment and which POR(s) it may affect. Given construction of access roads and clearing of vegetation within access points for the remediation of wetlands is predicted to have moderate noise impacts on PORs (as indicated in Table 7.3-43), it may be relevant to assess the potential noise impacts of construction of access roads and clearing of vegetation within access points for all relevant project components.</p>	c) Provide justification for why specific noise sources, locations, and project activities (including, but not limited to, additional haul routes, and access road construction and vegetation clearing) were excluded, as applicable.
HC-AE-08	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Section 7.2.1 Changes to the atmospheric environment Section 7.3.7 Mi'kmaq of Nova Scotia	EIS, Section 7.3.3.3 - Predicted Changes to Noise (p. 7-273) EIS, Section 7.3.3.5 Project Activities and Noise Interactions and Effects and Mitigation Measures (starting p. 7-275)	<p>Insufficient information on nighttime noise levels and potential sleep disturbance impacts</p> <p>Although the EIS states that heavy equipment movement and haulage will be restricted from 11pm to 7am in order to mitigate noise impacts, an assumption of the noise assessment is that “10 trucks per hour travelling at 25 km/hr during day/evening/night periods for construction and 2 per hour during the operational phase” (p. 7-273). Furthermore, dredging and associated activities will occur throughout the night.</p> <p>The predicted nighttime noise levels resulting from each project component and at each POR are not provided. Given that specific activities are expected to also occur during the night-time hours, evaluating sleep disturbance is relevant for receptors located near the project site and along the truck traffic routes.</p>	<p>If this information is not included in the modelling output file (see HC-AC-04), Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Ensure that predicted nighttime noise levels are provided for each POR for each project activity and that the sources of noise (and their duration) during the nighttime period are specified. Specify if applicable sound level adjustments are applied.</p> <p>b) Provide a discussion of whether there are any predicted noise impacts on sleep disturbance in accordance with HC’s noise guidance (Health Canada, 2017).</p>
HC-AE-09	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	9.2 Monitoring	EIS, Table 8.1-2 Summary Table of Environmental Impact Assessment (p. 8-11) EIS, Section 7.3.3.6 Noise Monitoring (p. 7-288)	<p>Clarification related to noise monitoring during the project.</p> <p>Section 7.3.3.6 of the EIS states that monitoring of noise during the project is not proposed, but rather that the principles of adaptive management will be followed. However, table 8.1-2 indicates “[u]ndertake regular checks for excessive noise on-site and in proximity to sensitive receptors” as a mitigation measure to control noise impacts from most if not all Project Activities, although how these checks will be undertaken is not explained.</p> <p>However, the EIS states: “[...] the principles of adaptive management, discussed further in Section 9 and in the draft EMP, will be followed. Should a concern be identified, or complaints be received from the public, investigations into the source of the noise will occur and appropriate mitigation measures will be implemented. If required, implementation of follow-up and monitoring programs to confirm the predictions of potential effects and the significance of residual effects made in the EIS or the effectiveness of the proposed mitigation, will occur. Any inconsistencies identified would be further investigated and discussed with regulators. Additional mitigation measures or other corrective measures will be identified and implemented to address the situation” (p. 7.288).</p>	<p>Health Canada recommends the proponent include the following revisions in the EIS:</p> <p>a) Clarify how regular checks for excessive noise on-site and in proximity to sensitive receptors will be undertaken if no monitoring is planned.</p> <p>b) Consider developing a more detailed monitoring plan that would respond to received noise complaints.</p>

ID	Project Effects Link to CEAA 2012	Reference to EIS guidelines	Reference to EIS	Context and Rationale	Specific Question/ Request for Information
				<p>In the event of public complaints regarding noise from project-related activities, the proponent should consider monitoring noise when environmental conditions are similar to when the complaint was logged. Noise monitoring would assist in the identification of the source(s) of the noise (e.g. project or non-project related), actual noise levels at the receptor location(s), and enable a comparison between, and validation of, the model predictions to real-life conditions.</p>	

Annex 3: Boat Harbour Remediation Project – Technical Review of Environmental Impact Statement (EIS) (February 8, 2021)

ID	Reference to EIS	Context and Rationale	Advice to the Proponent
HC-01	N/A	<p>The EIS does not refer to the entire suite of Health Canada guidance documents available to support the assessment of human health impacts in environmental assessment. HC recommends an assessment of the potential health impacts as per Health Canada’s guidance documents.</p>	<p>Health Canada recommends the use of the following guidance documents to assess the human health impacts in Environmental Assessment.</p> <p>Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment:</p> <p>Air Quality (https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-air-quality.html)</p> <p>Noise (https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-noise.html)</p> <p>Water Quality (https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-water-quality.html)</p> <p>Country Foods (https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-country-foods.html)</p> <p>Human Health Risk Assessment (https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-risk-assessment.html)</p>



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			living/guidance-evaluating-human-health-impacts-risk-assessment.html)
HC-02	Section 9.1.1 Complaints Procedure Protocol (p. 9-7) <i>“notify residents and business owners within 500 metres (m) of construction areas of the anticipated construction schedules for each site, at least one month prior to the start date.”</i>	Guidance on mitigation for reducing likelihood of noise-related complaints	It is important to engage the community proactively, including consulting potentially impacted receptors prior to any particularly noisy activities to better understand times where there may be an increased sensitivity to noise and work around those times to the extent possible. When the community receives information about expected changes in sound levels through a consultation process, and feels that concerns with respect to noise will be addressed, the incidence of noise-related complaints is frequently reduced (Health Canada, 2017).