

Environmental Health Program (EHP), Atlantic Region Regulatory Operations and Enforcement Branch (ROEB) 1505 Barrington Street, Suite 1625 Halifax, NS B3J 3Y6

Lachlan MacLean Impact Assessment Agency of Canada (IAAC) 200 - 1801 Hollis St. Halifax, NS B3J 3N4 Sept. 13, 2022

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

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

Dear Lachlan MacLean:

Thank you for your email dated August 3, 2022 requesting Health Canada's technical review of the proponent's responses to the Round Two (Part One) Information Requirements (IRs) issued by the Impact Assessment Agency of Canada (IAAC) on April 5, 2022 for the Boat Harbour Remediation Project (BHRP). Health Canada is participating in the environmental assessment process as a Federal Authority under the *Canadian Environmental Assessment Act*, 2012.

Health Canada has reviewed the proponent's responses to IRs IAAC-33, 35, 36, 37, 40/41/49/50/52, 42/43, 50, 44, 45, 48, 53, 57, 54b/56/58, 60, 62/63/65, 64, and 1/61 and provided detailed technical comments for IAAC's consideration in the attached table. In summary, Health Canada identified the following main issues in the proponent's responses:

- Site Specific Target Level (SSTL) calculations do not include all operable exposure pathways for the site, resulting in SSTLs that may not be protective of human health;
- Insufficient information to justify the use of intermediate/sub-chronic Toxicological Reference Values (TRVs) or Minimal Risk Levels (MRLs) in the SSTL calculations, which may underestimate site exposure and result in SSTLs that may not be protective of human health:
- Insufficient rationale to support the representativeness of plant species collected from the reference wetland to establish background concentrations;
- Insufficient rationale to support the exclusion of human consumption of terrestrial game mammals as an operable exposure pathway and insufficient information on postremediation monitoring of game mammals;



- Insufficient information on potential health risks from the resuspension of contaminated sediments remaining in the freshwater wetlands and estuary through the 'suspended sediment in the surface water exposure pathway' and 'country food exposure pathway' in Boat Harbour and out in the Northumberland Strait:
- Insufficient information to confirm whether concentrations of Contaminants of Potential Concern (COPCs) in effluent discharged during remediation activities would be protective of human health through the recreational water pathway;
- Insufficient noise modelling, including missing information on sound level measures (Ld, Ln and LAmax) and sound measures for the "project+baseline" scenario required to appropriately evaluate noise impacts, including noise impacts on sleep;
- Insufficient post-remediation monitoring plan for groundwater;
- Air quality modelling may not accurately reflect project emissions, because modelling did
 not account for truck use hauling waste to the containment cell; or, changes to the daily
 use and operation of trucks (i.e., from 24 to 12 hours per day);
- Insufficient rationale/information to support the conclusion that COPCs in fish and shellfish from the Study Area and Northumberland Strait do not pose human health concerns now or in the future, and inform decisions on monitoring of aquatic country foods.

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

Sincerely,

<Original signed by>

Chantal Roberge
National Director, Environmental Health Programs,
Regulatory Operations and Enforcement Branch (ROEB), Health Canada

CC:

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





Ellen Chappell, Impact Assessment Specialist, EHP, ROEB, Health Canada

Attachment: Health Canada's Technical Review of Additional Response to (April 5, 2022) Information Requirements – Boat Harbour Remediation Project



Health Canada's Technical Review of Response to (April 5, 2022) Information Requirements – Boat Harbour Remediation Project

Use column 1 to link any new comments that arise from your review of the proponent responses to February 2021 IRs (now considered IR-1). Please continue to follow the naming scheme from IR-1 for any further potential IRs. For example, if in reviewing the response to the original IR (e.g. IR-53), you have an IR directed to the proponent, name it IR(2)-53. If multiple IRs arise from reviewing the response, use letters to demarcate further (e.g.: IR(2)-63. 53a, IR(2)-53b, and so on). The Agency believes that in some instances uncertainties can be resolved either through questions directed at the proponent, or by imposing follow-up measures to verify the proponents' predictions. In these instances, the Agency would appreciate suggestions for follow-up measures in column 6 where there are uncertainties.

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

1	2	3	4	22	9	7
IR -1	IR #2	Project Effects Link Reference to EIS	Reference to EIS	Context and Rationale	Specific Question/ Proposed Follow-up Measure	Requires Technical
Reference #	Number	q	(including			Discussion
(Original IR #)		CEAA 2012	appendices)			
Human Health Ec	Human Health Ecological Risk Assessment (HHERA)	essment (HHERA)				
IR #:	IR Number:	Project Effects Link to	Reference to EIS:	Context and Rationale:	Specific Question/ Request for Information:	Requires Technical
IAAC-33	IR(3)-33	CEAA 2012:				Discussion:
		5(1)(c)(i) Aboriginal	The proponent's	All onsite exposure pathways have not been included in a single Hazard Quotient (HQ)	Health Canada recommends the proponent address the following	
		Peoples Health/socio-	responses to Round	calculation for each Contaminant of Potential Concern (COPC), and onsite exposure	comment:	No
		economic conditions	2 IRs	pathways other than direct contact with sediment have not been considered in the Site		
			Section 2.1.1, pdf p.	Specific Target Level (SSTL) calculations, resulting in SSTLs that may not be protective of	a) Recalculate the SSTLs for Vanadium and D/F to include, at a minimum,	
			17	human health.	site exposure through consumption of country foods in addition to direct	
					contact with sediment. The THQ used in the equation for D/F may	
			HHERA (EIS –	All exposures from the site plus background should not exceed the tolerable daily intake (TDI)	remain at 0.2 for all operable exposure pathways if background (off-site)	
			Appendix A)	in order to minimise the likelihood of adverse health effects. If the equation does not include	exposure is not calculated.	
			Section 6.4.3, pdf p.	the estimated daily intake (EDI), as noted in Health Canada (HC) guidance, a target hazard		
			165	quotient (THQ) of 0.2 may be used. The calculations do not reflect this approach. In cases	b) Provide information in the monitoring plan on calculation of a post-	
			Section 6.5, pdf p.	where background exposure exceeds the TDI, HC suggests that total exposure from all site	remediation HQ that includes all site exposure pathways (including, but	
			177	media should not exceed 20% of the TDI.	not limited to, direct contact with sediment and consumption of country	
					foods) together. This should be calculated for D/F, Vanadium and for any	
				The THQ of 0.2 used for Dioxins and Furans (D/F) was limited to exposure via direct contact	COPC that is found to exceed background concentrations in an on-site	
				with sediment; however, people may also be exposed to elevated levels of D/F in foods that	medium following remediation. The HQ should not exceed 1 if	
				may be consumed from the site. The risk assessment may underestimate risk as it did not	background (off-site) exposure has been calculated for the COPC, or 0.2	
				include calculations for exposure for people that would also consume foods from the site in	if background (off-site) exposure has not been calculated for the COPC.	
				future. This is inconsistent with HC guidance, which recommends that all operable exposure	The monitoring plan should also confirm that all assumptions used in	
				pathways from the site be included together in risk estimates and compared with a THQ of	calculating the SSTL are accurate post-remediation.	
				0.2. Use of a THQ of 0.2 that does not include background (i.e. offsite) exposure would be		
				acceptable if all exposure pathways from the site are included; however, this was not	c) In consultation with community members, identify risk management	
				provided.	measures to be taken, if levels of COPCs remaining on site may result in	

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an HQ that exceeds target levels for all operable exposure pathways. This may include further remediation of sediment, consumption advisories (e.g. allowable weekly number of aquatic country food portions to be consumed from the site) or other possible risk management measures.			or Information: Requires Technical Discussion:	Health Canada recommends the proponent address the following Yes	Derive an SSTL based on the ongoing chronic exposure identified in the report, without limiting the derivation of the SSTL to direct contact with	sediment, given that a THQ of 0.2 requires that exposure from all properable exposure pathways be considered. HC recommends the proponent recalculate the SSTL using a chronic TRV. HC provides a chronic TRV for D/F in HC (2021)*.		
an HQ that exceeds target lev This may include further reme advisories (e.g. allowable wee portions to be consumed fron management measures.			Specific Question/ Request for Information	Health Canada recommends t comment:	Derive an SSTL based on the creport, without limiting the d	sediment, given that a THQ of 0.2 operable exposure pathways be c proponent recalculate the SSTL us chronic TRV for D/F in HC (2021) ¹ .		
Similarly, the THQ of 1 used for Vanadium would be acceptable if all exposure pathways from the site are included (in addition to background, which has been included in current calculations); however, other on-site exposures were also not included in the Vanadium calculation.	The consumption of country food pathway (including, but not limited to, fish and shellfish, terrestrial wild game, and plants) has not been carried through the risk assessment to the SSTL calculation, and sufficient rationale has not been provided, as discussed in more detail in the following IRs. Excluding the combined exposure from food consumption and direct contact with sediment could underestimate sites exposure when characterizing risk (i.e. HQ not exceeding 0.2 for D/F or 1 for Vanadium) and in determining SSTLs, and affect the degree to which they could be protective of human health.	The SSTL calculations include several assumptions, which should be verified post-remediation. For example, the HHERA assumed that toddlers would not be present in the reed gathering scenario. If toddlers may be present following remediation, the post-remediation HQ calculation should use toddlers as the most sensitive receptor for the reed gathering scenario. SSTL calculations in the HHERA also included assumptions about sediment particle size (used to determine sediment loading rate). Post-remediation monitoring should verify the accuracy of these assumptions, and sediment loading rate should be updated in post-remediation calculations if required.	Context and Rationale:	Insufficient information is provided to justify the use of intermediate Toxicological Reference Values (TRVs) or Minimal Risk Levels (WRLs) in the SSTL calculations, which may not accurately reflect site exposure and therefore result in SSTLs that are not protective of	human health.	Where exposures are repeated annually, such as for this site adjacent to a residential community, an intermediate NRL may note be protective of health. Repeated annual exposures are reflective of chronic exposure, which may require the use of a chronic MRL. Health Canada guidance requests additional chemical-specific information related to the toxicity profile for each substance, which was not provided.	The proponent identified that the use of an intermediate MRL is appropriate for exposures up to 364 days, as stated by Agency for Toxic Substances and Disease Registry. However, the proponent also stated that continuous annual exposure is expected for country foods in the future and repeated direct contact exposure to sediment is expected for 30 weeks each year, which would had defined or change above the sediment is expected for 30 weeks each year, which would had defined or change above the amongs of the proposers.	repeated organized software and the properties of the properties o
			Reference to EIS:	The proponent's responses to Round	Section 2.1.2, pdf p.	HHERA (EIS – Appendix A) Section 6.3, pdf p. 161	Section 6.4, pdf p. 163 Section 6.5, pdf p. 177 Tables H-2.10 to H-	2.22 of Appendix H
			Project Effects Link to CEAA 2012:	5(1)(c)(i) Aboriginal Peoples Health/ socio- economic conditions				
			IR Number:					
			IR #:					

¹ Health Canada. 2021. Federal Contaminated Site Risk Assessment in Canada, Toxicological Reference Values (TRVs), Version 3.0, March 2021.

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				calculation and considered against a THQ of 0.2 (or 1 when background exposure has been calculated, as for Vanadium).		
				Further, generation of an SSTL that only considers direct exposure to sediment and does not consider levels of D/F in food consumed from the site (recognising that the higher than background SSTLs used by the proponent will allow for bloaccumulation of higher than background levels of D/F in country foods) will further increase the ongoing chronic exposure to D/F.		
				In addition to concerns related to chronic exposure versus intermediate exposure, the use of an intermediate MRL for repeated annual exposure would require additional information that was not provided, such as evidence that the increased exposure to D/F over the 30 weeks of elevated exposure to sediment would result in body burdens that return to background levels during the 22 weeks of non-exposure.		
IR #: IAAC-36	IR Number: IR(3)-36	Project Effects Link to CEAA 2012:	Reference to EIS:	Context and Rationale:	Specific Question/ Request for Information:	Requires Technical Discussion:
		5(1)(c)(i) Aboriginal Peoples Health/ socio-	The proponent's responses to Round	Insufficient rationale is provided to support the representativeness of plant species collected from the reference wetland to establish background concentrations.	Health Canada recommends the proponent address the following comment:	ON O
		economic conditions	2 IRs Section 2.1.3, pdf p. 23	The proponent's response states that only a limited number of the plant species, identified by the Pictou Landing First Nation (PLFN) for traditional use and purposes, were present at the	a) Include monitoring for all onsite plant species that were identified by PLFN for traditional use and purposes in the project's monitoring	
			HHERA (EIS Appendix A)	Site. The response further states that the majority of plants (approximately 80%) collected from the freshwater wetland and estuary were the same species of plants collected from the reference areas (i.e., cattails and bugleweed), and only a select few additional plant species	program. If these plant species are not currently found onsite, consider including provisions to adapt the monitoring to include any new plant species that may grow onsite in the future. Include collection of	
			Section 4.2.5.2, pdf p.73	(e.g., berries and other herbaceous plants) collected from the Site could not be located in the reference wetland.	appropriate background samples from a reference area.	
			Table C-2.3, pdf p.484	Based on the above, the proponent states "there is limited uncertainty associated with the	 b) Describe in the monitoring program, the use of various risk management and mitigation measures (like engineered and/or 	
			The proponent's	plant species utilized as background concentrations in the HHERA", as the majority of plants collected from the site were cattails and bugleweed.	administrative controls such as consumption advisories) that will be put in place for the protection of human health. Further, ensure any such	
			1 IRs	Additionally, the only reference to country foods monitoring in the Environmental Monitoring	action will be clearly communicated with community members and developed with their input.	
			section 2.2.5, pdf p. 108	rian tewl') or Project Environmental Protection Plan (P-Er-V) states, "Post remediation monitoring of country foods (such as edible fish, shellifsh indis and/or aquatic plants) will be conducted within the remediated sediment areas laquatic areas) at the Site."	c) If post-remediation monitoring of plant species found onsite and consumed by PLFN community members shows concentrations of COPCs	
			The proponent's additional	As limited sampling has been conducted for plant species identified by PLFN for traditional use	that exceed background levels, consumption of plants should be included in the calculation of a post-remediation HQ that includes all site	
			response to Round 1 IRs	and purposes in the future, should these species (other than cattails and bugleweed) be identified at the site following remediation, monitoring (with comparison to background	exposure pathways together, described in IAAC-33.	
			Section 4, pdf p.6	samples of the same species) should occur.		
IR #: IAAC-37	IR Number: IR(3)-37	Project Effects Link to CEAA 2012:	Reference to EIS:	Context and Rationale:	Specific Question/ Request for Information:	Requires Technical Discussion:
		5(1)(c)(i) Aboriginal	The proponent's	The quantitative risk assessment has not been updated to include consumption of terrestrial	Health Canada recommends the proponent address the following	
		Peoples Health/ socio- economic conditions	responses to Round 2 IRs	wild game (e.g., snowshoe hare and white-tailed deer) and additional rationale is not provided to support the exclusion of human consumption of terrestrial game mammals from the quantitative risk assessment.	comment:	ON.

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		Requires Technical	O N
a) Include the monitoring of terrestrial wild game (including but not limited to rabbit and deer), in the monitoring program being developed for this project regardless of soil quality guidelines. Describe how monitoring will be conducted and how threshold/rarget levels will be determined and for which tissues, including future food consumption surveys if necessary. This should be conducted in conjunction with local people to determine what specific tissues are likely to be consumed. If post-remediation monitoring of terrestrial wild game shows concentrations of COPCs that exceed background levels, consumption of terrestrial wild game showld be included in the calculation of a post-remediation HQ that includes all site exposure pathways together, described in IAAC-33. b) Describe in the monitoring program the use of various risk management and mitigation measures (like engineered and/or management and mitigation measures (like engineered and/or hand place for the protection of human health. Further, ensure any such developed with their input.		Specific Question/ Request for Information:	Health Canada recommends the proponent address the following comment: a) Describe how areas with a higher likelihood of human exposure to project-related contaminants will be determined (i.e. the depth criteria for determining "shallow water areas") and how much additional weight will be assigned to these areas. b) Provide information on an ongoing sediment sampling program to be implemented after the SWACs for each remedial sub-unit are calculated to be equal to or below the SST and remediation has been deemed complete. Discuss how the sediment sampling program will monitor for reconfamination in the post-remediation phase. The monitoring plan should address the potential for suspended contaminated material settling back onto surface sediments and for areas with contaminated sediment above the SSTL migrating into areas likely to be frequented by human receptors or out into the Northumberland Strait.
The proponent's response states, "() the pathwoy was included in the HHRA evaluation included as Appendix A of the EIS." However, as noted in HC's Round 1 IR for IAAC-37, only wetland species (Beaver and muskrat) have been included in the discussion on game meat in the HHERA. The MI'kmaq of Nova Scotla Ecological Knowledge Study report (Appendix T of the Environmental Impact Statement (EIS)) indicated that rabbit (likely snowshoe hare) and deer were food sources, and both species were present within the project Study Area. In the proponent's response to the Round 1 IR for IAAC-37, they provided rationale for screening out the consumption of terrestrial game mammals as an operable exposure pathway based on soil quality guidelines. In the Round 2 IR for IAAC-37, HC noted that it is not appropriate to screen out country foods based on soil quality guidelines for incidental soil ingestion. The consumption of terrestrial wild game pathway has not been included in the quantitative risk assessment and no additional rationale has been provided in the proponent's response to IR(2)-37 to support exclusion of this pathway from the assessment.	lagement Plan	Context and Rationale:	Uncertainty remains around the potential health risks from the <u>resuspension</u> of contaminated sediments remaining in the freshwater wetlands and estuary through the suspended sediment in the surface water exposure pathway' and 'country food exposure pathway' in Boat Harbour and in the Northumberland Strait. The proponent's response describes the use of Surface Weighted Average Concentrations (SWACs) for the confirmatory sampling program to ensure concentrations of D/F remaining in sediment of the Boat Harbour Stabilization Lagoon (BHSI, estuary and wetland areas are below the SSIL of 29 ggl. The Boat Harbour Efflient Treatment Facility (BHETF) will be divided into sub-units for remediation, and post remediation SWACs will be calculated for each sub-unit to ensure the SWAC for that sub-unit is equal to or below the D/F Toxic equivalence (TEQ) SSIL before remediation as proceed in another sub-unit. The proponent states, 'Remediation will be deemed complete when the SWACs for each remedial sub-unit and the entire BHETF (BHSL plus the wetlands and estuary) are equal to or below the SSIL." However, this approach does not address the potential for "hot spots" (areas with concentrations greater than the SSIL and surrounding areas) as individual polygons may have concentrations that exceed the SSIL, as long as the average for each sub-unit and the BHETF is equal to or below the SSIL. The proponent's response to IR-50 states that maximum criteria have yet to be developed for each polygon under the SWAC approach. The proponent states, "The Federal Contominated Sites Action Plan (FCSAP) Ecological Risk Assessment Guidance (ECCC, 2012) indicates that SWAGs can be used to estimate incidental solid ingestion of a minimal propertion of some plane of the station of the surface of the stat
Section 2.1.4, pdf p. 24 HHERA (EIS – Appendix A) Section 1.3, pdf p. 34 9. 144 p. 144 The proponent's response to Round 1.1Rs Section 2.2.6, pdf p. 108	RA-HHRA) and Risk Mar	Reference to EIS:	The proponent's responses to Round 2. IRs Section 2.2.1, pdf p. 2.4 and Section 2.2.3, pdf p. 28 EMP (Appendix B of the EIS) Section 5.4, pdf p. 35 Risk Management Plan Appendix K of the HHRA (EIS-Appendix A) Coastal Hydraulic Modelling Report (EIS-Appendix Z)
	Project Related Activities-Human Health Risk Assessment (PRA-HHRA) and Risk Management Plan	Project Effects Link to	5(1)(c)(i) Aboriginal Peoples Health/ socio- economic conditions
	ctivities-Human F	IR Number:	40/41/49/50 /52
	Project Related A	IR#:	IAAC-49 IAAC-50 (both parts) IAAC-52

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	Requires Technical Discussion: No
	Specific Question/ Request for Information: Health Canada recommends the proponent address the following comment: Update the risk-based criteria outlined in Memorandum-96 to ensure limits for release of water to the estuary from the BHSL during active remediation of the BHFIF and the TLTS operation are adequately protective of human health through the recreational water quality pathway.
confirmatory sampling program to focus (or be weighted) on shallow water areas of the BHETF that have a higher likelihood of exposure to humans in the future (following remediation)." However, the document referenced by the proponent focuses on ecological rather than human receptors. No information is provided by the proponent to who areas with a higher likelihood of exposure to humans will be determined (i.e. the depth criteria for determining "shallow water areas") or what additional weight will be assigned to these areas. Assigning a greater weight to areas with lower concentrations (i.e. shallow areas) will allow the SWAC of a sub-unit to be below the SSTL while higher concentrations remain in deeper areas (which are assigned lower weights in the SWAC calculations). The proponent's response has not addressed the potential for recontamination in the post-remediation phase. I lit is not clear whether sediment sampling will be conducted regularly following remediation or for migration of contaminated sediment suspended during remediation or for migration of contaminated sediment. Further, no information is provided on sediment sampling from the Northumberland Strait outside the estuary, due to the potential for migration of contaminated sediment. Additionally, the proponent's response has not addressed the potential for contamination from "hot spous" to impact country foods. The EMP states, "Post remediation monitoring of country, foods (such as eailbe fish, shellfish, birds and/or aquatic plants) will be conducted within the remediated sediment areas (quatic areas) at the Site." However, it is not sufficient to sample country foods only from within the remediated sediment areas (acut into the Northumberland Strait.	Context and Rationale: Insufficient information is provided to confirm whether predicted concentrations of COPCs in effluent dischaged during remediation activities will be protective of human health through the recreational water pathway. The proponent's response states, "During remediation including sludge dewatering, concentrations of COPCs in the BHSL and discharges to the estuary ore predicted to remain at the same or very similar concentrations as are observed currently in the BHSL." However, this prediction is based on several assumptions (listed in Memorandum-96 in Appendix D of the Proponent's Response) as well as limited Geotube samples. The Geotube data provided in Table 2.19 (and provided previously) only shows avenage and maximum concentrations. Additional data showing individual Geotube samples has not been provided. As noted in the proponent's response, "Geotube* effluent samples of sediment removed from the BHSL in the dry as part of the Pilot Scale Study were not collected for laboratory analysis." The response further states, "Memorandum-96 also outlines the proposed water discharge criteria and sampling approach for water discharge of uning the BHRP. () The proposed risk-based water discharge criteria are reasonable from an environmental risk perspective in the wolf part against sicharge criteria are reasonable from an environmental risk perspective in the wolf scharge criteria exceed the Human Health Screening Guidelines for Direct Contact with Surface Water provided by the proponent in Table 3.3 of the PRA-HHRA (Appendix A of the EIS). While predicted concentrations of COPCs in effillent
	The proponent's responses to Round 2.18s 2.18s 2.6ction 2.2.2, pdf p. Table 2.19, Appendix F, pdf p. 144 Memorandum 96 (included as Appendix D of proponent's response to Round 2.18s) PRA-HHRA (EIS-Appendix A) Table 3.3, pdf p. 5287 to 5288 Table 5.2, pdf p. 5587 to 5288
	Project Effects Link to (EAA 2012: (\$7.1)(c)(l) Aboriginal Peoples Health/ socio- economic conditions
	IR Number: IR33-42/43 b/c
	IR#: IAAC-43 B/C IAAC-43 B/C

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	Requires Technical	No No
	Specific Question/ Request for Information:	Health Canada recommends the Proponent address the following comment: a) Consider identifying additional mitigation measures to reduce: • Nightline noise, focusing on receptors that are close to where project-related activities likely to cause noise impacts (i.e., dredging and associated activities) will occur during the sleep period; and noise, particularly near sensitive receptors such as hospitals, senior/mursing/invaring/inva
discharged during remediation activities are shown to be below guidelines protective of human health (Table 3.3 of the PRA-HHRA), if concentrations of COPCs are greater than predicted concentrations, the risk-based criteria for discharge of water to the estuary may result in exceedances of human health criteria for recreational water quality.	Context and Rationale:	Uncertainty and information gaps in the quantitative noise assessment, such as i) potentially non-representative baseline noise levels, iii inaccurate representation of the "project-baseline" scenarios assessed, iii) absence of predicted nighttime noise levels for whice reverse alarms, may have led to an underestimation of noise impacts, particularly on sleep. HC notes that, given baseline levels are measured at monitoring stations and not at Point of Reception (POR) locations, they may not be representative of the baseline noise levels at receptors. Therefore, there may be additional uncertainty associated with the (rated) day-night sound levels (LR]dn) and change in percent highly annoyed (%HA) values (for "baseline" and "project-baseline" scenarios), which would impact calculations of change in %HA using the measured baseline levels. * "project-baseline" scenario refers to the "Construction, Remediation and Demolition Impacts + Baseline" and "Operation Noise Impacts + Baseline" scenarios assessed and presented in Tables 2.13-2.14 (September 2021 IR responses) and Tables 2.11 (uly 2022 IR responses). ii) It is unclear whether the "Construction, Remediation and Demolition Impacts + Baseline" and "Operation Noise Impacts + Baseline" scenario assessed and presented in Table 7.2-1 in EIs, p. 7-202). For example, the construction phase for the waste management components will take place in years 2-31. However, the construction phase for the bridge works and dameremoval will take place in years 2-37. However, the construction phase for the bridge works and dameremoval will take place in years 6-77. Furthermore, it is unclear whether and how the decommissioning and abandomment phase for some project components is included in either scenario (i.e., when it occurs from years 2-7). iii) In Tables 2.13 and 2.14 (September 2021 IR responses) and Table 2.1 (July 2022 IR responses), the nighttime sound levels (un) are solve so to a bove 45 dBA at some PORs for the "baseline" and Or "project-baseline" sonly present nois
	Reference to EIS:	The proponent's responses to Round 2 IRS Section 2.3.3, Table 2.1, page 26 E.2 EIS Section 7.2, Table 7.2.4, p. 7-202 Section 7.3, Table 7.3.4, p. 7-219-220 Section 7.3, Table 7.3.4, Mitigation Tables Section 7.3.3, Mitigation Tables Section 3.5 Follow-up programs The proponent's responses to Round 1 IRS Section 2.16, Table 7.13 and 1 IRS Section 2.2.16, Table 2.13 and 2.14, page 113
	Project Effects Link to	CEAA 2012: 5(1)(c)(l) Aboriginal Peoplae Health/ socio- economic conditions
	IR Number:	1R(3)- 44/45/48
	Noise IR#:	1AAC-44 1AAC-48 1AAC-48

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	Requires Technical Discussion: No
	Specific Question/ Request for Information: Health Canada recommends the proponent address the following comment: Clarify what parameters will be included in future monitoring of groundwater. All relevant project-related parameters (including D/F) should be included. With respect to D/F, the frequency of testing for D/F may not need to be the same as other substances that are more likely to
PORs would be higher, potentially exceeding the Health Canada (2017)² recommended WHO Guidelines for Community Noise (1999)³, which state that sleep disturbance can occur when outdoor continuous sound levels are equal to or above 45 dBA during the sleep period. In addition, the Proponent did not provide baseline or predicted (Amax values, or the number of times that LAmax exceeds or may exceed (as a result of the project) 60 dBA at POR locations, during the nighttime period. The WHO (1999) also recommends that, "for a good sleep, [outdoof] sound pressure levels should not exceed approximately [60] dBA LAmax more than 10–15 times per night", where LAmax represents the maximum value of the sound pressure level during a noise event (Health Canada, 2017). Health Canada also notes that some individuals may sleep outside of typical nighttime hours, and therefore increases in noise levels outside of standard nighttime hours, and therefore increases in noise levels outside of standard nighttime hours at sensitive receptors such as hospitals, senior/nursing/long-term care home and daycares/schools. It is unclear whether haul truck back up alarms (i.e., vehicle reversing alarms) were identified as a potential source of tonal sound in the quantitative noise assessment fresonse to IAACA, 81 term CJ. While mitiaation measures mentioned in the original ElSt (resoonse to IAACA, 81 term CJ. While mitiaation measures mentioned in the original ElSt	(Table 7.3-1 and "Mitigation Measures" tables in section 7.3-3) include. "Design site, including widening of roadways, the turn-around ac containment cell and placement of Site influstructure to minimize the need for reversing and vehicle reversing alarms, it is possible that this tonal noise source will not be completely eliminated. If back up alarms were not considered as tonal sounds and a +5 dBA adjustment was not applied for predicted noise levels or change %HA calculations at POR locations where tonal sounds are likely to be audible, noise impacts such as increased annoyance may have been underestimated at certain human receptors. Context and Rationale: It is not clear which parameters will be included in the ENMP (Section 8.2.4.1), 'the groundwater quality and quantity monitoring program in place at the Site. Groundwater quality monitoring program in place at the Site. Groundwater quality monitoring unalytics will include at a minimum the following constituents, in addition to groundwater elevation: General inorganic chemistry, Metals Including mercury), Flouride, TKN, BOD. COD, TSS, TP, Phenodis', It is not clear from the information provided in the EMPPEPP, the EIS or the HHERA what parameters are currently monitored in groundwater and will be included in the future groundwater monitoring program in dual be included in the future groundwater and will be included in the future groundwater monitoring program.
	Reference to EIS: The proponent's responses to Round 2 IRs Environmental Management Plan (EIS - Appendix B) Section 8.2.4.1, pdf p. 6.1
	Project Effects Link to CEAA 2012: 5(1)(A) Aboriginal Peoples Health/ socio- economic conditions
	IR Number: IR(3)-53
	Drinking water IR #: IAAC-53

² Health Canada (2017). Guidonce for Evoluating Human Health Impacts in Environmental Assessment: Noise. Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario. Available at: https://www.publications.gc.ca/site/eng/9.832514/publication.html
3 World Health Organization (WHO) (1999). Guidelines for Community Noise. Available at https://www.who.int/publications/i/item/a68672

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		Requires Technical Discussion:		No											
below the appropriate drinking water guidelines ^{4. 5} .		Specific Question/ Request for Information:	Health Canada recommends the proponent address the following	comment:	Provide a description of additional mitigation measures that will be annined should the monitored lavels of TSP PM., PM., Discel	Particulate Matter (DPM), VOCs, PAHs and Reduced Sulfur Compounds	(RSCs) exceed the predicted levels.								
Based on the information provided in the EMP/PEPP, it does not appear that D/F are included in the during/post-remediation groundwater monitoring program. While D/F are generally more likely to accumulate in soil, sediment and animal tissue than in water, the concentration of 2,3,7,3-tetrachlorodibenzofuran (TCDF) in surface water of BHSL is predicted to increase from year 0 to year 5 (Memorandum-96), As 2,3,7,8-TCDF is predicted to increase in surface water during/following remediation, D/F should also be included in future monitoring of groundwater.		Context and Rationale:	Air quality modelling may not accurately reflect project emissions, as modelling has not	been updated to include trucks used for hauling of waste to the containment cell and the	day.	The proponent's response states, "It is confirmed that the dredged material described in	Scenario 4 (Shoreline Dredging) will not be transported by trucks but pumped by the hydraulic drednes to the containment cell ()" However the response also states. "As such the use of	trucks for the hauling of waste to the CC may be used for minor amounts of wet sludge in a	solid form only, similar to historical activities carried out for maintenance of the BHETF." Based	on this contradictory information provided in the proponent's response, it is understood by HC that certain situations will require the use of trucks for hauling of waste to the containment	cell (CC). However, the proponent did not update their modelling to include the additional use	of trucks for hauling of waste. Therefore, the air quality impacts of trucks used in the	transportation of excavated waste from shoreline dreuging remains dirited.	In the revised air quality model provided in response to IR B of IAAC-54b/56/58	when candularsa, Appendix or In-2. Tespoinsy, fire thyopheric states that the control efficiency for dust suppression by watering of roads has been adjusted from 80% to 55%. The proponent concludes that the expansion of the paved portion of the road along with twice-
Project Environmental Protection Plan (EIS Protection Plan (EIS Section 7.5.3 pdf p. 178 HHERA (EIS Appendix A) Section 6.1.1.4, pdf p. 135 Table C-1.2, pdf p. 383 Section 7.4.1.1, pdf p. 80		Reference to EIS:	EIS	Section 3.1.2, pdf p.	Section 7.3.9.4.2,		The proponent's to	Section 2.5.1, pdf p.	33	Section 2.5.2, pdf p. 28		Memorandum-88	proponent's IR-2	response, pdf p.	145)
		Project Effects Link to CEAA 2012:	5(1)(c)(i) Aboriginal	Peoples Health/ socio-											
		IR Number: IR(3)-	54b/56/57/5	∞											
	Air quality	IR #: IAAC-54b	IAAC-56	IAAC-57											

"Health Canada. 2016. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Drinking and Recreational Water Quality, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario. https://www.publications.gc.ca/site/eng/9.832511/publication.html
5 Health Canada. 2022. Guidelines for Canadian Drinking Water Quality—Summary Table. Ottawa, Ontario. Health Canada. Available online at: <a href="https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html

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	Requires Technical	No			Requires Technical	Discussion:	No																							
	Specific Question/ Request for Information:	No further comment.			Specific Question/ Request for Information:	Health Canada recommends the proponent address the following	comment:	a) Identify an appropriate threshold target level to be used for future	monitoring of D/F, mercury, lead, arsenic, cadmium, aluminum and	manganese in fish and shellfish, as scientific rationale has not been	provided to support the use of CFIA guidelines and sufficient background	sampling nas not been conducted.	b) Describe a sampling plan for collection of background samples of	shellfish to accurately represent background conditions.		c) Describe a sampling plan for monitoring of COPCs in fish and shellfish	during and following completion of the BHRP. Identify location, number	and type of samples to be collected, as well as the unlation of sampling (i.e. start and end year) and the criteria that will be used to determine	no further monitoring is required (i.e. no statistically significant change	in COPC concentrations in seafood for a certain number of years).	Identify how future sampling (duration, species, location, life stage,	whole organism or parts of organism) will address the potential for	bloaccumulation and blomagnification of U/F in seatood. Sampling should occur from both the former BHETE and the Northimberland	Strait outside the former BHETF. The collection and preparation of tissue	samples for analysis should reflect local methods.	4) December 1 and 1 decided an	d) Describe from 11sh from fature consumption of fishif strength will be calculated, including whether and how consumption surveys will be	calculated. If post-remediation monitoring of aquatic country foods	shows concentrations of COPCs that exceed background levels,	consumption of fish/shellfish should be included in the calculation of a
daily watering of both the unpaved and paved portions is sufficient to control concentrations of Total Suspended Particulate (TSP) and the PM $_{10}$ under the updated dust control efficiency model. However, the proponent further states in Memorandum-88 that "The modelled periods with truck emissions changed from 24 hours per day to 12 hours per day" and, "The 12-hour modelling period much more closely aligns with the expected daily period of truck traffic." No additional information is provided regarding the representativeness or impact of this change. Therefore, it is not clear if the updated model provided in Memorandum-88 accurately represents future air quality for scenarios 1, 4 and 7 of the project.	Context and Rationale:	Health Canada's comments are sufficiently addressed.			Context and Rationale:	Insufficient information is provided to support the conclusion that COPCs in fish and	shellfish from the Study Area do not pose human health concerns now or in the future. A summary of the key outstanding issues is provided below		General:	The proponent's response to a previous IR states, "In an effort to collect background clam	samples, the Northumberland Strait shoreline area near Ferguson's Pond which was used for	rejerence sealment and surface Water samples Was also inspected for the presence of clams, hut none ware identified at this time "I Memorandum 03). This is insufficient rationale to	such force were identified at times. (Wellfold indam 5.2), this is insufficient tacking to support not collecting background samples of clams, particularly as clams are benthic	organisms that would likely be exposed to any contaminated sediments.		The proponent's response states, "The statistical test showing that the concentrations of D/F	in clams are statistically similar to background shellfish levels of the Northumberland Strait	ן נומני, ווועטפונט, מווע וסטגופי) וא סיטימפע וווי אספרועות ס-2 ען נוופ החבמא (אספרועות איט) נוופ בוא). This test (conducted for D/F as well as for other COPCs in shellfish) compares 10 clam samples	taken from the Northumberland Strait near the estuary against 35 samples of other shellfish	(lobster, crabs and mussels) collected by a Dalhousie student from the Northumberland Strait,	directly adjacent to the estuary and up to maximum distance of 8 km from the Boat Harbour	estuary mouth. Not only is it inappropriate to compare clams to other species (lobster, crabs	and mussels), this is not a true background sample as some of the - background snellfish samples were taken from the same location(s) (i.e., the Northlumberland Strait adjacent to the	estuary) as the "site" clam samples.		Insufficient rationale to support screening of dioxins/furans in fish and shellfish:	ine proponents response states. As previously indicated in numerous his including trace-35, 35 and 36 above, the primary COPC associated with the BHETF is D/F and concentrations of	D/F in clam tissue collected from the Northumberland Strait near the estuary were also similar	to the background clam tissue samples and other shellfish collected from the area." However,	no further information is provided on U/F in background clam tissue samples. It is not clear
Air Quality Impact Analysis (Appendix U of the E1S) Table 1.2 Air Quality Nodelling Scenarios, pdf p. 32	Reference to EIS:				Reference to EIS:	The proponent's	response to Round	Section 2.6.1, pdf p.	36		21.77 8 42.11.1	HHEKA (EIS	Tables H-1.10, H-	1.11 and H-1.15,	pdf p. 4909, 4911,	4916	Appendix G-2, pdf p.	4032 & 4062	Memorandum-93	(The proponent's	additional	response to Round	Liks) Section 6 ndf n 13	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0						
	Project Effects Link to	5(1)(c)(i) Aboriginal Peoples Health/ socio-	economic conditions		Project Effects Link to	5(1)(c)(i) Aboriginal	Peoples Health/socio-																							
	IR Number:	<u> </u>			IR Number:	62/63/65/42	a/43a																							
	IR#:	08-04-1		Country foods	IR#:	IAAC-62	IAAC-65	· · · · · · · · · · · · · · · · · · ·																						

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ound 2, Part 1) for	to the Impact Ass
se to April 5 IRs (R	nada – Submitted
view of the respons	rtment: Health Ca
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post-remediation HQ that includes all relevant exposure pathways together, as described in IAAC-33. e) In consultation with community members, identify risk management measures to be taken, should monitoring of seafood show potential risk to human heath. This may include further remediation of sediment, committee and additional for a plausable management, and additional for a plausable management.	consultation advisories (e.g. anowane weekly number of searcher postions to be consumed from the site) or other possible risk management measures.					
what background clam samples this comment is referring to or where this background data is provided. The only background data for D/F in shellfish that could be located in the HHERA or in any IR responses was for crab, lobster and mussels. Further, D/F in fish and shellfish were compared against Canadian Guidelines for Chemical Contaminants and Toxins in Fish and Fish Products (FFIA guidelines), which HC has noted provided to an appropriate and all the products (FFIA guidelines).	retroined has been provided to support the use of these guidelines in this or previous IR responses (e.g. demonstrating how the assumptions used in development of the CFIA guidelines are representative of country food consumption). D/F have the potential to bioaccumulate and biomagnify in aquatic food webs and should therefore be carried through to a full assessment. No scientific rationale has been provided to justify why dioxins/furans are not anticipated to accumulate in country foods.	Insufficient rationale to support screening of mercury in fish and shellfish: The proponent's response states that although mercury was not analysed in clams, mercury was not detected in fish samples. However, mercury has the potential to bioaccumulate and biomagnify in aquatic food webs and may concentrate in certain tissues or organisms more than others. In addition to not being analysed in clams, mercury was also not analysed in fish fillet samples.	Further, mercury in fish was compared against CFIA guidelines, which HC has noted previously are not an appropriate guideline for country food consumption. No scientific rationale has been provided to support the use of these guidelines in this or previous IR responses.	Insufficient rationale to support screening of lead in fish and shellfish: Lead in fish and shellfish collected from the site was statistically greater than both the background concentrations and the screening guideline (CFIA guideline, which may not be adequately protective of country food consumers). In Memorandum-33, dated November 10, 2021, lead in clams from the site was compared against a single composite sample (composited from 10 callected by a Dalhousie student from the Northumberland Strait approximately 65 km east of the BHETF. The concentration of lead in the site sample (1.6 mg/kg) was less than the concentration in this background sample (2.6 mg/kg). However, comparison against a single sample is insufficient rationale to support the screening out of lead, when lead exceeded background concentrations in other samples tested previously. As noted in the previous round of IRs, it is also not appropriate to screen out lead based on the sediment screening guideline.	Further, lead has the potential to bioaccumulate in aquatic organisms. Lead should therefore be carried through to a full assessment. No scientific rationale has been provided to justify why lead is not anticipated to accumulate in aquatic country foods.	Insufficient rationale to support screening of arsenic in fish and shellfish: No scientific rationale is provided to support how the use of the CFIA guideline values can adequately protect the health of Indigenous and non-Indigenous consumers of non-commercial fish and shellfish from the Northumberland Strait. The proponent states that, "The

echnical review of the response to April 5 IRs (Round 2, Part 1) for the Boat Harbour Remediation Project Environmental Impact Statement, received August 3, 2022	ederal Department: Health Canada – Submitted to the Impact Assessment Agency of Canada on: Sept. 13, 2022.
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detection limit for arsenic in the fish and shellfish samples is less than the human health screening guideline." However, no rationale is provided to support the use of this guideline.	Insufficient rationale to support screening of cadmium in fish and shellfish: No new information is provided to support screening of cadmium in whole fish, fish fillet and shellfish samples given that the detection limit for cadmium (0.3 mg/kg) is greater than the USEPA human health screening guideline (0.0846 mg/kg).	Insufficient rationale to support screening of aluminum in fish and shellfish: Aluminum in fish and shellfish collected from the site was statistically greater than both the background concentrations and the USEPA screening guideline. Aluminum in clams from the site was also compared against the single composite background sample collected by a Dalhousie student from the Northumberland Strair. The concentration of aluminum in the site sample (109 mg/kg) was less than the concentration in this background sample (197 mg/kg). However, comparison against a single sample is insufficient rationale to support the screening out of aluminum. As noted in the previous round of IRs, it is also not appropriate to screen out aluminum based on sediment screening guidelines.	Insufficient rationale to support screening of manganese in fish and shellfish: Manganese in fish and shellfish collected from the site was statistically greater than both the background concentrations and the USEPA screening guideline. Manganese in clams from the site was also compared against the single composite background sample collected by a Dalhousie student from the Northumberland Strait. The concentration of manganese in the site sample (115 mg/kg) was also greater than the concentration in this background sample (86 mg/kg). The proponent's response further states, "()8 of the 10 clam samples collected from the Study Area had manganese concentrations less than the background sample." This is not appropriate rationale to support the screening out of manganese. As noted in the previous round of IRs, it is also not appropriate to screen out manganese based on the sediment screening guideline.	remediation: The proponent's response to IAAC-42/43 A) states, "During remediation: The proponent's response to IAAC-42/43 A) states, "During remediation including sludge dewatering, concentrations of COPCs in the BHSL and discharges to the estuary are predicted dewatering, concentrations of COPCs in the BHSL and discharges to the estuary are predicted to remain at the same or very slumior to concentrations so observed currently in the BHSL and estuary (see Memorandum-96 included in Appendix D)." However, as discussed in IAAC-42/43, there are potential unrectanties associated with the predicted concentrations of COPCs in water discharged to the estuary. Further, while concentrations of the majority of COPCs in the BHSL and discharges to the estuary are predicted to remain the same or below concentrations currently observed, 2,3,7,8-TCDF is predicted to increase. The proponent's response states, "Water will only be discharged over the dam if it meets approved water quality guidelines protective of human and ecological health." However, these human health guidelines are meant to be protective of direct contact with surface water and may not be protective of human health through consumption of country foods, especially for bloaccumulative	substances. Insufficient monitoring plan:

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	Requires Technical Discussion: No		Requires Technical Discussion: No
	Specific Question/ Request for Information: Health Canada recommends the proponent address the following comment: a) Confirm that post-remediation monitoring of country foods will include game mammals. Provide target levels for post-remediation monitoring of vanadium and cadmium in game mammals, based on a RAF carl of 1.0 and the other conservative assumptions used in the HHERA, as adequate information has not been provided to justify the use of the absorption factor of less than 1.0. If post-remediation monitoring of game mammals shows concentrations of COPCs that exceed background levels, consumption of game mammals should be included in the calculation of a post-remediation HQ that includes all site exposure pathways together, described in IAAC-33. b) Identify risk management measures to be taken, should post-remediation monitoring of game mammals show potential risk to human health. This may include consumption advisories (e.g. allowable weekly number of game mammal portions to be consumed from the site) or other possible risk management measures.		Specific Question/ Request for Information: No further comment.
The proponent's response states, "In addition, NSLI will monitor country foods within the Study Area post-closure as outlined in the EMP and PEPP, included in Appendix B of the EIS." It is stated in the EMP, "Post remediation monitoring of country foods (such as edible fish, shellfish, birds and/or aquatic plants) will be conducted within the remediated sediment areas (aquatic areas) at the Site." However, it is insufficient to monitor country foods only within the remediated sediment area (i.e. the BHETF). Contamination of country foods may also occur in the Northumberland Strait outside the BHETF, due to the bioaccumulation/biomagnification potential of some COPCs.	Further assessment of health risks of cadmium and vanadium from consumption of game organs have not been provided. The proponent has reiterated the United States Environmental Protection Agency (USEPA) gastrointestinal absorption factors previously reported in the HHERA, but has not provided any additional rational eto support the use of these proposed absorption factors of less than 1.0. The proponent's it response further states, "GHD provided additional lines of discussion (see Section 6.4.3.6 of the HHERA, Appendix A of the EIS) to justify that the calculated risks were likely to be overly conservative with respect to human consumption of game organs." These other assumptions that are discussed as being overly conservative include the use of the 95° percentile rather than average consumption of game mammals and the fact that toddlers are unlikely to consume game mammals. While it is possible that these assumptions are overly conservative, it is also possible that game from the site could be consumed at the 95° percentile consumption rate and that toddlers could consume game from the site. The proponent's response further states, "As noted in the previous responses, NSLI will be monitoring country foods in the Study Area as part of the post-closure monitoring programs as outlined in the EMP and PEPP, it is not clear whether monitoring of game mammals will be conducted. If future consumption of game mammals may occur at the site, they should be included in post remediation monitoring of country foods.		Context and Rationale: Health Canada's comments are sufficiently addressed.
	Reference to EIS: The proponent's response to Round 2 IRs Section 2.6.2, pdf p. 37 HHERA (EIS Appendix A) Section 6.4.3.6, pdf p. 1.70 EMP (Appendix B of the EIS) Section 8.3.5, pdf p. 6.70 The proponent's response to Round 1.1Rs Section 2.2.27, pdf p. 1.1Rs Section 2.2.27, pdf		Reference to EIS:
	Project Effects Link to CRA 2012: 5(1)(Cl) Aboriginal Peoples Health's socio- economic conditions		Project Effects Link to CEAA 2012: 5(1)(c)(i) Aboriginal Peoples Health/ socio- economic conditions
	IR(3)-64	logy	IR Number: N/A
	IR#: IAAC-64	General Methodology	IR#: IAAC-1 IAAC-61