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SECTION 5

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5.0 PROJECT DESCRIPTION

5.1 Introduction

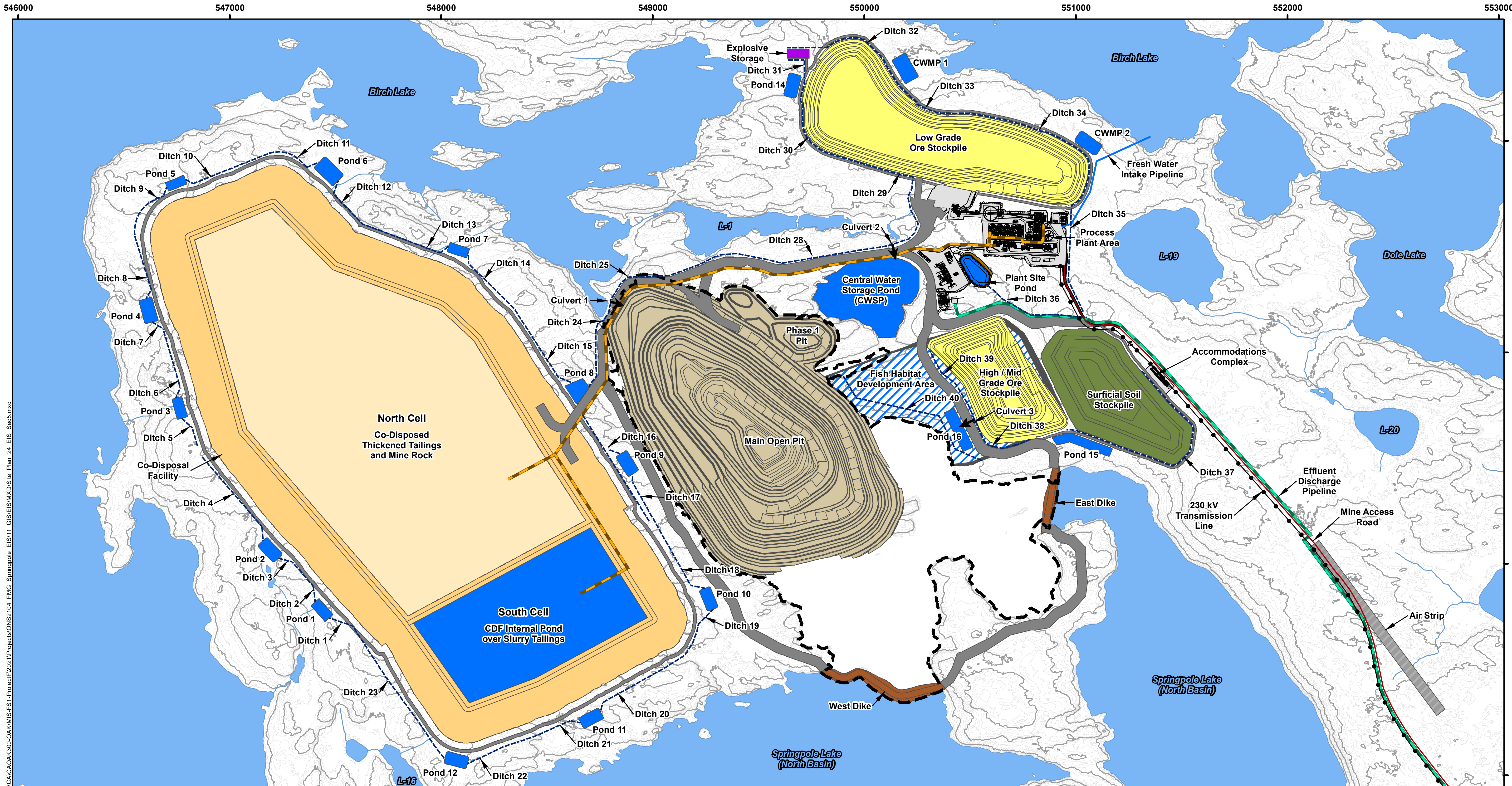
First Mining Gold Corp. (FMG) proposes to develop, operate and eventually decommission and close an open pit gold and silver mine and ore process plant with supporting infrastructure located in northwestern Ontario known as the Springpole Project (Project). The Project has an estimated mineral resource 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.



LEGEND

- Watercourse
- Waterbody
- Major Contours (5 m interval)
- Minor Contours (1 m interval)

Proposed Mine Features

- Open Pit
- Open Pit Basin
- Ore Stockpile
- Surficial Soil Stockpile
- Co-Disposal Facility
- Co-Disposed Thickened Tailings and Mine Rock
- Process Plant Area
- Dike
- Pond
- Haul / Access Road
- Explosives Storage
- Air Strip
- Mine Access Road
- Seepage / Runoff Collection System
- Culvert
- 230 kV Transmission Line
- Fresh Water Intake Pipeline
- Effluent Discharge Pipeline
- Tailings Pipeline Corridor
- Fish Habitat Development Area

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.

Datum: NAD83
Projection: UTM Zone 15N

0 0.5 1 2 3 4 5 Kilometres

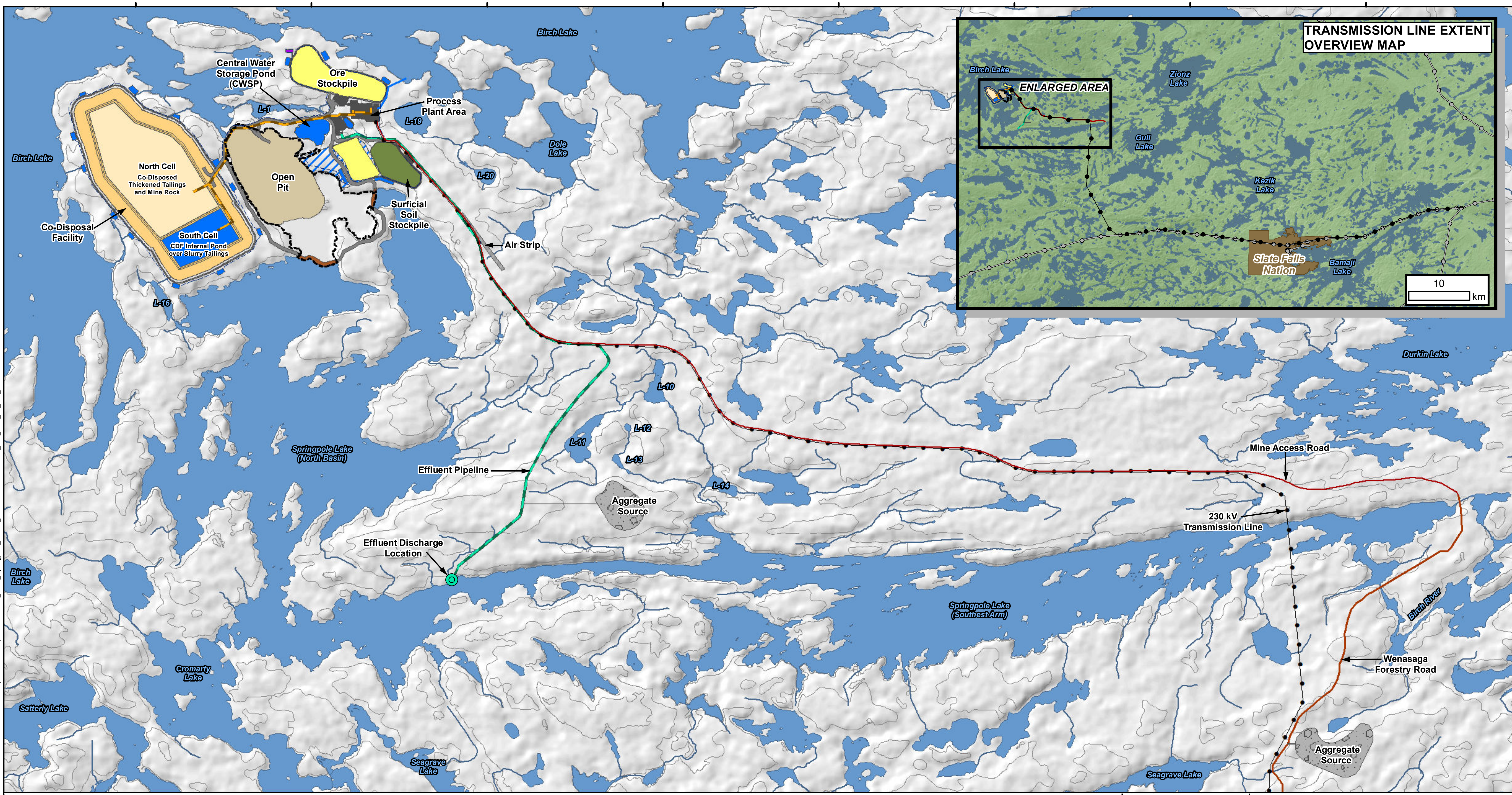
FIRST MINING GOLD

wsp

SPRINGPOLE GOLD PROJECT

EIS / EA Site Plan

PROJECT Nº: ONS2104	FIGURE: 5.1-1
SCALE: 1:17,000	DATE: October 2024



LEGEND

- Aggregate Source
- Existing Road
- Watercourse
- Waterbody
- Existing Transmission Line
- Contour (10 m intervals)

Proposed Mine Feature

- Open Pit
- Open Pit Basin
- Ore Stockpile
- Surficial Soil Stockpile
- Co-Disposal Facility
- Co-Disposed Thickened Tailings and Mine Rock
- Process Plant Area
- Dike
- Pond
- Haul / Access Road
- Explosives Storage
- Air Strip
- Mine Access Road
- Seepage / Runoff Collection System
- 230 kV Transmission Line
- Fresh Water Intake Pipeline
- Tailings Pipeline Corridor
- Effluent Discharge Pipeline
- Fish Habitat Development Area
- Effluent Discharge Location

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

0 1 2 4 6 8 10 Kilometres

FIRST MINING GOLD | WSP

SPRINGPOLE GOLD PROJECT

EIS / EA Extended Site Plan

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.

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^3) of ore, 20.4 Mt or 10.5 Mm^3 of overburden and 292 Mt or 133 Mm^3 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^3) 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^3/s) in June to 5.0 m^3/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^3, 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^3/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^3/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^3 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 O-1 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 $CaCO_3$/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 $CaCO_3$/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 $CaCO_3$/t, ranging from -1 to 20 kg $CaCO_3$/t) and the other group of samples had a higher NP content (approximately 200 kg $CaCO_3$/t, ranging from approximately 50 to 500 kg $CaCO_3$/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^3/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^3/day early in mine life to 2,637 m^3/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.

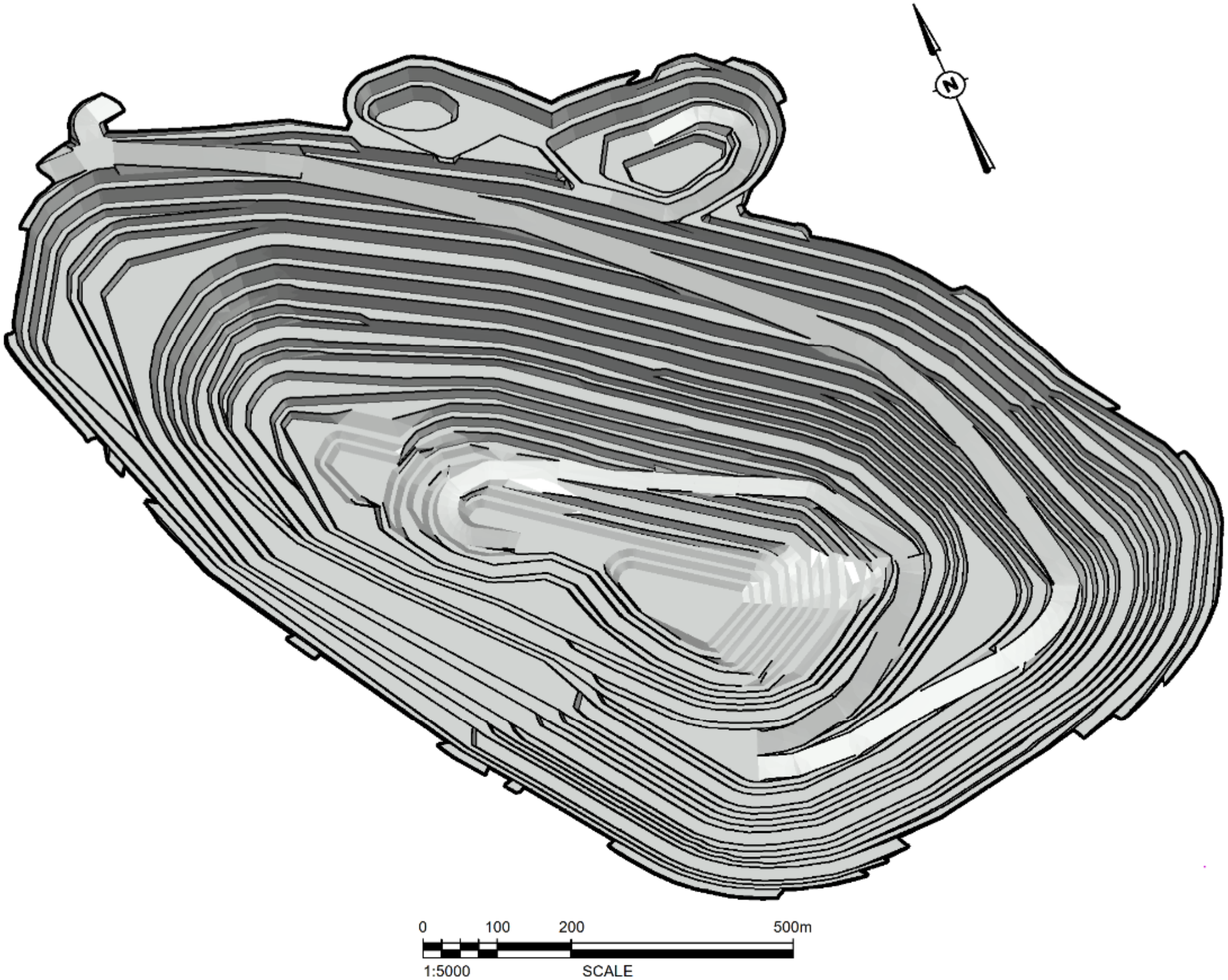
Explosives will be required primarily for the rock extraction in the open pit but may also be needed for other onsite construction work. Emulsion explosives will be manufactured on site under the care and control of a qualified contractor. The components of the emulsion explosive are not individually 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

Maximum Dewatering Rate (10% of available flow) (Mm^3/month)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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

Dewatering Schedule Scenario	Start	End	Total Duration of Dewatering Period (months)	Duration of Active Pumping (months)
Pump maximum 10% of receiver flow year-round				
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



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LEGEND

NOTES:

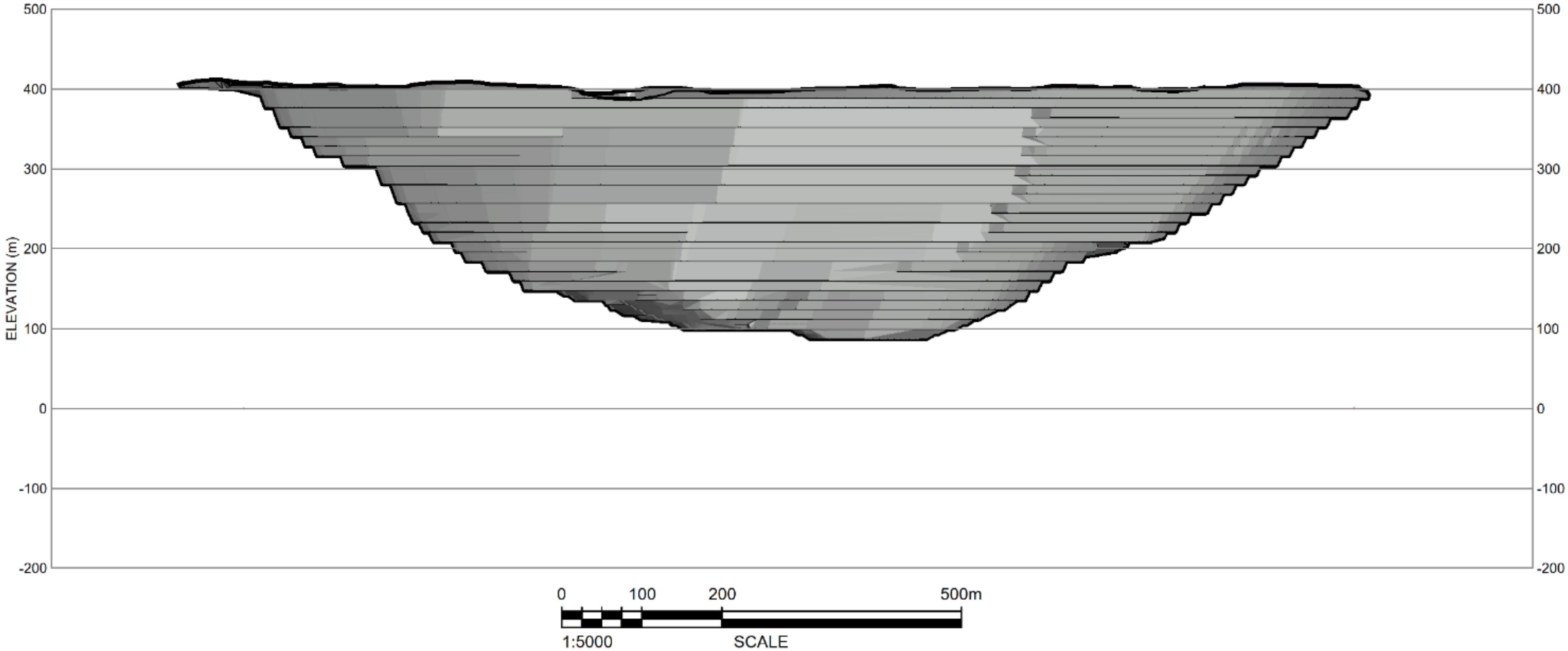
FIRST MINING GOLD

wsp

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:

First Mining Gold

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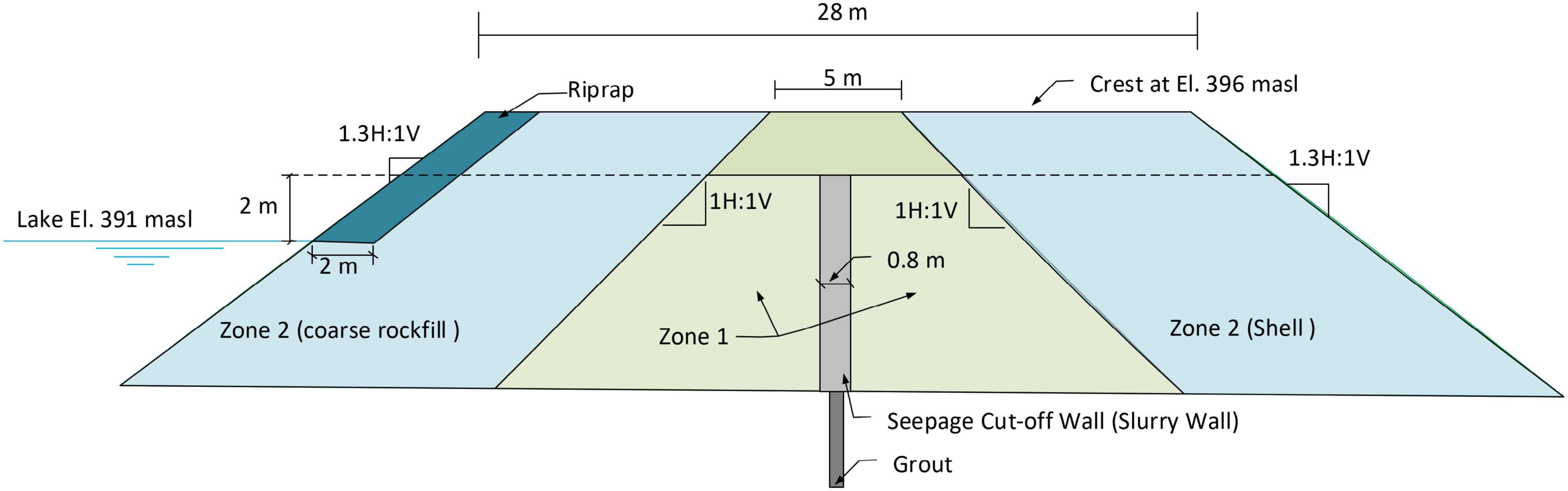
SPRINGPOLE GOLD PROJECT

Open Pit Cross Section

PROJECT N°: ONS2104	**FIGURE: 5.7-2**
SCALE: As Shown	DATE: June 2024



X:\CA\CAOAK300-OAK\MIS-FS1-ProjectF\2021\Projects\ONS2104_FMG_Springpole_EIS\11_GIS\EIS\MXD\Prelim_Dike_Cross_Sections_1.mxd

LEGEND

NOTES:

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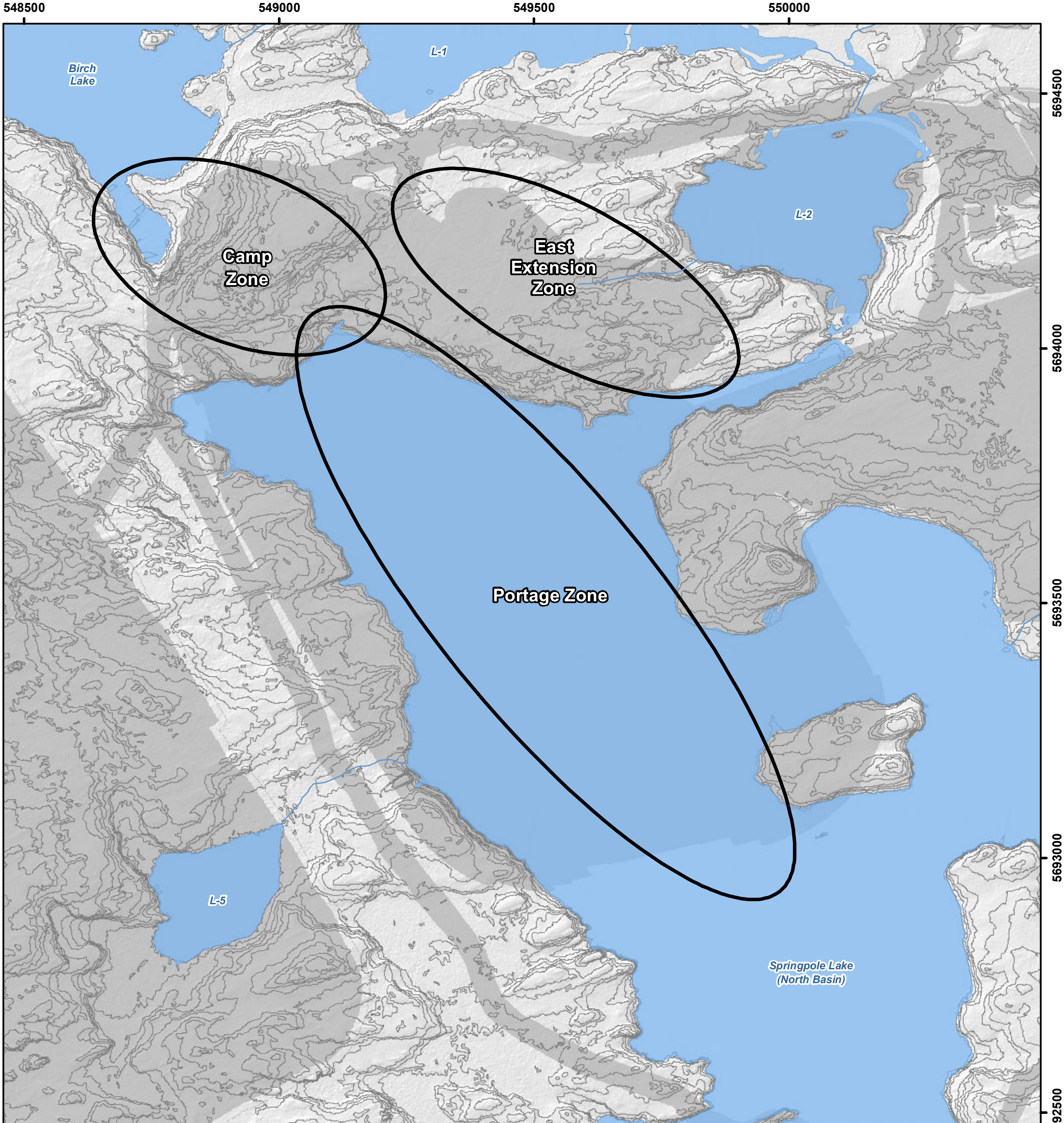
SPRINGPOLE GOLD PROJECT

Preliminary Dike Cross Sections

PROJECT N^{o}: ONS2104	**FIGURE: 5.7-3**
SCALE: N.T.S.	DATE: October 2024



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.

Datum: NAD83
Projection: UTM Zone 15N

0 0.1 0.2 0.4 0.6 0.8 1 Kilometres

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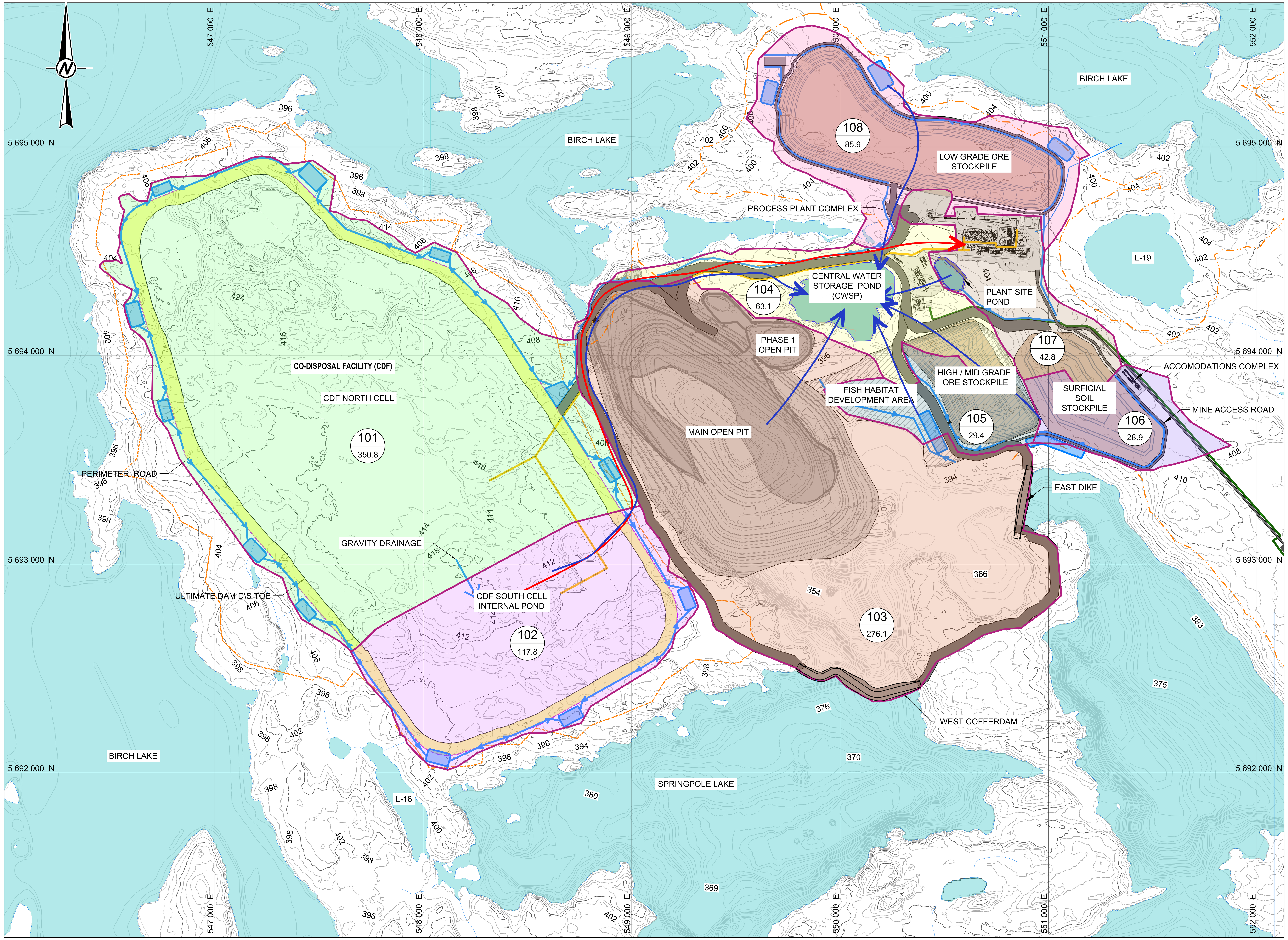
SPRINGPOLE GOLD PROJECT

Ore Body Zones

PROJECT N°: ONS2104	**FIGURE: 5.7-4**
SCALE: 1:10,000	DATE: June 2024



SITE PLAN
SCALE 1:10,000 m

LEGEND

- 400 CONTOUR
- PROPOSED DRAINAGE COLLECTION DITCH
- 120 m WATER BODY / OPEN PIT OFFSET
- EFFLUENT DISCHARGE LINE
- TAILINGS LINE
- WATERSHED
- CDF PROPOSED DESIGN DOWNSTREAM TOE
- CDF PROPOSED ULTIMATE CENTERLINE
- RECLAIM PUMPED FROM CDF INTERNAL POND TO PROCESS PLANT (CONCEPTUAL)
- PUMPED FLOWS TO CWSP (CONCEPTUAL)
- ROAD
- WATER
- SUMP
- OFFSET ALLOWANCE FOR PERIMETER DITCH AND ACCESS ROAD
- PROPOSED CULVERT
- 101 WATERSHED ID
- 350.8 WATERSHED AREA (ha)

NOTES

1. THIS FIGURE ILLUSTRATES THE PRELIMINARY OPERATIONS WATER MANAGEMENT PLAN. COLLECTION PONDS, DITCHES, BERMS/DAMS SHOWN ARE CONCEPTUAL ONLY.
2. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS. GRID COORDINATES ARE IN NAD 1983 UTM ZONE 15N.
3. THIS WATER MANAGEMENT PLAN SHOULD BE REVIEWED IN CONJUCTION WITH THE FLOW SCHEMATIC.

REFERENCES

1. THE DIGITAL FILES FOR THE BASE MAP WERE PRODUCED FROM DRAWING SP-0000-GX-LYD-0003-1.dwg, PROVIDED BY AUSENCO.

WATERSHED AREAS SUMMARY TABLE

CATCHMENT ID	CATCHMENT AREA (ha)
101	350.8
102	117.8
103	276.1
104	63.1
105	29.4
106	28.9
107	42.8
108	85.9
TOTAL:	994.8

0 500 1,000
1:10,000 METRES

CLIENT
FIRST MINING GOLD

CONSULTANT
WSP

YYYY-MM-DD	2024-10-30
DESIGNED	MM
PREPARED	JY
REVIEWED	MM
APPROVED	MM

PROJECT
SPRINGPOLE GOLD PROJECT
CO-DISPOSAL FACILITY

TITLE
OPEN PIT MINING PHASE WATERSHEDS AND FLOW CONCEPT

PROJECT NO.	CONTROL	REV.	FIGURE
ONS2104A	0001	B	5.7-5

5.8 Stockpiles

5.8.1 Overburden and Lake Bed Sediment Storage

Lake bed sediments and overburden will be stripped from the open pit footprint to gain access to the bedrock for mining (Section 5.7.2). Overburden will also be removed from several other site development areas as needed including the following:

- CDF;
- Plant site; and
- Aggregate and quarry operation(s).

It is estimated that about 11 Mm^3 of overburden will be stripped from the open pit basin and from other locations on site. Overburden will be removed beneath the dam foundations of the CDF prior to fill placement, where required to meet stability objectives for the facility, and additional capacity in the surficial soil stockpile has been included.

Overburden not needed directly at other site locations for construction or progressive reclamation purposes is planned to be stored primarily in the surficial soil stockpile located east of the open pit. The surficial soil stockpile is planned to be approximately 26 ha and 20 m high.

Where practicable, surface organics and organic soils will be stripped and stored separately from the mineralized overburden at the surficial soil stockpile location as it has increased value for reclamation purposes. Overburden and surficial organics stripped from Project aggregate operations will be stockpiled at the aggregate locations to facilitate future reclamation of the aggregate extraction site(s).

5.8.2 Mine Rock Storage

Approximately 133 Mm^3 of mine rock will be produced by the Project. The NAG mine rock will be preferentially re-used as a construction material for the Project, with the residual volume co-managed with the tailings produced by the process plant within a CDF as described in Section 5.10. The co-disposed mine rock and tailings will result in a structure approximately 375 ha in area with an average height of approximately 77 m above average ground surface.

5.8.3 Ore Stockpiles

Two ore stockpiles are to be developed: a high / mid grade stockpile, and a low grade stockpile located north of the process plant site (Figure 5.1-1). The high / mid grade stockpile will be removed and fully processed prior to construction and establishment of the fish habitat development area designed for closure. The approximate footprint of the ore stockpiles will be as follows:

- High / mid grade stockpile = 22 ha; and
- Low grade stockpile = 52 ha.

The stockpiles will range in height from approximately 40 to 60 m. The stockpiles will be established by placing ore on a pad base constructed of NAG mine rock that will provide a buffer between the ore and the native ground. The ore stockpiles are designed with an overall slope of 2H:1V, having a lift height of 10 m and a berm width of 7 m. Final design of the stockpiles will account for the nature of the material being managed to provide sufficient stability. An appropriate setback has been established to account for any minor slumping or sloughing during stockpile management.

Ore storage volumes vary but peaks at 9.9 Mm^3 near the end of Year 3. At that time, the storage in the high grade, mid grade and low grade stockpiles is projected to be 2.7 Mm^3, 1.4 Mm^3 and 5.8 Mm^3 respectively. The ore stockpiles are expected to be fully consumed by the end of Year 9. After depletion of the high /mid grade stockpile, the area will be further restored and enhanced as part of the fish habitat development area, while the low grade stockpile area will be reclaimed as terrestrial habitat in accordance with the closure plan.

During operations, runoff and seepage from the stockpiles will be directed into the stockpile contact water management ponds, which are part of the integrated site water management system. As needed, the water will be pumped to the CWSP for subsequent re-use or for treatment and discharge to the environment in accordance with applicable regulatory requirements.

A small, crushed ore stockpile will also be established to receive the crushed ore from the gyratory crusher. This covered stockpile will contain approximately 16 hours of live storage for the process plant.

5.9 Ore Processing

5.9.1 Buildings and Structures

Ore will be processed using proven technology at the process plant area to produce doré bars for transport off site for sale. The primary processing facilities as shown in Figure 5.9-1 are as follows:

- Primary gyratory crusher;
- Conveyor system for crushed ore;
- Semi-autogenous (SAG) mill;
- Ball mill with hydro-cyclone cluster;
- Flotation circuit;
- Carbon in pulp (CIP) leaching circuit;
- Elution and electrowinning gold room;
- Tailings cyanide destruction; and
- Tailings thickener.

Excluding the primary crushing facilities, these circuits are contained within or immediately adjacent to the process plant. Table 5.9-1 summarizes the approximate dimensions of the onsite buildings.

5.9.2 Processing

Ore will be hauled either directly from the open pit or extracted from the ore stockpiles and fed into the primary apron feeder located in the process plant area. Crushed ore will be transported by conveyor to a covered crushed ore stockpile, which will hold approximately 16 hours of process plant feed. Crushed ore will be directed by the conveyor to the process plant, where it will undergo conventional ore processing in a series of circuits:

- Comminution;
- Concentration and separation;
- Leaching and carbon adsorption; and
- Gold recovery.

The ore processing circuit is shown in Figure 5.9-2.

The crushed ore will be ground in a SAG mill, followed by a ball mill to complete the sizing process, and a hydro-cyclone cluster. In the cyclones, gravity and hydraulic forces separate the larger and smaller ore particles in suspension. Smaller particles in the cyclones tend to remain in suspension and are discharged as cyclone overflow to the flotation circuit. Larger particles will report to the ball mill for further grinding.

The hydro-cyclone overflow will flow through a three-stage flotation circuit in a series of tanks (rougher flotation, rougher scavenger flotation and cleaner flotation), all located adjacent to the process plant. The tanks will be surrounded by a walled concrete slab to provide secondary containment.

The thickened ore slurry will then pass through the following stages:

1. The feed slurry is leached in a series of leach tanks to which oxygen and sodium cyanide are added, within an alkaline environment to keep the cyanide in solution.
2. The gold and silver that is dissolved in cyanide solution is attached to the activated carbon in the CIP tanks.
3. The loaded (gold and silver bearing) carbon is transferred from the CIP tanks to the recovery circuit, to a pressurized elution circuit followed by electrowinning to produce a gold-silver precipitate.
4. The gold-silver precipitate is poured to produce doré gold bars.

A high efficiency of water recycling is achieved within the process plant. In addition, most of the activated carbon used in the process will be reactivated for re-use in the CIP circuit. The finer fraction is an inert waste that will be stored in super bags for subsequent disposal off site.

Cyanidation is the only technically and cost-effective means of gold recovery from gold-bearing ore at a commercial scale for the ore type. The use of cyanide as a reagent to leach gold from ore is the standard practice throughout the industry, including at most other active gold mines in Ontario. Industry best practices are well established and will be used during the mixing and in-plant cyanide leaching process, and in the destruction and recycling of cyanide components in tailings prior to transport to the CDF for permanent storage. The Project will follow the International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold (International Cyanide Management Institute 2024).

5.9.3 Reagent Transport, Storage and Use

Reagents to be used in ore processing and water treatment for the Project are typical of Ontario gold mines. All process reagents will be stored according to well-established supplier and safety guidance, in separated and, as applicable, contained areas. Reagent mixing systems will be located indoors in the process plant within containment areas, to contain any spills and prevent incompatible reagents from mixing. Storage tanks will be equipped with level indicators, instrumentation and alarms to prevent spills during operations.

The primary reagents required to process the ore and the anticipated form / storage are provided in Table 5.9-2. All of these chemicals will be handled and stored according to all applicable regulatory requirements and are used within the fully contained process plant.

5.9.4 Tailings Production

Tailings are the primary by-product from the processing of ore. Prior to leaving the process plant, various treatment processes are available for removing cyanide from the tailings. In-plant destruction of cyanide in tailings using the sulphur dioxide and oxygen (SO_2/O_2) treatment process is well established and effective, and is included in the Project design. The reagents required for that treatment process are oxygen, lime, copper sulphate and sodium metabisulphite. In-plant SO_2/O_2 treatment of cyanide and metallo-cyanide complexes involves the following (or equivalent) reactions:

$$CN^- + SO_2(g) + H_2O + O_2(g) \rightarrow CNO^- + H_2SO_4(aq)$$

where the cyanide ion (CN^-) is oxidized to the cyanate ion (CNO^-) using copper as a catalyst. Cyanate then reacts with water (hydrolyzes) to form ammonia (NH_3) and carbon dioxide (CO_2) in accordance with the following reaction:

$$CNO^- + 2H_2O \rightarrow OH^- + NH_3 + CO_2$$

The target concentration of total residual cyanide in the tailings after the cyanide destruction will be in compliance with the International Cyanide Management Code, and the low residual cyanide concentrations in the tailings will naturally degrade when exposed to sunlight at the CDF.

Approximately 78 Mm^3 of tailings will be produced by the process plant over the life of the mine. Two types of tailings are proposed to be produced in the process plant: thickened NAG tailings (80% of total tailings by mass) and conventional slurry PAG tailings (20% of total tailings by mass):

- **Thickened NAG tailings (approximately 62 Mm^3):** produced by passing a portion of the tailings after cyanide destruction through a tailings thickener in the process plant to produce a drier product that can still be transferred hydraulically by pipeline.
- **Conventional slurry PAG tailings (approximately 16 Mm^3):** remaining tailings left in a conventional slurry form for long-term ARD mitigation.

These two tailings types will be co-managed in a CDF to best manage the potential for acid generation from the tailings in the long term and minimize the footprint of the Project and to facilitate operational efficiencies and reclamation (Section 5.10).

5.9.5 Tailings Geochemistry

A total of 18 synthetic tailings samples were produced from metallurgical test work undertaken by Basemet Metallurgical Laboratories. The samples were produced as a part of two metallurgical programs (2021 and 2022), including nine samples of flotation tailings and nine samples of sulphide concentrate tailings. These samples reflect the tailing processing and deposition optimizations made to the Project since the draft EIS/EA. Some samples represent life of mine milling conditions and other samples were generated as part of variability testing. These 18 samples were then tested as part of geochemistry investigations. As noted in Section 5.9.4, two types of tailings will be produced by the process plant: a thickened NAG tailings (a flotation tailing with a low sulphide content) and a conventional PAG tailings slurry (sulphide concentrate tailing). The NAG filtered tailings represent approximately 80% by mass of the tailings generated over life of mine, while the conventional PAG portion represents 20% by mass. As noted in Section 5.7.4.5, while a large portion of the ore is PAG, the majority of the tailings are NAG because flotation is being used to remove sulphur and purposefully generate NAG tailings.

Tailings samples and other tailings products representative of these two tailings streams are part of ongoing metallurgical and geochemical studies, including static and kinetic testing to provide supplemental information on the ML/ARD characteristics of the tailings. Completed studies to assess the static geochemistry of the two tailings streams included a total of 18 synthetic tailings samples produced as a part of two metallurgical programs (2021 and 2022): nine samples of NAG tailings and nine samples of PAG tailings. Some samples represent life of mine milling conditions and other samples were generated as part of variability testing.

The sample from a flotation circuit that represents NAG tailings had a low concentration of total sulphur, ranging from 0.08% to 0.26% (median 0.15%). The PAG tailings flotation samples had total sulphur content ranging from 10% to 25% (median 18%). Sulphur was primarily present as sulphide sulphur in both samples. Mineralogical testing identified pyrite as the only sulphide mineral in the conventional slurry tailings sample at approximately 40 weight percent (wt.%). Sulphide minerals were only detected in one NAG tailings sample (including 0.6 wt.% barite). The NP content of the NAG tailing sample ranged from approximately 30 to 240 kg $CaCO_3$/t (median of 145 kg $CaCO_3$/t), whereas the NP content of the PAG concentrate sample ranged from approximately 20 to 150 kg $CaCO_3$/t (median of 49 kg $CaCO_3$/t). In both samples, carbonate NP was similar to the NP content indicating that NP was present as carbonate minerals however, some samples contain some non-carbonate NP. Mineralogical testing also identified the presence of calcite along with dolomite-ankerite in both samples along with other trace minerals.

Tailings sample ABA results were assessed for the potential for neutral and acidic ML in the future. For Project planning purposes, ABA results with a ratio of NPR<2 were assumed to be PAG in accordance with industry standard guidance (MEND 2009). Based on this threshold, the sample representative of the thickened floatation tailings was classified as NAG (NPR>2) and the sample representative of the conventional slurry tailings was classified as PAG (NPR<2).

Table 5.9-1: List of Anticipated Buildings

Item	Description
Primary Crusher Building	• Pre-engineered, enclosed steel frame metal cladded building • 85 t overhead crane, 17 m span
Grinding Building	• Pre-engineered, steel frame metal cladded building • 60 t SAG mill overhead crane • 45 t ball mill overhead crane
Process Building	• Pre-engineered, steel frame metal cladded building • 25 t regrind mill overhead crane • 25 t regrind / flotation overhead crane
Stockpile Building	• Pre-engineered, fabric cladded dome building
Gold Room	• Pre-engineered, steel frame metal cladded building
Tailings Filtration Building	• Pre-engineered, steel frame metal cladded building
Reagent Building	• Pre-engineered, steel frame metal cladded building • 7.5 t overhead crane
Administration / Dry	• Modular building • Offices and change rooms (dry)
Mine Offices	• Modular building • Office and mine rescue room with equipment
Warehouse / Workshops	• Pre-engineered, steel frame fabric cladded building • For maintenance of equipment and storage of equipment parts
Gatehouse	• Modular building
Laboratory	• Modular building • Onsite assaying, metallurgical and environmental testing
Tire Change Shop	• Pre-engineered, steel frame fabric cladded building • Primarily mine haul fleet tire maintenance
Truck Shop	• Pre-engineered, steel frame metal cladded building • Two, 25 t overhead cranes • Separate sections for warehousing and maintenance workshop
Vehicle Wash-Bay	• Pre-engineered, steel frame fabric cladded building • Contains fluid-collection sump and oil-water separator • Wash water expected to be re-used
Fuel Depot	• Approximately three to five days of light and mine fleet diesel supply (150,000 to 250,000 litres [L]) and dispensing facilities • Other minor fuel types of storage
Explosive Storage Magazine	• Designed in accordance with current applicable regulations • Development of an explosive factory may or may not be constructed on site, but if developed will be under the care and control of the supplier

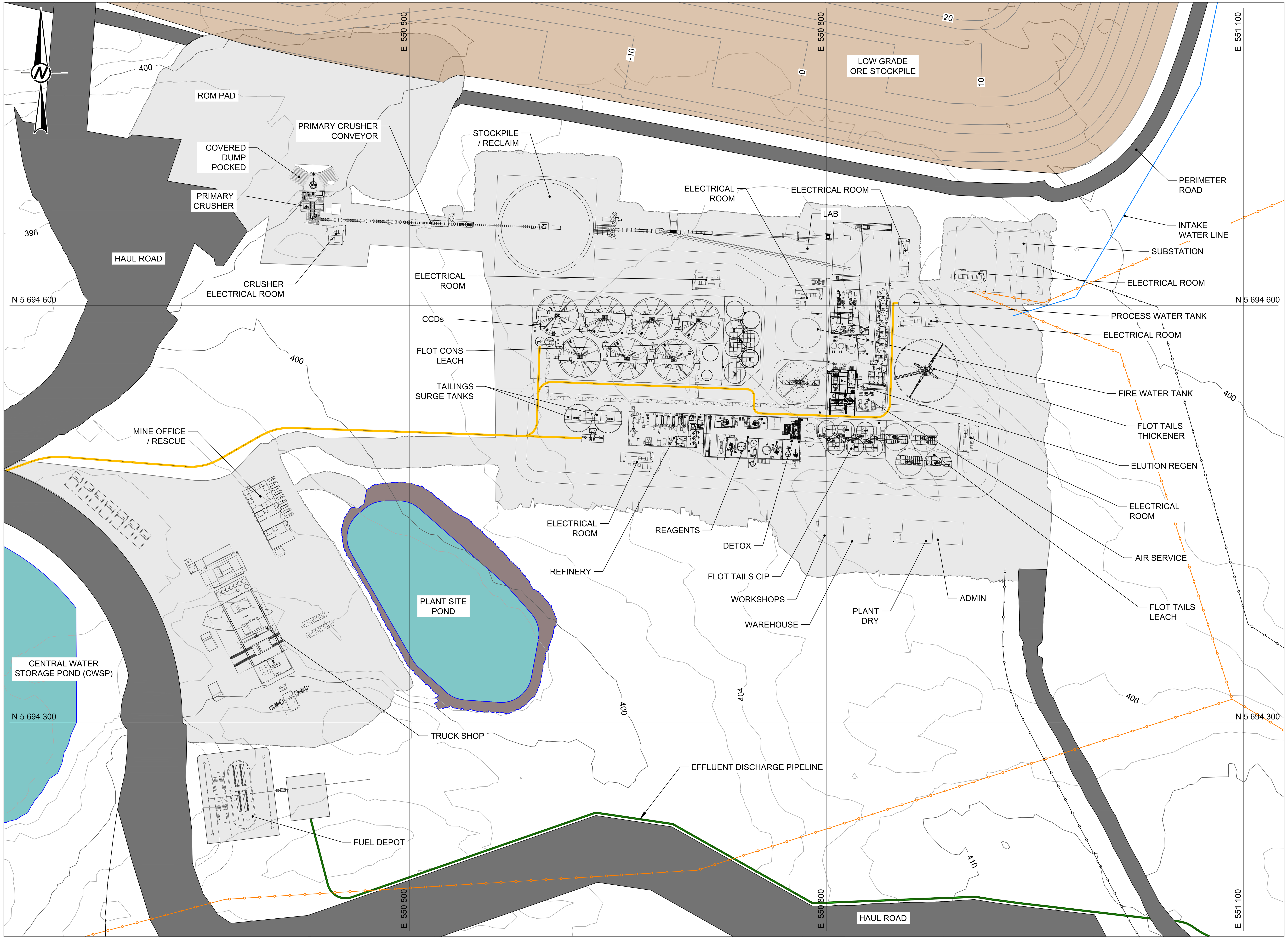
Table 5.9-2: Anticipated Reagent Use and Handling

Reagent	Use	Anticipated Form and Delivery(1)	Storage / Handling
Lime	pH adjustment; mixed into a hydrated lime slurry in plant	Fine powder in approximately 30 t container trucks	Silo; handled in accordance with industry standards for the protection of worker safety and the environment
Sodium Cyanide	Dissolution of gold; mixed to form a leach solution	Solid (briquettes) in bulk iso-tank carried by licensed carrier	Stored in containers inside the process plant with containment; handled in accordance with industry standards for the protection of worker safety and the environment
Caustic Soda	For cyanide mixing, carbon neutralization / stripping and electrowinning; diluted prior to use	Liquid in approximately 30 t tanker trucks	Diluted in a tank and stored in a holding tank(s); handled in accordance with industry standards for the protection of worker safety and the environment
Ferric Sulphate	Remove dissolved arsenic in the tailings' pore water.	Granular form (55-gallon drums) or liquid in tanker trucks.	Stored in a holding tank(s) or drums; handled in accordance with industry standards for the protection of worker safety and the environment
Hydrochloric Acid (or similar)	Used in elution circuit and elution tanks	Liquid in approximately 30 t tanker trucks	Stored in a holding tank(s); handled in accordance with industry standards for the protection of worker safety and the environment
Copper Sulphate Pentahydrate	Catalyst to aid in the cyanide destruction process	Solid, bulk (up to 1 t) super bags	Bulk bags stored with secondary containment; handled in accordance with industry standards for the protection of worker safety and the environment
Sodium Metabisulphite	Used in the cyanide destruction process	Solid, bulk (up to 1 t) super bags	Bulk bags stored with secondary containment; handled in accordance with industry standards for the protection of worker safety and the environment
Activated Carbon	Adsorption of gold in solution	Solid, bulk (up to 1 t) super bags	Bulk bags stored outdoors; inert material handled for dust control
Flocculant(s)	Slurry thickening (various); mixed into solution as appropriate	Solid, bulk (up to 1 t) super bags	Bulk bags stored with secondary containment; handled in accordance with industry standards for the protection of worker safety and the environment
Coagulant	Used to thicken tailings	Solid, bulk (up to 1 t) super bags	Bulk bags stored with secondary containment; handled in accordance with industry standards for the protection of worker safety and the environment
Collector	Used within the flotation circuit	Solid, bulk (up to 1 t) super bags	Bulk bags stored with secondary containment; handled in accordance with industry standards for the protection of worker safety and the environment

Table 5.9-2: Anticipated Reagent Use and Handling

Reagent	Use	Anticipated Form and Delivery[1]	Storage / Handling
Frother	Used within the flotation circuit	Solid, bulk (up to 1 t) super bags	Bulk bags stored with secondary containment; handled in accordance with industry standards for the protection of worker safety and the environment
Oxygen	Required in leach circuit	Liquid in approximately 30 t tanker trucks; expected to be replaced by onsite oxygen plant	Stored in a pressurized holding vessel; handled in accordance with industry standards for the protection of worker safety and the environment
Sulphur Dioxide	Cyanide destruction circuit	Liquid in 30 t tanker trucks	Stored in a pressurized holding vessel (approximately 64 m^3); handled in accordance with industry standards for the protection of worker safety and the environment

Note:
(1) Approximate; based on test work, supplier recommendations and practices in existing plants.



LEGEND

400	CONTOUR
	INTAKE WATER LINE
	EFFLUENT DISCHARGE LINE
	TAILINGS LINE
	25 KV TRANSMISSION LINE
	230 KV TRANSMISSIONS LINE
	ROAD
	WATER

NOTES

1. THIS FIGURE ILLUSTRATES THE CO-DISPOSAL FACILITY CONCEPTUAL DESIGN PLAN VIEW OF ULTIMATE CONFIGURATION.
2. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS, GRID COORDINATES ARE IN NAD 1983 UTM ZONE 15N.

0 50 100
1:1,500 METRES

CLIENT
FIRST MINING GOLD

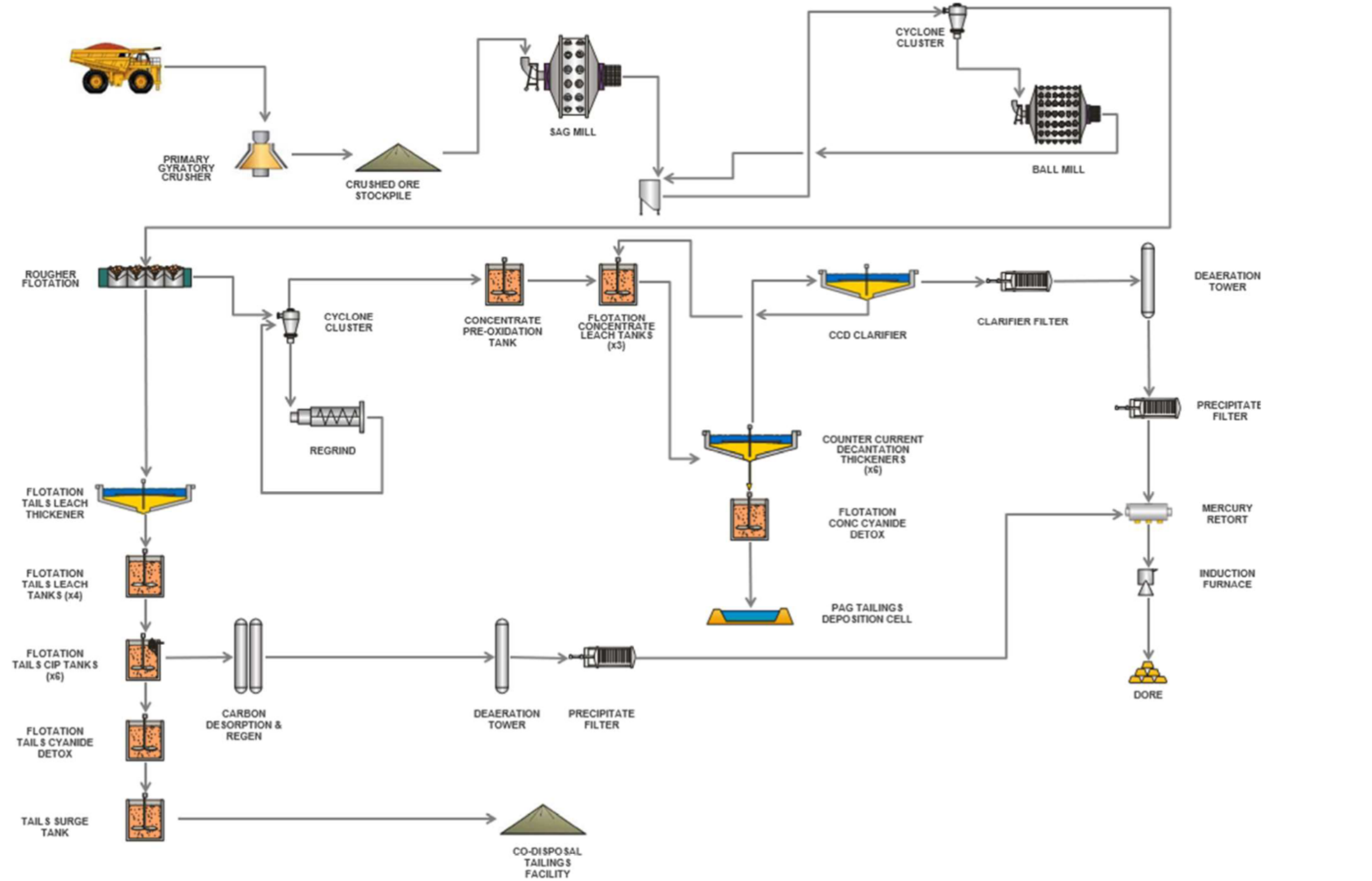
CONSULTANT

YYYY-MM-DD	2024-10-30
DESIGNED	MM
PREPARED	JY
REVIEWED	MM
APPROVED	MM

PROJECT
SPRINGPOLE GOLD PROJECT
CO-DISPOSAL FACILITY

TITLE
PROCESSING AREA SITE PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
ONS2104A	0001	B	5.9-1



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LEGEND

NOTES:
- Preliminary Process Flowsheet provided by Ausenso, Response to RFI ONS2104-RFI-055 Rev 1. Ausenco Document No. 104496-ER-E0000-11102-001 Rev 1. 14 April 2023.

FIRST MINING GOLD

wsp

SPRINGPOLE GOLD PROJECT

Current Process Flowsheet

PROJECT N°: ONS2104	**FIGURE: 5.9-2**
SCALE: N.T.S.	DATE: June 2024

5.10 Co-disposal Facility

5.10.1 Materials Requiring Storage

The Project will produce approximately 133 Mm^3 of mine rock. Mine rock will be used for CDF construction along with quarried construction rock. Approximately 81 Mm^3 of construction material will be required to construct the CDF dams. Any surplus mine rock will require permanent storage over the life of the mine. As described further in Section 5.7.4 and Appendix K-1.6, the geochemistry of the mine rock varies across the open pit including by rock type and will be the determining factor on how the rock is managed.

Approximately 78 Mm^3 of tailings will be produced by the process plant over the life of the mine. The Project will produce two tailings streams in order to best manage the potential for acid generation from the tailings in the long term: a thickened NAG tailings (80% by mass) and a conventional slurry PAG tailings (20% by mass):

- **Thickened NAG tailings (approximately 62 Mm^3):** produced by passing a portion of the tailings through thickeners. Although thickened, the tailings are still able to be hydraulically conveyed through a high density polyethylene (HDPE) tailings pipeline for final deposition in the north cell of the CDF.
- **Conventional slurry PAG tailings (approximately 15.5 Mm^3):** produced in a conventional slurry form at the process plant and transported to their final storage location in the dedicated south cell of the CDF by HDPE pipeline. This conventional tailings deposition approach for 20% portion of tailings that are PAG helps keep the material saturated and mitigates ARD potential in the long term.

5.10.2 Overall Approach

Through a comprehensive alternatives assessment following the ECCC requirements (Sections 4.9 to 4.13 and Appendix E), it was determined that the best means to manage mine rock and tailings for the Project would be in a single CDF with a dedicated cell for the PAG portion of tailings. The primary advantages of a single CDF as compared to the use of a separate mine rock stockpile and tailings management facility is a considerable reduction in Project footprint, and GHG emission reduction from reduced haulage of construction and mine waste materials (Appendix E). By thickening 80% of the tailings and co-mingling the thickened NAG tailings with mine rock, a relatively small portion of conventional slurry tailings remain for management. This approach reduces the volume of water present during operations in the south cell that is dedicated for the storage of conventional slurry tailings and further simplifies the closure strategy.

Co-disposal of mine wastes has been practiced in the mining industry for decades and for over 20 years the concept of purposely optimizing the different properties of tailings and mine rock has been a subject in the technical literature. The CDF is designed to take advantage of the different properties of the mine wastes, (tailings and mine rock). In particular, the lower permeability of the tailings will be used to provide an oxygen barrier for the mine rock. The use of soil and tailings as an oxygen barrier has also been successfully implemented in Ontario.

The NAG tailings will function as an oxygen barrier for the PAG/ML mine rock. Limiting the influx of oxygen will limit the rate of oxidation and consequently limit metal leaching. The comprehensive alternative assessment described in Section 4 and Appendix E also considered the best location for the CDF. Key considerations in the selection of the location of the CDF and the storage methods are as follows:

- Proximity to the open pit and process plant to achieve operational efficiencies and minimize transportation risks and emissions;

- Geotechnical characteristics for foundations;
- Geochemistry of the materials to be stored;
- Avoidance of waterbodies and watercourses as practicable;
- Minimizing the overall environmental footprint of the Project as practicable;
- Reducing the footprint and height of the storage facility;
- Designing for final decommissioning and closure; and
- Consideration for reasonable distance from the mine site and land tenure.

The preferred CDF location is adjacent to the west of the open pit, and maintains a minimum setback of 120 m from Springpole Lake and Birch Lake, in accordance with the MNR shoreline reservation policy.

5.10.3 Preliminary Design

The CDF is proposed as a two-cell facility with a total surface area of approximately 380 ha (Figure 5.10-1:). A final average height of approximately 77 m provides the required storage for mine rock and tailings. It has been designed to effectively use NAG mine rock for construction purposes and to permanently store PAG mine rock, NAG thickened tailings and PAG conventional slurry tailings. Overall, the majority of the CDF will be composed of mine rock by mass (~65%) with the remaining 35% of the structure consisting of the co-located tailings. The NAG tailings will be co-managed with the PAG mine rock in the north cell of the CDF, while the conventional PAG slurry tailings will be kept saturated in the south cell of the CDF to mitigate ARD potential.

An elevation difference will be maintained between the north and south cells so that runoff and tailings water reports to the south cell primarily by gravity. The thickened tailings will allow slightly steeper beaches to be formed during deposition to promote passive drainage through the internal dam and into the south cell. The internal dam will not be lined to intentionally promote water to pass through to the south, and enhancements to drainage including culverts could be added if needed. The CDF design meets all relevant requirements of the CDA, as well as provincial requirements under the *Lakes and Rivers Improvement Act*. The CDF will be designed to meet the factors of safety required for long-term, static loading conditions, as well as pseudo-static loading conditions and will be designed in stages with early construction and placement of material focused on the south cell of the CDF. By using predominantly, mine rock to construct the CDF dams, the overall stability of the facility is not affected by the strength of the thickened and slurry tailings. In addition, FMG will have a qualified geotechnical engineer dedicated to the safe design, construction and operation of the CDF.

Extensive geotechnical investigations have been undertaken in connection with the proposed CDF foundation conditions inclusive of:

- Fracflow (2020) – 6 boreholes and 13 test pits;
- Ausenco (2022) - 4 boreholes and 17 test pits;
- Knight Piésold (2022) – 11 boreholes and 39 test pits; and
- WSP (2024) – 7 boreholes and 4 monitoring wells.

Results of these investigations show that the major portion of CDF dams will be constructed on a robust bedrock foundation, with remaining portions being constructed mainly on areas of shallow overburden amenable to construction preparation. In addition to highly favourable geotechnical characteristics, the bedrock foundation uniformity across the CDF footprint provides highly effective mitigation for seepage management and capture.

The CDF design includes perimeter dams constructed from NAG rock on the downstream side sourced from the open pit and onsite quarries. The dams will be constructed with 3H:1V upstream slopes and 2H:1V downstream slopes for both the north and south cells. The north cell will have a centreline construction while the south cell will use a downstream raise construction method. The perimeter dam of the south cell is designed to be lined with a geosynthetic liner or other low permeability material such as clay excavated from the open pit basin for seepage mitigation. The geosynthetic clay liner or equivalent will be anchored to bedrock at the upstream toe.

The north cell (285 ha) of the CDF will co-manage PAG mine rock and thickened NAG tailings. The thickened NAG tailings produced at the process plant will be pumped through a HDPE pipeline to the north cell of the CDF for storage. The intent of co-disposal in the north cell is for the placement of the thickened NAG tailings to effectively encapsulate the PAG mine rock, thereby isolating the mine rock from atmospheric oxygen, which will mitigate potential acid generation and ML concerns.

The south cell (95 ha) will be designed to be water retaining, and will comprise a slurry PAG tailings cell, with an internal water management pond during the operations phase. The south cell dam is proposed to be lined with a low permeable liner to mitigate seepage. Maintaining the PAG tailings in a saturated condition mitigates acid generation. Conventional slurry tailings will be pumped from the process plant to the south cell by means of a HDPE pipeline.

Seepage from the CDF will be captured to the extent practical through site infrastructure and ditching systems. Interflow, defined as water that has infiltrated into the subsurface and returned to surface as overland flow, will be captured by the CDF and returned to the respective contact water management pond, before being transferred with surface runoff, to the CFD internal pond (Section 5.12.3.1).

The design requires separate 3.4 km long HDPE pipelines for both the NAG and PAG tailings. Both the NAG and PAG tailings pipelines will have spill detection instrumentation installed and will be double-walled or contained within collection areas such as ditches, ponds or topographic lows.

An Independent Geotechnical and Tailings Review Board (IGTRB) has been formed and is composed of an independent three-person panel of 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. The IGTRB will review the detailed permitting designs, construction, ongoing operations and closure design of the CDF. The IGTRB has reviewed the updated CDF design and provided advice on the design, construction and operational performance of the dams. In the IGTRB report (Appendix V-3.4), the IGTRB has indicated that the FMG has positively advanced the design concepts. The report states with the CDF dams founded on competent bedrock, there is ample foundation stability. In addition, with a negative water balance and no external runoff catchment, there would be no risk of overtopping the dams (Appendix V-1).

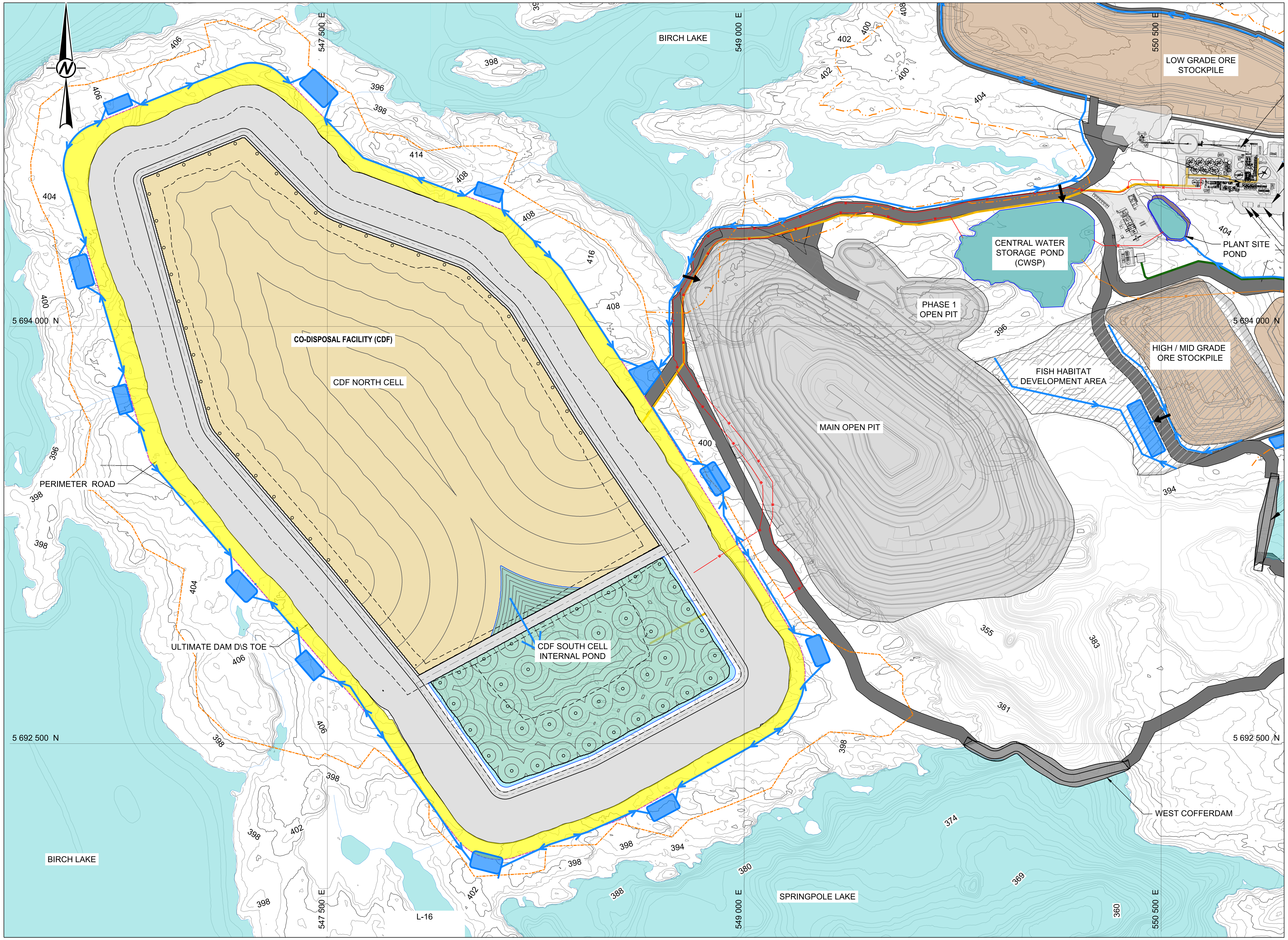
5.10.4 Construction and Operations

The footprint of the CDF will be cleared where required to support dam stability needs. Materials that are removed but not re-used during site preparation will be stored in the surficial soil stockpile located east of the open pit, or potentially at other temporary locations during construction within the Project footprint and away from waterbodies. The initial dams will be built during the construction phase for the Project, so that the facility is ready to accept PAG mine rock and NAG / PAG tailings when produced. Included in the construction is the lining of the dam of the south cell with a low permeability material. A quarry (CDF quarry) will be located within the north cell of the CDF as described in Section 5.16 to provide construction material for the CDF starter dams.

The perimeter dams of the CDF will be raised through centreline construction (north cell) and downstream raise construction (south cell) during operations in advance of predicted storage requirements, to a final estimated elevation of 485 m asml for the north cell and 480 m asml for the south cell. It is expected that annual construction of approximately 8 m high lifts will be required in a continuous manner throughout operations so that both the north and south dams are sized to contain a minimum of 12 months of production.

During operations, PAG mine rock will be trucked to the north cell for co-disposal, while the thickened NAG tailings and PAG conventional slurry tailings will be pumped to the north and south cells, respectively. PAG mine rock will be trucked from the open pit and placed within the north cell and NAG tailings will be end discharged over the PAG mine rock. It is expected that hydraulically pumped NAG tailings will flow and permeate into PAG mine rock pores creating the co-located matrix of PAG mine rock and NAG tailings. NAG tailings will also be spigotted from the perimeter dam to develop a low permeability zone of tailings against the perimeter dam. Spigotted tailings around the perimeter helps enclose the co-disposed PAG mine rock with a low permeability NAG tailings zone to limit oxygen ingress. Runoff from the north cell will be directed to the south cell, either through ongoing grading and temporary structures or using internal sump and pump locations. Towards the end of LOM, it is anticipated that milling ore from stockpiles will continue after mining ceases. This means NAG tailings will be available after mine rock production ceases. Following completion of PAG mine rock disposal within the north cell, NAG tailings will be deposited over the entire north cell covering the co-disposed PAG mine rock.

The south cell will be operated to keep the PAG tailings in a saturated condition to similarly isolate the PAG tailings from atmospheric oxygen and restrict the potential for acid generation. Contact water from the CDF will be directed to report to the internal pond in the south cell with transfer for re-use in the process plant, or CWSP as needed so that sufficient freeboard is retained in the facility.



LEGEND

400	CONTOUR
	PROPOSED DRAINAGE COLLECTION DITCH
	120 m WATER BODY / OPEN PIT OFFSET
	EFFLUENT DISCHARGE LINE
	TAILINGS LINE
	WATERSHED
	CDF PROPOSED DESIGN DOWNSTREAM TOE
	PUMPED WATER LINE
	CLEAN WATER LINE
	ROAD
	WATER
	SUMP
	OFFSET ALLOWANCE FOR PERIMETER DITCH AND ACCESS ROAD
	TAILINGS BEACH
	PROPOSED CULVERT

NOTES

1. THIS FIGURE ILLUSTRATES THE CO-DISPOSAL FACILITY CONCEPTUAL DESIGN PLAN VIEW OF ULTIMATE CONFIGURATION.
2. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS. GRID COORDINATES ARE IN NAD 1983 UTM ZONE 15N.
3. NORTH AND SOUTH CELLS STARTER DAMS WERE SIZED TO CONTAIN 1 YEAR OF COMMERCIAL PRODUCTION.
4. PERIMETER DAMS ARE TO BE FOUNDED ON PREPARED FOUNDATION (DENSE OVERBURDEN OR BEDROCK).
5. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

REFERENCES

1. THE DIGITAL FILES FOR THE BASE MAP WERE PRODUCED FROM DRAWING 105877-0000-G-001, PROVIDED BY AUSENCO.

0 250 500
1:7,500 METRES

CLIENT
FIRST MINING GOLD

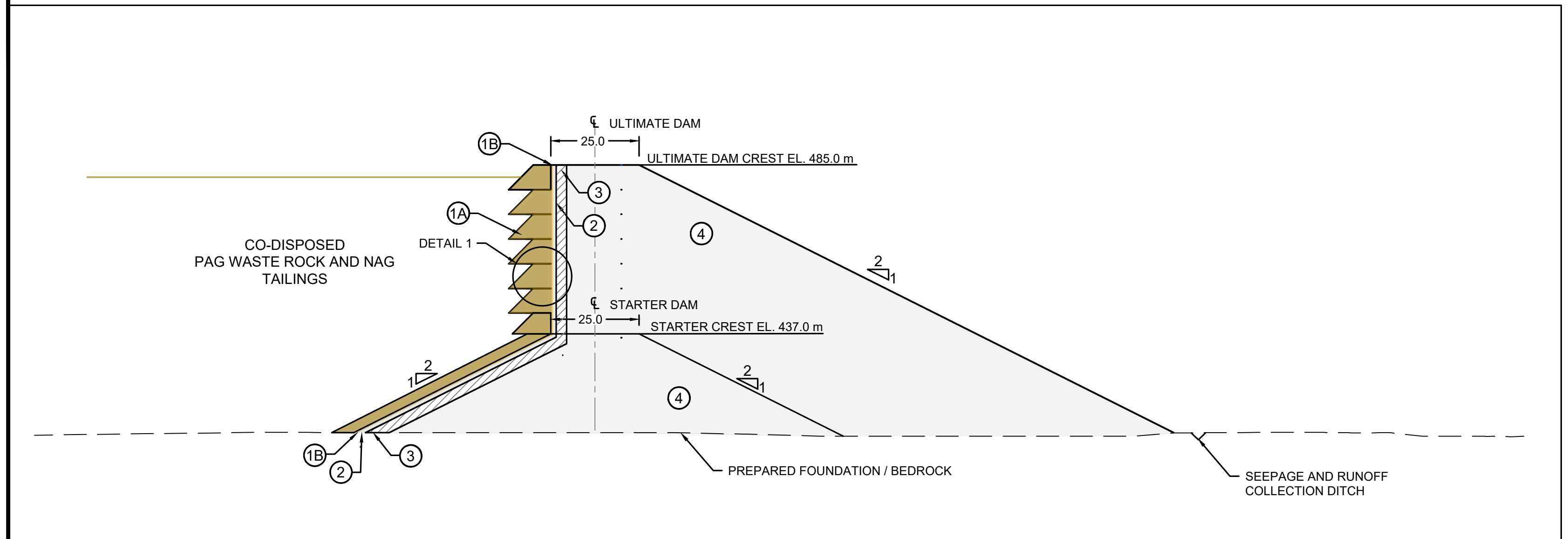
CONSULTANT
wsp

YYYY-MM-DD	2024-10-30
DESIGNED	MM
PREPARED	JY
REVIEWED	MM
APPROVED	MM

PROJECT
SPRINGPOLE GOLD PROJECT
CO-DISPOSAL FACILITY

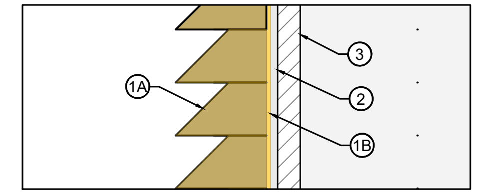
TITLE
TYPICAL CO-DISPOSAL FACILITY ULTIMATE CONFIGURATION DESIGN ARRANGEMENT

PROJECT NO.	CONTROL	REV.	FIGURE
ONS2104A	0001	B	5.10-1



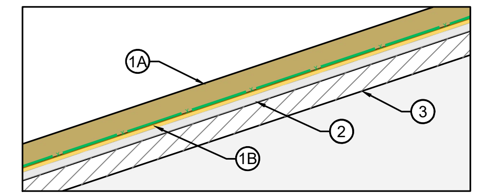
SECTION 1 NORTH CELL PERIMETER DAM - TYPICAL SECTION

SCALE: 1:1000



DETAIL 1

SCALE: 1:500



DETAIL 2

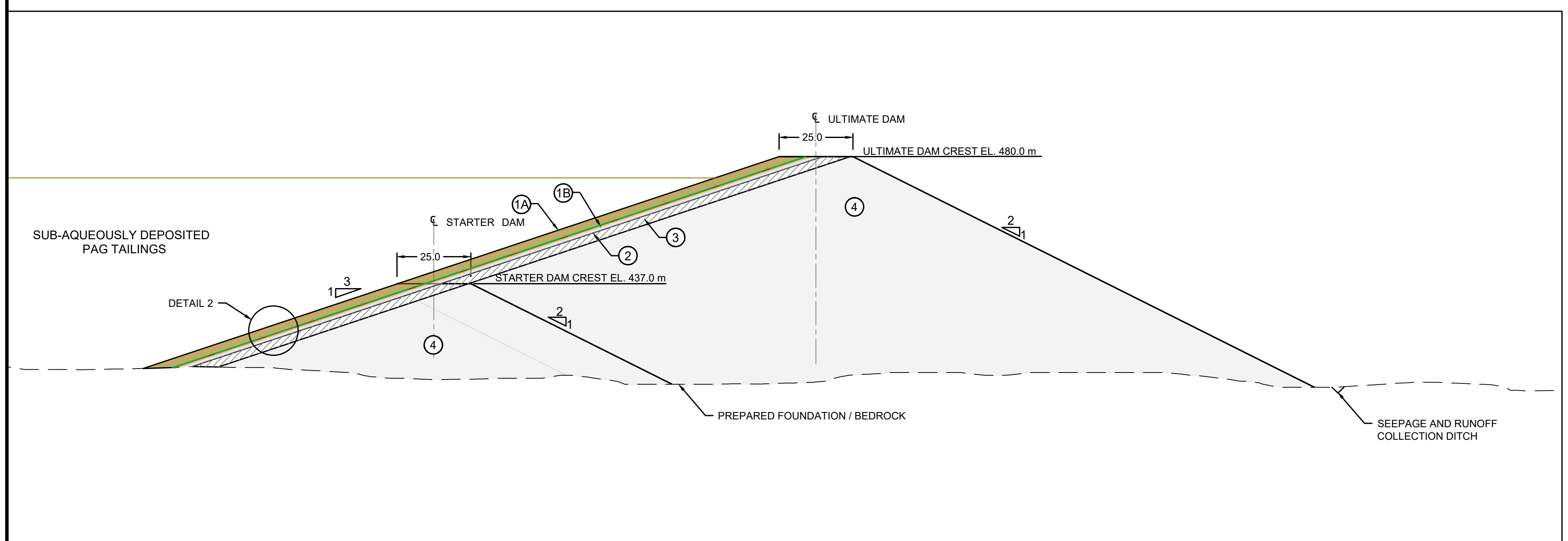
SCALE: 1:500

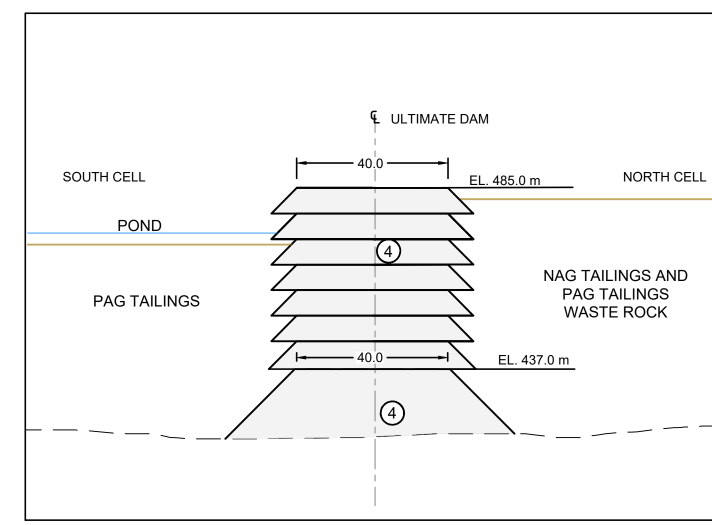
NOTES:

1. THIS FIGURE ILLUSTRATES THE CO-DISPOSAL FACILITY PERIMETER DAMS TYPICAL SECTIONS AND DETAILS.
2. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS. GRID COORDINATES ARE IN NAD 1983 UTM ZONE 15N.
3. THE DIGITAL FILES FOR THE BASE MAP WERE PRODUCED FROM DRAWING 105877-0000-G-001, PROVIDED BY AUSENCO.
4. NORTH AND SOUTH CELLS STARTER DAMS WERE SIZED TO CONTAIN 1 YEAR OF COMMERCIAL PRODUCTION.
5. A LIMITED SEGMENT OF NORTH CELL STARTER DAM (APPROXIMATELY 200 M) IS ASSUMED TO BE LINED WITH GCL TO MINIMIZE SEEPAGE LOSSES FROM SOUTH CELL.
6. PERIMETER DAMS ARE TO BE FOUNDED ON PREPARED FOUNDATION (DENSE OVERBURDEN) OR BEDROCK.
7. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING CONCEPTUAL REPORT.

CONSTRUCTION MATERIALS:

- 1A — ZONE 1A (3M THICK): TAILINGS OR SILTY/CLAYEY FILL, PROTECTION LAYER OVER GCL
- 1B — ZONE 1B (0.6 M THICK): BEDDING - SAND & GRAVEL
- 2 — ZONE 2 (1.0 M THICK): TRANSITION ZONE (150 MM MINUS)
- 3 — ZONE 3 (5 M THICK): ROCKFILL (600 MM MINUS)
- 4 — ZONE 4: COARSE ROCKFILL (900MM MINUS)
- GCL (PROVIDE GEOTEXTILE UNDERNEATH)





SECTION 3 INTERNAL DAM TYPICAL SECTION

SCALE: 1:1000

0m 10 20 30 40 50

1:1000

SECTION 2 SOUTH CELL PERIMETER DAM -TYPICAL SECTION

SCALE: 1:1000

CLIENT LOGO	CLIENT:		COMPANY LOGO	PROJECT	
FIRST MINING GOLD	FIRST MINING GOLD	DWN BY: SC	wsp	SPRINGPOLE GOLD PROJECT	DATE: JUNE 2024
		CHK'D BY: GN			PROJECT NO: OMGM2215
	WSP Canada Inc. 6925 Century Avenue, Suite 600 Mississauga, Ontario, Canada, L5N 7K2	DATUM: UTM NAD 83		TITLE: TYPICAL CO-DISPOSAL FACILITY CROSS-SECTIONS	REV. NO.: A
		PROJECTION: ZONE			FIGURE No. 5.10-2
		SCALE: AS SHOWN			

X:\CA\CAOAK300-OAK\MIS-FS1-ProjectF\2021\Projects\ONS2104_FMG_Springpole_EIS\13_CAD\03_Figures\XXX – EIS Report Figures\FIGURE 5.9-1&5.9-2.dwg – 5.9-2 – Jun. 12, 2024 6:08pm – wds_nadine.rondon

5.11 Fisheries Compensation Components

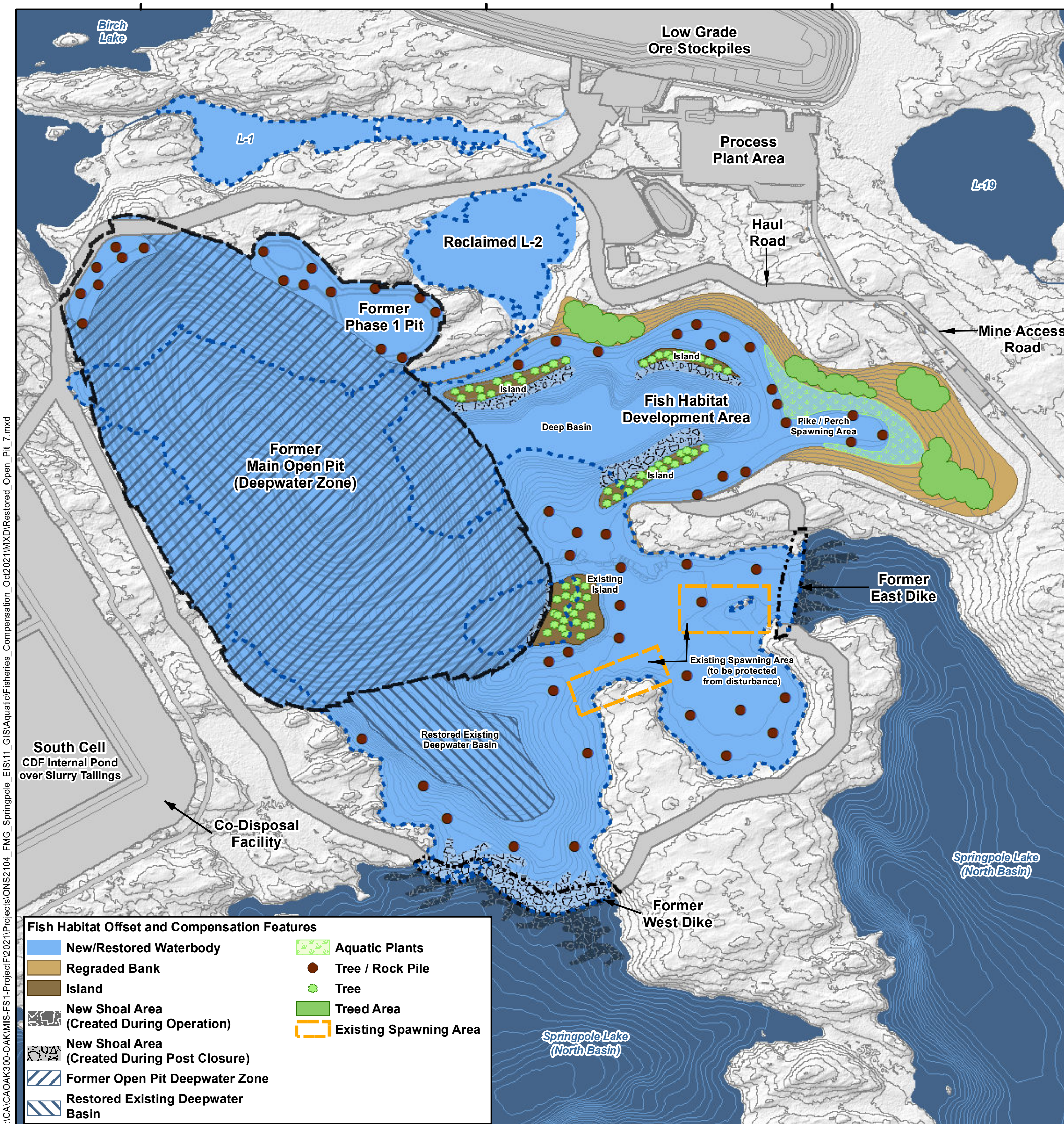
Efforts have been made to design the Project to minimize encroaching on fish habitat; however, avoidance of fish habitat is not entirely feasible, given the location of the ore body and the number of watercourses and waterbodies in the area. Mitigation measures detailed in Section 6.10 will be implemented for the Project for effects on fish and fish habitat in accordance with offsetting or compensation methods under the *Fisheries Act* regulations and policies, in a manner similar to most other mining projects in Canada.

During the life of mine, approximately 213 ha of fish habitat is anticipated to be impacted, but a combination of reclaimed habitat at closure, the addition of the fish habitat development area and complementary measures will result in an overall net benefit to fish and fish habitat in the system. Fish habitat overprinted during life of mine will require either a Schedule 2 listing under the MDMER or authorization under Paragraphs 34.4(2)(b) and 35(2)(b) of the *Fisheries Act*. An updated draft Fisheries Offsetting and Compensation Plan is provided in Appendix F.

A description is provided below of physical offsetting / compensation measures associated with the Project as shown in Figure 5.11-1. Initial offset and compensation measures presented in the draft EIS/EA were further reviewed and discussed with regulators and Indigenous communities and has contributed to the proposed list of measures. It is fully expected that additional adjustments to offsetting and compensation measures under the *Fisheries Act* may be evaluated and made part of the final plan during the permitting process. However, the draft plan demonstrates that there are several opportunities available to meet or exceed regulatory requirements and ultimately increase overall fish habitat and productivity.

The majority of the affected fish habitat is associated with the open pit basin so that mining can occur safely. Efforts have been made to minimize the disturbed area by placing the dikes near the open pit while accounting for geotechnical foundation conditions. This has resulted in being able to preserve 94% of Springpole Lake during operations and returns it to 103% of the lake area at closure. The primary mitigation (offset / compensation) option proposed for the Project will be the establishment of a new fish habitat area and reclamation of an expanded basin in Springpole Lake after mining ceases (Figure 5.11-1 and Figure 5.19-1). Offsetting features may include the following:

- Overbuild and integrate spawning shoals along the active lake-facing embankments of the dikes to replace Lake Trout and Lake Whitefish spawning opportunities lost within the dewatered basin.
- Coordinate with the provincial government (MINES) to implement the reclamation of the abandoned South Bay Mine.
- Implement the investigation and study of Lake Sturgeon in the Birch River and Cat River system and consider measures to reinstate or augment the population.
- Place coarse wood structure along Springpole Lake shorelines currently lacking structural diversity.
- Construct a new and significant embayment (46 ha fish habitat development area) to the east of the dewatered area to be functional at closure.
- Enhance the open pit basin (dewatered) area for selected key species (determined during engagement and consultation) by modifying cover, structure and substrates to improve habitat suitability where appropriate.
- Contour the north end of the main open pit and the Phase 1 pit and optimize fish habitat structures, substrates and depth for selected key species as determined during engagement and consultation.
- Restore flow to unnamed lake L-1 on completion of mining and filling of the dewatered basin.



LEGEND

Proposed Project Features

- Filled Open Pit
- Dike (Removed at Closure)
- Other Project Feature
- Dewatered Area (During Operation)
- 230 kV Transmission Line
- Waterbody
- Watercourse
- Bathymetry Contour (2 m intervals)
- Contour (2 m intervals)

NOTES:
- Contours extracted from 2020 LiDAR survey and 2017 Story Environmental Springpole Lake Bathymetry.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP July 2023.
- 230 kV transmission line provided by First Mining Gold, April 2024.

Datum: NAD83
Projection: UTM Zone 15N

0 0.1 0.2 0.4 0.6 0.8 1 Kilometres

N E S W

FIRST MINING GOLD

WSP

SPRINGPOLE GOLD PROJECT

On site Fish Habitat Offset and Compensation Areas

PROJECT N°: ONS2104	FIGURE: 5.11-1
SCALE: 1:15,000	DATE: October 2024

5.12 Water Management and Treatment Facilities

5.12.1 Water Management Plan

Water management for the Project incorporates best management practices:

- Contact water from the site is collected in ditches, sumps and constructed ponds and transferred into the integrated site water management system for containment, re-use, treatment and discharge to the environment in accordance with applicable regulatory requirements, as needed.
- Contact water is recycled as practicable, primarily for use in processing in the process plant.
- Treated effluent discharge location(s) are selected based primarily on the assimilative capacity of the receiving water.
- The number of final discharge locations to the environment is minimized.

A water management plan for the operations phase of the Project was developed to describe the way site contact water will be collected, contained, treated and discharged to the southeast arm of Springpole Lake (the proposed receiving environment). A comprehensive review of site topography was completed to determine the location of ditches and local collection ponds to minimize the mine contact water footprint and prevent uncontrolled discharge to the environment. The water management plan considers Project-specific design criteria, site limitations and opportunities, as appropriate.

The water management system design uses standard engineering criteria for ditches, water storage ponds, and any necessary emergency spillway. Storage ponds and water management structures are designed to manage the EDF 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.

For the operations phase, the EDF has been defined as a flood event with a 1:100-year return period, which is a typical requirement for mines in Ontario. Durations for this return period included:

- High-intensity shorter duration 24-hour event;
- 30-day rain on snow; and
- 365-day cumulative rain or water equivalent depth.

To meet the above design criteria, surface water management infrastructure such as ditching, berms and pumps are required to convey contact water to water storage facilities for re-use or for treatment and discharge to the environment in accordance with applicable regulatory requirements. The mine site runoff collection systems will also be designed to contain a 1:100 year flood 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 100-year flood event.

A layout of planned surface water management infrastructure is provided in Figure 5.7-5 with the resulting operations phase sub-watersheds.

5.12.2 Construction Water Management

Facilities described in Section 5.12.3 for the operations phase will be developed as needed to support the water management during the construction phase. Additional temporary ditching, sumps and ponds not described in that section may also be used to facilitate water collection and transfer during construction. Water management during construction is designed to accommodate appropriate design storms reflective of the shorter duration (two to three years) associated with construction. As described in Section 5.7.1, controlled dewatering of the open pit basin during construction will initially involve the transfer of lake water out of the isolated basin back into Springpole Lake on the downstream side of the dikes within the north basin. During initial controlled dewatering of the open pit basin, it is anticipated that water quality will not exceed water quality guidelines, such that direct discharge to Springpole Lake can occur. A detailed water quality monitoring program will be implemented to demonstrate this during the dewatering activity. The initial dewatering will continue until the threshold for TSS in the discharged water is approached and likely to be reached (likely 15 mg/L monthly average or 30 mg/L single grab sample, according to MDMER Schedule 4). Once the TSS threshold is approached / reached, the remaining water in the isolated open pit basin will be directed to a settling pond and/or other form of treatment (e.g., clarification, filtering, flocculation) to reduce TSS prior to discharge to the receiving environment.

A water balance assessment for the open pit basin was completed to determine the timing required to complete the dewatering process (Section 5.7.1.2).

5.12.3 Operations Water Management

Contact water arising from precipitation and groundwater is collected in ditches, sumps and ponds and transferred into the integrated site water management system for containment, treatment and discharge to the environment in accordance with applicable regulatory requirements, as needed. The water management strategy is to collect site runoff in local collection ponds within each sub-watershed. The largest ponds are the CDF internal pond, CWSP and ponds located within the open pit sub-watershed. The water collected in these ponds is considered as contact water and requires treatment through the ETP prior to discharge to the environment. Designs and locations for perimeter ditching and ponds consider distances from nearby infrastructure and natural waterbodies and maintain setbacks from these features. For example, perimeter collection ponds will be strategically located in the topographic low points surrounding the CDF.

The storage requirements for the major water storage is based on the EDF (1:100-year return period). 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. The minimum necessary pump rates were estimated such that the EDF volume is pumped out within one year. These minimum pumping rates and associated storage requirements adopted for the water management plan are summarized in Table 5.12-1. Additionally, the design of the dikes includes 5 metres 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.

The IDF is defined as the largest runoff event that a facility is designed to safely withstand and prevent overtopping of the water containment structures. Consistent with the *Co-Disposal Facility Conceptual Design Report - DRAFT* (WSP, 2024b), it has been conservatively assumed that the CDF will have an ‘Extreme’ hazard classification, and as such the IDF for the CDF will be defined as the Probable Maximum Flood (PMF). The 72-hr 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 internal pond in the CDF.

The integrated site water management system for the operations phase includes the key water collection locations and infrastructure described in Sections 5.12.3.1 to 5.12.6, most of which are shown schematically in Figure 5.12.

5.12.3.1 Co-disposal Facility Internal Pond

The CDF internal pond collects water from both the north and south cells and from CDF perimeter seepage collection ponds. Water collected in the CDF internal pond will be reclaimed to the plant/mill, reducing the need for freshwater demands from Birch Lake. Excess water will be pumped to the CWSP for monitoring, treatment, and discharge to the environment in accordance with applicable regulatory requirements to environment, as needed.

The CDF internal pond will require approximately 1.4 Mm^3 of active storage assuming a minimum pumping rate of 100 cubic metres per hour (m^3/h) (to the CWSP) and reclaim rate of 1,178 m^3/h (to the process plant). These rates are necessary to manage the 1:100-year event within one year. The 1.4 Mm^3 storage is required in addition to the following storage that will be considered at a later engineering / design stage:

- The maintenance of saturated tailings conditions to prevent acid generation;
- An operational volume to account for typical seasonal fluctuations; and
- Freeboard between the maximum IDF water level and the dam crest.

5.12.3.2 Central Water Storage Pond

The CWSP is the ultimate collection point for contact water and will provide make-up water to the process plant as needed. Excess water will be pumped to the effluent treatment plant (ETP) for treatment, and subsequently discharged to the environment in accordance with applicable regulatory requirements. The storage required to contain the EDF is estimated to be approximately 0.7 Mm^3, assuming a minimum discharge / treatment rate of 950 m^3/h required to manage the 1:100-year event. Higher treatment rates may be considered to reduce the storage required and optimize the operating ranges within the pond. Based on bathymetric data for the CWSP (unnamed lake L-2; Appendix O-3) and an assumed water surface elevation of 393.0 m amsl (from 2020 LiDAR survey), the CWSP storage capacity is estimated to be approximately 1 Mm^3.

5.12.3.3 Open Pit Basin

The open pit basin watershed storage will include temporary ponds to provide storage and house the dewatering pumps. Additional temporary ponds or ditching may also be provided in the open pit basin to help control runoff entering the pit. The combined open pit basin contact water (surface and groundwater) will be pumped from the sumps to the CWSP. A combined storage within the open pit basin of approximately 0.8 Mm^3 would be required during an EDF event, assuming a minimum pump rate of 500 m^3/h to manage the 1:100-year event.

5.12.3.4 Ore and Surficial Soil Stockpiles

The high / mid grade ore stockpile is located just south of the process plant. Runoff from the southern end of high / mid grade ore stockpile will be collected by ditching, directed to a local collection pond, and transferred to the CWSP as needed. This local collection pond will also capture runoff from the western side of the haul road during operations. Excess water will be pumped to the CWSP if topography does not allow gravity drainage.

The low grade ore stockpile will require collection ponds at surrounding topographic low points to manage the surface water and seepage from the sub-watershed (Figure 5.7-5). Contact water collected in these ponds may be partially consolidated before being pumped to the CWSP.

Water from the surficial soil stockpile will be directed to a contact water management pond or a collection ditch and pumped to the CWSP.

5.12.3.5 Plant Site Area and Plant Site Pond

The plant site area will be built up on a pad and graded towards ditches that drain by gravity to the plant site pond. The plant site pond will also capture runoff from the northern portion of the surficial soil stockpile. Runoff from the surficial soil stockpile will be directed by ditching and culverts towards the plant site pond.

The plant site pond will be either pumped to the CWSP or drain by gravity if grading allows.

5.12.3.6 Haul Roads

Surface water management infrastructure such as ditching, berms and pumps are required to convey contact water to water storage facilities for re-use, or for treatment and discharge to the environment in accordance with applicable regulatory requirements. All contact water from the Project mine site development area will be captured and managed by the water management system; this includes all haul roads but excludes the access road and treated effluent pipeline corridor. Ditching and berms will also be used to divert non-contact water from site facilities and haul roads.

5.12.4 Fresh Water Facilities – Operations

Fresh water will be required so that sufficient water is available for processing at all times of the year, and as needed for specialty uses where use of recycled water is not appropriate. These fresh water requirements are expected to include the following:

- Gland water for pumps;
- Make-up water;
- Elution circuit make-up water;
- Fire water for use in the sprinkler and hydrant system;
- Cooling water for mill motors and mill lubrication systems (closed loop); and
- Potable water.

A fresh water intake is proposed for Birch Lake, a very large waterbody located close to the primary fresh water use locations (process plant and accommodations complex). The intake will be located and designed to minimize environmental effects, including potential fish entrainment and impingement. Fresh water will be pumped from Birch Lake to water storage tank(s) until needed. Approximately 2.14 Mm^3/year of fresh water will be required for the process plant and an additional 0.03 Mm^3/year for the accommodations complex, on average, over the Project life.

A potable water treatment system will be established to treat water intended for human consumption, although bulk bottled water may be used for drinking purposes, particularly during the construction phase.

5.12.5 Effluent Treatment Plant and Discharge

Effluent treatment will be in addition to the cyanide destruction and metal reduction that will occur within the process plant and the natural physical and chemical processes that will occur within the site ditching and ponds.

The ETP will be designed to produce an effluent quality appropriate for discharge to the environment in accordance with applicable regulatory requirements, including the MDMER, and the effluent concentrations required by the MECP to protect the receiving water and aquatic resources. Best available technologies that are economically achievable will be considered for the ETP to meet protection requirements.

The preliminary ETP considered in the Pre-feasibility Study was a modular effluent treatment system. Additional engineering has optimized the water treatment concept as follows:

- A biological process will be used based on the moving bed bioreactor concept, where plastic carriers with attached biofilm move freely in the water column and remove contaminants present in the wastewater. The moving bed bioreactor will also be used for cyanide destruction in addition to the in-plant destruction of cyanide in tailings using the sulphur dioxide / oxygen (SO_2/O_2) treatment process (Section 5.9.4). The by-products are nitrate, carbon dioxide (CO_2) and associated biomass.
- The treatment process will continue to the removal of metals. Arsenic removal will be achieved by ferrous sulphate and iron co-precipitation principles. This will be followed by sulphide precipitation for further metals removal with the dosing of sodium sulphide. Adjustment of pH will be controlled by dosing acid and caustic to alkaline conditions of 7.5 to 8 as needed.
- The final stage involves flocculation, which includes a mixing tank before feeding to a clarification process. Following clarification, the fully treated effluent will be confirmed to meet all applicable regulatory discharge criteria before being released to the environment at the final discharge location in the southeast arm of Springpole Lake.

The southeast arm of Springpole Lake (Figure 5.7-5) was selected as the preferred discharge location for treated effluent through the comprehensive alternatives assessment (Section 4.17). This channelized section of Springpole Lake was selected as the primary effluent discharge location as it provides enhanced effluent mixing / attenuation, which will be supplemented with the use of a diffuser at the point of discharge. Although part of Springpole Lake, this portion of the lake has a defined current, much like a river. There is the potential that other minor discharge locations could be identified for the Project during construction, which could include aggregate operations if developed below the water table.

Effluent is proposed to be pumped to the discharge location through an HDPE pipeline, a distance of 9.3 km (Figure 5.7-5). The pipeline will be situated adjacent to the mine access road for a portion of the distance and then along a section of new access road to the discharge location for ease of construction and maintenance.

Further detail regarding effluent discharge from the Project and the receiving water quality is provided in Section 6.9 and Appendices M-2 and M-3.

5.12.6 Water Balance

A site-wide water balance was completed to estimate the quantity of mine site contact water expected to be managed during the construction, operations and closure phases of the Project (Appendix M-2). The water balance model considers the precipitation and groundwater gains, and losses such as porewater loss, evaporation and infiltration.

A total of 17 scenarios were modelled for the construction, operations, active closure - pit filling, active closure and post closure phases, under various climate conditions. These scenarios are detailed in Appendix M-2.

Throughout all phases and scenarios, inflows to the Project are largely driven by site runoff generated by precipitation on the Project site. Water losses (apart from site discharge) are driven by porewater (void) loss in the CDF during operations, and evaporation outside of operations.

Discharge of treated water to the environment is expected to be necessary through all Project phases, with the exception of extreme dry climate conditions during the operations phase, during which only STP discharge is required. During the operations phase, the average treated water discharge (ETP and STP) is expected to be 6.82 Mm^3/year. The highest treated water discharge simulated occurs during the construction and active closure phases under a 1:100 wet year climate condition. A treatment and discharge rate of 4.58 and 4.9 Mm^3/year is required for construction and active closure phases, respectively. During construction, additional discharge related to the open pit basin dewatering is also required (Section 5.6.1).

During the operations phase, water takings from Birch Lake will be required to support the process plant and accommodations complex. The greatest fresh water takings are estimated to occur during the operations phase, under the 1:100 dry year climate scenario, at a rate of 3.96 Mm^3/year.

Table 5.11-2 provides a summary of annual inflows and outflows from the integrated site water management system during the operations phase when mining is occurring, for average conditions. A summary for a 1:100 wet year (simulated in the final year of operations) and 1:100 dry year (simulated in the first year of operations) are also provided.

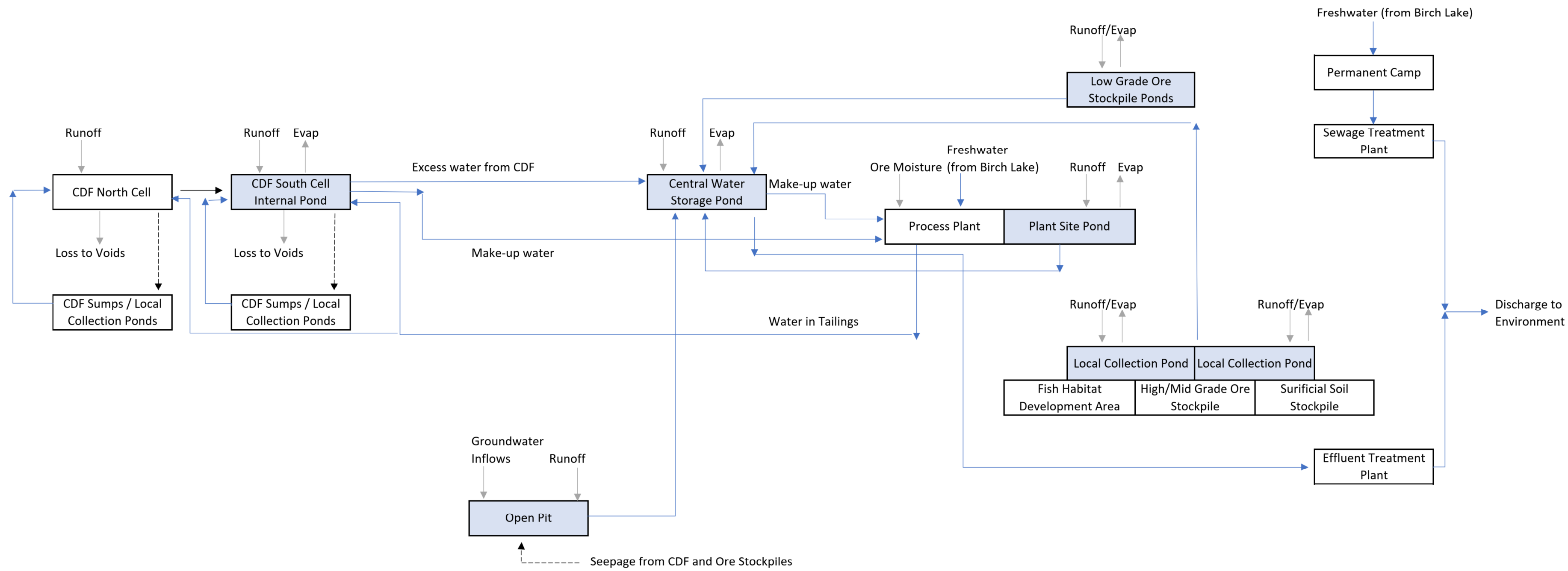
Table 5.12-1: Summary of Environmental Design Flood Storage and Pumping Requirements

Location	Storage Required (Mm^3)	Pump Rate (m^3/h)
CDF Internal Pond	1.4	100
Open Pit watershed Area	0.8	500
CWSP	0.7	950
Total Project Site	2.9	950

Table 5.12-2: Average Annual Water Balance

	Water Volumes (Mm^3/year)		
	Average	**1:100 Wet Year**	**1:100 Dry Year**
Inflows			
Water in Ore	0.58	0.58	0.58
Freshwater Takings for Process Plant from Birch Lake	2.14	1.91	3.93
Freshwater Takings for Potable Water from Birch Lake	0.03	0.03	0.03
Groundwater Inflows to Open Pit	0.77	0.95	0.27
Total Site Runoff	4.47	6.76	2.36
Total Inflows	**7.99**	**10.23**	**7.17**
Losses			
Loss to Tailings Voids	6.50	6.05	6.89
Total Site Evaporation	0.38	0.40	0.30
Total Losses	**6.88**	**6.45**	**7.19**
Required Discharge (Total)	**1.11**	**3.59**	**0.03**

Note:
*Total inflows are not equal to total losses and discharges due to accumulated or reduction in storage on site.



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LEGEND

- Input/Loss
- Pumped Flow
- Gravity Flow
- Seepage

NOTES:

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SPRINGPOLE GOLD PROJECT

Operations Phase
Water Management During Mining

PROJECT N°: ONS2104	**FIGURE: 5.12**
SCALE: N.T.S.	DATE: October 2024

5.13 Fuel and Chemicals, Storage and Management

The chemicals to be used and stored at the Project site are: process-related chemicals and reagents (Section 5.9.3); fuels (diesel, propane gas and gasoline); and equipment maintenance materials (oil, grease, lubricants and coolants). Table 5.13-1 provides an overview of the expected storage requirements for the expected fuel and mechanical fluids at the Project site as currently understood. All chemicals will be transported, stored and handled in accordance with applicable regulations and best management practice.

Most of the fuel required at the Project will be diesel needed to operate the heavy equipment fleet. A fuel depot will be established south of the process plant site and truck shop to store fuel products and will be accessible to the mine fleet for fuel dispensing. The fuel depot is expected to store about 150,000 to 250,000 litres (L) of ultra-low sulphur diesel and approximately 20,000 L of diesel exhaust fluid. Smaller quantities of gasoline will also be used for selected small trucks, all-terrain vehicles, snowmobiles, boats and gas-powered tools. Diesel and gasoline will be stored in double-walled Enviro tanks, or equivalent, with sufficient storage on site to provide appropriate inventory without need for re-supply in the event of supply disruptions due to winter storms or other causes.

These tanks will be provided with protection to guard against possible vehicular collisions, and all liquid fuel transfer areas where there is a reasonable potential for spills will be constructed as lined aprons and fitted with catchments to contain any fuel that might inadvertently be spilled. Automatic shut-off valves and other such equipment, as dictated by best practice, will be installed to further reduce the risk of spills during fuel transfer operations.

A limited quantity of aviation fuel may be retained to support helicopter use. Jet B fuel for occasional helicopter use will be stored in appropriately secured drums in a lined area at the airstrip (Figure 5.1-2).

Table 5.13-1: Fuel and Related Tankage Summary

Fuel or Related	Location	Estimated Tanks / Volume
Diesel (ultra-low sulphur)	Fuel depot, generators (Tankage at diesel generator(s) may be relocated during operation)	3 × 50,000 L
Diesel Exhaust Fluid	Fuel depot	18 × 1,200 L totes
Gasoline	Plant area	1 × 10,000 L
Coolant	Truck shop	1 × 5,000 L
Engine Oil	Truck shop	1 × 30,000 L
Hydraulic Oil	Truck shop	1 × 10,000 L
Transmission Fluid	Truck shop	1 × 10,000 L
Axle Fluid	Truck shop	1 × 30,000 L
Waste Oil	Truck shop	2 × 30,000 L
Waste Coolant	Truck shop	1 x 5,000 L
Gear Oil, Transmission Fluid, Windshield Fluid and Grease	Truck shop	1,200 L replacement bins
Propane	Plant area	330,000 L

5.14 Solid Waste

It is expected that the Project will produce approximately 45,000 to 65,000 m^3 of non-hazardous waste between construction and closure. Non-hazardous solid waste, such as food scraps, refuse, fabric, metal tins, scrap metal, glass, plastic, wood, paper and similar materials, will be sorted and prepared for recycling off site where possible. Non-recyclable waste material will be transported to an approved waste management facilities located off site, such as in Ear Falls and/or Sioux Lookout. The Municipality of Ear Falls has confirmed capacity and approval to accept non-hazardous wastes from the mine (Appendix D). An open burn area may be requested on the Project site for burning of paper and clean wood wastes in accordance with provincial approval requirements.

Special management solid wastes will be stored in sealed containers in lined, bermed areas (or in other means of secondary containment as appropriate). Used lubricants and associated materials will be stored in tanks with secondary containment and shipped off site by a licensed disposal company. Small quantities of other used fluids, such as cleaning solvents and degreasing agents, will be classified by type and transported off site to licensed processing facilities in accordance with applicable regulations and best management practices.

A spill prevention and contingency response plan will be developed prior to construction to reduce the potential for spills and guide response measures. Hydrocarbon-impacted soil will be transported off site to a licensed facility, as appropriate.

5.15 Domestic Sewage

Domestic sewage and grey water from the accommodations complex will be treated by an appropriately sized packaged sewage treatment plant. The plant will produce an estimated 3.4 m^3/h of treated effluent. Treated effluent from the domestic sewage treatment plant will be discharged to the environment with the treated site effluent. Sewage sludge from the plant is proposed to be vacuum-trucked off site to a licensed facility. Outlying site facilities are expected to be provided with holding tanks which will be periodically emptied and transferred for treatment in the onsite sewage treatment plant.

5.16 Aggregate Sources

The primary source of material for site construction, including for the construction of the dikes, CDF dams, haul roads, onsite access roads, the process plant site and other and building foundations, is expected to be NAG mine rock from the open pit development. Rock may also be available from the excavation of the fish habitat development area, east of the open pit (Section 5.11), the CDF quarry (Section 5.16) and other site excavations in bedrock.

Two primary quarry locations are proposed to provide NAG construction material for the Project:

- Fish habitat development area; and
- CDF quarry.

The fish habitat development area (Figure 5.1-1) is proposed to provide fish habitat offsetting and compensation at closure. To facilitate a small overall Project footprint, NAG material will be quarried from this area during construction and operation rather than developing a dedicated quarry at another location. Overburden will be stripped and removed to the surficial soil stockpile (Section 5.8.1) as needed. Subsequently, a quarry will be developed consistent with the bulk excavation plan for the final fish habitat design (Section 5.10 and Appendix F). At closure, fine grading, substrate placement and fish habitat features will be completed to the specifications of the final design.

The final elevations of the fish habitat development area will be determined in detailed design, but it is currently assumed that the area will have an average depth of approximately 10 m a maximum depth of 30 m and a surface expression of 45 ha. An estimated 3.8 Mm^3 of NAG rock will be available from the fish habitat development area. Static testing results of the drill core indicate that the rock proposed for quarrying from the fish habitat development area is NAG, and metal content analyses indicated a generally low potential for ML (Appendix K-1.4).

A quarry will be established during construction in the north cell of the CDF. The benefits of locating a quarry within the CDF footprint include the following:

- Maintaining a compact Project footprint;
- Reducing haulage distance during initial construction of the CDF, thereby reducing GHGs and air emissions; and
- Reducing the overall height of the CDF facility.

Stripping overburden and development of the quarry will also enable a comprehensive visual assessment of the bedrock condition and potential fractures within the established footprint. The basic design parameters for the quarry in the CDF footprint are as follows:

- The quarry footprint will be located within the north CDF cell only.
- Overburden will be stripped and transported to the surficial soil stockpile for re-use during reclamation.
- A minimum distance of 210 m will be maintained between the quarry perimeter and Birch Lake to comply with DFO guidelines for the use of explosives near water (Cott and Hanna 2005) assuming an explosive load of 192 kg/delay is used as a minimum charge. Smaller or larger charges may be used providing the DFO thresholds to protect fish are met, which may revise this setback.
- A minimum 50 m offset will be maintained between the quarry and the upstream toe of the north cell dike, and a minimum of 100 m setback will be maintained from the upstream toe of the south cell.
- The CDF quarry is conservatively estimated to provide approximately 16 Mm^3 of NAG rock for construction use.

Development and operation of the CDF quarry will be completed during construction of the CDF starter dikes. The quarry excavation will be filled with mine rock and NAG tailings during operation.

Rock samples were collected from the CDF north cell to determine preliminary acid generating and ML characteristics. All the samples were classified as NAG based on their neutralization potential ratio (NPR>2, CarbNPR>2), and leachable metal concentrations were low and generally below qualitative screening values (PWQO, interim PWQO) for all samples (Appendix K-1.6).

Experience with other mining projects in Ontario has shown that it can be difficult to generate aggregate for concrete and certain other applications from mine rock. Sand and gravel will be required primarily for backfill, drainage bedding and roads (sub-base, base and surface). Sand and gravel sources are expected to be required potentially for site construction, as well to build the mine access road to the Project site. Two locations have been identified to provide a dedicated aggregate supply for the Project (Figure 5.1-1: EIS/ EA Site Plan

:

- **Aggregate source 1:** near the mine access road; and
- **Aggregate source 2:** off Wenasaga Road.

Another potential location has been identified farther south on Wenasaga Road, which would likely only be developed if specialty aggregate were found to be present that could not be sourced from the listed locations (Section 4.29).

5.17 Site Access

The Project site is remote and only accessible by floatplane during the open water season and by ice road for a short period of time in the winter. An all-season gravel road will be constructed as the main access to the Project. Per Section 5.6, a helipad will be maintained to support medical evacuations and field investigations, and an airstrip will also be constructed to facilitate worker transport.

5.17.1 Access Road

A two-lane, all-season gravel access road is proposed that will extend approximately 18 km from the end of the existing Wenasaga Road to the mine site (Figure 5.17-1). The Wenasaga Road is a public road that is currently used over most of its length primarily for regional forestry activities. There are no communities located along the route. The Wenasaga Road is currently approved as a primary Class 1 public road, under the care and control of Dryden Fibre. FMG is continuing to work with Dryden Fibre to align the forest management road upgrades within the approved corridor to support the Project as needed. A controlled access gate is proposed to control unauthorized use of the mine access road, at a location to be determined in consultation with CLFN, SFN, MNR and the forestry road owner. A Project security gate will be installed at the mine site entrance.

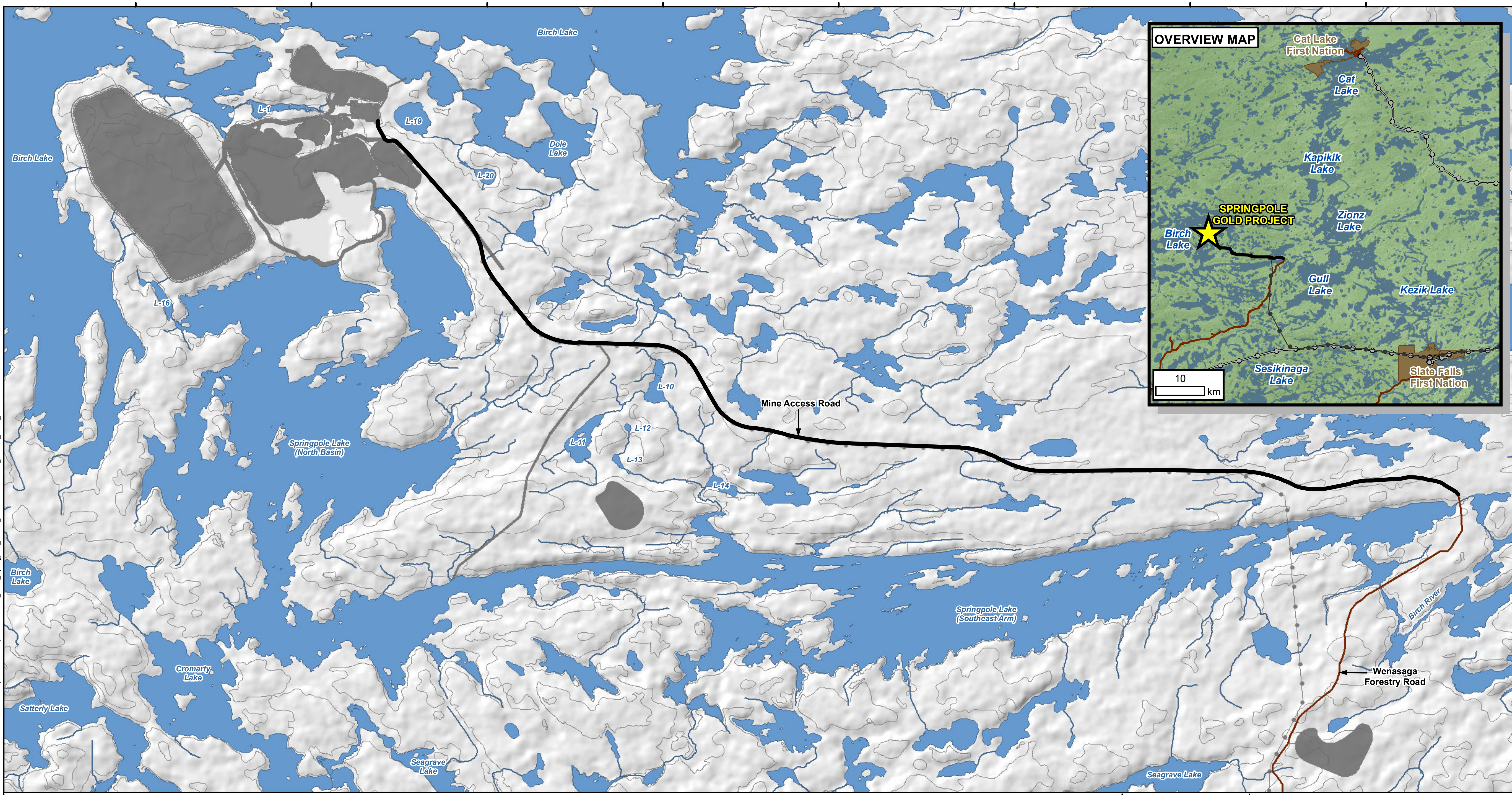
The proposed access route is the most direct and feasible route from the existing road network, avoiding major waterbodies and minimizing new disturbance. An updated alignment has reduced the number of potential water crossings from four to one. It is expected that the single minor watercourse crossings will be established using corrugated steel culvert(s) and designed and installed to meet all regulatory requirements. Ditching and drainage management culverts (cross drainage) may also be installed at low-lying areas, if needed. Culverts will be inspected regularly to remove any blockage. Beaver control, as and when required, will be conducted in consultation with the local commercial trapline holder and MNR.

Internal haul roads and service roads will link the principal site facilities to the mine access road, either directly or indirectly. Attention will be given to separating large haul truck traffic from other site vehicular traffic during ongoing design. Lighter vehicle roads will typically be 5 to 10 m wide. For more remote locations, single lane roads may be established with pullout area(s). Parking for buses, personal / contractor vehicles and other service vehicles will be available at the site.

5.17.2 Airstrip

The airstrip is co-located with the mine access road approximately 2 km southeast of the process plant site, oriented northwest–southeast as shown in Figure 5.1-2. Co-locating the airstrip with the mine access road and the mine site will minimize additional footprint expansion and potential environmental impacts. The airstrip has a proposed runway length of approximately 1,000 m and a width of approximately 30 m. The airstrip will cross a single minor tributary creek that drains unnamed waterbodies to Dole Lake (Figure 5.1-2).

The airstrip does not meet the definition of an aerodrome as a designated physical activity as per the federal Regulations Designating Physical Activities (SOR/2012-147); however, the effects of the construction, operation and closure of the airstrip including up to two flights per week on noise and wildlife have been assessed. Development of the airstrip along with the proposed helicopter pad would support faster emergency response, which is important for a more remote operation. The runway will be designed to meet applicable Transport Canada and other regulatory requirements.



LEGEND

- Project Location
- Proposed Mine Feature
- Proposed Mine Access Road
- Proposed 230 kV Transmission Line
- Existing Road
- Existing Transmission Line
- First Nation Reserve
- Watercourse
- Waterbody
- Contour (10 m intervals)

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

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 8 10 Kilometres

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SPRINGPOLE GOLD PROJECT

Mine Access Road

PROJECT Nº: ONS2104	**FIGURE: 5.17-1**
SCALE: 1:52,000	DATE: October 2024

5.18 Power Supply and Infrastructure

The Project site is remotely located without permanent power infrastructure. During the initial construction phase, diesel-fired generators are expected to be the primary power supply until a transmission line connecting to the regional electrical grid can be constructed. It is expected that less than 5 megawatts (MW) of diesel-fired generation will be needed. The units will be enclosed to minimize noise emissions and located close to the need during the construction phase. Once the permanent power system is in place, the diesel generators will provide standby / backup power capacity in the event of temporary grid power outages.

The average electrical demand site wide during operations is estimated to be 55 MW. The Project site will be connected to the provincial electrical distribution grid to obtain this power. Preliminary discussions with the Independent Electricity System Operator have confirmed that there is sufficient capacity within the Ontario electrical grid in the region to supply the power demand.

An 93.4 km, 230-kilovolt (kV) overhead transmission line is proposed to tie the Project into the Wataynikaneyap 230 kV line between Dinorwic and Pickle Lake (Figure 5.18-1). The Wataynikaneyap transmission line, has recently been developed and energized by Wataynikaneyap Power LP, a licensed transmission company equally owned by 24 First Nations communities (51%), in partnership with Fortis Inc. and other private investors (49%). The proposed transmission line route has been established to minimize overall length, reduce environmental effects and respect traditional land use by adjacent Indigenous communities.

Since the draft EIS /EA was submitted for comment, engagement with the SFN resulted in optimizing the transmission line route to pass north of the community of Slate falls adjacent to the existing E1C line thereby reducing the length of new linear corridors created and avoiding important land use areas. This engagement aligned with comments received from the MECP SARB that emphasized the importance of minimizing new linear corridors. Traditional Land Use information shared by MON also noted several land use values located along the southern end of Alternative 3 transmission line route which further informed the optimisation of the transmission alignment. The transmission line is expected to be composed primarily of single, steel pole structures, established within a 40 m wide corridor, much of which follows the existing E1C line . Additional cleared corridor width may be required at turning points, or where pole anchors are needed (such as in poor ground conditions), as well as for temporary laydown area(s) and access roads. The switching station at the connection point with the Wataynikaneyap transmission line will have a footprint of about one acre. The transmission line is expected to be constructed primarily in the winter from temporary winter roads, avoiding sensitive periods for wildlife as much as possible. Establishment of a permanent road along the transmission line route is not proposed, unless winter roads prove to be untenable. Work including vegetation clearing may also occur during the late summer and fall on higher ground / in areas of good accessibility.

The incoming electrical power from the 230 kV transmission line will be stepped down in an onsite substation for site distribution. The lines will be located within the plant site in cable trays or via underground duct banks as needed, but overhead powerlines will be used to distribute power to more distant facilities such as the mine and accommodations complex areas.

As discussed in Section 4.24, further investigations are proposed for the potential application of wind and solar power as supplemental power sources for the Project. These or other supplemental energy sources could be added during the detailed design or potentially during the operations phase.

LEGEND

- Proposed Mine Feature
- Proposed Mine Access Road
- Proposed 230 kV Transmission Line
- Existing Road
- Existing Transmission Line
- First Nation Reserve
- Watercourse
- Waterbody

0 5 10 20 30 40 50 Kilometres

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

Datum: NAD83
Projection: UTM Zone 15N

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WSP

SPRINGPOLE GOLD PROJECT

Transmission Line

PROJECT N°: ONS2104	**FIGURE: 5.18-1**
SCALE: 1:200,000	DATE: October 2024

5.19 Conceptual Closure Plan

5.19.1 Overall Approach

The conceptual closure plan describes the main reclamation objectives, summary of proposed progressive reclamation activities, final reclamation and decommissioning, and anticipated site conditions following closure. Mine decommissioning and closure will be completed to satisfy the Rehabilitation Standards under Ontario Regulation 35/24 of the *Mining Act*.

The primary goal of decommissioning and closure of the mine site is to establish a site that is physically, chemically and biologically stable. The Project footprint will be rehabilitated to a productive and natural state as practicable. The reclamation and decommissioning / closure objectives for the Project include:

- Re-establish natural drainage;
- Rehabilitate disturbed lands;
- Confirm site runoff meets regulatory criteria;
- Establish a self-sustaining vegetative cover; and
- Creation of functional wetland habitat.

Infrastructure will generally be removed unless otherwise stipulated, such as based on agreements with the respective authorities and local communities. The Project site will be revegetated to support plant, wildlife and fish communities (or could be considered for other land uses as applicable). It is expected that revegetation will occur through active seeding and hand-planting of seedlings of commercially available, native plant species, as well as natural revegetation from local vegetation communities. 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 the CLFN and LSFN. The cultural and socioeconomic objectives as listed by the 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 co-disposal facility (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).

FMG has developed a closure strategy based on the current Project and has aligned the strategy with the cultural and socioeconomic objectives of the CLFN and LSFN. The Project has prioritized the maintenance of a small footprint to minimize impacts to the land prior to and following closure. This included co-locating the required quarries and high to mid-grade ore stockpile with the CDF and fish habitat development footprints, and co-locating the tailings and mine rock storage into a single facility. Closure activities include the reclamation and restoration of the adjacent lands, such as the low grade ores stockpile, the plant site and water management system. The Project has been designed to protect the environment at closure, and rigorous monitoring plans will confirm that the site conditions and drainage are as expected to allow reuse of the lands for traditional land uses.

5.19.2 Progressive Reclamation

Reclamation activities that can be performed prior to final closure and that do not pose a barrier to daily operations will be considered for progressive reclamation. Progressively reclaiming facilities and site features where practical reduces the amount of work and time required at final closure. It also provides useful knowledge to improve final reclamation success, particularly with respect to revegetation methods.

Progressive rehabilitation of affected areas will be fully considered during operations. Some potential opportunities include:

- Regular backhaul of waste material off site;
- Decommissioning and salvage of infrastructure used only for exploration and construction;
- Initiation of revegetation studies during operations to evaluate soil amendments and seed mixes to maximize the success of the final revegetation program;
- Recontouring and revegetation of disturbed areas from exploration and construction phases that are not needed during operations;
- Progressive reclamation of the CDF perimeter dams; and
- Advancement of the designated fish habitat development area to final contours in preparation for completion during closure.

5.19.3 Final Reclamation

5.19.3.1 Open Pit

Once mining concludes in approximately Year 10, the open pit basin will start to fill with water by direct precipitation and through groundwater infiltration from the surrounding bedrock. Without enhancement, it would take decades (approximately 30 to 40 years) for the open pit basin to refill to the same level as Springpole Lake. To considerably reduce the filling time, supplemental water from Springpole Lake is planned to be transferred to the pit in a controlled manner over a period of approximately four years while maintaining lake water levels within natural variation (Appendix M-2). Other measures to be taken to reclaim the open pit will or are likely, to include:

- The ramp to the open pit will be barricaded until the pit is fully filled with water and reconnected to Springpole Lake (at that time the open pit ramp may be reopened so that it can be utilized to support recreational boating).
- Overburden slopes that will not be underwater will be graded to stable side slopes and revegetated with native species (rip rap or similar will be placed at the future potential wave interface).
- Enhancement to support fish habitat will be completed to provide fish habitat and increase the biodiversity within the lake.

The north end of the open pit is proposed to be backfilled to facilitate relocation of the haul road further from Birch Lake in approximately year 2. The recontouring of the north end of the pit will also allow an enhanced littoral area for future fish habitat measure (Figure 5.19-1). Further details regarding potential fish habitat enhancement measures within the basin are provided in Section 5.11 and Appendix F.

Controlled Filling of the Open Pit Basin

During the pit filling phase after mining is completed, an engineered spillway or siphon within one or both dikes is proposed to enable controlled transfer of water from Springpole Lake into the open pit basin to expedite filling of the pit. The open pit basin will be returned to the average pre-development water level of Springpole Lake (approximately 391.23 m). The water transfer rate would be adjustable to reflect between 10% and 15% of the inflows to the lake. Based on DFO (2013) guidance and Locke and Paul (2011), a 10% to 15% reduction in instantaneous flows is unlikely to have detectable ecological effects on the downstream habitats. This has been considered for filling the open pit basin at closure.

To assess the pit filling time under various climate conditions, wet and dry sequences were developed based on pro-rated historical flow records from the Sturgeon River at McDougall Mills Water Survey of Canada Station (05QA004). The dry year sequence was developed based on data from 1975 to 1981 and represents a 1st percentile flow sequence over the period. The wet year sequence was developed based on data from 2007 to 2010 and represents a 99th percentile flow sequence over the period. The results indicate that during a 99th percentile wet flow sequence, the pit filling time would be reduced to 3.3 years. During a 1st percentile dry flow sequence, the pit filling time would be increased to 6.3 years. Water taking from Springpole Lake accounts for 95% of the inflows to the open pit basin during the pit filling period (direct runoff and groundwater inflows are quite low in relation to the Springpole Lake water takings. At this proposed active filling rate (Table 5.19-1), the combined open pit basin and fish habitat development area would require three to five years to fill to the average natural elevation of Springpole Lake (elevation 391 m amsl), assuming average flow conditions during those years. Table 5.19-2 provides a range of years to fill for the open pit basin, allowing for average conditions as well as the very dry and very wet flow years.

Water level monitoring will occur throughout the refilling process so that lake levels are maintained within natural variation.

Water Quality of Refilled Basin

Model simulations were conducted to evaluate the future water quality of the refilled isolated basin using PitMod to predict the physical and chemical evolution of the water column during and after filling (Appendix N-3). Of key importance was predicting water quality conditions at the time the open pit basin will be reconnected to Springpole Lake. The current model predicts that the open pit basin will be filled and suitable for reconnection to the remainder of Springpole Lake in approximately 4 to 5 years after mining ceases.

PitMod is a numerical hydrodynamic model used for predicting the spatial and temporal distribution of temperature, density, dissolved oxygen and water quality parameters in lakes (Dunbar 2013; Martin et al. 2017). The model considered the entire refilled open pit basin retained in isolation from Springpole Lake, inclusive of the following:

- Open pit and re-contouring material;
- Fish Habitat Development Area;
- Exposed lake sediments as bounded by the east and west coffer dams;
- Water balance for the various inflows, including controlled conveyance of water from Springpole Lake which serves to accelerate basin re-filling; and
- Geochemical source terms for the various inflows.

Model results provide information on the chemistry of water layers with depth and time. Model outputs for temperature, dissolved oxygen and total dissolved solids suggest that the water column will form a permanently stratified density structure (meromixis), which will limit mixing between the surface mixed layer and water at depth. These model observations indicate that the effects of wind-driven and convective mixing are not sufficient to mix the water column below a surface mixed layer depth of approximately 40 m. Under conditions of meromixis, anoxic conditions are predicted to develop below the surface mixed layer over time.

Improvements in surface water quality within the isolated area are predicted to occur over time as filling occurs, and can be attributed to several time-dependent factors, including submerging of pit walls and cessation of sulphide mineral oxidation; reduced loadings from CDF seepage as the hydraulic gradient lessens; the input of direct precipitation to the lake surface increases relative to pit wall runoff; and the development of pit lake stratification serves to isolate more saline water quality.

Water quality results of the model were compared against the water quality guidelines for the protection of aquatic life. Results indicate no exceedances of PWQO at completion of pit filling. Further details regarding the modelling approach and the water quality predictions are provided in Appendix N-3. Monitoring during re-filling of the open pit basin will provide considerable time to validate the model predictions and to identify and implement additional mitigation measures if needed.

Monitoring and Reconnection

Water quality will be regularly monitored as the open pit basin fills. The basin will be maintained at a target level below the natural Springpole Lake elevation if needed, until such time as all regulatory requirements for reconnection are met.

Once the water quality in the refilled basin meets, and is predicted to continue to meet, all requirements, the water level will be increased to an eventual equilibrium water level controlled by the natural Springpole Lake elevation. Current modelling indicates that under average conditions reconnection could occur by Year 5 of active closure. The dikes will then be lowered, using appropriate methods and mitigation measures, to minimize environmental disturbance in order to establish a permanent reconnection between the filled basin and Springpole Lake. The dikes will be lowered and recontoured on the open pit basin side of the structure to provide additional spawning habitat opportunities for Lake Trout as per Appendix F.

5.19.3.2 Co-disposal Facility

The operational design and the decommissioning and closure concept for the CDF have been developed to promote long-term chemical and physical stability, minimize erosion, provide long-term environmental protection and minimize long-term maintenance requirements. During progressive reclamation or at closure, the NAG mine rock dams of the CDF will be covered as practicable with a growth medium and revegetated with commercially available native species or other approved species.

The CDF closure concept involves: 1) continuing to direct runoff from the north cell to the south cell; 2) maintaining minimum pond (or no pond with thick coarse rockfill cover) to maintain saturated PAG tailings in the south cell; and 3) implementing an overflow spillway at the south cell to safely convey excess water (including EDF and IDF) to the environment. Preparing the CDF for closure will involve the following:

- Construct an overflow spillway at the south cell perimeter dams to safely pass the IDF to environment. The overflow spillway could potentially be located at the southeast and direct the flows to the open pit or Springpole Lake;

- Following completion of life of mine PAG mine rock disposal within the north cell, deposit NAG tailings over the entire north cell surface to fully cover the PAG mine rock and limit oxygen ingress;
- Vegetate the tailings or, if necessary, place and grade an erosion protection cover over the entire north cell surface and direct all runoff to the south cell;
- Following completion of life of mine PAG tailings deposition within the south cell and upon final closure of the CDF, deposit NAG tailings or other suitable soil cover to remove excess pond capacity and provide cover over PAG tailings; and
- Breach perimeter collection ponds and allow runoff and seepage water to report to environment once water quality requirements are met.

5.19.3.3 Ore Stockpiles

All material from the ore stockpiles (high / mid grade and low grade) will be processed during the final years of processing operations. Once depleted, the footprint of the former ore stockpiles will be tested and excavated if needed to confirm no PAG material is remaining. Excavated materials, if any, will be transported and stabilized in the CDF prior to closing out that facility. Thereafter, the ore stockpile areas will be reclaimed (either regraded to promote natural drainage and revegetation or re-developed as part of the fish habitat and compensation activities).

5.19.3.4 Organics and Surficial Soil Stockpiles

FMG proposes to utilize the overburden materials stored in the surficial soil stockpiles, the lake sediments and any small local topsoil or organics stockpiles to support revegetation efforts progressively during operation and during closure. Stockpiled organics will be fully utilized during reclamation activities. Reclamation of the surficial soil stockpile is not anticipated to be required; however, if any material remains after closure activities, the area will be reshaped if needed to a physically stable condition and revegetated.

5.19.3.5 Buildings, Machinery and Equipment

Salvageable machinery, equipment and other materials will be dismantled and taken off site for sale and re-use if economically feasible. Gearboxes or other equipment, containing hydrocarbons that cannot be cleaned out, will be removed from the equipment and machinery and disposed of at a licensed facility.

Above-grade concrete structures will be broken and reduced to near grade, as required. Concrete structures and below-grade facilities (if applicable) will be infilled as needed. Affected areas will be contoured, scarified and covered with overburden and vegetated.

While not part of the current Project proposal or closure concept, FMG is committed to studying long-term sustainable green energy opportunities that could be implemented in post-closure, building on the key energy infrastructure put in place for the mine. For example, initial thinking includes exploring, with local interests, the concept of establishing solar or wind power generation on the CDF north cell in post-closure to supply and sell power to the grid. This may present a unique and sustainable opportunity for generations to come and will be further explored during the life of mine.

5.19.3.6 Petroleum Products, Chemicals and Explosives

All petroleum products and chemicals will be used upon decommissioning and closure. Any remaining products will ultimately be removed from the Project site. Empty storage tanks will be sold as scrap or cleaned to remove any residual fuel or chemicals and disposed of in an appropriate offsite facility.

An environmental site assessment will be conducted at the end of operations or early decommissioning and closure phase to delineate areas of potential soil contamination, particularly around fuel handling areas. Soil found to exceed acceptable criteria will be remediated on site or transported off site to an approved facility.

Any remaining explosives will be either detonated on site or hauled off site by an authorized transportation company.

5.19.3.7 Waste Management

During the decommissioning and closure phase, solid wastes will continue to be collected in bins and transported to an appropriate facility. Any remaining solid and/or domestic waste at closure will be transferred off site to an approved facility. Non-hazardous demolition wastes that are not transported off site for re-use or sale will require permanent disposal. These materials will generally require disposal in an approved landfill off site, similar to solids wastes for the mine.

5.19.3.8 Water Management

During the initial decommissioning and closure phase, pumps, pipelines, sumps and associated equipment used to support open pit water management and surface water management will be decommissioned, drained and removed from the site when no longer needed. In addition, the ETP will continue to be used if needed, or will remain available for contingency use. Water management infrastructure will be decommissioned when no longer needed.

5.19.3.9 Infrastructure

Site roads and the mine access road will be decommissioned when no longer needed to support final reclamation, long-term management and environmental monitoring, assuming that the roads are no longer required to support any developments on site or local needs. If site roads and the mine access road are no longer needed, the roads will be scarified to alleviate surface compaction to aid in vegetative regeneration.

Any aggregate operations established to support mine construction are proposed to be progressively reclaimed during operations when the resource is no longer needed.

Pumps, pipelines, sumps and associated equipment used to support open pit water management and surface water management will be decommissioned, drained and removed from the site when no longer needed.

The 230 kV transmission line will continue to operate and provide power to the Project site as needed after operations cease. It is anticipated that the transmission line will remain in place to support regional needs and continue to benefit the region. Associated onsite power distribution line(s) and related infrastructure or equipment that is not needed and has no salvageable value will be dismantled and transferred to an approved waste management facility. Other power equipment and materials will be taken off site for sale or resale.

5.19.4 Post-closure Monitoring

A post-closure monitoring program will be developed as part of the regulatory closure plan so that the site remains physically, chemically, and biologically stable. Proposed monitoring may include the following:

- General site inspections will be conducted regularly to confirm that appropriate vegetation is established and when needed remediation is provided (e.g., removal of trees from embankments);

- 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 (or as otherwise required by regulations or best management practices);
- Surface water and ground water monitoring will continue to demonstrate efficacy of decommissioning and closure measures;
- Revegetation will be monitored until vegetation covers are proven to be self-sustaining; and
- Vegetation, aquatic and terrestrial monitoring will be completed to confirm decommissioning and closure plan objectives are met.

Additional information regarding the proposed follow-up and monitoring program for the Project is provided in Section 12.

5.19.5 Expected Site Conditions Post-closure

The Project site is located in a remote area in which traditional pursuits (i.e., hunting, fishing, trapping and recreational use) and forestry are the dominant land use, with some mineral exploration. The overall intent is to restore the site to a self-sustaining ecosystem. In such a condition, the site can provide wildlife and aquatic habitat and the potential for traditional pursuits. After completion of decommissioning and closure, no hazards will remain on the property that would be inconsistent with a natural environment. Long-term physical and chemical stability will be achieved and public safety maintained.

The post-closure site conditions are illustrated in Figure 5.19-1. Further detail will be provided in the regulatory closure plan required under the *Mining Act*.

Following final decommissioning and closure, the terrain will be similar to the pre-development conditions with the exception of the rehabilitated CDF. The CDF will resemble a hill raised above the pre-development terrain. The revegetation program for the Project will use a mix of commercially available native species combined with natural revegetation and vegetation succession. Wildlife will re-enter and use the site once vegetation is re-establishing.

Fish habitat area will be increased, including a newly developed habitat in the north portion of the open pit, Phase 1 pit and the fish habitat development area, along with other measures as provided for in the fisheries offset and compensation plan. There is also an opportunity to create wetland areas as part of the fish habitat development area.

Once the open pit basin is reclaimed and reconnected with Springpole Lake, the overall footprint of Springpole Lake will be increased by approximately 100 ha (3.5% overall increase in lake area) providing additional recreational water use for local communities. This also results in an increase in the available volume of deep pelagic thermal refuge habitat up to 30 m deep for Lake Trout, Lake Whitefish and other large body species of 16%. The ramp to the former open pit may remain with the purpose of providing a boat ramp, further supporting recreational use of Springpole Lake.

5.19.6 Opportunities and Continued Improvement

Although a closure strategy has been developed to support the Project, FMG is committed to maintaining a progressive mindset and exploring opportunities with emerging technologies and land uses. Such opportunities may include reusing the established facilities for community use or utilizing the restored site for a secondary purpose such as the generation of renewable energy. Among potential renewable energy potential being considered for the site is wind power and solar power with or without battery storage.

While not part of the current Project proposal or closure concept, FMG is committed to studying long-term sustainable green energy opportunities that could be implemented in post-closure, building on the key energy infrastructure put in place for the mine. For example, initial thinking includes exploring, with local interests, the concept of establishing solar or wind power generation on the CDF north cell in post-closure to supply and sell power to the grid. This may present a unique and sustainable opportunity for generations to come and will be further explored during the life of mine.

Wind Power – A wind analysis was based on wind measurements collected at the site from August 2022 through March 2023. The analysis found an average annual wind speed of 6.57 m/s at 120 m above ground and concludes that the wind resource in this area is moderate, with prevailing wind direction from the northeast. The data suggests that the wind resource is suitable to warrant continued study and investigation of a wind generation Project at the site. Wind power would likely be combined with battery storage to provide stable electrical capacity. A wind facility could be considered at site or along the transmission line route during operations, as well as at closure.

Solar Power - development of a solar project at the mine site after mine closure may present a favourable renewable energy opportunity. The CDF will have a surface area of approximately 300 ha at the end of the mine life, and this area will be relatively flat and elevated above the local terrain. Based on the assumption that the surface of the CDF is geotechnically stable and capable of supporting a solar PV array, this represents a potentially ideal location for a long-term solar project.

It is recognized that there may be a period post closure where the CDF material will continue to consolidate and cause undulations and changes in the overall surface of the facility. However, instrumentation and records made during the operations phase will provide estimates of the extent and rate of the expected surface deformation, allowing for a more detailed array plan to be developed. While other locations for a potential solar project may ultimately be suitable the CDF option is viewed at this stage as a promising potential post closure land use.

Table 5.19-1: Open Pit Filling Rate and Duration

Maximum Springpole Lake Water Taking Rate (10% of Available Flow) (m^3/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Year	0.67	0.57	0.50	0.72	2.08	2.13	1.57	1.14	1.09	1.12	1.08	0.85
Dry Flow Sequence (1975-1981)	0.51	0.46	0.42	0.68	1.71	1.54	1.12	0.74	0.71	0.63	0.65	0.53
Wet Flow Sequence (2007-2010)	0.79	0.64	0.55	0.69	2.07	2.84	2.72	2.20	1.47	1.73	1.70	1.20

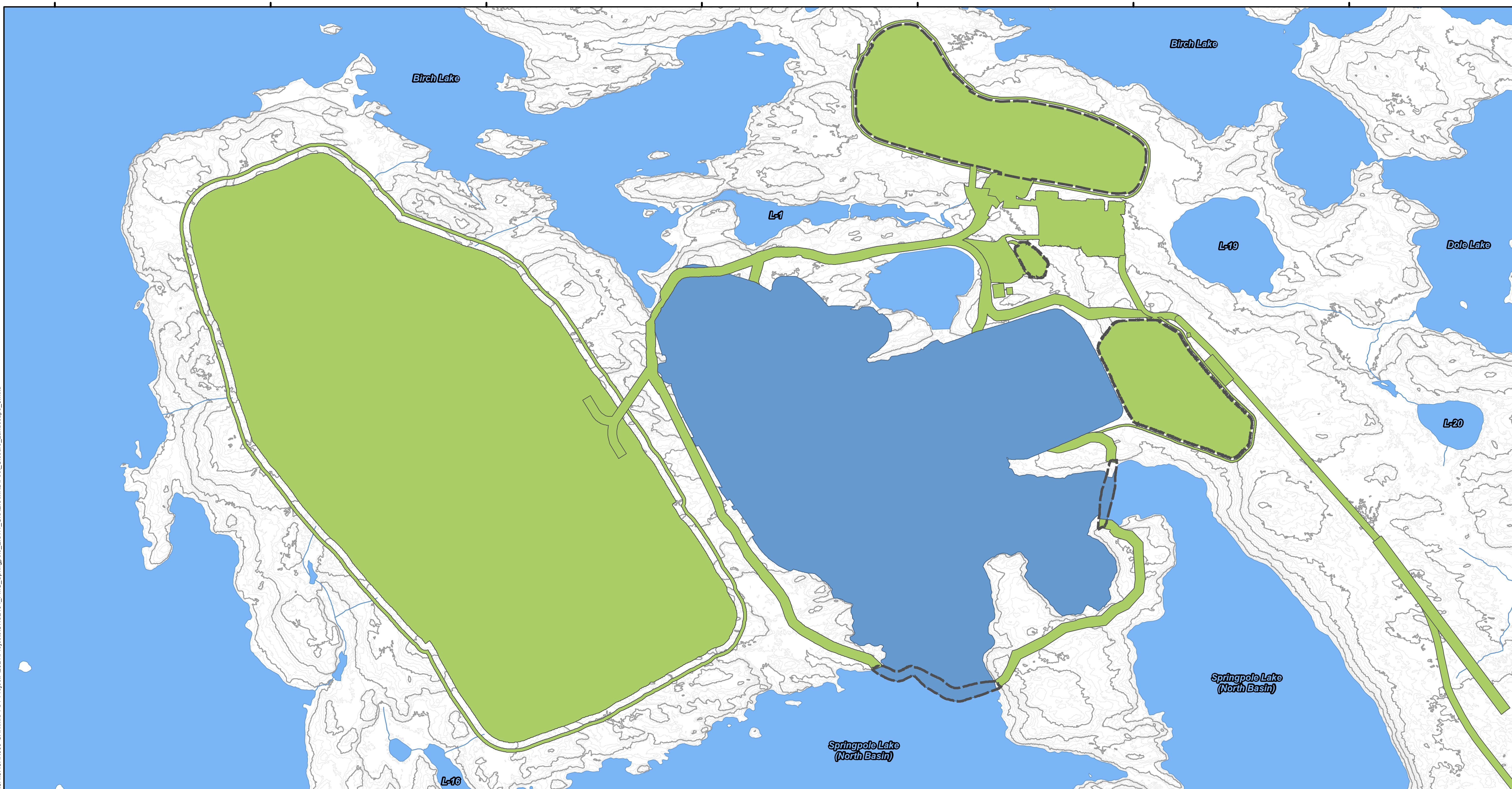
Note:

Dry and wet flow sequence values are based on a 7 year and 4 year rolling average, respectfully. The dry and wet flow sequences are based on the 1st and 99th percentile flows over the respective duration.

Values presented in the table are the average monthly flows over the respective flow sequence duration.

Table 5.19-2: Open Pit Filling Duration

Scenario	Total duration (months)	Total duration (years)
Average Year	56	4.7
Dry Flow Sequence (1975-1981)	76	6.3
Wet Flow Sequence (2007-2010)	39	3.3



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LEGEND

- Watercourse
- Waterbody
- Major Contours (5 m interval)
- Minor Contours (1 m interval)

Preliminary Post-Closure Landscape

- Restored / Filled Open Pit Area
- Revegetated (Active and Passive)
- Removed / Flattened Mine Feature

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.

Datum: NAD83
Projection: UTM Zone 15N

N S W E

0 0.5 1 2 3 4 5 Kilometres

First Mining Gold

wsp

SPRINGPOLE GOLD PROJECT

Preliminary Post-Closure Landscape

PROJECT Nº: ONS2104	**FIGURE: 5.19-1**
SCALE: 1:17,000	DATE: October 2024

5.20 Economic Benefits

5.20.1 Economic Model

The economic benefits resulting from employment related to the Project are significant and have been estimated by means of a model detailed in Appendix Q-2. During the approximately 18 years from construction through active closure, the Project will increase the provincial gross domestic product (GDP) by $7.6 billion through direct, indirect and induced effects. This is equivalent to an average of about $430 million per year. The Project will create 43,880 person-years of employment (including direct, indirect and induced effects) in Canada during construction, operations and active closure.

Annual direct employment generated during the construction phase is 1,690 person-years of employment, with total annual labour compensation of $111 million. Ontario GDP is directly increased by $155 million during each construction year (2.5 years in total). The annual direct, indirect and induced effects generated during the construction include 3,240 persons-years of employment, $190 million in labour compensation and up to $309 million in additional Ontario GDP. Of that, the annual total economic effects expected to be in the local area are up to 2,280 person-years of employment and up to $134 million in labour compensation.

Annual direct employment generated during the operations phase includes 450 person-years of employment, with total annual labour compensation of $57 million. Ontario GDP is directly increased by $342 million annually during the operations phase (10 years in total). The annual direct, indirect and induced effects generated during the operations includes 3,540 person-years of employment, $255 million in labour compensation and up to $675 million in additional Ontario GDP. Of that, the total annual economic effects expected to be the local area include up to 3,050 person-years of employment and up to $255 million in labour compensation.

Annual direct employment generated during the closure phase is 40 person-years of employment, with total annual labour compensation of $2 million. Ontario GDP is directly increased by $3 million during the closure phase (assumed five years in model). The annual direct, indirect and induced effects generated during the closure include 70 persons-years of employment, $4 million in labour compensation and up to $7 million in additional Ontario GDP. Of that, the annual total economic effects expected to be in the local area include up to 50 person-years of employment and up to $3 million in labour compensation.

5.20.2 Construction Labour Force

Mine construction and development will occur over an approximately three-year (2.5 years modelled) period. During the construction period, the majority of direct employment opportunities are expected to be filled directly by contractors as is typical of mine developments. Regional and local businesses and hiring local labour, with a focus on Indigenous peoples and others in the local area, will be encouraged.

Employment opportunities with contractors are expected to include equipment operators, truck drivers, labourers, electricians, mechanics and other tradespeople. Actual positions will vary according to the work being conducted.

5.20.3 Operations Labour Force

FMG provided a detailed estimate of the direct workforce required during the operations phase totalling 450 people. Four general types of jobs are anticipated to be required during operations: entry level (technical and trades), trades, middle management and supervisory. Table 5.20-1 presents a list of potential operations phase positions based on a benchmarking of other mining operations. Further information regarding these anticipated positions is provided in the economic model for the Project presented in Appendix Q-2.

At this time, all positions are expected to be based at site, assuming two weeks on site followed by two weeks off site. Schedules for senior supervisory staff may vary because of difficulty in duplicating some positions at this level. Employees will work 12-hour shifts.

Table 5.20-1: Preliminary Project Development and Production Schedule

Year of Development	Project Phase	Activities
Year -3, -2 and -1	Construction	• Construction phase of Project, including the installation of infrastructure and preparation for open pit mining • Ore is stockpiled for future processing
Years 1 to 10	Operation	• Ore is extracted from the open pit for processing • Ore stockpiles are managed • Process plant is commissioned and operated to produce gold and silver bars for sale • Water, emissions and wastes will be managed to comply with regulatory requirements
Years 10 to 15	Decommissioning and Closure	• Pit water management ceases and pit filling is initiated • Primary period of decommissioning, reclamation and closure • Pit filling is completed
Years 16+		• Post-closure environmental monitoring

Table 5.20-2: Summary of Potential Operations Phase Positions

Job Title	Number of Employees
Maintenance Superintendent	1
Maintenance General Foreman	1
Maintenance Shift Foremen	4
Maintenance Planner / Contract Admin	2
Clerk / Secretary	1
Light Duty Mechanic	3
Tire Man	4
Lube Truck Driver	4
Apprentice	7
Heavy Duty Mechanic	40
Welder	23
Electrician	2
Mine Ops/Technical Superintendent	1
Mine General Foreman	1
Mine Shift Foreman	4
Junior Shift Foreman	4
Road Crew/Services Foreman	1
Clerk / Secretary	1
General Equipment Operator	8
Road Pump Crew	8
General Mine Labourer	8
Trainee	4
Drill Operator	24
Blasters	2
Blaster Helper	4
Production Loader Operator	8
Shovel Operator	8

Table 5.20-2: Summary of Potential Operations Phase Positions

Job Title	Number of Employees
Haul Truck Driver	92
Dozer Operator	12
Grader Operator	6
Transfer Loader	3
Snow Plow/Water Truck	7
Chief Engineer	1
Senior Engineer	1
Open Pit Planning Engineer	2
Geotech Engineer	1
Blasting Engineer	1
Blasting / Geotech Technician	2
Dispatch Technician	1
Surveyor / Mining Technician	2
Surveyor / Mine Tech Helper	2
Clerk / Security	1
Chief Geologist	1
Senior Geologist	1
Grade Control Geologist/Modeller	2
Sampling / Geology Technician	4
Clerk / Secretary	1
Mill Operations Manager	1
Chief Metallurgist	1
Operations Shift Foreman	4
Control Room Operator	4
ROM / Crushing Operator	4
Mill / Gravity Operator	4
Flotation / Leach Operator	4
Acid Wash/Elution/Electro Winning Operator	4
Reagents Operator	4
Gold Room Operator	2
Tails Filtration Operator	4
Reagents Operator	4
Labours / helper	8
Maintenance Superintendent	1
Mechanical Planner	1
Mechanic	16
Electrician	4
Apprentice	8
Metallurgical Engineers	2
Controls Engineer	2
Assay Lab Tech	4
Chief Assayer	1
Sample Preparation	8

Table 5.20-2: Summary of Potential Operations Phase Positions

Job Title	Number of Employees
Assayer	4
Mine General manager	1
Receptionist	1
Accountant	1
Account Payables & Receivables	2
Payroll specialist	2
IT Superintendent	1
IT Specialist	4
Supply Chain / Warehouse Manager	1
Warehouse Technician	4
Security Personnel	4
HR Manager	1
HR Coordinator	2
Health, Safety & Training Manager	1
Environmental Manager	1
Environmental Specialist	2
Bus Drivers	1

Note:
This list should be considered preliminary and is subject to change as additional information becomes available.

5.21 Summary of Changes since Originally Proposed

Extensive study, analysis and consultation has been carried out over the six years since the submission of the Project Description to the federal agencies (February 2018). Over that period of time, FMG has:

- Aligned the federal and provincial EA processes to facilitate coordination;
- Continued consultation and engagement activities with Indigenous communities, government agencies and other interested parties, with a particular focus during 2020 through 2024;
- Conducted engineering work to further define the Project;
- Completed a pre-feasibility-level engineering study;
- Engaged additional engineering and environmental consulting support;
- Collected baseline environmental and geotechnical data to support the preparation of the EIS/EA;
- Evaluated alternatives for carrying out the Project;
- Prepared and provided a draft EIS/EA in support of consultation activities; and
- Prepared a final EIS/EA.

In May 2021, FMG submitted a Project Description Addendum to update the Canadian Impact Assessment Agency on the Project design, consistent with the information provided in the provincial Terms of Reference (ToR; Appendix B-3). The agency posted an Amendment to the EIS Guidelines to the Canadian Impact Assessment Registry in March 2022.

The continuing maturing of the Project design has resulted in the potential refinements and improvements to the preliminary Project design. The refinements and optimizations that have occurred during the intervening period between the Project Description and the draft EIS/EA, and the draft EIA/EA and the final EIS/EA are typical of mining projects as design concepts progress.

The bullets that follow provide an overview of the primary Project design elements that have been refined or optimized since the submission of the Project Description (2021), the draft EIS/EA (2023), and that are included in the final EIA/EA.

- **Tailings and Mine Rock Management:** Optimized management concept for mine rock and tailings to promote a smaller carbon footprint and more effective encapsulation of PAG mine rock by producing thickened NAG tailings that will be hydraulically transported via pipeline to the north cell of the CDF and reduce trucking activity.
- **CDF:** Based on a better understanding of geochemistry of the site materials, a two-celled CDF for both tailings and mine rock storage is now proposed to provide improved management and mitigation for PAG mine rock and tailings (separate facilities are no longer preferred, thus reducing overall footprint). The foundation liner has been removed, 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.
- **Dikes:** With additional engineering the location and length of the dikes has been refined and are at similar locations.
- **Ore stockpiles:** The area has been expanded to allow better continuity with the process plant and to provide the opportunity to cease mining earlier while processing continues, to potentially refill the open pit with water sooner.

- **Water Management:** Optimized the management of water through the use of BATEA for water treatment, enhanced contact water management approach through development of an integrated water management plan, and optimized location for the treated effluent discharge.
- **Lake bed sediments repository:** A dedicated facility is no longer proposed and lake bed sediments will be retained in the open pit basin, reducing the overall Project footprint.
- **Solid waste management:** To reduce the Project footprint and potential environmental effects, non-hazardous solid waste will be transported off site for disposal rather than landfilled on site (hazardous solid waste continues to be proposed to be transported off site).
- **Quarry:** 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.
- **Transmission Line**: Co-located the transmission line routing with the mine access road to reduce Project footprint and linear corridors, and revised transmission line routing to reduce potential disruptions to traditional use areas and minimize creation of new linear corridors.
- **Airstrip:** Inclusion of the co-located airstrip (i.e., with the mine access road).
- **Wenasaga Road:** Dryden Fibre (formerly Domtar) received approval to construct a Primary / Class 1 Right-of-Way under the Forest Management Plan from kilometre 105 to 130 which minimizes the length of new mine access road required for the Project.

5.22 References

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