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## **5.0 PROJECT DESCRIPTION**

### **5.1 Introduction**

First Mining Gold Corp. (FMG) proposes to develop, operate and eventually decommission and close an open pit gold and silver mine and ore process plant with supporting infrastructure located in northwestern Ontario known as the Springpole Project (Project). The Project has an estimated mineral resource of 4.6 million ounces of gold and 24.3 million ounces of silver (AGP 2021) with a planned mine life of approximately 10 years, while providing significant benefits to the local, regional and Indigenous economies of northwestern Ontario. The Project also has important critical mineral potential, hosting considerable tellurium which will be further evaluated during life of mine.

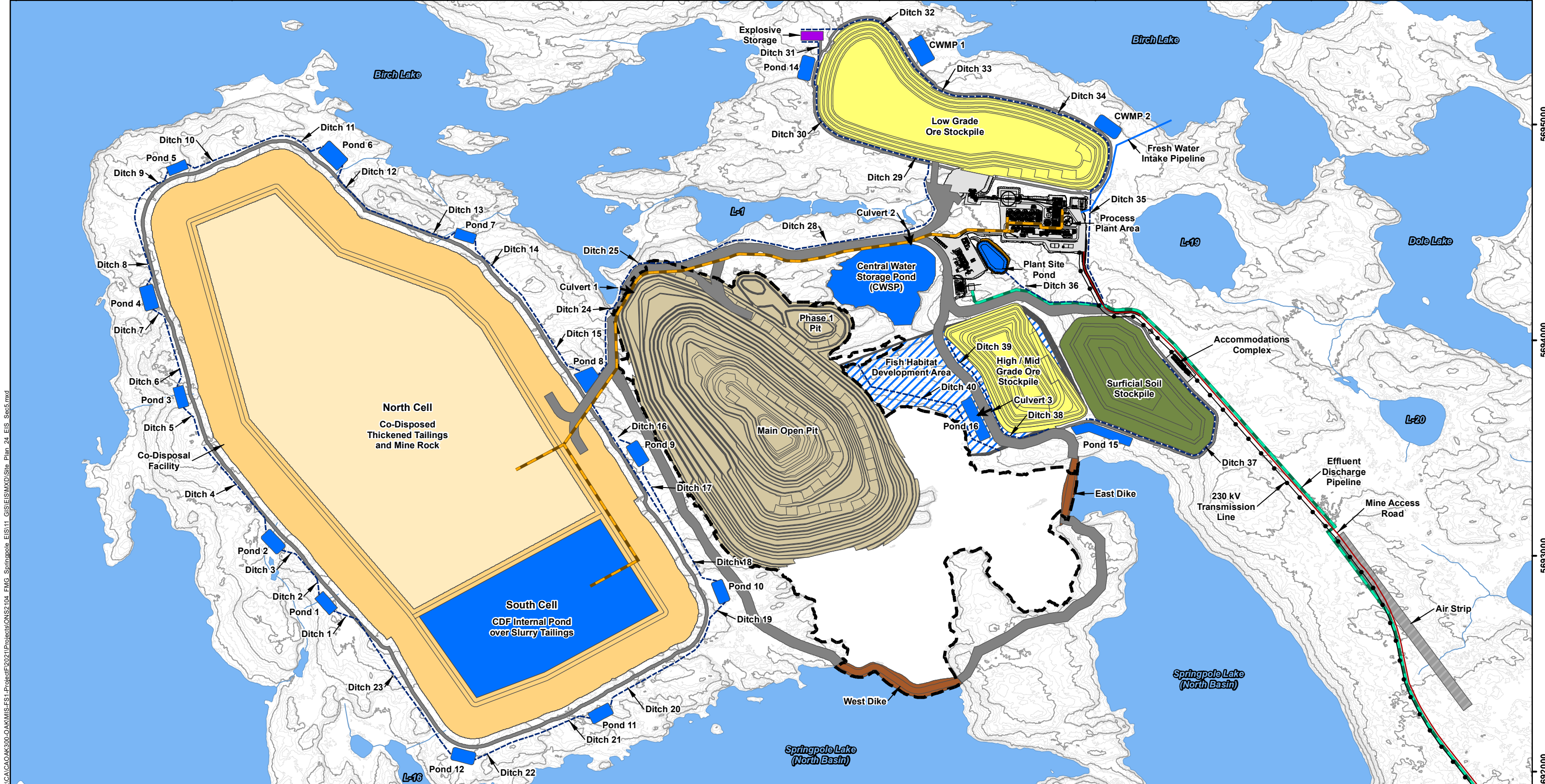
Critical minerals are essential resources that play a crucial role in various industries, including technology, manufacturing, defense, and especially renewable energy towards national and global decarbonization. The Project will support critical minerals strategies consistent with provincial, federal and global priorities, including, Ontario's Critical Mineral Strategy (MNR 2022), which aims to support the development of the critical mineral sector to secure resilient supply chains while unlocking economic growth and infrastructure development. The deposit also contains critical minerals such as tellurium and fluorspar. Of the 31 critical minerals listed, tellurium, zinc, fluorspar and lithium occur in various quantities in and around the Project site. While silver is not currently listed as a critical mineral by the Canadian government, is the most conductive element on earth, widely sought for industrial and green energy applications. With over 24 million ounces of silver, the Project would be the most significant silver producer in Ontario.

The proposed site layout and infrastructure routing provided in Figure 5.1-1 and Figure 5.1-2 have been developed by means of a comprehensive assessment of alternatives (Section 4), guided in part by feedback received from consultation and engagement activities completed to date (Section 2). The Project is planned and designed to provide flexibility for future design optimizations, avoid/minimize adverse environmental effects through careful configuration and use of best available technology economically achievable (BATEA). For example, mine-related facilities have been strategically placed near the open pit to the extent practicable to minimize the overall footprint and associated environmental effects. With a mine site footprint of only 867 hectares (ha) and a total Project footprint of approximately 1,365 ha when considering the access road and transmission line, the Project is one of the smallest open pit mining projects in the Canadian gold sector for a mine of its production capacity. With these efforts, Project facilities have been located to avoid and reduce interactions with sensitive environmental features. Where avoidance is not practicable, proven mitigation measures have been included.

FMG is committed to supporting the federal and provincial target of net-zero through the development and implementation of a Net-Zero Strategy (Appendix I-2). The Net-Zero Strategy details FMG's plan for a net-zero Project and to embed a climate positive approach to all aspects of the Project. The Net-Zero Strategy is presented in support of the target to reduce the net greenhouse gas emissions to zero over the life of the Project. It includes the use of technologies and practices to reduce fossil fuel use and potential opportunities through carbon offsets and credits to balance residual greenhouse gas emissions from the Project.

The Project sets out to be designed in a manner compatible with regional land use planning, to be respectful of the rights and interest of local Indigenous communities and land users in the area, and to facilitate the eventual reclamation of the site, while providing long-term sustainable infrastructure opportunities for the region.

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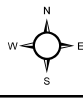
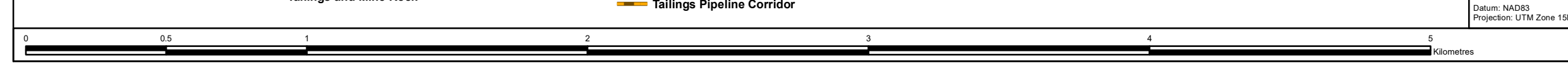
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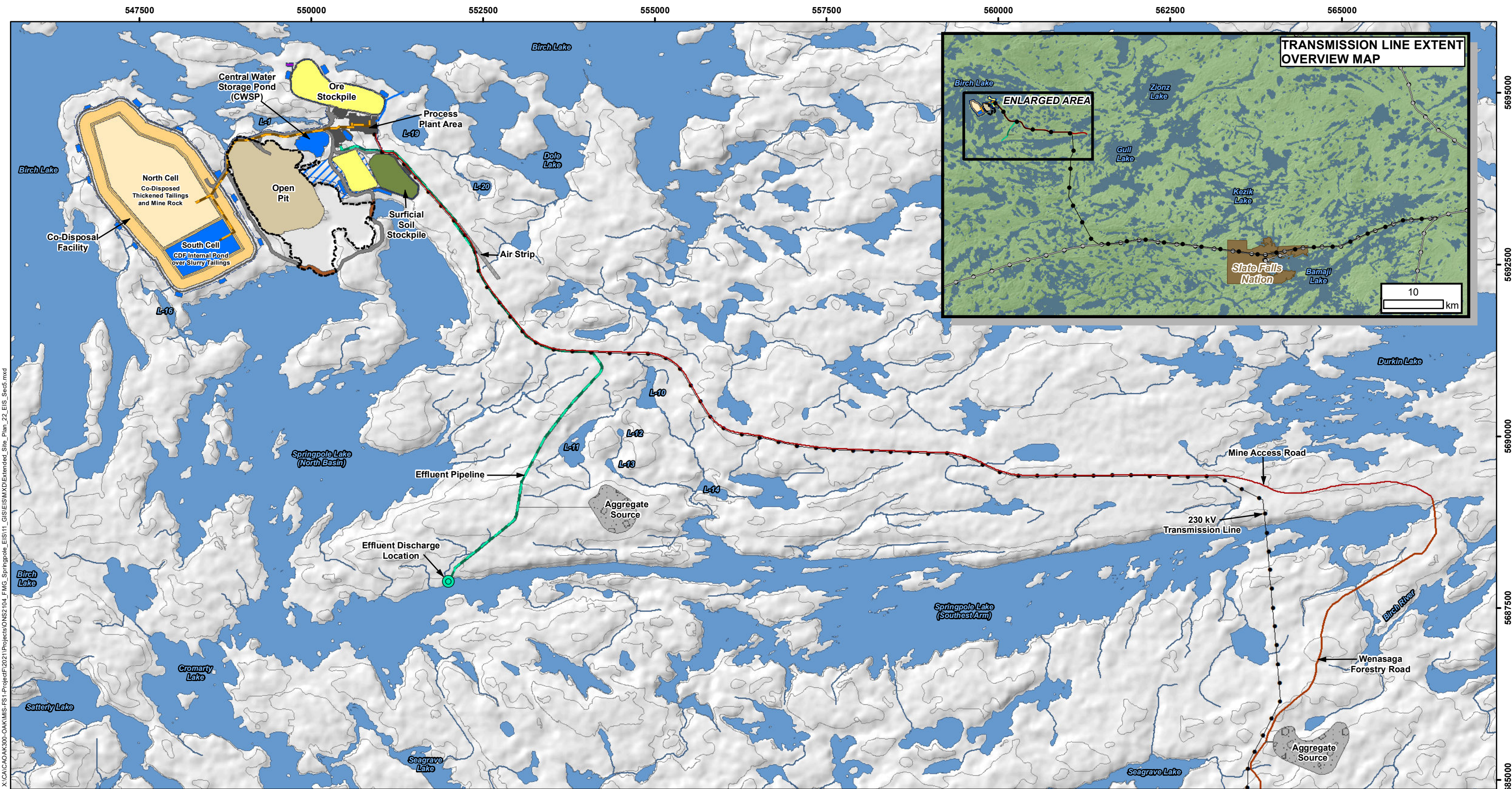
Watercourse	Proposed Mine Features	Process Plant Area	Mine Access Road	Fish Habitat Development Area
Waterbody	Open Pit	Dike	Seepage / Runoff Collection System	
Major Contours (5 m interval)	Open Pit Basin	Pond	Culvert	
Minor Contours (1 m interval)	Ore Stockpile	Haul / Access Road	230 kV Transmission Line	
	Surficial Soil Stockpile	Explosives Storage	Fresh Water Intake Pipeline	
	Co-Disposal Facility	Air Strip	Effluent Discharge Pipeline	
	Co-Disposed Thickened Tailings and Mine Rock		Tailings Pipeline Corridor	

**NOTES:**  
 - Contours extracted from 2020 LiDAR survey.  
 - 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.  
 - Ditching and sums current as of October 2024.

<b>SPRINGPOLE GOLD PROJECT</b>	
<b>EIS / EA Site Plan</b>	
PROJECT N°: ONS2104 SCALE: 1:17,000	FIGURE: 5.1-1 DATE: October 2024



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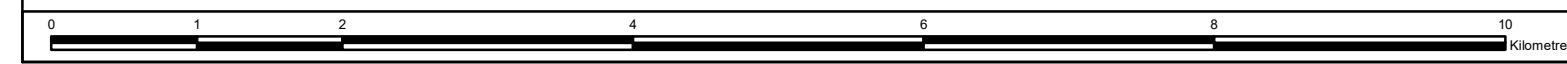
Aggregate Source	Proposed Mine Feature	Process Plant Area	Mine Access Road	Fish Habitat Development Area
Existing Road	Open Pit	Dike	Seepage / Runoff Collection System	Effluent Discharge Location
Watercourse	Open Pit Basin	Pond	Fresh Water Intake Pipeline	
Waterbody	Ore Stockpile	Haul / Access Road	Tailings Pipeline Corridor	
Existing Transmission Line	Surfacial Soil Stockpile	Explosives Storage	Effluent Discharge Pipeline	
Contour (10 m intervals)	Co-Disposal Facility	Air Strip		
	Co-Disposed Thickened Tailings and Mine Rock			

**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.
- Ditching and sumps current as of October 2024.

Datum: NAD83  
Projection: UTM Zone 15N

<b>SPRINGPOLE GOLD PROJECT</b>	
<b>EIS / EA Extended Site Plan</b>	
PROJECT N°: ONS2104	FIGURE: 5.1-2
SCALE: 1:52,000	DATE: October 2024



## 5.2 Project Overview

FMG has focused on designing a compact and highly efficient mine site. The main components of the Project are as follows and as shown in Figure 5.1-1 and Figure 5.1-2:

- Open pit and related infrastructure;
- East and west dikes used to safely isolate the open pit basin during mining;
- Co-disposal Facility (CDF) for mine rock and tailings (north cell and south cell);
- Surficial soil stockpile, for temporary storage of soil that will be reused in site restoration;
- Ore stockpiles, for temporary storage of ore to be processed over the life of the mine;
- Process plant and process plant complex;
- Site infrastructure;
- Water management and treatment facilities;
- Fish habitat development area;
- Accommodations complex;
- Aggregate operation(s);
- Transmission line; and
- Mine access road and co-located airstrip.

The Project is expected to be developed over a three-year construction phase (Year -3 to Year -1). A mine life of approximately 10 years (Year 1 to 10) is anticipated based on the extensive work carried out to define the Springpole ore body. Progressive reclamation will be carried out during operations, and final decommissioning and closure of the site will follow once operations cease. The primary decommissioning and closure period (i.e., active closure; Year 11 to Year 15 – five years in length) will be followed by a period of post-closure environmental monitoring (Years 16+). Activities associated with each Project phase are described further in Section 5.4.

The foundation for this description of the proposed Project is based primarily on the Pre-feasibility Study (AGP 2021) but also considers completed and ongoing optimization studies, additional data and analysis, and consultation and engagement activities, including expert input from the IGTRB. Examples of technical optimizations made since the Pre-feasibility Study was published (2021) include:

- Optimized management concept for mine rock and tailings to promote a smaller carbon footprint and more effective encapsulation of potentially acid generating (PAG) mine rock by producing thickened non-acid generating (NAG) tailings that will be hydraulically transported via pipeline to the north cell of the CDF and reduce trucking activity;
- Development of a quarry within the CDF to maintain small and highly efficient Project footprint and reduce CDF dam heights from additional tailings capacity of the quarried volume;
- Removal of the foundation liner while retaining the dam liners at the south cell of the CDF to reflect increased certainty in the foundation conditions, which demonstrate the liner is not necessary;
- Use of BATEA for water treatment;



- Enhanced contact water management approach through development of an integrated water management plan;
- Optimized location for the treated effluent discharge;
- Enhanced design of the fish habitat development area for closure;
- Inclusion of the co-located airstrip (i.e., with the mine access road);
- Revised transmission line routing to reflect SFN comments and discussions to reduce potential disruptions to traditional use areas; and
- Co-located the transmission line routing with the mine access road to reduce Project footprint and linear corridors.

The Project has been optimized to reflect the advancement of engineering studies and consultation with government agencies, Indigenous communities and interested parties on the draft EIS/EA.

### **5.3 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).

Consultation feedback has been addressed through direct responses (in writing and during follow-up meetings) and in the final EIS/EA, as appropriate. FMG responded to technical and Indigenous/public comments from provincial and federal regulators (Impact Assessment Agency of Canada [IAAC], Environment and Climate Change Canada [ECCC], Fisheries and Oceans [DFO], Ministry of the Environment, Conservation and Parks [MECP], Ministry of Natural Resources [MNR], Ministry of Mines [MINES] and Ministry of Citizenship and Multiculturalism [MCM]), Indigenous Groups (Cat Lake First Nation [CLFN], Lac Seul First Nation [LSFN], Mishkeegogamang Ojibway Nation [MON], Slate Falls Nation [SFN] and Northwestern Ontario Métis Community [NWOMC]) and the local public held over an extensive 26-month-long consultation process. An overview of the key areas of feedback that had the most influence on the design of the Project, and additional work undertaken between the draft and final EIS/EA is provided below.

#### **5.3.1 Transmission Line**

Traditional Land Use information shared by MON noted several land use values located along the southern end of Alternative 3 transmission line route. During discussions and follow-up communications, SFN also requested that the transmission line routing (Alternative 3) selected in the draft EIS/EA be replaced with Alternative 1 to follow the existing E1C transmission line corridor through the northern portion of the SFN Reserve lands. Alternative 1 and Alternative 3 were both identified as the preferred alignment routes in the draft EIS/EA with an understanding that further engagement and discussion with SFN and others could result in optimizing the alignment. SFN shared land use value locations along the southern end of Alternative 3, and noted that following the existing E1C corridor was preferred over making a new corridor around the community. The MECP Species at Risk Branch (SARB) also provided comments on the draft EIS/EA and in follow up meetings that an emphasis should be placed on minimizing new linear corridors. Accordingly, Alternative 1 has been selected as the updated preferred alignment. In addition to selecting

Alternative 1, the transmission line has been optimized to follow the mine access road more closely, thereby reducing the overall corridor width through this segment. Details on the transmission line are provided in Section 5.18.

### **5.3.2 Closure Planning**

Comments from CLFN and LSFN requested that additional details be provided on how the site would be closed and that FMG develop closure objectives that meet cultural and socioeconomic objectives of CLFN and LSFN. The cultural and socioeconomic objectives as listed by CLFN and LSFN include:

- 1) Ensuring the conservation and continued use of sites near the mine site;
- 2) Supporting CLFN and LSFN members' ability to practice their way of life and to transfer knowledge and teachings specific to the area;
- 3) Ensuring long-term benefits while minimizing post-closure socioeconomic impacts, including job loss and gender-, addiction-, and mental health-related issues;
- 4) Mitigating impacts to harvesting practices, as well as to water, fish and non-human relatives within the reclaimed open pit and the mine waste CDF areas; and
- 5) Mitigating long-term risks of erosion, accidents, spills, or structural failures of the mine waste facility, including due to flooding or extreme meteorological events (e.g., 100-year floods).

Section 5.19 has been expanded with additional detail and more specific information, including feasibility of and alternatives considered for closure elements. Closure planning is a progressive and iterative process of mine development, and as such, detailed closure plans that build on the final EIS/EA will be submitted to regulators during the permitting process with periodic updates during the life of mine. The cultural and socioeconomic objectives of CLFN and LSFN will be integral to the closure strategy have been added to Section 5.19, including details, where available at this stage of the Project.

### **5.3.3 Co-disposal Facility**

SFN requested more information on how FMG can prevent the south cell and north cell from mixing of PAG and NAG mine rock piles. The design of the CDF is described in Section 5.10, and in Appendix V-1, and involves co-locating the non-acid generating (NAG) tailings with the potentially acid generating (PAG) mine rock in the north cell. The north cell will be maintained at an elevation above the south cell such that drainage will be from the north cell through the permeable internal dam into to the south cell by gravity.

SFN also asked what thresholds exist to determine contact waters that need treatment, and will the chemicals continue to concentrate as recycling proceeds. All contact water from the CDF will be collected and sent either to the process plant as recycled water or to the CWSP for treatment and release when it can be demonstrated to meet water quality criteria as regulated by the Province. Additional details have been included in Section 5.12, the Mine Site Water Quality model (Appendix K-2) and the Mine Site Water Balance (Appendix M-2).

MINES provided comments regarding the use of dry filtered tailings in a CDF being a potentially new design concept with potential challenges to being able to co-deposit dry tailings and mine rock. IAAC also commented regarding the design of the CDF and encapsulating the PAG rock with NAG tailings and how the material would be co-disposed. In consideration of the comments received, additional engineering trade-off assessments were carried out, resulting in the optimization of the CDF. Optimizations include the production of a thickened pumpable NAG tailings (instead of the filtered tailings) that can be hydraulically transported and placed in a manner that improves operational and environmental performance of the CDF.

Thickened tailings provide a more robust operation for co-mingling with mine rock, reduced energy consumption and reduced air emissions, including GHGs. The optimized CDF designs were subsequently presented and discussed during follow-up meetings with reviewers and the Independent Geotechnical and Tailings Review Board (IGTRB). An IGTRB has pro-actively been established for the Project and is composed of three external experts. The purpose of the IGTRB is to provide independent oversight on the design, construction, operation, performance and closure planning for the CDF, with the objective of long-term safety and environmental protection. Additional details on the optimized design of the CDF are summarized in Section 5.10.3 and provided in Appendix V-1.

MINES also commented that because the north cell is not lined, groundwater may be affected via seepage. Additional information has been included in Section 5.10.3 to describe the management of seepage. More clarification or detail was requested regarding the co-disposal of tailings and PAG mine rock, and how metal leaching and acid rock drainage (ML/ARD) would be minimized.

#### **5.3.4 Location of Co-disposal Facility and Central Water Storage Pond**

MINES commented that other acceptable alternatives to the design and placement of the CDF should be presented. A detailed and comprehensive assessment of tailings alternatives following ECCC guidelines for the assessment of alternatives for mine waste disposal was completed for the draft EIS/EA and has been updated in Appendix E. The assessment used a stepwise approach and multiple accounts analysis to demonstrate that the preferred location and technologies proposed for tailings and mine rock are defensible according to environmental, social, technical and financial considerations. ECCC determined that the central water storage pond (CWSP) would also be subject to Schedule 2 of the Metal and Diamond Mine Effluent Regulations (MDMER; SOR/2022-222) and require assessment following the ECCC guidelines. Accordingly, a comprehensive assessment and analysis of water storage alternatives has also been included in the updated assessment in Appendix E.

MECP requested additional rationale for the minimum 120-metre (m) setback proposed for the CDF. The 120 m setback is defined for the Project in accordance with MNR shoreline surface rights reservation policy, as well as a best practice to minimize impacts to local waterbodies. Additional clarity regarding the proposed setback distance has been provided throughout the final EIS/EA as applicable, and in Section 5.7.

#### **5.3.5 Employee Health & Wellness Strategy**

The development of the draft Employee Health & Wellness Strategy (Appendix Q-3) is a key component in following up on the feedback FMG heard during engagement and consultation with local communities and health service providers. Through the draft EIS/EA consultation process, FMG was informed of the challenges that many communities and individuals face with mental health and addictions, and the various barriers to treatment and employment opportunities. As a key employer for the region, the Project can be leveraged as a vehicle for positive change and employment stability for many. Working with communities, governments, service providers and experts in the field, FMG's proactive approach contained in the draft Employee Health & Wellness Strategy is based on emerging practices and will continue to be informed by those who are proximate to the Project. The draft Employee Health & Wellness Strategy responds to what FMG has heard, including that northern-focused health and wellness support is crucial to improving employment participation; creating a mental health-conscious workplace; and enabling the Project, local people and communities to thrive. The approach necessitates more than standard corporate occupational health and wellness policies and programs. It requires tailored health and wellness approaches, services and programs, in coordination with health service providers, that address the holistic needs of northern people and communities participating in the mining industry.

For the Project, FMG is committed to providing employees with access to the health and wellness support and services they need to achieve their potential and be successful in the workplace and beyond. Health and wellness support from employers has traditionally been focused on reducing employee sickness and absenteeism. The draft Employee Health & Wellness Strategy takes a progressive approach to account for the broader geographic, economic, social and community factors that underpin an individual's ability to bring their best self to work and home after work. It considers the major factors that affect and could improve holistic health and wellness for a diverse workforce including physical, mental, cultural, family and emotional issues. Additional considerations are also factored to address barriers to employment in remote work environments for women and young workers.

The draft Employee Health & Wellness Strategy looks at employee health and well-being through a proactive lens by embracing education, prevention and early intervention measures. From design to implementation, FMG provides a collaborative framework with opportunities for continual improvement input and guidance so that services and support offered will remain relevant throughout the life of mine.

### **5.3.6 Airstrip**

IAAC commented that clarification is required regarding whether the proposed airstrip is a Project component or incidental to the Project. It was confirmed that the airstrip is co-located with the mine access road approximately 2 kilometres (km) southeast of the process plant site (shown in Figure 5.1-1 and described in Section 5.17). The airstrip has a proposed length of approximately 1,000 m. Although the airstrip does not meet the definition of an aerodrome as a designated physical activity as per SOR/2012-147, the effects of the construction, operation and closure of the airstrip on air quality, noise and wildlife have been assessed in Section 6.3 (Noise), Section 6.10 (Fish and Fish Habitat), Section 6.13 (Caribou), and Section 6.21 (Traditional Land Use).

### **5.3.7 Haul Roads and Mine Access Road**

IAAC requested clarification on whether runoff from haul roads would be considered contact water and how this water would be managed. Section 5.12.3.6 has been updated to provide clarification that sumps and ditching at locations across the site will be used as needed to divert non-contact water from site facilities and haul roads and to collect contact water for management. The collection system has been added to the site plan (Figure 5.1-1). The mine access road was further reviewed for efficiencies, resulting in minor changes to the alignment, which reduced the number of potential water crossings from four to one.

### **5.3.8 Water Treatment and Management System**

Comments received from IAAC and MECP requested additional information to demonstrate that the contact water collection system considered design standards for storms, and that sufficient space is available to manage the required water volumes during weather events. Section 5.11 has been updated to clarify that although the short-term construction phase water management will use more frequent design events (i.e., 1:10-year), the operations phase water management facilities will be designed to accommodate and contain a 1:100-year, 24-hour storm event. Figure 5.12-1 has been created to show the water management plan infrastructure, including the perimeter seepage collection system.

IAAC requested additional discussion of the resiliency of the overall water management system to extreme rainfall events and the consequences of discharge of untreated contact water, particularly from the collection ditches and water management ponds. A water management plan and schematic are provided in Section 5.11. Additional discussion on managing extreme rainfall events is included in Section 8.6 (Major Precipitation Events).

SFN asked how the Effluent Treatment Plant (ETP) will function before releasing contaminants (nitrates, cyanide) to Springpole Lake, and what will management of the mine rock, tailing slurry and PAG rock in the CDF entail. Additional information about the three stages of water treatment (i.e., biological process, removal of metals, and a flocculation/ clarification process), are provided in Section 5.12.5. The management of excess mine rock and tailings is described in Sections 5.8 and 5.10, respectively. In both cases the facilities will be engineered including perimeter seepage collection to mitigate impacts to the environment from seepage and runoff.

### **5.3.9 Description of Project Components**

It was requested by MECP that additional information be provided about some of the Project components, (i.e., dikes, controlled dewatering of the open pit basin, open pit development, stockpiles, construction material, waste management, and airstrip). Additional details have been added to Section 5.7 to 5.17.

## **5.4 Project Phases and Schedule**

This section provides information related to the proposed construction, operations, and decommissioning and closure phases of the Project. The planned development schedule and Project phases are based on current knowledge as presented in Figure 5.1-1. Environmental management, monitoring and reporting will occur during all of the Project phases.

### **5.4.1 Construction Phase**

Construction would begin once the EA processes are complete and initial approvals are received. Site preparation and construction of the surface infrastructure to start mining and processing activities is approximately three years. Primary construction phase activities are expected to include:

- Mine access road and airstrip construction;
- Development of temporary construction camp, associated infrastructure and staging areas (primarily on site, but potentially small temporary mobile camps near the transmission line route);
- Site preparation activities including clearing, grubbing, earthworks and construction water management (as needed);
- Aggregate and quarry resource development and operation;
- Dike construction;
- Establishment of the CWSP;
- Controlled dewatering of the open pit basin;
- Stripping of lake bed sediments and overburden at the open pit;
- Initiation of pit development in rock;
- Construction of the starter dams for the CDF;
- Onsite haul and access road construction;
- Construction of a transmission line to the Project site;
- Construction of buildings and onsite infrastructure;
- Establishment and operation of water and waste management and treatment facilities;
- Collection of water for process plant commissioning;

- Stockpiling of ore for start-up;
- Commissioning of the process plant; and
- Environmental monitoring.

#### **5.4.2 Operations Phase**

The operations phase is anticipated to last approximately 10 years and will include the following primary activities:

- Operation of the process plant;
- Operation of the open pit mine;
- Management of overburden, mine rock, tailings and ore in designated facilities;
- Operation of water and waste management and treatment facilities;
- Operation of the accommodations complex;
- Environmental monitoring; and
- Progressive reclamation activities.

#### **5.4.3 Decommissioning and Closure Phase**

The decommissioning and closure phase is anticipated to include an active decommissioning and closure phase, and a post-closure maintenance and monitoring phase. Activities to be completed during the active closure phase, where not completed progressively during operation, are anticipated to include:

- Removal of assets that can be salvaged for re-sale or re-use;
- 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 regrading, placement of an appropriate cover to facilitate revegetation if needed, and revegetation (active or passive);
- Filling of open pit to near final water level, and once the water quality meets all regulatory requirements, lowering of the dikes in a controlled manner and reconnection of the reclaimed basin to Springpole Lake; and
- Closure and post-closure, environmental monitoring and engineering inspections.

Decommissioning and closure of the Project will be completed in accordance with the Rehabilitation of Lands Act (O Reg. 35/24). A comprehensive regulatory closure plan will be developed for the Project as required by the *Mining Act* (RSO 1990, c. M.14). It will also include a cost estimate for the financial assurance required to be provided, in the prescribed manner to ensure the performance of the closure plan activities. Section 5.19 provides a conceptual closure strategy for both progressive and final reclamation measures. Feedback gained through ongoing consultation and engagement activities, including on the final EIS/EA, will be fully considered in the regulatory closure plan.

## **5.5 Existing Facilities and Infrastructure**

The Project site is an active mineral exploration area with established facilities and infrastructure components currently present on the site, including a modular full service exploration camp, fuel storage and power generation, office, sewage treatment plant, storage facilities and equipment yard areas. Photographs of the existing site are provided in Appendix A.

Mineral exploration at the Project property has been carried out during two main periods: from the 1920s to 1940s, and from 1985 to the present. During the most recent period, exploration activities have included geological mapping, geophysical surveys, diamond drilling and trenching. In 2015, the property was acquired by FMG.

The Project site is accessible by floatplane to Springpole Lake or Birch Lake during the late spring, summer and early fall. Helicopters are used periodically for field investigations. During the winter, an ice road is periodically used to connect the site to Confederation Lake, where all-season road access is available. During lake ice freeze-up in the fall and breakup in spring, the site is only accessible by helicopter. The closest all season road is the Wenasaga Road; located approximately 18 km from the mine site to the end of the Wenasaga Road.

## **5.6 Buildings, Other Facilities and General Infrastructure**

Operational support buildings will be required on site to facilitate the mining operations. Modular or pre-engineered, steel frame buildings are planned to be brought to site and installed during the construction phase. Table 5.9-1 provides a summary of the buildings proposed for the Project, which may be refined with the final design. Approximate locations are shown in Figure 5.1-1 and Figure 5.9-1.

An accommodations complex will be required to provide accommodations for the work force on site. A modular facility for over 650-persons is expected to be required to support the construction phase and will be scaled back during operations. The facility will include a commercial kitchen, dining / recreation room and laundry facility. The accommodations complex location is southeast of the process plant site area along the mine access road to facilitate worker access to the mine and safety from other Project infrastructure (Figure 5.1-1).

## **5.7 Open Pit**

An open pit mine is required to extract ore safely and economically for onsite processing. The pit is expected to be developed in a sequenced manner, starting with a portion to the northeast (Phase 1 pit) before transitioning to the main open pit. The ultimate pit, using a top of pit elevation of 409 metres above mean sea level (m amsl) and a bottom elevation of 88 m amsl, will be approximately 321 m deep (Figure 5.7-2). The surface expression of the open pit will encompass approximately 132 ha, and measure approximately 1.7 km long and 1 km wide. The open pit is proposed to have 12 m benches, although some zones may have reduced bench heights as needed for stability. Inter-ramp angles will vary from 22 to 52 degrees (°) depending upon the wall orientation and rock type. Mining widths of 35 to 40 m are proposed, with preferred bench widths of 60 m or more. The ramps from surface have an approximate 10 percent (%) design gradient and will be either single or double lane width (27 to 35 m width), designed to accommodate haul truck requirements.

The open pit mine production rate will vary over the life of the mine, but along with the ore stockpiles, will provide feed to the process plant, which has a typical throughput of 30,000 tonnes per day (tpd). The mine will generate about 101 million tonnes (Mt) or 38.6 million cubic metres (Mm<sup>3</sup>) of ore, 20.4 Mt or 10.5 Mm<sup>3</sup> of overburden and 292 Mt or 133 Mm<sup>3</sup> of mine rock. The pit has a calculated mine life of approximately

10 years. A schematic of the open pit and open pit cross sections is provided in Figure 5.7-1 and Figure 5.7-2.

### **5.7.1 Pre-development Activities**

#### **5.7.1.1 Dikes**

During the first year of the construction phase, two dikes (west dike and east dike) will be constructed to isolate the open pit area of Springpole Lake (Figure 5.1-1 and Figure 5.1-2). Dikes are essential for the safe and controlled dewatering of the open pit basin in advance of mining operations and have been successfully implemented at several other similar Canadian mining projects including the Diavik Mine and Gahcho Kué Mine in the Northwest Territories and the Meadowbank Mine in Nunavut. These other existing mines in Canada are much larger and involve longer dikes than what is required for the Project. The dikes have been designed and located to meet the following requirements:

- Establish a hydraulic barrier between Springpole Lake and the open pit basin area following controlled dewatering;
- Provide sufficient freeboard above the lake level for protection during storm events for worker safety, along with protection from ice heaving that may occur in the winter;
- Maintain stability during and following open pit basin development (meeting or exceeding regulatory factor of safety requirements), as well as after controlled refilling with water at the end of mine life;
- Account for lake bed geotechnical foundation conditions;
- Minimize the footprint of the open pit area;
- Minimize the required area to be isolated from Springpole Lake;
- Provide for a safe open pit work area;
- Minimize dike length and height to facilitate eventual closure and reclamation; and
- Provide enhanced fish habitat on the downstream side to support fish habitat offset goals.

The dikes include sufficient freeboard above the elevation of Springpole Lake to prevent flooding during storm events (i.e., 5 m above the average lake level elevation of approximately 391 m amsl). In situ monitoring has shown that water levels in Springpole Lake varies by approximately 2.1 m, with a peak water elevation of approximately 392.8 m amsl, and a minimum water level of approximately 390.7 m amsl. This information was used to predict the average lake level and the dike freeboard height in accordance with the Canadian Dam Association *Dam Safety Guidelines* (CDA 2013, 2019). Ongoing monitoring of water levels in Springpole Lake will continue during all phases of the Project. The information will be used to verify the required dike height and determine if a raise is required. The design includes dikes with a crest width of about 28 m and combined length of approximately 940 m (Appendix V-2). Dike height (height from dike crest to lake bottom) will vary due to the natural undulations in the lake bed (water depth), with a maximum height of about 11 m for the west dike and approximately 17 m for the east dike.

The dikes are designed to meet the factors of safety required by guidelines and regulations such as the CDA (2013, 2019) *Dam Safety Guidelines* and supporting technical bulletins and the *Lakes and Rivers Improvement Act* (RSO 1990, c. L.3) for long term, static loading conditions, as well as pseudo-static loading conditions. The recommended inflow design flood (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 dike design factor. An IDF represents the most severe inflow flood (peak, volume, shape, duration, timing) for which a dam and its associated facilities are designed (CDA 2007). Instrumentation and monitoring will be installed within the dike fill and foundation materials to monitor the dikes. A design memorandum is provided in Appendix V-2.

The dikes consist of a zoned embankment shell and a hydraulic barrier composed of a seepage cut-off wall and grout barrier within the foundation injected into the bedrock. Cross sections representative of both the west and east dikes are provided in Figure 5.7-3. A trade-off evaluation of seepage cut-off wall options was completed, and as a result of the additional engineering investigations, the design has been optimized to use a slurry wall (i.e., cement-bentonite or plastic concrete) in place of the originally proposed secant pile wall identified in the draft EIS/EA. This option offers a more favourable schedule and lower risk of leakage, as well as lower cost than the previously proposed secant pile wall.

The dikes will be constructed primarily of crushed rock and mine rock, tied into the bedrock including the shoreline as needed. A 2 m thick layer of riprap is included on the upstream face in the wave action zone to protect the dikes from erosion. The dikes will require approximately 230,000 cubic metres (m<sup>3</sup>) of rock fill, the majority of which is anticipated to come from onsite excavations. The outer dike slopes are designed to be constructed at a slope angle of approximately 1.3 horizontal to 1 vertical (1.3H:1V). Earthquake design ground motion parameters have been determined for the dikes using the Natural Resources Canada seismic hazard calculator for the Laurentian Seismic Zone.

Turbidity barriers will be installed on both sides of the dikes prior to construction and supplemented as needed to contain suspended sediment potentially generated during embankment construction. Once environmental protection measures are in place, the dikes will be advanced from the shoreline as homogeneous rockfill embankments using rock sourced from onsite excavations, such as the fish habitat development area or potentially other Project aggregate sources. The dikes will be constructed as follows according to proven design and construction methods:

- Foundations will be stripped, where needed;
- Dikes will be advanced across Springpole Lake to a level above the normal water elevation;
- The cut-off wall will be excavated into the granular core of the dike and backfilled with the slurry seepage cut-off wall using continuous trenching methods;
- Excavated material will be contained and used, where appropriate;
- Dikes will be advanced, including the cut-off wall, to the final designed height; and
- If required, the foundation will be further sealed by drilling through the installed slurry cut-off wall to inject grout into the shallow bedrock.

#### **5.7.1.2 Pre-development Controlled Dewatering**

Once the open pit basin of Springpole Lake has been isolated using dikes, controlled dewatering and fish removal will occur with the involvement of interested local Indigenous communities. As a base case, controlled dewatering of the open pit basin is expected to take approximately six months to complete, based on continuous (24-hour, 7-day per week) pumping at a rate that is able to maintain Springpole Lake water levels within baseline natural variation.

Average monthly inflows to Springpole Lake range from 21.3 cubic metres per second (m<sup>3</sup>/s) in June to 5.0 m<sup>3</sup>/s in March. The average water level of Springpole Lake ranges from 391.78 m amsl in June to 390.79 m amsl in March (Appendix M-1). The volume of the proposed open pit basin within Springpole Lake

ranges is approximately 18 Mm<sup>3</sup>, consistent with the bathymetric survey. Springpole Lake displayed a maximum natural variation of 2.1 m over the approximately 2.5-year period of record. Based on the data collected and analyzed to date, this provides an observed annual natural variation in flow of 16.3 m<sup>3</sup>/s and 1.0 m in water level.

Controlled dewatering of the open pit basin will be completed in a manner to mitigate potential environmental effects by managing and monitoring flow rates. The six-month timeframe has been determined based on the receiving capacity of Springpole Lake to accept an increase in flow, limited to 10% of the instantaneous natural flow through Springpole Lake. The 10% threshold has been applied as a mitigation measure and is consistent with the Fisheries and Oceans Canada (DFO) guidance document *Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada* (DFO 2013). Within the framework, DFO provides a national technical guidance that cumulative flow alterations of less than 10% in amplitude of the actual (instantaneous) flow relative to a “natural flow regime” have a low probability of detectable impacts to ecosystems. By limiting the rate of dewatering and associated discharge to the downstream environment to less than 10% of the calculated instantaneous flow, the determination that the activity is not harmful to fish and fish habitat is well supported. A higher rate above the 10% threshold, while not currently proposed, may also be protective of fish and fish habitat but would require additional consideration in detailed design.

Table 5.7-1 provides the maximum dewatering rate by month (using the 10% instantaneous flow threshold), while Table 5.7-2 shows calculated dewatering durations for average, dry and wet years. It is recognized that instantaneous flow in the DFO guidance refers to a continuous condition, and monthly values are provided for context only. During the dewatering activities, a continuous flow monitoring station at the inlet and outlet of Springpole Lake will be used to provide a running average flow that will be used to inform the actual dewatering rate consistent with anticipated permit conditions.

The controlled dewatering process of the open pit basin, including the transfer of water back into Springpole Lake and the removal of fish, will be designed to mitigate potential environmental effects, including maintaining lake levels within natural variation. The estimated potential change in water elevation of Springpole Lake due to the development of the open pit basin would be less than 10 centimetres (cm), which is less than 10% of the observed natural annual average water level fluctuation and less than 5% of the maximum observed fluctuation of the lake water level.

During initial controlled dewatering, a barge is proposed to transfer lake water out of the open pit basin and back into Springpole Lake on the downstream side of the east dike. Dewatering will continue in this manner until the threshold concentration of total suspended solids (TSS) in the discharged water is reached (15 to 30 milligrams per litre [mg/L] according to Schedule 4 of the MDMER and anticipated provincial permit limits). Once the TSS threshold is reached, this water will be directed towards the CWSP for additional settling prior to discharge back to Springpole Lake. The CWSP and related infrastructure will be set up early in the process to be available to receive the TSS-laden water when needed.

The CWSP was selected as the preferred location to receive this water for additional settling given its large surface area and depth, which will provide operator flexibility during development of the open pit basin. The CWSP can support a dewatering rate of up to 2.6 m<sup>3</sup>/s, which will be sufficient for average year hydrologic conditions. The settling pond size assumes that a 5 to 10 micron (µm) particle can be settled (the smallest particle size that can be settled by sedimentation alone). Flocculant or other means may be used in the CWSP if needed to help settle suspended sediments.

### **5.7.2 Lake Bed Sediment and Overburden Removal**

During the late stages of the open pit basin dewatering process, exposed lake bed sediment primarily within the open pit footprint will be preserved in temporary piles within the open pit basin for future reuse. These piles will be retained in the open pit basin to facilitate the creation of the fish habitat development area and reclamation at closure. Excess material may be removed by loader and placed in haul trucks for transport to the surficial soil stockpile.

Following the management of lake bed sediments within the open pit footprint, overburden stripping is necessary to gain access to the bedrock and allow extraction of ore. Overburden and organics present at surface will be stripped progressively starting in the northeast lobe Phase 1 open pit. These activities will commence during the first year of the construction phase and continue into the operations phase. Overburden will be stripped from the future pit area using shovels, loaders, bulldozers and/or comparable equipment, and will be transported by haul truck directly to the surficial soil stockpile positioned east of the open pit adjacent to the mine access road, or alternatively, trucked directly to the applicable construction site if intended for re-use. Where practicable, organic materials / topsoil will be stripped and stored separately close to the source, or at the surficial soil stockpile for use in future reclamation activities.

It is estimated that about 10.7 Mm<sup>3</sup> of overburden is to be stripped from the open pit footprint. The overall angle of the overburden slopes in the open pit will depend on the thickness and types of overburden but will generally be in the range of 30°. Steeper slopes may be used temporarily during the initial pit development in overburden. An approximately 12 m wide bench will be established at the overburden / bedrock interface to account for sloughing, to increase worker safety, and to facilitate remediation and potential mitigation.

### **5.7.3 Open Pit Mining**

The open pit is planned to operate on two 12-hour shifts, 365 days a year. Conventional mining equipment (i.e., blast hole drill rigs, mining shovels, excavators, loaders, bulldozers and/or comparable equipment) will be selected to meet the mine production requirements. While the assessment work contained in the final EIS/EA conservatively assumes that the mining equipment will be powered by diesel engines based on currently available technologies, FMG is closely following industry advancements with the electrification of open pit mining equipment. Electrification opportunities are further discussed in Section 6.4 and the Project's Net-Zero Strategy (Appendix I-2).

Rock (ore and mine rock) will be broken at the face using heavy equipment and explosives where necessary. Blasting patterns will vary according to the rock type, conditions and proximity to the dikes. Portions of the open pit have been defined and demarcated based on lithological, textural and rock quality designation data. The pit geology results in reduced required explosive use for the mine compared to other open pit mines where the rock is more consolidated. Emulsion-based explosives are anticipated to be primarily used. Preliminary explosives powder factors are in the order of 0.30 kilograms per tonne (kg/t) for both ore and mine rock. Annual explosive consumption will range from 10,000 to 19,000 tonnes (t).

Haul trucks will transport the ore to either the primary crusher or to high / mid grade ore stockpile or low grade ore stockpile located near the process plant. Mine rock will be transported to the CDF for permanent storage unless it is required for construction.

#### **5.7.4 Geochemistry of Mined Materials**

Extensive geochemistry studies were conducted for the Project as part of baseline programs for the mine plan. The geochemistry results reflect the natural rock characteristics of the ore body and surrounding rock, which are unique at every mine site despite some broad regional similarities. Geochemical characteristics of mined material was determined as follows:

- Acid Base Accounting (ABA) testing was conducted to assess the potential for a sample to generate acidity, determined by the balance of acid generating minerals and neutralizing minerals in a sample. For Project planning purposes, ABA results with a neutralization potential ratio (NPR; NP to acid potential ratio) less than 2 were assumed to be PAG in accordance with industry standard guidance (MEND 2009).
- Elemental content analyses were conducted on samples by aqua regia digestion and inductively coupled plasma-mass spectrometry (ICP-MS) scan. The purpose of this test is to assess the presence of elements that may be enriched by screening samples against qualitative threshold value (10 times the average crustal abundance).
- Shake Flask Extraction (SFE) testing was conducted to assess the potential release of soluble metals during the initial (i.e., short-term) stages of weathering but it is not a direct indicator of drainage quality.

The results summarized in this section and detailed in Appendix K are both representative of common rock types and geochemistry results for northern Ontario and site-specific conditions.

##### **5.7.4.1 Overburden**

Overburden samples were collected from areas to be stripped as part of open pit development for assessment of metal leaching/ acid rock drainage (ML/ARD) potential. Thirty-six samples of overburden were collected from a range of depths, (surface to 4 m depth), and a range of the observed overburden types. Static testing methods was used to screen the results for the ML/ARD potential. The results of the testing are detailed in Appendix K and summarized as follows:

- All of the overburden samples are classified as NAG, with low levels of total sulphur content, generally at or near the analytical detection limit.
- Elemental content analysis determined that samples are generally below the average crustal abundance threshold with a single sample showing a higher concentration of arsenic and a single sample with a higher tungsten value. In both cases, the concentration reflects naturally occurring baseline conditions.
- Leachate quality, as estimated by the results of SFE tests, have low concentrations of sulphate and metals.

##### **5.7.4.2 Lake Bed Sediments**

Thirty discrete samples of the lake bed sediments within the immediate vicinity of the open pit were collected using a subaqueous sediment sampler with and additional 3 samples collected from drill cores. Lake bed sediment samples were also collected during aquatic baseline investigations and are summarized in Appendix K1.5 for both physical and chemical properties. The result of the testing is summarized as follows:



- Static testing (ABA) results indicated that the samples generally contained low concentrations of sulphur, had a variable neutralization potential (NP) content, and that some samples contained high concentrations of organic matter as expected;
- Approximately 60% of the samples were classified as NAG and 40% of the samples as PAG. Based on the high organic matter content of the samples determined as PAG, and the observed trends, it is inferred that stored acidity is related to the presence of organic acids in the samples, which are often present in lacustrine sediments;
- Elemental content testing showed that metal concentrations were generally low but detectable with some samples with higher concentrations (greater than ten times average crustal abundance) for selenium and arsenic; and
- SFE tests for some elements including phosphorous, arsenic, cobalt, copper, thallium, vanadium and zinc had leachate concentrations slightly higher than the applied qualitative screening values; however, this is not uncommon in lake sediment deposits and represents natural baseline conditions.

#### **5.7.4.3 Mine Rock**

Mine rock is rock that will be mined as part of development of the open pit but does not have sufficient economic value in terms of gold content to be processed. A total of 716 mine rock samples were collected from all three ore body zones in the open pit (the Portage, East Extension and Camp zones) as follows:

- Portage zone (479 samples);
- Camp zone (119 samples); and
- East Extension zone (118 samples).

The approximate locations of the zones defined for the geologic domains are shown in Figure 5.7-4. These samples and resulting data were used to develop the Project design, which aims to mitigate potential ML/ARD and identify sources of construction material. Key findings regarding ML/ARD potential for the mine rock samples are summarized below.

#### **Acid Rock Drainage Potential**

Mine rock samples had variable sulphur contents, ranging from 0.005% to 10%, with a median sulphur content of 0.9%. No strong patterns were apparent in sulphur content among different rock types from the open pit. Sulphide represented the dominant sulphur species in the samples. Available information and data indicated that pyrite is generally the only observed sulphide mineral.

Overall, the NP content of the samples was variable, ranging from -1 to approximately 550 kilograms of calcium carbonate per tonne (kg CaCO<sub>3</sub>/t.) The mine rock samples formed two distinct groups based on their NP content. The low NP content group samples were exclusively from the Portage zone, whereas the higher NP content group included samples from the Portage zone, the East Extension zone and the Camp zone.

ABA results for mine rock were screened to assess the potential for neutral and acidic metal leaching (ML) in the future. Approximately 54% of the mine rock samples from the Portage zone, which represents the most volumetrically significant zone of the open pit, were classified as NAG. Most samples from the East Extension and Camp zones were classified as NAG with NPR >2 owing to the generally higher NP and relatively lower sulphur content of rock from these zones. Overall, there is a roughly even split in the total

mass of mine rock produced by the open pit (292.5 Mt) between PAG rock (145.5 Mt) and NAG rock (147.0 Mt).

Without considering the mitigation measures included in the Project design, preliminary estimates based on currently available kinetic testing (Appendix K-1.3) suggest that 15% to 20% of the Portage zone mine rock samples could become net acid generating within one year of exposure, while up to 25% to 30% of the samples could become net acid generating over approximately 10 years. Approximately 50% of the Portage zone mine rock samples were found to only become net acid generating after several decades of unmitigated exposure. The lag time to acid onset for PAG samples from the East Extension and Camp zones was estimated to be on the order of several decades of exposure, with approximately 15% of the mine rock samples from these zones eventually becoming net acid generating. This lag time is notably longer than samples from the Portage zone owing to the higher NP content of these samples. Based on the currently available data, no samples from these zones showed the potential for rapid acid onset. Section 5.10 provides the proposed CDF design to mitigate these geochemical characteristics of the rock.

### **Metal Leaching Potential**

When conservatively compared to Provincial Water Quality Objectives (PWQOs) or interim PWQOs to identify parameters for further assessment consideration, SFE testing indicated that only 10% to 20% of the samples show antimony, cadmium, cobalt, copper and lead have concentrations greater than their respective PWQO, while arsenic ranges between 4% and 40% of samples greater than the PWQO and the more conservative interim PWQO.

Humidity cell test results for mine rock indicate that arsenic, antimony, cadmium, molybdenum, selenium and tungsten may be of interest for neutral metal leaching in some samples (Appendix K-2). Among the neutral-leaching humidity cell tests, higher release rates for a given element were typically related to a higher elemental content for that element.

NAG leachate results indicated that aluminum, cadmium, chromium, cobalt, copper, iron, lead, nickel, silver, thallium, uranium, vanadium and zinc may be of potential interest under acidic leaching conditions. These results provide only a total metal release under complete oxidation of the sulphide content of a sample and should not be interpreted as a direct indicator of water quality. The elements of potential interest identified above are fully considered within the groundwater and surface water quality assessments summarized in Sections 6.5 to 6.9.

#### **5.7.4.4 Rock from the Fish Habitat Development Area**

Drill core samples from the fish habitat development area were collected to determine the rock geochemistry. Forty drill core samples were taken from six drillholes advanced within the planned extent of the fish habitat development area. Samples were selected to represent the rock mass from downhole depths that aligned with elevations of approximately 375 to 400 m amsl based on the design for the area. The samples selected included the range of rock types, sulphide content and geologic descriptions among the rock encountered within the specified sampling zone.

Static testing results indicated that all of the drill core samples tested from the fish habitat development area were NAG. The metal content analyses showed that the samples generally contained low concentrations of metals, and ML test results based on SFE testing indicated a generally low potential for ML. Detailed results are provided in Appendix K-1.4 and summarized below:

- All of the drill core samples were classified as NAG.

- SFE testing generally showed low concentrations of sulphate and metals. Three samples had cadmium concentrations and two samples had lead concentrations that were marginally greater than PWQO. Aluminum concentrations were higher than the PWQO value (0.075 mg/L) in all samples; however, the observed aluminum concentrations are likely an artefact of the test procedure due to the presence of colloidal aluminum and are unlikely to be observed under field conditions at neutral pH.

#### **5.7.4.5 Ore**

The geochemistry program for the Project included the collection of ore samples from the proposed open pit area. Ore samples were collected on the basis of gold grade from available core. A total of 160 ore samples were collected. The samples were tested for their ARD potential and elemental content, and short-term ML tests were performed. Key findings regarding ARD potential, elemental content and ML potential for the ore samples are summarized below. These data were used to develop the Project design, which aims to mitigate potential ML/ARD.

All the ore removed from the open pit will be either sent directly to processing, or temporarily stockpiled on engineered NAG pads with seepage and runoff collection until fully consumed by the process plant by the end of mine life (within 10 years). Processing of the ore will result in the production of tailings (Section 5.9.4) that will be conveyed to the CDF (Section 5.10).

#### **Acid Rock Drainage Potential**

Approximately 101 Mt of ore will be extracted from the open pit. Ore samples had sulphur content ranging from 0.01% to 7.5% and a median sulphur content of 3%. Available information and data indicated that pyrite is generally the only observed sulphide mineral in the samples.

The NP content of the ore samples ranged from 0.1 to approximately 400 kg CaCO<sub>3</sub>/t. Similar to the mine rock samples, the ore samples formed two distinct groups based on their NP content, whereby one group of samples had a low NP content (approximately 10 kg CaCO<sub>3</sub>/t, ranging from -1 to 20 kg CaCO<sub>3</sub>/t) and the other group of samples had a higher NP content (approximately 200 kg CaCO<sub>3</sub>/t, ranging from approximately 50 to 500 kg CaCO<sub>3</sub>/t). The lowest NP content group of samples were exclusively from the Portage zone, whereas the higher NP content group of samples included samples from the Portage zone, the East Extension zone and the Camp zone. In general, the ore samples from the Portage zone had notably lower NP contents than mine rock samples from the Portage zone. The NP content of ore samples from the Camp and East Extension zones were generally similar to the NP content of mine rock from these zones.

Ore sample ABA results were screened to assess the potential for neutral and acidic ML in the future. On the order of 85% of the ore-grade rock samples from the Portage zone, which represents the most volumetrically significant zone of the open pit, were classified as PAG. Most samples (approximately 70% to 80%) from the East Extension zone and Camp zone were classified as NAG (NPR >2) owing to the generally higher NP and relatively lower sulphur content of rock from these zones.

Without considering the mitigation measures included in the Project design, currently available kinetic testing indicate that about 90% of the Portage zone ore samples would eventually become net acid generating only after several decades of exposure. The lag time to acid onset for PAG ore samples from the East Extension zone and Camp zone were estimated to be on the order of several decades of exposure, with approximately 50% and 30% of the samples from these zones eventually becoming potential net-acid generating respectively. This lag time is notably longer than samples from the Portage Zone owing to the higher NP content of these samples. No samples from these zones showed the potential for rapid ARD onset.

## **Metal Leaching Potential**

SFE leachate results for the ore samples indicated that arsenic may be a parameter of potential interest under short-term neutral leaching conditions, with approximately 44% of the samples being higher than the interim PWQO value for arsenic when compared for screening purposes while a few samples (6%) had arsenic concentrations greater than the PWQO. In addition, cobalt was greater than the PWQO screening value in 50% of the ore samples. Several other metals, including cadmium, copper, lead, nickel, molybdenum and thallium, had concentrations greater than their respective PWQO screening values in the SFE leachates for approximately 10% to 30% of the ore samples.

Humidity cell test results indicated that arsenic, antimony, cadmium, molybdenum, selenium and tungsten may be of interest for neutral ML in some samples, as some humidity cell tests showed relatively elevated release rates for these elements under neutral pH conditions (Appendix K-2). Among the neutral leaching humidity cell tests, higher release rates for a given element were typically related to a higher elemental content for that element. Kinetic testing is ongoing and planned to continue until steady state results are achieved.

The geochemistry data summarized above and detailed in Appendix K are used to inform the application of Project design mitigation measures and the assessment of groundwater and surface water quality in Sections 6.6 to 6.9 and other sections as appropriate. Ore will be stored on engineered NAG pads with perimeter seepage and runoff collection.

### **5.7.5 Critical Mineral Potential**

Critical minerals are essential resources that play a crucial role in various industries, including technology, manufacturing, defense, and especially renewable energy towards national and global decarbonization. Increase in current demand and forecasts are driving initiatives such as Ontario's Critical Mineral Strategy (MNR 2022), which aims to support the development of the critical mineral sector to secure resilient supply chains while unlocking economic growth and infrastructure development. Federal and provincial governments have released a list of 31 critical minerals. For FMG, gold and silver have been the primary targeted minerals in Springpole's exploration and development history; however, the deposit also contains critical minerals such as tellurium and fluorspar. Of the 31 critical minerals listed, tellurium, zinc, fluorspar and lithium occur in various quantities in and around the Project site.

Tellurium holds critical importance across multiple high-tech sectors, particularly within electronics, renewable energy and catalysis. As a pivotal mineral in the transition toward clean energy, approximately 40% of its current production is dedicated to the manufacture of photovoltaic cells. Additionally, roughly 30% is used in thermoelectric production, highlighting its essential role in energy efficiency technologies.

#### **5.7.5.1 Significance of Silver as critical mineral**

Silver is not currently listed as a critical mineral by the Canadian government, although it has been designated by the French government in 2021, and is the most conductive element on earth, widely sought for industrial and green energy applications. Silver meets all the criteria listed by the Canadian government for a mineral to be listed, including its importance in the green economy along with the supply issues it faces domestically and globally. An open letter to the Minister of Energy and Natural Resources was sent on behalf of a consortium of silver producers and international miners asking for silver to be re-classified because of its importance in the green and technological economy along with the supply issues it faces domestically.

Silver holds significance as a critical mineral for several reasons:

- Silver is a key component in the production of solar panels, particularly in the form of silver paste used to create electrical connections in photovoltaic cells. With the increasing demand for solar energy and the growth of the renewable energy sector, the demand for silver in photovoltaic applications is expected to continue to rise.
- Industrial applications in electrical contacts, conductive pastes for electronics, mirrors, photographic film, and various medical and healthcare products.
- Nuclear reactors, an important part of Ontario's energy strategy uses control rods, which typically are made out of neutron-absorbing materials, such as silver and boron are used so that the nuclear reaction takes place at the right speed.
- Silver has long been valued for its antimicrobial properties. It is used in medical devices, wound dressings, and antimicrobial coatings to prevent infections and promote healing. As antibiotic resistance becomes a growing concern, silver's antimicrobial properties remain highly relevant in healthcare settings.

The majority of silver production comes as a by-product of mining other metals, such as gold, copper, zinc, and lead. This makes silver production heavily dependent on the economics of these primary metals. Fluctuations in demand for these primary metals can impact silver supply, highlighting the importance of silver as a critical mineral within global supply chains. With over 24 million ounces of silver, the Project would be the most significant silver producer in Ontario and secure a domestic supply for over 10 years when industrial silver demand is projected to continue to rise with electric vehicle manufacturing and other green energy applications.

#### **5.7.6 Minewater Management**

Contact water that enters the mining area from direct precipitation, as well as surface runoff and groundwater inflows, will be pumped from the open pit year-round over the life of the mine to maintain a safe working environment. This is expected to include runoff from the 275.5 ha watershed area (Figure 5.7-5), as well as groundwater inflows to the open pit. Groundwater inflows to the ultimate operations phase open pit are estimated to be 3,034 m<sup>3</sup>/day (Appendix M-2). This minewater will be captured in drains and/or sumps in the base of the open pit that will be relocated progressively as required. Snow in the pit will be managed and will melt and drain to the sumps. Special handling or treatment of snow within the pit is not expected to be required, although it will be managed as needed for trafficability.

Excess minewater in the open pit will be pumped to the CWSP (Section 5.12). The pumping rate from the open pit sump(s) during mine operation is estimated to increase from approximately 348 m<sup>3</sup>/day early in mine life to 2,637 m<sup>3</sup>/day near the end of mining. Should a storm event occur, including the environmental design flood (EDF), 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. This represents a robust operational measure to manage extreme weather events.



### **5.7.7 Mine-Related Infrastructure**

Mine haul roads are required to connect the open pit to the CDF, stockpiles, the primary crusher and associated mine facilities (i.e., maintenance shop, fuel dispensing and truck wash). The roads will be approximately 37.5 m wide to accommodate two-way heavy equipment traffic between locations. The total length of the mine haul roads and other service roads outside the pit limit is approximately 8.9 km. Haul road and lighter vehicle road crossings have been avoided for safety reasons in the site design.

Explosives will be required primarily for the rock extraction in the open pit but may also be needed for other onsite construction work. Emulsion explosives will be manufactured on site under the care and control of a qualified contractor. The components of the emulsion explosive are not individually reactive. The materials are only active if mixed in appropriate proportions, placed under certain confined conditions and detonated with an external device. Detonators to start the blast and boosters as applicable will be required for each blast hole. An explosives plant and magazine(s) will be located at a safe distance away from the other facilities, in compliance with the *Explosives Act* (RSC 1985, C. E-17) and associated guidance (BNQ 2015). An explosive storage facility is currently proposed northwest of the low-grade ore stockpile (Figure 5.1-1). The required buildings and structures are expected to consist of three separate facilities: the explosives plant, powder magazine and caps magazine.

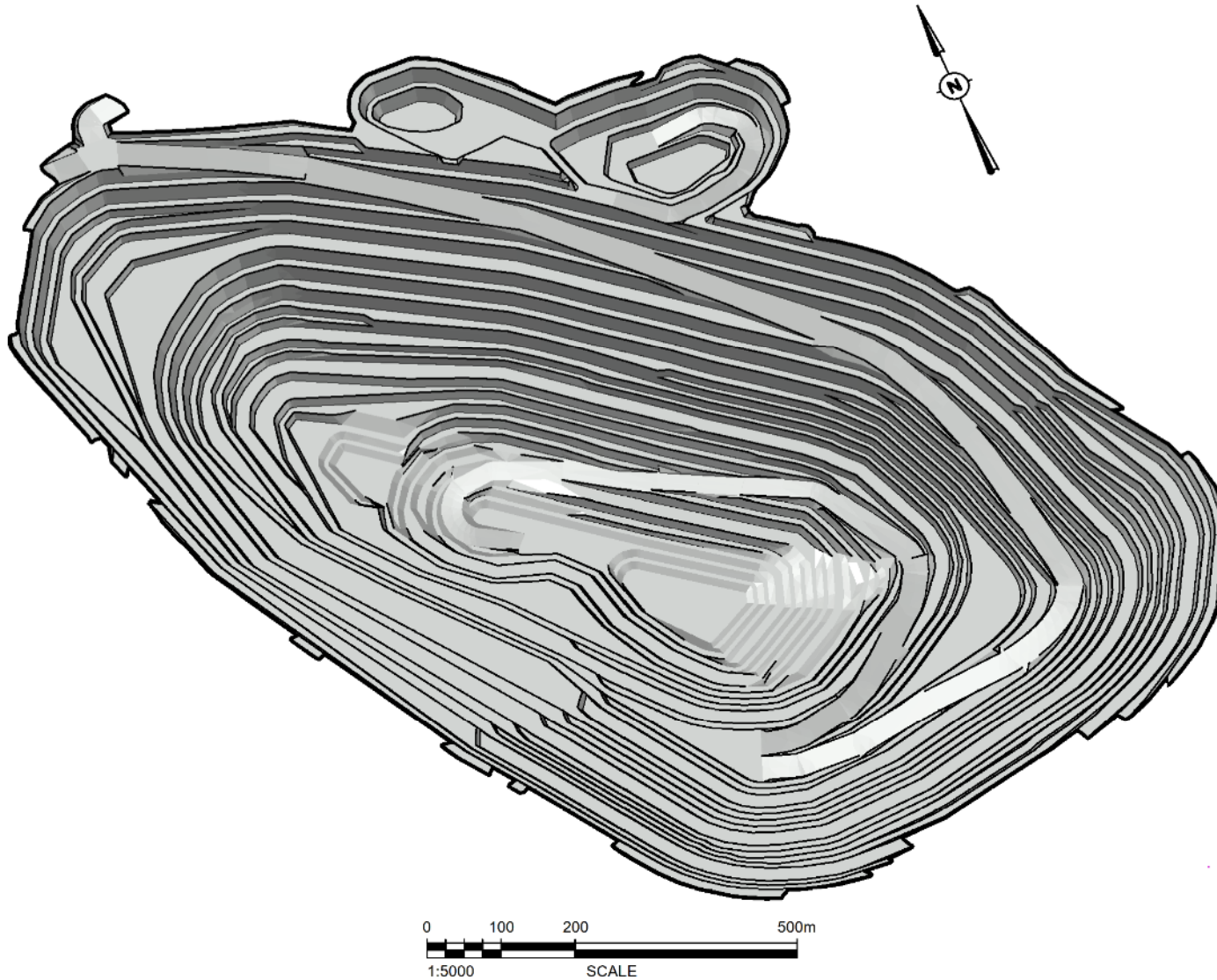


**Table 5.7-1: Open Pit Basin Calculated Maximum Dewatering Rate**

<b>Maximum Dewatering Rate (10% of available flow) (Mm<sup>3</sup>/month)</b>												
	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
Average Year	1.8	1.4	1.3	1.9	5.6	5.5	4.2	3.0	2.8	3.0	2.8	2.3
Dry Year (5th Percentile Flow)	1.0	0.8	0.7	1.0	3.1	3.1	2.3	1.7	1.6	1.7	1.6	1.3
Wet Year (95th Percentile Flow)	2.9	2.2	2.2	3.1	9.1	9.0	6.9	5.0	4.6	4.9	4.6	3.7

**Table 5.7-2: Open Pit Basin Calculated Dewatering Durations**

<b>Dewatering Schedule Scenario</b>	<b>Start</b>	<b>End</b>	<b>Total Duration of Dewatering Period (months)</b>	<b>Duration of Active Pumping (months)</b>
<b>Pump maximum 10% of receiver flow year-round</b>				
Average Year	Sept Year-3	May Year-2	9	9
Dry Year (5th percentile flow)	Sept Year-3	Aug Year-2	12	12
Wet Year (95th percentile flow)	Sept Year-3	Feb Year-2	6	6



**LEGEND**

NOTES:



**FIRST MINING  
GOLD**



**SPRINGPOLE GOLD PROJECT**

**Open Pit Schematic / Plan View**

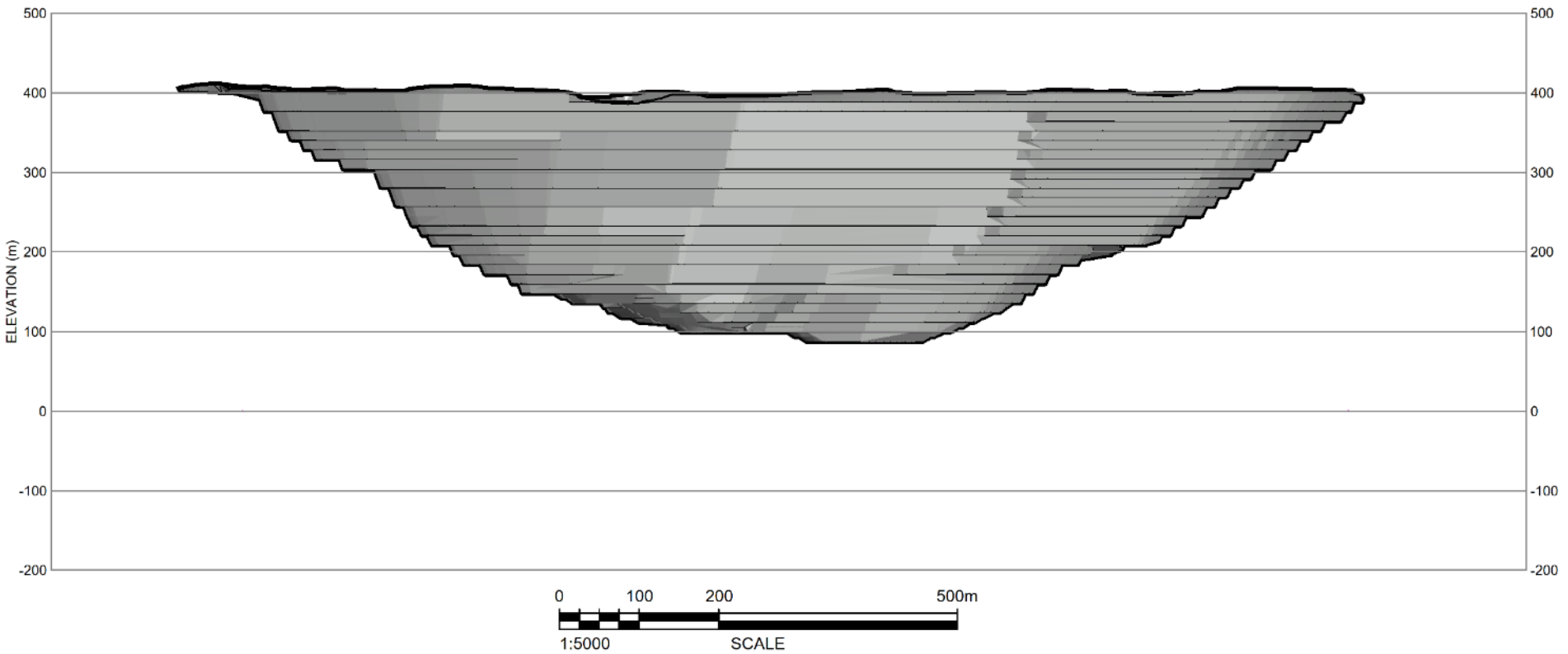
PROJECT N°: ONS2104

FIGURE: 5.7-1

SCALE: As Shown



DATE: June 2024

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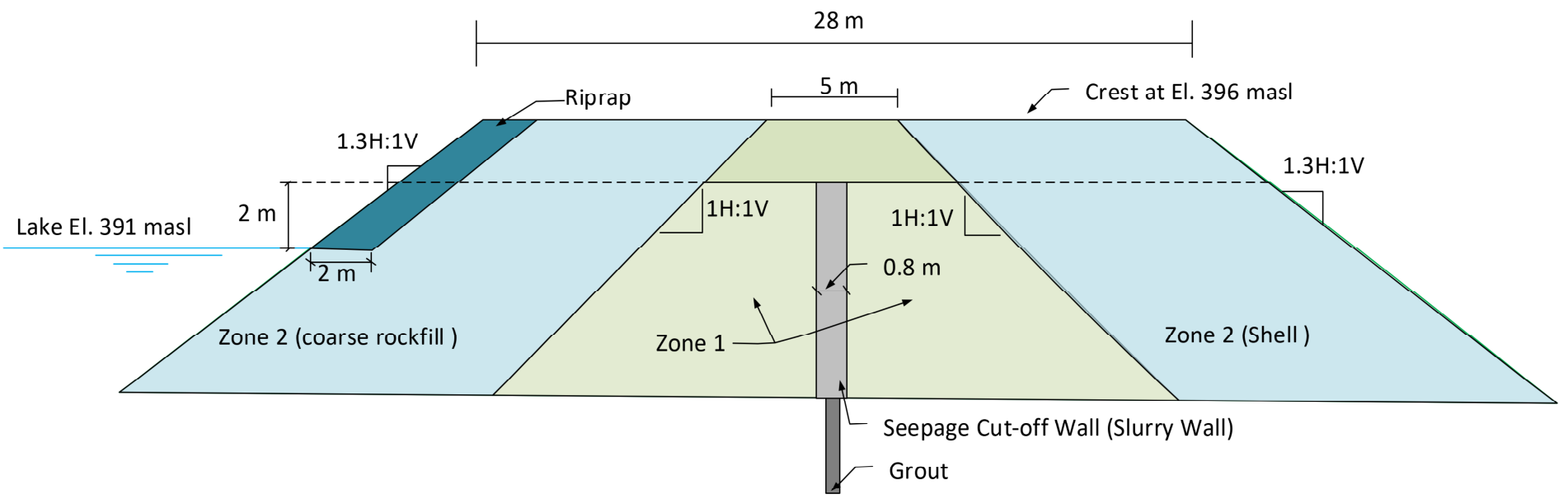




**LEGEND**

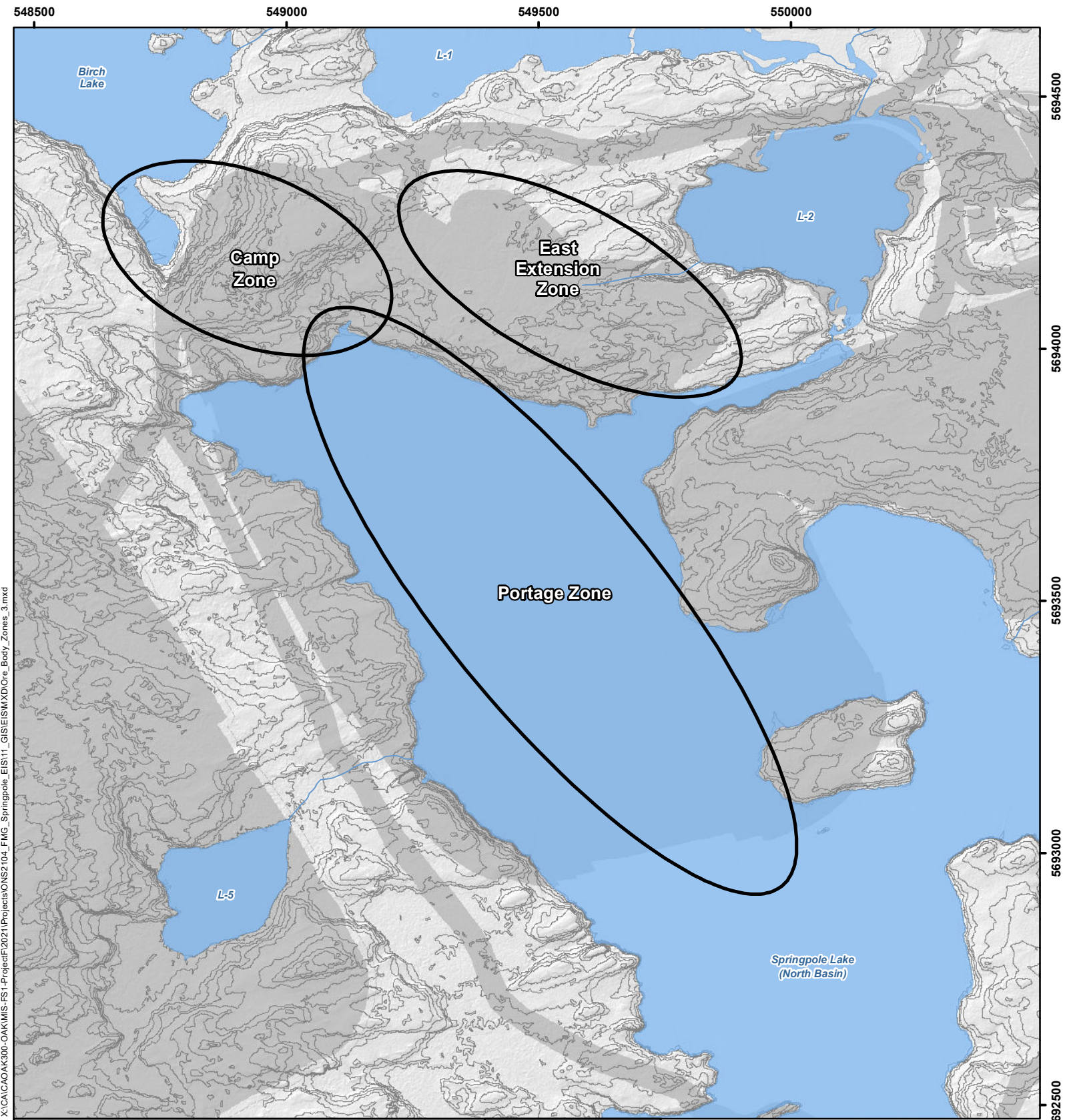
NOTES:

			
<b>SPRINGPOLE GOLD PROJECT</b>			
<b>Open Pit Cross Section</b>			
PROJECT N°: ONS2104		FIGURE: 5.7-2	
SCALE: As Shown		DATE: June 2024	

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<b>LEGEND</b>	NOTES:	 	
		<b>SPRINGPOLE GOLD PROJECT</b>	
		<b>Preliminary Dike Cross Sections</b>	
		PROJECT N°: ONS2104	<b>FIGURE: 5.7-3</b>
		SCALE: N.T.S.	DATE: October 2024



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**LEGEND**

- Ore Body Zones (Labelled with Name)
- Proposed Mine Feature
- Watercourse
- Waterbody
- Contours (1 m interval)

**NOTES:**  
 - Contours extracted from 2020 LIDAR survey.  
 - 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.

	<b>FIRST MINING GOLD</b>	
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**SPRINGPOLE GOLD PROJECT**

**Ore Body Zones**



Datum: NAD83  
 Projection: UTM Zone 15N



PROJECT N<sup>o</sup>: ONS2104

**FIGURE: 5.7-4**

SCALE: 1:10,000

DATE: June 2024