FIRST MINING GOLD

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8.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

8.1 Introduction

The assessment of potential effects of the environment on the Springpole Gold Project (Project) includes the identification of natural hazards and influences of nature, including climate change, deemed to have reasonably possible consequences for the proposed Project, and mitigation measures that will be implemented to reduce or eliminate potential risks.

Planning and design of the Project considers how natural hazards (e.g., extreme weather events, forest fires, seismic events) could potentially affect the Project so that appropriate design measures are implemented, and emergency response protocols are developed. The assessment of potential effects of the environment on the Project is based on guidance provided from regulatory agencies, Project-specific information and experience with other mine environmental assessments (EAs). This section complements Section 9, Accidents and Malfunctions. Accidents and malfunctions refer to events or conditions caused by industrial hazards that are not part of the normal activity or operation of a project as planned. Accident and malfunction scenarios are evaluated in Section 9.

8.2 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 consultation process. The Record of Consultation (Appendix D) includes detailed comments received, and responses provided, during the development of the final Environmental Impact Statement / Environmental Assessment (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. An overview of the key comments that influenced the assessment for air quality between the draft and final EIS/EA is provided below:

8.2.1 Regulatory Guidance

The Ministry of Environment, Conservation and Parks (MECP) requested clarification on the regulatory guidance and Project-specific information that was considered for this assessment of effects of the environment on the Project. The MECP (2021) guide *Considering Climate Change in the Environmental Assessment Process* was considered in the EA process, and information related to climate change has been incorporated into various sections of the final EIS/EA, including the existing environmental conditions in Section 3.3.1, the environmental effects of the Project on climate change in Section 6.4 and the effects of climate change on the Project (this section). The potential effects of climate change on the Project have been considered and incorporated in the planning and design of Project infrastructure, as noted in Sections 8.5 and 8.10.

The Impact Assessment Agency of Canada requested the incorporation of updated climate change information from the Sixth Assessment Report from the Intergovernmental Panel on Climate Change (IPCC) into the assessment. Further, the Impact Assessment Agency of Canada requested the use of grid cell that contains the Project and include climate projections that use downscaled data. Therefore, a grid cell approach that selected the grid cell that contained the Project was used, rather than the grid cell of the selected met station. Future climate change projections from the IPCC's Sixth Assessment Report have been incorporated into the assessment of climate change effects on the Project, as described in Section 8.4.

8.2.2 Dike Design and Safety

Cat Lake First Nation and Lac Seul First Nation requested clarification on the dam (i.e., dike) design and safety factors for the co-disposal facility (CDF), and if they consider climate change, severe extreme or severe weather, events involving rain, ice, snow, thunderstorms, microbursts, wind, and increased temperatures. The dikes are designed to meet the factors of safety required by guidelines and regulations such as the Canadian *Dam Safety Guidelines* (CDA 2013, 2019) and supporting technical bulletins, Ministry of Natural Resources (MNR 2011a) guidelines and the *Lakes and Rivers Improvement Act* (R.S.O. 1990, c. L.3) for long-term, static loading conditions, as well as pseudo-static loading conditions. Additional design information on dike stability and safety is included in Section 8.6.2.

8.2.3 Water Management System

The Impact Assessment Agency of Canada requested that additional design detail for water management features be included in the final EIS/EA, including the resilience of the water management system to extreme rainfall events (i.e., major precipitation events). In addition, Cat Lake First Nation and Lac Seul First Nation expressed concern regarding the use of a lesser flooding resistance standard (1:10-year rainfall events) for the design of the seepage collection system (ditches) and for general stormwater drainage facilities. The Project components are designed and constructed to withstand weather and major precipitation events expected to occur within the region and consider climate change. The risks associated with major precipitation events will be managed through design criteria, guidelines and regulations, and management practices. Additional analysis and design was completed in 2024 for the seepage and runoff collection systems and has been incorporated into the Water Management section of the Project Description (Section 5.11). As a result, the design criteria for the ditches and collection ponds have been modified (i.e., 1:100-year storm event). A description of the design criteria has been added to 8.6.

8.2.4 Future Climate Conditions

Cat Lake First Nation and Lac Seul First Nation requested climatic hazards, including heavy rainfall, snow accumulation, blowing snow, freeze-thaw, winter rain on snow, heat wave, and drought, to be considered in the Project design. Hazards identified to potentially interact with the Project include high winds, extreme temperatures (i.e., extreme heat, extreme cold, and freeze-thaw cycles), snowstorms, major precipitation events, flooding from increasing water levels in Springpole Lake, seismic event and forest fires. Future climate projections were developed and are described in Section 8.4. Potential effects of climate change on the Project have been considered in accordance with Ontario government guidance Considering Climate Change in the Environmental Assessment Process (MECP 2021) and incorporated in the planning and design of Project infrastructure. Section 8.4 also includes a table (Table 8-2) showing the climate hazards that would have a potential impact on the safety and performance of key Project components. Engineering design and mitigation included in the Project to withstand climatic hazards are discussed in Section 8.5 to 8.9. In addition, a summary table of climate hazards, their impact on the Project, and associated mitigation measures has been included as Table 8.7-1.

8.2.5 Consideration of Indigenous Knowledge and Land Use Studies

A key source of Traditional Knowledge are the Traditional Knowledge and land use studies completed by Indigenous communities. In addition to the Indigenous Knowledge and land use studies, Indigenous Knowledge was shared during consultation and engagement activities undertaken through the EA development process. Indigenous Knowledge related to effects of the environment on the Project was incorporated into the assessment by viewing the information as complementary and influential alongside scientific information.

It is worth noting that some members of Indigenous communities have observed and experienced the effects of climate change on the environment, including shifts in ecology, and changes in the distribution and abundance of wildlife populations. The following are excerpts from the Slate Falls Nation - Health, Socio-economic, Indigenous Knowledge and Land Use Baseline Study (Slate Falls Nation and Odonaterra 2024).

- *"Ducks and other birds are also mainly hunted in the spring and fall. Some of our members have noticed a decline in the length of the bird hunting seasons. These changes are likely due to climate change-related seasonal shifts, climate change-related storms causing trees to blow down, and clear cutting from forestry."*
- *"Caribou are occasionally hunted for the Elders in the community for special occasions… Caribou populations have moved northward due to habitat impacts from forestry, development, and climate change."*
- *"Climate change and microbursts have also been identified as concerns requiring further consideration."*
- *"Forest fires have impacted our community by causing a change in animal migration patterns resulting in a need to shift hunting and trapping practices."*

Additionally, during a technical meeting on February 16, 2024, a member of Mishkeegogamang Ojibway Nation stated the following:

- *"We've seen geese and ducks that weren't supposed to be in our area in late October, early November and the partridge doing a mating dance. Those are the impacts of climate change."*

Future climate projections were developed and are described in Section 8.4. Potential effects of climate change on the Project have been considered in accordance with Ontario government guidance Considering Climate Change in the Environmental Assessment Process (MECP 2021) and incorporated in the planning and design of Project infrastructure. The potential effects of climate change on the environment are also discussed in the effects assessment sections (Section 6.2 to 6.26), where relevant.

8.3 Assessment Approach

The initial step in the assessment of the effects of the environment on the Project is to identify natural hazards that could adversely affect the Project. Natural hazards were identified using environmental baseline information, the knowledge base of the Project team, as well as information received through consultation and engagement with Indigenous communities, government agencies and the public (Section 8.2). Natural hazards that have the potential to cause adverse effects on the Project include the following:

- Extreme weather events (i.e., high winds, extreme temperatures, extreme temperature fluctuations, and severe snowstorms);
- Major precipitation events;
- Seismic events; and
- Forest fires.

Extreme weather events, major precipitation events, and forest fires could contribute to conditions that may affect the successful establishment of vegetation during reclamation of the site.

Natural hazards that could potentially affect the Project are related to the Project's geographic location. Accordingly, some of the natural hazards identified in the EIS Guidelines (Appendix B-1) as potential events, such as subsidence, are not credible events for the Project, as there is no permafrost or limestone locally and no underground mining proposed. The Project is located in an area with the lowest ranking for the likelihood of a landslide to occur, and therefore the likelihood of damage or interruption to the Project as a result of landslide is considered low and not assessed further (NRCan 2012).

Local environmental conditions in and around the Project are considered at every phase of the Project. The assessment of effects of the environment identifies how a natural hazard may adversely affect the Project and provides a basic description of the potential effects to infrastructure and activities. Hazard scenarios for the Project, with the exception of seismic events, were developed based on climate-infrastructure interactions and climate vulnerabilities by Project activity and are described in Section 8.4.2.

Where potential adverse effects on the Project infrastructure or performance were identified, design mitigation practices were proposed to avoid and minimize potential adverse effects. Potential effects of the environment will be addressed through engineering design and compliance with codes and standards that provide sufficient margins of safety to prevent damage to Project infrastructure from environmental forces (e.g., national building codes to protect against a seismic event).

Typical engineering design involves the consideration of environmental effects and loadings or stresses from the environment on a project component. Responsible engineering carried out for the Project aims to consistently overestimate and account for possible forces of the environment, and thus inherently incorporates a considerable margin of safety so that the Project is designed to be safe and reliable. In addition, an adaptive management approach will be implemented throughout the life of the Project to monitor trends in the environment and identify opportunities to adjust activities or practices to realize improvements.

8.4 Climate Change

Climate change has the potential to change future precipitation and temperature regimes, which would modify how weather-related hazards could affect the proposed Project. Therefore, understanding the current climate and the future climate trends is important when evaluating Project design parameters (i.e., the climate resilience of the Project). To support this understanding, future climate projections were developed and are described below. Potential effects of climate change on the Project have been considered in accordance with Ontario government guidance *Considering Climate Change in the Environmental Assessment Process* (MECP 2021) and incorporated in the planning and design of Project infrastructure.

8.4.1 Current and Future Climate Projections

The IPCC is considered to be the definitive source of information related to past and future climate change, as well as climate science. As an international body, the IPCC provides a common source of information relating to emission scenarios, provides third-party reviews of models, and recommends approaches to document future climate projections. Periodically, the IPCC issues assessment reports summarizing the most current state of climate science. The Sixth Assessment Report (IPCC 2021) represents the most current complete synthesis of climate change information.

Within Canada, the Canadian Centre for Climate Services provides a single portal for accessing data regarding projections of future climate. Most of the data available through the centre are generated by global climate models and represent projections with a resolution of tens to hundreds of square kilometres. While data at that resolution can be illustrative, it is often necessary to develop projections at a finer resolution, using techniques collectively referred to as downscaling. Downscaled climate projections for Springpole Lake (Kenora) from ClimateData.ca (2023) were used in this assessment. These data are provided in Appendix I-3.

Climate projections are presented as changes from the 1971 to 2000 baseline period and provided for mid-century (2041 to 2070) and end-of-century (2071 to 2100) time horizons (Appendix I-3). These projections were used to compile the projected changes in summer and winter temperature and precipitation for the region near the Project. For each of these time horizons, climate projections were developed for the following variables

- Extreme heat;
- Extended cold spells;
- Freeze-thaw cycles;
- Heavy rainfall;
- Heavy snowfall; and
- Other extreme weather events (includes storms [i.e., high winds, lightning, ice, and hail], overland flooding, and wildfire).

For the other extreme events category, data is not directly available within ClimateData, and therefore other sources were used. Data for overland flooding for the area around Springpole Lake was extracted from Flood Map Viewer (Simonovic et al. 2023), while future trends for storms and wildfires are based on a literature review.

Generally, the future climate presented for the area in the vicinity of the Project is of increasing temperatures in both the summer and winter for all forecast horizons. Summer precipitation rates are projected to increase for the 2011 to 2040 horizon, changing to a decrease for the 2041 to 2070 and 2071 to 2100 horizons. Winter precipitation rates are projected to decrease for the 2011 to 2040 and 2041 to 2070 horizons but increase for the 2071 to 2100 horizon. These results, presented in Appendix I-3, suggest that the future climate for the region will continue to warm, with precipitation decreasing slightly except in the later stages of the century.

8.4.2 Climate-Project Interactions

Identifying potential interactions between Project components / activities and climate is an important step in assessing the resiliency of a Project to climate change. The presence of a climate interaction for a given Project component is denoted by a checkmark in Table 8.4-1. These interactions are described further in Table 8.7-1. Construction is not included in the assessment as it will occur within a short time frame, and therefore has little to no potential for interactions with the climate outside of the normal seasonal variation experienced in the region. There is a larger potential for changes in both the extreme weather events during the operations, active closure and post-closure phases. Risks associated with these interactions are assessed in Sections 8.4 to 8.9, along with a description of the planned mitigation measures to reduce risk.

Table 8.4-1: Climate-Project Interactions

Project Component	High Winds	Extreme Temperatures	Snowstorms	Major Precipitation Events	Forest Fires
Operations					
East and west dikes	✓	✓	n/c	✓	n/c
CDF dams	n/c	✓	n/c	✓	n/c
Surficial soil stockpile and ore stockpiles	✓	✓	n/c	✓	n/c
Buildings, other facilities, and general infrastructure (e.g., process plant complex, explosives facility, accommodations complex)	✓	✓	✓	✓	✓
Water management system and treatment facilities	n/c	✓	n/c	✓	n/c
Transmission line	✓	n/c	n/c	n/c	✓
Haul roads, mine access road and airstrip(1)	✓	✓	✓	✓	✓
Decommissioning and Closure					
Remaining infrastructure management	✓	✓	✓	✓	✓
CDF rehabilitation	n/c	✓	n/c	✓	n/c
Open pit	✓	✓	✓	✓	n/c
Water management	✓	✓	✓	✓	✓
Implementation of the revegetation plan	✓	✓	n/c	✓	✓

Note:
(1) The haul roads, access roads and airstrip have been grouped together as they are all anticipated to be gravel and have similar impacts.
✓ = climate-infrastructure interaction; n/c = no climate-infrastructure interaction.

8.5 Extreme Weather Events

The Project components are designed and constructed to withstand the weather conditions expected to occur within the region and consider climate change, as required by professional engineering and design standards. However, weather events can produce extreme conditions, beyond the range of normal conditions, affecting the performance of facilities and management systems. These events can include extreme temperature fluctuations (heat and cold), severe rain and flooding, extreme snow and wind.

In northwestern Ontario, the most common extreme weather events are major storms involving rain, freezing rain, snow and high winds (Chiotti and Lavender 2008). Although storms and precipitation are common in Ontario, the extreme events involving severe precipitation and winds usually occur during the winter season for northern Ontario. Potential risks from high winds, extreme temperatures and snowstorms are discussed below.

8.5.1 High Winds

High wind events have the potential to physically impact buildings and infrastructure; however, the effect of storms on buildings will be low due to their completely enclosed steel structures and ridged sloping roofs. These conditions could lead to a greater need for repairs or complete replacements, adding complexity to infrastructure maintenance. The facilities and infrastructure for the Project will be designed in accordance with professional engineering and design standards and building codes to withstand extreme winds. Buildings and structures will be designed such that they will withstand extremes of wind, temperature, snow, and ice events through the life of the Project and into post-closure, as applicable. The structures and foundations will be designed to withstand these weather-related factors and loads, in consideration of future climate changes.

High winds during periods of below-freezing air temperatures can contribute to increased wind chill and blowing snow, which will reduce visibility, and potentially limit access to the mine site. High winds could also cause downed trees, which could block the mine access road and down the transmission line, resulting in power loss. During high wind events, safety procedures will be in place to address worker safety, and will include reducing traffic speeds, addressing road conditions (e.g., snow removal, sanding) as quickly as possible, and if necessary, issuing work stop orders. In the event of a power outage, onsite diesel generation will be in place to provide backup power to safely reduce operations until the full power supply can be reinstated.

Surficial soil and ore stockpiles may be affected from high winds and intensified storms, which can lead to erosion. Erosion as a result of extreme winds is not anticipated to have an adverse effect on the surficial soil and ore stockpiles due to planned mitigation such as progressive reclamation, seeding the surficial soil and ore stockpiles as they are developed, and staged development.

The Project has been designed to withstand extreme wind events that could result in enhanced wave action in Springpole Lake against the dikes for the open pit. The dikes will be constructed of coarse rock outer shell to withstand winds and wave action and include 5 metres (m) of freeboard above the elevation of Springpole Lake. Dike design specifications are detailed further in Section 8.6.

High winds could contribute to conditions that may affect the successful establishment of vegetation during reclamation of the site. Unsuccessful revegetation activities may result in reclamation activity delays, additional costs of adjusting or repeating revegetation, and increased erosion potential for the period that revegetation is unsuccessful. Revegetation studies will be initiated during operations to evaluate soil amendments and seed mixes to maximize the success of the final revegetation program. In addition, adaptive monitoring of reclaimed areas to allow for modifications in response to changes in site-specific conditions. Monitoring of revegetation until vegetation covers are proven to be self-sustaining.

The risks associated with high winds are addressed by engineering design to comply with building codes and standards that incorporate factors of safety to account for possible high winds (including allowances for future increased frequency and/or severity of these events that could arise from climate change). In addition, planned mitigation measures and best management practices such as progressive reclamation and staged development of the surficial soil and ore stockpiles will be implemented to minimize wind erosion. Consequently, high winds are not considered to have the potential to substantively affect Project infrastructure or components during all phases of the Project.

8.5.2 Extreme Temperatures

Freeze-thaw weathering is a process of erosion that happens in cold areas where ice forms. This process can degrade concrete and can lead to cracks in pipes. Increasing freeze-thaw cycles may also cause physical damage to the roofs, decreasing their life expectancy. The facilities and infrastructure for the Project will be designed in accordance with professional engineering and design standards and building codes to withstand extreme temperatures. Buildings and structures will be designed to withstand extreme temperatures and freeze-thaw cycles through the life of the Project and into post-closure, as applicable. The effects of freeze-thaw cycles will be mitigated as the buildings have a completely enclosed steel structure. All piping will be designed and installed to standards that are designed for regional weather (e.g., heat tracing). The roads and the airstrip will be designed for the site-specific climate and maintained to mitigate the potential for cracks and potholes due to extreme temperature fluctuations and freeze-thaw cycles.

The intent of engineering design standards and codes is to maintain the integrity of the infrastructure and facilities. Therefore, with implementation of these design standards and codes, combined with engineering best practices, extreme temperatures are not considered to have the potential to substantively damage Project infrastructure or components during all phases of the Project.

Temperature-related erosion could affect areas that have not been fully installed or reclaimed, leading to enhanced erosion. Erosion as a result of extreme winds and temperatures is likely to occur but is not anticipated to have an adverse effect on the Project during all Project phases due to engineering design standards and planned mitigation. Exposed soils will be stabilized, roadways will use suitable gravel bases and sub-bases to prevent erosion, and exposed areas will be vegetated where possible to prevent surface erosion. Erosion would be limited in extent and be repaired relatively quickly with no disruption to other Project activities or substantial damage to infrastructure.

Extreme temperatures could contribute to conditions that may affect the successful establishment of vegetation during reclamation of the site. Unsuccessful revegetation activities may result in reclamation activity delays, additional costs of adjusting or repeating revegetation, and increased erosion potential for the period that revegetation is unsuccessful. Revegetation studies will be initiated during operations to evaluate soil amendments and seed mixes to maximize the success of the final revegetation program. In addition, adaptive monitoring of reclaimed areas to allow for modifications in response to changes in site-specific conditions. Monitoring of revegetation until vegetation covers are proven to be self-sustaining.

8.5.3 Snowstorms

Severe snowstorms could affect vehicle operation at the mine site because of reduced traction and poor visibility and could increase the probability of vehicle accidents. Large snowfall events could also impede the movement of equipment and activities on site. Safety procedures will be in place to address worker safety, and will include reducing traffic speeds, addressing road conditions (e.g., snow removal, sanding) as quickly as possible, and if necessary, issuing work stop orders. Emergency procedures will also include emergency prevention and response procedures for heavy snowfall events.

Infrastructure may experience increased loads from snow accumulation, which could cause structural damage of buildings and facilities. The risks associated with weather uncertainties have been accounted for, and risks associated with severe snowstorms and snow loads to facilities will be managed through design criteria. Buildings will be designed according to the appropriate codes, such as Part 4 of the National Building Code of Canada (NBCC; NRCan 2020a), to withstand large accumulations of snow on rooftops. In addition, snow can be shovelled off roofs after heavy snowfalls if needed to prevent roof damage from excessive loads.

8.6 Major Precipitation Events

A major precipitation event (e.g., severe rainstorms, snowmelts, or flooding) could result in water levels in a watershed being outside the predicted flow range and conditions being wetter than anticipated. Mean temperature, mean precipitation, extreme heat, heavy rainfall, and overland flooding show an increasing trend due to climate change, whereas, extended cold spells, freeze-thaw cycles, snowfall show a decreasing trend over time. The following sections describe the design criteria and mitigation for Project components to withstand major precipitation events that could occur within the region and considers climate change.

8.6.1 Excess Water

Springpole Lake is a large lake that discharges through a narrow channel at the east end, where it flows into the Birch River. The lake level is effectively natural and unconstrained. A major precipitation event (e.g., severe rainstorms) could result in excess water management requirements. During year(s) of significantly increased precipitation, there would more runoff entering the water management system, requiring increased water storage capacity depending on the volume already in the system.

Local precipitation volumes and resulting runoff conditions (including periodic temporary flooding and potential for erosion) are variable from year to year in the area in the vicinity of the Project. In a 1:100-year wet annual climate condition, the mine site is projected to receive up to 1,050 millimetres (mm) total annual precipitation (363.6 mm; or approximately 53 percent [%] more than the average annual precipitation of 686.4 mm) (Mine Site Water Balance; Appendix M-2). The water management system has been designed to provide a large reservoir capacity that accommodates extreme precipitation events to alleviate the potential for flooding during any unusual climatic conditions.

Storage ponds have enough capacity to withstand the both the environmental design flood (EDF) and the inflow design flood (IDF) without discharge of untreated water to the environment. An EDF is a hypothetical flood (peak discharge or hydrograph) adopted as the basis in the engineering design of project components The EDF provides a basis of the safety of a structure against failure by overtopping (e.g., during a flood) and for flood control and drainage work to provide safety to downstream areas against flooding (Jain and Singh 2003). The IDF represents the most severe inflow flood (peak, volume, shape, duration, timing) for which a dam and its associated facilities are designed (CDA 2007).

For the Project, the EDF has been defined as a flood event with a 1:100-year return period, at a minimum, which is a typical requirement for mines in Ontario. This provides a large reservoir capacity that accommodates year-to-year variations in precipitation and runoff to alleviate the potential for major precipitation events. The 72-hour probable maximum precipitation was calculated to be about 400 mm by Knight Piésold (March 2021) and has been used as the IDF criteria for the storage ponds, including the CDF. For the pond sizing, the ability to contain various durations of the 1:100-year event is a function of the available storage and pumping capacity. Additionally, the design of the dikes includes 5 m of freeboard (height above the lake level). The freeboard provides a reliable buffer to accommodate waves and ice movement, as well as natural year-to-year lake level fluctuations and major precipitation events. Should ongoing lake level monitoring indicate an increasing trend during operations, the crest height of the dikes can be raised to provide additional contingency to safely continue operations. Placement of riprap upstream is also included for wave protection.

Once process plant operations commence, water management capacity will also be available within the plant site pond in addition to the central water storage pond (CWSP). Should a storm event occur, including the EDF or IDF, minewater can remain temporarily in the open pit as a contingency if there is insufficient capacity remaining in the CWSP. The water would then be pumped out of the open pit in the days following a storm event as capacity becomes available in the CWSP. During any such period, the ore processing plant feed can continue from the ore stockpile so as not to disrupt ore processing and mining could potentially continue above the filled pit level. Special handling or treatment of snow is not required, as accumulated snow in the pit will be removed with the excavated mined materials (overburden, mine rock or ore), or will melt and drain towards the installed sumps.

The mine site runoff collection systems will be designed to contain a 1:100-year storm event. Typically, the design of mine site water management systems in northern Ontario is governed by the spring freshet (which is a long duration event, lasting several weeks) or a summer rainstorm (which is a shorter period, ranging from several hours to several days). For the ditch sizing, a short duration storm event will produce the largest peak flow and therefore govern the sizing. Conveyance requirements for the collection ditches were also conservatively developed to convey the peak flow from the 1:100-year storm.

The intent of engineering design standards and codes is to maintain the integrity of infrastructure and facilities. The risks to buildings and infrastructure associated with major precipitation events will be managed through design criteria and management practices. The NBCC (NRCan 2020a) provides for factors of safety to account for possible extreme precipitation events and will form the design basis for Project-related buildings and structures to prevent damage to infrastructure from such events. In the event of flooding in the building areas, it expected that water would be pumped out and minor damage would be repaired, without stoppage in Project activity. With implementation of these design standards and codes, combined with engineering best practices, major precipitation events are not considered to have the potential to substantively damage Project infrastructure or components during all phases of the Project.

Extreme precipitation events could contribute to conditions that may affect the successful establishment of vegetation during reclamation of the site. Unsuccessful revegetation activities may result in reclamation activity delays, additional costs of adjusting or repeating revegetation, and increased erosion potential for the period that revegetation is unsuccessful. Revegetation studies will be initiated during operations to evaluate soil amendments and seed mixes to maximize the success of the final revegetation program. In addition, adaptive monitoring of reclaimed areas to allow for modifications in response to changes in site-specific conditions. Monitoring of revegetation until vegetation covers are proven to be self-sustaining.

8.6.2 CDF Dam and East and West Dike Stability

Major precipitation events have the possibility of causing erosion of the dams within the CDF and the dikes (i.e., east and west) isolating the open pit. Similar to the dikes constructed at the Meadowbank Gold Mine in Nunavut and the dam constructed at the Diavik Diamond Mine in the Northwest Territories, the Project dikes are designed to a very high level of stability. The water level of Springpole Lake is continuously monitored, which informs the design of the dams in the CDF and dikes isolating the open pit, in accordance with the Canadian Dam Association *Dam Safety Guidelines* (CDA 2013, 2019) and the requirements of the Ontario *Lakes and Rivers Improvement Act* (R.S.O. 1990, c. L.3) (MNR 2011b). As described in Section 8.6.1, the recommended IDF during operations is based on the dam classification under the CDA guidelines (CDA 2013, 2019); a 72-hour probable maximum precipitation (400 mm) is used as the dam design factor. With implementation of the design standards and codes, combined with engineering best practices, major precipitation events are not considered to have the potential to substantively erode the dikes isolating the open pit and dams within the CDF during all phases of the Project.

8.7 Seismic Event

Detailed information on seismic events that have occurred in Canada is contained in publications of Earthquakes Canada of Natural Resources Canada and their predecessor organizations. A seismic zoning map for Canada has been developed on the basis of these studies and is used in the NBCC (NRCan 2020a) to help design and construct buildings that are appropriate for a given region.

The Project is located within a low seismic hazard zone (AGP 2021). The Geological Survey of Canada provides ground motion parameters (peak ground acceleration [PGA] and spectral accelerations for various return periods) for locations within Canada. PGA is a measure of how hard the earth shakes and is measured in units of acceleration due to gravity (g). The ground motion parameters are published in the 2020 NBCC and made available through an online seismic hazard calculator tool (NRCan 2020b). The PGA values obtained from the online calculator for 1:475, 1:1,000 and 1:2,475-year return periods for the mine site are summarized in Table 8.7-1. The PGA value corresponding to the 1:10,000-year event was obtained by extrapolation. Based on maximum credible seismic criteria estimates from the Natural Resources Canada seismic hazard calculator (NRCan 2020b), the design seismic event is characterized as halfway between the 1:2,475-year and the 1:10,000-year return period seismic events.

Table 8.7-1: Peak Ground Accelerations for the Springpole Project

Return Period (years)	PGA (g)	Probability of Exceedance
1:475	0.01	10% / 50 year
1:1,000	0.02	5% / 50 year
1:2,475	0.04	2% / 50 year
1:10,000	0.13 (1)	0.5% / 50 year

Source: NRCan 2020a.
Note:
(1) Extrapolated value.

The Project and related facilities and infrastructure will be designed to the applicable standard in consideration of the maximum credible seismic event for the region. The NBCC (NRCan 2020a) provides for sufficient factors of safety to account for seismic activity in active seismic zones in Canada and form the basis of the design and construction of the Project-related buildings and structures. Furthermore, the dikes have been designed in accordance with the Canadian *Dam Safety Guidelines* (CDA 2013, 2019) and the provincial regulatory requirements under the *Lakes and Rivers Improvement Act* (R.S.O. 1990, c. L.3) (MNR 2011a). Stability analyses were performed for long-term and 1:10,000-year design seismic event loading conditions (CDF Design Report: Appendix V-1) and determined that the required factors of safety criteria for the CDF dams are met or exceeded as required by CDA (2013). In addition, the CDF design criteria will consider the highest hazard classification with a 1:10,000-year design seismic event.

The intent of these and other design standards is to maintain the integrity of the facilities based on the level of risk for a seismic event of a magnitude up to the maximum credible event. Therefore, seismicity is not considered to have the potential to substantively damage Project infrastructure or components during all phases of the Project, due to planned design mitigation and the application of the NBCC (NRCan 2020a) and other applicable guidelines.

8.8 Forest Fires

Forest fires are part of the natural regeneration cycle within the Trout Lake Forest Management Unit of the Wabigoon Ecoregion where the Project is situated, which has stand-replacing fire cycles ranging between 50 and 187 years (Crins et al. 2009). The mine site lies within a heavily forested area, dominated by upland deciduous – mixed wood forest, upland coniferous forest and coniferous swamp communities. As a result, all Project components are vulnerable to a natural fire due to the surrounding contiguous forest cover. A considerable number of natural fires have occurred in the region in the past (Figure 3.2-1), including in 2021, when a fire required the temporary evacuation of personnel from the mine site.

Birch Lake to the north and Springpole Lake to the west and south of the Project act as a natural fire break, limiting forest fires that could otherwise travel toward the Project from the north and west. There is a somewhat higher susceptibility to fires arising from the southeast. However, the open pit, overburden stockpile and general direction of winds being from the west and northwest will provide a degree of protection for Project infrastructure.

The risks associated with forest fires will be managed through design criteria and management controls. Design criteria for Project infrastructure and facilities incorporated fire protection as appropriate in accordance with the NBCC (NRCan 2020b) and the National Fire Code of Canada (NRCan 2020c). The facility structures will be constructed primarily of concrete and steel, which are not typically affected by fire, and the majority of materials handled (e.g., ore, mine rock, tailings) are not flammable. Emergency measures will be in place to quickly control and extinguish the flames prior to contact with Project components in the event of a forest fire in direct proximity to the Project.

Fire suppression systems will also be installed to protect key infrastructure including buildings, power supply, and fuel storage areas and ensure the safety of personnel. Remote buildings such as the explosives storage will be equipped with portable extinguishers as required, to expedite response. In addition, firefighting capabilities and personnel (including appropriate equipment) on-site will be at a high level of training and readiness. Evacuation plans will be developed to ensure the safe transportation of people from site, if needed, including via boat and airstrip should the mine access road be unsafe. Should it be determined in the future that additional fire breaks are required, appropriate approvals will be sought from the MNR.

As the proposed transmission line passes through areas previously impacted by forest fires, as well as areas of mature forest, it is vulnerable to natural fires along the entire route over the life of the mine. Accordingly, the transmission line is expected to use steel rather than wooden poles. If portion(s) of the transmission line were to be damaged by fire, those portions would need to be repaired before permanent power could be restored to the site. Until such time, onsite diesel generation will provide backup power to safely reduce operations until the full power supply can be reinstated. Contingency transmission line poles may be stored at site to facilitate expeditious line repair in the event of fire damage to the line.

Forest fires may affect the successful establishment of vegetation during reclamation of the site. Unsuccessful revegetation activities may result in reclamation activity delays, additional costs of repeating revegetation. Monitoring of revegetation until vegetation covers are proven to be self-sustaining.

The ongoing monitoring during the fire season and proposed safety programs for the Project are capable of rapid detection and response to any forest fire threat. As such, safe evacuation of the site will be possible if needed, without leaving facilities in an environmentally insecure condition. While natural fires could have an effect on Project components and require temporary cessation of work, emergency response plans and fire trained individuals and response equipment are planned in readiness for, and in response to a forest fire event.

8.9 Summary

This assessment of effects of the environment on the Project identified and characterized potential changes to, or effects on, the Project that may occur in association with natural hazards or the influences of nature (e.g., climate change) in order to identify design features and mitigation practices that will be implemented to avoid or limit potential changes or effects.

The Project has been designed and will be carried out to withstand environmental conditions by applying engineering principles and practices, and by following various codes and standards from the NBCC and other required governing bodies. This includes identification of prevention measures to minimize the probability of occurrence of the natural hazard and measures to mitigate the severity of the potential effect. There are no environmental components that are anticipated to result in a substantial change to the Project schedule, a long-term interruption in service, damage to Project infrastructure causing a significant environmental effect or an increased safety risk, or damage to Project infrastructure requiring repairs that cannot be technically or economically implemented, for any phase of the Project. Table 8.9-1 describes the identified interactions with Project components or activities, and the engineering design and mitigation measures to be implemented to minimize or eliminate risk.

The assessment also considered the potential effects of future climate change on the Project. The results of a site-specific analysis summarizing climate variables for the Project indicate a future that is likely to be Mean temperature and extreme heat show an increasing trend over time. These projected changes may contribute to increases in the frequency and severity of wildfires, major precipitation events, summer storms, and extreme heat events. Climate changes could potentially result in a shift in weather conditions and/or the frequency of extreme weather events. The closure plan developed for the Project does not rely on measures that would be materially affected by climate change, as these events are already considered in the Project's engineering design and includes mitigation measures, including adaptive management, to certify that reclamation objectives are met.

As part of a continual improvement process, the potential risks associated with natural hazards and future climate change will continue to be considered in engineering and design on an ongoing basis. As the Project advances through operations to post-closure, any observed effects of climate change that may occur will be incorporated in the active management and operation of the Project. Modifications done through an adaptive management approach will prevent an undue effect of the environment on the Project that could adversely affect operations, damage infrastructure, cause Project delays, or otherwise adversely affect the normal course of operation at the facilities. This continual improvement will allow the Project to operate with flexibility as the climate continues to change and as information on climate projections are updated.

Table 8.9-1: Project Interactions and Mitigation Measures for Climate Hazards

Project Component / Activity	Climate Hazards	Description of Identified Project Interaction	Mitigation Measures
Operations Phase			
• East and west dikes • CDF dams • Surficial soil stockpile and ore stockpiles • Buildings, other facilities, and general infrastructure (e.g., process plant complex, explosives facility, accommodations complex) • Transmission line • Haul roads, mine access road and airstrip	High winds	• Extreme wind events can result in enhanced wave action on Springpole Lake against the dikes. • High winds can lead to erosion of surficial soil and ore stockpiles. • High winds could lead to a greater need for repairs or complete replacements of buildings and infrastructure. • High winds could cause downed trees, which could down the transmission line resulting in power loss. • High winds could cause downed trees, which could block the mine access road. • High winds during periods of below-freezing air temperatures can contribute to increased wind chill and blowing snow, which will reduce visibility, and potentially limiting access to the mine site.	• The risks associated with high winds are addressed by engineering design to comply with building codes and standards that incorporate factors of safety to account for possible high winds (including allowances for future increased frequency and/or severity of these events that could arise from climate change). • Safety procedures will be in place to address worker safety, and will include reducing traffic speeds, addressing road conditions (e.g., snow removal, sanding) as quickly as possible, and if necessary, issuing work stop orders. • In the event of a power outage, onsite diesel generation will be in place to provide backup power to safely reduce operations until the full power supply can be reinstated. • Erosion because of extreme winds on the surficial soil and ore stockpiles is reduced through planned mitigated, such as progressive reclamation, seeding the surficial soil and ore stockpiles as they are developed to help control erosion of the stockpile, staged development of the surficial soil and ore stockpiles to minimize wind erosion. • The dikes are constructed of coarse rock outer shell to withstand winds and wave action and include 5 m of freeboard above the elevation of Springpole Lake to prevent overtopping during storm events.
• East and west dikes • Surficial soil stockpile and ore stockpiles • Buildings, other facilities, and general infrastructure (e.g., process plant complex, explosives facility, accommodations complex) • Water management system and treatment facilities • Haul roads, mine access road and airstrip	Extreme temperatures	• Temperature-related erosion of areas that have not been fully installed or reclaimed, leading to enhanced erosion. • Freeze-thaw cycles may cause physical weathering of the surficial soils and ore stockpiles. • Extreme temperature changes can degrade concrete and can lead to cracks in pipes. • Extreme cold could lead to the freezing of pipes and equipment. • Increased temperatures and freeze-thaw cycles could cause degradation of buildings and insulation. • Extreme cold and freeze thaw cycles may affect the roads and airstrip causing cracks or potholes due to temperature fluctuations.	• The risks associated with extreme temperatures are managed through design criteria (e.g., building codes and standards) and management practices. • The intent of engineering design standards and codes is to maintain the integrity of the infrastructure and facilities. • All piping will be designed and installed to standards that are designed for regional weather (e.g., heat tracing). • Buildings will be designed for the climate; roofs would be designed to meet requirements associated with local climate, which would avoid damage caused from snowfall melt. • Exposed areas will be vegetated where possible to prevent surface erosion. • Erosion will be repaired quickly with no disruption to other Project activities or substantial damage to infrastructure. • Roads and the airstrip will be designed for the site-specific climate and maintained accordingly. • Exposed soils will be stabilized, roadways will use suitable gravel bases and sub-bases to prevent erosion.

Table 8.9-1: Project Interactions and Mitigation Measures for Climate Hazards

Project Component / Activity	Climate Hazards	Description of Identified Project Interaction	Mitigation Measures
• Buildings, other facilities, and general infrastructure (e.g., process plant complex, explosives facility, accommodations complex) • Water management system and treatment facilities • Haul roads, mine access road and airstrip	Snowstorms	• Buildings may be vulnerable to extreme weather events, including heavy snowfall, which may cause structural damage to the roofs. • Severe snowstorms could affect vehicle operation at the site because of reduced traction and visibility and could increase the probability of vehicle accidents.	• Safety procedures will be in place to address worker safety, and will include reducing traffic speeds, addressing road conditions (e.g., snow removal, sanding) as quickly as possible, and if necessary, issuing work stop orders. • Emergency procedures will include emergency prevention and response procedures for heavy snowfall events. • Weather uncertainties have been accounted for, and risks associated with severe snowstorms and snow loads to facilities are managed through design criteria for the Project. • Buildings will be designed according to the appropriate codes, such as Part 4 of the NBCC (NRCan 2020a), to withstand large accumulations of snow on rooftops. • Vehicle traffic during severe snowstorms can be deferred or reduced. • Snow will be shovelled off roofs after heavy snowfalls. if needed. to prevent roof damage from excessive loads.
• East and west dikes • CDF dams • Surficial soil stockpile and ore stockpiles • Buildings, other facilities, and general infrastructure (e.g., process plant complex, explosives facility, accommodations complex) • Water management system and treatment facilities • Haul roads, mine access road and airstrip	Major precipitation events	• Major precipitation events may cause erosion of the dikes and the CDF dams. • Extreme precipitation may cause erosion of the surficial soils and ore stockpiles. • Increasing extreme precipitation events may result in structural damage of buildings because of corrosion. • Water management systems and control structures may be affected by heavy precipitation causing overflow. • A major precipitation event (e.g., severe rainstorms) could result in excess water management requirements. • Increasing extreme precipitation events including high intensity rainfalls and storms may cause flooding on the roads, limiting the access to the site.	• The risks associated with major precipitation events will be managed through design criteria and management practices. • The NBCC (NRCan 2020a) provides for factors of safety to account for possible extreme weather and forms the design basis for Project-related buildings and structures to prevent damage to infrastructure. • The Project's water management system is designed to manage the EDF without discharge of untreated water to the environment. • The infrastructure designs use professional engineering standards and criteria for ditches, water storage ponds, and any necessary emergency spillway. • Storage ponds and water management infrastructure designs have enough capacity to withstand both the EDF and IDF. • Dikes and dams have been designed in accordance with both the Canadian *Dam Safety Guidelines* (CDA 2013, 2019) and Ontario MRN (2011a) guidelines, as applicable. • Water volumes within the water management system will be controlled to maintain storage capacity in advance of wet seasons to accommodate the potential excess water volumes. • Water management capacity will be available within the plant site pond in addition to the central water storage pond. • Should a storm event occur minewater can remain temporarily in the open pit as a contingency if there is insufficient capacity remaining in the CWSP.

Table 8.9-1: Project Interactions and Mitigation Measures for Climate Hazards

Project Component / Activity	Climate Hazards	Description of Identified Project Interaction	Mitigation Measures
• Buildings, other facilities, and general infrastructure (e.g., process plant complex, explosives facility, accommodations complex) • Transmission line • Haul roads, mine access road and airstrip	Forest fires	• Buildings are vulnerable to forest fires. • Forest fires could cause temporary suspension of activities because of danger to worker safety, discomfort, and unhealthy working conditions due to smoke inhalation. • The transmission line is vulnerable to fires along its entire route as it passes through mature forest. • Forest fires may affect site access using roads.	• Design criteria for Project infrastructure and facilities incorporated fire protection as appropriate in accordance with the NBCC (NRCan 2020a) and the National Fire Code of Canada (NRCan 2020c). • The facility structures will be constructed primarily of concrete and steel, which are not typically affected by fire. • Emergency measures will be in place to quickly control and extinguish the flames prior to contact with Project components. • Fire suppression systems will be installed to protect key infrastructure including buildings, power supply, and fuel storage areas and help ensure the safety of personnel. • Remote buildings such as the explosives storage will be equipped with portable extinguishers as required, to expedite response. • Firefighting capabilities (including appropriate equipment) on-site will be at a high level of training and readiness. • Evacuation plans will be developed to ensure the safe evacuation of people from site, if needed, including via boat and airstrip should the mine access road be unsafe. • The transmission line is expected to use steel rather than wooden poles. • Onsite diesel generation provides backup power to safely reduce operations until the full power supply can be reinstated. • Contingency transmission line poles may be stored at site to facilitate expeditious line repair in the event of fire damage to the line. • Ongoing monitoring during the fire season.
Decommissioning and Closure [(1)]			
• Remaining infrastructure management • CDF rehabilitation • Open pit / pit lake • Surface water controls	High winds	• High winds could lead to a greater need for repairs or complete replacements of buildings and infrastructure required for active closure. • Buildings required for active closure may be vulnerable to extreme weather events, including high winds, which may cause structural damage to the roofs. • High winds can lead to erosion of surficial soil and ore stockpiles.	• The risks associated with high winds are addressed by engineering design to comply with building codes and standards that incorporate factors of safety to account for possible high winds (including allowances for future increased frequency and/or severity of these events that could arise from climate change). • Where practical and applicable, progressive reclamation and revegetation will be implemented for disturbed areas no longer required.

Table 8.9-1: Project Interactions and Mitigation Measures for Climate Hazards

Project Component / Activity	Climate Hazards	Description of Identified Project Interaction	Mitigation Measures
	Extreme temperatures	• Extreme cold could also lead to the freezing of pipes and equipment on the ground surface that are used to manage water during closure or provide heating to buildings and facilities. • Increased temperatures and extreme heat could cause degradation of the remaining buildings and insulation, which would reduce the life expectancy of the buildings. • The freeze-thaw cycles may interact with the remaining building structures and insulation causing freeze weathering. • Extreme cold and freeze thaw cycles may affect the roads and airstrip causing cracks or potholes due to temperature fluctuations. • Extreme heat could cause drought conditions that would reduce the flow rate of water from Springpole Lake into the open pit, which would increase the time needed to fill the pit and subsequently a long closure period. • Temperature-related erosion could affect areas that have not been fully installed or reclaimed, leading to enhanced erosion of areas more vulnerable to erosion.	• The risks associated with extreme temperatures are managed through design criteria (e.g., building codes and standards) and management practices. • The intent of engineering design standards and codes is to maintain the integrity of the infrastructure and facilities. • All piping will be designed and installed to standards that are designed for regional weather. • Buildings will be designed for the climate; roofs would be designed to meet requirements associated with local climate, which would avoid damage caused from snowfall melt. • The overburden slopes of the open pit, which will not be underwater, will be graded to stable side slopes and vegetated to reduce the potential for soil erosion from wind and water. • Implementation of the Erosion and Sedimentation Plan will reduce the risk of erosion. • Exposed areas will be vegetated where possible to prevent surface erosion. Erosion will be repaired quickly with no disruption to other Project activities or substantial damage to infrastructure. • Roads and the airstrip will be designed for the site-specific climate and maintained accordingly. • Physical stability monitoring will include annual dam safety inspections conducted by a qualified Professional Engineer and dam safety reviews will be completed every 10 years following closure.
	Snowstorms	• Buildings required for active closure may be vulnerable to extreme weather events, including heavy snowfall, which may cause structural damage to the roofs. • Heavy snowfall could restrict access to the site.	• Safety procedures will be in place to address worker safety, and will include reducing traffic speeds, addressing road conditions (e.g., snow removal, sanding) as quickly as possible, and if necessary, issuing work stop orders. • Emergency procedures will include emergency prevention and response procedures for heavy snowfall events. • Weather uncertainties have been accounted for, and risks associated with severe snowstorms and snow loads to facilities are managed through design criteria for the Project. • Buildings will be designed according to the appropriate codes, such as Part 4 of the NBCC (NRCan 2020a), to withstand large accumulations of snow on rooftops. • Snow will be shovelled off roofs after heavy snowfalls. if needed. to prevent roof damage from excessive loads.

Table 8.9-1: **Project Interactions and Mitigation Measures for Climate Hazards**

Project Component / Activity	Climate Hazards	Description of Identified Project Interaction	Mitigation Measures
	Major precipitation events	• Increased precipitation may impede the movement of equipment and activities on the mine site and limiting access for the completion of closure activities. • Increasing extreme precipitation events may result in structural damage of remaining buildings because of corrosion. • A major precipitation event could result in excess water management requirements. • Increasing extreme precipitation events including high intensity rainfalls and storms may cause flooding on the roads, limiting the access to the site.	• The risks associated with major precipitation events will be managed through design criteria and management practices. • The NBCC (NRCan 2020a) provides for factors of safety to account for possible extreme weather and forms the design basis for Project-related buildings and structures to prevent damage to infrastructure. • Where practical and applicable, progressive reclamation and revegetation will be implemented for disturbed areas no longer required. • The Project's water management system is designed to manage the EDF without discharge of untreated water to the environment. • The infrastructure designs use professional engineering standards and criteria for ditches, water storage ponds, and any necessary emergency spillway. • Water management infrastructure designs have enough capacity to withstand both the EDF and IDF. • Implementation of the Erosion and Sedimentation Plan will reduce the risk of erosion. • Dikes and dams have been designed in accordance with both the Canadian *Dam Safety Guidelines* (CDA 2013, 2019) and Ontario MNR (2011a) guidelines, as applicable. • During the closure phase, the ETP will continue to be used if needed, or will remain available for contingency use. • Physical stability monitoring will include annual dam safety inspections conducted by a qualified Professional Engineer and dam safety reviews will be completed every 10 years following closure. • Ore stockpile areas will be reclaimed (either regraded to promote natural drainage.
	Forest fires	• Buildings are vulnerable to forest fires. • Forest fires could cause temporary suspension of closure activities because of danger to worker safety, discomfort, and unhealthy working conditions due to smoke inhalation. • The transmission line is vulnerable to fires along its entire route as it passes through mature forest. • Forest fires may affect site access using roads.	• Design criteria for Project infrastructure and facilities incorporated fire protection as appropriate in accordance with the NBCC (NRCan 2020a) and the National Fire Code of Canada (NRCan 2020c). • The facility structures will be constructed primarily of concrete and steel, which are not typically affected by fire. • Emergency measures will be in place to quickly control and extinguish the flames prior to contact with Project components. • Fire suppression systems will be installed to protect key infrastructure including buildings, power supply, and fuel storage areas and help ensure the safety of personnel. • Firefighting capabilities (including appropriate equipment) on-site will be at a high level of training and readiness. • Evacuation plans will be developed to ensure the safe evacuation of people from site, if needed, including via boat and airstrip should the mine access road be unsafe. • The transmission line is expected to use steel rather than wooden poles. • Onsite diesel generation provides backup power to safely reduce operations until the full power supply can be reinstated. • Contingency transmission line poles may be stored at site to facilitate expeditious line repair in the event of fire damage to the line. • Ongoing monitoring during the fire season.

Table 8.9-1: Project Interactions and Mitigation Measures for Climate Hazards

Project Component / Activity	Climate Hazards	Description of Identified Project Interaction	Mitigation Measures
• Implementation of the revegetation plan	High winds	• High winds may affect the successful establishment of vegetation used in the reclamation of the site.	• Initiation of revegetation studies during operations to evaluate soil amendments and seed mixes to maximize the success of the final revegetation program. • Adaptive monitoring of reclaimed areas to allow for modifications in response to changes in site-specific conditions. • Monitoring of revegetation until vegetation covers are proven to be self-sustaining.
	Extreme temperatures	• Extreme heat could contribute to drought conditions that may affect the successful establishment of vegetation used in the reclamation of the site. • Unsuccessful revegetation activities may result in reclamation activity delays, additional costs of adjusting or repeating revegetation, and increased erosion potential for the period while revegetation is unsuccessful.	
	Major precipitation events	• Major precipitation events could contribute to flooding that may affect the successful establishment of vegetation used in the reclamation of the site. • Unsuccessful revegetation activities may result in reclamation activity delays, additional costs of adjusting or repeating revegetation, and increased erosion potential for the period while revegetation is unsuccessful. • Increasing extreme precipitation events including high intensity rainfalls and storms may cause flooding on the roads, limiting the access to the site to complete closure and post-closure monitoring.	
	Forest fires	• Loss of reclaimed areas due to forest fires may result in reclamation activity delays, additional costs of adjusting or repeating revegetation, and increased erosion potential for the period while revegetation is unsuccessful.	

Note:

(1) Flooding from increasing water levels in Springpole Lake have not been identified as a climate hazard for closure and post-closure phase activities as this would be a benefit to the Project as it would reduce infilling time of the open pit.

8.10 References

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