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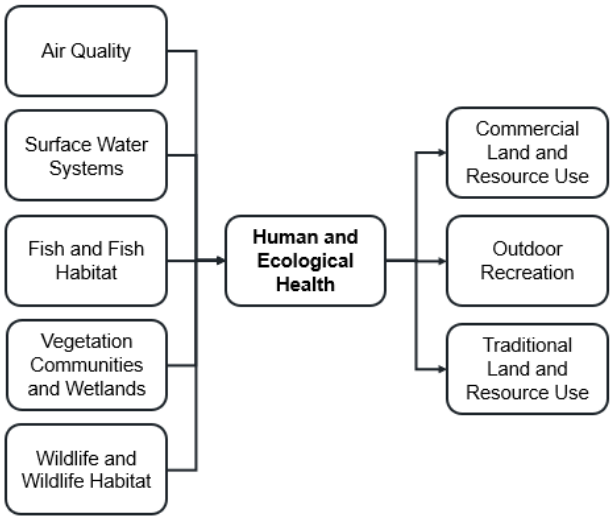
6.24 Human and Ecological Health

Human and ecological health is selected as a VC as it has inherent importance to the wellbeing of humans, food security, the natural environment and environmental and safety regulatory requirements. In the absence of mitigation, the construction and operation of the Project may increase emissions of criteria air parameters, polyaromatic hydrocarbons, volatile organic compounds and metals that could disperse to the adjacent areas which could potentially affect wildlife and human health through inhalation, and through ingestion of soil, surface water, sediment and country foods (vegetation and wild game). The assessment of the potential effect on human and ecological health from the proposed Project will compare these effects against relevant provincial and federal criteria.

In the absence of mitigation measures, the assessment of potential changes to human and ecological health is directly linked to other VCs, and is informed by the following sections:

- **Air Quality (Section 6.2):** The assessment of potential effects to air quality includes changes to air quality parameters, and the deposition of dust during construction, operation and closure of the Project, which may affect human and ecological.
- **Surface Water Systems (Sections 6.6, 6.7 and 6.8):** The assessment of potential effects on surface water systems includes changes in surface water quality due to dust deposition, runoff and the discharge of treated effluent during construction, operation and closure of the Project, which may affect the exposure risks for human and ecological receptors.



- **Fish and Fish Habitat (Section 6.10):** The assessment of potential effects on fish and fish habitat includes changes in fish health during construction, operation and closure of the Project, which may affect the exposure risks for human and ecological receptors.
- **Vegetation Communities and Wetlands (Section 6.11):** The assessment of potential effects on vegetation communities and wetland includes indirect changes to vegetation communities due to dust deposition in the immediate vicinity of the Project during construction, operation and closure of the Project, which may affect the exposure risks for human and ecological receptors.
- **Wildlife and Wildlife Habitat (Section 6.12):** The assessment of potential effects on wildlife includes indirect changes to wildlife habitat due to dust deposition during construction, operation and closure of the Project, which may affect exposure risks for human and ecological receptors.

In addition, the assessment of potential changes to human and ecological health is also directly linked to other VCs, and informs the analysis of the following sections:

- **Commercial Land and Resource Use (Section 6.17):** The assessment of potential effects on commercial land and resource use is informed by changes in ecological health during construction, operation and closure of the Project, which may affect trapping, bait harvesting and outfitter.

- **Outdoor Recreation (Section 6.18):** The assessment of potential effects on outdoor recreation is informed by changes in ecological health during construction, operation and closure of the Project, which may affect recreational fishing and hunting.
- **Traditional Land and Resource Use (Section 6.21):** The assessment of potential effects on traditional land and resource use (TLRU) is informed by changes in human and ecological health during construction, operation and closure of the Project, which may affect availability and experience associated with TLRU activities.

The assessment of the changes in human and ecological health from the Project is completed by assessing exposure to changes in environmental media due to air and water emissions from the Project (Section 6.24.1.4) in comparison to existing conditions (Section 6.24.2) in addition to regulatory guidelines applicable for each media. The human and ecological health technical support documentation is found in Appendix R and includes the Human and Ecological Health Risk Assessment (HEHRA).

6.24.1 Assessment Approach

The approach to the assessment of potential effects on human and ecological health includes a summary of the relevant regulatory and policy setting, an overview of the input obtained through consultation specific to this VC, the identification of criteria and indicators along with the associated rationale, a description of the spatial and temporal boundaries used for this VC along with a description of the attributes used to determine the significance of any residual adverse effects. The assessment of potential effects is supported by a description of the existing conditions for the VC (Section 6.24.2), the identification and description of applicable pathways of potential effects on the VC (Section 6.24.3) and a description of applicable mitigation measures for the VC (Section 6.24.4). An outline of the analytical methodology conducted for the assessment and the key assumptions and/or conservative approach is found in Section 6.24.5. With the application of mitigation measures to the potential effects on the VC, the residual effects are then characterized in Section 6.24.6.1 and the significance of the residual effects is determined in Section 6.24.7.

6.24.1.1 Regulatory and Policy Setting

The effects assessment for human and ecological health has been prepared in accordance with the requirements of the federal Environmental Impact Statement (EIS) Guidelines (Appendix B-1) and the provincial approved Amended Terms of Reference (ToR; Appendix B-3). Concordance tables, indicating where EIS Guidelines and ToR requirements have been addressed, are provided in Appendix B-2 and B-5, respectively. Government policies, objectives, standards or guidelines most relevant to the VC are summarized below.

The protection of human health from exposure to chemicals in the environment is administered by Health Canada, whereas the responsibility for ecological health is administered by several regulatory institutions including the Ministry of the Environment, Conservation and Parks (MECP) and Environment and Climate Change Canada.

The scope of the Human and Ecological Health VC satisfies the requirements under the provincial *Environmental Assessment Act* and the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), which considers the potential Project effects to human and ecological health. The assessment of the Human and Ecological Health VC relies on the HEHRA technical support document (Appendix R). The HEHRA technical support document follows guidance frameworks published by Health Canada, the MECP, and the Canadian Council of Ministers of the Environment as follows:

- Federal Contaminated Sites Risk Assessment in Canada, Guidance on Human Health Risk Preliminary Quantitative Risk Assessment, Version 3.0 (Health Canada 2021a);
- Federal Contaminated Sites Risk Assessment in Canada, Toxicological Reference Values, Version 3.0 (Health Canada 2021b);
- Federal Contaminated Sites Risk Assessment in Canada, Part V: Guidance on Complex Human Health Detailed Quantitative Risk Assessment for Chemicals (DQRACHEM) (Health Canada 2010);
- Federal Contaminated Site Risk Assessment in Canada: Supplemental Guidance on Human Health Risk Assessment for Country Foods (HHRA Foods) (Health Canada 2010b);
- A Framework for Ecological Risk Assessment – Canadian Council of Ministers of the Environment (CCME 2020);
- Procedures for the Use of Risk Assessment under Part XV.1 of the Environmental Protection Act (Ontario Ministry of the Environment [MOE] 2005; RSO 1990, c. E.19);
- Rationale for the Development of Soil and Groundwater Standards for Use at Contaminated Sites in Ontario (MOE 2011); and
- Federal Contaminated Sites Action Plan (FCSAP) (Environment Canada 2012).

In addition to the guidance documents from the Canadian Council of Ministers of the Environment, Health Canada, and Environment and Climate Change Canada mentioned above, the following Health Canada guidance for human health risk assessment in impact assessments were referenced where appropriate:

- Guidance for Evaluating Human Health Effects in Impact Assessment: Human Health Risk Assessment, December 2023 (Health Canada 2023a);
- Guidance for Evaluating Human Health Effects in Impact Assessment: Country Foods, December 2023 (Health Canada 2023b);
- Guidance for Evaluating Human Health Effects in Impact Assessment: Air Quality, December 2023 (Health Canada 2023c);
- Guidance for Evaluating Human Health Effects in Impact Assessment: Drinking and Recreational Water Quality, December 2023 (Health Canada 2023d); and
- Guidance for Evaluating Human Health Effects in Impact Assessment: Noise, December 2023 (Health Canada 2023e).

Statutes and regulations applicable to fish, vegetation and wildlife (including migratory birds and species at risk) are discussed separately in Section 6.10 (fish and fish habitat VC), Section 6.11 (vegetation communities and wetlands VC) and Section 6.12 (wildlife and wildlife habitat VC), respectively.

6.24.1.2 Influence of Consultation with Indigenous Communities, Government and the Public

Consultation has been ongoing for several years prior to and throughout the environmental assessment process, and will continue with Indigenous communities, government agencies and the public through the life of the Project. Section 2 provides more detail on the extensive consultation process. The Record of Consultation (Appendix D) includes detailed comments received during the development of the final EIS/EA.

Feedback received through consultation has been addressed through direct responses (in writing and follow up meetings) and incorporated into the final EIS/EA, as appropriate. The key comments that influenced the effects assessment for human and ecological health between the draft and final EIS/EA is provided below:

Incorporation of Traditional Knowledge and Traditional Land and Resource Use Information

Cat Lake First Nation (CLFN), Lac Seul First Nation (LSFN), Slate Falls Nation (SFN), and the Northwestern Ontario Métis Community (NWOMC) requested that Traditional Knowledge (TK) / TLRU information be presented and incorporated into the effects assessment and disaggregated by Indigenous community within relevant sections of the final EIS/EA to make it easier to identify where NWOMC information has informed the assessment beyond targeted species. Non-confidential TK/TLRU information provided by Indigenous communities during the preparation of the final EIS/EA has been included and disaggregated by Indigenous group (Section 6.21.2). For the purposes of the HEHRA, this information informs: the selection of chemicals of potential concern (COPCs); representative Points of Reception (PORs) associated with TLRU activities for use in the air quality modelling; identification of fish, vegetation and wildlife species important to Indigenous communities; identification of important traditional country foods; and informs the selection of representative country foods ingestion rates. Within supporting Attachment A of the HEHRA Modelling Report (Appendix R), the TK/TLRU information pertaining to important country foods species and country foods ingestion is disaggregated by Indigenous community in the rationale for the selection of representative country foods species and ingestion rates. A description of the TK/TLRU Traditional knowledge related to human and ecological health is provided in Section 6.24.2.1.

NWOMC also requested that clarification be added within Section 6.24 as to how the assessment of country foods was completed (i.e., were only certain organs tested). The baseline concentrations of COPCs in plants, fish and wild game are included in the assessment of ecological and human health. Attachment A of the HEHRA (Appendix R), includes baseline sampling methodology and analytical results for plants and small mammals. With respect to the methodology for the small mammals sampling in particular, a total of 20 small mammals were trapped and submitted to the laboratory for chemical analyses. Fifteen of the small mammal samples were submitted for whole body analyses, while five of the samples had their kidney dissected and submitted for analysis separate from the rest of the body. A summary of baseline concentrations of COPCs considered in the HEHRA and incorporated into the HEHRA model (including air, soil, sediment, water and country foods including plants, small mammals and fish) is also included in Attachment A of Appendix R. Where data was not available, a conservative approach was taken and concentrations of selected inorganic COPCs were modelled into plants and soil organisms, mammals and birds, and aquatic receptors using published uptake factors, for use in the country foods component of the human health risk assessment, and for use in the ecological risk assessment. Where possible for context, modelled concentrations in mammals and birds were compared against country foods concentrations reported from the Ecozone 1 region in the First Nations Food, Nutrition and Environment Study, Results from Ontario (Chan et al, 2014). The baseline and predicted exposure point concentrations for COPCs (arsenic, cobalt, mercury and methyl mercury) in each media are summarized in Tables B-1-1 to B-1-4 in Attachment B of Appendix R.

General – Baseline Conditions and Effects Assessment

The Impact Assessment Agency of Canada (IAAC) requested that additional information be collected on Indigenous and non-Indigenous land and resource use (including baseline conditions related to commercial activities and recreational uses by Indigenous and non-Indigenous populations) to inform the effects assessment. IAAC also requested that the biophysical effects assessment be sufficiently scoped to enable

assessment of pathways of effects from the Project to Indigenous and non-Indigenous receptors. Additional Indigenous TK/TLRU studies have been received (Section 6.21.2) and non-confidential information from these studies informs the HEHRA (Appendix R), and the overall assessment of effects on Indigenous populations (Section 6.26). Additional non-Indigenous land and resource use information has been collected (Section 6.17.2) and informs the HEHRA (Appendix R) and the overall assessment of effects on commercial land and resources users (Section 6.17) and outdoor recreational users (Section 6.18).

IAAC requested justification for the lack of site-specific baseline data, rationale to validate the data used to characterize baseline levels of contaminants in larger and small mammals, and how these assumptions may contribute to uncertainty. Since the time that the HEHRA was completed and the draft EIS/EA was submitted for comment, baseline small mammal sampling has been completed, with co-located soil sampling. These additional baseline sampling data were used as a surrogate for baseline concentrations in small wild game (hare). Baseline and predicted concentrations in large wild game are predicted using the total dose and body burden for baseline, project and post closure concentrations from applicable exposure media (e.g. soil, surface water, plants, etc.). The baseline and predicted exposure point concentrations for each media are summarized in Table B-1 through B-1-4 in Attachment B (Appendix R) and uncertainties are summarized in Table 4.5-1 in Section 4.5 for the human health risk assessment and in Section 5.6.5 for the ecological risk assessment (Appendix R).

CLFN and LSFN requested that the HEHRA reevaluate the potential risk to Indigenous consumers of country foods and fish, recognizing that the Health Canada definition of "high consumer" may not be indicative of existing or desired consumption rates of Indigenous harvester. For the purposes of the HEHRA, preferred country foods and ingestion rates by members of Indigenous communities in the region were selected based on a comparative analysis from several sources including TK/TLRU studies and land use plans available at the time of writing (PFN 2006; CLFN SFN 2011; ArrowBlade 2014; Know History 2021, Firelight Research Inc., 2024a; Firelight Research Inc., 2024b; Slate Falls, 2024) and other regional studies including the First Nations Food, Nutrition and Environment Studies (FNFNES): for Ontario (Chan et al, 2014 and 2019). Based on the comparative analyses, adult "heavy consumer" and "average consumer" consumption rates selected for the purposes of the HEHRA are the consumption rates included in Chan et al 2014, reported by Indigenous communities in the Boreal Sheild Ecozone 1 region, which align with information provided in the TK/TLRU studies for the Project. The rationale for selection of country foods species and ingestion rates considered in the HEHRA is summarized in Section 4.3.2.1 of Appendix R.

Assessment Methodology

NWOMC requested that the change in ecological health within the project development area (PDA) and regional study area (RSA) also be included this assessment. The HEHRA (Appendix R) assesses risks from the Project outside the PDA. Assessing ecological health changes within the local study area (LSA) adjacent to the PDA is considered a worst-case assessment of potential Project effects on ecological health. The LSA encompasses the area adjacent to the mine site area of the PDA to capture the maximum predicted ground-level concentrations due to the Project and where air quality can be predicted or measured with a reasonable degree of accuracy. For the human and ecological risk assessment, the LSA is defined as an area that extends approximately 10 kilometres from the main Project emission sources (Section 6.24.1.3 and Appendix R, Section 3.1.1). During the active phases of the Project (i.e., construction, operations, and decommissioning and closure) access to the mine site area of the PDA will be controlled and not a high use area for wildlife

and land users. As such, the potential ecological health effects on mammals and birds as a result of the Project are expected to be much lower than predicted in the ecological risk assessment (Appendix R, Section 5.6.2).

NWOMC requested clarification for the country foods (e.g., wildlife species or plants) that were assessed. Plants (blueberries and raspberries), fish (Lake Whitefish and Walleye) and wild game (moose, deer, hare and grouse) were the country goods selected for consideration in the human health risk assessment (HHRA). The rationale for selection of country foods species considered is summarized in Section 4.3.2.1 of Appendix R, based on TK/TLRU information pertaining to important country foods species, and is disaggregated by Indigenous community.

IAAC requested clarification of whether cancer risks from inhalation of airborne benzo(a)pyrene were calculated using a toxicological reference value (TRV) developed for the inhalation exposure pathway. In the HEHRA for the final EIS/EA (Appendix R), the recommended Inhalation Unit Risk factor from Health Canada (as presented in Table 4.2-3, Appendix R) is used in the calculation of cancer risks for benzo(a)pyrene for the inhalation exposure pathway. The fugitive dust inhalation dose is calculated using the Health Canada recommended equation, as presented in Section 4.3.3.1 of Appendix R. Cancer risk calculation results from inhalation of airborne benzo(a)pyrene are presented in Table 4.4.3.1-1 in Section 4.4.3 of Appendix R.

IAAC requested an assessment of health effects from both short- and long-term exposures to nitrogen dioxide and for particulate matter less than 2.5 microns in the worst-case exposure scenario during all phases of the Project. An assessment of health effects from short- and long-term exposure to particulate matter less than 2.5 microns and nitrogen dioxide at the maximum point of impingement (MPOI) are included in Section 4.4.2.2 of Appendix R. Hazard quotients were below their respective guidelines at the MPOI and at the receptor location with maximum concentrations.

IAAC requested a quantitative assessment of the carcinogenic risk of diesel exhaust associated with the Project, making use of the associated unit risk value published by the California Environmental Protection Agency (CalEPA) accompanied by a discussion of the uncertainties associated with the CalEPA unit risk. A quantitative assessment of the carcinogenic risk from inhalation of diesel exhaust associated with the Project is included in Appendix R, using the unit risk value published by the CalEPA (as presented in Table 4.2-3). Uncertainties are summarized in Table 4.5-1 in Section 4.5 for the human health risk assessment (Appendix R). The quantitative assessment utilizes the predicted diesel particulate matter (DPM) concentrations, using particulate matter less than 2.5 microns as a surrogate for DPM. Cancer risk calculation results from inhalation of airborne DPM are presented in Table 4.4.3.1-2 and 4.4.3.1-3 in Section 4.4.3.1 of Appendix R. The results of the assessment of potential cancer risk via the exposure to predicted incremental DPM concentrations due to the Project, indicated that the inhalation incremental lifetime cancer risk is within the target of 1 × 10-5 for all receptor locations.

IAAC requested further rationale on why potential exposure via ingestion of contaminated surface or groundwater and incidental ingestion of or dermal contact with contaminated sediment are not operable pathways. In the HEHRA for the final EIS/EA (Appendix R), ingestion of and dermal contact with surface water and sediment have been included as operable pathways. Although no COPCs were identified to exceed applicable human health guidelines in surface water or sediment, exposures have been included in the multi-media assessment for COPCs identified in other media. There are no known potable groundwater wells in the RSA and the majority of the TKLU studies reported consumption of surface water for drinking water. One groundwater spring location within the PDA was identified by Cat Lake First Nation, however the PDA is outside the boundaries of the LSA and RSA for human and ecological health and is not evaluated

in the HEHRA since access to the mine site area of the PDA will be controlled and not a high use area for land users. One groundwater spring location within the LSA was identified by LSFN as being located near the effluent discharge location. This is outside the influence of groundwater impacts and therefore the predicted COPC concentrations in surface water are considered more conservative for evaluation of risks from drinking water. Therefore, ingestion of groundwater was excluded from the risk assessment. Since all potential media exposure pathways (soil, surface water, sediment and country foods) have been included in the HHRA, multi-media total hazard quotients, presented in Tables B-3-1 through B-3-8 in Attachment B of Appendix R, are compared to a target total hazard quotient of 1.

Mitigation Measures

NWOMC requested that the mitigation in the final EIS/EA include measures to address potential effects on soil, overburden and vegetation. The mitigation measures identified for the potential effects on air quality (Section 6.24.4) and surface water quality (Section 6.6.4, 6.7.4 and 6.8.4) will act to mitigate potential effects from dust deposition and runoff to soil, overburden and vegetation. These specific measures, in addition to other mitigation measures for potential effects on country foods, are summarized in Section 6.24.4, below. By implementing the mitigation measures for air quality and surface water quality, the potential effects on soil, overburden and vegetation will be mitigated by minimizing emissions, dust deposition and runoff to soil, overburden and vegetation which will in turn help to mitigate potential effects on fish and fish habitat and wildlife and wildlife habitat and country foods.

6.24.1.3 Spatial and Temporal Boundaries

The PDA is defined as the footprint of the Project including the mine site area, mine site access road and the transmission line corridor, as well as a buffer in order to allow for flexibility for design optimizations. The buffer includes approximately 250 metres (m) around the mine site area. The buffer for the transmission line is included within the 40 m wide corridor and within the 30 m wide corridor for the mine access road. Where the mine access road and transmission line are aligned together, the buffer is included within a 60 m wide corridor.

The spatial boundaries considered for the assessment of human and ecological health are shown in Figure 6.24-1 and defined as follows:

- **Local Study Area:** The LSA is a combination of both the air quality and surface water system LSAs. The LSA for human and ecological health encompasses the area adjacent to the PDA to capture the maximum predicted ground-level concentrations due to the Project and where air quality can be predicted or measured with a reasonable degree of accuracy. For human and ecological health, the LSA is defined as an area that extends approximately 10 kilometres from the Project emission sources and includes the sub-watershed boundaries of Birch Lake and Springpole Lake, and extends both upstream and beyond the potential downstream influence of mine operations.
- **Regional Study Area:** The RSA for human and ecological health is a combination of both the air quality and surface water system RSAs and is defined as an area that extends approximately 20 kilometres from the main Project emissions sources.

The temporal boundaries used in the assessment of human and ecological health were selected to be consistent with those used in evaluating the effects of the Project, namely:

- Construction Phase: Years -3 to -1, representing the construction period for the Project;

- Operations Phase: Years 1 to 10, with the first year potentially representing a partial year as the Project transitions from construction into operations. Mining of the ore from the open pit will end in Year 10, at which time the pit will begin refilling with water; and
- Decommissioning and Closure Phase:
  - Active Closure: Years 11 to 15, when final decommissioning and the majority of active reclamation activities are carried out; and
  - Post-closure: Years 16+, corresponding to the post-closure monitoring period when the filled open pit basin will be reconnected to Springpole Lake.

Effects on the human and ecological health VC are assessed for each Project phase (i.e., construction, operations and closure).

6.24.1.4 Criteria and Indicators

In undertaking the assessment of human and ecological health, the following criteria were used:

- Change in human health; and
- Change in ecological health.

The specific criteria, measurable indicators and the rationale for the selection of criteria are described in Table 6.24-1.

6.24.1.5 Description of Residual Effect Attributes

The residual effects for human and ecological health are characterized in terms of the following:

- Magnitude;
- Geographic extent;
- Duration;
- Frequency;
- Reversibility; and
- Timing.

These attributes along with the rankings are further described in Table 6.24-2.

In addition, the residual effects for human and ecological health are characterized according to the ecological and/or social context within which the VC is found. This is a qualitative measure of the sensitivity and/or resilience of the VC to potential change. The following ranking is applicable:

- Level I: The VC may or may not be sensitive but is capable of supporting the predicted change with typical mitigation measures.
- Level II: The VC is sensitive and requires special measures to support the predicted change.
- Level III: The VC is sensitive and unable to support the predicted change even with special measures.

As noted in Section 6.1, a residual effect is defined as significant if both of the following criteria are satisfied:

- A Level II or III rating is attained for all of the attributes involving magnitude, extent, duration, frequency and reversibility; and

- A Level II or III rating is attained for ecological and/or social context.

Conversely, if a Level I rating is achieved for any of the attributes involving magnitude, extent, duration, frequency or reversibility; or, if a Level I rating is achieved for the ecological and/or social context, then the residual effect is considered to be not significant.

In the event there is a significant adverse effect, the likelihood of occurrence is further described.

6.24.2 Existing Conditions

A description of the baseline conditions is presented below to characterize the existing conditions related to human and ecological health and is based on several years of study that has resulted in comprehensive information for this stage of project planning. The existing conditions are used to support the assessment of potential effects from the Project on human and ecological health and will support long-term monitoring for the Project.

In the context of the human and ecological health, the Baseline Assessment Scenario of the HEHRA (Appendix R) considers potential risk to human and ecological health associated with present, pre-Project existing conditions, including ambient environmental conditions and existing sources of potential risk including chemical concentrations in air, soil, water, sediment and country foods.

The Baseline Assessment Scenario is assessed by evaluating the potential risk associated with existing chemical concentrations in exposure media (e.g., air, soil, water, sediment, country foods), obtained from the results of monitoring completed. The use of existing measured data is supplemented by modelled predictions where data are not available (e.g., baseline chemical concentrations in some country foods and ecological receptors).

Baseline concentrations in environmental media including air, soil, surface water, sediment, fish and select country foods (plants) were measured for use in the HEHRA. Baseline conditions in various media are discussed in the corresponding baseline reports included in the appendices of the EIS/EA, (including Baseline Air Quality in Appendix G-1, Baseline Surface Water Quality in Appendix N-1, and Baseline Aquatic Resources in Appendix O). Attachment A of the HEHRA (Appendix R), includes baseline sampling and analytical results for soil and select plants and small mammals. A summary of baseline concentrations considered in the HEHRA and incorporated into the HEHRA model is also included in Attachment A of Appendix R.

6.24.2.1 Traditional Knowledge

As part of the Project, all eight Indigenous communities were contacted to participate in the EA process, and to provide TK/TLRU information. To date, six Indigenous communities, CLFN, LSFN, Mishkeegogamang Ojibway Nation, SFN, Wabauskang First Nation and NWOMC, have provided TK/TLRU information. Specific TK/TLRU information relevant to bats was not identified.

CLFN noted that access to clean drinking water from natural sources on the land is integral to and inseparable from spending time on the land in preferred ways for CLFN members. Members reported collecting drinking water from different lakes, including, but not limited to, Birch Lake, Springpole Lake, Keesic Lake, Gull Lake, Swayne Lake and Zionz Lake. Water is collected from lakes year-round, including during the winters when CLFN members will drill through ice to collect fresh water. Further, it was noted that collecting drinking water from sources north of the Project (e.g., the Keigat area, northeast of the regional study area) would be essential for potability. They reported that their traditional lands intersect with portions of the LSA and RSA and they access these areas for TLRU activities such as food harvesting

(fish such as trout, northern pike and lake whitefish; wild game such as Moose, Caribou, beaver, goose, duck and partridge; and vegetation such as bear root, rat root, blueberries and mint), ceremonies, and holistic health of the community.

LSFN noted the importance of water quality and quantity cannot be understated. It was noted that the waters of northern lakes closer to the Project were important and highly valued as places where water was cleaner due to greater distance from the industries and lake uses that might impact lakes closer to the community. Members emphasized the importance of the English River water system in the territory for the ability to collect drinking water safely, and for supporting healthy fish habitats. The lakes and rivers north of Lac Seul were referenced by many participants as being farther away from the roads, industries and settlements and water-level changes which were considered to impact water quality. LSFN also reported that their traditional lands intersect with portions of the LSA and RSA and they access these areas for TLRU activities such as food harvesting (fish such as walleye, lake whitefish and lake trout; wild game such as moose, deer, muskrat and duck; and vegetation such as wild rice, cedar and rat root), ceremonies, and holistic health of the community.

SFN noted that healthy water means that the water in the Cat River System is free of contaminants, and that the water from the land can be consumed by members without concern for wellbeing. The rivers and lake systems are noted as being used as travel routes by SFN members. SFN noted their involvement in water quality and quantity monitoring and requested that visitors operating in SFN traditional territory must share the results of water monitoring with SFN. SFN also reported that their traditional lands intersect with portions of the LSA and RSA and they access these areas for TLRU activities such as food harvesting (fish such as walleye, lake whitefish and suckers; wild game such as Moose, Caribou, rabbit, duck, geese and partridge; and vegetation such as blueberries, strawberries, blackberries and saskatoon berries), ceremonies, and holistic health of the community.

Mishkeegogamang Ojibway Nation reported that their members' land use and occupancy area, which overlaps with portions of the LSA and RSA, is holistic and encompasses food harvesting and medicine gathering (fish, Moose, wild rice, Caribou, deer, berries, geese), cultural and sacred ceremonies, family camps, language and traditional knowledge, and other recreational activities that together sustain the Anishinaabe identity and way of life. They noted the importance of water in supporting fish and wildlife species that are traditionally harvested and providing access to the areas where Traditional harvesting occurs.

NWOMC indicated that their whole land use and occupancy area, which intersects with portions of the LSA and RSA, is significant for food harvesting (fish such as walleye, northern pike and lake trout; wild game such as Moose, deer, Caribou, partridge, grouse and duck; and vegetation such as blueberries, raspberries, wild rice and cherries), ceremonies, and holistic health of the community and noted the importance of water in supporting fish and wildlife species that are traditionally harvested and providing access to the areas where traditional harvesting occurs.

TK/TLRU information provided by the potentially affected Indigenous communities to date has been considered in the identification of PORs related to TLRU activities, identification of valued ecological components and important country foods, in the design of the country foods sampling program, as well as in the estimation of receptor characteristics related to the consumption rates of country foods from the area for use in the HEHRA.

6.24.3 Identification of Pathways to Potential Effects

The interactions between the Project and other VCs such as air quality, surface water quality, fish and fish habitat, vegetation and wildlife may result in pathways to potential effects on human and ecological health. These potential effects may be direct, indirect and/or positive effects, where applicable. Table 6.24-3 includes all potential interactions of the Project with human and ecological health, prior to the application of the mitigation measures. The professional judgement of technical experts with experience in mine projects in Ontario as well as input from Indigenous communities, government agencies and the public informed the identification of those interactions that are likely to result in a pathway to a potential effect due to a measurable change on human and ecological health. Those interactions with the potential to cause adverse residual effects, including direct and indirect effects, as well as positive effects where applicable, are further evaluated and assessed in the HEHRA (Appendix R).

The predicted increases in COPC concentrations between the Baseline Assessment Scenario and the Project and Post Closure Assessment Scenarios were negligible for air, soil, sediment and terrestrial country foods and marginal for surface water and aquatic country foods. Predicted increases in COPC concentrations in surface water did not result in exceedance of applicable human health or aquatic life guidelines.

6.24.3.1 Construction Phase

The construction phase of the Project is expected to occur over a three-year period and will include preparation of the site and the construction of mine infrastructure. The following interactions with the Project result in pathways to potential effects on human and ecological health as described below. After mitigation is applied to each pathway, as described in Table 6.24-4, the residual effects are assessed using the criteria identified for each pathway.

- Site preparation activities including clearing, grubbing and bulk earthworks interact with human and ecological health. These activities result in pathways to potential effects due to emissions from the operation of equipment and ground disturbances that could lead to increased sedimentation. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from these pathways.
- Construction of the mine site access road and airstrip, including the development and operation of aggregate resource areas, development of the temporary construction camp and staging areas, construction of the onsite haul and access roads, construction of buildings and onsite infrastructure, and the construction of dikes in north basin of Springpole Lake interact with human and ecological health. These activities result in pathways to potential effects due to emissions from the operation of equipment and ground disturbances that could lead to increased sedimentation. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from these pathways.
- The stripping of lake bed sediment and overburden at the open pit, development of the surficial soil stockpile and the initiation of stockpiling of ore interact with human and ecological health. These activities result in pathways to potential effects due to emissions from the operation of equipment. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from these pathways.
- The commissioning of the process plant interacts with human and ecological health. This activity results in a pathway to potential effects due to emissions from the operation of the facility. The

assessment of potential effects on human and ecological health includes changes in human health and ecological health from this pathway.

- The construction of the fish habitat development area, construction of the central water storage pond, construction of the starter embankments for the CDF, and initiation of pit development in rock, initiation interact with human and ecological health. These activities result in pathways to potential effects due to emissions from the operation of equipment and blasting, and ground disturbances that could lead to increased sedimentation. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from these pathways.
- The establishment and operation of water management and treatment facilities interacts with human and ecological health. This activity results in a pathway to potential effects due to the discharge of treated effluent. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from this pathway.
- The construction of the transmission line to the Project site results in a pathway to potential effects on human and ecological health due to emissions from the operation of equipment. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from these pathways.
- The controlled dewatering of the open pit basin interacts with human and ecological health. This activity results in pathways to potential effects due to emissions from the operation of equipment and sedimentation from the discharge of water to the north basin of Springpole Lake. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from these pathways.

There is no plausible interaction between the employment and expenditures activities and human and ecological health during any Project phase

6.24.3.2 Operation Phase

The operation phase is anticipated to occur over a 10-year period. The following interactions with the Project result in pathways to potential effects on human and ecological health as described below. After mitigation is applied to each pathway, as described in Table 6.24-4, the residual effects are assessed using the criteria identified for each pathway:

- The operation of the process plant interacts with human and ecological health. This activity results in a pathway to potential effects due to emissions from the operation of the facility. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from this pathway.
- The operation of the open pit mine interacts with human and ecological health. This activity results in pathways to potential effects due to emissions from the operation of equipment and blasting. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from these pathways.
- The management of overburden, mine rock, tailings and ore in designated facilities interacts with human and ecological health. This activity results in a pathway to potential effects due to emissions from the operation of equipment. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from this pathway.

- The operation of water management and treatment facilities interacts with human and ecological health. This activity results in a pathway to potential effects due to the discharge of treated effluent. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from this pathway.
- Operation and maintenance of mine site infrastructure interacts with human and ecological health. This activity results in a pathway to potential effects due to emissions from the operation of equipment. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from this pathway.
- Progressive reclamation activities interact with human and ecological health. These activities result in pathways to potential effects due to emissions from the operation of equipment and ground disturbances that could lead to increased sedimentation. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from these pathways.

The operation of the accommodations complex is not anticipated to interact with human and ecological health.

6.24.3.3 Decommissioning and Closure Phase

Activities during the active closure phase, which is expected to occur over a five-year period, are similar to those during the construction phase and use similar mining and construction equipment but on a much smaller scale. The following interaction with the Project results in pathways to potential effects on human and ecological health as described below. After mitigation is applied to each pathway, as described in Table 6.24-4, the residual effects are assessed using the criteria identified for each pathway:

- The reclamation of impacted portions of the PDA, such as by regrading, placement of cover and revegetation, as applicable, results in pathways to potential effects on human and ecological health. These activities result in pathways to potential effects due to emissions from the operation of equipment and ground disturbances that could lead to erosion and sedimentation. The assessment of potential effects on human and ecological health includes changes in human health and ecological health from these pathways.

During decommissioning and closure, the removal of assets, demolition of remaining materials, disposal of demolition-related wastes, filling the open pit with water, and monitoring are not expected to have an interaction with human and ecological health.

6.24.4 Mitigation Measures

Measures to be implemented to avoid or minimize the effects of the Project on human and ecological health include:

- Implement the mitigation measures for potential effects on air quality (Section 6.2.4), including the following specific to dust:
    - During construction, operations and active closure, a dust management plan will be implemented to identify potential sources of fugitive dusts, outline mitigation measures that will be employed to control dust generation and detail the inspection and record keeping required to demonstrate that fugitive dusts are being effectively managed.
    - Vehicle speeds will be limited.

- During construction, operations and active closure, dust emissions from roads and mineral stockpiles will be controlled through the application of water spray and supplemented by dust suppressants if required.
- During operations, the process plant emission sources will be designed to allow good atmospheric dispersion. Dust control measures such as enclosures and shrouds, along with dust control equipment such as dust collectors, baghouse and water sprays will be used together with best practices, where necessary, to reduce emissions.
- During active closure, exposed dust sources will be revegetated, and progressive reclamation will be conducted wherever appropriate to better control dust emissions from the mineral waste stockpiles and CDF.
- Routine maintenance of all pollution control equipment, diesel-fired engines (vehicle, equipment and standby power generation)

- Implement the mitigation measures for potential effects on surface water (Section 6.6.4, Section 6.7.4 and Section 6.8.4), including the following specific to water quality:
  - During construction, operation and active closure, an integrated water management system will be designed to collect and control all contact water from the stockpiles, CDF and plant site areas;
  - During construction, operation and active closure phases, water collection ditches will be constructed and operated around the perimeter of infrastructure, including the CDF and stockpiles to collect overland flow and seepage and direct it to the integrated water management system. Non-contact water will be diverted away from Project components using ditches, diversion berms and other suitable measures;
  - During operations and active closure, effluent will be discharged at a location where sufficient flow exists to reduce the potential for erosion and promote assimilation at the discharge location. A diffuser or other means could be used to encourage greater mixing and attenuation of the effluent plume at the discharge location, if required. Consistent with MECP Policy B-1-5, the mixing zone size will be minimized to the extent practical;
  - The effluent treatment plant (ETP) will be designed and operated to produce an effluent quality appropriate for discharge to the environment in accordance with applicable regulatory requirements, including the Metal and Diamond Mining Effluent Regulations (MDMER; SOR/2002-222). Best available technologies that are economical achievable will be considered for the ETP to meet protection requirements. The ETP will be refined with ongoing Project planning and engineering design, and as discharge criteria are finalized during the approvals process.; and
  - During construction, operation and active closure, an erosion and sediment control plan will be implemented to manage runoff water in disturbed areas.
- Implement mitigation measures for potential effects on country foods, including the following:
  - Mechanical vegetation removal practices will be used, when possible; and
  - Discouraging wildlife from inhabiting contact water ponds (including the CDF and CWSP ponds).

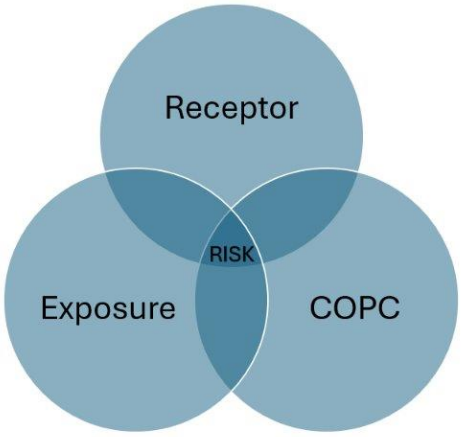
By implementing the mitigation measures for air quality and surface water quality, the potential effects on soil, overburden and vegetation will be mitigated by minimizing emissions, dust deposition and runoff to soil, overburden and vegetation which will in turn help to mitigate potential effects on fish and fish habitat and wildlife and wildlife habitat and country foods.

The application of mitigation measures to specific pathways and phases is illustrated in Table 6.24-4. Mitigation measures described in this section are expected to be effective for their intended purposes given their effective implementation at similar projects.

Monitoring programs will be implemented to verify the accuracy of the predicted effects, assess the effectiveness of the implemented mitigation measures and may be further optimized in response to monitoring data. Extensive monitoring programs are in place for the Project with previous data collection completed. Monitoring for the Project going forward is further described in Section 12 and will be further refined during the permitting phase to incorporate conditions of approvals and permits. Consultation on the monitoring programs is expected to continue through all phases of the Project.

6.24.5 Analytical Methodology

A human and ecological health risk assessment is a process used to assess the potential risks to human and ecological receptors resulting from one or more environmental stressors. Where a COPC, route of exposure, and a receptor are all present in an environmental scenario, the potential for health risks also exists as shown below.



The risk assessment takes into account the COPC to be evaluated, its toxicity and the manner in which receptors may be exposed. As risk assessments are considered forward looking, they predict what could happen under a certain set of circumstances. They are based on conservative assumptions concerning how much of a COPC might be present and how ecological and human receptors may be exposed to that COPC.

Risk assessments typically employ conservative assumptions that result in estimates of exposure that overestimate the potential for human health and ecological risks. These are often referred to as worst case exposure conditions. In addition, conservative assumptions are incorporated into the air quality and surface water quality models used to predict future concentrations for input into the risk assessment models, resulting in additional levels of conservatism. Actual conditions are not expected to reflect these worst-case assumptions, because the assumptions used in the assessment overestimate the extent of exposure and risk. Worst case exposure assumptions are used to focus on those COPC and exposure conditions that may represent a risk and screen out those that do not. If potential risks are within acceptable limits using worst case assumptions, then it can be concluded that risks will also be within acceptable limits. In contrast, if the potential for unacceptable risks is identified using worst case assumptions, then it is important to examine the assumptions used in the assessment to better understand the sources of those risks and whether additional assessment, mitigative measures and/or monitoring are warranted under the circumstances.

The objective of the HHRA is to assess potential human health risks associated with the identified COPCs in the study areas, for all assessment scenarios, and associated with each Project phase. Potential health risks to human receptors were determined by completing a qualitative or quantitative assessment using site-specific conditions, where available, and generic assumptions provided by Health Canada or the MECP. The HHRA is conducted according to industry accepted risk assessment practices and methodologies and follows guidance published and endorsed by government agencies.

An Ecological Risk Assessment (ERA) process follows a recognized framework (FCSAP 2012, CCME 2020) which starts with screening (i.e., identification of contaminants and receptors) and progresses from a qualitative assessment of valid exposure pathways (i.e., problem formulation), through exposure and toxicity (effects) analysis and culminates in a qualitative and quantitative risk characterization using a weight of evidence approach.

The weight of evidence approach to ERA has been developed as an effective means to evaluate multiple receptor groups via multiple exposure pathways using various lines of evidence. Weight of evidence is defined as any process used to aggregate information from different lines of scientific evidence to render a conclusion regarding the probability and magnitude of harm (FCSAP 2012, CCME 2020). Weight of evidence assessments typically combine both qualitative (e.g., best professional judgment, habitat assessment) and quantitative methods (i.e., hazard quotients) to develop conclusions which integrate all the data collected during the assessment.

6.24.5.1 Assessment Scenarios

In the framework for the HEHRA, potential risks are discussed in the context of the assessment scenarios, which include:

- Baseline Assessment Scenario;
- Project Alone Assessment Scenario
- Project Assessment Scenario (Project Alone + Baseline); and
- Post-Closure Assessment Scenario.

The Baseline Assessment Scenario represents the levels of COPC exposure that would be experienced in the vicinity of the Project should the Project not proceed.

The Project Assessment Scenario represents the levels of COPC exposure that would be experienced in the vicinity of the Project should the Project proceed. This Assessment Scenario evaluates the contributions of the Project in addition to baseline conditions for all phases of the Project defined above.

The Post-Closure Assessment Scenario represents the levels of COPC exposure that would be experienced once all activities have ceased, and site reclamation has been achieved.

The Project Alone Assessment Scenario represents the levels of increased COPC exposure that would be experienced in the vicinity of the Project should the Project proceed. This Assessment Scenario evaluates the contributions of the Project without baseline conditions for all phases of the Project defined above. This scenario is particularly relevant to assessing incremental risk from the Project.

6.24.5.2 Assumptions and the Use of the Conservative Approach

Conservative approaches are defined as those that provide estimates that will tend to be higher than expected, as a means to help ensure that potential effects from the Project will not be underestimated. Overall, the human and ecological health risk estimates represent an overestimate of potential risk.

The level of conservatism associated with the country foods assessment in particular is relatively high due to the modelling of chemical concentrations into country foods based on modelled environmental predictions and the use of published uptake factors to estimate concentrations in some country food items including fish, plants, mammals and birds. In addition, the HHRA non-carcinogenic risk estimates are based on highly conservative exposure assumptions, including that receptors obtain 100% of their country foods from within the LSA and obtain all of their drinking water from Birch Lake or Springpole Lake near a cabin area or TLRU location within the LSA. Overall, the risk estimates represent an overestimate of potential risk.

The assumptions, conservative approaches and uncertainties associated with each step of the risk assessment are summarized in Table 6.24-5 for the HHRA and Table 6.24-6 for the ERA and are discussed in the HEHRA (Appendix R).

6.24.6 Characterization of Potential Residual Effects

6.24.6.1 Changes in Human Health

Based on screening of baseline conditions in soil against applicable human health-based guidelines, arsenic and cobalt were carried forward for additional consideration in the HHRA. Screening of predicted concentrations in soil due to the Project did not result in any additional COPC being carried forward to the HHRA. Polyaromatic hydrocarbons and diesel particulate matter associated with air emissions from the Project were also carried forward for further consideration. Due to the potential for bioaccumulation in aquatic country foods, mercury and methyl mercury were also carried forward for further assessment in the HHRA.

The human receptors considered for the assessment of potential adverse effects on human health in the HHRA were assumed to be Residents of nearby Indigenous or non-Indigenous communities who spend part of their time at cabins and/or who conduct TLRU activities within the LSA and RSA near the PDA. PORs used to predict air concentrations and deposition rates in the Air Quality Assessment (Appendix G-2) were used to represent cabins and TLRU areas where receptors may spend time in the LSA/RSA (Figure 6.24-2). To help ensure the worst-case potential human exposure was evaluated, the most sensitive human receptors were assumed to be Indigenous community residents who spend a portion of their time at PORs near the PDA and are either average or heavy consumers of a variety of country foods (which they are assumed to hunt or harvest year-round, predominantly from the LSA). Therefore, the following receptor exposure scenarios were assessed in the HHRA:

1. Indigenous resident/ cabin receptor – This receptor is assumed to spend 60% of their time in their community (represented by POR 16 in the LSA) and 40% of their time at one of the cabins located closest to the PDA (POR01 and POR07 within the LSA and POR22, POR24 and POR38 within the RSA but outside the LSA), conducting TLRU activities and consuming country foods harvested from the same areas. For this receptor exposure scenario, HHRA calculations were completed to assess exposure considering both average and heavy country foods consumption rates reported by Indigenous communities in the area.
2. Indigenous resident / TLRU receptor - This receptor is assumed to spend 80% of their time in their community and 20% of their time conducting TLRU activities near the PDA (POR02, POR04, POR05

and POR61 within the LSA), consuming country foods harvested from the area. For this receptor scenario, HHRA calculations were completed to assess exposure considering both average and heavy country foods consumption rates reported by Indigenous communities in the area.

These receptor exposure scenarios also conservatively assess exposure to non-Indigenous residents who spend time in cabins and/or conduct recreational activities within the LSA/ RSA, including harvesting and consuming country foods at average and heavy country foods consumption rates.

The results of the HHRA for exposure to criteria air parameters via the inhalation of air pathway indicated that criteria air parameters were below their respective guidelines at the PORs with maximum concentrations, including at the MPOI.

Risk characterization results for polyaromatic hydrocarbons and DPM via ambient air inhalation pathway indicated that results for all points of reception considered in the HHRA were within non-carcinogenic and carcinogenic targets.

The predicted increases in COPC (arsenic, cobalt, mercury and methyl mercury) concentrations between the Baseline Assessment Scenario and the Project and Post Closure Assessment Scenarios were negligible for air, soil, sediment, surface water and country foods. Predicted increases in COPC concentrations in surface water did not result in exceedance of applicable human health or aquatic life guidelines.

The HHRA results for predicted non-carcinogenic effects for metals COPC are as follows:

- Arsenic (all media and exposure pathways) – the Total Hazard Quotients (THQ) are at the target of 1 at baseline conditions for the heavy country foods consumer. The change at the selected PORs from Baseline to Project and Post-closure Assessment Scenarios are conservative, as discussed below, representing a negligible increase in predicted human health risk from arsenic exposure. There were no exceedances for the average country foods consumer.
- Cobalt (all media and exposure pathways) – the THQs are below the threshold of 1 for all receptor locations and Assessment Scenarios for both heavy and average consumers, with the exception of a negligible exceedance at POR04 (i.e., a THQ of 1.1 versus a target of 1.0 at the TLRU immediately west of the PDA). The calculations are highly conservative, as discussed below, and potential increases in risk associated with non-carcinogenic effects from cobalt from the Project is not expected.
- Mercury (all media and exposure pathways) - there were no exceedances of the non-carcinogenic targets for exposure to mercury via all exposure pathways combined.
- Methylmercury (all media and exposure pathways) – the THQs exceed the threshold of 1 for the heavy consumer (sensitive individuals and general population) and average country foods consumer at all receptor locations and Assessment Scenarios, including Baseline. The threshold was not exceeded for the general population for the average consumer. The only exposure pathway contributing to the HHRA results for methylmercury is fish ingestion which accounts for 100% in all exposure Assessment Scenarios (Baseline, Project and Post-closure). This result is not unexpected and is reflected in the fish consumption advisory that has been put in place by the Government of Ontario for Birch Lake and other lakes in Ontario, due to existing mercury concentrations in fish. Concentrations of methylmercury in fish fillets is quite variable amongst fish species and the length of the fish. The Lake Whitefish fish tissue concentrations estimated as occurring during the project are up to 0.143 milligrams per kilogram (mg/kg) wet weight, within the range of Baseline concentrations measured in 2022 (0.0365 to 0.204 mg/kg wet weight). The Walleye fish tissue

concentrations estimated as occurring during the project are up to 0.716 mg/kg wet weight, within the range of Baseline concentrations measured in 2022 (0.112 to 1.94 mg/kg wet weight). As such, changes in fish tissue methyl mercury concentrations from the Baseline Assessment Scenario to the Project and Post-closure Assessment Scenarios are expected to be negligible. The calculations are highly conservative, as discussed below, and potential increases in risk associated with non-carcinogenic effects from methylmercury from the Project is not expected.

A number of assumptions are included in this assessment which are expected to overestimate potential risk. The receptor is assumed to obtain 100% of their country foods in close proximity to the PDA. Additionally, concentrations used in the exposure assessment assume 95% upper confidence limit of the mean for baseline soil and country foods quality and maximum 75th percentile over the year for surface water quality. The conservative surface water concentration has a notable effect on the overall risk estimates. In addition, the toxicity reference values used to calculate the THQs are designed to be conservative. Therefore, potential increases in risk associated with non-carcinogenic effects from COPCs from the Project are not expected.

Incremental lifetime cancer risk estimates for arsenic identified negligible exceedances of the target of 0.00001 (ranging from 0.000011 to 0.000023) at some POR locations for the heavy consumers of country foods who are assumed to be harvesting all of their country foods from areas closest to the PDA. If it is assumed that heavy country foods consumers obtain 50% of their country foods from the LSA, calculated risks are reduced with negligible exceedances (0.000011 to 0.000014) at only two TLRU POR locations closest to the PDA. There are no exceedances of the target for average country foods consumers.

The evaluation of potential risk from carcinogenic effects assumes the receptors are exposed to COPCs near the PDA for a portion of every year for their entire lifetime. In addition, the toxicity reference value used to calculate the incremental lifetime cancer risks are designed to be conservative. The change in calculated risk levels from the Baseline Assessment Scenario to Project and Post-Closure Assessment Scenarios are negligible considering the conservatism built into the models.

In all cases, the potential risk is driven primarily by the fish consumption exposure pathway. These are conservative estimates as:

1) Receptors are assumed to obtain 50 to 100% of their country foods from Birch Lake or Springpole Lake throughout an entire lifetime. These likely over-estimates as the area is remote and although some Indigenous communities in the area report harvesting country foods including fish from within the LSA, they also report harvesting country foods from areas outside the LSA and RSA.
2) Surface water concentrations are based on models which do not account for mixing throughout the water column, resulting in surface water concentrations greater than is likely to occur.
3) Fish concentrations are predicted based on uptake from predicted surface water concentrations that are likely to be over-estimated.

There is a provincial fish consumption advisory currently in effect for Birch Lake and other lakes in Ontario (based on existing mercury concentrations in upper trophic level fish). Following the consumption advisory may act to limit exposure to arsenic, cobalt and methylmercury within the LSA/RSA for all Assessment Scenarios, including Baseline. It is noted that fish consumption serves as an essential source of nutrition and fish consumption has been linked to many health benefits such as cardiovascular health (Health Canada, 2007).

In general, a high degree of conservatism is incorporated into the models used to predict Project related air emissions, deposition to soil and predicted surface water, sediment and fish concentrations. In addition, the conservative assumptions used in the HHRA model result in overestimation of the predicted risks to human health.

The change in calculated risk levels from the Baseline Assessment Scenario to Project and Post-Closure Assessment Scenarios are negligible and potential risks to human receptors who spend time in cabins and/or practice TLRU in areas surrounding the Project are not anticipated.

Monitoring programs, including for surface water and fish, will be implemented to verify the accuracy of the predicted effects, validate the models and assess the effectiveness of the implemented mitigation measures and may be further optimized in response to monitoring data. Extensive monitoring programs are in place for the Project. Monitoring for the Project going forward is further described in Section 12 and will be further refined during the permitting phase to incorporate conditions of approvals and permits. Consultation on the monitoring programs is expected to continue through all phases of the Project.

6.24.6.2 Changes in Ecological Health

The results of the ERA screening identified 14 COPCs based on exceedances of their respective criteria / guidelines / standards.

The ERA identified the following:

- Surface water concentrations did not exceed guidelines (Section 3.4.2.3 of Appendix R).
- Soil concentrations did not exceed benchmark values for terrestrial receptors (Section 5.6.2 of Appendix R).
- Sediment concentrations for some metals exceed benchmark values; however, the Project did not result in an increase the potential risk (Section 5.6.2 of Appendix R).
- Multimedia exposure model identified a low potential risk to birds and mammals.

The results of the ERA identified risk estimates exceeding baseline and the benchmark in three instances: manganese for the muskrat, methylmercury for the Bald Eagle and lead for the spotted sandpiper. Due to the conservative assumptions associated with these scenarios, no potential risk to mammals and birds via exposure to chemicals in Project-influenced media within the LSA is anticipated.

As a result, there are no anticipated residual effects on ecological health from the proposed Project.

6.24.7 Significance of Residual Effects

The Project is not predicted to result in a change to human or ecological health. In the absence of a measurable residual effect, there is no pathway through which to result in a cumulative effect.

With the proposed design and mitigation measures, residual effects on human and ecological health are not predicted and therefore a determination of significance is not required.

6.24.8 Confidence Prediction

The level of confidence in the prediction is considered to be high. The predicted effects are based on the values from HHRA and ERA model, which used a conservative, worst-case approach that is expected to over-estimate concentrations.

6.24.9 References

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Table 6.24-1: Criteria, Indicators and Rationale for Human and Ecological Health

Criteria	Indicators	Rationale
Change in Human Health	• Change in air quality Chemicals of Potential Concern (COPC) • Change in surface water quality COPC • Change in soil quality COPC • Change in country foods quality (fish, vegetation, wild game) COPC	For there to be a potential effect on human health due to Project emissions, there must be a receptor, exposure pathway and a chemical that is present at levels in the environment that could be harmful. As a result, the changes in concentrations of parameters of potential concern in environmental media are used, in comparison to applicable regulatory guidelines. Where COPC exceed regulatory guidelines, the HHRA assesses potential risk from exposure to these COPC across a multi-media assessment.
Change in Ecological Health	• Change in air quality COPC • Change in surface water quality COPC • Change in soil quality COPC • Change in country foods quality (fish, vegetation, wild game) COPC	Similarly, for there to be a potential effect on ecological health due to Project emissions, there must be a receptor, exposure pathway and a chemical that is present at levels in the environment that could be harmful. As a result, the changes in concentrations of parameters of potential concern in environmental media are used, in comparison to applicable regulatory guidelines. Where COPC exceed regulatory guidelines, the ERA assesses potential risk from exposure to these COPC across a multi-media assessment.

Table 6.24-2: Significance Determination Attributes and Rankings for Human and Ecological Health

Attribute	Description	Category
Magnitude	A qualitative or quantitative measure to describe the size or degree of the residual effects relative to baseline conditions	**Level I:** Project-related environmental exposures do not result in a change in human or ecological health. **Level II:** Project-related environmental exposures are unlikely to substantially result in a change in human or ecological health. **Level III:** Project-related environmental exposures may result in a long term, substantive change in human or ecological health.
Geographic Extent	The spatial extent over which the residual effect will take place	**Level I:** Effect is restricted to the PDA. **Level II:** Effect is restricted to the LSA. **Level III:** Effect extends beyond and/or into the RSA.
Duration	The time period over which the residual effect will or is expected to occur	**Level I:** Effect occurs over the short term: less than or equal to 3 years. **Level II:** Effect occurs over the medium term: more than three years but less than 20 years. **Level III:** Effect occurs over the long term: greater than 20 years.
Frequency	The rate of occurrence of the residual effect	**Level I:** Effect occurs once, infrequently or not at all. **Level II:** Effect occurs intermittently or with a certain degree of regularity. **Level III:** Effect occurs frequently or continuously.
Reversibility	The extent to which the residual effect can be reversed	**Level I:** Effect is fully reversible. **Level II:** Effect is partially reversible or potentially reversible with difficulty. **Level III:** Effect is not reversible.

Table 6.24-3: Potential Interactions of Project Components on Human and Ecological Health

Project Component / Activity	Human and Ecological Health
Construction Phase	
Site preparation activities including clearing, grubbing and bulk earthworks	Yes
Construction of the mine site access road and airstrip, including the development and operation of aggregate resource areas	Yes
Development of temporary construction camp and staging areas	Yes
Construction of the fish habitat development area	Yes
Construction of the transmission line to the Project site	Yes
Construction of the onsite haul and access roads	Yes
Construction of dikes in north basin of Springpole Lake	Yes
Construction of buildings and onsite infrastructure	Yes
Construction of the central water storage pond	Yes
Controlled dewatering of the open pit basin	Yes
Construction of the starter embankments for the CDF	Yes
Stripping of lake bed sediment and overburden at the open pit	Yes
Development of the surficial soil stockpile	Yes
Initiation of pit development in rock	Yes
Initiation of stockpiling of ore	Yes
Establishment and operation of water management and treatment facilities	Yes
Commissioning of the process plant	Yes
Employment and Expenditures	-
Operations Phase	
Operation of the process plant	Yes
Operation of open pit mine	Yes
Management of overburden, mine rock, tailings and ore in designated facilities	Yes
Operation of water management and treatment facilities	Yes
Accommodations complex operations	-
Operation and maintenance of mine site infrastructure	Yes
Progressive reclamation activities	Yes
Employment and Expenditures	-
Decommissioning and Closure Phase	
Removal of assets that can be salvaged	-
Demolition and recycling and/or disposal of remaining materials	-
Removal and disposal of demolition-related wastes in approved facilities	-
Reclamation of impacted areas, such as by re-grading, placement of cover, and revegetation	Yes
Filling the open pit with water	-
Monitoring and maintenance	-
Employment and Expenditures	-

Note:
(-) The interaction is not expected, and no further assessment is warranted.

Table 6.24-4: Proposed Mitigation Measures for Potential Human and Ecological Effects

	Phase			
Pathways / Criteria	**Con.**	**Op.**	**Cl.**	**Proposed Mitigation Measure**
Change in human health	•	•	•	Implement the mitigation measures for the potential effects on air quality (Section 6.2.4), including the following specific to dust: • Dust emissions from roads and mineral stockpiles will be controlled through the application of water spray and supplemented by dust suppressants if required. • Site roads will be maintained in good condition, with regular inspections and timely maintenance completed to minimize the silt loading on the roads. • Vehicle speeds will be limited. • A dust management plan will be implemented to identify potential sources of fugitive dusts, outline mitigation measures that will be employed to control dust generation and detail the inspection and record keeping required to demonstrate that fugitive dusts are being effectively managed. • During operations, the process plant emission sources will be designed to allow good atmospheric dispersion. Dust control measures such as enclosures and shrouds, along with dust control equipment such as dust collectors, baghouse and water sprays will be used together with best practices, where necessary, to reduce emissions. • During active closure, exposed dust sources will be revegetated, and progressive reclamation will be conducted wherever appropriate to better control dust emissions from the mineral waste stockpiles and CDF. • Routine maintenance of all pollution control equipment, diesel-fired engines (vehicle, equipment and standby power generation)
	•	•	•	Implement the mitigation measures for the potential effects on surface water (Section 6.6.4, 6.7.4 and 6.8.4), including the following specific to water quality: • An integrated water management system will be designed to collect and control all contact water from the stockpiles, CDF and plant site areas. Collected contact water that is not recycled in ore processing will be treated at the ETP) and discharged to the southeast arm of Springpole Lake in accordance with permitting requirements. • An erosion and sediment control (ESC) plan will be implemented to manage runoff water around disturbed areas. The ESC plan will be prepared prior to the construction phase with the purpose of minimizing site erosion and protecting surface water from sedimentation. The ESC plan will provide further details on measures to minimize slope length and grade, ditching and diversion berms, contact water management ponds, use of natural vegetation buffers and runoff controls.

Table 6.24-4: Proposed Mitigation Measures for Potential Human and Ecological Effects

	Phase			
Pathways / Criteria	**Con.**	**Op.**	**Cl.**	**Proposed Mitigation Measure**
				• Water collection ditches will be constructed and operated around the perimeter of infrastructure, including the CDF and stockpiles to collect overland flow and seepage and direct it to the integrated water management system. Non-contact water will be diverted away from Project components using ditches, diversion berms and other suitable measures. • During operations and active closure, effluent will be discharged at a location where sufficient flow exists to reduce the potential for erosion and promote assimilation at the discharge location. A diffuser or other means could be used to encourage greater mixing and attenuation of the effluent plume at the discharge location, if required. Consistent with MECP Policy B-1-5, the mixing zone size will be minimized to the extent practical. • During operations and active closure, the ETP will be designed and operated to produce an effluent quality appropriate for discharge to the environment in accordance with applicable regulatory requirements, including the MDMER. Best available technologies that are economical achievable will be considered for the ETP to meet protection requirements. The ETP will be refined with ongoing Project planning and engineering design, and as discharge criteria are finalized during the approvals process.
	•	•	•	Implement mitigation measures for potential effects on country foods, including the following: • Mechanical vegetation removal practices will be used, when possible; and • Discouraging wildlife from inhabiting contact water ponds (including the CDF and CWSP ponds).
Change in ecological health	•	•	•	Implement the mitigation measures for the potential effects on air quality (Section 6.2.4), including the following specific to dust: • Dust emissions from roads and mineral stockpiles will be controlled through the application of water spray and supplemented by dust suppressants if required. • Site roads will be maintained in good condition, with regular inspections and timely maintenance completed to minimize the silt loading on the roads. • Vehicle speeds will be limited. • A dust management plan will be implemented to identify potential sources of fugitive dusts, outline mitigation measures that will be employed to control dust generation and detail the inspection and record keeping required to demonstrate that fugitive dusts are being effectively managed. • During operations, the process plant emission sources will be designed to allow good atmospheric dispersion. Dust control measures such as enclosures and shrouds, along with dust

Table 6.24-4: Proposed Mitigation Measures for Potential Human and Ecological Effects

	Phase			
Pathways / Criteria	**Con.**	**Op.**	**Cl.**	**Proposed Mitigation Measure**
				control equipment such as dust collectors, baghouse and water sprays will be used together with best practices, where necessary, to reduce emissions. • During active closure, exposed dust sources will be revegetated, and progressive reclamation will be conducted wherever appropriate to better control dust emissions from the mineral waste stockpiles and CDF. • Routine maintenance of all pollution control equipment, diesel-fired engines (vehicle, equipment and standby power generation)
	•	•	•	Implement the mitigation measures for the potential effects on surface water (Section 6.6.4, 6.7.4 and 6.8.4), including the following specific to water quality: • An integrated water management system will be designed to collect and control all contact water from the stockpiles, CDF and plant site areas. Collected contact water that is not recycled in ore processing will be treated at the ETP) and discharged to the southeast arm of Springpole Lake in accordance with permitting requirements. • An ESC plan will be implemented to manage runoff water around disturbed areas. The ESC plan will be prepared prior to the construction phase with the purpose of minimizing site erosion and protecting surface water from sedimentation. The ESC plan will provide further details on measures to minimize slope length and grade, ditching and diversion berms, contact water management ponds, use of natural vegetation buffers and runoff controls. • Water collection ditches will be constructed and operated around the perimeter of infrastructure, including the CDF and stockpiles to collect overland flow and seepage and direct it to the integrated water management system. Non-contact water will be diverted away from Project components using ditches, diversion berms and other suitable measures. • During operations and active closure, effluent will be discharged at a location where sufficient flow exists to reduce the potential for erosion and promote assimilation at the discharge location. A diffuser or other means could be used to encourage greater mixing and attenuation of the effluent plume at the discharge location, if required. Consistent with MECP Policy B-1-5, the mixing zone size will be minimized to the extent practical. • During operations and active closure, the ETP will be designed and operated to produce an effluent quality appropriate for discharge to the environment in accordance with applicable regulatory requirements, including the MDMER. Best available technologies that are economical achievable will be considered for the ETP to meet protection requirements. The ETP will be refined

Table 6.24-4: Proposed Mitigation Measures for Potential Human and Ecological Effects

	Phase			
Pathways / Criteria	**Con.**	**Op.**	**Cl.**	**Proposed Mitigation Measure**
				with ongoing Project planning and engineering design, and as discharge criteria are finalized during the approvals process.

Notes:
Con: Construction Op: Operation Cl: Closure
● Mitigation is applicable
– Mitigation is not applicable

Table 6.24-5: Evaluation of Assumptions in the Human Health Risk Assessment

Risk Assessment Assumption/ Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
Problem Formulation		
Measured concentrations in media (air, soil, plants, surface water and fish) are representative of baseline conditions.	There were sufficient samples in each media to provide a reasonable estimate of representative baseline concentrations.	Neutral
Predicted concentrations in country foods (plants, meat) were based on published uptake factors from predicted concentrations in soil or surface water.	Conservative assumption based on published uptake factors in the absence of site-specific data on soil to plant, plant to animal and surface water to fish uptake.	Overestimate
It was assumed that there is a uniform distribution of chemicals in vegetation and meat (especially the edible portions, such as the fruit and muscles) and that an equilibrium is rapidly established in the tissues of the plant or meat.	Reasonable and conservative assumptions in accordance with Health Canada guidance.	Overestimate to neutral
Maximum concentrations in each media were used in the initial identification of COPC.	Conservative and in accordance with Health Canada Guidance	Overestimate to neutral
Modelled exposure to COC EPC.	Conservative estimate of the reasonable maximum exposure over the LSA in accordance with Health Canada guidance.	Overestimate to neutral
Groundwater was eliminated from consideration as a media source of exposure during the problem formulations stage.	Although there is no known potable groundwater wells in the LSA or RSA, Lac Seul First Nation identified potential groundwater spring location near the proposed effluent discharge location. The were also numerous reports of community members consuming surface water for drinking water. Therefore, the potential exists that individuals who live or spend time in the LSA and RSA may consume surface water. Since the potential groundwater spring location is outside the influence of groundwater impacts from the Project, surface water concentrations are considered to represent drinking water in the area. The assessment conservatively assumes humans would consume the local surface water without treatment on a daily basis.	Overestimate to neutral

Table 6.24-5: Evaluation of Assumptions in the Human Health Risk Assessment

Risk Assessment Assumption/ Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
Sediment was considered as a media source of exposure for humans accessing Birch Lake or Springpole Lake during TLRU or recreational activities.	It was assumed sediment is available for contact by humans in the LSA / RSA.	Overestimate to neutral
The most sensitive human receptors on the site were assumed to be Indigenous community members (infant to elder) who were assumed to reside in their community and spend 40% of their time at cabin locations close to the PDA, practising TLU activities, including harvesting and consuming 100% of their country foods from the LSA. Both a heavy and average consumer of country foods were evaluated. The most sensitive age group evaluated for non-cancer effects was a toddler.	The most sensitive receptor, life stage and exposure were considered for the Human Health Risk Assessment.	Overestimate to neutral
Toxicity Assessment TRVs developed by regulatory agencies often incorporate assumptions that lead to varying degrees of uncertainty, such as those listed below:		

Table 6.24-5: Evaluation of Assumptions in the Human Health Risk Assessment

Risk Assessment Assumption/ Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
• Animal studies are often used to predict effects on humans. For the extrapolation of animals to human exposures, the exposure limits for chemicals are typically based on animal experiments where exposures to chemicals are administered. Statistical manipulations are performed to derive an appropriate TRV. Therefore, these procedures to derive the TRV imply that humans and animals will respond in similar fashion. In addition, the derivation also requires an assumption that the effects observed at the high doses that were used in the animal experiments would be equally or proportionally similar to effects at the low doses that human exposures would typically occur. • TRVs assume that the chemical exposures yield effects that follow similar physiological mechanisms of action in both animals and humans. These include the detoxification processes as well as the toxicological implications. All of these toxicological uncertainties may contribute to either an over- or under-estimation of the potential risks for the humans exposed to the chemicals.	Exposure limits (TRVs) developed by leading regulatory agencies typically incorporate large safety / uncertainty factors to compensate for uncertainties. The process used to establish TRVs is more likely to overestimate than underestimate the risks.	Overestimate to neutral

Table 6.24-5: Evaluation of Assumptions in the Human Health Risk Assessment

Risk Assessment Assumption/ Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
• Short-term toxicity studies (e.g., maximum two years for rodent studies) are used to predict effects from long-term exposures in humans. • Predicting potential health effects from the exposure to media at the site requires the use of models to extrapolate the observed health effects from the high doses used in laboratory studies to the anticipated human health effects from low doses experienced in the environment. The models contain conservative assumptions to account for the large degree of uncertainty associated with this extrapolation. • Toxicity testing on homogenous inbred animal populations are used to predict the effects on the heterogeneous human population. • Derivation of the cancer slope or unit risk factors are often an upper bound 95th percentile of the probability of response.		
Exposure Assessment: The exposure assessment makes assumptions regarding the exposure regimes that the human receptors undergo. Uncertainties in the exposure assessment include:		
The EPCs used for environmental media are estimated based on measured and modelled data.	Measures are taken (e.g., use of 90th percentile) to reduce the likelihood of underestimating exposure.	Overestimate to neutral
Uptake factors from literature are employed to estimate concentrations in some country foods.	Uptake factors are likely conservative estimates of uptake.	Overestimate to neutral

Table 6.24-5: Evaluation of Assumptions in the Human Health Risk Assessment

Risk Assessment Assumption/ Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
For non-cancer calculations, receptors were assumed to be present 7 days a week, 24 hours a day in the LSA. For cancer calculations, resident/cabin receptors were assumed spend 7 days a week, 24 hours a day in the LSA for 40% of their lifetime, while resident/TLRU receptors were assumed to spend 7 days a week, 24 hours a day in the LSA for 20% of their lifetime.	The exposure times likely represent a conservative estimate.	Overestimate to neutral
Receptor characteristics (e.g., body weight, soil ingestion rate) were obtained from published sources (e.g., Health Canada) and country foods species and ingestion rates were estimated from literature (e.g., Chan et al. 2014) applicable to Indigenous communities in the region.	The receptor characteristics employed are considered to be reasonably conservative and unlikely to underestimate exposure.	Overestimate to neutral
Receptors are assumed to obtain 100% of their country foods consumed and 100% of their drinking water from within the LSA.	This results in a conservative assumption of exposure as Indigenous communities have reported conducting TLRU activities including collection of Traditional foods from outside the RSA in addition to within the LSA and RSA.	Overestimate
Point estimates of the chemical physical-chemical parameters in the assessment that are assumed to be consistent in a real world situation. The physical-chemical characteristics are typically laboratory derived data under controlled situations and their values may change in the actual environment where external variables, such as temperature fluxes and atmospheric air pressure changes, may change the parameter values.	Reasonable and conservative assumption in accordance with applicable guidance.	Overestimate to neutral
The assumption that the metabolism of chemicals in an individual is zero. This is especially important since some metabolism and depuration would occur during the lifespan of an individual. Bioavailability is assumed to be 100% for oral exposure for most chemicals, which may not be the case for all COPCS.	These assumptions will consequently over-estimate the risks.	Overestimate

Table 6.24-5: Evaluation of Assumptions in the Human Health Risk Assessment

Risk Assessment Assumption/ Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
The assessment assumed that individuals will be eating wild game as part of their normal diet. Although there is no analysis of game meat quality, uptake models were used to predict concentrations in game meat.	Due to the conservatism incorporated into the uptake values and bioavailability assumptions, the estimated game meat concentrations may overestimate risk.	Overestimate to neutral
Risk Characterization		
The level of conservatism associated with the characterization of risk, in particular from the Project, is relatively high due to the conservative assumptions incorporated into the modelling of predicted chemical concentrations in various media including air, soil, surface water and country foods, as well as the use of published uptake factors to model chemical concentrations into some country food items including mammals and birds. In addition, it was conservatively assumed that 100% of country foods and water consumed by receptors are from the LSA.	Overall, the human health risk estimates represent an overestimate of potential risk.	Overestimate

Table 6.24-6: Evaluation of Assumptions in the Ecological Risk Assessment

Risk Assessment Assumption/ Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
Problem Formulation		
Habitat Survey and Receptor Selection: This risk assessment relied on a desktop review of habitat which included literature reviews, review of site assessment photographs and observations by field staff who conducted the sampling	As such, the habitat and receptor selection have low uncertainty for this ecological risk assessment.	Neutral
Utilization of Receptors as Sentinels to Represent Other Organisms: The use of receptors as sentinels is intended to limit the number of ecological receptors evaluated.	The receptors selected are considered to be sensitive, and consistently present on the site, and to be highly exposed to the COPCs present at the site via relevant exposure pathways. Therefore, it is reasonable to assume that conclusions that are reached in respect of the modelled receptor organisms can be generalized to other biota that might use the site. The uncertainty associated with using sentinels in risk assessment is low.	Neutral
Species at Risk: Based on a review of the federal and provincial species at risk lists, all threatened and endangered species were considered within the risk assessment.	Based on the conservatism built into the assessment, there is low uncertainty associated with the interpretation of risks for SAR.	Neutral
Selection of COPCs: The COPCs were selected independently in each of the media and/or areas evaluated in the ecological risk assessment, and the analysis was completed to include all relevant media and/or areas if the substance exceeded screening criteria for any one of these.	Based on the conservative nature of the screening, the uncertainty associated with the COPC identification is considered low.	Neutral
Toxicity Assessment TRVs developed by regulatory agencies often incorporate assumptions that lead to varying degrees of uncertainty, such as those listed below:		

Table 6.24-6: Evaluation of Assumptions in the Ecological Risk Assessment

Risk Assessment Assumption/ Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
Receptor-Specific Toxicity Data: For most COPCs and receptors, toxicity data are available in some form. However, it is important to note that toxicity data are not necessarily available for the particular receptor species under consideration.	Toxicity values are not necessarily specific to the receptor species, or to a reproductive or population-level endpoint. As a result, there is uncertainty associated with the extrapolations that may be used to translate toxicity data from one species into a TRV for a second species despite the fact that the toxicity data represent organisms that are expected to be sensitive to the COPC and that the conversion factors are scientifically based and are applied in a reasonable manner. All TRVs selected for inclusion of the risk assessment are derived by federal or provincial guidelines and therefore have been peer reviewed and are conservative for risk assessment and the uncertainty associated with using the TRVs is considered low.	Neutral
Chemical Speciation: The fate, food chain interactions and toxicity of a number of inorganic COPCs (such as arsenic) depend to a large extent upon their chemical form. Oral reference doses, however, are typically based on chemical forms that have high bioavailability (e.g., salts).	When administered in food or water to laboratory animals, it is expected that the bioavailability of the toxicant is maximal. When trace elements are ingested by wildlife, some portion will be of natural origin, distributed through soil fractions ranging from inorganic soil particles to biological materials, having widely varying bioaccessibility. Therefore, conservative assumptions about chemical form, bioavailability and absorption over the gut were generally carried forward in the risk assessment, and the potential for toxicity is likely to be overstated. For example, soil bioaccessibility was conservatively assumed to be 1.0. The uncertainty associated with chemical speciation is moderate and has likely led to conservative estimation of potential ecological risks.	Neutral to overestimate

Table 6.24-6: Evaluation of Assumptions in the Ecological Risk Assessment

Risk Assessment Assumption/ Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
Exposure Assessment: The exposure assessment makes assumptions regarding the exposure regimes that the ecological receptors undergo. Uncertainties in the exposure assessment include:		
Concentrations of COPCs: The ecological model estimated exposures associated with concentrations at the MPOI and highest estimated water concentrations.	This is anticipated to overestimate potential exposure.	Overestimate
Uptake into Food Chain: Incorporation of uptake factors to estimate tissue concentrations in the food chain model .	This represents a source of uncertainty which is anticipated to overestimate exposure.	Overestimate

500000 520000 540000 560000 580000 600000 620000 640000

5720000 5700000 5680000 5660000

Mamakwash Lake
Wavell Lake
Noble Lake
Mink Lake
Little Shabumeni Lake
Shabumeni Lake
Birch Lake
Springpole Lake
Seagrave Lake
Bertha Lake
Washagomis Lake
Narrow Lake
Okanse Lake
Woman Lake
Trout Lake
Joyce Lake
Perrigo Lake
Confederation Lake
Little Bear Lake
Uchi Lake
Fly Lake
Jubilee Lake
Slate Lake
Margaret Lake
Wakeman Lake
Jeanette Lake
Sesikinaga Lake
Carillon Lake
Cat Lake
Kapikik Lake
Jackpine Lake
Zionz Lake
Gull Lake
Fawcett Lake
Kezik Lake
Senior Lake
Lang Lake
Bertrand Lake
Gitche Lake
McVicar Lake
Wettlaufer Lake
Dobie Lake
Meen Lake
Strout Lake
Dorothy Lake
Nabemakoseka Lake
Obaskaka Lake
Wright Lake
Fry Lake
Bamaji Lake
Roadhouse Lake
Gage Lake
Blackstone Lake
Lake St. Joseph

SLATE FALLS NATION

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LEGEND

- Proposed Mine Feature
- Project Development Area
- Local Study Area for Human and Ecological Health
- Regional Study Area for Human and Ecological Health
- First Nation Reserve
- Existing Road
- Existing Transmission Line
- Watercourse
- Waterbody

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- 230 kV transmission line provided by First Mining Gold, April 2024.

FIRST MINING GOLD

WSP

SPRINGPOLE GOLD PROJECT

Local and Regional Study Areas for Human and Ecological Health

Datum: NAD83
Projection: UTM Zone 15N

N W E S

0 5 10 20 30 40 50 Kilometres

PROJECT N°: ONS2104

FIGURE: 6.24-1

SCALE: 1:375,000

DATE: October 2024

500000 520000 540000 560000 580000 600000 620000 640000

5720000 5700000 5680000 5660000

Mamakwash Lake
Wavell Lake
Noble Lake
Little Shabumeni Lake
Shabumeni Lake
Birch Lake
Cat Lake
Carillon Lake
Kapikik Lake
Jackpine Lake
Lang Lake
McVicar Lake
Bertrand Lake
Gitche Lake
Meen Lake
Wettlaufer Lake
Dobie Lake
Strout Lake
Zionz Lake
Dorothy Lake
Nabemakoseka Lake
Obaskaka Lake
Wright Lake
Fawcett Lake
Gull Lake
Springpole Lake
Kezik Lake
Bertha Lake
Seagrave Lake
Washagomis Lake
Narrow Lake
Okanse Lake
Woman Lake
Trout Lake
Joyce Lake
Confederation Lake
Perrigo Lake
Sesikinaga Lake
Jeanette Lake
Wakeman Lake
Little Bear Lake
Uchi Lake
Fly Lake
Jubilee Lake
Slate Lake
Fry Lake
Bamaji Lake
Gage Lake
Roadhouse Lake
Blackstone Lake
Lake St. Joseph

POR60 POR37 POR45 POR57 POR01 POR59 POR05 POR06 POR35 POR58 POR04 POR30 POR56 POR24 POR02 POR17 POR18 POR03 POR07 POR38 POR19 POR61 POR22 POR55 POR31 POR23 POR44 POR46 POR50 POR51 POR32 POR47 POR20 POR42 POR52 POR54 POR21 POR39 POR08 POR12 POR15 POR43 POR10 POR09 POR16 POR13 POR14 POR11 POR48 POR40 POR27 POR41 POR53 POR28 POR49 POR34 POR29 POR36 POR33 POR26 POR25

SLATE FALLS NATION

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LEGEND

- Proposed Mine Feature
- Project Development Area
- Local Study Area for Human and Ecological Health
- Regional Study Area for Human and Ecological Health
- Air Quality Modelling Boundary (First Mining Gold Patents and Leases)
- First Nation Reserve
- Existing Road
- Existing Transmission Line
- Watercourse
- Waterbody

Potential Points of Reception

- Cabin/Lodge/Camp
- TLRU
- Residential

0 5 10 20 30 40 50 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- 230 kV transmission line provided by First Mining Gold, April 2024.

Datum: NAD83
Projection: UTM Zone 15N

First Mining Gold

WSP

SPRINGPOLE GOLD PROJECT

Potential Points of Reception in the HEHRA Regional Study Area

PROJECT N°: ONS2104 | **FIGURE: 6.24-2**

SCALE: 1:375,000 | DATE: October 2024