Enclosure 1: Federal Authority Advice Record – Crawford Nickel Project Impact Statement

Please submit the completed form by **February 7, 2025,** via the Registry.[1]

Department Contact Information

Submission Date	February 7, 2025
Department/Agency	Environment and Climate Change Canada (ECCC)
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1. Review the Impact Statement and provide views for IAAC's consideration in the analysis of the Project's effects and preparation of the Impact Assessment Report (Table 1) or identify potential deficiencies in the Impact Statement (Table 2).

2. As per the Cooperation Plan[2], consider all the mechanisms in place to manage potential federal effects. If your department is responsible for, or aware of, any relevant federal or provincial legislative frameworks, policies, programs, or potential complementary measures[3] that may help manage the Project's potential adverse federal effects, please specify and describe applicability to the Project and any known limitations to managing effects.

3. Indicate whether your department has identified any power that it will be unable, or may be unable, to exercise to allow the Project to proceed, in whole or in part as currently planned, and next steps to resolve any issues.

Blake Haskell
Name of Departmental / Agency Responder

Environmental Assessment Officer
Title of Responder

February 7, 2025
Date

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[1] All comments should be submitted via the ***Submit a Comment*** feature available on the Project's Canadian Impact Assessment Registry page (CIAR #83857). Letters and forms can be uploaded using this feature. If you have any difficulties submitting this way, please contact IAAC at *Crawford@iaac-aeic.gc.ca* for assistance.

[2] *https://iaac-aeic.gc.ca/050/evaluations/document/147338*

[3] Complementary measures are additional authorities of government officials or programs that may be used to mitigate effects that may be beyond the care and control of the proponent. They can be taken into account in decision-making.

Table 1. Views to Inform the Impact Assessment

Table 1 should be used to provide views for IAAC's consideration in the analysis of the Project's effects[4] and preparation of the Impact Assessment Report and potential conditions. Expert advisors should consider project context and regulatory context and provide risk-proportional, solution-oriented advice even where potential gaps in the Impact Statement are observed.

Comment ID	Refence to Impact Statement	Description of View or Concern Related to an Effect	Advice to Inform the Impact Assessment
Please identify comments by organization and comment number. *e.g.: HC-01*	*Identify the specific section of the Impact Statement to which your comment applies.*	*Provide a brief description of the view or concern for IAAC's consideration in the analysis of effects, based on available information, such as:* • *a missing pathway of an adverse federal effect that may really increase the overall extent of significance; or* • *sources of uncertainty that, in your department's view, may weaken potential conclusions.*	*Considering project context and regulatory context, provide solution-oriented advice for the impact assessment. For example:* • *Characterize residual effects and the level of uncertainty with predictions in the absence of more information from the Proponent, as predicted by your department. Explain the uncertainty. Consider describing the range of possible scenarios.* • *Suggest other mitigation and follow-up measures that may increase certainty in predictions or help manage uncertainty for adverse federal effects, including operational guidance or standards, and well-understood practices.* • *Describe any other federal or provincial legislative frameworks, policies, programs, and potential complementary measures that may provide another means to address adverse federal effects, or considerations related to the public interest factors, including predictable outcomes and whether other tools set conditions on the Proponent.* • *Identify those mitigation measures and project design elements that are necessary to limit the extent of significance of adverse federal effects, and those follow-up program measures that are necessary to address substantial uncertainty with the accuracy of predictions and the effectiveness of mitigation, in relation to key issues that are material to decision-making.* • *Provide advice on risk (likelihood and severity of effects), using applicable frameworks relevant to your mandate, to support IAAC's risk-based decisions.* • *Provide any additional considerations in relation to the Project's contributions to sustainability or to Canada's environmental obligations and climate change commitments.* • *Provide any additional considerations in relation to IAAC's obligations under section 79 of the* Species at Risk Act. *In the event of cross-cutting issues or a shared mandate/expertise with another agency or department, please specify the agency/department and contact persons.*
ECCC-01	Air quality assessment report – Appendix B.2 – Section 5.0, p.24 Appendix C.1 - Section 3.4.13, p.29	Baseline air contaminant concentrations were determined using the 90th percentile for 24-hour average concentration and annual average concentration from a full year of on-site measurements using a combination of air samplers (Section 3.4.13, Appendix C.1). For CO and O_3, historical values from National Air Pollution Surveillance Program stations were used. A comparison showed that on-site concentrations were consistent with or lower than values from NAPS stations (Section 5.0, Appendix B.2).	ECCC acknowledges the general approach and methodology used for establishing baseline concentrations and considers it reasonable.
ECCC-02	Air quality assessment report – Chapter 4 - Section 4.3.5.3, p.72	In Section 4.3.6.6 (Appendix C.1, p. 76), the Proponent states that the methodology for modeling particulate matter (PM) emissions from haul roads and stockpile wind erosion is conservative, as air quality models often overestimate impacts, with effects typically limited to a few hundred meters. The methodology for determining particle composition follows the US EPA Human Health Risk Assessment Protocol method and is presented in Section 4.3.5.3. While this provides a standardized approach, there is some inherent uncertainty regarding the potential dispersion of particles, as their composition may vary from the generalized emission factors used in the methodology, depending on site-specific conditions and source characteristics. Factors such as particle size and	Given the potential for PM generated from the Project to contain chrysotile asbestos and crystalline silica, the Proponent's Air Quality Management Plan should include detailed measures to minimize chrysotile asbestos and respirable crystalline silica in airborne dust and a robust monitoring program to track residual impacts, particularly near sensitive receptors. ECCC recommends the Proponent focus on mitigation strategies that minimize dust generation and dispersion, supported by consistent monitoring to evaluate their effectiveness. The monitoring

[4] "Effects" means adverse effects within federal jurisdiction and direct or incidental adverse effects (as defined in section 2 of the IAA), and considerations related to the public interest factors (as defined in section 63 of the IAA). Advice is also invited in relation to IAAC's separate obligations under section 79 of the *Species at Risk Act.*

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	Air quality assessment report – Appendix C.1 - Section 4.3.6.6 Modelling haul roads and stockpile wind erosion, p.76	wind conditions can extend PM dispersion beyond this range, potentially impacting sensitive receptors outside the modelled mine boundary. This may warrant further attention as the Project has the potential to generate chrysotile asbestos (up to 50% of the standard) and respirable crystalline silica (up to 117% of the standard), as stated in Table 5.6 (Section 5.2.2, page 113). The Proponent has committed to a number of mitigation measures to address fugitive dust, such as having enclosed crushers with dust collectors, enclosed conveyors, optimized road, watering and use of dust suppressant on haul roads, and the use of tier four equipment, where feasible. However, the potential for adverse impacts to sensitive receptors could be further minimized through more rigorous mitigation measures, particularly during waste rock handling and haulage on unpaved roads. Health Canada offers additional information on characterizing residual effects and advice on risk to human health receptors in their comment HC-03.	program should be developed for the construction and operational phases of the Project to account for the inherent variability in particle behaviour and the influence of multiple factors on the dispersion and fate of pollutants, particularly considering the presence of sensitive receptors within the local study area (LSA). Additionally, ECCC recommends the consideration of the following mitigation measures, such as, but not limited to: limiting haul truck speeds on unpaved roads; maintain or plant suitable vegetation, such as fast-growing grasses or native plants, along the sides of unpaved haul roads to naturally reduce dust dispersion; limit fugitive dust-emitting activities during periods of high winds, particularly when prevailing winds are in the direction of sensitive receptors and monitoring indicates elevated concentrations; use tarps or covers on trucks transporting materials to minimize particle losses; engage local communities and workers to share dust data, address concerns, and adapt mitigation measures; and any other mitigation measures considered relevant to mitigate fugitive dust.
ECCC-03	Air quality assessment report – Appendix C.1 - Section 5.2.2 - Table 5.6, p.111 Air quality assessment report – Chapter 12 - Section 12.4.2.2, p.12.34	The air quality assessment predicts exceedances of $PM_{2.5}$ and NO_2 near sensitive receptors, including areas of cultural practice for Indigenous communities, and occasional exceedances for other contaminants (e.g., manganese, muscovite, PM_{10}, CO, SO_2) compared to federal and provincial standards. This highlights the need for effective mitigation measures to address residual impacts. While Section 12.4.2.2 proposes air-related mitigation measures, considering additional enhanced measures (page 12.34) or other relevant adaptive mitigation measures could further reduce impacts near sensitive receptors. Health Canada offers additional information on characterizing residual effects and advice on risk to human health receptors in their comment HC-03.	ECCC recommends adopting the enhanced mitigation measures listed on page 12.34 and additional mitigation measures from recognized guidance documents such as Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities (http://www.bv.transports.gouv.qc.ca/mono/1173259.pdf), and implementing a robust monitoring plan for relevant air contaminants. These measures should be applied as appropriate to ensure their effectiveness and address any emerging issues. Moreover, ECCC recommends that the Proponent also consider the Canadian Council of Ministers of the Environment's Ambient Air Monitoring and Quality Assurance/Quality Control Guidelines (as part of the National Air Pollution Program) (https://ccme.ca/en/res/ambientairmonitoringandqa-qcguidelines_ensecure.pdf) when designing and implementing the follow-up program. See ECCC-02 for additional recommendations on mitigation measures that will reduce dust generation and dispersion.
ECCC-04	Air quality assessment report – Appendix C.1 – Appendix B Special Receptors Air quality assessment report – Appendix C.1 - Section 3.3, p.20; Section 5.2.3 – Table 5.8, p.124	The Proponent defines sensitive receptors as areas where human activity more regularly takes place. Appendix B lists sensitive receptors within the LSA along with their coordinates and indicates whether they are inside or outside the modeled mine boundary. Section 3.3 (page 20) mentions plans to restrict access within the mine boundary through agreements. However, as mentioned in Table 5.8, under the cumulative scenario for the operational phase, there are predicted modeled concentrations at sensitive receptors located outside the modeled mine boundary but still within the LSA, such as NO_2, TSP, $PM_{2.5}$, and respirable crystalline silica that exceed or approach the applicable standards. As a result, these sensitive receptors in the LSA may experience residual impacts from the Project. These receptors include several overnight habitation locations and a campground used by Indigenous Peoples. Health Canada offers additional information and advice on the identification of sensitive receptors within the LSA in their comment HC-01.	ECCC recommends developing mitigation measures and monitoring programs to address potential impacts comprehensively, including for sensitive receptors in the LSA who may experience residual impacts despite access agreements. Robust and adaptable strategies are essential to manage concerns for all receptors in the LSA. The Proponent should also develop a contingency action plan to address potential exceedances at these sensitive receptors. This plan could include timely mitigation measures, such as operational adjustments, enhanced dust suppression, or temporary activity modifications near affected areas, along with follow-up actions like additional monitoring and effective stakeholder communication. A tiered approach to trigger values should also be integrated into the air quality management plan to ensure a structured and proactive response to potential impacts. See comment ECCC-05 for details related to implementing a tiered approach to air quality monitoring.
ECCC-05	Air quality assessment report – Chapter 12 - Section 12.4.2.2. Mitigation and	The Proponent plans to develop an air quality management plan (Section 12.4.2.2) with mitigation measures for the construction and operation phases, including the use of trigger values for adaptive management (Section 34.2.3, page 34.20). The Proponent suggests setting the trigger value at either the provincial standard or 85% of it. While this approach is appropriate, real-time reactionary measures, such as applying dust and contaminant mitigations, adjusting operations and halting activities temporarily have not been specified.	ECCC recommends that the Proponent adopt a tiered approach to trigger values (for example, 50% and 80%) within the air quality management plan, emphasizing the importance of establishing multiple thresholds to ensure proactive and effective management of air quality impacts. The Proponent should clarify the basis for these trigger values and outline the corresponding mitigation measures for each tier. This approach would enhance the plan's capacity to address residual air quality impacts on sensitive receptors.

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	enhancement measures, p.12.32 Air quality assessment report – Chapter 34 – Section 34.2.3, p.34.20	ECCC recommends adopting a tiered approach with multiple trigger thresholds would help refine the plan by enabling progressively stronger mitigation measures at each level. This adaptive management approach would enhance the plan's capacity to proactively and effectively address residual air quality impacts on sensitive receptors.	
ECCC-06	Air quality assessment report – Appendix C.1 - Section 4.3.3.2, p.64	Section 4.3.3.2 (page 64) states that meteorological data were sourced from ECCC's Maniwaki station (upper air) and Timmins airport station (surface) for 2018–2022. The Proponent has not provided rationale for why these sites were selected, nor do they provide an analysis confirming their representativeness of the Project's meteorological conditions. Therefore, ECCC cannot confirm the suitability of these stations for their use in the assessment of air quality for the Project.	It is not clear if the Maniwaki and Timmins airport monitoring stations are representative of the Project's meteorological conditions. Despite its distance, however, ECCC acknowledges that the Maniwaki station may still reflect similar regional atmospheric patterns. The Proponent is encouraged to validate this by providing additional context regarding the rationale behind the selection of these stations.
ECCC-07	Air quality assessment report – Appendix C.1 - Sections 4.2.3.4.8 and 4.2.4.4.8	In Sections 4.2.3.4.8 and 4.2.4.4.8 the Proponent appropriately used the US EPA Emission Standards to perform modeling for vehicle and non-road equipment emissions. As applied, the model assumes that only Tier Four emission standard equipment will be used which represents the most stringent emission standard. However, the exclusive use of Tier Four equipment may not always be feasible, given the potential variability in contractor fleets. This results in an underestimation of predicted air contaminant concentrations from these sources.	The Proponent's modeled air contaminant concentrations from vehicle and non-road equipment are underestimated unless the Proponent exclusively uses Tier Four certified engines and equipment. Currently, Tier Four is the most stringent emission standard, reducing emissions of air pollutants like PM and NO_x by 90% relative to older emission standards. Therefore, the use of Tier Three (or lower) equipment on site could result in higher air contaminant concentrations than predicted.
ECCC-08	Climate Change Resilience Assessment, Appendix N Water Resources Assessment Chapter 15, Appendix B.6 and Appendix C.5	In their Climate Change Resilience Assessment (Appendix N), the Proponent provides and analyses risks to the Project from a range of climate change scenarios noting that: "The risk scores for Project assets and infrastructure under SSP2-4.5 and SSP5-8.5 are presented on Figure A.10 (Appendix A). Most of the data and information presented in this report are based on SSP5-8.5, as this pathway closely reflects the current greenhouse gas emissions and socio-economic trajectory. Using a lower GHG forcing scenario or socio-economic pathway could lead to underestimating the climate risks to the Project." (Appendix N, p. 30). Furthermore, the CCRA states the following: "Long-duration rainfall poses high risks to pit operations and water management systems from localized flooding and overwhelming of pumps, leading to potential equipment damage and disruption to operations. These risks are low under baseline climate and the 2020s, increasing to high risks in the 2080s. The Tailings Management Facility is at moderate risk in the 2050s and high risk in the 2080s from long duration rainfall" (Appendix N, p. 27). Taking into consideration these risks and the range of climate change information provided in the Climate Change Resilience Assessment, the Water Resources Assessment (including assessment of site water balance and water management infrastructure sizing) indicates that the intermediate SSP 2-4.5 scenario has been used to develop climate change adjustments (Chapter 15, Appendix B.6 and Appendix C.5).	The Proponent should provide rationale for why the SSP 2-4.5 scenario was used for discussion and climate change adjustments in the Water Resources Assessment. Since using SSP 2-4.5 would in general be less conservative than using SSP 2-8.5 scenario, the Proponent should also identify what, if any, risks this approach introduces given the information provided in the Climate Change Resilience Assessment.
ECCC-09	Chapter 3, Section 3.3.4, p.3.9; Chapter 31, Section 31.2.2, p.31.10	A failure of the Tailings Management Facility (TMF) could pose significant risks to sensitive environmental receptors and various valued components, including fish and fish habitat, migratory birds and their habitats, and species of importance to Indigenous Peoples and their habitats. ECCC finds that the pathway of effect of an accidental failure of the TMF dam has been adequately characterized and appropriate mitigation has been proposed. However, incorporating a communication plan as part of the Emergency Preparedness and Response Plan, as discussed in comment ECCC-11, would be a key preparedness measure to address concerns associated with a potential failure of the TMF.	ECCC recommends that the Proponent develop and implement a communication plan as part of the Emergency Preparedness and Response Plan.
ECCC-10	Chapter 3; Section 3.3.3.2, p.3.8 and section 3.3.6.4, p.3.13;	To adequately understand effects and the overall extent of significance of any effects that may result from release of hazardous materials due to accidents or malfunctions, it is important to have a complete list of chemicals and expected quantities of hazardous materials that will be present on site. The Proponent does not provide a list of chemicals or expected quantities of hazardous materials required on-site (Chapter 3, Section 3.3.3.2, p.3.8; Section 31.2.4.3, p.31.22), except for a brief description of the fuel farm	ECCC recommends that emergency and spill response capabilities, along with the available resources, be clearly detailed in the Spill Prevention and Contingency Plan or the Emergency Preparedness and Response Plan, as part of the Environmental Management Plans outlined in the Follow-up Programs (Table 34.6, p. 34.41). These plans should be representative of the risks presented by the hazardous materials present.

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	Chapter 31, Section 31.2.4.3, p.31.22 and Section 31.2.4.3, p.31.22; Chapter 34, Section 3.4, p.34.41	area. This omission prevents an adequate evaluation of which hazardous materials could be released into the environment as a result of accidents or malfunctions and hinders the assessment of the worst-case scenario resulting from a vehicle malfunction or accident, as referenced in Section 31.2.4.3 - Risk Assessment of the Release of Fuel or Hazardous Materials (p.31.25). While the Proponent states that the fuel farm will be located within a containment area capable of holding its total contents (Section 3.3.6.4, p.3.13), no details are provided regarding the building standards or design features of the containment area. There remains significant uncertainty regarding the hazardous materials proposed for use on-site and the associated environmental risks in the event of an accident or malfunction. In Section 31.2.4, the Proponent generically described the materials by their roles, stating: "*Hazardous materials that will be used on site include chemicals such as reagents, solvents, and hydraulic fluid*." Furthermore, the Proponent has not provided a worst-case scenario analysis for a hazardous substance spill resulting from a vehicle malfunction or accident leading to some uncertainty as to the impact that scenario would present.	
ECCC-11	Chapter 31, Section 31.1.4, p.31.3, and 31.2; Crawford Nickel - TISG Final	There is insufficient information on key mitigation measures that are necessary to increase certainty in predictions and limit the extent of significance of effects as a result of accidents and malfunctions. In Sections 31.2.2 and 31.2.4, the Proponent acknowledges that events such as the failure of the TMF or the release of hazardous materials could impact fish and wildlife abundance and/or health. The Emergency Preparedness and Response Plan is referenced throughout Chapter 31 as a key mitigation measure to address accident and malfunction scenarios that could adversely affect valued components (VC). However, ECCC cannot evaluate the effectiveness of the Proponent's preparedness and response measures because the Emergency Preparedness and Response Plan will be prepared post-decision, prior to the start of construction. In addition, significant uncertainty remains regarding the trigger events and communication practices that would be employed in the event of an accident or malfunction with potential impacts within federal jurisdiction, such as a TMF failure. This results in a gap in assessing the Proponent's readiness to respond to accidents and malfunctions that could have significant impacts on environmental receptors. The effects assessment presented in Section 31.2 includes high-level information about emergency response measures but lacks detailed particulars on the handling of specific scenarios. While Section 31.1.4 outlines the information expected to be included in the Emergency Preparedness and Response Plan, ECCC notes that some information required by the Tailored Impact Statement Guidelines (TISG) is missing, creating uncertainty about whether these key mitigation measures will be incorporated into the final Plan, such as (Section 13.3 of TISG): • "describe emergency communication and public notification plans, community awareness plans and public reporting, including plans for translations in French or Indigenous languages, as appropriate; • describe emergency communication plans that would provide emergency instructions to surrounding communities, including Indigenous communities, and how these will be informed by the public and Indigenous communities. The Proponent should consider including: o immediate urgent actions, such as notifying the public of security and safety concerns, instructions for on-site shelter or shelter-in-place, procedures and evacuation routes; and longer-term actions, such as a general website and telephone helplines, updates on the status of incidents, injured animal reports, etc."	ECCC recommends the development and incorporation of emergency communication strategies in the Emergency Preparedness and Response Plan. These strategies should be proportional to the risks posed to affected communities and informed by nearby communities.
ECCC-12	Chapter 19, 19.4.5.3.3 Summary of Change in Wildlife Health, page 19.61; Appendix C.7, Human Health and Ecological Risk	The Impact Statement (IS) states "unacceptable risks to wildlife" are not expected (Chapter 19 – Assessment of Potential Effects on Wildlife and Wildlife Habitat; 19.4.5.3.3 Summary of Change in Wildlife Health, Page 19.61). However, calculations suggest a hazard quotient (HQ) >1 with respect to wildlife exposure to selenium. For example, a HQ > 1 for selenium exposure was calculated for mammalian receptors (e.g., American mink and northern river otter) (Appendix C.7, Human Health and Ecological Risk Assessment, page 241). Selenium is of toxicological concern to aquatic-dependent egg-laying vertebrates (e.g., fish, birds, and amphibians), that are generally found to be more sensitive than other vertebrate/mammalian receptor species. It is not clear why an HQ >1 was calculated for American mink and northern river otter but not for species that are documented as more sensitive, including birds.	The *Migratory Birds Convention Act* (MBCA) prohibits the deposition of substances that are harmful to migratory birds in waters or areas they frequent (Migratory Birds Convention Act, 1994). To improve the quality of and eliminate uncertainty in the ecological risk assessment, it is recommended the Proponent calculate a HQ for selenium exposure for migratory birds or rationalize why their approach was appropriate. Completing this analysis on receptors that are more sensitive or using a more relevant toxicity reference value would allow for a complete understanding of effects to migratory birds from selenium exposure resulting from the Project.

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	Assessment, page 241.	The Proponent's conclusions on risks to wildlife from selenium exposure from Project activities does not align with ECCC's understanding of selenium toxicity. HQs appear to be calculated for various chemicals of potential concern (COPCs) resulting from Project activities for various wildlife species, including birds. However, specifically for selenium, HQ >1 values were determined for two mammalian receptor species, but HQs for selenium were either not calculated for birds, or were found to be less than one. In general, aquatic-dependent egg-laying vertebrates (e.g., fish, birds, and amphibians) show greater sensitivity to the effects of selenium exposure relative to mammals. Therefore, ECCC concludes that selenium exposure to wildlife from Project activities is either underestimated or overlooked.	
ECCC-13	Appendix C.7, Human Health and Ecological Risk Assessment.	The Proponent indicates that metals such as arsenic, beryllium, cadmium, chromium VI, and nickel were detected in geological samples in the Project Area (PA) and are anticipated to be present in dust as particulate (Appendix C7 Human Health and Ecological Risk Assessment, page 144). It should be noted that the inhalation pathway for contaminants bound with dust (e.g., metals) was not carried forward to the ecological risk assessment based primarily on the assumption that exposure to contaminants in dust to wildlife receptor species is more likely to occur via ingestion of soil rather than inhalation. Furthermore, the Proponent indicates that deposition of dust and metals to soil is accounted for, and therefore exposure to wildlife via ingestion takes this exposure pathway into account (Appendix C7 Human Health and Ecological Risk Assessment, page 233). However, the Proponent further states that the mass of the deposited dust has a negligible effect on the estimated soil metal concentrations and that the mass of the deposited dust is minor compared to the mass of the surface soil prior to deposition, and conservatively was not included with the calculation of Baseline Plus Project scenario soil concentrations (Appendix C7 Human Health and Ecological Risk Assessment, page 51). The Proponent acknowledges that monitoring of certain metals, including nickel, in terrestrial invertebrates (earthworms and flying insects) would provide an extra level of certainty around modelled exposure estimates for insectivorous wildlife receptor species (e.g., masked shrew barn swallows) (Appendix C7 Human Health and Ecological Risk Assessment, page vi).	ECCC recommends that the inhalation pathway for contaminants predictions be validated and that metal deposition to soil be incorporated into follow-up and monitoring plans. This would allow the Proponent to apply adaptive measures, such as dust mitigation, in response to exceedances beyond modelled exposure estimates.
ECCC-14	Section 3.3.5.2 Mine Water Management; Figure 3-2 Project Site Plan – Mine Site, Figure 4.1 Site Wide Water Management Strategy Schematic (Appendix J Site-Wide Management Plan)	The Proponent states that surface water runoff that comes into contact with disturbed areas of the mine (contact water) will require management prior to release to the receiving environment to reduce water quality impacts on receivers by providing mine water sedimentation control and treatment. A site-wide water management system where contact water will be collected by a series of ditches and directed to the various collection ponds located throughout the site including collecting surface contact water and seepage from stockpiles is proposed. There is conflicting information in the IS as it relates to ditches for Reclaim Stockpile 2 located west of the Tailings Management Area (TMA). In Figure 3-2 Project Site Plan – Mine Site in Chapter 3 indicates no ditching for Stockpile 2 whereas in Figure 4.1 Site Wide Water Management Strategy Schematic of Appendix J Site-Wide Management Plan it clearly indicates that ditching for Stockpile 2 will be included in the Project.	ECCC recommends that the Proponent's site-wide water management system include ditching around Reclaim Stockpile 2 in keeping with the water management objectives stated in the Appendix J Site-Wide Management Plan.
ECCC-15	Appendix B.7.1 Vegetation, Riparian and Wetlands Environments Supplemental	Over 8,667 ha of wetlands are expected to be directly removed as a result of the Project. Wetlands provide important habitat for migratory birds and species at risk during the wintering and breeding periods and offer critical stopover sites during migratory bird migration including species at risk migratory birds such as Olive-sided Flycatcher, Canada Warbler, Yellow Rail, Blanding's Turtle and SAR Bats. A full Wetland Functions Assessment was not completed in accordance with TISG requirements, using the guiding principles of Wetland Ecological Functions Assessment: An Overview of Approaches or any subsequent approved guidelines. The only function identified under Section 16.2.2.3 "Wetlands and Wetland Functions" is	ECCC makes the following recommendations: • Additional information is needed to demonstrate predicted effects on wetland functions and resulting effects on migratory birds and species at risk are well understood and that avoidance and mitigation measures are in place to sufficiently address these effects. • Wetland habitat restoration should be incorporated into progressive reclamation and closure rehabilitation plans to minimize the direct loss of over 8,667 ha of habitat.

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	Baseline Report Appendix F Conceptual Closure Plan	their containment of peat. Major wetland functions including hydrological, biogeochemical cycling, habitat for migratory birds and species at risk, carbon sequestration, climate functions, and socioeconomic functions were not included in the assessment. Appendix B.7.1 briefly lists five types of habitat functions which is not a comprehensive list and it lacks detail. Although wetlands are mapped in the IS (i.e., Level 1 assessment), they are not mapped across the RSA (Regional Study Area) according to the specifications of the TISG. As a result, the department is concerned that the Project effects are being underestimated with respect to effects to migratory birds and species at risk. A robust understanding of adverse effects to wetlands is crucial to understanding effects to migratory birds and species at risk that depend on the wetlands within the PA such as: • Olive-sided Flycatcher (currently listed as Special Concern under SARA) and Canada Warbler (currently listed as Threatened under SARA) were both confirmed as occurring within the LSA. These two species breed in wetlands of the boreal forest including habitat types within the Project study area. • Yellow Rail (currently listed as Special Concern under SARA) is considered to be rare in the RSA, and the breeding status of Yellow Rail in boreal regions south of the Hudson Bay Lowlands is uncertain. This highly secretive marsh bird was detected once in the LSA during surveys; however, there were few marsh surveys completed in limited areas of the LSA, and therefore it can be conservatively assumed as present. • Other SAR migratory birds confirmed as occurring within the LSA that depend on wetland habitats include Barn Swallow (currently listed as Threatened under SARA), Common Nighthawk (currently listed as Special Concern under SARA), Lesser Yellowlegs (currently listed as Special Concern under SARA), Eastern Whip-Poor-Will (current listed as Threatened under SARA) and Rusty Blackbird (currently listed as Special Concern under SARA). Common Nighthawk, Lesser Yellowlegs, and Rusty Blackbird depend on a variety of boreal wetland habitats for breeding and nesting habitat. Barn Swallow uses wetlands for foraging habitat, in addition to other SAR migratory birds with potential to occur in the LSA (e.g., Bank Swallow and Eastern Whip-Poor-Will). Habitat loss is a main threat common to these migratory bird species. • Blanding's Turtle (currently listed as Endangered under SARA) was confirmed as occurring within the LSA through three historical observations from First Nations, however, limited surveys were undertaken to confirm baseline conditions across the study area. This species is semi-aquatic and spends much of its time in aquatic habitats such as marshes, ponds, swamps, bogs, fens, coastal wetlands, slow moving rivers and creeks, pools, lakes, bays, sloughs, mash meadows and artificial channels to carry out life processes such as overwintering, mating, foraging, thermoregulation, summer inactivity and movement. • Little Brown Myotis, Northern Myotis and Tricolored Bat (all currently listed as Endangered under SARA) were confirmed as occurring in the LSA. As a result of insufficient baseline, species are likely underrepresented across the study areas. All three species require overwintering habitat (e.g., hibernacula such as caves, abandoned mines or wells), summering habitat including roosting (for maternity roosts and males) and foraging habitat and swarming habitat in late summer and early fall for mating and socialization. All three species use a variety of habitats to carry out their life processes such as forests stands for roosting, open habitats such as ponds, roads, open canopy forests, forests, forested riparian areas over water for foraging and caves and mines for overwintering. Main threats include white-nose syndrome and habitat loss. • Boreal Caribou (listed as Threatened under SARA) has Category 3 critical habitat that occurs on the Project site. Boreal Caribou use wetlands, particularly peatlands, for a variety of life processes including calving and nursery areas, as well as for refuge and to avoid predators. The primary threat to most Boreal Caribou local populations is unnaturally high predation rates as a result of human-caused and natural habitat loss, degradation, and fragmentation.	• A follow-up and monitoring program should be developed and implemented to confirm predictions. The program should include collection of additional baseline information on wetlands prior to site disturbance; clear mitigation objectives; details on mitigation measures; ecological performance standards; monitoring and adaptive management plans.
ECCC-16	Chapter 19 Assessment of potential effects on wildlife and wildlife habitat	ECCC is of the view that additional information is needed to inform the assessment of impacts of the Project on Black Ash and three bat species (Eastern Red Bat, Hoary Bat and Silver-haired Bat). Black Ash is currently assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Threatened and the three bat species were assessed by both COSEWIC and the Committee on the Status of Species at Risk in Ontario (COSSARO) as Endangered. Listing of these species federally on Schedule 1 of the *Species at Risk Act* (SARA) may overlap with the impact assessment process prior to construction and as such warrant additional consideration.	ECCC has the following recommendations: • Additional ecosite information should be provided for sites that could support Blash Ash to better demonstrate the potential abundance and distribution of Black Ash in the study areas. Based on this information: ○ Describe how presence/absence of the species was determined and the measures that will be taken to minimize impacts on the species to address the risk that effects have been underestimated.

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		With respect to Black Ash, mapping and surveying to confirm presence/absence throughout the Study Areas is incomplete. Most of the LSA is comprised of swamp and fen communities that could support Black Ash. This is partially acknowledged in the IS which states that direct effects to Black Ash may be "understated". ECCC recommends consulting available scientific reports to inform best management approaches to avoid, minimize and offset for direct and indirect effects on the species including: • Multi-species Action Plan for La Mauricie National Park and National Historic Sites of La Mauricie and Western Quebec regions - https://ecprccsarstacct.z9.web.core.windows.net/files/SARAFiles/legacy/plans/Ap-MauricieWQcO-v00-2022Feb-Eng.pdf • COSEWIC Assessment and Status Report on the Black Ash (Fraxinus nigra) in Canada- https://ecprccsarstacct.z9.web.core.windows.net/files/SARAFiles/legacy/cosewic/FreneNoirBlackAsh-2019-Eng.pdf With respect to Little Brown Myotis, Norther Myotis and Tri-colored Bat, ECCC is of the view that additional information is needed to inform the assessment for these species. Chapter 19, Appendix B.7.4 and B.7.3 describe the methods used to determine baseline conditions for SAR bats. These sections contain insufficient information to verify the reliability of abundance and distribution information as a result. The predicted impacts of the Project on SAR bats may be underestimated: • Mapping of hibernacula and roosting habitat, which do not accurately describe relative abundance of roosting habitat, and do not identify potential migration and movement corridors (at the region and local scales). • Omission of swamp and coniferous forest in survey locations for Maternity Roost Habitat Surveys. • Not incorporating a spatially balanced design (e.g., appears biased to occur along roads) which may impact conclusions due to over and under representation of species, habitat types and/or locations. • Timing of Autonomous Recording Unit (ARU) monitoring in maternity roost habitat and not being consistently monitored between June 1 and 30 as per MECPs Maternity Roost Surveys (Forest/Woodlands) protocol. • Timing of Autonomous Recording Unit (ARU) monitoring for hibernacula not being completed during suggested timeframe in the Bats and Bat habitat: guidelines for wind power projects and lack of information on the set-up for these surveys. • Lack of confidence on whether all bat hibernacula were discovered, which are rare in the landscape and crucial for bat survival. • Lack of confidence in conclusions regarding abundance and distribution. ECCC also notes that sampling between years was not completed and spatial overlap between sampling years is lacking. No information was provided with respect to use of modelling or simulations in survey protocol planning or how existing data was incorporated into sampling and survey decisions. The issues described negatively impact the department's ability to provide meaningful and informed advice on the adequacy of proposed mitigation measures and follow-up monitoring programs.	• Additional information on Eastern Red Bat, Hoary Bat and Silver-haired Bat should be included throughout the assessment. In the absence of understanding effects to these species a precautionary approach should be taken and include: ○ Removal of potential maternity roosts and maternity roost habitat outside the active period for migratory tree bats (between May 15 and October 15 inclusively). ○ Consulting available scientific reports to inform management approaches to avoid, minimize and offset direct and indirect effects on the species such as the COSEWIC Assessment and Status Report on the Hoary Bat (*Lasirurus cinereus*), Eastern Red Bat (*Lasiurus borealis*), Silver-haired Bat (*Lasionycteris noctivagans*) in Canada - https://ecprccsarstacct.z9.web.core.windows.net/files/SARAFiles/legacy/cosewic/sr-HoaryEasternRedSilverHairedBats-v00-Nov2023-eng.pdf ○ That a follow-up and monitoring program be in place to verify the accuracy of the predications, determine the effectiveness of mitigation measures, and implement adaptive management measures where necessary. • Additional information on Little Brown Myotis, Northern Myotis and Tricolored Bat hibernacula and roosting habitat and potential travel corridors is needed to effectively avoid and minimize impacts to these species. In absence of more information, a precautionary approach be taken that includes: ○ Removal of potential maternity roosts and maternity roost habitat outside the active period for bats (between September 1 and April 30 inclusively). ○ Avoiding the use of artificial lights (particularly lights that emit blue/green/white UV wavelengths) in bat habitat to the extent possible, and when not possible use of low intensity lighting and lighting fixtures that restrict or focus illumination to target areas. ○ Maintaining tree canopy adjacent to roadway and rail above the height of traffic to encourage bats to fly at heights that are out of harm's way. ○ That a follow-up and monitoring program be in place to verify the accuracy of the predications, determine the effectiveness of mitigation measures, and implement adaptive management measures where necessary.
ECCC-17	Appendix B.7.3 Terrestrial Wildlife and Wildlife Habitat Supplemental Baseline Report Appendix B.7.4 Terrestrial Ecology Baseline Study	ECCC is of the view that additional information is needed to inform the assessment of Project impacts on Blanding's turtle, a species listed as Threatened on Schedule 1 of SARA, and to ensure measures are taken to limit impacts, consistent with the federal Recovery Strategy (ECCC, 2018). Chapter 19 and Appendix B.7.4 and B.7.3 describe the methods used to determine baseline conditions for Blanding's turtle. These sections contain insufficient information to verify the reliability of abundance and distribution information and as a result, the predicted impacts of the Project on the species may be underestimated. For example, the department has concerns with regards to: • Lack of information to demonstrate surveys were designed to reach spatial and temporal targets. • Not applying a spatially balanced design (e.g., appears biased to roadways) creating the potential for over and under representation of species, habitat types and/or locations. • Survey methods deviated from Ontario's Survey Protocol for Blanding's turtle in Ontario (OMNRF 2015) including:	ECCC has the following recommendations: • Additional information be provided to identify areas where Blanding's Turtle may be present and that the precautionary approach be taken, including assuming the presence of the species in these areas. • More information be provided on measures that will be taken to minimize impacts on the species to address the risk that effects have been underestimated. Measures taken should include: ○ Avoidance of removal or disturbance to important habitat features during both the active season and inactive season (overwintering) to minimize impacts to individuals. In cases where removal or disturbance of these habitats cannot be avoided, exclusion fencing should be installed prior to the appropriate season.

Comment ID	Refence to Impact Statement	Description of View or Concern Related to an Effect	Advice to Inform the Impact Assessment
		○ 10 of 17 surveys were completed after 5 pm, guide recommends surveys be completed between 8 am and 5 pm. ○ 4 of the 17 surveys completed when temperatures were above 25 degrees Celsius. ○ One survey was completed per site over a 5-day period, when the recommendation is that where populations occur at low densities, a minimum of 10 surveys spread out over three weeks be carried out to avoid false absence. • The habitat assessment and eDNA: ○ Habitat was assessed through aerial transects in mid-August 2023 however limited ground truthing was done and as a result habitat features (e.g., residences, movement corridors, etc.) may be under-represented across the PA. ○ Protocol for eDNA sampling were not provided including how the number of samples and locations were determined to support the study design. No discussion of the limitations of eDNA were included such as: (i) amount and integrity of eDNA shed (low density species, low DNA shedding), (ii) persistence of eDNA in the environment, (iii) transport of system where eDNA collected (water flow, closed vs open systems. In addition, the IS does not include a description of the search effort (protocol recommends 2-4 person hours per hectare in sites searched using transect method and less search effort required at sites that can be easily scanned from shorelines) and does not contain information with respect to use of modelling or simulations in survey protocol planning. The issues described negatively impact the department's ability to provide meaningful and informed advice on the adequacy of proposed mitigation measures and follow-up monitoring programs and, if mitigation measures are not performing as intended, to implement adaptive management to address effects to individuals, their residences and connectivity between habitats. In addition, ECCC recommends consulting the Operational Framework for the Use of Conservation Allowances (ECCC, 2012) and more specifically the mitigation hierarchy to further consider minimizing impacts on the species. **References:** [ECCC, 2012] Environment and Climate Change Canada. 2012. Operational framework for use of conservation allowances. Environment and Climate Change Canada, Ottawa. [ECCC, 2018] Environment and Climate Change Canada. 2018. Recovery Strategy for the Blanding's Turtle (*Emydoidea blandingii*), Great Lakes / St. Lawrence population, in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. viii + 59 pp.	○ Wildlife passage placement could be useful for turtles under roads or to get across railroad tracks where habitats are being bisected by linear features. • That a follow-up and monitoring program be in place to verify the accuracy of the predictions, determine the effectiveness of mitigation measures, and implement adaptive management measures where necessary. The program should also take into consideration the need for habitat offsets to compensate for the loss and alteration of habitat.

Table 2. Identification of Deficiencies and Required Clarifications in Relation to the Requirements of the Tailored Impact Statement Guidelines

Table 2 should be used to identify potential deficiencies in the Impact Statement where information from the proponent is **both** 1) missing or unclear as prescribed by the Tailored Impact Statement Guidelines **and** 2) necessary to formulate advice (Table 1) to IAAC on matters that are likely to be material and relevant to decision-making[5]. Expert advisors should consider project context and regulatory context and provide risk-proportional, solution-oriented advice.

Deficiency ID	Reference to Impact Statement	Reference to Tailored Impact Statement Guidelines	Description of Deficiency (Context and Rationale)	Advice to Proponent for Resolving Deficiency
Please identify deficiency by organization and comment number. *e.g.: HC-02*	*Identify the specific section of the Impact Statement where information is deficient.*	*Identify the specific section of the Tailored Impact Statement Guidelines where a requirement has not been satisfied.*	*Provide a brief description of the deficiency in the Impact Statement, including:* • *how it does not meet the requirements of the Tailored Impact Statement Guidelines; and* • *why the information or studies are required to formulate advice to IAAC on matters that are likely to be material and relevant to decision-making.* *Include, where relevant:* • *how the deficiency relates to an adverse federal effect or to a public interest factor including outlining the relevant pathway of effect;* • *identify the level of concern about the deficient information and implications or consequences for strength of conclusions; and* • *advice to IAAC on risk (likelihood and severity of effects), using applicable frameworks relevant to your mandate.* *Identify if the deficiency links to specific advice provided to IAAC in Table 1.*	*Provide a clear and precise description of the missing information or clarification that would resolve the issue detailed at left.* *Also provide, where applicable, other commitments the proponent can make to respond to the issue, such as:* • *offsetting or mitigation to compensate for uncertainty in baseline;* • *follow-up to verify the accuracy of predictions and effectiveness of mitigation;* • *applicable guides, standards and thresholds the proponent intends to meet; and* • *measures the proponent intends to take to comply with other legislative frameworks that provide a means to address effects.*
ECCC-18	Air quality assessment report – Appendix C.1- Section 4.2.4.6 – Table 4.2, p.55 Air quality assessment report – Appendic C.1 - Section 5.8 – Table 5.13, p.144	Section 8.5.2	In Table 2 (Section 4.2.4.6), the Proponent used attenuation rates of 85% (summer) and 95% (winter) for PM emissions from haul roads and stockpiles, based on literature values. These rates assume snow cover and mitigation measures such as road watering, dust suppressants are in place. However, the justification for why these literature values are representative of the attenuation rates in the modelling was not provided. ECCC notes that these values may not fully reflect actual conditions due to variability in mitigation effectiveness, site-specific factors like soil composition and haul truck activity and seasonal snow cover variations. Literature values often represent generalized scenarios and may not fully capture site-specific conditions. In Section 5.8 (page 144), a sensitivity analysis with lower attenuation rates (50% and 70%) revealed significantly higher PM concentrations—approximately double at 70% and triple at 50% compared to 85%. This underscores the importance of consistently applying mitigation measures to effectively control PM emissions, especially given the projected chemical composition of PM emissions. See Health Canada's submission HC-03 for additional information.	It is recommended that the Proponent provide additional details regarding the representativeness of the attenuation rates used in the modeling, including a rationale for their selection. In the absence of this information ECCC cannot validate the Proponent's conclusions on PM attenuation. During the construction and operations phases, emphasis should also be placed on the consistent application of mitigation measures and monitoring to manage PM emissions effectively. See ECCC-02 for recommendations related to mitigation measures for fugitive dust and ECCC-05 for the adoption of trigger values which would contribute to a more effective management of potential effects.
ECCC-19	Air quality assessment report – Appendix C.1 - Section 5.2.2 – Table 5.6 Air quality assessment report – Appendix C.1 - Section 5.2.3.2 – Table 5.8 and Table 5.9, p.124	Section 8.5.2	Table 5.6 (p.111) shows that maximum cumulative predicted concentrations for the operation scenario exceed or approach applicable standards (federal Canadian Ambient Air Quality Standards (CAAQS) or provincial Ambient Air Quality Criteria (AAQC)) for several air contaminants and metals, including Total Suspended Particulates (TSP), PM_{10}, $PM_{2.5}$, CO, SO_2, NO_2, aluminum, manganese, nickel, muscovite, chrysotile asbestos, and respirable crystalline silica. These exceedances are primarily project-driven rather than background-related. Similar trends are observed in Tables 5.8 and 5.9 (p.124 and 131) for sensitive receptors. The modeling approach is conservative as it excludes plume depletion and deposition, precipitation effects, and by considering forest fire impacts on baseline data. However, high PM control efficiencies (85% in summer, 95% in winter) were assumed, which may not fully reflect site conditions (See comment ECCC-18). Even with refined modeling that includes plume depletion and deposition, several contaminants remain near or above standards.	It is recommended that the Proponent include monitoring for all air contaminants assessed in the base case in the Air Quality Management Plan, given their significant contribution to the Project and the proximity of sensitive receptors. These contaminants should include: TSP, metals in dust, PM_{10}, $PM_{2.5}$, polycyclic aromatic hydrocarbons (PAHs), RCS, chrysotile asbestos, diesel particulate matter (DPM), volatile organic compounds (VOCs), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and dustfall. These contaminants were monitored in the baseline air quality monitoring and should be included in the air quality monitoring program during relevant Project phases to effectively manage potential impacts to sensitive receptors in the LSA.

[5] Deficiencies must be limited to information or clarifications that are necessary to formulate or substantially strengthen a conclusion related to decision-making, such as the extent to which federal effects are significant, the identification of appropriate mitigation and follow-up measures, and whether the federal effects are justified in the public interest. "Federal effects" means effects within federal jurisdiction and adverse direct or incidental effects (as defined in section 2 of the IAA). Public interest considerations are outlined in section 63 of the IAA. Comments can also be provided in relation to IAAC's obligations under section 79 of the *Species at Risk Act.*

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	Air quality assessment report – Chapter 34 - Section 34.2.3, page 34.20		Section 34.2.3 (p.34.20) highlights the Proponent's plan to monitor NO_2, dust, metals in dust, and dustfall. However, SO_2 monitoring is notably excluded, despite its significant contribution from the Project and its inclusion in the baseline air quality monitoring program. Given these exceedances and the proximity of the Project to sensitive receptors, ECCC underscores the importance of cautious and rigorous implementation of mitigation measures and comprehensive monitoring of all relevant air contaminants to minimize potential impacts effectively. In their comment HC-03, Health Canada further expands on follow-up monitoring program recommendations to address these exceedances with respect to the health of Indigenous Peoples.	
ECCC-20	Air quality assessment report – Appendix C.1 - Section 5.2 – Tables 5.4, 5.6 and 5.8, p.86, p.111 and p.124	Section 8.5.2	In Tables 5.2 (Section 5.1.2) and 5.6 (Section 5.2.2), maximum cumulative predicted concentrations for NO_2 and SO_2 are compared only to provincial standards. Comparing these values to federal CAAQS, as done in other tables (e.g., Tables 5.4 and 5.8), which would result in a more conservative comparison, particularly for NO_2 as the CAAQS standards for NO_2 are more stringent. Notably, Tables 5.2 and 5.6 represent the highest concentrations within the modelled domain, while Tables 5.4 and 5.8 focus on sensitive receptors. As a result, excluding federal standards in Tables 5.2 and 5.6 may reduce clarity regarding potential exceedances under the construction and operation scenarios.	It is recommended that the Proponent compare NO_2 and SO_2 maximum cumulative predicted concentrations to the federal CAAQS for the construction and operation scenarios. It is also recommended that the Proponent provide details on any additional exceedances identified through this comparison including seasonal exceedances to better understand whether specific periods of the year require strengthened mitigation efforts.
ECCC-21	Section 3.3.5.2 Mine Water Management and Appendix C.5 Surface Water Resources Assessment. Table B.1.4, iAppendix B, Surface Water Resources Assessment. Table B.1.1.1 and Table B.1.2.1, Assimilative Capacity Study, Appendix C of the Surface Water Resources Assessment and specifically in Appendix B of the Assimilative Capacity Study.	Section 8.6.2	ECCC has concerns with the methodology used in the water quality assessment and the seepage mitigation proposed for the waste rock impoundment, ore stockpiles, and TMA due to the large predicted volumes of seepage bypassing the collection ditch system that are incorporated into the operation of Final Discharge Points (FDP) and discharging directly to eight (8) lakes, Jocko Creek, the West Buskegau River, and the North Driftwood River. The Proponent is predicting the daily volume of seepage from the site during operations to be approximately 10,200 m^3, which is a substantial amount and raises concerns regarding potential adverse effects to aquatic environment including fish. In the IS, the Proponent predicts seepage to bypass collection in the operations phase in Table B.1.1.1 (Seepage Quantity at the Subwatershed Scale) of 4,949 m^3/d for Lakes 1 to 8 (L6 1,660 m^3/d, L1 1,503 m^3/d, and L3 1,193m^3/d), 2,359 m^3/d for Jocko Creek (subwatersheds JC2 1,274 m^3/d and JC1 1,030 m^3/d), 2,217 m^3/d for the West Buskegau River (subwatersheds WB14 1,246 m^3/d and WB16 776 m^3/d), and 709 m^3/d for the North Driftwood River (subwatersheds ND3 320 m^3/d and ND6 202 m^3/d). Any seepage that bypasses the collection ditch system and the final discharge points (that are to be monitored) will be deposited directly to the surface waters of the aforementioned lakes, creeks and rivers. The receiving water quality predictions used in the surface water quality model are based on assessment nodes that are located downstream of the point of discharge of seepage, in some cases kilometres away from the TMA, waste rock impoundment, and ore stockpiles. The concern with this approach is that while it does assess flow from upstream nodes, catchment area inputs, seepage flow, and FDP discharges, it does not assess the potential effects of the seepage at the seepage face. A seepage face is the boundary between a saturated flow field and a surface water feature where water is free to exit from the subsurface (Sudeler et al. 2017). This is especially important given the close proximity of the Impoundment Facility, Ore Stockpiles, and TMF and the predicted volume of seepage of approximately 10,200 m^3/d to eight (8) lakes, and twenty-one (21) subwatersheds of the North Driftwood River, the West Buskegau River, and Jocko Creek, specifically: 1659 m^3/d to Gerry Lake (L6), 1503 m^3/d to an unnamed lake south of Zed Lake (L1), and 1193 m^3/d to Mel Lake (L3) (Table B.1.4 Modelled Groundwater Seepage Rate Included in HEC_HMS Model Throughout Mine Life and Table B.1.1.1 Seepage Quantity at the Subwatershed Scale in Appendix C.5 Surface Water Resources Assessment). Regarding the mitigation that is proposed to mitigate seepage migration into surface waters, the Impact Statement states that seepage (and runoff) interception ditching will be in place, but no other mitigation measures to limit seepage into adjacent surface waters are being proposed. ECCC is	It is recommended that the Proponent do the following: • Complete an assessment of effects using the predicted concentrations from Table B.1.2.1 (Seepage Quality: Maximum Concentrations) evaluating the potential effects of the seepage at the seepage face (i.e., not when it is fully mixed with surface). • Identify additional mitigation measures to prevent or reduce the volume and effects of seepage from the Impoundment Facility, Ore Stockpiles (East and West), open-pit after it is filled with tailings and TMF to the eight (8) lakes listed in Table B.1.1.1 (Seepage Quantity at the Subwatershed Scale), Jocko Creek, the West Buskegau River, and the North Driftwood River to increase certainty in predictions and manage adverse federal effects. • Provide further information on seepage monitoring plans for Lakes 1-8, Jocko Creek, the West Buskegau River, and the North Driftwood River, and subsequent adaptive mitigation options being considered should impacts be found.

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			concerned that interception ditching alone will not be sufficient, and that opportunities to apply adaptive mitigation measures in response to future monitoring results will be limited because the facilities will have already been constructed and cannot easily be modified as required. To calculate the potential effects to aquatic life associated with the estimated seepage at the seepage face from the proposed Project, ECCC completed a HQ risk analysis for the seepage from the Impoundment Facility, Ore Stockpiles, TMF, and the open pit after it is filled with tailings. This analysis compared the seepage quality estimates in Table B.1.2.1 Seepage Quality: Maximum Concentrations located in the Assimilative Capacity Study in Appendix C.5 Surface Water Resources Assessment using the maximum value from the Impoundment Facility, East and West Stockpiles, TMF, and Pit-Full for each element or substance to the water quality guidelines prescribed by the Proponent also in Table B.1.2.1. This HQ risk methodology is used for developing ecological risk guidelines in the Canadian Council of Ministers of the Environment (CCME) Ecological Risk Assessment Guidance document. The HQ refers to a ratio of an exposure and a response as a threshold effect level. A ratio greater than one (>1) indicates the predicted concentration is higher than the water quality guidelines and there is a risk to surface water aquatic organisms. The elements and substances with an HQ > 1 in the seepage, and for which toxicity effects are likely, are: • Arsenic (As) • Chloride (Cl) • Chromium VI (Cr VI) • Cobalt (Co) • Copper (Cu) • Nitrate-N (NO_4) • Nitrite-N (NO_3) • Selenium (Se) • Uranium (U) • Vanadium (V) • Zinc (Zn) The *Fisheries Act* prohibits the deposit of all deleterious substances into waters frequented by fish or to any place, under any conditions, where it may enter water frequented by fish. This applies to all deposits whether they are made directly into water frequented by fish or indirectly, such as a roadside ditch that flows into water frequented by fish. A deposit of a deleterious substance is only authorized pursuant to, and in a manner consistent with, a *Fisheries Act* regulation or by a regulation under other federal legislation. The *Fisheries Act* makes no allowance for a mixing zone. **References:** CCME (2020). Ecological Risk Assessment Guidance document, PN 1585, p.172 (see especially Section 5.3.1) Scudeler, C., C. Paniconi, D. Pasetto,and M. Putti (2017). Examination of the seepage face boundary condition insubsurface and coupled surface/subsurface hydrological models, WaterResour. Res., 53, 1799–1819	
ECCC-22	Section 34.2.6 Surface Water, Fig 34-2 Surface Water Quality	Section 8.6.3	Appropriate coverage of surface water quality monitoring stations is necessary to address uncertainties in the Proponent's predictions and conclusions regarding adverse federal effects on fish and build confidence in the ability of the Proponent to identify or limit the extent of those effects.	It is recommended that the Proponent add additional surface water quantity monitoring stations to address the uncertainty with the accuracy of predictions and to inform the potential need for any future adaptive management. The following

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	Monitoring Stations		With this in mind, surface water quality monitoring is not proposed for all of the eight (8) lakes that are located just to the southwest of the proposed tailings management facility and west of Stockpile West. There are no water quality monitoring stations for L1 an unnamed lake south of Zed Lake, L2 Zed Lake, L3 Mel Lake, L5 Jack Lake, L6 Gerry Lake, and L8 an unnamed lake west of stockpile. Further, coverage is insufficient between water quality monitoring stations NDR-S-06 and NDR-S-07. Additional surface water quality monitoring stations are needed at the six (6) lakes L1-3, L4-5, and L8 identified in Table B.1.1.1 Seepage Quantity at the Subwatershed Scale in Appendix C.5 Surface Water Resources Assessment. ECCC notes these lakes are predicted to receive between 43 to 1660 m^3/d of seepage in operations. Further, the distance between surface water quality monitoring station NDR-S-06 and NDR-S-07 is sufficient that one (1) additional station should be added north of station NDR-S-06 and south of NDR-S-07 to provide adequate coverage for this area. This is to reduce the potential for environmental degradation going unmonitored, and to better position the verification of the accuracy of the impact assessment and evaluation of the effectiveness of mitigation measures.	additional surface water quantity monitoring stations should be incorporated into the surface water quality monitoring plan: • Add six (6) surface water quality monitoring stations, one (1) each at L1 an unnamed lake south of Zed Lake, L2 Zed Lake, L3 Mel Lake, L5 Jack Lake, L6 Gerry Lake, and L8 an unnamed lake west of stockpile; • Add one (1) surface water quality monitoring station north of station NDR-S-06 and south of station NDR-S-07.
ECCC-23	Appendix C.6	Section 8.12.4	As part of the Best Available Technology (BAT)/Best Environmental Practices (BAP) Determination, the Proponent presents Table 9.1 in Appendix C.6 which describes the BAT Implementation Timeline. The table provides the proposed "Technology" in the left column and "Year" on the right. It is unclear to ECCC what the Year column represents, as some technologies are associated with a range of years. This information is required to clearly understand the schedule of implementation for BAT and its implications on projected Greenhouse Gas (GHG) emissions.	ECCC requests that the Proponent provide an implementation schedule for BAT that clearly indicates when each technology will be implemented and the number of years the technology will be utilized. This information is required to fully assess the Proponent's conclusions on GHG emissions.
ECCC-24	Appendix C.6	8.12.1 Strategic Assessment of Climate Change Annex B and Annex D (Step 2)	For the direct GHG emissions analysis, the Proponent describes the calculation framework appropriately (Section 4.3.1.2), and supplies some of the default values used in their calculations with references (Land Use Change section of worksheets). However, the Proponent has not adequately justified the choice of variables used in their calculations, some of which do not seem appropriate. For example, the Proponent cites a value of 23.1 t C ha^{-1} for soil organic carbon (SOC) reference value citing Kurz *et al*. 2013. When reviewing this cited paper value could not be found. The Kurz *et al*. 2013 cites a value of 78 t C ha^{-1} in Figure 5 for the average of the entire forest management unit of Canada which would be a national-level value, as well as 138 t C ha^{-1} for unfrozen mineral soils in Table 1. Furthermore, Kurz *et al*. 2013 uses reports on national-level means, which does not reflect the high carbon density of the Project footprint area (boreal shield of Ontario). Additionally, as part of this analysis, the Proponent should have provided detailed land classification survey data to inform their calculations of direct Land Use Change emissions. While the Proponent did provide detailed land classification survey data as presented in Appendix B, it was difficult to follow how this information was used in their calculations of direct Land Use Change emissions. Further clarification on how values in their equations were derived or justified is needed to properly assess the Proponents methodology. For instance, the Proponent does not classify the type of land cover that will be impacted by the Project. While the Proponent does provide the definition of forest land and claims that 95% of the land within the Project footprint meets this classification, they do not justify this assumption (e.g., a citation of where this data came from)). Additionally, the Proponent does not include in the report what proportion of the forest land has organic soil versus mineral soils, or how this is applied in their calculations. Therefore, ECCC cannot validate these estimates with the information provided. Further, while the Proponent presents the equation for quantifying the carbon impacts of flooded lands, they do not report the area of the land that will be flooded in the land-use emissions sections or the land-use categories that will be flooded. In Annex B (Step 2) of the Strategic Assessment of Climate Change (SACC) guidelines, the Proponent is asked to report the area of land impacted by each type of disturbance (e.g. flooding, vegetation clearing, fill, drainage etc.).	It is recommended that the Proponent update the Land Use Change emissions estimations and redo the analysis to utilize site- or regional-specific variables (not national-level means from Kurz *et al*. 2013). It is also recommended that the Proponent use and cite methods to determine specific land classes beyond the forest land and wetland comparison (including forest type, age, soil type), and provide justification of the assumptions on the proportion of land-use classes, and the breakdown the areas impacted by flooding, excavating or other land managements as per the SACC Technical Guidance (as per Step 2 and 3 in Figure 5 of Annex B).

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			In the absence of this information, the worst-case scenario is that the Forest Land which makes up 95% of the large area, according to the Proponent, is 100% Forested Peatlands (with potentially deep organic soils) that store a significant amount of carbon. The potential presence of these carbon rich areas could lead to gross over- or under-estimation of emissions.	
ECCC-25	Appendix C.6	8.12.2 Carbon Sinks	The Proponent did not provide any of the areas or default natural carbon accumulation rate values used in the assessment of project impacts on carbon sinks (Equation (14) SACC Technical Guidance) such as what wetland types were included and in what proportion. Even if using the defaults provided by the SACC Technical Guidance, the choice of the most appropriate value should be given and justified as being the most appropriate value. In Section 5.1 the Proponent cites the use of 3.7 for carbon update value (no units provided) and justified the choice of this value by stating that it is representative of boreal mixed wood forests in northern Ontario. However, given the location (near Timmins), ECCC is of the opinion that the boreal shield would have been a more appropriate selection unless a field survey was conducted to justify this choice. The Proponent did provide detailed land classification survey data in Appendix B, however, it was difficult for ECCC to follow how this information was used in the calculations of the impact to carbon sinks. Further clarification on how values in their equations were derived or justified is needed to properly assess the Proponent's methodology.	It is recommended that the Proponent update the impact on carbon sinks estimation and related sections and provide justification for the assumptions and variables used to allow for an assessment of the methodology used. The Proponent is encouraged to do this by citing where applied values came from including how values may have been derived based on data compilations in Appendix B. It is also recommended that the Proponent update the value in Section 5.1 such that it includes the units, and to use boreal shield rather than boreal mixed wood forests, unless justified by a field survey.

ECCC-26	Appendix B.6 Surface Water Resources Baseline Report – Section 4.1.4 Hydrological Model and Section 5.2.4 Hydrologic Model Results	8.6.1 Baseline conditions	Three separate hydrological models were developed, one per affected watershed, to characterize the regional hydrology. These models are used to predict long-term flows used to quantify predicted changes to water quantity as a result of the Project. The models, developed in the US Army Corps of Engineers (USACE) Hydrologic Engineering Center Hydrologic Modelling System (HEC-HMS), were calibrated against daily discharge flows which were estimated at the most downstream outlet of each watershed based on measured flows at the Water Survey of Canada (WSC) station ID 04MD004 (Porcupine River at Hoyle) and prorated based on watershed areas. The models were calibrated for the period 2008 to 2014. The calibration was measured based on similarity between hydrographs and through statistical performance metrics such as root mean square (RMS), root mean square error (RMSE) and Nash-Sutcliffe efficiency. The results of the calibration are presented graphically in Figures 5.17 to 5.19 and in tabular form in Tables B1.4 to B1.6.
			
			Appendix C.5 of the IS (Section 6.1.2) suggests that the existing baseline hydrological model was also calibrated against local project hydrometric stations using the developed local rating curves. However, the performance metrics and figures comparing the model predictions to site hydrometric data collected as part of the baseline studies could not be found.
			
			The predicted changes to water quantity are dependent on the model's ability to accurately represent local hydrology, which is achieved through model calibration and is assessed via selected performance metrics. Modelled flows using HEC-HMS were not compared against local measured flows at monitoring stations SW-1 to SW-9. In addition, the existing hydrometric stations considered by the Proponent do not fully match with the nodes used in the HEC-HMS model upstream and downstream of the PA and do not extend far enough to assess potential residual effects to water quantity in the receiving environment. Additional hydrometric stations are recommended to fill these gaps. Finally, the units of the RMSE used to quantify the average difference between model predicted and measured values are not reported. As a result, the accuracy of the model predictions is not understood and the level of uncertainty in the predicted local flows and estimated flow changes is high.
			
			Based on the above-noted uncertainty, the effects to water quantity have the potential to be non-negligible, which may alter the evaluation of effects to fish and fish habitat, vegetation and riparian and wetland environments and wetlands and water quality within and downstream of the PA.
				It is recommended that the Proponent provide the following information to reduce the levels of uncertainty in the hydrological model predictions:
				• Provide results of model calibration at stations SW-1, SW-2b, SW-3, SW-4, SW-5, SW-6b, SW-7, SW-8, and SW-9. The results should include graphical comparison of measured and modelled flows, and a table summarizing the statistical performance metrics over the entire monitoring period.
				• Clarify the units of the RMSE included in Tables B1.4 to B1.6.
				• Based on the results of the model calibration against local hydrometric data, quantify the level of uncertainty in the estimated flows and flow changes at different locations within the LSA.
				• Consider installing additional hydrometric monitoring stations to further support ongoing and future hydrological modelling during operations and provide data to support adaptive water management strategies. It is anticipated that these additional hydrometric stations could provide data to support an improved model and later used to validate model predictions during the Project life and to assess residual effects. Additional monitoring stations are recommended at the following locations:
				  ○ West Buskegau upstream of SW-5 and further upstream from the PA (e.g., at WB16);
				  ○ West Buskegau downstream of SW-6b and further downstream from the PA (e.g., at WB3);
				  ○ Nesbitt Creek in the North Driftwood watershed (east of SW-2b); and
				  ○ North Driftwood downstream of SW-2b (e.g., at ND5 and ND3).

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			The Department of Fisheries and Oceans Canada (DFO) has provided information characterizing residual effects and advice on risk to fish and fish habitat in their comments (See comment DFO-04).	
ECCC-27	Appendix C.5 Surface Water Resources Assessment – Section 6.3.6 Effect Assessments	14.0 Effects of the environment on the project • identify the Project's sensitivities and vulnerabilities to changes in climate (both in mean conditions and extremes such as short-duration heavy precipitation events)	The regional hydrologic model in HEC-HMS considered two climatic scenarios, baseline climatic data (applied to years -1, 2 and 17; figures A.88 to A.121) and climate-adjusted baseline data (applied to years -1, 2, 17, 23, 35, 41, 47, pit full; figures A.18 to A.87). Only the climate change adjusted scenarios were used to quantify the effects to water quantity (Tables 6.8 to 6.12). As stated in the TISG, the effects of climate change are considered in the assessment, however, the Proponent does not provide a sensitivity analysis to quantify the potential effects under both baseline and climate-adjusted baseline conditions. The Proponent has not demonstrated how climate change considerations may affect the effect assessment to surface water and whether this climatic condition leads to conservative estimates. Appendix B.6 to the Impact Statement, Figure 5.6, presents the regional station mean monthly flow, which is characterized as having a peak in May due to spring freshet and a second peak in November due to fall rainfall. Derived flow hydrographs for local monitoring stations (Appendix B.2 to Appendix B.6) appear to support the regional monthly flow distribution. The HEC-HMS predictions using baseline climatic data (Appendix C.5 Figures A.88 – A.121) appear to show a sharp discharge peak in early April but not an increase in discharge in November, meaning that the modelled timing of peak flows and monthly distribution of flows do not match those estimated by the regional station assessment. This observation could be related to some weaknesses related to the model calibration and the model ability to replicate flows measured at the local hydrometric stations as noted in NHS-01. Modelled climate-adjusted baseline flows (Appendix C.5 Figures A.18 – A.87) appear to show the receiving environment running at its lowest flow during May, with peaks in February and March. This differs greatly from the characterization of current conditions. While it may be speculated that climate change adjustments may be largely responsible for the substantial alteration of hydrology peak timing, this is uncertain based on the information presented. There is an unknown level of uncertainty associated with the modelled hydrographs under climate-adjusted baseline data and their suitability and usefulness to support the assessment to effects to surface water. This leads to compounded levels of uncertainty around the predicted changes to water quantity. Based on the above-noted uncertainty, the effects to water quantity have the potential to be non-negligible, which may alter the evaluation of effects to fish and fish habitat, vegetation and riparian and wetland environments and wetlands and water quality within and downstream of the PA. DFO has provided information characterizing residual effects and advice on risk to fish and fish habitat in their comments.	It is recommended that the Proponent provide the following information to reduce the levels of uncertainty in the predicted flows under climate-adjusted baseline conditions: • Provide an explanation of any differences in hydrological watershed parameters (for example, discharge peak timing and quantity) between observed on-site water flows and flows modelled in HEC-HMS under baseline and climate-adjusted baseline conditions. • Provide any HEC-HMS model results that can explain this difference, such as the modelled depth of snowpack time-series in the climate-adjusted baseline, compared with the baseline. • Quantify the effects to water quantity under baseline climate and describe whether the estimated changes to flows are conservative than under climate-adjusted baseline conditions.
ECCC-28	Appendix B.6 Surface Water Resources Baseline Report – Section 5.2.1 Regional Hydrology	8.6.1 Baseline conditions 14.0 Effects of the environment on the project	Regression of the regional hydrometric stations was used to derive mean annual flows (MAF), flood flows, and low flows (7Q10 and 7Q20) relationships correlating these hydrological parameters to the associated catchment area. The regional analysis provides the data that forms the basis for the local site station environmental low flows presented in Table B4.3 calculated using the Tessman Method. Environmental flows for climate-adjusted baseline conditions are not presented in tabular form but represented graphically in Appendix C.5 to the Impact Statement (Figures A.18 to A.87). It is unclear if the environmental flows considered under climate-adjusted baseline conditions are different than those predicted using the regional analysis under baseline conditions. There is a risk that these may not adequately represent low flow conditions for climate-adjusted baseline conditions, affecting the assessment of effects to surface water.	It is recommended that the Proponent provide the following information to reduce the uncertainty about characterization and modelling of environmental flows: • Provide clarification or explanation that the discharge behaviour in relation to the estimated environmental flows is adjusted to account for climate-adjusted baseline conditions. • Quantify the uncertainty of the estimated environmental flows. • Present the final monthly environmental flows, along with MAF, and mean 30% MAF in tabular form for each HEC-HMS watershed for the climate-adjusted baseline case.

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			The differences between the baseline and the climate-adjusted baseline hydrographs are apparent, as noted in comment ECCC-27. Therefore, the data used to derive low environmental flows for climate-adjusted baseline conditions would have to be adjusted to capture these changes. Failing to adjust the baseline data would result in adequate quantification of baseflows and high-degree of uncertainty in predicted Project-related effects to water quantity. Further, the environmental flow threshold is frequently crossed in the HEC-HMS modelled flows (Refer to Appendix C.5 to the Impact Statement; Figures A.18-A.121). This suggests that even with no project effects, in a typical year, predicted baseline flows go below the environmental flow during certain periods. For example, in Figure A.37, the modelled baseline discharge dips below environmental flows for certain periods in almost every month of a typical year. This observation could be related to inadequate quantification of baseflows for climate-adjusted baseline conditions. Based on the above-noted uncertainty around environmental flow predictions, the effects to water quantity have the potential to be non-negligible, which may alter the evaluation of effects to fish and fish habitat, vegetation and riparian and wetland environments and wetlands and water quality within and downstream of the PA. DFO has provided information characterizing residual effects and advice on risk to fish and fish habitat in their comments.	

ECCC-29	Appendix C.5 Surface Water Resources Assessment – Section 6.3.6 Effect Assessments	8.6.2 Effects to surface water and groundwater
		
		8.6.3. Mitigation and enhancement measures
			The effects assessment includes the estimated potential changes to flows for a subset of selected subwatersheds (based on the HEC-HMS model discretization), including those located immediately downstream from the proposed discharge points (i.e., WB9 for the West Buskegau and ND5 for the North Driftwood). Estimated changes to flows are presented for selected subwatersheds in Figures A.18 to A.121 and Tables 6.8 to 6.12. The effects are quantified as the number of days with predicted changes to flow as follows: (1) flow reduction above 10% threshold; (2) flow reduction above 10% threshold and below the environmental flow; (3) flow increase above 10% threshold; and (4) flow increase above 10% threshold and Q100 flood flow.
			
			Appendix C.5 focuses on the effects to surface water resources predicted at the most downstream discharge points (WB1 for the West Buskegau and ND1 for the North Driftwood) which are located at significant distance from the PA (e.g., WB1 is located approximately 17.1 km downstream of WB14, and ND1 is located approximately 24.1 km downstream of ND5).
			
			The effects assessment to water quantity focuses its discussion on water quantity effects at the most downstream discharge points (ND1 and WB1). At these locations, flow changes are reduced given the contribution of water from additional watersheds. The discussion around the Project effects with respect to water quantity is misleading as it focuses on the furthest downstream discharge point where changes to flows are minimized by the contribution from other tributaries and the discussion generally excludes the changes that occur within the reach and up to the point of discharge (near the PA) where predicted changes are the largest. The estimated changes at the receiving subwatersheds (WB9 and ND5) are often beyond the 10% threshold during most operational phases. Specifically, for ND5, there is significant and consistent reduction of streamflow below environmental flow threshold during all phases of the Project, including closure and post-closure phases.
			
			In addition, the predicted changes to surface water resources reported in Tables 6.8 to 6.12, are assessed based on the number of days when changes to flows are predicted to be beyond the given threshold, without distinction or quantification of changes to flows during critical periods that may be relevant to fish and fish habitat. As a result, the predicted changes to flows are not presented at adequate temporal and spatial scales or provide quantification of effects to flows and water levels in a comprehensive manner to support characterization of effects to surface water. The rationale and quantification of the selected thresholds (environmental flows and Q100) for the climate-adjusted
				It is recommended that the Proponent provide the following information to reduce the levels of uncertainty in the predicted effects to surface water resources:
				• Based on predicted daily changes to flows, provide summary tables containing the information listed in bullet form below. Information should be included on a monthly basis and representative years for all Project phases. Tables are requested for key nodes in the watershed extending from the watershed immediately receiving the proposed discharge, to the downstream discharge point and including the key junctions (confluences) within the reach (refer to Figures A.2 and A.3 for HEC-HMS model schematic with all watershed and confluences). The information provided should include:
				  ○ Monthly average flows (baseline, project affected);
				  ○ Changes to monthly average flows as a result of the project (expressed as a %);
				  ○ Quantify the number of days when the 10% threshold is exceeded;
				  ○ Quantify the number of days when flows are predicted below the estimated environmental flows;
				  ○ Quantify the number of days when flows are predicted above the flood flows (100-year return period, 24-hour duration event).
				• The tabular information requested above should be presented for both baseline and climate-adjusted conditions.
				• Describe the potential changes to water levels estimated as a result of the modelled changes to flows in the receiving environment.
				• In order mitigate potential effects to flows and water levels, describe the water management strategies that could be adopted and the estimated level of efficacy to mitigate these potential effects.
				• Present the final flood flows (Q100) in tabular form for each HEC-HMS watershed for the climate-adjusted scenario.
				
				The level of uncertainty of the predicted changes to flows could be minimized by implementing a robust monitoring program to validate the assumptions used in the regional hydrological and on-site water balance model and by identifying

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			baseline conditions which are used to quantify the number of days when these conditions may be exceeded is not provided. The presented documentation does not discuss how the proposed water management on-site is designed to minimize potential effects in the receiving environment. The reach of West Buskegau River and North Driftwood River located between the proposed discharge points and the furthest downstream discharge point (WB1 and ND1) may experience changes to flows and water levels that may lead to non-negligible effects to fish and fish habitat, vegetation and riparian and wetland environments and wetlands and water quality downstream of the PA. DFO has provided information characterizing residual effects and advice on risk to fish and fish habitat in their comments.	deviations from predictions. This approach will help ensure that the water management strategies remain effective and potential effects to the receiving environment are mitigated.
ECCC-30	Appendix B.6 Surface Water Resources Baseline Report – Section 4.1.4 Hydrological Model	8.6.1 Baseline conditions	Lag times are used as an input to the hydrological model to predict flows in the receiving environment. Lag times were calculated using reach lengths, following USDA TR-55 and shown in Table 4.5. However, the reach lengths provided for some of the subwatersheds, shown in Table 4.6, appear to be overly large compared to the area of the subwatersheds themselves. For instance, the total area of subwatershed ND3 is approximately 50 km^2 with estimated dimensions of 10 km x 5 km, however the length for the associated reach appears to be more than 45 km. This calls into question the accuracy of the reach lengths used to calculate lag times. The information presented leads to uncertainty about the modelled flows under baseline and Project affected conditions, leading to compounded levels of uncertainty around the predicted changes to water quantity. Consequentially, the effects to water quantity have the potential to be non-negligible, which may alter the evaluation of effects to fish and fish habitat, vegetation and riparian and wetland environments and wetlands and water quality within and downstream of the PA.	It is recommended that the Proponent re-evaluate and provide additional information to demonstrate the accuracy of the reach lengths reported in Table 4.6 and, if incorrect, quantify any uncertainty that this model input may have added to the model predictions.
ECCC-31	Appendix C.5 Surface Water Resources Assessment – Appendix C Assimilative Capacity Study	6.2 Effects to surface water and groundwater 8.6.1 Baseline conditions	Table 3.1 in Appendix C.5 includes the low flow statistics (7Q20) in the receiving environment, adjusted for climate change. The 7Q20 was estimated based on watershed area and the corresponding regional regression relationship, noting that the catchment areas associated with the identified FDPs range between 20.4 and 158 km^2. The low flow 7Q20 regression relationship, presented in Figure 5.8 in Appendix B.6 of the Impact Statement, shows the relationship between catchment area and low flows (7Q10 and 7Q20) for the five (5) selected WSC stations used to evaluate the regional hydrology which range in catchment area between 92.5 and 1,640 km^2 (Table 5.12 in Appendix B.6. of the Impact Statement). The information presented leads to uncertainty about the regression analysis used to characterize the 7Q20 low flow. There is not sufficient evidence about how the flows estimated using regression analysis (i.e., MAF, flood flows or low flows) overall compared to flows measured on-site (Refer to comment ECCC-28). This observation leads to uncertainty around the estimated low flow conditions which may alter the evaluation of effects to water quantity and quality within and downstream of the PA.	It is recommended that the Proponent provide the following information to reduce the uncertainty around low flow estimates: • Describe how the equations resulting from regression analysis with respect to the 7Q20 were adjusted to account for climate change. • Quantify the uncertainty of the low flow predictions based on comparing monitoring data collected on-site as part of the baseline program to regional flow data.

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ECCC-32	Appendix C.5 Surface Water Resources Assessment – Appendix C Assimilative Capacity Study	8.6.2 Effects to surface water and groundwater	Two observations with respect to the maximum and mean treated effluent discharge rates considered in the potential effects to water quantity are listed as follows: • The maximum and mean effluent discharge rates associated with each FDP are summarized in Table 5.1 including a maximum flow of 648 L/s (56,000 m^3/d) and mean flow of 422 L/s (36,000 m^3/d). The Proponent indicates that maximum effluent discharge rate was specified as the nameplate flow rate of the water treatment plants and refers to Appendix I and J for the sources to these numbers. It is noted that the linkage between the effluent discharge flows included in Table 5.1 and average and peak outflows at each collection pond presented in the Site-Wide Water Balance Model (Sections 5.1 and 5.2 of Appendix I of the Impact Statement) or in the Site-Wide Water Management Plan (Appendix J of the Impact Statement) is unclear. • Figure A.1 depicts five water treatment plants, one per collection pond. This figure could also suggest five (5) discharge location points to the receiving environment, with the north-east TMF discharging to the West Buskegau River rather than pumped to the north-west TMF pond from where discharged to the North Driftwood River as described by the Proponent in Appendices I and J. It is understood that once the TMF is reclaimed, flows from the north-east TMF collection pond will be directed to the West Buskegau River, however, it is unclear whether a water treatment plant is required at this FDP. These observations lead to uncertainty around the maximum and mean effluent flows used to quantify the potential effects to surface water. The effluent discharge flows are inputs to the regional water balance model and may affect the estimated changes to flows. This has the potential to affect the evaluation of effects to water quantity and may alter the evaluation of effects to fish and fish habitat, vegetation and riparian and wetland environments and wetlands and water quality within and downstream of the PA	It is recommended that the Proponent provide the following information to reduce the uncertainty around maximum and mean treated effluent discharge rates: • Clarify the linkage between the maximum and mean treated effluent discharge rates input flows (Table 5.1), corresponding average and peak pond outflows referred to in Appendices I and J of the Impact Statement and Project-related discharge considered in the HEC-HMS model of the receiving environment. • Depict outflows from each proposed water treatment plant to the environment. • Confirm whether there is a planned water treatment plant from the north-east TMF collection pond discharging to the West Buskegau River.
ECCC-33	Appendix C.5 Surface Water Resources Assessment – Appendix C Assimilative Capacity Study	8.6.2 Effects to surface water and groundwater	The assimilative capacity in the receiving environment is evaluated for two scenarios: regulatory and normal conditions. Regulatory conditions are considered the worst-case and conservative, whereas normal conditions represent average expected conditions adjusted for climate change. Table 3.1 summarizes the representative environmental flow statistics used to assess these two conditions. Expected normal conditions assume the receiver flow as the MAF which is estimated based on the regional regression analysis and calculated as a function of the area of the catchment. Appendix B.6 of the Impact Assessment shows, in Table 5.11, that the MAF at WSC station Porcupine River at Hoyle is 5.6 m^3/s, while the mean monthly flow distribution (Figure 5.6 of the same appendix) shows that for this station, the monthly average flows appear to exceed the MAF less than 50% of the time. This observation refers to the WSC station Porcupine River at Hoyle since flows measured at this station were prorated and used to calibrate the regional hydrological model used to predict flows in the receiving environment. During periods when flows in the receiver are less than the MAF, the assimilative capacity in the receiving environment is expected to be smaller than estimated during normal conditions (assuming that the rest of the inputs remain unchanged). Based on the information noted above, this situation is expected to occur more than 50% of the time in a given year. These observations lead to uncertainty around whether the assumptions with respect to environmental flows for the normal condition are representative. It appears that these assumptions may overestimate the assimilative capacity on a regular basis. This uncertainty has the potential to affect the evaluation of effects to water quality within and downstream of the PA.	It is recommended that the Proponent quantify the time and specific periods when conditions may be representative of regulatory conditions or normal conditions, understanding that the estimated assimilative capacity may represent conservative estimates of the available assimilative capacity for a given condition to reduce the uncertainty around how often each of these conditions may occur.

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ECCC-34	Appendix I Crawford Site-Wide Water Balance Summary Report – Section 5.0 Results	8.6.2 Effects to surface water and groundwater 8.6.3. Mitigation and enhancement measures	The predicted average and peak monthly inflows and outflows from all collection ponds are summarized based on monthly simulations (Section 5.1) and based on daily simulations (Section 5.2) for key years during the Project life. It is unclear if these outflows include evaporation, dust suppression, water reclaimed for use in the process plant or whether these outflows represent only the treated water discharged to the environment at the Final Discharge Point (FDP). Monthly water balance results, including outflows from all collection ponds are also presented for each mine life year, in Appendix C. The flows from each collection pond to the proposed FDPs will fluctuate depending on the time of the year, year within the Project life cycle and adopted water management strategy on-site. It is noted that Figure A.16 in Appendix C.5 to the Impact Statement may depict outflows from each collection pond, however this figure is not labelled or referred to in the text. It is unclear how water will be managed within each collection pond, specifically, the estimated pump rates from each pond (via the water treatment plants) to the receiving environment and the relationship between outflows and associated water levels at each pond. As a result, it is not possible to verify that water is adequately managed on-site, that ponds are adequately designed or that mitigation measures with respect to water management have been considered, to mitigate potential effects to water quantity in the receiving environment. There is uncertainty around the volume, timing and nature of the outflows presented in Appendix I and whether these represent discharge to the receiving environment or all water losses. The level of information presented with respect to temporal variability of discharge to the environment and predicted levels (or available capacity) in the collection ponds is not understood and cannot be used to verify the proposed capacity of the collection ponds under the proposed water management strategy. These information gaps have the potential to affect the evaluation of effects to surface water within and downstream of the PA.	It is recommended that the Proponent provide the following information to better understand the simulated outflows from the collection ponds and treated effluent discharge to the receiving environment, as well as to reduce the level of uncertainty around the design of the proposed collection ponds: • Provide monthly summary (average and peak) of treated effluent discharge to each FDP and corresponding estimated level in the collection ponds for selected key years throughout the construction and operational phase including also representative flows once the pit lake is flooded; • Provide monthly summary (average and peak) of treated effluent discharge to each watershed (e.g., FDP-SP01 and FDP-SP03 combined; FDP-SP-Temp0, FDP-TMF-SP and FDP-SP-02 combined) throughout the life of Project including representative flows once the pit lake is flooded; • Describe alternative water management strategies that could be implemented on-site to minimize potential changes to flows and levels in the receiving environment.
ECCC-35	Appendix I Crawford Site-Wide Water Balance Summary Report – Section 5.0 Results	8.6.1 Baseline conditions	The runoff coefficient is a key input to the site-wide water balance model and regional hydrological model as it directly affects flow predictions within the PA and the LSA and therefore directly and significantly affects the effect assessment to water quantity. The assumed runoff coefficients within the site for various mine site areas (e.g., natural ground, pit, stockpile, impoundment, reclaimed) and each of the project phases are included in Table 3-4. For the closure phase, the runoff coefficients range from 0.5 to 1. Some mine facilities, such as the TMF, have a runoff coefficient (0.7) which is higher than that assumed for natural ground (0.5) leading to higher changes in water quantity compared to those estimated for other facilities such as the stockpiles (estimated runoff coefficient of 0.4). While the Proponent's assumed runoff coefficient for existing conditions is not included in Table 3-4 or specified in Appendix I, it could be speculated that is assumed as 0.5 given that this is the value assumed for natural ground for all Project phases (Table 3-4) however, it is important that the correct coefficient be used and that this information be provided. Appendix B.6 to the Impact Statement (Section 6.1) concludes that the climate normal streamflow estimate represents a runoff coefficient of 41%, based on an environmental water balance for the PA using the USGS Thornthwaite method. Table 5.11 of the same document shows runoff coefficients for stations considered in the regional analysis, ranging from 0.38 to 0.51 with the selected station chosen for the model calibration (Porcupine River at Hoyle) yielding the highest runoff coefficient. Appendix C.5. of the Impact Statement (Section 6.3.6) indicates that under the closure phase (during active closure while the pit lake is filling and once the pit is full) flows in the receiving environment are predicted to increase over baseline. These changes are predicted, despite the increased loss of water to evaporation from the pit lake and the increased capture of groundwater volumes by the pit (relevant during pit filling).	It is recommended that the Proponent provide the following information to address the uncertainty around the effect of the selected runoff coefficient to characterize baseline conditions on the predicted changes to flows: • Provide clarification for the selected runoff coefficient used for baseline in Appendix I; • Demonstrate that the selected runoff coefficient is adequate for application to the PA by comparing flow estimates by the baseline site-wide water balance model with flow measured at the local hydrometric stations; • Consider sensitivity analysis to the baseline runoff coefficient to decrease the level of uncertainty in the predicted changes to flows presented in Appendix C.5. of the Impact Statement (Section 6.3.6).

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			The predicted changes to flows, specifically for the closure phase raise some uncertainty around the assumptions for natural ground (0.5) which appears different from the runoff coefficient of 41% described in Appendix B.6 to the Impact Statement. An overestimation of the runoff coefficient for baseline conditions may underestimate the potential effects to flows associated with the Project. This uncertainty has the potential to affect the evaluation of effects to fish and fish habitat, vegetation and riparian and wetland environments and wetlands and water quality within and downstream of the PA.	
ECCC-36	Appendix I Crawford Site-Wide Water Balance Summary Report – Appendix B Overview of Mine Facilities Footprint	8.6.2 Effects to surface water and groundwater	The site-wide water balance model (and associated water quality model) uses the footprint of each mine facility and its change over time, to predict changes to water quantity (and associated water quality). Each mine facility at each project phase is assigned a distinct water quality. The mass load associated with each mine facility is dependent on the predicted water quantity and the assigned water quality. Appendix B includes a table with an overview of mine facility footprint through the mine life. This table includes, for each facility, a breakdown of the catchment area draining the facility (if applicable) and the area of the facility under operations and once reclaimed. During the period when facilities transition from operations to reclamation, the total area of some of the facilities does not appear to be maintained. For example, Appendix B includes the following: (1) Year 29: 11,707,871 m^3 of rock impoundment and 0 m^3 of reclaimed rock impoundment; (2) Year 33: 0 m^3 of rock impoundment and 8,791,303 m^3 of reclaimed rock impoundment; and (3) Year 34: 0 m^3 of rock impoundment and 11,718,271 m^3 of reclaimed rock impoundment. This information suggests a deficit in the rock impoundment area (operational or reclaimed) of approximately 2,917,000 m^3 on Year 33. The same observations are found for the stockpiles and TMF. It is unclear how the areas unaccounted for are considered in the site-wide water balance model and it is unclear how this observation may affect predicted changes to water quantity. Furthermore, the flows originated in these facilities have the potential to convey large mass load of constituents of potential concern which has the potential to affect the water quality predictions. Not accounting for the footprint of some of these facilities could lead to uncertainty around the predicted changes to flows and associated mass load from the PA to the receiving environment. This uncertainty has the potential to affect the evaluation of effects to water quantity and quality within and downstream of the PA and affect the evaluation of effects to fish and fish habitat, vegetation and riparian and wetland environments and wetlands and water quality within and downstream of the PA.	It is recommended that the Proponent provide the following information to address the uncertainty around the footprint of mine facilities used in the site-wide water balance model: • Provide the rationale for not accounting for the footprint areas for some mine facilities where the total area does not appear to be maintained through time. • Explain the assumptions with respect to the transition (timeframe) from operational to reclaimed conditions and the impact on predicted changes to water quantity. • If footprint areas were unaccounted for during some years, provide information on the potential effects that missing footprint areas may have on the site-wide water balance and water quality model predictions.
ECCC-37	Appendix I Crawford Site-Wide Water Balance Summary Report – Appendix C Monthly Water Balance Results Throughout the Life of Mine	8.6.2 Effects to surface water and groundwater 8.6.3. Mitigation and enhancement measures	There are some uncertainties about the water balance model results with respect to predicted inflows to the TMF north-west (NW) pond and the overall duration of the pit lake filling period. The key observations are summarized below: • Figures 4-3 and 4-4 of Appendix I include water balance schematics for Phase 1 (Year 1 to 5) and Phase 2 (Year 5 to 30), respectively. It is understood that the TMF north-east (NE) pond is pumped to the TMF NW during Phase 1 from where water is used to meet the process water demand. From Year 18 onwards, the TMF is assumed to be naturalized and reports to the TMF NE pond from which is discharged to West Buskegau River. Predicted inflows to the TMF NW pond do not seem to include pumped flows from TMF NE which are anticipated to occur until Year 18. The total inflows and outflows from collection ponds 1, 2, 3, TMF NE TMF, TMF NW and the pit are reported on a yearly basis and throughout the life of mine in Appendix C based on the monthly water balance model results. The TMF NE and TMF NW are predicted to receive up to approximately 8 Mm^3/yr (each). It is unclear if the capacity of TMF NW pond is sufficient to accommodate the pumped flows from the TMF NE. Inadequate estimate of the capacity of the TMF NW pond to manage on-site runoff has the potential to result in insufficient on-site storage that under a combination of circumstances could lead to an uncontrolled release of runoff from the site to the receiving environment affecting water quantity and quality.	It is recommended the Proponent provide the following information to address the uncertainty around the modelled inflows to the TMF NE collection pond: • Confirm the period and volumes that are expected to be pumped from the TMF NE to the TMF NW collection pond and determine whether the volume of the TMF NW collection pond and estimated capacity of the water treatment plant are sufficient. • Provide mitigation measures that could be implemented if water quality objectives in the TMF NE collection pond are not met to prevent discharging to the receiving environment once the TMF is reclaimed. It is also recommended that the Proponent provide the following information to address the uncertainty around the duration of the pit lake filling phase: • Demonstrate how the volume of inflows to the pit lake were estimated. • Confirm that evaporation was taken into consideration in the site-wide water balance including the pit lake during filling.

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			• The total inflows reporting to the open pit (labelled at MZ+EZ inflows in Appendix C), peak at approximately 14 Mm^3 at end the of Operations Phase 2. This number appears slightly higher than expected given the annual precipitation value (915 mm for 2071-2100), maximum pit footprint (approximately 9 km^2), and estimated groundwater contribution (up to 9.400 m^3/d). The same observation applies to the entire pit filling period. An overestimation of the total inflows reporting to the open pit could affect the predicted time when the pit could be filled, and functional fish habitat could be restored. As a result, the observations described above carry some uncertainties that could be significant and have the potential to affect water quantity, water quality and fish and fish habitat within and downstream of the PA.	
ECCC-38	Appendix C.5 Surface Water Resources Assessment – Section 5.1.1 Hydrology Appendix C.5 Surface Water Resources Assessment – Section 6.3.6.1.2 Surface Water-Groundwater Change Assessment	8.6.2 Effects to surface water and groundwater	The methods used to assess the Project-related effects on hydrology (Section 5.1.1) are described as a tiered approach to evaluate changes in flows against baseline conditions. The methodology specifies that project-related changes to groundwater contribution to surface water features were included in the continuous HEC-HMS hydrological model. This model was developed as part of the Surface Water Baseline Assessment (Appendix B.6). The surface water-groundwater change assessment (Section 6.3.6.1.2) includes the predicted groundwater discharge to surface water (Table 6.13). These predicted values are approximately an order of magnitude smaller compared to the baseflow estimated using data from regional hydrometric stations (See comment NRCan-01). The regional baseflow discharge rate per unit area of 0.0035 $m^3/s/km^2$ is used in the HEC-HMS baseline model. It is uncertain if the predicted groundwater contribution to surface water (Table 6.13) were considered in the HEC-HMS model. ECCC is therefore concerned that the baseflow considered by the Proponent is overestimated which in turn, could result in an underestimation of the Project-related effects to surface water. The above-noted uncertainty of Project-related changes to groundwater has the potential to affect the predicted effects to water quantity and may alter the evaluation of effects to fish and fish habitat, vegetation and riparian and wetland environments and wetlands and water quality downstream of the PA. DFO has provided information characterizing residual effects and advice on risk to fish and fish habitat in their comments (See comments DFO-03 and DFO-04).	It is recommended that the Proponent provide the following information to address the uncertainty around the consideration of groundwater contribution to the hydrological HEC-HMS model: • Confirm if the predicted groundwater discharge to surface water features (Table 6.13) was included in the HEC-HMS model under baseline and during the different Project-related phases. • If predicted groundwater discharge to surface water features were not included, revise the HEC-HMS model to incorporate the linkage and compute the estimated changes to water quantity. Alternatively, quantify the uncertainty and provide information on what measures will be put in place to handle such uncertainty.
ECCC-39	Chapter 3, Section 3.4.1, p.3.17, and Chapter 31, Section 31.2.4	Section 13.1	The Proponent conducted an effects assessment and risk assessment for various scenarios arising from plausible accidents and malfunctions related to the Project. The effects have been well documented, with clear pathways identified for most scenarios. The risk assessment for each plausible accident or malfunction scenario was determined based on the likelihood and severity of consequences, along with a description of residual risk with an indication of confidence in the assessment and, as outlined in Section 31.4. Additionally, the Proponent provided a sensitivity map (Figure 31.3) at the end of Chapter 31, which can be used to identify sensitive environmental receptors in the event of an emergency. ECCC is satisfied with the scenarios evaluated by the Proponent, as they are representative of accidents and malfunctions scenarios that could occur. However, ECCC notes that one plausible scenario was not adequately addressed in Chapter 31: a rail accident resulting in the release of nickel concentrate, one of the Project's primary outputs. The Project includes the construction of a rail spur that will cross several waterways, including Jocko Creek, a tributary of the Mattagami River. The rail spur will accommodate up to four roundtrip trains per 24 hours for the life of the mine, transporting various commodities, including nickel concentrate,	It is recommended that further analysis be completed with regards to the potential environmental effects for a rail accident or malfunction resulting in the release of nickel concentrate, including identifying the extent of the impacted area. It is also recommended that more information be provided on potential mitigation measures in the event of a release into a waterbody or the environment including a description of the emergency response capabilities and plans.

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			an output produced at the mine. Nickel concentrate is known to be toxic to the environment, particularly to aquatic organisms, and may cause long-term adverse effects in aquatic ecosystems, including fish and fish habitat. Although the likelihood and frequency of accidental releases could very well be low, the magnitude of effect should one occur would be significant. This missing pathway of effect for spills of nickel concentrate, and the residual uncertainty with predictions, may greatly increase the overall extent of significance of effects on fish and fish habitat, migratory birds and their habitats, and species of importance to Indigenous Peoples and their habitats. The Proponent indicates that the rail spur will be owned and operated by Ontario Northland Railway, but the Proponent will remain the consignor of the load, maintaining responsibility for overseeing remedial measures in the event of an accident involving these materials. In Section 31.2.4, regarding the release of fuel and hazardous materials, the Proponent mentions the possibility of a train derailment that could result in the release of hazardous substances. In Section 13.1, the TISG requires that the Proponent conduct an analysis of each hazard and adverse event, including a description of the potential consequences. However, the Proponent has not provided: • A characterization of the fate and behavior of nickel concentrate; • Details on the potential effects of a release of nickel concentrate into waterways supporting fish or fish habitat; and • An assessment of the broader environmental impacts of such a release. The missing information is necessary to gain a comprehensive understanding of the potential effects related to accidents and malfunctions, in particular in relation to the overall extent of significance of an accidental release of nickel concentrate on fish and fish habitat, migratory birds and their habitats, and species of importance to Indigenous Peoples and their habitats.	
ECCC-40	19.4.2.3.1.5.2, Appendix B.7.4 2023 Terrestrial Ecology Baseline Study, Appendix B.7.3 Terrestrial Wildlife and Wildlife Habitat Supplemental Baseline Report	Sections 8.11.1 and 8.11.2	The Proponent has not provided a qualitative summary of the most predictable changes to caribou habitat conditions and population levels over the Project timelines that would occur in the absence of the Project, taking into account forest management practices, forest succession, and other predictable changes. This information is needed to assess the impacts of the Project to potential future Boreal Caribou populations and their habitat. Additionally, the Proponent has not described or mapped how the landscape will provide for future Boreal Caribou habitat during the decommissioning and abandonment phases, including how much of the Project will be available for boreal caribou use, and approximately when the restored habitat is expected to age into preferred boreal caribou habitat, nor have they described how reclaimed habitat may compare to baseline conditions. If the Project will prevent or delay the recovery of changing caribou habitats (also referred to as the dynamic caribou habitat schedule) blocks, it is important to understand exactly where recovery will be prevented, and how long delays will be. Without this information it is unclear how or if the landscape will provide Boreal Caribou habitat in the future, and if so, how this would compare to existing conditions in the absence of the Project. ECCC is also unable to assess how caribou populations levels themselves would change in the absence of the Project. The worst-case scenario effect to Boreal caribou habitat recovery is that harvesting of currently suitable Boreal Caribou habitat in the Kesagami range continues according to forest management plans which are premised on the assumption that the study area or some portion of it will return to suitable boreal caribou habitat in the future. If the Project prevents that planned habitat recovery, and there is an associated loss of future habitat, that should be acknowledged as an impact to caribou.	It is recommended that a qualitative summary of trends in the absence of the Project be provided to account for changing caribou habitats within the RSA. It is also recommended that maps be used and provided to inform a qualitative summary of the most predictable changes to caribou habitat conditions that would occur in the absence of the Project, such as changing caribou habitat blocks that are scheduled to be harvested, and when conditions in the blocks are scheduled to become suitable for caribou according to relevant provincial and federal caribou habitat definitions.

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			Based on the information provided by the Proponent, the risk to caribou habitat conditions and population levels remains unknown and potentially important effects to caribou via loss of habitat have not been clearly accounted for.	
ECCC-41	Air quality assessment – Appendix C.1 - Appendix I Concentration contour plots	Section 8.5.2	The isopleth maps in Appendix I show only the Project's contribution to air contaminant concentrations, excluding background levels. While the background concentrations are noted in the figures, displaying cumulative concentrations (background plus Project) directly on the maps would provide a more comprehensive overview of air quality impacts in the LSA. Additionally, including sensitive receptors on the contour plots would enhance the understanding of potential effects. As shown in Table 5.7 and Table 5.8, $PM_{2.5}$ inside the mine boundary, levels rise from 63% to 109%, meaning baseline concentrations alone account for 44% of the federal standard. Using isopleth maps to visually depict both cumulative concentrations and sensitive receptors would further the Proponent's understanding of localized impacts and exceedance patterns. Additionally, the use of 85% and 95% attenuation rates for $PM_{2.5}$ introduces uncertainty in the results, which should be considered when interpreting cumulative effects. This comparison can also be extended to other contaminants, demonstrating the importance of considering baseline concentrations when presenting isopleth maps.	It is recommended that the Proponent provide isopleth maps displaying cumulative concentrations (background and Project) and including sensitive receptors to better illustrate potential impacts.
ECCC-42	Chapter 5, Section 5.2, Table 5.1 Section 5.2, Tables 5.4-5.13	4.4 Alternative means of carrying out the project	The alternatives assessment does not meet the TISG requirements. Specifically, the alternatives assessment does not describe potential effects on terrestrial species at risk, their residence and critical habitat, nor does it describe how the avoidance of effects was considered and how it may be achieved through alternative means of carrying out the Project or alternatives to the Project. The IS discussed these considerations more generally from a wildlife and wildlife habitat perspective but not specific to species at risk. With respect to the alternatives assessment, as per the TISG, the Proponent should identify potential effects to species at risk, including a description of how avoidance of effects was considered and how it may be achieved through alternative means of carrying out the Project. Without this information the department is unable to determine the extent to which effects to species at risk could have been avoided or reduced through the selection of alternative means of carrying out the Project. Avoidance of adverse effects to individuals, their residence and/or their critical habitat remains the mitigation option that carries the least risk and uncertainty.	It is recommended that the Proponent describe and demonstrate how avoidance of effects to each species at risk was considered and how avoidance may be achieved through alternative means of carrying out the Project or alternatives to the Project assessment.
ECCC-43	Chapter 8	7.3.1 Spatial boundaries	Section 7.3.1 of the TISG states that spatial boundaries should be selected based on the geographic extent over which Project activities and their effects are likely to occur, as well as other ecological, technical, Indigenous knowledge and social considerations. A rationale for each boundary must also be provided and the LSA should encompass the PA, be valued component specific, and be based on the likely geographic extent by which Project-related effects can be predicted. It is not clear how valued component specific considerations were incorporated into the delineation of the LSA and no science-based justification was provided for any of the valued components. Without this information it is difficult to predict the likelihood and severity of effects to individual migratory birds and species at risk and this limits ECCC's ability to provide specific mitigation and follow-up measures advice specific to these species and their habitat. The following references along with advice from the appropriate regulatory authorities may help to identify valued component specific considerations when determining appropriate spatial boundaries: • Recovery Strategies, Action Plans or COSEWIC Status Reports found at the following link: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html • Provincial Recovery Strategies or Action Plans, where available.	It is recommended that the Proponent: • Describe and demonstrate that the spatial boundaries chosen for species at risk and migratory birds are appropriate. The justification should take into consideration the geographic extent by which Project-related effects can be predicted as well as how individual species-specific considerations may affect these boundaries (e.g., ecological considerations, species biology, Bird Conservation Regions, etc.). • Update the effects analysis for migratory birds and terrestrial species at risk using updated spatial boundaries, if required. • Describe how the mitigation hierarchy was applied, including the measures that will be taken to avoid, minimize and offset effects to species at risk and migratory birds. • List mitigation measures being proposed to address potential effects on migratory birds and species at risk.

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			• Bird Conservation Strategy for Region 8: Ontario Boreal Softwood Shield - https://www.canada.ca/en/environment-climate-change/services/migratory-bird-conservation/publications/strategy-region-8-boreal-softwood.html • Specific advice from jurisdictions that manage the species.	
ECCC-44	Chapter 16 Assessment of Potential Effects of Vegetation, Riparian and Wetland Environments. Chapter 24 Summary of Residual Effects	8.7.2 Effects to vegetation, riparian and wetland environments	The extent of Project-related effects on hydrology, including changes to quantity and quality of groundwater and surface water, are not clear and create a high degree of uncertainty in terms of effects to species at risk and migratory birds (See ECCC-26, ECCC-29 and ECCC-38). Changes to quantity and quality of groundwater and surface water will affect vegetation, riparian and wetland environments, and consequently the migratory birds and species at risk that depend on these habitats. It is reported in several sections that hydrological impacts may extend further into the LSA, but the extent and significance of these impacts on habitats of importance to these species is unclear. Section 8.7.2 of the TISG requires that the IS describe all potential effects to vegetation and riparian and wetland environments due to the Project, for all phases, however, the likelihood and severity of Project-related hydrological effects on these habitat features have not been fully incorporated into the effects assessment. This information is required for ECCC to formulate advice, as understanding the extent of hydrological impacts (e.g., groundwater and surface water) in terms of both quantity and quality is essential to assess effects beyond the PA and guide the development of specific mitigation measures. Without this information the uncertainties associated with the hydrological effects assessment could lead to unanticipated effects and poorly designed mitigation measures including as it relates to impacts on migration stopover sites and/or breeding sites for species such as: • Canada Warbler, listed as Threatened under SARA, is likely to be affected by changes in hydrological regimes as they are known to breed in forested swamps, bogs, and near open water (EC, 2016). • Waterfowl, shorebirds, waterbirds, and marsh birds all make use of wetlands, open water, etc. for staging, breeding, as stopover habitat, etc. and these sensitive habitat features will also be affected by changes in hydrological regimes. • Yellow Rail, a marsh bird listed as Special Concern under SARA, is threatened by alteration to hydrology even when they occur away from habitat sites (EC, 2013). Created wetlands often lack the range of habitat conditions required by this species (EC, 2013). Additional information would allow ECCC to provide effective advice that minimizes hydrological impacts to species or habitat, including mitigations such as limiting the depth of extraction, installing impermeable barriers around extraction areas or pumping of suitable volumes of water to fill open pits during rehabilitation (OMNRF, 2014). See comment ECCC-15 for further information related to the Wetlands Functions Assessment. **References:** [EC, 2016] Environment Canada. 2016. Recovery Strategy for the Canada Warbler (Cardellina canadensis) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. vii + 56 pp. [EC, 2013] Environment Canada. 2013. Management Plan for the Yellow Rail (Coturnicops noveboracensis) in Canada. Species at Risk Act Management Plan Series. Environment Canada, Ottawa. iii + 24 pp. [OMNRF, 2014] Ontario Ministry of Natural Resources and Forestry. 2014. Significant Wildlife Habitat Mitigation Support Tool. 533 pp.	ECCC recommends that the Proponent: • Provide detailed information on the extent of Project-related effects to groundwater and surface water and resulting impacts on vegetation, riparian and wetland environments including the potential for effects to migratory birds and species at risk. • Describe mitigation measures being proposed to minimize these effects to migratory birds and species at risk. • Update the effects analysis for migratory birds and terrestrial species at risk.

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ECCC-45	Chapter 18 Assessment of Potential Effects on Birds and Bird Habitat Section 18.2 Existing Conditions for Birds and Bird Habitat Appendix B.7.4 2023 Terrestrial Ecology Baseline Study	8.9.1 Baseline conditions Appendix 1 Additional Guidance, Guidance for Biophysical Components, Bird and bird habitat	The TISG requires sufficient information be provided related to migratory birds and species at risk to demonstrate the information presented is representative of current conditions, with justification (statistical analyses, simulations, organized reasoning) that additional studies are not necessary to improve confidence in predictions, which is critical to assessing residual effects and selecting appropriate mitigation measures. Upon review of Chapter 18 and Appendix B.7.2 and B.7.4 of the IS, ECCC is of the view that critical gaps in this understanding of current conditions within the study areas remain. This has impacted ECCC's ability to provide advice related to potential residual adverse effects and mitigation measures. Examples of critical methodology concerns and information gaps include: • Surveys for waterfowl were unsuitable and timed incorrectly leading to potential incorrect conclusions about bird use in the areas for staging or breeding. • The wrong model of Autonomous Recording Unit (ARU) was used, which made the data unreliable for counting birds and estimating their density. • Lumping ARU data from breeding and non-breeding periods. • Use of detection frequency to represent abundance, leading to inaccurate estimates. • Relying on online recognition tools instead of experienced interpreters. • Poorly considered assumption of uniform habitat suitability across the study areas within coarse land cover classes. • Lack of information to demonstrate surveys were designed to represent spatial targets, making it unclear if conclusions are valid. • Survey design did not use a spatially balanced design which could affect conclusions due to over- or under-representing certain species, habitats or locations. • Survey selection appears to be biased to roads which is unsuited to make inferences to off-road locations and to the study area. • Stratification (grouping areas) was done after random selection, statistically invalid without poststratification and unlikely to result in sufficient sampling across habitat types. • Lack of information to demonstrate that modeling or simulations were used in planning the survey. • Unknown incorporation of existing data into sampling and survey decisions. • Goals of abundance and distribution are presented but the report (Appendix B.7.4) does not demonstrate surveys or analysis that are likely to achieve those goals. • Impaired synthesis and interpretation of data as a result of incorrect statistical methods used, and/or violation of assumptions that are necessary for statistical results to be valid. These methodology concerns and information gaps lead to an impaired ability to understand the extent and significance of adverse effects and an increased risk of unanticipated and unmitigated impacts to migratory birds and species at risk. With respect to individuals, nests/residences, populations and critical habitat, there is concern for undetected species and a poor understanding of habitat availability and use, such as annual variations in species, seasonal use of locations by birds, and areas of high concentration for birds. In addition, these multiple deficiencies lead to compounding and interacting consequences, resulting in greater unreliability and higher overall conservation risk. Some of the high-level risks associated with proceeding with the Project in the absence of representative baseline data include: • Failure to detect species presence leading to elevated risks of incidental harm, mortality and disturbance to birds and their nests, and to SAR habitat, due to operational activities. • Risks associated with underestimating the scope and magnitude of Project impacts on migratory birds, their nests, and populations, and compounding risks associated with evaluating cumulative effects. • Unanticipated, unmitigated and unpermitted impacts to locations (including aggregation sites, nests) important for staging or breeding birds.	ECCC has identified substantial deficiencies in the baseline data collection methodologies that would ideally be addressed through the provision of baseline data that is fully representative of current conditions and collected using appropriate methodologies. In the absence of sufficient baseline data that is representative of migratory birds and their habitat, it is difficult for ECCC to provide Project-specific advice in relation to the information presented in the IS. Therefore, ECCC recommends that the following advice be considered as a precautionary approach to the assessment. ECCC recommends that the Proponent: • Take into account the methodology concerns and information gaps described, revisit the assessment, and demonstrate the information presented is representative of current conditions (including with respect to species presence and abundance as well as locations of sensitive habitat features such as nests, waterfowl staging areas, migratory stopover areas and seasonal concentration areas) and can lead to reliable predictions. • Design and implement mitigation measures with the assumption that all migratory birds and species at risk that have the potential to occur are present in the area. • Avoid Project components in sensitive habitat features (examples include avoiding placement of discharge sites in areas that support ground nesting birds, and locating Project components away from areas identified as breeding territories (e.g., Eastern Whip-poor-will), waterfowl staging habitat, areas of seasonal concentration, migratory stopover areas, or heronries). • Avoid use of active nest searches as a method to manage harm to species as the ability to detect active nests is typically very low while the risk of disturbing or damaging nests is high. • Refer to ECCC's online guidelines for avoiding harm to migratory birds: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds.html, develop and list measures in consultation with ECCC to be taken to protect migratory birds, nests and eggs from potentially harmful activities, including vegetation removal, site grubbing, equipment and vehicle operation, and stockpile/exposed soil management, including the following: ○ Time potentially harmful activities outside of the extreme early and late nesting dates for the nesting zone applicable to the Project site (C5) and periods to implement the most restrictive timing window and ensure timing avoids the earliest and latest nesting records for each habitat type. ○ Establish species-specific buffer zones and setbacks around occupied nests. ○ Develop species-specific measures, which should include but not be limited to: ○ Implement measures to reduce light pollution (such as the placement and use of directed lighting) in all habitats with the potential to be used by Eastern Whip-Poor-Will to minimize impacts on the species (ECCC, 2018). ○ Reduce vehicle speeds at night across the Project site to reduce impacts on Common Nighthawk as the Project will affect forage near and over roads, and the species is known to rest at night on gravel roads and can experience mortality from collision with vehicles.

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			• An inability to differentiate between Project-specific (direct, indirect) and outside-Project impacts to migratory birds. One approach that may be used to address the uncertainty that arises from deficiencies in baseline surveys and analysis and the resulting increased risks to migratory bird individuals, nests, populations and critical habitat is to apply a precautionary approach by assuming all species whose ranges overlap with the area are present within the habitats and timeframes in which they could be expected to occur and implementing comprehensive measures using this assumption. However, using this as the only mechanism to resolve this concern runs the risks that measures applied are unnecessary, overly restrictive, and ineffective, as well as labour and resource intensive. **A more comprehensive list of risks associated with proceeding without sufficient sampling and further assessment includes:** **Sampling Deficiencies** • Insufficient sampling leads to: ○ High uncertainty in estimates of baseline conditions. ○ Failure to detect species that are using the project areas and sites within them. ○ High uncertainty for inputs to cumulative impact evaluations. ○ Consequences and risks ▪ Inability to estimate impacts to migratory birds, including SAR birds. ▪ Impaired ability to develop and evaluate mitigations. ▪ High likelihood of false absences, particularly for uncommon species (e.g., SAR). ▪ Risks of elevated incidental harm, mortality and disturbance to birds and their nests, and to SAR habitat, due to operational activities. ▪ Risks concerning the use of human and financial resources due to misguided and ineffective mitigations. ▪ Risks associated with underestimating the scope and magnitude of project impacts on migratory birds, their nests, and populations, and compounding risks associated with evaluating cumulative effects. ▪ Potential for cumulative risks associated with impacted breeding production of migratory birds and domestic and international consequences relating to impacted migratory bird populations within the hemisphere. • Biased sampling or incorrect methodology leads to: ○ Locations important for breeding and migrating birds being omitted from sampling. ○ Critical time periods omitted from sampling and bird dependence on sites, for migration staging and/or breeding. ○ Collected data that is of limited use and/or leading to erroneous conclusions. ○ Consequences and risks ▪ Unanticipated, unmitigated and unpermitted impacts to locations (including aggregation sites, nests) important for staging or breeding birds. ▪ Incorrect estimates of species occurrence, abundance, timing of site use, and other baseline conditions. (Note that high statistical certainty can still occur with biased and incorrect results.) ▪ Risks associated with misguided approval, mitigation, permitting and other regulatory decisions. ▪ Risks associated with underestimating the scope and magnitude of project impact on migratory birds, their nests, and populations, and compounding risks associated with evaluating cumulative effects. **Analysis Deficiencies** • Impaired evaluations of sampling options and sufficiency:	○ If an active heronry for Great Blue Heron is found during Project activities, all work should stop and ECCC should be contacted to seek advice on sensitive timing periods and the application of appropriate buffers to reduce effects from noise and Project-related disturbance. Mitigation measures should be in place prior to activities recommencing. ○ If a Barn Swallow, nest or nesting territory is identified during Project activities, all work should stop and ECCC should be contacted for advice on measures that can be taken to reduce impacts to individuals and residences and seek advice to verify potential SARA permitting requirements. Mitigation or SARA permitting should be in place prior to activities recommencing. • Develop and implement a follow-up and monitoring program to verify predictions. The program should include collection of additional baseline information prior to site disturbance; clear mitigation objectives; details on mitigation measures; performance standards; monitoring and adaptive management plans. **References:** [ECCC, 2012] Environment and Climate Change Canada. 2012. Operational framework for use of conservation allowances. Environment and Climate Change Canada, Ottawa. [ECCC, 2018] Environment and Climate Change Canada. 2018. Recovery Strategy for the Eastern Whip-Poor-Will (*Antrostomus vociferus*) in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. vi + 107 pp.

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			○ Limited or no consideration of balance of cost (e.g. financial, time) and benefit (with respect to information content of data) for implemented sampling design ○ Limited or no evaluation of cost/benefit efficiencies across sampling design options ○ Reduced ability to identify and correct weaknesses in sampling design, and to identify appropriate data analysis methods. ○ Consequences and risks ▪ Inefficient sampling efforts by proponents, with high resource outputs producing poor quality data. ▪ Failure to identify and correct for insufficient or biased sampling. ▪ Risks associated with institutional (e.g. proponent, government) relationship frictions and the integrity of the assessment process. ▪ Risk of wasteful use of human and financial resources by proponents and/or government reviewers and decision makers. • Impaired synthesis and interpretation of data: ○ Bird data summarized in ways that limit utility and obscures information (e.g. bird species grouped, species occurrence only, no estimates of abundance) ○ Data summarized spatially in ways that limit utility and obscure information (e.g., spatial measures at very coarse scale, habitat features lumped). ○ Incorrect statistical methods used and/or violation of assumptions that are necessary for statistical results to be valid. ○ Risks and consequences ▪ Impaired ability to generate reliable estimates for, and differentiate between, the three project spatial scales (Project, Local, Regional). ▪ Inability to differentiate between project-specific (direct, indirect) and outside-project impacts to migratory birds. ▪ Impaired ability to develop, implement and evaluate mitigations. ▪ Incorrect outputs from statistical procedures, extrapolation of results, and erroneous interpretations of analysis results. ▪ Similar risks to those described for sampling deficiencies, with compounding effects if both sampling and analysis deficiencies exist.	
ECCC-46	Chapter 16, Section 16.2 Appendix B.7.4	8.7 Vegetation, riparian and wetland environments; 8.7.1 Baseline conditions 8.10 Terrestrial wildlife and wildlife habitat 8.10.1 Baseline conditions 8.11. Species at Risk and their habitat	The TISG required that the IS describe any location within the study area that might constitute sensitive areas for terrestrial wildlife including migratory birds and species at risk and that these areas be displayed on maps. It also required information and/or mapping be provided at an appropriate scale for residences, seasonal movements, movement corridors, habitat requirements, key habitat areas, identified or proposed Critical Habitat and/or recovery habitat (where applicable). In addition, it required the IS to describe baseline data collection, including a description of the biodiversity, relative abundance, and distribution of vegetation species and communities of ecological importance within the LSA and RSA of the Project. Given these requirements, ECCC notes the following concerns with the methods described in the IS and the impacts these could have on predictions: • Survey selection appears biased to occur along roads and unsuited to make inferences to off-road locations and to the study area leading to inaccurate habitat mapping or undetected habitat types. • No descriptions of biodiversity in the study areas were provided and biodiversity metrics, or biotic and abiotic indicators used to characterize baseline vegetation biodiversity was also not provided. • No detailed descriptions of the extent of anthropogenic and natural habitat disturbance provided for the study areas. The missing information listed above as well as the issues with the methodology does not allow ECCC to provide specific, informed advice on the extent of significance of adverse effects, residual adverse	ECCC recommends that the Proponent address the following: • A clear understanding of habitat that is representative of current conditions should be provided to understand habitat availability and use for migratory birds and species at risk. Update vegetation mapping prior to beginning Project activities to ensure all study areas are covered, including those that have not been surveyed due to logistical constraints. Taking into consideration newly collected information, demonstrate a clear understanding of the current conditions including habitat available within the study areas that supports migratory birds or species at risk. Apply this updated information to inform where to locate mitigation measures for migratory birds and species at risk. • If habitat mapping is not updated, and sufficient baseline information of migratory bird and SAR presence and abundance is absent, use the precautionary approach of assuming that all species whose ranges overlap with the Project site will be using those habitats that they prefer or could otherwise use.

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			effects and on the appropriateness of proposed mitigation and follow-up monitoring programs in relation to migratory birds and species at risk.	
ECCC-47	Chapter 19 Assessment of potential effects on wildlife and wildlife habitat	8.11.3 Mitigation and enhancement measures	The IS describes three measures that will be applied to avoid or minimize adverse effects of the Project on Boreal Caribou and its critical habitat: (1) Consideration of Ontario's best management practices for mineral exploration and develop in the Wildlife Management Plan for the Project, (2) Consideration of creating Boreal Caribou habitat on-site as part of the Mine Development Closure Plan, and (3) Obtain an Overall Benefit Permit under the ESA, if required. There is no additional information provided in the Wildlife Management Plan that would demonstrate that all feasible measures will be taken to avoid and minimize the adverse effects of the Project on Boreal Caribou and its critical habitat, nor is there additional information in Appendix F Conceptual Closure Plan that support the required design of offsets for effects to Boreal Caribou and habitat. There is reference to consideration of Ontario's best management practices in the development of the Wildlife Management Plan, but no other information is provided. Additionally, there is reference to the creation of Boreal Caribou habitat on site as a part of the Mine Development and Closure Plan, however no details are provided in Appendix F Conceptual Closure Plan to support this. Without this information ECCC is unable to verify the effects predictions or proposed measures to offset negative impacts on Boreal Caribou, either directly or indirectly. Effects to individuals (e.g., from vehicle collision, predation) and effects of critical habitat destruction are important impacts to caribou that require avoidance, minimization, and offsetting to balance against the adverse and residual effect. ECCC advises that the mitigation hierarchy prioritizes avoidance of disturbance over minimization of adverse impacts, followed by on-site restoration and, lastly, offsetting. Biodiversity offsetting is the last step in the mitigation hierarchy, which establishes an order of preference that promotes Project development designs with the least environmental impact. **ECCC offers the following references to support the Proponent:** Environment Canada. 2012. Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. xi + 138 pp. Environment and Climate Change Canada. 2020. Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. xiii + 143 pp. Environment and Climate Change Canada. 2024. Report on the Progress of the Recovery Strategy Implementation (Period 2017-2022) and the Action Plan Implementation (Period 2018-2023) for Caribou (Rangifer tarandus), Boreal Population, in Canada. Species at Risk Act Recovery Strategy Report Series. Environment and Climate Change Canada, Ottawa. xii + 125 pp.	ECCC recommends that the Proponent: • Provide information on measures to avoid, minimize or offset each potential adverse effect identified to Boreal Caribou and Boreal Caribou critical habitat. This information should be provided in accordance with TISG requirements, in keeping with the mitigation hierarchy requirements (which prioritize avoidance of disturbance over minimization of adverse effects, followed by on-site restoration and, lastly, offsetting), and considering Ontario's best management practices. • Provide details on how the appropriate strategies, frameworks and best management practices were incorporated into the assessment. • Provide a detailed Mitigation and Offsetting Plan for Boreal Caribou and commit to securing offset measures, and related agreements, before the construction phase begins. It is recommended that offsets and offset plans be developed in consultation with the appropriate regulatory authorities and Indigenous Nations. ECCC also provides the following resources and advises the Proponent to detail how these were considered: • *Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada* at https://species-registry.canada.ca/index-en.html - /consultations/offaA859cgc7cdD4lBlQz • *Operational Framework to Use of Conservation Allowances* at https://publications.gc.ca/collections/collection_2012/ec/En14-77-2012-eng.pdf • *Best management practices for mineral exploration and development of activities and Woodland Caribou in Ontario* at https://species-registry.canada.ca/index-en.html - /consultations/offaA859cgc7cdD4lBlQz **ECCC offers the following advice with regards to how to develop effective offsets and offset plans:** Offsets are measurable and demonstrable conservation benefits designed to balance against the residual adverse effects of a Project after the implementation of all feasible avoidance, minimization, and on-site restoration measures have been applied. The goal of biodiversity offsetting is to achieve a balance against the residual adverse effects of a Project so that No Net Loss is achieved. In the context of SAR, the amount of offset, typically in the form of habitat measures, though not always, aims to ensure that projects do not contribute to jeopardizing the survival or recovery of the species. 'Equivalency' is a key consideration in the design of a biodiversity offset. Equivalency describes the type and amount of offsetting needed to balance against the residual adverse effects. Multipliers are typically employed to manage to acceptable levels the uncertainties and risks associated with the offset. Larger ratios reflect situations that are riskier or more uncertain in their potential outcomes, or both. ECCC typically recommends a minimum offset multiplier of 4:1 (offset outcome: residual impact). This is a benchmark ratio applied to a Project that is in the lower end of the risk spectrum; for example, for a Project with a low severity impact adversely (Project adverse effect) affecting a low vulnerability ecological component (species). In general, the minimum 4:1

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				multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context.
				Offset multipliers are variable and determined by Project-specific circumstances and associated risks and uncertainties. For example, the offset multiplier has been as high as 30:1 for high-risk projects. The determination of offset outcome includes some degree of professional judgement with respect to the determination of risk to the species, in consideration of the key factors at play, including the lack of information on caribou use of the area, and the need to apply the precautionary approach in the risk assessment.
				In the absence of data required to validate appropriateness of mitigation measures and potential offsetting requirements to address Project-related effects, ECCC recommends the proponent follow a precautionary approach to ensure consistency with the amended recovery strategy.
				
				In consideration of current information provided by the Proponent and the status of the Kesagami Range and the habitat type, the level of risk to recovery of the species is suggested to be medium.
				
				Developing the Offset Plan
				• Ontario Best Management Practices: Best management practices for mineral exploration and development activities and Woodland Caribou in Ontario | ontario.ca
				• A detailed on-site Restoration Plan with spatial areas identified for site rehabilitation (including maps), timelines and methods for site rehabilitation.
				• Mitigation measures should form the framework of the Follow-Up and Monitoring Plan, with details on measurable parameters, indicators of change, targets and expected outcomes.
				• A fully developed Caribou Habitat Offsetting Plan, including each opportunity being advanced, with timelines and expected outcomes.
				
				Specific to offsetting measures, they should include the following:
				
				(1) General Description
				• Identify the location of the offset, including a map with coordinates identifying any existing disturbance.
				• Describe offset sites, including existing land uses, present conditions, and relationship to Boreal Caribou and its critical habitat.
				• Provide all timelines associated with the offsetting plan, including:
				  ○ When the adverse effects of the activity will occur.
				  ○ When the benefits of the offset measures are expected to be realized; and
				  ○ The timelines for implementation of each element of the plan.
				  ○ Identify the parties, roles and responsibilities for implementing each aspect of the offset (including the party responsible for monitoring)
				• Describe the measures to avoid or mitigate any adverse effects from the implementation of the offset itself. This includes the identification of the possible adverse effects from the offset and analysis of how proposed measures will avoid or mitigate those adverse effects, as well as the identification of the possible adverse effects on other species, habitat or ecological processes.

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				(2) Offset ownership
				• Identify who owns the offset and provide proof that the offset can be undertaken by the relevant parties.
				• Confirm that all commitments vis à vis the offset will be transferred to any new owner or operator.
				
				(3) Offset assessment
				• Describe the projected future conditions at the impact and offset sites (use conservative estimates): without the offset; and with the offset.
				• Describe the timing of the short-term and long-term benefits, in particular in relation to the timing of the adverse impacts of the activity.
				• Describe the short-term and long-term benefits of the offset, including how they:
				  ○ Compare to the anticipated residual impacts of the activity.
				  ○ Compare to the duration of the adverse impacts of the activity, and;
				  ○ Contribute to the survival and recovery of the species, including attainment of the population and distribution objectives for Boreal Caribou.
				• Explain how the benefits of the offset were determined.
				  ○ Include a description of the extent to which the type of offset has been demonstrated to be effective, particularly in similar circumstances.
				  ○ Describe all relevant uncertainties.
				• Demonstrate that the offset is additional:
				  ○ Describe how the offset will provide benefits to the species above what is already taking place or planned. This must include the description of the business-as-usual scenario.
				
				(4) Contingency measures
				• Describe and characterize the risks that the offset will not function as intended, and the potential impacts, accounting for the risks of partial and complete failure.
				• Describe the design features to prevent risks from occurring.
				• Describe the contingency measures that will be put in place if the offset does not function as intended.
				
				(5) Monitoring and reporting
				• Describe the monitoring measures that will be used to assess the effectiveness of the offset, including:
				  ○ the methodology and parameters to be used to measure the effectiveness of the offset.
				  ○ the methodology and parameters to be used to identify performance failures and to trigger contingency measures.
				  ○ timelines (expected frequency of monitoring).
				• Describe responsibilities and timelines for verification of offset implementation by a third party (can be an independent organization or a group of stakeholders).
				• Provide the timelines and method for reporting.
				
				(6) Resources and financial security
				• Cost of the offset

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				○ Provide estimates of the cost of implementing each element of the offsetting plan. ○ Identify specific resources (funding and technical expertise) needed to implement the offset (including after the activity has ended but impacts persist). **(7) Capacity to implement the offset** • Provide evidence relevant to the ownership or control of the offset site(s), such as land titles, deeds, leases, agreements and land surveys. • Describe the resources available to the applicant to implement the offset. • Provide assurances (including financial security) that the plan will be fully implemented, including any contingency actions that may be required, for the full duration of the plan.
ECCC-48	Chapter 19 Assessment of potential effects on wildlife and wildlife habitat	8.11.3 Mitigation and enhancement measures	The TISG requires that all feasible measures be taken to minimize the adverse effects of the Project on Boreal Caribou and its critical habitat, including to restore the habitat to provide availability of undisturbed habitat over time. The IS does not describe in detail measures to progressively reclaim Boreal Caribou habitat during operation, decommissioning and abandonment. A total of 6020 ha of critical habitat will be destroyed within the Kesagami range as a result of the Project. The IS indicates rehabilitation of the PA will occur as part of progressive rehabilitation, decommissioning and closure. However, the IS includes limited information on proposed progressive rehabilitation measures aimed at reducing impacts to caribou habitat, including: • How much habitat will be restored on site. • The type and timing of restoration activities. • What residual impacts will remain after restoration, if any, and how these will be offset offsite. ECCC is of the view that the level of risk to survival and recovery of the species is suggested to be medium with regards to critical habitat destruction when considering the time lag to restore habitat in the PA for a range that is already below the 65% threshold. Furthermore, the PA is within Provincial Category 3 habitat which is already highly degraded making any further destruction problematic to retain necessary biophysical attributes needed for caribou. As a result, providing additional information on restoration activities including progressive rehabilitation, timing and residual impacts is critical to the determination of how much critical habitat will be lost and returned to the landscape and will assist in understanding any residual effects and offsetting requirements.	ECCC recommends that the Proponent: • Describe and list rehabilitation measures being considered to restore or reduce impacts to caribou critical habitat including: ○ How much habitat will be restored within each of the study areas. ○ The type and timing of restoration activities. ○ What residual impacts will remain after restoration, if any, and how these will be offset offsite. ○ Describe how long it will take for restored habitat to age to preferred Boreal Caribou habitat, what residual impacts remain, and how they will be offset.
ECCC-49	Appendix B.7.3, Appendix B.7.4	8.11.1 Baseline conditions	The IS does not adequately describe adverse effects due to the destruction of caribou critical habitat and changes to connectivity during all Project phases. More information is needed on measures that will be taken to avoid, minimize, and offset impacts related to critical habitat including as a result of destruction, alteration, degradation of existing habitat and biophysical attributes; effects on connectivity and effects to predator/prey dynamics; effects to individuals such as direct mortality as a result of roadways; and effects to important habitat features, such as the Hicks Oke Bog and Lake Abitibi. Without this information, the Proponent has not demonstrated that all feasible measures will be taken to avoid and minimize the adverse effects of the Project on caribou and its critical habitat. The lack of detailed information also limits the department's ability to evaluate the measures being proposed to verify they are consistent with the Amended Recovery Strategy for Woodland Caribou, Boreal Population, in Canada. The IS indicates that 6020 ha of existing (critical) habitat will be directly destroyed. An additional 1113 ha impact is stated as indirect disturbance (taking into consideration the 500 m buffer). ECCC notes that effects to individual Boreal Caribou through avoidance would extend past the 500 m buffer as	ECCC recommends that the Proponent: • Describe the current state of habitat connectivity within the Kesagami Range including between important habitat features such as the Hicks Oke Bog and Lake Abitibi and demonstrate how it may be affected by the Project, including projections of impacts to habitat connectivity in the absence of the Project over Project timelines. • Describe and provide an explanation for the conclusion on whether the Project will remove or alter biophysical attributes necessary for Boreal Caribou • Evaluate and describe effects to habitat quality and habitat connectivity at the local, regional, and range scales using quantitative methods. • Incorporate "Zone of Influence" supported by scientific literature (e.g., as per the literature reviewed in Johnson et. al, 2015) to revise the assessment of indirect effects with consideration of biophysical attributes occurring in the study area. • Describe the most predictable change to habitat conditions (i.e. destruction of habitat), connectivity, and population levels that would occur in the

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			described by the Proponent. This means that the effects to individuals have been underestimated and are larger in geographic extent than stated by the Proponent. Given that the Kesagami range has undisturbed habitat below the 65% threshold, all existing habitat (disturbed or not) is considered critical habitat, where existing habitat is defined as the entire Boreal Caribou range area minus permanent alterations. Maintaining a long-term self-sustaining status for Boreal Caribou ranges depends on the protection of critical habitat as well as connectivity within and between ranges. Consequently, irreversible range retraction or permanent breaks in range connectivity must be avoided. Ranges that are highly disturbed will take decades to recover from habitat alteration, as Boreal Caribou occur in mature boreal forest ecosystems that have evolved over centuries. The level of risk to survival and recovery of the species is suggested to be medium with regards to critical habitat destruction when considering the time lag to restore habitat in the PA for a range that is already below the 65% threshold. The PA is within Provincial Category 3 habitat which is already highly degraded making any further destruction problematic to retain necessary biophysical attributes needed for caribou.	absence of the project over project timelines taking into account for forest management practices, forest succession, and other predictable changes that would occur in the PA/LSA in the analysis including the Dynamic Caribou Habitat Schedule for the study area (See comment ECCC-40). • Evaluate how the Project may compromise the ability of the range to be restored to the undisturbed habitat threshold and provide a rationale for the conclusions. • Provide map(s) detailing how the landscape will provide for future Boreal Caribou habitat during the decommissioning and abandonment phases, including how much of the PA will be available for Boreal Caribou use, and approximately when the restored habitat is expected to age to preferred Boreal Caribou habitat; describe how reclaimed habitat may compare to baseline conditions (See related recommendations in comments ECCC-40 and ECCC-49). • Provide additional information on any residual impacts. Discuss whether offsets are being considered to address those impacts (See comment ECCC-47 for additional recommendations related to offsetting).
ECCC-50	Chapter 19, section 19.8 Chapter 34	8.11.3 Mitigation and enhancement measures 17.1. Follow-up program framework	The TISG requires the Proponent to design and implement a follow-up program that includes but is not limited to monitoring effects on Boreal Caribou (if present or if individuals become present) and their critical habitat and monitoring the efficacy of offsetting including a robust methodology to allow for a quantitative assessment, a monitoring schedule, performance indicators, thresholds for adaptation, and contingency measures. ECCC is of the view that Table 34.2 in Section 34.2.10 does not contain the required information for Boreal Caribou including as it relates to expected outcome(s) and targets, planned studies (including a list of parameters to be measured, planned implementation timetable, etc.), performance indicators, contingency measures, and triggers and intervention mechanisms for adaptation. In addition, there is insufficient information in the IS on the follow-up program for Boreal Caribou and their critical habitat. Without knowing how the follow-up program will operate there is no assurance that mitigation measures are being implemented as intended and creates risk that effects will go undetected and opportunities to apply adaptive measures will not take place, when needed. The absence of design and implementation detail regarding how mitigation measures will be monitored carries a medium risk of impacts to caribou.	It is recommended that the Proponent develop, in consultation with Indigenous communities and relevant authorities, including ECCC, a Follow-up and Monitoring Program specific to Boreal Caribou that incorporates, but is not limited to: ○ Monitoring effects on Boreal Caribou individuals (if present or if individuals become present) and their critical habitat. ○ Robust methodology to allow for a quantitative assessment, a monitoring schedule, performance indicators, thresholds for adaptation, and contingency measures. ○ Monitoring the efficacy of offsetting.
ECCC-51	Chapter 18 Assessment of Potential effects on Birds and bird Habitat	8.9.2 Effects to birds, migratory birds and their habitat	The Proponent has not provided sufficient information on the assessment of potential effects on birds and bird habitat to meet the requirements of the TISG. The TISG included a requirement to describe the interaction between the Project and migratory birds and their habitats, for all phases of the Project, including in relation to: • The deposition of harmful substances in waters that are frequented by birds and changes to water quality. • Construction and operation of tailings facilities, wastewater ponds, or other ponds containing process liquids or substances harmful to birds. • Changes to the atmospheric, acoustic, and visual environment (e.g., noise, lighting, air emissions and dust). • Any Project activities that may occur during critical periods and/or restricted activity periods for migratory and non-migratory birds, including species at risk. It also included a need for a description of: • Measures to mitigate adverse effects to migratory and non-migratory birds and their habitat, including their eggs and nests.	It is recommended that the Proponent: • Describe the interaction between the Project and migratory birds, and their habitat, for all phases of the Project, including from: ○ Deposit of harmful substances in waters that are frequented by birds and changes to water quality. ○ Construction and operation of tailings facilities, wastewater ponds, or other ponds containing process liquids or substances harmful to birds. ○ Changes to the atmospheric, acoustic, and visual environment (e.g., noise, lighting, air emissions and dust). ○ Any Project activities that may occur during critical periods and/or restricted activity periods for migratory and non-migratory birds, including species at risk (in relation to exposure to harmful substances that may be released to air or water). • Describe and list measures to be taken to mitigate adverse effects to migratory and non-migratory birds and their habitat, including their eggs and nests (due to the release of harmful substances to air or water).

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			• Measures for preventing the deposit of substances harmful to migratory birds in areas frequented by migratory birds. • Technologies and approaches to minimize the impacts of tailings ponds on migratory birds that may come into contact with process affected waters. Chapter 18 does not include an assessment of the effects of exposure of migratory birds to harmful substances that may be released or deposited into water or the atmospheric environment, for example from air emissions, discharge of waste into water, or accidental spills (See comment ECCC-12). This information is required to formulate advice on the risk to migratory birds and the measures that can be taken to mitigate adverse federal effects, and on follow-up. The MBCA prohibits the deposition of substances that are harmful to migratory birds in waters or areas frequented by migratory birds.	• Describe and list measures to be taken to prevent the deposit of substances harmful to migratory birds in areas frequented by migratory birds. • Describe and list technologies and approaches being considered to minimize the impacts of tailings ponds on migratory birds including as a result of potential contact with contaminated waters on the Project site.
ECCC-52	Chapter 31 Assessment of potential effects of potential accidents or malfunctions	13. Effects of potential accidents or malfunctions Section 13.1 Risk Assessment	The Proponent conducted an effects assessment and risk assessment for various scenarios arising from plausible accidents and malfunctions related to the Project. The effects have been well documented, with clear pathways identified for most scenarios. However, ECCC notes that impacts to terrestrial species at risk and migratory birds were not described in relation to a potential release of untreated contact water, release of fuel or hazardous materials or stockpile slope failure. The risk assessment for each plausible accident or malfunction scenario was determined based on the likelihood and severity of consequences, along with a description of residual risk with an indication of confidence in the assessment and, as outlined in Section 31.4. Additionally, the Proponent provided a sensitivity map (Figure 31.3) at the end of Chapter 31, which can be used to identify sensitive environmental receptors in the event of an emergency. ECCC is satisfied with the scenarios evaluated by the Proponent, as they are representative of accidents and malfunctions scenarios that could occur. However, ECCC notes that one plausible scenario was not adequately addressed in Chapter 31: a rail accident resulting in the release of nickel concentrate, one of the Project's primary outputs, and that Section 13 of the TISG requires the Proponent to describe accident and malfunction scenarios relative to the location and timing of sensitive receptors such as migratory birds and terrestrial species at risk. The Project includes the construction of a rail spur that will cross several waterways, including Jocko Creek, a tributary of the Mattagami River. The rail spur will accommodate up to four roundtrip trains per 24 hours for the life of the mine, transporting various commodities, including nickel concentrate, an output produced at the mine. Nickel concentrate is known to be toxic to the environment, particularly to aquatic organisms, and may cause long-term adverse effects in aquatic ecosystems, including fish and fish habitat. Although the likelihood and frequency of accidental releases could very well be low, the magnitude of effect should one occur would be significant. This missing pathway of effect for spills of nickel concentrate, and the residual uncertainty with predictions, may greatly increase the overall extent of significance of effects on fish and fish habitat, migratory birds and their habitats, and species of importance to Indigenous Peoples and their habitats. The Proponent indicates that the rail spur will be owned and operated by Ontario Northland Railway, but the Proponent will remain the consignor of the load, maintaining responsibility for overseeing remedial measures in the event of an accident involving these materials. In Section 31.2.4, regarding the release of fuel and hazardous materials, the Proponent mentions the possibility of a train derailment that could result in the release of hazardous substances. In Section 13.1, the TISG requires that the Proponent conduct an analysis of each hazard and adverse event, including a description of the potential consequences. However, the Proponent has not provided:	It is recommended that the Proponent: • Provide additional information on potential impacts to terrestrial species at risk and migratory birds linked to all plausible accidents and malfunctions scenarios. • Complete further analysis with regards to the potential environmental effects for a rail accident or malfunction resulting in the release of nickel concentrate, including identifying the extent of the impacted area. • Provide additional information on potential mitigation measures in the event of a release into a waterbody or the environment including a description of the emergency response capabilities and plans.

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			• A characterization of the fate and behavior of nickel concentrate; • Details on the potential effects of a release of nickel concentrate into waterways supporting fish or fish habitat; and • An assessment of the broader environmental impacts of such a release including in relation to migratory birds and species at risk. The missing information is necessary to gain a comprehensive understanding of the potential effects related to accidents and malfunctions, in particular in relation to the overall extent of significance of an accidental release of nickel concentrate on fish and fish habitat, migratory birds, species at risk and their habitats, and species of importance to Indigenous Peoples and their habitats.	