Sabina
GOLD & SILVER CORP.

BACK RIVER PROJECT
Waste Rock Management Plan

April 2022

BACK RIVER PROJECT
WASTE ROCK MANAGEMENT PLAN

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Revision Log

Date	Section	Page	Revision
November 2015	All	All	Supporting Document for Final Environmental Impact Statement; submitted to Nunavut Impact Review Board (NIRB).
October 2017			Supporting Document for Type A Water Licence Application; submitted to Nunavut Water Board (NWB).
November 2020	All	All	Revisions to address requirements and commitments of Project Certificate, No. 007, and Water Licence, 2AM-BRP1831 and updated to reflect 2020 Type A Water Licence Amendment Application to the NWB.
April 2022	1; 5.1.3		Revisions to addresses commitment made during the technical review of the amendment application for Water Licence 2AM-BRP1831 to include Sulphur as criteria for defining potentially acid generating rock

Acronyms

ABA	Acid base accounting
AP	Acid generation potential
ARD	Acid rock drainage
ICRP	Interim Closure and Reclamation Plan
kt	Kilotonne
ML	Metal leaching
ML/ARD	Metal leaching/acid rock drainage
MLA	Marine Laydown Area
Mt	Million tonnes
NAG	Net Acid Generation test
NP	Neutralizing potential
NPAG	Non-potentially acid generating
NWB	Nunavut Water Board
PAG	Potentially acid generating
Project	Back River Project
Sabina	Sabina Gold & Silver Corp.
TSF	Tailings Storage Facility
WRMP or Plan	this Waste Rock Management Plan
WRSA	Waste Rock Storage Area

Executive Summary

The Waste Rock Management Plan describes the procedures and monitoring to be undertaken at the Back River Project relevant to the management of waste rock. The Plan is one of the documents that forms part of Sabina's overall Waste Management Program for the Project. This plan ensures that: 1) the procedures for the management of waste rock during Project Construction and Operations are defined, 2) relevant laws and regulations are appropriately adhered to, and 3) potential impacts related to waste rock generation and storage are minimized and monitored.

Uyarakhiuqvik Iqakut Uyaqat Aulatauni Parnaut (WRMP) Ataniqnut Nainaqhimayuq

Una Uyarakhiuqvik Iqakut Uyaqat Aulatauni Parnaut (WRMP) unniqtuqtai tapkuat pityuhit muariyaunilu havariyakhat talvani Hanningayuq Kuugaq Havagihia turangayuq tapkununga aulatauni tapkuat Iqakut Uyaqat. Tamna Parnaut ilagiyat tapkuat titiqat ilagiyai tapkuat Sabina-kut tamaitnut Iqakut Aulatauni Havagutai taphuma Havaguhia. Una Parnaut atuqpiaqtai tapkuat 1) tapkuat pityuhit tapkuat aulatauni iqakut uyaqat atuqtitlugu Havaguhia Hanayaunia Aulataunialu unniqtuqnit, 2) turangayut maligait maligauyutlu naamaktumik naalaktauni tapkuatlu 3) aktualaqnit turangayut tapkununga iqakut uyaqat pinguqtauni tutqumanilu mikhigiaqni munariyaunilu.

WRMP ᐃᓱᒪᑕᐅᓂᕐᓂᑦ ᓇᐃᓈᖅᓯᒪᔪᖅ

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1. Introduction

The Back River Project (the Project) is a gold project owned by Sabina Gold & Silver Corp. (Sabina) within the West Kitikmeot region of southwestern Nunavut. It is situated approximately 400 kilometres (km) southwest of Cambridge Bay, 95 km southeast of the southern end of Bathurst Inlet, and 520 km northeast of Yellowknife, Northwest Territories. The Project is located predominantly within the Queen Maud Gulf Watershed (Nunavut Water Regulations, Schedule 4).

The Project is comprised of two main areas with interconnecting winter ice roads; the Goose Property and the Marine Laydown Area (MLA). The majority of annual Project resupply will be completed using the MLA situated along the western shore of southern Bathurst Inlet, which is connected seasonally to Goose via an approximately 160 km long winter ice road. Both the Goose Property and the MLA make use of a local networks of all-weather roads.

The Waste Rock Management Plan (the Plan or WRMP) outlines the approach for managing waste rock and overburden produced at the Back River Project. No mine waste rock will be generated at the MLA.

This Plan has been constructed in consideration of all applicable guidelines and requirements, including those of the Type A Water Licence, 2AM-BRP1831, and Project Certificate, No. 007. This Plan revision specifically addresses commitments made during the technical review of the amendment application for Water Licence 2AM-BRP1831. This plan will be reviewed and updated as needed to reflect changes in regulatory requirements, facility operation and/or technology, approach, monitoring results, management reviews, incident investigations, best practice updates or other Project specific protocols.

Any updates to this plan will be filed with the Nunavut Water Board (NWB) and the Nunavut Impact Review Board (NIRB) following NWB approval.

2. Scope and Objectives

The WRMP is one of the documents that forms part of Sabina's overall Waste Management Program for the Project. This plan describes Sabina's approach to managing mine waste rock and overburden. Goose Property quarry rock and overburden identified as being waste will also be disposed of as outlined in this Plan.

The scope of the Plan covers operational procedures, implementation of environmental protection measures, and monitoring and reporting of the effectiveness of mitigation. The purpose of the Plan is to: outline procedures and processes for Construction and Operations of the Project as proposed; meet relevant laws and regulations; mitigate potential adverse environmental effects; and monitor potential mitigation measures for success.

The Plan applies to the Construction and Operations phases of the Project during which time waste rock will be produced and has relevance to the Closure and Post-Closure phases as waste rock will be permanently stored at the Property. Progressive reclamation as well as the closure and reclamation of Waste Rock Storage Areas (WRSA), is addressed in detail in the Interim Closure and Reclamation Plan (ICRP).

The main environmental concerns related to waste rock storage are the potential effects of metal leaching/acid rock drainage (ML/ARD) and release of nutrients from explosives use (ammonia and nitrate) on local water quality, as well as deposition of dust from the WRSAs on the surrounding land and water.

The measures identified in this plan and related management and monitoring plans are intended to protect permafrost and the Project Valued Ecosystem Components, including, air quality, surface water, water quality, sediment quality, aquatic habitat, and fish.

2.1 ADDITIONAL APPROVED DEVELOPMENT INFRASTRUCTURE/MINING AREAS

Project components previously assessed and permitted but not a part of the current mine plan may be reintroduced into the mine plan in future based on market considerations and engineering advancement. As these components were assessed and approved by NIRB, reintroduction of these mining areas to the mine plan in future would not constitute a modification to the Project under Part G of the existing Type A Water Licence, 2AM-BRP1831. Similarly, NIRB's letter, Direction Regarding the "Back River Project 2020 Modification Package" submitted by Sabina Gold & Silver Corp. in relation to the Back River Project (K. Kaluraq to M. Pickard, dated August 11, 2020, NIRB File No. 12MN036), the NIRB determined that the Back River Project 2020 Modification Package would not constitute a significant modification that requires further assessment by the NIRB, including "the use of mined-out open pits as tailings storage" (NIRB 2020).

The mining areas and associated support infrastructure that may be reintroduced and reintegrated into the mine plan, and subsequently future ICRPs, are listed below:

- Llama Underground;
- Goose Main Underground;
- Tailings Storage Facility (TSF);
- Any associated Underground laydown pads, water pumps and pipelines;

- All associated water or tailings pumps and pipelines, and diversion berms and ponds, including but not limited to:
    - Umwelt WRSA Containment Dam; Umwelt WRSA Diversion Berm;
    - Saline Water Pond Diversion Berm; Saline Water Pond East Containment Dam;
    - West Llama Reservoir Diversion Berm; East Llama Reservoir Diversion Berm; South-West Llama Reservoir Diversion Berm, South Llama Reservoir Diversion Berm; Llama WRSA Diversion Channel; and
    - Ore Stockpile Diversion Berm; Tailings Storage Facility (TSF) WRSA Pond.

Should Sabina choose to reintegrate any of these components into the mine plan a notice of modification prior to the disposal of waste would be provided to the NWB (per 2AM-BRP1831 Part B, Item 17) and would include information on: waste disposal quantities, volumes, disposal timing, maximum pit capacity, effects to pit closure, and appropriate mitigation and monitoring plans. Any necessary plans that may need updating, including this ICRP, would also be updated.

2.2 RELATED DOCUMENTS

This plan is to be implemented in conjunction with various other Sabina management, mitigation, and monitoring plans. Plans that have relevance to this plan include:

- Environmental Management and Protection Plan;
- Water Management Plan;
- Aquatic Effects Management Plan;
- Road Management Plan;
- Thermal and Geotechnical Monitoring Plan;
- Air Quality Monitoring and Management Plan; and
- Interim Closure and Reclamation Plan.

The following reports and studies have also informed the development of this plan:

- WRSA Design Report (Sabina 2017b, Appendix F-3);
- Geochemical Characterization Report (Sabina 2017b, Appendix E-3);
- Site-Wide Geotechnical Characterization Report (Sabina 2017b, Appendix F-2);
- Water and Load Balance Report (SRK 2020); and
- Site Wide Water Management Report (Sabina 2017b, Appendix F-1).

This plan is based on the waste rock design report submitted as part of the Water Licence submission package (Sabina 2017b, Appendix F-3), which includes the following design details:

- Waste Rock Storage Area (WRSA) Management Approach;
- WRSA Thermal Analysis;
- WRSA Stability Analysis;
- WRSA Design Criteria;
- WRSA Foundation Conditions; and
- WRSA Construction Sequencing.

3. Applicable Legislation and Guidelines

The Plan has been prepared to comply with existing regulations and follow the applicable guidelines provided by the federal government and the government of Nunavut.

Specific legislation, regulations, and guidelines related to waste rock management in Canada, and specifically within Nunavut, are summarized in Table 3-1.

The Project is also bound by the requirements of the Back River Project Certificate, No. 007, the Type A Water Licence, 2AM-BRP1831, and various land use permits. Sabina will also be bound by the terms and conditions of its land use permits issued by the Kitikmeot Inuit Association for Inuit Owned Land.

Table 3-1. Applicable Legislation to Waste Management in Nunavut

Acts	Regulations	Guidelines
Federal		
Canadian Environmental Protection Act (CEPA; 1999)		
Nunavut Waters and Nunavut Surface Rights Tribunal Act (2002)	Nunavut Water Regulations (2013)	
Territorial Lands Act (1985)	Territorial Land Use Regulations (CRC, c.1524) Northwest Territories and Nunavut Mining Regulations (CRC, c.1516)	Implications of Global Warming and the Precautionary Principle in Northern Mine Design and Closure (BGC 2003)
Fisheries Act (1985)	Metal and Diamond Mining Effluent Regulations (SOR/2002-220)	
Territorial – Nunavut		
Nunavut Environmental Protection Act (1988)	Spill Contingency Planning and Reporting Regulations (NWT Reg (Nu) 068-93)	Canada-Wide Standards for Petroleum Hydrocarbons (PHC) In Soil (CCME 2008)
Mine Health and Safety Act (SNWT (Nu) 1994, c.25)	Mine Health and Safety Regulations (NWT Reg (Nu) 125-95)	

Plan development also considered the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories issued by the MVLWB and AANDC (MVLWB/INAC/GNWT 2017).

4. Roles and Responsibilities

The General Manager is ultimately responsible for the success of the Plan and approves all relevant policies and documents, auditing, action planning, and the verification process.

The Mine Manager, along with their direct reports, is responsible for specifics of this plan including:

- Overall management of plan;
- Operational aspects; and
- Internal reporting.

Mine Operations is responsible for the implementation of this plan including:

- Monitoring;
- External reporting; and
- Ensuring compliance and adaptive management.

It is expected that successful implementation of this plan will require dedicated support by the Geology, Engineering, Site Services, Mine Operations, and Environment Departments.

5. Planning and Implementation

5.1 OVERVIEW

A total of 105.7 million tonnes (Mt) of overburden and waste rock comprised of the following will be generated from open pit and underground operations:

- Waste Rock = 99.9 Mt.
- NPAG Overburden = 6.5 Mt.

The majority of waste rock and all overburden produced will be stored in engineered WRSAs located close to each of the open pits (2020 Modification Package Appendix A, Figure 3). Approximately 5 Mt of waste rock will be used for other purposes, including approximately 3.5 Mt of geochemically suitable waste rock for general site construction activities. Beyond this, a minor volume of PAG waste rock will be used for backfill in the underground mine.

There will be three WRSAs at the Goose Property as follows:

- Umwelt WRSA: Located to the East of the proposed Umwelt open pit mine.
- Llama WRSA: Located to the East and South of the proposed Llama open pit mine.
- Echo/Goose WRSA: Located directly adjacent to the Echo open pit mine.

Figure A-01 shows the associated water management facilities associated with the WRSAs and nearby receiving waterbodies. See the Water Management Plan for more details.

Approximately 6.5 Mt of overburden, which is geochemically suitable for use as cover or construction material, will be stripped during development and the top organic layer may be stockpiled for use during reclamation. Depending on the physical characteristics of the overburden, it may be incorporated within the WRSAs, used for specific construction purposes, or used as WRSA cover material.

The WRSAs have been designed to progressively encapsulate the PAG waste rock during Operations such that a minimum 5-m thick NPAG waste rock cover is created on the top and sides of each WRSA. See the ICRP for more details. Over time, it is expected that permafrost will aggrade into the PAG rock, which will reduce oxidation rates and contact with seepage and runoff (Sabina 2017b, Appendix E-3). Results from the water quality assessment indicate that at Closure, the water in contact with the NPAG cover material will meet water quality criteria acceptable for direct discharge to the environment. Additional details on the water quality assessment can be found in the Water Management Plan, the Water and Load Balance Report, and Interim Closure and Reclamation Plan.

The following sections provide details on the physical and geochemical characteristics of the waste rock; the waste rock production schedule; the WRSA design layouts, stability and thermal analyses completed in support of the design; and waste rock and overburden management alternatives considered.

5.2 WASTE ROCK PHYSICAL CHARACTERISTICS

Physical characterization of run-of-mine waste rock was not carried out for the purpose of completing a stability assessment due to the practical limitations of suitable test methods for this type of material. Instead, and per standard practice, literature values supported by engineering judgement were used.

Table 5.2-1 summarizes the material properties adopted for run-of-mine waste rock for the Project; this table is sourced from the Site-Wide Geotechnical Characterization Report (Sabina 2017b, Appendix F-2).

Table 5.2-1. Typical Run of Mine Waste Rock Physical Properties

Parameter		Value
Moist Unit Weight (kN/m^3)		20
Degree of Saturation (%)		30
Porosity, n		0.3
Volumetric Water Content		0.09
Frozen	Apparent Cohesion, c' (kPa)	5
	Friction Angle, ϕ (°)	38 to 40
Unfrozen	Apparent Cohesion, c' (kPa)	0
	Friction Angle, ϕ (°)	38 to 40

kN/m^3 = kilonewtons per cubic metre; kPa = kilopascal; % = percent.

5.3 WASTE ROCK AND OVERBURDEN GEOCHEMICAL CHARACTERISTICS

Detailed geochemical characterization studies were completed between 2007 and 2015 to determine the ML/ARD potential of waste rock and overburden from the Project (Geochemical Characterization Report; Sabina 2017b, Appendix E-3). The results of the geochemical characterization program, specifically the quantities of PAG and NPAG waste rock that will be produced during mining activities, and water quality predictions for each of the WRSAs, were key considerations in developing the waste rock and water management plans for the Project.

Approximately 700 waste rock samples and 60 overburden samples from the Goose Property were analyzed, including acid base accounting (ABA) and trace element analyses, during this characterisation study; details of this sampling program and the subsequent results can be found in the Geochemical Characterization Report (Sabina 2017b, Appendix E-3). A brief summary of the testing program and results for waste rock and overburden associated with the Goose Property is provided below, see the Geochemical Characterization Report (Sabina 2017b, Appendix E-3) for details and sampling methodologies.

The Umwelt, Llama, and Goose Main deposits are located within a sequence of turbiditic meta-sedimentary rocks. This sequence is cut by felsic dykes (quartz feldspar porphyry) and gabbroic dykes. From oldest to youngest, the stratigraphic sequence is composed of the following units: lower greywacke, deep iron formation, lower iron formation, middle mudstone, upper iron formation, phyllite, upper greywacke, and upper sediments/overburden. The deposits are overlain by glacial till. Gold mineralization tends to be hosted in the lower greywacke, lower iron formation, and upper iron formation.

Geochemical characterization indicates that overburden has a negligible potential for ML/ARD and is classified as NPAG. For waste rock, appreciable proportion of the waste rock is classified as PAG according to the geochemical analysis results. PAG and uncertain waste rock are found in all of the stratigraphic units except for the gabbro dykes, but are more common in the lower iron formation, and to a lesser extent in the upper iron formation units.

Seep testing results indicated under neutral pH conditions, metal concentrations tend to be much lower than if conditions were acidic, but there is still some potential for leaching of aluminum and arsenic from the NPAG rock. The kinetic tests indicate that metal leaching, notably aluminum, cadmium, copper, iron, nickel, and zinc, is greatly enhanced when acidic conditions are allowed to develop. Based on the kinetic test results and seep surveys, specific measures will be necessary to control ML/ARD potential in the PAG waste rock. For management purposes, Sabina has assumed that all rock that is PAG, or rock which has an uncertain potential for ARD, will be managed as PAG which will also address the potential for metal leaching related to acidic conditions.

5.3.1 Geochemical Criteria for Material Management

Site-specific classification criteria were developed based on the results of geochemical testing of overburden and waste rock for the purpose of material management during Construction and Operations. The classification criteria presented in Table 5.3-1 are supported by the results of ABA, NAG testing, and kinetic testing. Rock is classified based on the ratio of neutralization potential (NP) to acid generation potential (AP, calculated using total sulphur content). Refinement of the classification criteria can be considered in the future based on the ongoing collection of geochemical testing data and site-specific monitoring data collected during the Construction and Operations phases of the Project.

Table 5.3-1: Site-specific Geochemical Classification Criteria

Acid Generation Potential	Criteria	Comments
Non-Potentially Acid Generating	NP/AP > 3 or total S <0.15%	These samples are not expected to generate acidity
Potentially Acid Generating	NP/AP < 3 and total S >0.15%	Potentially acid generating or uncertain acid generation potential owing to uncertainty in availability and reactivity of bulk NP

5.3.2 Waste Rock Classification

The criteria for geochemical classification of mine materials presented in Table 5.3-1 was used to determine the relative number of PAG samples in the geochemical dataset by mine area. As presented in Figure 5.3-1 and Figure 5.3-2, the Umwelt and Llama deposits have the highest proportion of PAG samples, while the Goose Main deposit has the lowest proportion.

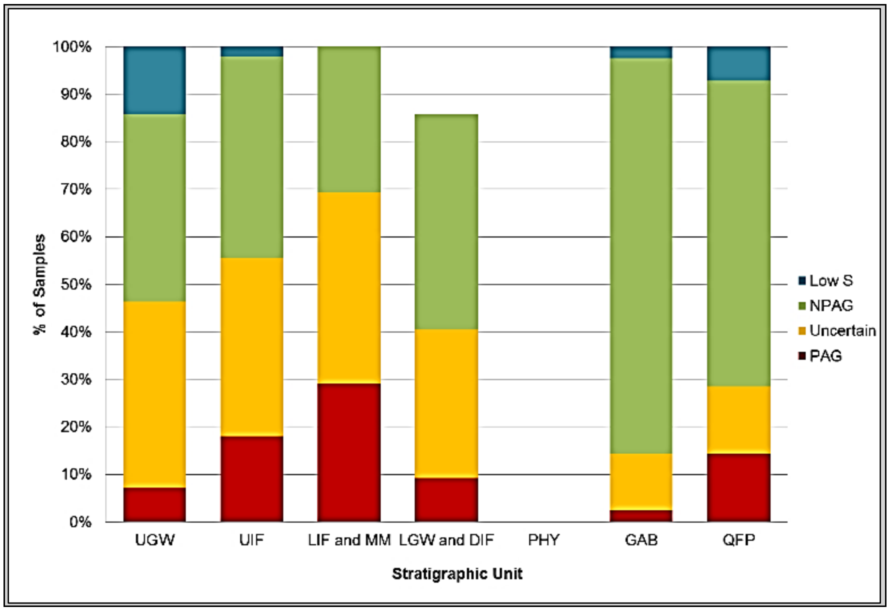

Figure 5.3-1: Distribution of PAG, Uncertain, NPAG, and Low Sulphur Waste Rock Samples According to Stratigraphic Unit and Deposit Groupings – Umwelt & Llama Deposits

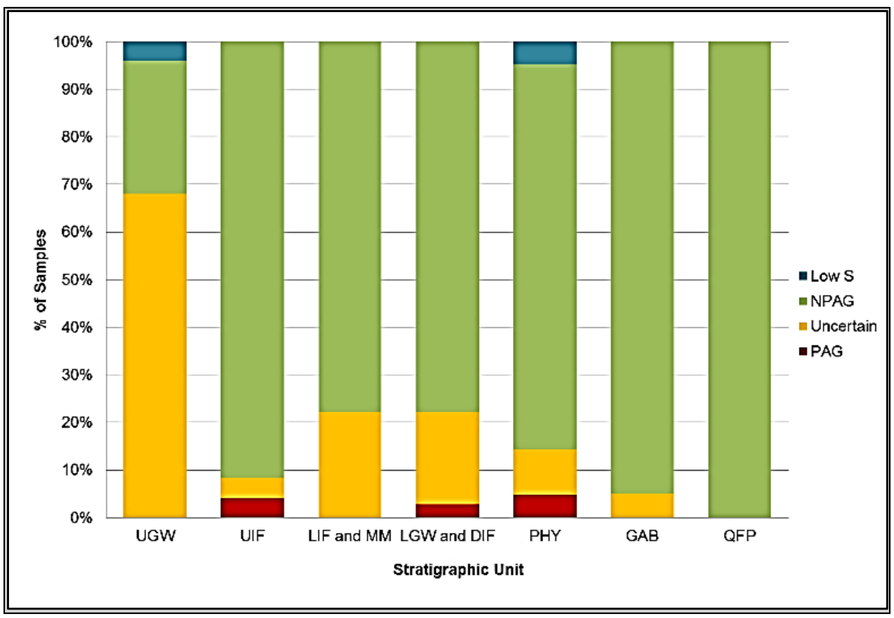

Figure 5.3-2: Distribution of PAG, Uncertain, NPAG, and Low Sulphur Waste Rock Samples According to Stratigraphic Unit and Deposit Groupings – Goose Main Deposit

In-situ quantities of PAG and NPAG rock were determined based on the proportion of PAG and NPAG samples present in each of the modelled stratigraphic and intrusive units, and the quantities of waste rock present in each of these units. The in-situ quantities were then conservatively adjusted to reflect inefficiencies in the segregation process. Estimates of PAG/NPAG waste rock quantities are presented in Table 5.3-2, and further details on each WRSA are found in Section 5.4.1.

Table 5.3-2. Quantities and Proportions of Waste Rock by ARD Classification – Goose Property Deposits (ktonnes)

Scenario	Pit	Quantity (000s)			Distribution (%*)	
		PAG	NPAG	OVB	PAG	NPAG
In-situ Quantities	Umwelt	7,338	6,909	1,178	52%	48%
	Llama	14,933	14,178	1,278	51%	49%
	Goose Main	8,163	35,104	4,019	19%	81%
	Total	**30,434**	**56,191**	**6,474**	**35%**	**65%**
75% of NPAG recovered except 0% in LIF and 50% in Umwelt/Llama UIF	Umwelt	10,106	4,141	1,178	71%	29%
	Llama	21,047	8,064	1,278	72%	28%
	Goose Main	19,271	23,996	4,019	45%	55%
	Total	**50,424**	**36,201**	**6,474**	**58%**	**42%**

** Distribution does not include overburden (OVB), which is NPAG.*

The distribution of PAG and NPAG waste rock is not closely linked to stratigraphy nor to lithology. Therefore, identification and subsequent segregation of these materials will require a dedicated blast hole monitoring program which is outlined in Section 7.1.

Preliminary calculations indicate that acidic conditions are not expected to develop in the majority (>95%) of the waste rock during an approximately 10-year freeze-back period. Although acidic conditions could occur more rapidly in some of the waste rock, average pH conditions in seepage and runoff would be expected to remain buffered until WRSA freeze back conditions develop. Nonetheless, due to the potential for somewhat elevated metal and/or nutrient (ammonia and nitrate) concentrations during the freeze-back period, seepage and runoff water will be managed throughout Operations, as described in Section 6.2.

5.4 WASTE ROCK STORAGE AREA DESIGN

The locations of the WRSAs were chosen based on consideration of the environmental, social, economic, and technical aspects of waste rock management, which included the following:

- minimize the overall footprints of the WRSAs while maintaining the short-term and long-term stability of the facilities;
- avoid or minimize impact to fish bearing lakes (details regarding fish-bearing waters can be found in the Section 7.1.8 of the Main Application Document in the Type A Water Licence Application (Sabina 2017b);
- minimize the haul distance from the open pits to the WRSAs;
- minimize the number of water catchment areas potentially affected by drainage from the WRSAs;
- when feasible, divert the upstream clean natural non-contact run-on water away from the WRSAs;
- facilitate the collection and management of contact water from the WRSAs during Operations to avoid potential impacts on the surrounding environment;
- maintain a minimum distance of 100 m between the toe of the WRSAs and the open pits;
- maintain a minimum distance of 100 m between the toe of the WRSAs and adjacent lakes that will not be disturbed by mine activities; and

- build the WRSAs to maximize progressive reclamation and minimize dedicated closure activities during Closure.

Considering the WRSA management strategy and the results of the thermal and stability analyses, the following WRSA design criteria will be adopted for the Project:

- The WRSAs will be constructed in benches using a bottom-up technique.
- The lift thickness is not critical for freeze back or stability and can therefore be determined based on constructability requirements of the mine haul truck fleet. Based on the proposed 64 t haul trucks, lift heights of around 5 to 8 m can reasonably be expected.
- The final overall slope (measured bench crest to bench crest) of the WRSAs will be 3H:1V or less. Individual bench slopes can be at angle of repose with bench setbacks designed to allow for an overall slope at the desired grade. The design slope geometry is not a requirement due to stability but rather a reasonable long-term slope considering overall landscape design. Final landscape design of the WRSAs will also consider, where practical, a configuration that will promote shedding of snow to minimize its insulating effects.
- The designs of the WRSAs include complete encapsulation of PAG material with a minimum 5 m of NPAG waste rock. Placement of the NPAG cover is planned to be concurrent with PAG waste rock placement as the WRSAs develop. No appreciable amount of NPAG stockpiling and handling is planned due to the progressive reclamation approach, and the closure of the WRSAs is intended to be appreciably completed prior to the end of the Operations Phase.
- In general, overburden is not expected to be widely useable for either construction or structural reclamation material (frozen chunks in winter and water-saturated silt in summer). However, some sand and gravel overburden is expected to be present at the Property and would be geotechnically suitable as a portion of the 5 m NPAG cover and for construction of key infrastructure during the Construction Phase. This will need to be reviewed and assessed during Construction and Operations. As noted previously, the top organic layer from overburden stripping during development at site may be stockpiled for use during reclamation. The overburden that is not deemed geotechnically suitable as cover material will be placed in interior cells of the WRSAs with a 20 m minimum set-back from the outer edge of the WRSA.

5.4.1 Waste Rock Storage Area Descriptions

5.4.1.1 Umwelt Waste Rock Storage Area

The proposed Umwelt WRSA will permanently occupy an area of approximately 33 ha, have a height of approximately 34 m, and will be located East of the proposed Umwelt open pit. The Umwelt WRSA will be used to store the majority of waste rock and overburden from the Umwelt open pit. Some geochemically suitable waste rock from Umwelt Pit may also be used for construction material. One small stream and two ponds are located within the footprint, or immediately upstream, of the Umwelt WRSA and will be covered by the facility (2020 Modification Package Appendix A, Figure 3). The stream and ponds are less than 2 m deep and freeze to the bottom annually during winter. To manage slope stability, overburden will be placed within areas surrounded, and ultimately covered, by waste rock. The Umwelt WRSA is expected to reach its design capacity at the end of Year 2.

5.4.1.2 Llama Waste Rock Storage Area

The proposed Llama WRSA will permanently occupy an area of approximately 43 ha, have a height of approximately 76 m, and will be located East and South of the proposed Llama open pit. It will store waste rock and overburden from the Llama open pit. There are no ponds or streams located within the footprint of the Llama WRSA (2020 Modification Package Appendix A, Figure 3). To manage slope stability, overburden will be placed within areas that will be surrounded by waste rock. The Llama WRSA is expected to reach its design capacity at the end of Year 3.

5.4.1.3 Echo/Goose Waste Rock Storage Area

The proposed WRSA will permanently occupy an area of approximately 106.7 ha. The waste rock and overburden from the Goose Main open pit and the Echo Open Pit will be placed in the Echo/Goose WRSA, on top of the mined out Echo Open Pit once it is no longer in use. One small stream and two ponds are located within the footprint of the Echo/Goose WRSA and will be covered by the facility. These streams and ponds are less than 2 m deep and freeze to the bottom annually in winter. To manage slope stability, overburden will be placed within areas that will be surrounded by waste rock.

5.4.2 Waste Rock Storage Area Foundation Conditions and Construction Sequencing

Geotechnical field investigations have confirmed that the proposed locations of the Llama, Umwelt, and Echo/Goose WRSAs to inform the design. WRSAs are underlain by less than 2 m of overburden.

The permafrost soils will provide suitable foundation conditions for WRSAs provided the foundations remain frozen. To maintain frozen conditions in the foundations, the first lift of all new WRSAs will be constructed during the winter season, where possible. In the event the first lift of waste rock has to be constructed during the summer months, the WRSA may be subject to differential settlement during the first summer due to consolidation settlement of the active layer. However, since there is less than 2 m of overburden under the WRSAs, such settlement does not pose any substantial risk or concern.

In all cases, whether WRSA construction is started in summer or winter, once freeze back has been achieved in the foundation, and the active layer is demonstrated to remain within the waste rock stockpile, there will likely not be restrictions on the maximum lift thickness used for WRSA construction. The overall maximum height (i.e., total vertical thickness) of the WRSA will be limited to 80 m unless appropriate analysis is completed to confirm otherwise.

The WRSAs may experience creep deformation as a result of ice rich foundation soils. High ice content soils generally carry more load on the ice phase and the ice creeps under load, resulting in creep behaviour of the soil. Creep rates in frozen soils are dependent upon the loading rate and temperature, with higher creep rates observed at higher temperatures and under greater shear loading conditions. Maximum creep rates occur at near-thawed conditions. Due to the relatively thin layer of overburden soils, creep deformation is not expected to be a significant concern. A discussion of WRSA creep is provided in the WRSA Design Report (Sabina 2017b, Appendix F-3).

In areas where the WRSA foundation is on exposed bedrock, no significant issues are expected; therefore, placement on exposed bedrock is preferred and can proceed during any season provided adequate clearing of snow and ice has been completed.

Waste rock storage areas will be constructed using a bottom-up approach. Haul trucks will end dump waste rock in horizontal layers (bubble dumps). A dozer will be used to level out these dumps, prior to starting a new lift. No dedicated waste rock compaction will be completed; however, haul trucks will continuously traffic over previously placed areas providing wheel traffic compaction.

Table 5.4-1 provides an overview of WRSA development and closure for the Project by year. Waste rock will be placed in accordance with its ARD classification, with PAG waste rock placed in the central part of the WRSA, and NPAG waste rock placed along the outer margins. Upon completion, the entire outer surface of the WRSA will be clad in a minimum 5-m thick layer of NPAG rock. Over time, permafrost is expected to aggrade into the WRSAs, but an active layer will remain in the NPAG cover.

As far as practical, WRSA construction will be done to minimize re-handling by placing NPAG waste rock concurrently as an outer shell around the PAG waste rock. However, based on material sequencing, there may be periods when small volumes of NPAG waste rock will have to be separately stockpiled and re-handled so that there is sufficient NPAG waste rock for the minimum 5 m cover.

Water management around the WRSAs will be completed in accordance with the Water Management Plan.

5.5 WASTE ROCK STORAGE AREA STABILITY ANALYSIS

Slope stability analyses for the WRSAs were carried out during the feasibility study. Using the material parameters presented in Section 5.2 and the geometries described in Section 5.4, the results of the stability analysis indicate that the calculated minimum factors of safety for the WRSAs meet or exceed the acceptable factors of safety. Information on stability studies for the WRSAs is described in the Appendix F-3 of the Type A Water Licence Application (Sabina 2017b).

5.6 WASTE ROCK STORAGE AREA THERMAL MODELLING

Thermal analyses were conducted to estimate the thermal regime of the WRSAs and foundations during Operations and after Closure. Multiple sensitivity scenarios based on a range of conditions were considered during thermal modelling including material saturation, thermal properties, variable boundary conditions, material composition, as well as convection and conduction. All modelling was done taking climate change into consideration. The thermal modelling completed to date is considered reasonable and appropriately conservative. For additional information refer to FEIS Addendum Volume 4, Appendix V4-3D and Appendix V4-3E (Sabina 2017a).

Freeze back of the WRSAs is considered to be validated if the temperature throughout the PAG waste rock remains below 0°C. Under these conditions, freeze back at the Property is estimated to be less than five years with no allowance for convective cooling in the winter, and less than 2.5 years with allowance for convective cooling.

The WRSA thermal modelling was also developed to account for projected influences of climate change. The modelling results indicate that the active layer thickness for the assumed base case is expected to be less than 5 m (i.e., it will remain in the NPAG waste rock cover) assuming convection facilitates cooling.

Further Information on thermal studies relating to the WRSAs is provided in the WRSA Design Report (Sabina 2017b, Appendix F-3). The results of this analysis will be confirmed and refined during Operations and Closure of the Project. As additional site-specific data is collected, this information will be used to further enhance or modify the closure of WRSAs, associated water treatment, and closure monitoring.

5.7 WASTE ROCK AND OVERBURDEN MANAGEMENT ALTERNATIVES

Sabina applied the Guidelines for the assessment of alternatives for waste rock disposal to complete a multiple accounts analysis for waste rock storage locations and disposal technologies. The analysis concluded that the most appropriate waste rock management alternative is the WRSAs as shown on the 2020 Modification Package Appendix A, Figure 3, and encapsulation of PAG waste rock with the placement of a NPAG waste rock thermal cover was the most appropriate disposal technique. A summary of the alternatives assessment can be found below. For more details, refer to the WRSA Design Report (Sabina 2017b, Appendix F-3), and the Multiple Accounts Analysis that was updated in February 2016 as part of the FEIS Information Request Response Package (Sabina 2016).

5.7.1 Waste Rock Storage Alternatives Analysis Design Basis

The proposed locations of the WRSAs were selected based on capacity, proximity to mine workings, elevation changes, footprints, suitability of ground conditions, associated costs, as well as the ease with which runoff from the WRSAs can be collected within runoff collection ponds. Consideration was also given to identify important terrestrial habitat, special landscape features, and rare vegetation, and to archeology.

Geochemical characterization of samples from the Project resulted in grouping the rock into two reportable categories based on acid rock drainage generating potential: PAG and NPAG. The geochemical study (Sabina 2017b, Appendix E-3) concluded that 35% of the waste rock in-situ is PAG; however, due to operational recovery estimates and conservative waste segregation practices, it is assumed that 58% will be categorized as PAG with the remainder (42%) being NPAG.

Preliminary calculations indicate acidic conditions are not expected to develop in >95% of the waste rock during the freeze-back period. Although acidic conditions could occur more rapidly in some of the waste rock, average pH conditions in seepage and runoff would be expected to remain non-acidic until complete freeze back of the WRSAs.

The geochemical study (Sabina 2017b, Appendix E-3) indicated that blending of the PAG and NPAG waste rock to take advantage of the buffering offered by the NPAG to neutralize the PAG would not be viable.

5.7.2 Waste Rock Storage Alternatives Analysis Assessment Results

The assessment of alternative methods for managing PAG/ML mine waste material considered the following disposal technologies:

- freeze back with a thermal NPAG waste rock cover;
- low permeability covers;
- co-mixing of mine waste material;
- co-disposal of mine waste rock and tailings; and
- subaqueous disposal in lakes and/or open pits.

Sub-aqueous disposal can include disposal in an engineered structure, in a natural waterbody, in a mined-out open pit, or in an exhausted underground development. Construction of a permanent, water retaining, engineered structure was ruled out since it would not be considered best practice. Deposition in a natural waterbody was also ruled out as the lakes around the Property are either shallow, thus offering limited capacity or are larger lakes, thus providing good aquatic habitat.

The underground mining methods employed on the Project require a portion of material from open pit development as mine backfill. As such, this backfill material will be composed, as much as practical, of PAG waste rock, either sourced locally from underground development or backhauled from surface development. Consideration was given to storing PAG waste rock in mined-out open pits; however, the current mine scheduling, and the need to use the pits for tailings and water management, made this a less desirable option. If future mine scheduling allows for in-pit disposal of waste rock, this option will be reconsidered.

For the remaining PAG waste rock on the surface, consideration was given to low permeability covers. Generally, the use of low permeability covers would be the most cost effective; however, no suitable natural materials are generated by Project activities and as such, this would not be a cost-effective option. Therefore, the only viable low infiltration cover would be geosynthetic liners. The initial capital costs and long-term replacement costs of these liners make them an unsustainable option.

Based on technical, environmental, socio-economic, and economic considerations, encapsulation of PAG waste rock with the placement of a NPAG waste rock thermal cover was found to be the preferred methodology. During progressive reclamation and in Closure, the PAG waste rock will be surrounded and capped by NPAG material to protect the underlying waste rock from seasonal thawing and promote the aggregation of permafrost into the PAG waste rock.

6. Environmental Protection Measures

6.1 WASTE ROCK MANAGEMENT

The location of waste rock disposal will be dependant on waste rock type (i.e., NPAG vs PAG) as determined by the waste rock monitoring program outlined in Section 7.1. Waste rock will be monitored as it is produced through a blast hole sampling program. Based on this monitoring, all waste rock will be identified as either PAG or NPAG. All PAG will be placed in the WRSAs in a manner that will allow the encapsulation of this material by NPAG rock on closure such that PAG rock will become fully frozen and inactive following closure. Overburden on the Property is considered NPAG material, and as such may be segregated for use as a cover material. Overburden which is not structurally suitable (e.g., high silt content) will be co-disposed with waste rock, with ultimate placement at least 20 m from the outer edge of the WRSAs to maintain overall pile stability. This management approach will facilitate a long term chemically and physically stable closure state.

If a single sample or a cluster of samples are classified as PAG or to be metal leaching, the area from which the sample(s) were collected will all be considered PAG and will not be used for WRSA cover material. After blasting, dig limits will be flagged and documented based on monitoring results to ensure waste rock is clearly identified and segregated as necessary for placement as part of the 5-m NPAG cover in WRSAs. Waste rock placement quantities (in tonnes) and locations will be tracked and tied to sample results, this data will be used to verify closure predictions and conditions and will be included in the annual report. Only waste rock confirmed to be NPAG and non-metal leaching may be used as construction material, per Water Licence 2AM-BRP1831 Part D, Item 5.

6.2 WATER MANAGEMENT ASSOCIATED WITH WRSAS

The water management objectives for the Project are to minimize potential impacts to the quantity and quality of surface water at the site. Water management and monitoring is detailed in the Water Management Plan, and overview of the activities related to WRSAs is provided below.

Prior to closure of the WRSAs, seepage and runoff is expected to contain elevated levels of some parameters; as such, all WRSA seepage and runoff will be collected in perimeter berms and directed to collection ponds. These berms will be strategically located to take advantage of topography to limit water ponding. During Operations, runoff from the WRSAs at the Goose Property will be pumped to the active Tailings Facility and treated as necessary prior to discharge; any discharge locations will be located so as to limit the potential for erosion. The collection ponds constructed for the WRSAs will apply appropriate design criteria in terms of managing extreme flows. Seepage and runoff volumes as well as extreme events were accounted for in the Project Water and Load Balance Report (SRK 2020); details on water treatment, WRSA catchments, and runoff criteria can be found in the Water Management Plan.

During Closure, collection ponds will continue to operate and collect runoff from the WRSAs, until the collected runoff meets discharge criteria and applicable receiving water quality criteria. During the Active Closure Stage and while the collection ponds remain operational, collected runoff at the Goose Property will be directed to a tailings management facility or reservoir. Once runoff is demonstrated to meet applicable limits, the ponds will be decommissioned in accordance with the ICRP.

6.3 DUST MANAGEMENT

The possible sources of dust related to the waste rock and overburden during Construction, Operations, and Closure include:

- Site preparation prior to placement of waste rock or overburden (i.e., stripping, excavation and/or placement of foundation pad);
- Wind erosion of fine particles from the WRSA;
- Vehicle traffic dislodging fine particles from the surface of the WRSAs, and associated service and haul roads to the WRSAs;
- Waste rock and overburden handling and transfer (i.e., loading, hauling, unloading, placement, and compaction); and
- Placement of closure and capping layers.

Dust suppression measures typical of current practices at other operating mines (i.e., Meliadine and Meadowbank mines), and consistent with best management practices, will be used through design, operation, and closure activities to control dust.

Minimal site preparation is required for the WRSA during the Construction Phase, and therefore, dust from these areas is not expected to be problematic.

Dust is expected to be a minor issue during the operation of the WRSAs as the waste rock produced at the Project site will generally comprise large pieces of rock that will not be susceptible to wind erosion. The overburden contains material that is fine-grained and thus more susceptible to wind erosion. The plan is to store overburden material away from the WRSA surfaces. Therefore, dust from the overburden material is not expected to be an issue. However, should dusting become an issue, dust control measures such as spraying water and/or other approved chemical dust suppressants will be used as necessary.

Dust generated from vehicles travelling on the surface of the WRSAs and associated service roads will be controlled principally by spraying water on the traffic areas, which will be carried out regularly by mine services during dry periods in the summer. The water used for dust suppression during the summer is estimated to be approximately 400 m^3/day and is accounted for in the Water Management Plan and will remain within licenced limits. Watering the haul and service roads is only possible when temperatures are above freezing. When the temperature is below freezing, dust suppression using water or an approved chemical may pose a safety hazard for travel; if warranted, reducing speed limits will be considered as the principal way of controlling dust during these periods.

Other control measures considered in design and Operations related to dust generation by vehicle travel include:

- Roads will be designed as narrow and short as possible while maintaining safe construction and operational practices;
- Coarse size rock will be used as much as possible for road construction;
- Roads will be regularly graded to mix the fines found on the road surface with coarser material located deeper in the roadbed; and
- As required, roads and travel areas will be topped with additional aggregate.

Dust from material handling is not expected to be problematic on-site. Front-loading and end-dumping will be employed to dump waste rock and overburden in lifts, and materials will be spread with a dozer. Long end dumps, which can generate significant amounts of dust, is not currently intended at site. Where possible, multiple handlings of materials that have the potential to generate dust will be avoided. However, should dust related to material handling occur on-site, specific control measures will be evaluated and applied, as required.

7. Monitoring and Reporting Program

This section describes the routine inspections, monitoring, and waste rock confirmatory testing that will take place under this Plan during waste rock generation and disposal.

Additional monitoring related to waste rock management is undertaken and reported under separate Project monitoring and management plans. To avoid plan overlap and the resulting potential for conflicting information, these monitoring details are not repeated in this Plan. Instead, relevant monitoring has been identified below and the appropriate management plan(s) referenced.

The additional waste rock-related monitoring and reporting that supplements the monitoring and reporting described in this Plan includes:

- dust monitoring (see the Air Quality Management and Monitoring Plan);
- wildlife monitoring (see the Wildlife Monitoring and Management Plan);
- runoff and seepage water monitoring at WRSAs (see the Water Management Plan and the Aquatic Effects Monitoring Plan);
- noise monitoring (see the Noise Abatement Plan);
- geotechnical monitoring (see the Thermal and Geotechnical Monitoring Plan); and
- WRSA Closure monitoring (see the Interim Closure and Reclamation Plan).

The monitoring to be conducted under the WRMP is detailed in the sections below.

7.1 WASTE ROCK MONITORING

7.1.1 WRSA Inspections – Daily and Monthly

During the active development of the WRSAs, personnel will carry out daily visual inspections in relation to the performance and condition of the WRSA. The purpose of these inspections is to identify and document any potential hazards or risks to the facility, safety, or the environment. These include deformations, unusual seepage, slumping, local failure, pooling water, etc.

In addition, containment of surface runoff and seepage from the WRSAs will be monitored during the Construction and Operations phases. This will be done through monthly visual inspections (weekly during freshet) along the downgradient side of the diversion berms and containment structures during the open water season. Daily inspections will be carried out during extreme rainfall events (e.g., 1:100 year 24-hour rainfall event), if safe to do so. The detailed information on the monitoring of surface runoff and seepage from the WRSAs is described in the Water Management Plan.

These inspections will be recorded, and any issues addressed adaptively.

7.1.2 WRSA Monitoring – Annual

Each WRSA which have been active in a given year will also be subject to an annual elevation and geometry survey to verify the overall volume placed. These annual surveys may be conducted in concert with the Annual Geotechnical Inspection (as per 2AM-BRP1831 Part I, Item 10) and as part of the Thermal and Geotechnical Monitoring Plan.

Inactive WRSAs may also be visually inspected on an annual basis to confirm geotechnical stability under the Thermal and Geotechnical Monitoring Plan.

A spring seep survey along the toe of the waste rock storage areas, as well as regular monitoring of the collection ponds, will also be completed to verify and refine the water quality predictions for each of the WRSAs. The locations of seeps will be marked in the field and recorded using a portable GPS. Field measurements of pH, electrical conductivity, oxidation-reduction potential, and temperature will be recorded, and samples will be submitted for acidity/alkalinity (as appropriate), sulphate, dissolved major cations (calcium, magnesium, sodium, and potassium), as well as a full suite of dissolved metals. Further details on water quality monitoring in the collection ponds are provided in the Water Management Plan.

The results of these inspections will be recorded, and any issues addressed adaptively.

7.1.3 Blast Monitoring

Blast hole sampling will be conducted in open pits to identify PAG and NPAG materials and allow the direction of each material to the appropriate location within each of the WRSAs. As discussed in Section 5.3, the distribution of PAG and NPAG waste rock is not closely linked to stratigraphy nor to lithology. Therefore, identification and subsequent segregation of these materials will require a dedicated blast hole monitoring program similar to the procedures that are used to identify and segregate ore in the mining operation and quarry rock during quarrying.

Waste rock drill core samples will be collected from exploration or blast holes drilled prior to blasting. These samples will be collected based on blasting plans which will be reviewed by trained mine geology personnel to select potential blast holes or areas for sample collection based on known geologic conditions. Samples will be analyzed as outlined below to determine geochemical characteristics on which monitoring and management actions will be based.

7.1.4 Waste Rock Confirmatory Testing and Segregation

All waste rock generated will be identified and segregated as being either NPAG or PAG prior to disposal in the WRSA and will be placed in accordance with this Plan. Waste rock placement will be documented by blast and location within the WRSA and will be tied to sampling results. To confirm that there is sufficient NPAG for WRSA cover construction, quantities of the NPAG and PAG waste rock and overburden produced and placed in WRSAs and used for construction will be recorded on a monthly basis as per 2AM-BRP1831 Part I Item 9b.

Waste rock samples collected in advance of, or concurrent with, mine development will be geochemically analyzed to ensure to characterize these materials. At a minimum, 8 samples will be collected for every 100,000 tonnes of material to be excavated (MEND 2009). Samples will be collected from blast holes drilled in the rock quarries prior to waste rock excavation. Samples will be as follows:

- Each sample will weigh no less than 1 kg.
- Each sample will be labeled with a unique sample identification number.
- Each sample will be documented in terms of sample depth and location and the blast hole number.
- Composite samples (more than one lithology) will be avoided where possible.

All samples will be submitted for total sulphur and total inorganic carbon analysis at an off-site, accredited laboratory, using LECO furnace analyser or a similar appropriate technique. Analytical methods must achieve a suitable detection limit for classification. Total sulphur will be used to calculate acid potential (AP) and TIC will be used to calculate neutralization potential (NP).

Additional laboratory testing on a subset of the samples collected will include ABA and net acid generation (NAG) testing to confirm geochemical the ARD classification. Short-term leach testing following the shake flask extraction (SFE) method will be conducted on subset to confirm the metal leaching (ML) potential of NPAG material; this testing is not required for PAG samples, as PAG waste rock will not be used for construction.

Classification of Material

Sample results will be evaluated against the following criteria:

- Materials classified as NPAG (NP/AP greater than 3) or low sulphur (total sulphur content less than 0.15%) are suitable for placement anywhere within the WRSAs and will be the only material to be used for the WRSA cover and construction purposes.
- Materials classified as uncertain (NP/AP between 1 and 3) or PAG (NP/AP less than 1) will not be placed within the 5 m waste rock cover zone and placement may be additionally constrained to promote chemically stable closure conditions.

The testing programs described in the Geochemical Characterization Report (SRK 2016) show that these criteria provide an appropriate level of conservatism for waste rock classification.

NPAG samples analyzed for SFE will be compared against 10x CCME guidelines for aquatic life to confirm metal leaching potential. Material with a high metal leaching potential will also not be used for WRSA cover material.

In future, Sabina may install an on site LECO furnace for sample analysis. This would provide a faster turnaround time for results and minimizes double handling of waste rock. As a quality assurance and quality control measure, 10% of samples will be split and sent to an external laboratory for verification testing to confirm site-generated results.

As-built volumes of waste rock used in construction and placed in the WRSAs will be recorded daily in a manner such that rock disposal location is tied to sampling results.

7.2 REPORTING

Environmental reporting will be conducted as defined in permits, approvals, and authorizations relevant to mine waste management, with the primary regulatory instrument governing mine waste management for the Project being the Type A Water Licence, 2AM-BRP1831.

As required by Schedule B of the Water Licence, the following information will be reported annually to the NWB as part of the Water Licence Annual Report:

- All monitoring data with respect to geochemical analyses including acid/base accounting and associated test work conducted for the PAG/NPAG waste rock characterizations;
- As-built volumes (in tonnes) of Waste Rock used in construction and placed in the WRSAs with estimated balance of acid generation to acid neutralization capacity in a given sample as well as metal toxicity;
- Any geochemical outcomes or observations that could imply or lead to environmental impact.

8. Adaptive Management

The mine design, including the WRSA design, has been carefully prepared taking into consideration the vast database of site characterization data gathered for the Project, coupled with rigorous engineering analysis. Where data was limited, conservative assumptions were consistently applied. While there is a high level of comfort that the plans are viable and realistic, it is understood that mining activities are by nature inherently uncertain. Therefore, additional mitigation or adaptive management may be required as an outcome of monitoring activities described in Section 7. This may include changes to WRSA development as a result of operational, engineering, and/or environmental monitoring. Any additional mitigation or adaptive management that is found to be required will be implemented in a timely manner.

Possible waste rock scenarios and contingency strategies are outlined Table 8-1.

Table 8-1. Waste Rock Management Contingency Strategies

Possible Scenario	Contingency Strategy
The total volume of waste rock might be smaller or greater than expected.	Provided the ratio of PAG to NPAG remains unchanged, this will have no material effect. A greater total volume of waste rock might require a small increase on event pond sizing during Operations.
The ratio of PAG to NPAG waste rock might be different than expected.	If the amount of NPAG increases, there is no negative effect. If the amount of PAG increases leaving a shortfall of NPAG to cover the PAG, management options could include a portion of the PAG may have to be covered with a geosynthetic liner, or a portion may have to be disposed of in an open pit upon closure, or additional NPAG material may have to be locally sourced as cover material.
The PAG material might oxidize faster than expected.	This may require increased Operations Phase and/or Closure Phase water treatment capacity. It will however not change the overall closure strategy as the WRSA is still expected to freeze. If the heat from oxidation is preventing freezing of the pile, a portion of the pile may need to be covered with a geosynthetic liner to reduce infiltration or a portion of the PAG may need to be relocated to an open pit.
Neutral metal leaching from the NPAG material may be greater than expected.	This may require the WRSAs be covered with a geosynthetic liner, or relocation of waste rock into an open pit upon closure, or earlier initiation of water treatment, or extended water treatment until control methods are in place.
Freeze back of the waste rock pile may take longer than expected.	Depending on the runoff water quality, this may require a longer active closure period.
The active layer thickness of the WRSA, and therefore the required cover thickness, might be greater than expected.	If there is insufficient NPAG to make up the difference, this may require that a portion of the PAG be covered with a geosynthetic liner, or additional NPAG may have to be locally sourced, or a portion of PAG may have to be relocated to an open pit upon closure, or earlier initiation of water treatment, or extended water treatment until control methods are in place may be required.

The Plan will be reviewed on a regular basis to incorporate any lessons learned, major changes to facility operation or maintenance, and environmental monitoring results. Any updates will be filed with the Annual Report submitted under the Type A Water Licence, 2AM-BRP1831.

This plan represents an adaptive approach to understanding the effects of the Project on the landscape and the species that live there. In this context, the Plan is part of a continually evolving process that relies not only on the efficacy of data collection and analytical results, but is also dependent on feedback from the communities, government, Indigenous groups, and the public. Having an adaptive and flexible program allows for appropriate and necessary changes to the design of monitoring studies, and the mitigation and monitoring plans.

9. Reclamation

The majority of WRSA closure activities will occur as progressive reclamation. The WRSAs have been designed to progressively encapsulate the PAG waste rock during Operations such that a minimum 5-m thick NPAG waste rock cover is created on the top and sides of each WRSA. The WRSAs will be progressively capped in the Operations Phase using NPAG waste rock sourced from adjacent or nearby active open pits. The majority WRSAs will be fully developed within a timeframe such that the final cover of NPAG waste rock over the WRSA can be mostly completed during the Operations Phase. Closure and Post-Closure water quality monitoring will be conducted in the WRSA areas, under the ICRP, to confirm that runoff meets applicable receiving water quality objectives. Additional details pertaining to reclamation and closure are provided in the ICRP.

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