BACK RIVER PROJECT
Ore Storage Management Plan

October 2017

BACK RIVER PROJECT
ORE STORAGE MANAGEMENT PLAN

Table of Contents

List of Figures

FIGURE **PAGE**

List of Tables

TABLE **PAGE**

Revision Log

Version	Date	Section	Page	Revision
1	October 2017	All	All	Supporting Document for Type A Water Licence Application, submitted to Nunavut Water Board for review and approval

Acronyms

ARD	Acid Rock Drainage
FEIS	Final Environmental Impact Statement
KIA	Kitikmeot Inuit Association
kt	Kilotonnes (thousand tonnes)
MAD	Main Application Document
ML	Metal Leaching
MMER	Metal Mining Effluent Regulations
NIRB	Nunavut Impact Review Board
NWB	Nunavut Water Board
OSMP or Plan	Ore Storage Management Plan
Project	Back River Project
ROM	Run-of-Mine (i.e., blasted ore that has not yet been crushed)
Sabina	Sabina Gold & Silver Corp.
SOP	Standard Operating Procedure
WRSA	Waste Rock Storage Area

1. Introduction

The Back River Project (the Project) is a proposed 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 (Main Application Document [MAD] Appendix A, base Figure 2): Goose Property (MAD Appendix A, base Figure 3) and the Marine Laydown Area (MLA) (MAD Appendix A, base Figure 4) situated along the western shore of southern Bathurst Inlet. The majority of annual resupply will be completed using the MLA, and an approximately 160 km long winter ice road will interconnect these sites. Refer to the MAD Appendix A, base Figures 1 to 5 for general site layout and locations. A detailed project description is provided in the MAD.

The Ore Storage Management Plan (OSMP or Plan) outlines Sabina's plan for managing stockpiled ore at the Project. The scope of the Plan covers operational procedures, the implementation of environmental protection measures, and monitoring the effectiveness of any mitigation strategies. The Plan applies to the Construction and Operations phases of the Project during which ore will be produced and stored prior to processing. It is expected that all ore will have been processed by the end of the Operations Phase.

The Plan was prepared following the requirements of the Supplementary Information Guidelines (SIG) for Mining and Milling MM3 and Water Works M1, issued by Nunavut Water Board (NWB 2010 a, b) and the Environmental Impact Statement Guidelines issued by the Nunavut Impact Review Board to Sabina (NIRB 2013) and in accordance with best management practices and in conformance with current Federal and Territorial statutory requirements (see Applicable legislation and Guidelines Section 3).

This plan is a living document to be updated upon changes in related regulatory requirements, management reviews, incident investigations, changes to facility operation or maintenance, and environmental monitoring results, best practice updates or other Project specific protocols once construction starts through to Project closure activities. Any updates will be filed with the Annual Report submitted under the Type A Water Licence.

The information presented herein is current as of September 2017. The Plan has most recently been updated for the Type A Water Licence Application based on Final Environmental Impact Statement (FEIS) and Feasibility Study designs. An update will be initiated prior to the start of Construction and will incorporate for-construction engineering drawings of stockpiles and associated water management infrastructure. The Plan will be reviewed as needed for changes in operation and technology and as directed by the NWB in the Type A Water Licence or other regulatory authorization where appropriate. Completion of the updated Plan will be documented through signatures of the personnel responsible for reviewing, updating, and approving the Plan.

A record will document all significant changes that have been incorporated in the Plan subsequent to the latest review. The record will include the names of the persons who made and approved the change, as well as the date of the approval.

Sabina will maintain a distribution list providing contact details for all parties to receive the Plan including key personnel, contractors, organizations, and external agencies.

2. Scope and Objectives

The Ore Storage Management Plan is one of the documents that forms part of Sabina's overall Waste Management Program for the Project. This plan has been written to meet requirements of a Type A Water Licence and applies to all Sabina projects in the Kitikmeot region.

This plan is divided into the following components:

- Applicable Legislation and Guidelines (Section 3);
- Roles and Responsibilities (Section 4);
- Planning and Implementation (Section 5);
- Environmental Protection Measures (Section 6);
- Monitoring Program (Section 7);
- Adaptive Management (Section 8); and
- Reclamation (Section 9).

The Plan is a discipline-specific biophysical management plan that forms part of Sabina's overall Environmental Management and Protection Plan developed for the Project. This plan has been prepared in accordance with Section 9.4.5 of NIRB (2013).

The focus of this plan is on the management (i.e., handling and storage) of ore. The main environmental concerns related to ore storage are associated with the effects of runoff on local water quality and the potential for dust to spread ore fines on the surrounding land and water. As such, the Valued Ecosystem Components that will be monitored include air quality and water quality.

2.1 RELATED PLANS AND STUDIES

Documents within the Application for the Type A Water Licence, which support this plan include the following:

- Air Quality Monitoring and Management Plan (FEIS Volume 10, Chapter 17);
- Water Management Plan (Supporting Document [SD]-05);
- Quality Assurance/Quality Control Plan (SD-24);
- Environmental Management and Protection Plan (SD-20);
- Site-Wide Geotechnical Properties Report (MAD Appendix F-2);
- Water and Load Balance Report (MAD Appendix E-2); and
- Geochemical Characterization Report (MAD Appendix E-3).

3. Applicable Legislation and Guidelines

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

Sabina will also be bound by the terms and conditions of its land use permits to be issued by the Kitikmeot Inuit Association (KIA) for Inuit Owned Land, and its Type A Water Licence to be issued by the Nunavut Water Board (NWB).

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 Mining Effluent Regulations (SOR/2002-220)	
Territorial – Nunavut		
Nunavut *Environmental Protection Act* (1988)	Spill Contingency Planning and Reporting Regulations (NWT Reg (Nu) 068-93)	Government of Nunavut (GN) Environmental Guidelines for the Management of:
Mine Health and Safety Act (SNWT (Nu) 1994, c.25)	Mine Health and Safety Regulations (NWT Reg (Nu) 125-95)	

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 Environmental Superintendent, along with his/her direct reports, are responsible for the implementation of this plan including:

- Overall management of Plan;
- Monitoring;
- Operational aspects;
- Internal reporting;
- External reporting; and
- Ensuring compliance and adaptive management.

5. Planning and Implementation

5.1 PHYSICAL CHARACTERISTICS

The main lithologies at the Project include greywackes, Banded Iron Formation, mudstones, and other minor units (i.e., dykes and other intrusions). The majority of the gold mineralization within the various pits is hosted within the Banded Iron Formation unit. Within the Goose deposit, the mineralization is also hosted within greywackes and mudstones although it is expected that the ore will exhibit characteristics most similar to the Banded Iron Formation. The bulk density of the stockpiled ore will likely be approximately 2.24 t/m^3. The blasted ore material could be up to 2 m in diameter depending on the equipment used.

A review of other Northern gold mines (primarily Agnico Eagle's Meadowbank Mine) shows similar densities and material size.

5.2 GEOCHEMICAL CHARACTERISTICS

Geochemical characterization studies were initiated to assess the metal leaching/acid rock drainage (ML/ARD) potential of ore and waste rock upon exposure to ambient conditions. The results of geochemical characterization were considered during the development of this plan.

A detailed description of geochemical assessments and ML/ARD potential was presented in the Water and Load Balance Report and the Geochemical Characterization Report (MAD, Appendix E-2 and Appendix E-3). Some of the key findings relating to ore stockpiles include:

- A total of seven humidity cell tests were completed on material identified as ore. Two humidity cell tests developed acidic conditions during the humidity cell tests (HC-20, HC-31). Three additional cells were classified as PAG, and were considered likely to generate acidity after 10 years (HC-30, HC-37, HC-41). The other two humidity tests identified as ore were categorized as uncertain (HC-34, HC-46).
- Water quality predictions suggest that the majority of stockpiled ore will be processed before ML/ARD occurs. As a precaution, ore stockpile runoff will be collected and treated if required prior to discharge. Further details on water management can be found in the Water Management Plan (SD-05).

Results from the geochemical characterization program were used to estimate the chemistry of seepage and runoff that will be directly in contact with the ore stockpile and pad prior to dilution from local runoff in undisturbed areas of the catchments. The estimates were based on a combination of scale-up calculations, geochemical modelling, and extrapolation of monitoring data from geologically similar mine sites in the area. The results were a key input to the water and load balance used to predict discharge and receiving water quality from the site, for use in the in the effects assessment. The water quality estimates are discussed in detail in the in the Water and Load Balance Report and the Geochemical Characterization Report (MAD, Appendix E-2 and Appendix E-3) and summarized in Section 6.1 of this plan.

The associated ML/ARD and water management plans have considered the experience of other similar project in similar climatic conditions (Lupin, Meliadine, and Meadowbank).

5.3 PRODUCTION OVERVIEW

5.3.1 Mine Plan Overview

The mine production schedule for the Project deposits incorporates four mineral deposits at the Goose Property (Umwelt, Llama, Goose Main, and Echo). The mill feed tonnage will be sourced from a series of open pit and underground mines and supplemented from high-, mid-, and low-grade ore stockpiles. Access to underground mines will be established by declines (or potentially shafts) driven outside of the open pit extents to allow flexibility in mine scheduling. Open pit mining will be by traditional truck and shovel methods. Underground mining will use a combination of post-pillar cut and fill, longitudinal open stoping, drift and fill, and other methods as applicable to each deposit and each ore zone. For additional information related to the Mine Plan refer to the Main Application Document.

5.3.1.1 Earthworks for Mine Development

Open pit development will require removing overburden and waste rock material to access ore. During mining, safety berms, roads, and water management structures such as diversion berms or containment ponds will be built and maintained.

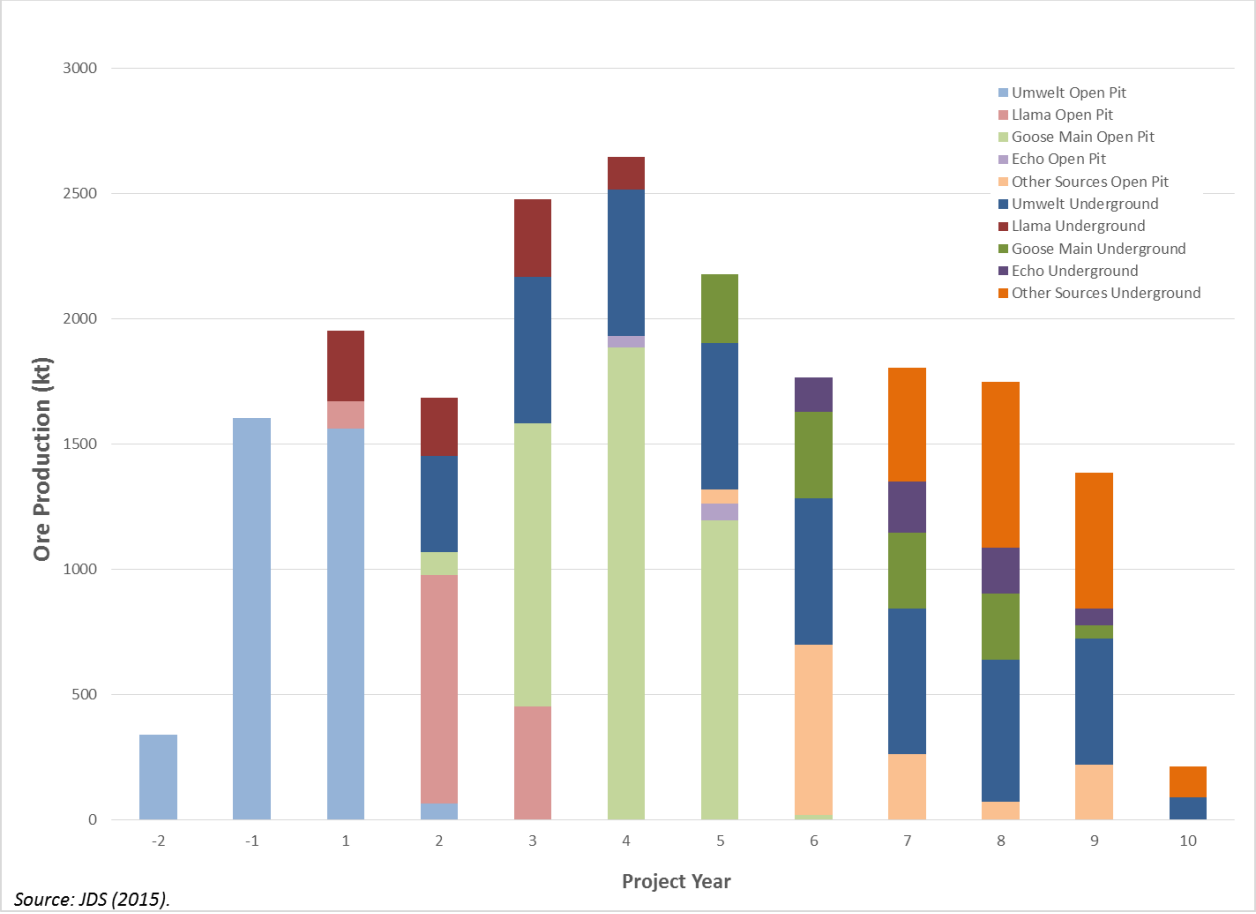
Underground mines will be accessed by decline ramps (or potentially shafts) driven from surface. Earthworks and other minor infrastructure will be built at and around the decline collar including a laydown pad and any water management structures required. In preparation for Closure, open pit boulder fences and pit outflow structures will be constructed and underground access through the portal will be blocked with non-potentially acid generating (NPAG) waste rock. Air raises will either be closed with waste rock plugs or concrete caps as appropriate.

5.3.2 Ore Production Schedule

An ore production schedule is provided in Figure 5.3-1 and summarized in Table 5.3-1. The schedule includes low-, mid-, and high-grade ore.

There will be one main ore stockpile area at the Goose Property located to the northwest of the Process Plant and temporary stockpiles on the laydown areas near underground portals (MAD Appendix A, base Figure 3). The main stockpile area will contain three stockpiles: low-, mid-, and high-grade ore. All ore will be fed from these stockpiles to the crushing circuit. Crushed ore will be fed by conveyor onto the covered, fine ore stockpile, before being fed into the mill.

Figure 5.3-1. Ore Production Schedule



Source: JDS (2015).

Other Sources are not 43-101 compliant reserves.

Table 5.3-1. Ore Production Schedule (kt)

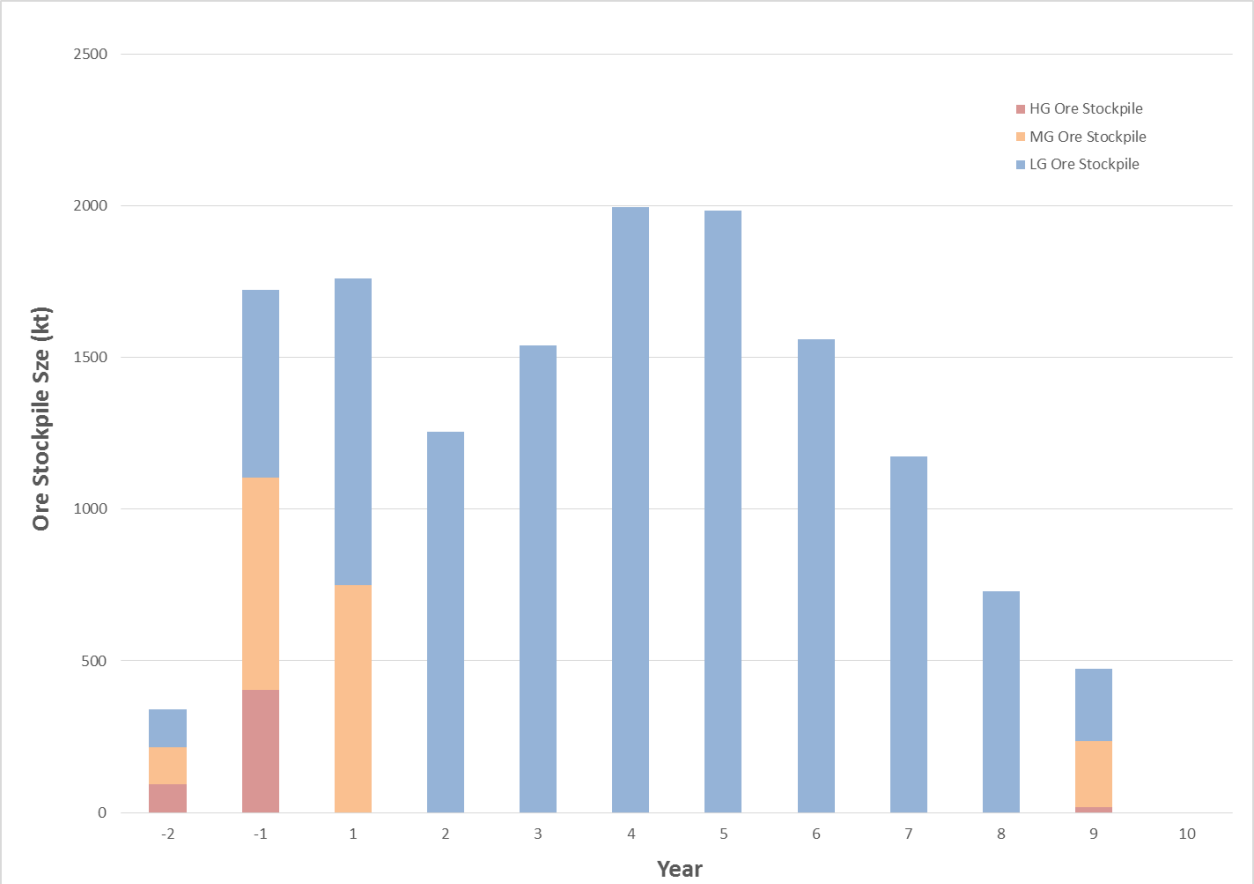
	Year											
Production Area	**-2**	**-1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Umwelt Open Pit	340	1603	1561	67								
Llama Open Pit			110	910	453							
Goose Main Open Pit				90	1130	1885	1195	20.9				
Echo Open Pit						45	67					
Other Sources Open Pit							57	677.5	261	73	220	
Umwelt Underground				386	584	584	584	584	584	565	502	92
Llama Underground			282	231	310	130						
Goose Main Underground							276	346	302	264	55	
Echo Underground								137	204	185	66	
Other Sources Underground									453	659	542	121
Total OP/UG (kt)	**340**	**1603**	**1953**	**1684**	**2476**	**2644**	**2179**	**1765**	**1804**	**1746**	**1386**	**212**

Other Sources are not 43-101 compliant reserves.
Source: JDS (2015).

Open pit mining at the Goose Property will begin with Umwelt pit in Year -2 to provide waste rock for construction and enable the stockpiling of high-grade ore prior to the start of processing. Open pit mining will then transition sequentially to the Llama, Goose Main and Echo pits. Open pit mining will be completed by Year 6 at Goose Property. Underground ore production will begin in Year 1 with the Llama mine and then transition to the Umwelt, Goose Main, and Echo mines. Underground mining at Umwelt will begin in Year 2 and will continue until Year 10. In addition to the ore identified from the Goose Deposits, it is assumed that the Goose Process Plant will be fed ore from other sources (which could include additional ore added to the mine plan by extending the Goose deposits, and or through the addition of other deposits). Other Sources are not currently 43-101 compliant reserves.

Run of Mine (ROM) stockpiles are used throughout the project life to optimize life-of-mine economics and mill feed. The size of the ore stockpiles over the mine life is shown on Figure 5.3-2 and in Table 5.3-2.

Figure 5.3-2. Ore Stockpile Sizes



Source: JDS (2015).

Table 5.3-2. Ore Stockpile Sizes over the Life of Mine

	Ore Stockpile Size (kt)			
Year	**High-grade**	**Mid-grade**	**Low-grade**	**Total in Goose Stockpile**
-2	93	123	124	**340**
-1	**404**	700	620	**1724**
1	0	**749**	1012	**1761**
2	0	0	1255	**1255**
3	0	0	1541	**1541**
4	0	0	**1995**	**1995**
5	0	0	1984	**1984**
6	0	0	1559	**1559**
7	0	0	1173	**1173**
8	0	0	730	**730**
9	18	219	236	**473**
10	0	0	0	**0**

Source: JDS (2015).

The size of the high-grade ore stockpile next to the Process Plant will peak at approximately 404 kt in the year before production (i.e., Year -1). The size of the mid-grade stockpile will peak in Year 1 at 749 kt. The size of the low-grade ore stockpile will steadily increase in size from Year -2 and peak at approximately 2,000 kt in Years 4 and 5. From Year 5 onward, the low-grade ore is processed to supplement mine production until the stockpiles are consumed.

5.4 GOOSE PROPERTY ORE STOCKPILE METHODS AND PROCEDURES

The current mine production schedule has 19,793 kt of ore being produced from open pit and underground mines. Ore generated from mining activities will be end-dumped in surficial stockpiles and deposited in a similar manner as the waste rock or direct dumped into the plant's crushing circuit. The current total ROM ore stockpile storage design basis is approximately 3,500 kt. The size of the stockpile will be adjusted in accordance with the mine plan throughout the life of mine. The stockpiled material will be segregated by grade into three sub-stockpiles all on the same Ore Stockpile Pad. The size of the high-, mid-, and low-grade sub-stockpiles will vary throughout the mine life as shown in Table 5.3-2.

The acid generation potential of the ore is not expected to adversely impact surface water and soil quality as the temporary or stockpiles will be consumed during processing. In the unlikely event that ore stockpiles are present at closure, the ore will be relocated to Waste Rock Storage Areas (WRSAs) or left in place; in either instance the remaining ore would be capped with NPAG waste rock.

Experience from similar northern operations (i.e., Meadowbank) were considered in the ore grade handling aspects of the Project. The ore at the Goose Property will be stockpiled with maximum side slopes of 2H:1V. Preliminary stockpile design parameters are provided in Section 5.6 of this plan. Final design details (stockpile design, foundation requirements, detailed design of runoff management, etc.) will be provided in a future update of the plan following detailed engineering. Final plans will be provided at least (60) days prior to construction.

The stockpiled ROM ore will eventually be loaded into the hopper of the primary crusher. Crushed ore will be fed by conveyor onto the enclosed fine ore stockpile to be temporarily stored before being fed into the mill for processing.

The development of deposits at the George Property is not being proposed in the Water Licence.

5.5 ORE MANAGEMENT ALTERNATIVES

The proposed layout for surface stockpiles located on a centralized pad near the plant site was selected based on proximity to facilities (i.e., high-, mid-, and low-grade stockpiles will be located near the plant site), operational simplicity, and economic considerations.

Additional alternatives for ore storage considered include:

- Multiple stockpiles near WRSA(s) or open pits: This alternative could optimize haul distances from the deposit to the stockpile but would require a larger number of stockpiles, and increase operational complexity, overall footprint, and cost of ore management. Also, as the material eventually will be fed to the mill, this would not reduce total haul distance.
- Stockpiling underground: insufficient space and material handling costs make the alternative to store significant quantities of ore underground impractical and uneconomic.
- Covered stockpiles (e.g., a dome or silo): the volume of ROM ore to be stored in stockpiles make these options impractical and uneconomic.
- Avoiding stockpiles by directly feeding material to the mill as it is mined: this alternative would negatively impact the Project's economics by not being able to optimally feed high-grade ore and would not have a clear environmental benefit.

The size of each stockpile was optimized against the design mine plan for quantities and grade of ore produced. However, the mine plan or cut-off grades associated with each stockpile may change. As a result, the size and active life of stockpiles, may be change for economic, technical, or operational reasons.

5.6 STOCKPILE DESIGN

At least sixty (60) days prior to construction detailed design drawings and construction methods and procedures will be provided. Preliminary design criteria and assumptions are provided in the subsections below.

5.6.1 Geotechnical Assessment

The ground condition for design and engineering of Goose Property infrastructure including ore stockpiles has been informed by four geotechnical investigations from 2010 to 2015 including test pits, drill holes, thermistor installations and a variety laboratory and in-situ testing. Geotechnical design is also supported by Rescan ERM's 2014 Cumulative Permafrost Baseline Data Report from 2007 to 2014 which includes observations on active layer freeze-thaw cycle and active layer depth. SRK's 2015 geotechnical program included one drillhole in the Goose Ore Stockpile Pad footprint (SRK-15-GSE-DH27) and one drillhole in the Ore Stockpile Pond Containment Dam foundation (SRK-15-GSE-DH38).

The Goose and Marine Laydown Area properties are located in low seismicity zones. Seismic parameters were calculated for both properties using the National Building Code of Canada website (NRCC 2017) which provides ground accelerations and probability of occurrence. The PGA of 0.036 g is used for surface infrastructure foundation design.

Infrastructure foundation preparation recommendations produced by SRK (MAD, Appendix F-2) as a result of geotechnical investigations and thermal modelling for the Goose Property for unheated infrastructure such as ore stockpiles, where some differential settlement is acceptable, include:

- 1.0 m compacted run-of-quarry rock-fill pad (or geochemically suitable waste rock) on top of undisturbed grade.
  - Maximum rock size limited to 0.9 m.
- 150 mm of 2" minus topping directly on top of rock-fill pad for trafficability (no need for intermediate 6" minus layer).

More detail on the geotechnical and geothermal investigations and results are presented in SRK's Site-Wide Geotechnical Properties Report (MAD, Appendix F-2).

Key design features of the ore stockpiles and Ore Stockpile Pad are provided in Table 5.6-1.

Table 5.6-1. Key Ore Stockpile Design Parameters

Parameter	Ore Stockpile Pad	Goose Plant Stockpile
Pad thickness/ maximum stockpile height (m)	1	100
Approximate thickness of lifts (m)	-	10
Assumed side slopes for ore and pad	1.3H:1V	1.3H:1V (2:1 max.)
Design footprint (m^2)	135,000	135,000
Volume (m^3)	92,000	1,563,000
Mass (tonnes)	200,000	3,500,000

5.7 ORE STOCKPILE WATER MANAGEMENT INFRASTRUCTURE

The water management objectives for the Project are to minimize potential impacts to the quantity and quality of surface water at the site. This is further detailed in the Water Management Plan (SD-05).

Seepage and runoff from the ore stockpile may contain elevated levels of some parameters; as such, all ore stockpile seepage and runoff will be collected in perimeter berms and directed to a collection pond. These berms are strategically located to take advantage of location topography to limit water ponding. The collection ponds constructed for the ore stockpile will apply appropriate design criteria in terms of managing extreme flows. During Operations, runoff from the ore stockpiles at the Goose Property will be pumped to the Tailings Storage Facility or active Tailings Facility and treated prior to discharge. Refer to the Water Management Plan (SD-05) for details on berm and pond design criteria, water quality predictions, and typical water management berm and dam design drawings. Additional design drawings will be provided at least sixty (60) days prior to construction of ore runoff collection facilities.

Since the ore storage stockpiles are temporary and the life of the mine is relatively short, the identification of measures to protect the ore storage infrastructure from the effects of climate change was not deemed necessary. In the unlikely event that ore stockpiles are present at closure, the ore will be relocated to WRSAs or left in place; in either instance the remaining ore would be capped with NPAG waste rock.

6. Environmental Protection Measures

6.1 RUNOFF MANAGEMENT

The ore stockpile will be built up in Year -2 and Year -1 from mining of Umwelt Open Pit, before the Goose Process Plant is operating. Runoff from the stockpile will be considered contact water. Runoff and seepage will be directed towards the Ore Stockpile Pond via the Ore Stockpile Pond Diversion berm. This pond will be surrounded by a containment dam. Water from the Ore Stockpile Pond will be pumped to the Primary Pond, which will ultimately be pumped to the Llama Reservoir during the Construction Phase. During Operations (Phase 2), runoff water from the Ore Stockpile Pond will be pumped to the active tailings management facility and managed as appropriate. The estimated water quality of ore stockpile runoff is accounted for in the water and load balance; refer to the Water Management Plan (SD-05) for water quality details.

Milling of all remaining stockpiled material will be completed by Year 10. The Ore Stockpile Pond Contact Water Diversion will be breached at the beginning of the Closure Phase so that the pond flows towards Umwelt Tailings Facility. No remaining seepage or runoff from the area is expected. Five years of post-closure water quality monitoring will be conducted in the area to ensure runoff meets water quality objectives.

6.2 DUST CONTROL

Dust generated from the ROM ore stockpiles during ore handling or from wind erosion is not expected to be meaningful given the large size of the ore coming from the pit. The central location of the Ore Stockpile Pad has been chosen to minimize haul distances, which reduces dust produced by vehicle traffic. Crushing and screening operations will be conducted in enclosed units to minimize dispersion of ore dust. The fine ore stockpile will be enclosed. Dust will be monitored at the site as described in Section 7.2.2.

In the unlikely event that an unacceptable amount of dust is generated from end-dumping or front-loading during stockpiling and transferring operations, additional dust mitigation measures will be applied, such as applying water or approved dust suppressants on haul roads and stockpiles.

7. Monitoring Program

This section presents a summary of the monitoring programs that will be carried out during Construction and Operations phases related to ore storage management. After Closure, no ore stockpiles will remain. Refer to the Interim Closure and Reclamation Plan (SD-26) for details on monitoring during the Closure Phase of the Project. Five years of post-closure water quality monitoring will be conducted in the area to ensure runoff meets water quality objectives.

Routine ore stockpile inspections will be conducted at regular intervals by the Environmental Superintendent or designate during Construction and Operations related to ore storage management. There are two types of monitoring related to mine waste management: 1) monitoring that is carried out for operational and management purposes by Sabina for day-to-day decision making, with no obligation to report; and 2) monitoring that is specified in the Type A Water Licence. These inspections are outlined in Table 7-1.

Each monitoring activity will be further defined, prior to the development of ore stockpiles and will be completed according to the approved environmental protocols. Details on other water monitoring related to ore stockpile are included in the Environmental Monitoring and Protection Plan (SD-20).

Table 7-1. Ore Stockpile Monitoring during Construction and Operations

Proposed Monitoring	Monitoring Component	Monitoring Frequency	Reporting
Internal Monitoring	Quantities of ore processed	Daily	Monitoring data will be used by Sabina internally.
	Survey of ore stockpiles	Monthly or as needed for operational planning	
	Inspection of ore stockpiles	Weekly to monthly depending on frequency of stockpile use	
Water Licence Monitoring	Quantities of ore produced	Daily	Monitoring data will be at least annually and/or as otherwise requested by regulatory authority.
	Air quality related to ore management	Dustfall and particulate monitoring of sites of heaviest activity as described in the Air Quality Monitoring Management Plan	
	Geotechnical and structural monitoring	Annually	
	Inspection of runoff and seepage water quality monitoring	Weekly to monthly during ice free season and additional inspection after extreme event and during dewatering activities as described in the Water Management Plan.	

In the event of temporary Closure, ore stockpiles will be maintained such that they are physically stable and will be routinely inspected to ensure their stability or to implement any required mitigation measures.

Air and water quality monitoring and reporting will be conducted as described in the Air Quality Monitoring and Management Plan (FEIS Volume 10, Chapter 17) and Water Management Plan (SD-05), respectively. Summaries of each monitoring component are presented in sections below.

7.1 INTERNAL MONITORING

Data gathered during internal monitoring activities will be recorded, maintained, and used by Sabina internally and will be made available to regulators upon request. It will not be routinely included in annual water licence reporting.

Record keeping will be conducted by the Environmental Superintendent or designate. Field and laboratory data will be entered into suitable electronic databases.

Environmental reporting will be conducted as identified in future permits, approvals, and authorizations relevant to ore storage and management.

7.1.1 Quantities of Ore Processed

Ore will be hauled from underground and open pit mines by truck and either directly fed into the crushing circuit or deposited onto one of the three stockpiles near the Goose Process Plant before being reclaimed and fed into the crushing circuit. A conveyor belt scale will be used to continuously measure the quantity of ore being fed into the Process Plant. The tonnages of ore processed will be measured, recorded, and reported at least annually and/or as otherwise requested by the licence.

7.1.2 Annual Survey of Stockpiles

Surveys of stockpiles are used to estimate the current stockpile volume. This information is used to reconcile data from other sources and is used to guide the operation plan. The quantity of ore contained in each stockpile will be measured and recorded monthly or as needed for operational planning and reported annually.

7.1.3 Inspection of Ore Stockpiles

The following activities comprise the program for inspecting ore stockpiles:

- Monitoring stockpile construction and operation visually to ensure compliance with permits, authorizations, and commitments of monitoring plans;
- Evaluating the effectiveness of runoff collection measures;
- Surveying the extents of stockpiles to ensure the piles are within the areas set out in the permits and authorizations; and
- Photographing the site conditions and observations as necessary.

7.2 WATER LICENCE MONITORING

Data gathered during Water Licence monitoring of the ore stockpiles will be collected, recorded, maintained, and reported annually in the Annual Report to regulators.

The Quality Assurance/Quality Control for the ore monitoring program will include the preparation of a Standard Operating Procedure (SOP) for each of the activities within the program (i.e., stockpiling and transporting of ore, etc.) and auditing operations against this plan and any relevant SOPs. See the Quality Assurance/Quality Control Plan (SD-24) for more information.

7.2.1 Quantities of Ore Produced

Ore will be hauled from underground and open pit mines by truck and either directly fed into the crushing circuit or deposited onto one of the three stockpiles near the Goose Process Plant according to the

material's gold grade. Ore from underground mines may be hauled to surface and stored in temporary ore stockpiles on the underground mine portal's laydown pad before being trucked to the main stockpile(s). The number of truckloads and tonnages of ore hauled and stockpiled will be measured, recorded, and reported.

7.2.2 Air Quality Related to Ore Management

Dust and particulate matter from mobile equipment transporting ore to and from stockpiles, and rehandling ore from stockpiles are the primary air quality concerns related to ore stockpile management. Wind erosion from stockpiles can also generate particulate emissions.

Upon Project approval, dust fall monitoring will be carried out during the Construction and Operations of the Project. At the Goose Property, the monitoring will be sited to ensure that all large sources of emissions including ore stockpiles and haul roads are monitored approximately 30 m, 100 m, 1 km, 3 km, and 5 km downwind of the location with the most activity.

Monitoring of total suspended particulate, PM_{10}, and $PM_{2.5}$ concentrations will be carried out according to the National Air Pollution Surveillance (Environment Canada 2011) schedule by drawing a known quantity of air through a pre-weighed filter using a BGI PQ100-FRM Sampler following a standard monitoring cycle where a single 24-hour sample is collected every six days. Specific station locations will be sited approximately 100 m downwind of the location with the most activity.

7.2.3 Geotechnical and Structural Monitoring

To identify, document, and mitigate risks of any hazards, such as signs of localized failure and slumping, regular visual inspection of ore stockpiles will occur. The frequency of these inspections will vary with the activity level. Weekly inspection will occur during construction of the stockpile pad, and during Operations when stockpiles are being built up or drawn from. Monthly inspections will occur when activity is reduced.

7.2.4 Inspection of Runoff and Seepage

The following activities comprise the program for inspecting runoff and seepage:

- Regular visual monitoring of ore stockpile diversion berm and containment dam water management facilities;
- Monitoring of runoff from the ore stockpile pond for evaluation of water quality;
- Monitoring of water quantity and quality will occur during all dewatering activities;
- Volume of water transferred will be measured on a continuous basis using appropriate flow meters;
- Verification monitoring of drainage water from the ore stockpile will be conducted from the stockpile construction until it is decommissioned during Closure; and
- Water samples will be taken from the Ore Stockpile Pond monthly during the open-water period.

More detail can be found in the Water Management Plan (SD-05) and Aquatic Effects Management Plan (SD-21).

Table 7.2-1. Site Runoff Discharge Criteria

Parameter	Maximum Average Concentration (mg/L) [1]	Grab Sample Maximum Concentration (mg/L) [1]
Total suspended solids (Construction)	50	100[1]
Oil and Grease	No visible sheen	No visible sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Notes:
[1] Source: Standard NWB Licence requirement.

8. Adaptive Management

The Plan may be updated if monitoring under the Air Quality Monitoring and Management Plan (FEIS Volume 10, Chapter 17) and Water Management Plan (SD-05) identify the need for corrective action.

The Environmental Superintendent or designate will conduct regular evaluations of the monitoring activities. This plan may be updated if additional methods for monitoring are found to be more appropriate.

The Environmental Superintendent or designate will conduct regular checks of the monitoring activities and any trends in the data collected. Corrective action will be taken if ore storage is not being conducted in accordance with this plan or any SOPs developed for ore management.

The Plan may be updated again prior to Construction if instructed to do so by the NWB during the licensing process. 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 to the OSMP will be filed with the Annual Report submitted under the Type A Water Licence.

All employees will be informed of relevant updates and the updated OSMP will be located in a designated area at each site.

Sabina will retain all raw data records and annual reporting for at least two years in digital format. The updated OSMP, raw data, and annual reporting will be made available by Sabina at all times for review by the lands and waters inspectors, the NWB, and Environment and Climate Change Canada.

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, Aboriginal 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. Some changes may come about through the observation of unanticipated effects or inadequacies in the sampling methods to detect measurable effects. Other changes may result from ecological knowledge acquired through working with Aboriginal community members and discussions with Elders, both in the field and through workshops.

Sabina is committed to considering and incorporating Traditional Knowledge into the Plan. The incorporation of Traditional Knowledge will occur throughout all stages of the Plan, including identification of mitigation measures, monitoring study design, data collection, and follow-up programs to obtain feedback.

9. Reclamation

At the end of Operations, all ore stockpiles will be processed at the Process Plant. Final closure of the ore storage sites will be undertaken once they are no longer needed, or when the mine closes as part of mine closure activities. Final closure of the ore storage areas will consist of breaching the associated contact water management berms and scarifying the NPAG foundation pad. Five years of post-closure water quality monitoring will be conducted in the area to ensure runoff meets applicable water quality objectives.

In the unlikely event that ore stockpiles are present at Closure, the ore will be left in place or relocated to WRSAs; in both cases, the material would be capped with a 5-m NPAG waste rock cover.

Refer to the Interim Closure and Reclamation Plan (SD-26) for additional details pertaining to reclamation and closure, as well as temporary closure.

10. References

1985. *Fisheries Act*, RSC. C. F-14.

1988. *Environmental Protection Act*, C. E-7.

1992. *Northwest Territories Waters Act*, SC. C. 39.

1993. *Nunavut Land Claims Agreement Act*, SC. C. 29.

2002. *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, SC. C. 10.

Metal Mining Effluent Regulations, SOR/2002-222.

Northwest Territories Waters Regulations, SOR/93/303.

Environment Canada. 2011. Analysis and Air Quality Section: National Air Pollution Surveillance Program (NAPS). http://www.ec.gc.ca/rnspa-naps/

JDS Energy & Mining Inc. 2015. *Sabina Back River Project, Technical Report and Feasibility Study for the Back River Gold Property, Nunavut*. Prepared for Sabina Gold & Silver Corp.

NRCC 2017. National Research Council Canada. National Codes and Guides. https://www.nrc-cnrc.gc.ca/eng/solutions/advisory/codes_centre/features.html#online

Nunavut Impact Review Board (NIRB). 2013. Guidelines for the Preparation of an Environmental Impact Statement for Sabina Gold & Silver Corp.'s Back River Project. NIRB File No. 12MN036).

NWB (Nunavut Water Board). 2010a. Mining and Milling Supplemental Information Guideline (SIG) for Mine Development (MM3). February 2010.

NWB. 2010b. Miscellaneous Supplemental Information Guideline (SIG) for General Water Works (including crossings, flood control, diversions, and flow alterations) (M1). February 2010.