



BACK RIVER PROJECT
Interim Closure and Reclamation Plan

March 2021

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Revision Log

Date	Section	Page	General Description
November 2015	All	n/a	Conceptual Mine Closure and Reclamation Plan. Supporting Document for the Final Environmental Impact Statement; submitted to the Nunavut Impact Review Board (NIRB).
August 2017	All	n/a	Draft Interim Closure and Reclamation Plan. Supporting Document for Type A Water Licence Application; submitted to Nunavut Water Board (NWB).
October 2017	All	n/a	Updated Version through KIA and CIRNAC Closure Discussions; submitted to the NWB.
November 2017	All	n/a	Updated Version to include minor edits as requested by the KIA and CIRNAC during Closure Discussions; submitted to the NWB.
November 2020	All	n/a	Revision post-issuance of Project Certificate No. 007 and Water Licence 2AM-BRP1831 to address requirements of each and related commitments as well as to reflect the Project changes outlined in Sabina's 2020 Modification Package.
January 2021	1.7	1-9 to 1-13	Updated to include additional closure information associated with approved Type A Water Licence mining areas and infrastructure not currently in the 2020 Modification Package.

Plain Language Summary

This Interim Closure and Reclamation Plan (ICRP or Plan) outlines the activities and monitoring required for the temporary closure or permanent closure and reclamation of the Back River Project (Project). For the purposes of this Plan, Closure includes an Active and Passive Closure Stage, during which reclamation and remediation actions are undertaken, followed by a Post-Closure Phase during which confirmatory testing is conducted to ensure closure activities have been effective. This Plan also outlines the progressive reclamation procedures to be undertaken when use of a particular portion of the Project has ceased.

This Plan has been constructed with sufficient detail to allow its immediate implementation if needed. However, this is an interim plan being submitted in the very early stages of Project development, prior to the initiation of mining or the construction of the majority of planned Project infrastructure. It is anticipated that this Plan will be developed and updated further as the Project moves through Construction and Operations. A Final Closure and Reclamation Plan will be submitted at least 12 months prior to the end of mining.

A Cost Estimate for the permanent closure of the fully constructed Project has been developed and is included in this Plan. This Cost Estimate is directly based on the closure and reclamation procedures outlined in this Plan as well as the associated monitoring. This Cost Estimate forms the basis for the security which must be set aside for the Project to ensure appropriate closure will take place regardless of the reasons for the closure.

The ICRP and associated Cost Estimate are based on the previously approved versions submitted to the Nunavut Water Board (NWB) in 2017. Revisions have been made to reflect the Project Modification Package by Sabina in their submission to the Nunavut Impact Review Board (Sabina 2020a) and the NWB (Sabina 2020b) as well as to address closure, reclamation, and cost estimate-specific requirements of Project Certificate, No. 007 and Water Licence, 2AM-BRP1831.

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Kangirhinnaqtumik Titiraqhimayuq Naittuq

Una Umighimallaktunut Pitquhianullu Utiqtittinahuat Parnaiyautait (ICRP taamnaluuniit Parnaiyautit) ilittuqhitivaktuq havaaghanik munaqtighaniklu ihariagiyaayut umighimallaktillugu umiktauniarumiluuniit taimaalu pitquhianut utiqtittiyaamik talvani Hanningayumi Havakvingnit (Havaaghaq). Hapkununga Parnaiyautinut, Umiktittiyunut ilauyut taapkua Atuqtauayut Pitquhiqtuqtittiyullu Umiktittiyut Havaaghait, talvuuna pitquhianut utiqtittinahuat ihuaqhailutiklu havaghutik, kinguanilu Umiktautaaqtut-Havaaghait iniqtauuyughat qauyihaivaktut umiktauqpiariaghainik ihuaqtumiklu. Una Parnaiyautik ilittuqhitivaktuq iniqtauhimmaaqtunik utiqtittiyunik pitquhirnut havaanginnik taapkua havakvigaluangit Havakvingnit atuqtauhuiraangat.

Una Parnaiyautik iniqtauhimayuq naammaktunik naunaitkutaqaqtumik taimaa atuqtauyaamik ihariagiyaupkat. Kihimi, una parnaiyautikaffuk tuniyaayug hanalihaaqhutik Havakvingnit hanavalliauyut, aullaqtiqtinnagit uyaraghiuqtut hanatinnatiklu parnaiyaqtauhimayunik ikluqpaghanik Havakvingnit. Naahuriyaayug taimaa una Parnaiyautik hanayauniaqtuq nutaannguqtiqtauluni Havaaghaq ingilravalliapat Hanayaghanut Aulapkaiyunullu. Kingulliqaat Umiktittiyut Pitquhirnullu Utiqtittiyut Parnaiyautait tuniyauniaqtut 12-nik tatqiqhiutaugalanik umiktinnagu uyaraghiuqvik.

Akighait Nalauttaaqtat umiktitauniarumik hanayauhimayut Havakvik iniqtauhimayuq iliqahiutiyaupluni hapkununga Parnaiyautinut. Akighait Nalauttaaqtat ihumaliuqhimayut umighimaniagut pitquhianullu utiqtittiyut havaaghait titiraqhimayut Parnaiyautinit taapkualu munaqtiuyullu ilagiyait. Akighiat Nalauttaaqtat tunngaviuvaktuq qutanngnaitjutinut hanimuktaghauyut Havaaghanut taimaa ihuaqtumik umiktittiyaamik huukiaq umiktauhimayaamikluuniit.

Taamna ICRP taamnalu Akighait Nalauttaaqtat ihumaliuqtauayut hivulliqnit angiqtauhimayunit titiraangit tuniyauhimayut talvunga Nunavut Imaligiyyit Katimayit (NWB) 2017-mi. Titiratqiktauhimayut ilittuqhitiyaamik Havaaghaum Ihuaqhaitjutighait Sabina-kunnit tughirautainit talvunga Nunavumi Avatilikiyyin Katimayin (Sabina 2020a) talvungalu NWB (Sabina 2020b) taimaalu ilittuqhitiyaamik umiktittiyut, pitquhianut utiqtittiyut, akighainiklu nalauttaaqtanut-ihariagiyaat Havaaghanut Iilitaritjutinit, #007 Imaqnullu Laisiutaat 2AM-BRP1831.

1. Introduction

1.1 PURPOSE AND SCOPE OF THE CLOSURE AND RECLAMATION PLAN

The purpose and scope of this Interim Closure and Reclamation Plan (ICRP or Plan) is to outline the actions Sabina will take to close and remediate and reclaim the Back River Project (Project) (Appendix A, Figure A-01). This includes information on closure activities in the event of temporary closure (i.e., care and maintenance), approach to progressive reclamation, as well as full decommissioning and rehabilitation actions for permanent closure. This Plan also describes the monitoring that will be undertaken to confirm closure and reclamation success during Closure and Post-Closure Phases and includes an estimate of the costs associated with implementation of the permanent closure activities described in this Plan.

This Plan was developed to address and align with applicable regulatory guidance and requirements, including those of Water Licence 2AM-BRP1831 (the Licence) and Project Certificate No. 007. Once approved by the Nunavut Water Board (NWB), this Plan will supersede Sabina's 2017 Interim Closure and Reclamation Plan (2AM-BRP1831 Part B, Item 14g). This update of the ICRP addresses closure-, post-closure-, reclamation-, and cost estimate-specific requirements of Project Certificate No. 007 and the Licence, both of which have been issued since the last update to this Plan in 2017. This ICRP has been based on the current mine design as outlined in Sabina's 2020 Modification Package submitted to the Nunavut Impact Review Board (NIRB) (Sabina 2020a) and the Nunavut Water Board (NWB) (Sabina 2020b). Note that some of the changes outlined in the 2020 Modification Package require specific amendments to the Licence. These changes and additions have been highlighted in the 2020 Modification Package to the NWB and are assumed to have been adopted in the amended Licence for the purposes of development of this Plan.

This Plan has been constructed with sufficient detail to allow its immediate implementation if needed. However, this is an interim plan which is being submitted at the very early stages of Project Development and prior to the initiation of mining or the construction of the majority of planned Project infrastructure. It is anticipated that the concepts in this Plan will be developed and updated further as the Project moves through Construction and Operations. A revised version of the ICRP will be submitted at minimum 12 months after the commencement of Operations and a Final Closure and Reclamation Plan will be submitted at least 12 months prior to the end of mining (per Part J, Item 1 of the Licence).

For the purposes of this Plan, Closure is sub-divided into two phases: the Closure Phase (including Active Closure and Passive Closure stages) and the Post-Closure Phase. Active Closure refers to the stage during which the demolition, earth-moving, and waste disposal is undertaken. Passive Closure refers to the stage during which monitoring is the primary activity along with final closure activities. The Post-Closure Phase is primarily a monitoring phase during which closure success is monitored to ensure the site is stable.

Although this Plan focuses on closure and reclamation-specific activities, mine closure planning is an iterative process that starts during Project conception and continues until mine closure is complete following the end of mine life. During the conceptual development of this Project, extensive consideration was given to minimizing Project impacts and to facilitating an efficient, effective and stable closure. These considerations are documented in Sabina's FEIS (Sabina 2015b) as well as in Sabina's Project Modification Package (Sabina 2020b). These documents also provided comprehensive descriptions of the pre-existing environmental conditions in the Project area. This baseline information informs the development of appropriate closure approaches and objectives for the Project. During Project

construction and operation a suite of management and monitoring programs is also implemented to ensure facilities are managed, and activities are conducted, in a manner that continues to minimize impacts and aligns with the closure principles outlined in this Plan.

1.2 CLOSURE GOALS

The overall goal of closure is to return the mine site and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities. This overall closure goal is supported by the achievement of four closure principles: physical stability, chemical stability, no long-term active care requirements, and compatibility with future land uses for each component of the Project (MVLWB/AANDC 2013).

Specific closure objectives and criteria for each Project component are provided in Section 0.

1.2.1 Closure Objectives and Criteria

The overall Project closure goal has been broken down into 8 general closure objectives and criteria which are described below.

Objective 1: Design the Mine for Closure

This involves identifying the processes and forces that may act upon the mine components after mine closure and reclamation so that they can be factored into the design and operation of the mine. This includes adoption of the objectives outlined by MVLWB/AANDC (2013) as follows:

- o Design and construct mine components in such a way that they achieve, or can readily be modified to achieve, the reclamation objectives and closure criteria.
- o Determine mine reclamation costs as part of the closure planning and provide adequate security to cover the cost of reclamation over the life of the mine to ensure the closure criteria can be met.
- o Include reclamation planning in the development and operation of the mine. This planning will ensure that mine operating activities do not unnecessarily increase the amount of reclamation work or effectively compromise what might otherwise be promising reclamation activities.
- o Incorporate progressive reclamation activities into operation of the mine.
- o Coordinate among Aboriginal, Federal, and Territorial governments; landowners; local communities; regulatory authorities; Sabina; and other impacted parties to ensure that appropriate objectives, closure criteria, and activities are developed.

Objective 2: Achieve Physical Stability

Mine components that will remain after mine closure will be constructed or modified at closure to be physically stable so as to not erode, subside, or move from its intended location under natural extreme events or disruptive forces to which it may be subjected after closure. The objective of physical stability is to not pose a hazard to humans, wildlife, or environment health and safety.

Achieving physical stability entails the removal of any culverts and restoration, as practicable, of the drainage to match the natural channel and implementation of erosion and sedimentation measures where required. Physical stability also includes establishing the conditions post-closure that allow for natural revegetation so that the land returns to productive use by wildlife. This includes the re-grading, if practicable, roads and airstrips to match natural contours to reduce erosion and contouring and

stabilizing disturbed areas to the extent practical. Active revegetation of the Property as part of closure is not planned given the cold climate setting of the Project as well as the precedent established for mine closure in Nunavut. Additional research in this field may be considered in future.

Objective 3: Achieve Chemical Stability

Mine components including wastes remaining after mine closure will be chemically stable. Chemical constituents released from the mine components should not endanger public, wildlife, or impact environmental health and safety. These constituents should not result in the inability to achieve the water quality objectives in the receiving environment and should not adversely affect long-term soil or air quality. If necessary, appropriate long-term management of potentially acid generating/metal leaching materials and any affected waters will be considered. Areas that have been contaminated by hydrocarbons from normal fuel transfer procedures will be reclaimed to meet objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation (2010).

Objective 4: No Long-Term Active Care

All practical efforts will be made to ensure that Project components that remain after Closure will not require long-term active care. Any Post-Closure monitoring will only continue for a defined period of time. Adherence to objective 1, which proposes designing the mine for Closure, and Objectives 2 and 3 for physical and chemical stability, will help ensure the achievement of this principle.

Objective 5: Consider Future Use and Aesthetics

The site will be compatible with the surrounding lands once reclamation activities have been completed. Consideration of future use and aesthetics involves the following elements:

- o Naturally occurring biophysical conditions, including any physical hazards of the area (pre- and post-development);
- o Characteristics of the surrounding landscape pre- and post-development;
- o Level of ecological productivity and diversity prior to mine development and intended level of ecological productivity and diversity for Post-Closure;
- o Local community values and culturally significant or unique attributes of the land; and
- o Level and scale of environmental impact.

Objective 6: Inclusion of Community Values

An important aspect of northern mine closure is the incorporation of community perspectives on closure. This is a stated requirement of the Northwest Territories Mine Closure and Reclamation Guideline (MVLWB/AANDC 2013). It is also a key element of the NIRB environmental review and the NWB water licencing processes.

In the short-term, community perspectives are gathered during the permitting phase through the public environmental review and water licencing processes. In the longer term, communities and workers will become more familiar with the Project through the Construction and Operations phases and will be able to provide input into mine closure through both Sabina's worker and community engagement programs, as well as during formal reviews of future ICRPs submitted as required by the Licence.

Objective 7: Mine Effluent Discharge Limits and Receiving Water Quality Objectives

Applicable thresholds, such as those defined in the Licence as well as the Metal and Diamond Mining Effluent Regulations (MDMER) are applied in this ICRP. This includes discharges to the environment from open pits, Llama TF, and Waste Rock Storage Areas (WRSAs).

In addition, receiving water quality guidelines have been adopted, including Site-Specific Water Quality Objectives (SSWQOs) for select parameters (FEIS Volume 6), or the generic criteria presented in the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-PAL), developed by the Canadian Council of Ministers of the Environment (CCME 1999). Monitoring during Operations and Closure will confirm whether criteria are being met.

1.3 CLOSURE SCHEDULE OF ACTIVITIES

Three deposits, namely Umwelt, Llama, and Goose Main, will be mined by open pit and Umwelt will also include an underground mine. The mining schedule for each deposit is described in Table 1.3-1. Ore will be produced over approximately ten years; the mill will continue to operate from ore stockpiles for the remaining approximately two years of Operations. A total of 12.4 Mt of ore will be processed from open pit and underground developments, at a milling rate of approximately 3,000 to 4,000 tpd.

Table 1.3-1: Summary of Mine Schedule

Mine Operation	Start	End
Open Pit Development		
Umwelt Open Pit	Y-1, Q2	Y2, Q3
Llama Open Pit	Y1, Q3	Y5, Q1
Goose Main Open Pit	Y3, Q4	Y8, Q3
Underground Development		
Umwelt Underground Mine ¹	Y-3, Q1	Y9, Q1

1) From Year -3 to Year -1, the underground development is for portal and ramp development only. Underground production begins in Year 1, Q1.

Mine closure is anticipated to be 13 years and consists of three periods:

- o Active Closure [Phase 3, Stage 1] – Project Year 13 – 14, (i.e., two years after mining operations cease). During this time, Active Closure activities such as demolition, earth-moving, waste disposal, and rerouting of pipelines will occur. Water treatment may also occur during this time, if required.
- o Passive Closure [Phase 3, Stage 2] – Project Year 15 – 20, (i.e., six years following the Active Closure Stage during which seasonal water treatment and monitoring are the primary activities). A final demobilization and demolition of mine facilities will occur at the end of this stage in Year 20. Water treatment may also occur during this time, if required.
- o Post-Closure [Phase 4] – Project Year 21+, (i.e., a period of time during which confirmatory water quality, stability, aquatic effects, and ecosystem monitoring is conducted in order to ensure closure objectives have been met). This period is expected to be five years.

The Closure Phase will occur over approximately eight years. The majority of the mine workings, tailings structures, and water management structures will be decommissioned throughout Closure. The Project will subsequently enter Post-Closure, which will consist of monitoring and adaptive management.

In recognition that the refined mine plan (see Sabina 2020b, Section 3.1.3 for details) is a subset of the previously approved permitted mine plan, Sabina acknowledges that, with the continued advancement in Detailed Engineering and market consideration, the previously approved deposits may be reintegrated into this updated mine plan; namely: Llama Underground, Goose Main Underground, Echo Open Pit, and Echo Underground. Should Sabina choose to include these mining areas in the future mine plan, all applicable management plans, including the ICRP, will be updated to reflect these changes, and Sabina will adhere to all appropriate requirements of the Back River Project Certificate (PC No. 007) and the Type A Water Licence (2AM-BRP1831).

1.4 ENGAGEMENT

Public consultation, government engagement, and traditional knowledge was incorporated during the development of the FEIS, FEIS Addendum, and NWB regulatory review process. Public consultation and engagement are a legal requirement in Nunavut, an industry best practice, and an important corporate commitment. Effective public consultation and engagement helps ensure that community members are informed and knowledgeable about proposed projects, that community support for those projects is more readily obtained, and sustainable development goals are achieved. A key goal of Sabina's public consultation and engagement program has been to ensure the Company obtains a "social licence to operate", by securing the support of a majority of residents from potentially impacted local communities. To obtain this goal, a number of process goals have been followed: 1) identification and prioritization of communities and community stakeholder groups; 2) developing an understanding of key community and stakeholder views regarding the Project; 3) addressing community and stakeholder issues and expectations; and 4) continuous improvement.

Sabina continues to actively consult and engage the public as well as regulatory stakeholders relevant to the Project. Sabina's public consultation and engagement program is multi-faceted. It includes a commitment to cultural sensitivity and inclusiveness, and the use of various community engagement methods and tools. These include public meetings, meetings with key stakeholders and stakeholder groups, meetings with community advisory groups in Cambridge Bay and Kugluktuk, Project site visits, social media (e.g., websites and Twitter/email/RSS feeds), a Project newsletter, other distribution materials, establishment of a Cambridge Bay office, use of local employees and contractors including a Cambridge Bay-based Community Liaison Officer, execution of TK studies in partnership with the Kitikmeot Inuit Association (KIA) and Kugluktuk Hunters' and Trappers' Organization, execution of various socio-economic/environmental studies, the development of an IIBA with the KIA, other forms of community engagement (e.g., radio shows, trade show participation, cross-cultural training, and community advertisements), and community donations. Engagement also occurs through standardized regulatory processes, from project assessment and permitting to renewal, amendment and modification applications and plan and study submissions.

Sabina recognizes that an effective and satisfactory closure of this Project is of particular importance to the local communities and the landowners, represented by the KIA and the Crown. Sabina has and will continue to engage with the KIA, which is the primary Inuit organization with rights and responsibilities in the Project area, as well as the local communities. Kitikmeot Region communities have also been a key focus of Sabina's public consultation and engagement activities. Various levels of consultation and engagement were employed by Sabina depending upon a community's proximity to the Project. The communities that have been the focus of Sabina's public consultation and engagement program include: Cambridge Bay (Ekaluktutiak), Kugluktuk (Coppermine), Kingaok (Bathurst Inlet), Omingmaktok (Bay Chimo), Gjoa Haven (Ursuqtuq), Taloyoak (Spence Bay), and Kugaaruk (Pelly Bay), and Yellowknife as well as number of Northwest Territories Aboriginal organizations have also been engaged for the Project.

Ongoing consultation and engagement are managed through Sabina's Socio-Economic Monitoring Plan and the Back River Socio-Economic Monitoring Committee. Engagements are documented and reported in Sabina's annual report to the NIRB, as well as the KIA. Since June 2012, more than 300 meetings and major correspondences with Project stakeholders have occurred. Input and traditional knowledge gained through these engagements has been incorporated into project design and execution as well as monitoring programs and management plans, including the development of this ICRP. Further details of Sabina's engagement practices are outlined in the Socio-Economic Monitoring Plan and engagement summaries can be found in the annual report for this plan.

1.4.1 Key Consultation Findings

Meeting minutes were taken during many of Sabina's public consultation and engagement activities and have been incorporated into a public consultation database. This database has been analyzed to identify key issues and concerns amongst communities and stakeholders.

Key issues and concerns identified through public consultation can be categorized under three main themes: community benefits and engagement, employment and training, and environmental management and monitoring. They are presented in detail along with Sabina's commitments to addressing key issues in Volume 3 of the FEIS (Sabina 2015b).

Of the key issues and concerns identified in the FEIS, the following pertaining to closure were considered of particular importance during the development of this Plan:

- o Inuit culture, harvesting, and livelihoods should not be negatively affected by the Project.
 - o Sabina has addressed this through the development of appropriate the Closure goals and objectives.
- o A comprehensive environmental management and monitoring program should be developed. Key areas of concern for local communities include: caribou, fish, water quality, mine tailings and contaminants, and other wildlife resources.
 - o This is addressed in part by this ICRP as a whole, and in full by Sabina's comprehensive suite of management and monitoring plans and programs.
- o Guarantees must be in place that mine closure will be done properly.
 - o This is addressed through the maintenance of reclamation security defined in the Licence and based on the Cost Estimate included as part of this Plan. This reclamation security is held by the KIA and the Minister of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) and is sufficient to allow for the complete closure of the Project if necessary.

1.5 REGULATORY INSTRUMENTS FOR CLOSURE AND RECLAMATION

1.5.1 Legislation and Guidance Applicable to Mine Closure

Legislation applicable to mine Closure and Reclamation Plans in Nunavut include:

- o Nunavut Land Claims Agreement (Canada 1993);
- o *Territorial Lands Act* (Canada 1985a);
- o Territorial Lands Regulations (Canada undated);
- o *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (Canada 2002);

- o Nunavut Waters Regulations (Canada 2013);
- o *Fisheries Act* (Canada 1985b), and applicable regulations including the MDMER;
- o *Arctic Waters Pollution Prevention Act* (Canada 1985c);
- o Arctic Waters Pollution Prevention Regulations (Canada undated);
- o *Transportation of Dangerous Goods Act* (Canada 1992);
- o Transportation of Dangerous Goods Regulations (Canada 2001);
- o *Environmental Protection Act* (Nunavut 1988a);
- o *Environmental Rights Act* (Nunavut 1988b);
- o *Mine Health and Safety Act* (Nunavut 1994); and
- o Mine Health and Safety Regulations (Nunavut 1995).

Specific primary relevant acts, regulations, and guidelines applicable to closure and reclamation of provided in Appendix B, Table B-01. Sabina also subscribes to the Towards Sustainable Mining (TSM) Initiative, including the implementation of the Mine Closure Framework (MAC 2008).

The development of this Plan was also based on the following guidance:

- o Guidelines issued by NIRB for the Project (NIRB 2013) and specifically those relating to the preparation of a closure and reclamation plan;
- o Mine Site Reclamation Policy for Nunavut (AANDC 2002);
- o Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB/AANDC 2013);
- o Mine Site Reclamation Guidelines for the Northwest Territories (AANDC 2007);
- o CCME Guidelines for the protection of Aquatic Life (CCME 2013, 2016);
- o CCME Abandonment and Reclamation Policy for IOL (QIA no date);
- o Environmental Guideline for Site Remediation (GN 2010); and
- o CCME Guidelines for the Protection of Environmental and Human Health (CCME 1999b) and Canada-Wide Standard for Petroleum Hydrocarbons in Soil (CCME 2008).

1.5.2 Current Permits and Approvals

Land use authorizations and water licences are the primary regulatory instruments applicable to mine closure in Nunavut. A summary list of land and water access permits/licenses for the Project is found in Appendix B, Table B-02.

Land ownership in relation to the Project is shown in Appendix A, Figure A-02 and Figure A-03 for the Goose Property and Marine Laydown Area (MLA), respectively. The majority of the Project is located on Inuit Owned Land (IOL). Surface rights for IOL are vested in the KIA, which administers the access and management of the IOL for the benefit of the Inuit in that region. Access to and use of surface lands

requires an Inuit land use permit, licence, or commercial lease issued by the KIA. The majority of the Project, including the Goose Property and the MLA, is located on either surface rights, or surface and subsurface rights on IOL administered by the KIA. Surface rights on Crown Land are vested in the federal government and are administered by CIRNAC. Access to and use of these surface lands requires a land use permit, licence, or commercial lease issued by CIRNAC.

The use of water resources as well as waste disposal in Nunavut is regulated by the NWB. The Project has Type A Water Licence (2AM-BRP1831; the Licence) for mine development, pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. Terms and conditions of the Licence applying to abandonment, reclamation, and closure are listed in Appendix B, Table B-03 along with where they are addressed in this Plan.

The Project Certificate for the Back River Project also contains a number of terms and conditions related to abandonment, reclamation, and closure and these have been included in Appendix B, Table B-03 along with the location in this Plan in which they are addressed.

1.6 RELATED PLANS OR STUDIES

During the development of each Project facility and component, extensive consideration has been given to minimizing effects and to facilitating an efficient, effective, and stable closure condition. These considerations were detailed in Sabina's FEIS (Sabina 2015b) as well as in Sabina's Project Modification Package (Sabina 2020b). In addition, continued alignment with these desired outcomes is maintained through the implementation of various management and monitoring plans. This ICRP should be interpreted in conjunction with these plans, particularly the following:

- o Road Management Plan;
- o Borrow Pit and Quarry Management Plan;
- o Ore Storage Management Plan;
- o Waste Rock Management Plan;
- o Tailings Management Plan;
- o Landfill and Waste Management Plan;
- o Landfarm Management Plan;
- o Thermal and Geotechnical Monitoring Plan (*under development*);
- o Environmental Management and Protection Plan;
- o Aquatic Effects Management Plan;
- o Fish Offsetting Plan; and
- o Quality Assurance/Quality Control Plan.

The development of this Plan was also supported by the following studies:

- o Project Feasibility Study Report (JDS 2015);
- o Multiple Accounts Analysis (Sabina 2016);
- o Geochemical Characterization Report (Sabina 2017, Appendix E-3);
- o Tailings Management System Design Report (Sabina 2017, Appendix F-4);
- o Hydrogeological Characterization and Modelling (Sabina 2017, Appendix F-5);

- o Geotechnical Design Parameters Report (Sabina 2017, Appendix F-2); and
- o Hydrology Report (Sabina 2015b, Volume 2, Appendix V2-7B).

Selected aspects of closure and reclamation planning completed for other mining operations in the Nunavut region have also been reviewed and incorporated, where applicable, in the development of this Plan.

1.7 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 by NIRB under Project Certificate (PC No. 007; NIRB File No. 12MN036) and subsequently approved in the ICRP by the NWB Part, B Item 14g), 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:

- o Llama Underground;
- o Goose Main Underground;
- o Echo Open Pit;
- o Echo Underground;
- o Echo WRSA;
- o Any associated Underground laydown pads and roads;
- o All associated water or tailings pumps and pipelines, and diversion berms and ponds, including but not limited to:
 - o Echo WRSA Containment Dam; Echo WRSA Diversion Berm; West Echo Diversion Berm; East Echo Diversion Berm; East Echo Containment Dam;
 - o Umwelt WRSA Containment Dam; Umwelt WRSA Diversion Berm;
 - o Saline Water Pond Diversion Berms; Saline Water Pond East Containment Dam;
 - o 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
 - o Ore Stockpile Diversion Berm; Tailings Storage Facility (TSF) WRSA Diversion Berm.

The Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB/AANDC 2013) require that a "description of each project component, including proposed components and historical components no longer in use" be included in closure and reclamation plans. Although the components described above are not currently proposed, nor are they historical components no longer in use, a further description of each of these components has been

retained in Section 1.7.1 this Plan for reference. These components are also considered in the Cost Estimate associated with this Plan.

Should Sabina choose to reintegrate any of these components into the mine plan in future, all closure activities and approaches outlined in this Plan would be maintained for the closure of these components. Additionally, 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.

1.7.1 Descriptions of Additional Approved Development Infrastructure/Mining Areas

1.7.1.1 *Llama, Goose Main, and Echo Undergrounds*

Llama, Goose Main, and Echo underground mines would be spatially located below the respective open pits. The underground deposits would be accessed via declines driven from surface and would typically be approximately 5 m by 5 m high at about a -15% gradient. The declines would be used for haulage of ore and waste, access of personnel, equipment, materials, and services, as well as exhaust airways. The locations of the portals would be chosen such that environmental offset limits from lakes and streams were maintained.

The mining method as Echo Underground would likely be longitudinal open-stopping. At Llama and Goose Main undergrounds, drift and fill mining methods would likely be undertaken. All of these underground mining methods require backfill to maintain ground stability and to provide a working base for the equipment on the next cut above. The backfill material would be primarily sourced from development waste from the underground mines, with any shortfall being met from utilizing potentially acid-generating waste rock from the open pit operations.

Ventilation systems, consisting of fresh air raises and main fans, for the underground operations for the Project would be used to dilute and remove dust, diesel emissions, and blasting fumes to maintain compliance with Nunavut mine regulations. Based on ventilation modelling results, a twinned 4-m diameter Fresh Air Raise (FAR) system would be required at each underground mine.

Groundwater inflows would only be expected at Llama and Goose Main underground mines, and these inflows are expected to be saline. Inflows would be expected where mine workings extend below the base of permafrost, which correlates to about 320 to 350 mbgs. In mining areas within the permafrost, such as the Echo Underground, no groundwater inflows are expected. The predicted groundwater inflow rates at the cessation of underground mining at each location are as follows:

- o Llama U/G: 246 m³/d; and
- o Goose Main U/G: 64 m³/d.

After the underground mining is completed and the potential for an extension of the underground operations has been dismissed, dewatering would cease and the underground workings at Llama and Goose Main would be actively flooded. Underground workings at Echo would be passively flooded with site contact water entering through the portal and through the connection to Echo Pit created by the removal of the crown pillar.

1.7.1.2 *Echo Open Pit*

The Echo Open Pit would have an estimated 33 ha footprint and extend to approximately 45 m deep with an estimated volume of 0.4 Mm³. The open pit development approach is outlined in the FEIS. Development would take place in a manner that would ensure appropriate levels of structural stability of the pit and annual geotechnical inspections would be conducted under the Thermal and Geotechnical Monitoring Plan and as a requirement of the Licence.

During development, pit seepage would be monitored as outlined in the WMP for other open pits, to verify closure assumptions and conditions. The Echo Pit would be developed entirely within permafrost and as such, no groundwater inflows would be expected.

After the open-pit mining was complete and the potential for an extension of the open pit operations dismissed, the open pit would be decommissioned progressively during the Operations Phase of the Project. The Echo Underground crown pillar would be removed and the pit and underground thereby connected. The pit and underground would then be allowed to passively flood with site runoff and precipitation.

1.7.1.3 *Echo WRSA*

To reduce haul distances, it is expected that Echo Pit would have a separate WRSA to retain some or all of the waste rock. The Echo WRSA would be used to store waste rock and the overburden not suitable or used for other purposes. The waste rock disposal and design criteria would be the same as employed for other WRSAs at the Project and are outlined in Section 5.2.3.1 of this Plan. PAG and NPAG waste rock would likely be placed in lifts in a “bottom-up” approach to maximize stability and promote aggradation of permafrost. The Echo WRSA would have final overall slopes similar to all other WRSAs at 3H:1V or less. The WRSAs are expected to be stable over the long-term, and no additional regrading would be carried out at Closure. It is anticipated that the surface of the facilities would revegetate naturally over time.

Based on the originally mine plan, the Echo WRSA would have a footprint of approximately 3.3 ha and contain approximately 1.2 Mt of waste rock with a height of about 15 m.

The Echo WRSAs would be fully constructed and covered with NPAG material as employed with other WRSAs (see Section 5.2.3) and in a manner that final reclamation can be undertaken progressively before the end of the Operations Phase.

Geochemical evaluations suggest that runoff from WRSAs during Operations will likely exceed MMER Schedule 4 limits for arsenic and copper (SRK, 2015c). It is expected that the final WRSA would be frozen except for an active layer within the NPAG cap. Once the WRSA is capped and permafrost has aggraded into the PAG rock, water quality is expected to improve to acceptable limits for discharge. Since the final cover would be applied during the Operations Phase, it would be possible to monitor the aggradation of permafrost and improvements in the quality of runoff through the Operations and Closure phases.

1.7.1.4 *Associated Underground Laydown Pads and Roads*

Small rock fill pad laydowns would be located in the vicinity of the underground workings, for temporary stockpiling of waste rock prior to use as backfill material. Construction materials for both roads and pads would be sourced from locally developed, geochemically suitable locations. Rock would be placed directly onto the tundra to preserve the permafrost, and a layer of graded surfacing material would be placed to provide a protective trafficking layer. By the end of Operations, all waste rock on these laydown areas would have been hauled back underground or relocated to a WRSA, and all other materials would have been consumed, landfilled, or backhauled.

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Any additional haul roads to support these open pit and underground mines would be constructed as all-weather roads. These haul roads would be constructed in accordance with mine haul road specifications, which require appropriate safety berms or barricades.

At Closure, laydown pads and roads associated with Echo and the Llama and Goose Main undergrounds would be closed in the same manner as other site rock fill pads and roads (see Section 5.2.7).

1.7.1.5 Associated Pumps and Pipelines, and Diversion Berms and Ponds

Diversion berms and ponds associated with the permitted, but not currently proposed, mine components would include:

- o Echo WRSA Containment Dam; Echo WRSA Diversion Berm; West Echo Diversion Berm; East Echo Diversion Berm; East Echo Containment Dam;
- o Umwelt WRSA Containment Dam; Umwelt WRSA Diversion Berm;
- o Saline Water Pond Diversion Berms; Saline Water Pond East Containment Dam;
- o West Llama Reservoir Diversion Berm; East Llama Reservoir Diversion Berm; South-West Llama Reservoir Diversion Berm; South Llama Reservoir Diversion Berm; Llama WRSA Diversion Berm; and
- o Ore Stockpile Pond Diversion Berm; TSF WRSA Diversion Berm.

A summary of these diversion and containment structures are provided in Table 1.7-1.

Table 1.7-1: Diversion and Containment Structure Summary

Structure	Lining Details	Notes
Llama Lake Diversion Berms (Southwest, West, East, and South)	Unlined	Divert upstream non-contact runoff from entering Llama Lake
Umwelt WRSA Containment Dam	Lined	Contains contact water runoff from Umwelt WRSA
Umwelt WRSA Diversion Berm	Unlined	Diverts runoff from Umwelt WRSA into Umwelt WRSA Pond
Llama WRSA Diversion Berm	Unlined	Diverts seepage and runoff from the Llama WRSA towards the Llama WRSA Pond
Ore Stockpile Pond Diversion Berm	Unlined	Diverts contact water runoff from the Ore Stockpile, along western edge of Ore Stockpile
Saline Water Pond Containment Dam (East)	Lined	East and South section of dam containing saline water, around former Umwelt Lake footprint
Saline Water Pond Diversion Berms	Unlined	Diverts runoff from entering the Saline Water Pond
East Echo Containment Dam	Unlined	Contains non-contact runoff south of Echo Pit
Echo Diversion Berm (East and West)	Unlined	Diverts non-contact runoff around Echo Pit
Echo WRSA Containment Dam	Lined	Contains contact water from the Echo WRSA and Echo Pit, along the southern edge of the haul road
Echo WRSA Diversion Berm	Unlined	Diverts contact runoff from the Echo WRSA to the Echo WRSA Pond
TSF WRSA Diversion Berm	Lined	Collects seepage and runoff from the TSF WRSA

In alignment with closure methodologies of analogous structures in the current mine plan (see Section 5.2.9), the contact water management system would be maintained during the Closure Phase until water quality monitoring demonstrates that water flowing from these facilities is acceptable for release to the environment. Once water quality is acceptable for discharge based on criteria established through the water licensing process, these structures would be breached to allow the surface runoff and seepage water to naturally flow to the environment. Structures would be breached in strategic locations to restore natural surface water drainages. Many berms would be breached during the Operations Phase with the remainder of diversion berms breached during Closure. Any pipelines would be purged, dismantled, and disposed of as they become redundant, or reused if possible. At Closure, all pumps and pipes would be drained, decommissioned, and landfilled.

All structures would be breached, with any liners removed and landfilled, and the areas re-contoured and armoured (if necessary) to allow for passive runoff. Besides breach locations, structures would remain in place beyond the Post-Closure Phase.

2. Roles and Responsibilities

Sabina is committed to environmentally responsible and socially acceptable exploration and mining practices. The Company is dedicated to creating and maintaining a safe environment for both the land it occupies and the people that drive its success. Sabina also subscribes to the principles of sustainable development in mining. While mining cannot occur without an impact on the surrounding natural environment and communities, the company's responsibility is to limit negative environmental and social impacts and to enhance positive impacts. The executive and management team will demonstrate to employees, contractors, government, and the community that the company regards excellence in environmental performance a priority.

Sabina also requires that all staff and contractors adhere to Sabina policies and practices as outlined in their management plans. By doing so, Project effects will continue to be minimized and conditions optimized for closure at the end of mining activities.

The Project Owner is:	Sabina Gold & Silver Corp. (Sabina)
The corporate address is:	Suite 1800, Two Bentall Centre 555 Burrard Street, Box 220 Vancouver, BC V7X 1M9, Canada Tel: (604) 998-4175 Fax: (604) 998-1051 Toll Free: (888) 648-4218
The Project site is located at:	latitude 65°32'42" N, longitude 106°25'43" W (Goose Property) latitude 65°32'40" N, longitude 106°25'32" W (MLA) Territory of Nunavut, Canada
Acting on behalf of the Owner:	Golder Associates Ltd. (Golder) 16820 107 Avenue Edmonton, AB T5P 4C3, Canada
The main contact person is:	Matthew Pickard B.Sc., MBA, P.Geo, CRSP, EP Vice President, Environment & Sustainability Tel (Direct): 604.484.8967/416.848.1184 Tel (Vancouver Reception): 888.648.4218 Cell: 416.605.7881 Fax (Vancouver): 604.998.1051 Email: mpickard@sabinagoldsilver.com

3. Environment

The Project is located in a remote area within the Kitikmeot Region of Nunavut. The closest communities to the Project are Kingaok, located approximately 160 km to the north of the Goose Property, and Omingmaktok, located approximately 250 km to the northeast of the Goose Property. The communities of Kugluktuk and Cambridge Bay are the closest major regional settlements.

Virtually no development and little human disturbance have occurred in the area, aside from various mineral exploration campaigns conducted since 1982. A comprehensive and extensive overview of the baseline environmental conditions can be found in Sabina's FEIS for the Back River Project (Sabina 2015b). A summary of existing environmental conditions relevant to Project Closure and Reclamation is provided below.

3.1 ATMOSPHERIC ENVIRONMENT

The climate in the area is characterized by extremes. The winter period lasts from October to May, consisting of snow and extremely cold mean monthly temperatures, ranging from -33.0 to -1.3°C, and a cool spring, summer, and fall period (June to September), with mean monthly temperatures ranging from -0.3 to 14.5°C. The Project area experiences relatively low amounts of rainfall (summer means ranging from 4 mm to 211 mm), but due to sub-zero temperatures for the majority of the year, also experiences high snow accumulation (annual mean precipitation ranging from 125 mm to 344 mm). Summer is a season of nearly perpetual sunlight, while winter is dominated by night, twilight and extreme cold. Climate change shows that the annual mean temperature will increase about 5.3°C over the next century. Permafrost will still pervasively exist in the area; however, the seasonal active zone will become deeper.

Due to the relative absence of obstructions to impede the wind (e.g., trees, buildings, mountains), wind speeds are generally high. Baseline air quality and noise reflect predominantly pristine conditions a result of the Project location's remoteness and general the lack of anthropogenic influence.

3.2 PHYSICAL (TERRESTRIAL) ENVIRONMENT

The Project is located within the continuous permafrost region of western Nunavut. A seasonally thawed active layer is present immediately beneath ground surface to a depth of approximately 2 m. The permafrost extends to approximately 500 m depth. Taliks surrounding waterbodies may extend connect to the sub-permafrost groundwater where waterbodies are more than 200 m wide. Beneath the permafrost, and where open taliks exist, the regional groundwater is saline.

The Project is located in an area dominated by gently undulating or rolling landscapes with numerous kettle lakes connected by streams. Terrain elevation ranges between 300 and 700 metres above sea level (masl) and slope gradients rarely exceed 7%. Uplands are typically covered by morainal materials deposited on Precambrian sedimentary, metamorphic, or intrusive rocks. Glaciofluvial, organic, marine, and lacustrine deposits are less common. Most soils are moderately coarse (e.g., loam, sandy loam, fine sandy loam). Exposed bedrock occurs occasionally. The thickness of mineral soils overlaying bedrock (overburden) is the highest in plains and very gently sloping areas (average of 10.6 m) and decreases in rolling and undulating landscapes (average of 4.8 m).

A number of distinct landform types, including eskers, morainal rocky ridges, and boulder fields exist throughout the region. Several soil phenomena are also associated with the permafrost setting. Thermokarsts typically occurs in wetlands as a system of very irregular hummocks and hollows, which

form as a result of frost heaving and ice accumulation on the bottom of organic horizons. Frost boils are typically circular (1 to 3 m in diameter) upwellings of mud that are created by frost heaving. The presence of permafrost and annual cycles of freezing and thawing results in poor development of soils. About 2/3 of the inspected soils have been classified as Static Cryosols and 1/3 as Turbic Cryosols.

3.2.1 Geotechnical Characteristics

Geotechnical field investigations in the vicinity of the Goose Property and MLA were carried out between 2011 and 2015. Laboratory testing on geotechnical samples confirms that overburden soils at the Goose and onshore MLA generally consist of silty sands with some clay and gravel which are likely the result of the reworked marine and glacial sediments. The physical state (frozen or thawed) will likely define its apparent strength. In a thawed state, the soils will likely have a relatively low strength, whereas in a frozen state the ice will contribute to the cohesive strength so that the soil strength increases with decreasing temperatures (SRK 2015a).

3.2.1.1 Marine Laydown Area

Studies in an adjacent area 13 km south of the MLA indicate that offshore sediments consist primarily of normally consolidated marine clay deposits with occasional silty sand lenses. The soft, weak clays were found to be unfrozen with an average water content of 60% (Nishi-Khon/SNC Lavalin 2001).

None of the test pits or drillholes completed at the MLA reached bedrock, therefore, the total overburden thickness is not known in this area. Understanding of the permafrost conditions in this area is limited as there have not been any thermistors installed, and test pits and drillholes generally stopped at or above frozen ground. The active layer is at least 0.8 mbgs in some parts of the MLA.

3.2.1.2 Goose Property

In general, the overburden thickness ranges from 0 to 25 m across the Property. The thickest overburden deposits are along the airstrip alignment, along the west edge of Goose Main Pit, and along the north western end of the Llama Pit (SRK 2010; SRK 2011).

Thermistors installed in the active layer revealed depth ranges from 1.3 to 4.2 mbgs, with the greatest depths occurring in areas where bedrock forms part of the active layer (Rescan 2014). The porewater salinity across the Goose Property averages approximately 26 parts per thousand (ppt) with a maximum of 85 ppt. High salinity values have the effect of depressing the freezing point, as well as contributing to high unfrozen water content.

The rock quality designation (RQD) values of shallow bedrock underlying soils at the Goose Property are generally 'good' with minor occurrences of 'poor', 'fair', and 'very good' rock mass qualities across the site (Knight Piésold 2013; SRK 2015a).

3.2.2 Seismicity

A preliminary assessment of the regional seismicity has been carried out to enable selection of appropriate design earthquake events for the Project facilities. Review of historical earthquake records and regional tectonics indicates that the Project is located in a region of low seismicity surrounded by large regions of sparse, diffuse seismicity.

Seismic parameters were calculated for the Project area using the National Building Code of Canada website which provides ground accelerations and probability of occurrence. A peak ground acceleration (PGA) of 0.036 g for 1:2,475-year event was selected for the design of the Project facilities.

3.2.3 Geology

The Property is located in the central-eastern portion of the Slave Structural Province and forms part of the Canadian Shield. The Slave Structural Province is predominantly comprised of metamorphosed greenstone and turbidite sequences and plutonic rock underlain by older gneiss and granitoids. Volcanic-turbidite series rocks are widespread and abundant, consisting of large areas of turbidites flanked by narrow volcanic belts. Iron formations are locally abundant in the volcanic turbidite series and host most of the strata bound gold deposits.

The Goose Property is underlain by a turbidite sequence cut by felsic and gabbroic dikes. The turbidite sequence is comprised of greywacke, iron formations, and mudstones. Most of the gold mineralization is hosted in the central greywacke and lower iron formation units. All units are cross cut by gabbro dikes.

Regional structural features have been identified from field mapping and from interpretation of geophysical data sets. Deposit scale features such as folding and faulting have been identified from drill core intersections and field mapping. Host rock units exhibit folding; Goose Main Pit sits in an antiform, both Llama and Umwelt sit in antiform/synform sets. Most faults transecting the deposits have been identified firstly by lithologic offset, and then subsequently supported by observations from drill core and field mapping. The Llama fault trends northwest/southeast and may be coincident with a gabbroic dike. The Umwelt fault trends north-northwest/south-southeast and truncates the deposit on the western limb. Multiple faults have also been modelled at Goose Main Pit; one offsets mineralization and trends north/south, one trends north-northeast/south-southwest and the other trends northeast/southwest. All lithologies and fault structures have been modelled in 3D and have been used to assist with the Project design.

Gold mineralization at the Goose Property (Goose Main, Umwelt, and Llama) is situated within folded silicified and sulphidized oxide iron formations and locally in the underlying greywacke located within antiform structures. As a result, the mineralization geometry is relatively continuous between sections and down-dip. However, within the interpreted mineralized zones, gold grades can be highly erratic and discontinuous.

3.2.4 Hydrogeology

The Project lies within the continuous permafrost zone of the continental Canadian Arctic, and as such groundwater is present deep below the continuous permafrost layer (e.g., > 400 mbgs). Water present in the active layer above the permafrost, which is thawed during the summer only, can interact with surface waters in general. There is minimal connection between the surface active layer and deep groundwater flow regimes due to the presence of the thick low-permeability permafrost. The deep sub-permafrost groundwater is hydraulically connected with the surface water and the active layer via open taliks (also called through taliks) beneath large lakes, such as below Goose Lake.

Structural features in the bedrock, such as the northwest-southeast trending faults commonly found at the Goose Property, may act as preferential flow pathways for groundwater in taliks and beneath the permafrost. In general, the deep groundwater flows from higher elevation large lakes to lower elevation large lakes, therefore the flow direction can be inferred from the surface elevation of the large lakes that overlie open taliks. Site-specific groundwater data were collected annually from 2012 to 2015 within the Goose Property. Thermistor strings, vibrating wire piezometers, borehole packer testing, and a Westbay well have been used to characterise the groundwater environment. The Westbay well, installed adjacent to the Umwelt deposit in 2013, has been used to conduct groundwater quality sampling. Preliminary results of groundwater sampling indicate that the deep groundwater is more saline than seawater and has elevated levels of chloride and certain trace metals.

3.2.5 Lake Bathymetry

Lakes at the Project area are generally small and shallow, ranging between 5 and 500 ha in surface area and less than 10 m in maximum depth. Lakes shallower than 2 m are usually frozen to the bottom during the winter months. Lakes are usually well mixed from the surface to the sediments during the open-water season due to wind-driven forcing. Some gradients in temperature and density may occur in deeper lakes or in ice-covered lakes in winter, although this is uncommon. The water clarity of lakes is generally high, despite the potential for wind-driven mixing to the sediments. Water temperatures in lakes and streams tend to follow the Arctic climate, with greatest temperatures observed in August at the height of the short summer.

3.2.6 Surface Hydrology

The Project is located within the watershed boundaries of the Queen Maud Gulf Watershed, and the Back River Watershed. The majority of proposed infrastructure at the Goose Property lies within the Queen Maud Gulf Watershed, which flows northwest and enters the ocean on the west side of Bathurst Inlet. The Back River Watershed is located south of the Goose Property and flows east eventually entering the Arctic Ocean south of Gjoa Haven. An overview of hydrological conditions is provided in the FEIS Volume 2, Section 7.1.4.

Surface hydrology is governed by the Arctic nival regime where peak flow discharges during the spring, shortly after air temperature rises above freezing. In small basins, these high flows can last as little as a few days. Peak flow typically occurs immediately after ice break-up in lakes and channel reaches, especially in the smaller basins. Due to the presence of permafrost, small streams do not receive groundwater contributions, and flow discharges from these basins may cease after freshet until the late summer rains begin. For rivers draining larger watersheds, the freshet peak may be delayed relative to smaller drainages as snowmelt from upper portions of the watershed is routed through the drainage network.

Precipitation events in the late summer and early fall may lead to a second hydrographic peak, but this is generally of lower magnitude than the freshet peak. Channel freeze-up typically occurs between late October and early November. In smaller drainage basins, stream channels typically freeze to their bottom, with zero flow occurring in winter. In very large catchments and larger lake outlets, flow energy and water turbulence may sufficiently maintain streamflow and prevent downstream reaches from freezing completely.

3.2.7 Archaeological Sites

Archaeological surveys were conducted prior to Project development and site locations were documented in reports submitted to the Government of Nunavut. Sites which could not be avoided in Project design will be mitigated.

3.3 CHEMICAL ENVIRONMENT

3.3.1 Freshwater Water and Sediment Quality

Baseline water and sediment quality data have been collected for the Goose Property since 1994, with extensive water sampling programs being carried out from 2010 to 2015. The water of lakes and streams is typical of pristine Arctic surface waters, with low concentrations of anions, suspended material, nutrients, and most metals. Metal concentrations in baseline water quality samples are below CCME guidelines (CCME 1999), with the exceptions of cadmium and copper, and to a lesser extent, aluminum, iron, lead, and nickel. Lake and stream sediments have naturally elevated metal concentrations that are

often greater than CCME guidelines for arsenic, cadmium, chromium, copper, and/or zinc (CCME 1999). Geochemical characterizations are provided in the FEIS Volume 2, Section 3.3.4.

3.3.2 Marine Water Quality

Baseline studies show that water in southern Bathurst Inlet is typical of pristine Arctic marine waters, with low concentrations of nutrients, suspended solids, and metals.

3.3.3 Marine Sediment Quality

The sediment environment in Bathurst Inlet is generally a function of water depth and physical processes. Shallower, near-shore areas are subjected to increased erosion and resuspension due to the interaction of the wind-driven water currents and the seabed. Metal concentrations in marine sediments were strongly correlated to the relative abundance of silt and clay particles, and therefore were generally greater in the deeper waters. Naturally elevated concentrations of arsenic, chromium, and copper were observed in the deeper sediment samples and were often greater than the CCME guidelines (CCME 1999). Sediment metal concentrations near the MLA were observed to be naturally low, as expected because of the relative dominance of sand-size particles.

3.3.4 Geochemical Characterization

Geochemical characterization of the waste rock, ore, quarry rock, overburden, tailings, and mine workings has been completed on the Property (Rescan 2013; SRK 2015b).

Results from these characterizations indicated that, after a conservative 75% segregation efficiency is taken into account, approximately 58% of the open pit and underground mine workings and waste rock is potentially acid generating (PAG) and may lead to acidic drainage after a lag time of 14 to 20 years. This lag time is expected to be longer than the amount of time needed for the PAG rock, which will be covered with at least 5 m of non-potentially acid generating (NPAG) rock, will take to freeze. Acidic conditions are expected to occur more rapidly in some of the waste rock, but average pH conditions in seepage and runoff would be expected to remain buffered until WRSA freeze back conditions develop. As such, long-term acid rock drainage and metal leaching are not anticipated.

Samples from the Umwelt Quarry and the Airstrip Quarry have indicated the rock there is NPAG. However, some rocks in the iron formation from the Airstrip Quarry have been characterized as PAG. Elevated concentrations of arsenic have been observed in samples from both quarries. Overburden across the Goose Property has been characterized as NPAG. Further details on waste segregation and management can be found in the Waste Rock Management Plan, and the Borrow Pits and Quarry Management Plan.

The majority of the tailings samples from the Goose Property have been characterized as PAG (Rescan 2013; SRK 2015b).

3.4 BIOLOGICAL ENVIRONMENT

3.4.1 Vegetation and Special Landscape Features

Vegetated ecosystems, constituting 73% of the Project site, are dominated by mesic tundra, dry-sparse tundra, and moist shrub-dominated tundra. Sparsely vegetated ecosystems constitute nearly 9% of the total site. The remaining areas are dominated by freshwater lakes and ponds. Special landscape features include esker complexes, cliffs, bedrock outcrop and lichen-dominated ecosystems, riparian ecosystems, wetland ecosystems, and marine beaches and old beach heads.

3.4.2 Wildlife

There are three barren-ground caribou herds whose ranges interact regionally. Satellite collaring data indicate that the Bathurst herd, the Beverly and Ahiak herds, and the Dolphin and Union herds are found in the region during portions of the year.

Using a DNA mark-recapture analysis, the regional population of bears was calculated to be 72 females and 54 males in 2012, and 64 females and 54 males in 2013. TK indicates that grizzly bears are found throughout the region especially in association with major river systems such as the Western River and coastal areas, including Bathurst Inlet.

Muskox occur at moderate to low densities across the Canadian Arctic and are valued by the Inuit as a source of food, hides, horns, and wool, as well as for the commercial export of meat. TK indicated that muskox populations have been undergoing a long-term recovery from previously low numbers and occur throughout and surrounding the region at low densities.

Wolverine and grey wolves were selected as representative of furbearer species. Baseline studies estimated the local population of wolverine to be very low. However, habitat suitability modeling for wolverine indicates that there is approximately 44.7% high-quality habitat within the region. TK identified eskers as the primary denning habitat for wolves, and eight dens were identified on eskers during denning surveys conducted for grey wolf, of which five dens produced pups.

Aerial surveys were also conducted during the spring moulting period (mid-May through mid-July) between 2007 and 2013 to assess the abundance and distribution of ringed seals. Results indicated that ringed seal abundance was spatially variable in Bathurst Inlet, with moderate densities present in most parts of the inlet except in the southern RSA south of Kingaok where very low densities of adult and 8 to 10-week-old pups were found. Ringed seal lairs were only found further to the north. During the summer, ringed seal density is anticipated to be very low in Bathurst Inlet.

3.4.3 Birds

Aerial surveys for water birds indicate that Canada geese accounted for 80% to 90% of all detections of water bird species. Additionally, a key staging site was identified in the western region near the Goose Property, where large flocks of geese and ducks were consistently observed during both spring and fall staging surveys. Upland birds were mostly found along the shoreline of Bathurst Inlet. A total of 147 raptor nest sites were mapped on cliffs; nests of the peregrine falcon were the most abundant of all raptor species.

Aerial and ground surveys documented a total of 23 species of seabirds, although no evidence of breeding was recorded during breeding surveys in any years. In spring, staging areas appeared to occur in open-water areas and near major river drainages. In late-summer and fall (mid-July and August), large numbers (> 50 birds) of Canada geese and ducks were observed in the shallow bay southwest of the MLA footprint. The greatest abundances of seabirds and seaducks were observed in late-summer and fall periods.

3.4.4 Freshwater Fish and Aquatic Habitat

Comprehensive baseline studies on freshwater fish and aquatic habitat were conducted extensively for the Goose Property with more than 30 streams characterized. Lake zooplankton and lake and stream benthic invertebrate communities all showed considerable variation, consistent with the close coupling between trophic levels and the strong local effects. Site-specific baseline information has characterized healthy and robust communities of benthic invertebrates.

3.4.5 Freshwater Fish Communities

The freshwater fish communities around the Goose Property are characteristic of Arctic freshwater ecosystems and include freshwater as well as anadromous species at the MLA. Baseline studies were conducted extensively from 2010 to 2015, and periodically from then onwards. The freshwater fish communities are typical of inland, headwater regions of the Canadian Arctic. Lake Trout was the dominant species, followed by Round Whitefish, Arctic Grayling, Slimy Sculpin, and Ninespine Stickleback. Other species include Burbot and Lake Whitefish. No Arctic Char have been captured at the Goose site, although they are likely present within the region.

3.4.6 Marine Fish and Aquatic Habitat

Based on nearshore surveys and TK, potentially important habitat areas for marine and anadromous fish were identified. The outlets of some rivers are important habitat for Arctic Char.

3.4.7 Marine Fish Community

The marine fish community of Bathurst Inlet is characteristic of Arctic marine ecosystems and includes marine, anadromous, and freshwater/estuarine species. Nineteen fish species typically found in the Arctic have been captured during baseline studies. Although no Arctic Char were captured, they are presumed to occur due to favourable habitat and appropriate spawning streams that flow into the Inlet.

4. Project Description

4.1 LOCATION AND ACCESS

Although remote, the Project can be accessible year-round through air transportation. There is an existing all-weather airstrip at the Goose Property and the MLA; both of which will be extended for continued use. Both Goose Property and the MLA can be serviced by ice airstrips in the winter and by float planes in the open water season, if required. Crew movements to the Goose Property and the MLA will be facilitated by chartered air service from Edmonton, Yellowknife, Cambridge Bay, and/or Kugluktuk. The current use of helicopters and fixed-wing aircraft are used as needed to support exploration and environmental monitoring and for movement between the MLA and Goose Properties.

Bulk cargo may be shipped by either of two open water marine shipping routes to the MLA on Bathurst Inlet. The ships and barges will be self-sufficient for offloading cargo. Lightering barges may be used to transfer cargo from the vessel to the MLA. Bulk fuel is transported to the MLA via tanker ships and/or barges and transferred to storage tanks on land at the MLA. Incoming freight and incoming fuel will be staged at MLA while awaiting transfer to the Goose Property site over the Winter Ice Road (WIR). Outgoing cargo will also be staged at the MLA awaiting the appropriate vessel for back-haul. Materials and fuel are transported between the MLA and Goose Property over a 160 km long seasonal WIR. Ground transportation within the Goose Property and MLA will be by all-weather roads.

4.2 SITE HISTORY AND EXPLORATION

Comprehensive summaries of historical work on the Property were compiled in previous technical reports by WGM (2005), Coffey Mining (2009), and Nakai-Lajoie and Cater (2011). A summary of the historical ownership milestones of the Property is presented in Appendix B, Table B-05 and Appendix B, Table B-06 summarizes the historical exploration work carried out by previous operators.

Exploration activities have been carried out at the Property area since 1982 and will continue over the life of the Project. Exploration activities are currently ongoing at the Goose Property. The exploration activities at the Goose Property area are being carried out in accordance with the approved Type B Water Licence (2BE-GOO2028) and Land Use Permits. The existing exploration facilities at the Goose Property area include:

- o an all-season exploration camp;
- o a core processing facility;
- o heavy equipment storage facilities;
- o a warehouse;
- o two maintenance shops;
- o a fuel storage facility;
- o an all-weather airstrip;
- o an all-weather road that connects the Goose Exploration Camp to the airstrip;
- o dirt trails around the camp; and
- o a quarry (called Airstrip Quarry).

The existing exploration facilities at the Goose Property are not covered in this ICRP as they are covered under the Type B Exploration Facilities ICRP (2BE-GOO2028). With respect to the airstrip and quarry, only the works related to the existing all-weather airstrip for the Project Operations and further development of the quarry are included in this ICRP.

The Back River Property (the Property) comprises 54 federal mineral leases and 10 federal mining claims covering approximately 55,000 ha (Appendix A, Figure A-04). The Property is divided into one main project: Goose, and five exploration prospects: George, Boot, Boulder, Del, and Bath. Exploration prospects are excluded from this Plan.

4.3 PROJECT SUMMARY

The refined current mine plan on which this ICRP is based is summarized in this section. The current mine plan is a subset of the previously approved permitted mine and the modifications outlined in Sabina's 2020 Modification Package (Sabina 2020b). At present, the mine plan does not include Llama Underground, Goose Main Underground, Echo Open Pit, and Echo Underground (PC No. 007 and Type A Water Licence 2AM-BRP1831). However, as mentioned in Section 1.7, these previously approved deposits may be reintegrated into the mine plan at a later date based on continued advancement in detailed engineering and market considerations. Should Sabina choose to include these mining areas in the future mine plan, all applicable management plans, including the ICRP, will be updated to reflect these changes, and Sabina will adhere to all appropriate requirements of the Back River Project Certificate (PC No. 007) and the Type A Water Licence (2AM-BRP1831).

The total mine life of the Project from Construction to the end of Closure is estimated to be approximately 28 years. The mine life was divided into four phases and two stages in both Operations and Closure to describe key periods as detailed in Table 4.3-1.

Table 4.3-1: Mine Phase and Stage

Phase	Stage	Description	Start	End	Comment
1	-	Construction	Y-3, Q1	Y-1, Q4	<i>Build Process Plant and TSF; start Umwelt open pit mining</i>
2	1	Operations - TSF	Y1, Q1	Y5, Q1	<i>Begin milling and tailings deposition in TSF</i>
	2	Operations - Llama TF	Y5, Q2	Y12, Q4	<i>Continue milling and tailings deposition in Llama TF</i>
3	1	Closure – Active Closure	Y12, Q4	Y14, Q4	<i>Active site closure, remove site infrastructure, and passive pit flooding and continued water treatment (seasonal), if required</i>
	2	Closure – Passive Closure	Y15, Q1	Y19, Q4	<i>Passive pit flooding and continued water treatment (seasonal), if required</i>
4	-	Post-Closure	Y20, Q1	+	<i>Site closed; performance monitoring</i>

The Construction Phase will occur over approximately three years, and involve dewatering, pit excavation, and the construction of tailings management and water management structures as well as pads and roads. Major mine development infrastructure will be constructed at both the Goose Property and the MLA.

The total area that will be disturbed during Construction and Operations for the Project is approximately 489 hectares (ha); which corresponds to 471 ha for Goose Property facilities (Appendix A, Figure A-05) and 18 ha for the MLA facilities (Appendix A, Figure A-06). At Closure, the majority of this area will be reclaimed. Non-reclaimed land is associated with residual disturbances derived from the flooded open

pits (excepting Llama Pit which will be located in Llama Lake), the TSF WRSA, and other WRSAs at Goose Property (Appendix A, Figure A-09).

The major infrastructure at the Goose Property will include the following:

- o Goose Plant Site (Goose Camp Accommodations and Process Plant);
- o Ore Stockpile;
- o Tailings Management Facilities (i.e., TSF, Llama Pit as Llama Tailings Facility [TF]);
- o WRSAs (Umwelt WRSA, Llama WRSA, and TSF WRSA);
- o Goose Property All-weather Airstrip;
- o Saline Water Pond (Umwelt Lake, once dewatered);
- o Umwelt Reservoir (Umwelt Pit as meromictic lake);
- o Event Ponds (i.e., Llama WRSA Pond, Primary Pond, Plant Site Pond);
- o Haul and service roads; and
- o Open pits and underground mine workings (Umwelt, Llama, and Goose Main open pits; Umwelt Underground).

The infrastructure at the MLA will include the following:

- o Industrial area including camp and storage areas;
- o Hazardous waste management area and landfarm;
- o Desalination plant and associated water management infrastructure;
- o Construction laydown area; and
- o Fuel storage and offloading pad.

The infrastructure along the WIR will include the following:

- o Three service/emergency camps; and
- o Quarries.

The Operations Phase will extend for 12 years and will consist of both open pit and underground mining at the Goose Property. Two Tailings Management Facilities will be operated sequentially through Operations; a purpose-built TSF and a mined-out open pit (Llama TF). Deposition in each Tailings Management Facility is presented as a separate stage within the Operations Phase.

Three deposits; namely Umwelt, Llama, and Goose Main, will be mined by open pit and Umwelt will also include an underground mine. The mining schedule for each deposit is described in Table 1.3-1. Ore will be produced over approximately ten years; the mill will continue to operate from ore stockpiles for the remaining approximately two years of Operations. A total of 12.4 Mt of ore will be processed from open pit and underground developments, at a milling rate of approximately 3,000 to 4,000 tpd.

Approximately 86.6 Mt of mining waste rock and about 6.5 Mt of overburden are expected to be produced during the life of mine (LOM), for a total of approximately 93.1 Mt of waste. Approximately 12.4 Mt of tailings will be produced.

Figure 4.3-1 presents the Project phases and stages, along with tailings and waste rock disposal scheduling and key water management activities for each of the deposits.

INTERIM CLOSURE AND RECLAMATION PLAN

Figure 4.3-1. Project Phases and Stages

2020 Modification Package	Project Year	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Phase																												
	Stage/Active Tailings Facility	1: Construction				2: Operations								3: Closure								4: Post-Closure							
					1: TSF				2: Llama TF				1: Active		2: Passive														
Mining	Umwelt Open Pit																												
	Llama Open Pit																												
	Goose Main Open Pit																												
	Umwelt Underground ¹																												
Milling	Goose Process Plant ²																												
Tailings	TSF																												
	Llama TF																												
Reclaim Source	Primary Pond ³																												
	TSF																												
	Llama TF ⁴																												
Waste Rock Placement	Construction & TSF																												
	Umwelt WRSA																												
	Llama WRSA																												
	TSF WRSA ⁵																												
Dewater ⁶	Llama Lake (via Umwelt Lake)																												
	Umwelt Lake																												
Water Treatment	Llama Lake [TSS] ⁷																												
	Umwelt Lake [TSS]																												
	Llama TF [NH3, Cu] ⁸																												
Saline Water Storage ¹⁰	Saline Water Pond (Umwelt Lake)																												
	Umwelt Reservoir																												
	Umwelt Underground																												
Open Pit Flooding ¹¹	Umwelt Reservoir (Meromictic) ¹²																												
	Llama TF																												
	Goose Main Reservoir																												

1: Light red denotes Underground Development (decline) in advance of Production.

2: Milling, tailings deposition, and reclaim anticipated to start Year -1 Q4.

3: Reclaim from Primary Pond used for start-up and Year 1 until TSF supernatant pond is sufficiently established.

4: Reclaim from Llama TF will begin once TSF supernatant reclaim is no longer practical (i.e., in Year 12 Q2, based on average hydrological conditions).

5: Final portion of waste rock cover paused during Operations to allow TSF reclaim to finish. Once TSF supernatant reclaim is complete, then final portion of waste rock cover will be placed.

6: 50% direct discharge to Goose Lake; 50% treated for Total Suspended Solids (TSS) before discharge. Dewatering from both lakes assumed to be completed in one open water season.

7: TSS = Total Suspended Solids.

8: NH₃ = ammonia, Cu = copper. Year-round treatment for ammonia and copper required; contingency allowance for treatment of Total Suspended Solids and arsenic (if required).

9: Saline Water Pond provides temporary storage until Umwelt Reservoir is available for permanent storage. Saline water will also be stored in mined-out underground as space is available.

10: Flooding timelines denote average hydrologic conditions.

11: Purple denotes saline water as part of flooding; dark blue denotes flooding with contact and fresh water runoff.

Mine closure is anticipated to be 13 years and consists of three periods:

- o Active Closure [Phase 3, Stage 1] – Project Year 13 – 14, (i.e., two years after mining operations cease). During this time, Active Closure activities such as demolition, earth-moving, waste disposal, and rerouting of pipelines will occur. Water treatment may also occur during this time, if required.
- o Passive Closure [Phase 3, Stage 2] – Project Year 15 – 20, (i.e., six years during which seasonal water treatment and monitoring are the primary activities following the Active Closure Stage). A final demobilization and demolition of mine facilities will occur at the end of this stage in Year 20. Water treatment may also occur during this time, if required.
- o Post-Closure [Phase 4] – Project Year 21+, (i.e., a period of time during which confirmatory water quality, stability, aquatic effects, and ecosystem monitoring is conducted in order to ensure closure objectives have been met and application of any necessary adaptive management actions). This period is expected to be five years.

The infrastructure planned at the Goose Property, MLA, and along with WIR are provided in Appendix B, Table B-06, Table B-07, and Table B-08, respectively, along with an overview of the infrastructure anticipated at end of Operations. See Appendix A, Figure A-02 and Figure A-03 for Project infrastructure locations at the Goose Property and the MLA, respectively.

Throughout the mine planning process, the Project has been designed with final closure in mind. Where possible, the designs of waste rock and tailings disposal areas, berms and water management infrastructure have been chosen or modified to reduce the potential overall impact of the development and to facilitate progressive reclamation.

4.3.1 Mine Waste Management

This subsection provides a summary of the mine waste management for the Project. Detailed plans regarding the management of tailings, overburden, and waste rock are presented in the Tailings Management Plan (TMP) and the Waste Rock Management Plan (WRMP).

Table 4.3-2 presents a summary of the estimated tonnages of waste materials that will be produced by the Project. The table also indicates the quantities of waste materials that will be deposited in each waste storage facility, or if the material will be used for another purpose. There are three WRSAs: Umwelt WRSA, Llama WRSA, and TSF WRSA. Where two storage facilities are presented in the table as the destination for a quantity of materials, the exact quantity distribution between the facilities will be determined based on on-site conditions and requirements.

Table 4.3-2: Mine Waste Summary

Waste Type	Estimated Quantities (Mt)		Source Area and Destination
Overburden	6.5	1.2	Removed from the Umwelt Open Pit and stored in Umwelt WRSA.
		1.3	Removed from the Llama Open Pit and stored in the Llama WRSA.
		4.0	Removed from the Goose Main Open Pit and stored in the TSF WRSA.
Waste Rock	86.6	14.2	Removed from the Umwelt Open Pit and stored in the Umwelt WRSA, as well as used for general site construction and TSF Dam construction.
		29.1	Removed from the Llama Open Pit and stored in the Llama WRSA.
		43.3	Removed from the Goose Main Open Pit and stored in the TSF WRSA.
Tailings	12.4	4.4	Stored in the TSF.
		8.0	Stored in the Llama TF.

Should Sabina identify additional opportunities for the use of other open pits as TFs or WRSAs, or the expansion of current waste management facilities, Sabina intends to provide the NWB, as per 2AM-BRP1831 Part B, Item 17, with the following:

- o waste disposal quantities;
- o volumes;
- o disposal timing;
- o maximum pit capacity;
- o effects to pit closure; and
- o appropriate mitigation and monitoring plans.

4.3.1.1 Overburden Management

Overburden will be removed from the surface footprint of the three open pits (quantities as shown in Table 4.3-2). A majority of the overburden materials will be co-disposed of with waste rock in the WRSAs. Depending on the physical characteristics of the overburden material, a portion may be used for the construction of site infrastructure, kept for future revegetation studies/efforts, or used for WRSA cover material. Refer to the WRMP and Borrow Pits and Quarry Management Plan for more details on overburden.

Mining will begin with pre-stripping at the Umwelt Pit in Year -2 (i.e., during Construction). Open pit mining will then transition sequentially to the Llama Pit, and Goose Main Pit. All open pit mining at Goose Property will conclude in Year 8, by which time mining in the Goose Main Pit will be complete.

4.3.1.2 Waste Rock Management

A summary of the location and surface areas of each WRSA is included in Table 4.3-3. Details regarding approximate final waste rock material quantities and source locations are shown in Table 4.3-2. Only waste rock from the open pit mining operations will be deposited in the WRSAs. Waste rock from underground workings will be redeposited in mined-out underground workings. Refer to the WRMP for more details on waste rock.

Table 4.3-3: Waste Rock Storage Area Summary Information

Facility	Approximate Location	Surface Area (ha)
Llama WRSA	200 m southeast of the Llama Open Pit	42.9
Umwelt WRSA	200 m east of the Umwelt Open Pit	28.2
TSF WRSA	1,800 m south of the Goose Main Open Pit	172.6

It is estimated that a total of 86.6 million tonnes (Mt) of waste rock and 6.53 Mt of overburden will be produced, for a total of approximately 93.1 Mt of mining waste. Waste rock and overburden will be co-disposed in the following WRSAs:

- o Umwelt WRSA;
- o Llama WRSA; and
- o TSF WRSA (servicing the Goose Main Pit).

The Umwelt, Llama, and TSF WRSAs will be conventional stockpiles constructed with final side slopes expected to be stable over the long-term. The TSF WRSA is a waste rock storage area created on and around the TSF to support mining of the Goose Main Pit once use of the Llama TF for tailings disposal has been initiated and the supernatant water starts being drained from the TSF.

Results from geochemical characterizations indicated that, after a 75% segregation efficiency is taken into account, approximately 58% of the open pit and underground waste rock is potentially acid generating (PAG) and could potentially produce acidic drainage after a lag time of 14 to 20 years. This lag time is expected to be longer than the amount of time needed for the natural freezing of the PAG rock. In addition, PAG rock will be covered with at least 5 m of non-potentially acid generating (NPAG) rock to reduce oxygen exposure with the PAG material. Geochemical characterization of overburden indicates the material is NPAG.

PAG and NPAG waste rock will be placed concurrently at each WRSA location during Operations such that there will be a 5 m cover of NPAG waste rock over and surrounding the PAG waste rock core. A disposal plan has been developed that maximizes the placement of NPAG waste rock over final PAG lifts during mine operations by using NPAG waste rock sourced directly from the pits. This approach will reduce the amount of dedicated capping that will be required to close out the WRSAs. Overburden will be co-disposed in the WRSAs to minimize the Project footprint, and a portion may also be used for capping material. The Project phases and stages, along with tailings and waste rock disposal is shown in Figure 4.3-1. The Llama and Umwelt WRSAs will be fully constructed and covered with NPAG material by the end of Year 5 such that the majority of final reclamation can be undertaken progressively before the end of the Operations Phase. The exception is TSF WRSA, which will have the majority of waste rock cover placed by Year 6, and then will pause waste rock placement until the TSF supernatant is fully reclaimed through the Process Plant in Year 12. The small outstanding portion of waste rock cover will be placed at the TSF WRSA during Year 12 and 13.

During Operations, runoff from the WRSAs at the Goose Property will be directed to contact water storage ponds, and then to the active Tailings Management Facility. This water will eventually be pumped to the water treatment plant (WTP) for treatment prior to discharge. It is expected that the final WRSAs will be frozen except for an active layer contained within the NPAG cap. Once the WRSAs are capped and permafrost has aggraded into the PAG rock, water quality is expected to improve to acceptable limits for discharge.

4.3.2 Tailings Management

Approximately 12.4 Mt of tailings will be produced over the 12-year LOM. All tailings will be deposited as slurry. Initially, tailings will be deposited in the TSF, which is the only purpose-built Tailings Management Facility on-site. Tailings deposition will transition Llama Open Pit once mining operations have ceased in that location (called Llama TF). The Operations Phase is described in stages according to the tailings storage and water management plans, as follows:

- o Stage 1 – Tailings Storage Facility – For about five years of Operations (Years 1 to 5) this purpose-built TSF will be utilized;
- o Stage 2 – Llama Tailings Facility (Llama TF) – From Year 5 onward, tailings will be disposed of in the mined-out Llama Open Pit.

The majority of the tailings samples from the Goose Property have been characterized as PAG (Rescan 2013; SRK 2015b). As such, tailings in the TSF will be covered with waste rock and overburden material once tailings deposition is complete with a 5-m cover of NPAG material, and the Llama TF will be flooded with a minimum water depth of 5 m for closure to reduce oxidation of the tailings. Refer to the Tailings

Management Plan for further tailings management details and design drawings associated with TSF retaining structures.

4.3.3 Ore Management

There will be one main Ore Stockpile at the Goose Property located southeast of the Process Plant, and temporary stockpiles at the underground laydown area. The Ore Stockpile will contain three sub-stockpiles: low-grade, mid-grade, and high-grade ore. All ore will be processed on-site using conventional gravity concentration and cyanidation techniques. The Process Plants capacity will be 3,000 to 4,000 tpd. Ore will be processed during the Operations Phase only, and runoff from the ore stockpile areas will be collected and managed as site contact water. Refer to the Ore Storage Management Plan for more details.

The ore from all open pits will be recovered using conventional truck and shovel open pit mining methods. The underground mining operations will be carried out using post pillar cut-and-fill mining techniques. Gold doré bars will be produced on-site and then flown off-site for further refinement.

4.3.4 Water Management

Water on the Project will be categorized into three types:

- o Contact water – Water which has been impacted by mineralized materials (waste rock, ore stockpile, pits, underground workings, tailings, etc.). Contact water will be contained in event ponds and Tailings Management Facilities and will be transferred via diversions and pumped pipelines.
- o Non-contact water - Water which is runoff from undisturbed areas. Non-contact water will be diverted off-site through event ponds, pumped pipelines, berms, and culverts.
- o Saline water – Saline groundwater will flow into the Llama Pit and the Umwelt Underground mine. Saline water will be pumped from Llama Pit and the underground facilities and stored in the Saline Water Pond. This water will ultimately be pumped into mined-out underground workings and the bottom of the mined-out Umwelt Pit (then called the Umwelt Reservoir) which will receive a freshwater cover.

Each type of water will be managed separately throughout each Project phase.

A water treatment plant (WTP) will be operational in the open water season at the Goose Property in the Construction Phase to initially dewater Llama and Umwelt lakes to create storage for contact water and saline water, respectively, and to support the mining of Llama Pit. Treatment will be inactive between Years 1 and 4 but will begin again year-round in the Llama TF in Year 5 to reduce metal and total suspended solids (TSS) loading in the facility. This year-round treatment is expected to continue until Year 11, with no water treatment planned during the Closure Phase. As a contingency, the WTP will be maintained for two additional water treatment seasons, should additional water treatment be required. The Goose Property is finally closed in Year 20.

Sabina will undertake significant progressive reclamation activities throughout the mine. Facilities will be decommissioned and removed at the end of their useful life. This will include encapsulation of mine wastes (potentially acid-generating waste rock and tailings) in the TSF WRSA with non-potentially acid-generating rock, backfilling of the Llama Pit with tailings (i.e., becoming the Llama TF), flooding the open pits, and Pit treating out-of-compliance water. To reduce water treatment requirements, the open pits, including Llama TF, will be flooded to mitigate the potential for acid generation and metal leaching.

The Umwelt Pit will be converted to the Umwelt Reservoir by pumping saline water from the Saline Water Pond to the bottom of the pit and allowing site runoff and precipitation to create a freshwater cover on top to create a meromictic lake. The Llama TF and the Umwelt Reservoir will be passively flooded with site runoff and precipitation such that they can become natural outflow systems. The Goose Main Pit will be passively flooded with water from the TSF WRSA in addition to site runoff and precipitation and will also become a natural outflow system. Underground workings at Umwelt will be actively flooded with water from the Umwelt Reservoir, the Umwelt Underground portal will be plugged with waste rock. Underground vent raises will either be closed with waste rock plugs or concrete caps.

The contact water management system will be maintained during the Closure Phase until water quality monitoring demonstrates that water flowing from these facilities is acceptable for direct release to the environment. Once water quality is acceptable for direct release based on criteria established through the water licensing process, dikes/berms/dams will be breached to allow the surface runoff and seepage water to naturally flow to the environment. They will be breached in strategic locations to restore natural surface water drainages. Many berms will be breached during the Operations Phase with the remainder of diversion berms will be breached during Closure. Pipelines will be purged, dismantled, and disposed of as they become redundant.

Breached diversion structures will remain in place beyond the Post-Closure Phase. However, collection ponds will have been breached, liners removed and landfilled, and the areas re-contoured and armoured (if necessary) to allow for passive runoff.

The MLA does not require any pond or diversion infrastructure for water management purposes and will remain in the same condition for both the Construction and Operations phases. A desalination plant produces domestic and industrial water for the MLA, and greywater is discharged to the tundra.

5. Permanent Closure and Reclamation

5.1 DEFINITION OF PERMANENT CLOSURE AND RECLAMATION

Permanent closure is defined as the final closure of a mine site with no foreseeable intent by the existing proponent to return to either active exploration or mining. For the purposes of this Plan, closure activities include the Closure Phase (including Active and Passive Closure stages) during which the site is closed and reclaimed followed by the Post-Closure Phase during which confirmatory monitoring is conducted to ensure closure actions have been effective. Permanent closure indicates that the proponent intends to have no further activity on the site aside from Closure-related activities and Post-Closure monitoring and potential contingency actions. Permanent closure does not, however, preclude the proponent or another party from pursuing opportunities at the existing site or in the area at a time beyond the foreseeable future (MVLWB/AANDC 2013).

An important consideration of permanent closure is the effect of mine closure on employees, contractors, suppliers, and the public, which will be managed and minimized through the Socio-Economic Monitoring Committee (SEMC) and Socio-Economic Monitoring Plan (SEMP). It is Sabina's aim to plan for closure so that adequate notice (if possible, on the order of a year or more) can be given to employees and the public.

Some infrastructure may stay in place should local communities, KIA, GN, federal government bodies, or other appropriate parties choose to take ownership of it. The schedule outlined in this ICRP assumes that all infrastructure associated with the Project will be removed.

5.2 PERMANENT CLOSURE AND RECLAMATION REQUIREMENTS

This sub-section provides the permanent closure and reclamation requirements for each individual component of the Project. The components are categorized in sub-sections for clarity. The specified closure objectives may be revised with subsequent updates to the ICRP but are considered reasonable at this time to guide the advancement of closure planning. For additional details on the water management, water quality predictions, and the mine waste refer to the Water Management Plan and the Mine Waste Rock Management Plan.

Closure and Post-Closure activities will be strategically conducted in a manner that ensures facilities needed for continued closure and reclamation remain available as long as necessary to effectively and efficiently meet Closure objectives. This has strongly influenced the operational and closure sequence of all site facilities such as water management structures (including the WTP) and pits. The closure of the airstrips will also be postponed until a time that remaining activities can be reasonably supported by helicopter (anticipated to be in the Post-Closure Phase) and camp facilities will be progressively closed and replaced with a smaller camp to allow continued accommodation of closure crews until no longer practical. Equipment used for closure activities and long-term maintenance (e.g., trucks, backhoes, etc.) will be disposed of only once they are no longer required. This strategic and sequential closure will be facilitated by the progressive reclamation activities and is an important for minimizing costs associated with Closure. The specific process for the closure of each facility as well as approximate timing is provided in the component-specific subsections below.

The refined mine plan outlined in this ICRP is based on a subset of the previously approved and permitted mine combined with the proposed 2020 Modification Package. This Plan does not currently include Llama Underground, Goose Main Underground, Echo Open Pit, and Echo Underground (PC No. 007 and Type A Water Licence 2AM-BRP1831). However, these original Project components may still be developed in future based on results of continued advancement in detailed engineering and market considerations. In this event, Sabina will update the ICRP as outlined in Part B Item 17 of the Type A Water Licence, 2AM-BRP1831.

See Appendix A, Figure A-02 and Figure A-03 for Project component locations.

5.2.1 Open Pit Mine Workings

5.2.1.1 *Project Component Description*

There will be three open pits at the Project: Umwelt, Llama, and Goose Main. The mine production schedule by deposit is shown in Figure 4.3-1. Open pit mining activities will cease by Year 8 of Operations (i.e., 4 years prior to Closure). Approximate dimensions for the open pits at the end of Operations are provided in Appendix B, Table B-09. Open pit development approach is outlined in the FEIS. Development will take place in a manner that will ensure appropriate levels of structural stability of the pits and annual geotechnical inspections will be conducted under the Thermal and Geotechnical Monitoring Plan and as a requirement of the Licence.

During development, pit seepage will be monitored as outlined in the WMP to verify closure assumptions and conditions. The maximum predicted groundwater inflows for the Llama Pit are up to 900 m³/day. The Umwelt Pit and Goose Main Pit will be developed entirely within permafrost and as such, no groundwater inflows are expected. Further details can be found in the Water Management Plan.

After the open-pit mining is complete and the potential for an extension of the open pit operations has been dismissed, the open pits will be decommissioned progressively during the Operations Phase of the Project. Umwelt Pit and Goose Main Pit will be passively flooded, with a portion of the saline water from the Saline Water Pond pumped to the bottom of Umwelt Pit to create a meromictic lake (becoming Umwelt Reservoir). The mined-out Llama Pit will be used for tailings storage (i.e., becoming the Llama TF), and the deposited tailings will be covered with a water cover at Closure (passively flooded). Passive flooding and partial filling with tailings in the case of Llama TF can be expected to increase the physical stability of the open pits.

Further details on permanent closure requirements for the open pits as well as water management system details can be found in the following sub sections.

5.2.1.2 *Pre-Disturbance, Existing, and Final Site Conditions*

The pre-disturbance surface area of the Umwelt Pit and Goose Main Pit are located on land, whereas the Llama Pit will be developed over a portion of Llama Lake. Goose Main Pit intersects water courses draining to Goose Lake. Appendix A, Figure A-10 presents an aerial photo of the existing site disturbance in the Goose Property area taken in 2019. Aside from some minor impacts from exploration drilling, the existing conditions at the open pit areas are the same as the pre-disturbance conditions.

Descriptions of site conditions at the end of Operations is provided in Section 5.2.1.1, and Section 5.2.4.1 in the case of Llama TF. The ultimate mine development of the Project is shown on Appendix A, Figure A-02. At closure, the open pits and TF will be flooded. Water from the Llama Main TF will be pumped for treatment and returned to the Llama TF until Year 11, at which point water will naturally overflow, as shown on Appendix A, Figure A-07. Once closure and remediation activities are complete, the flooded

open pits/tailings facilities will become new waterbodies on the landscape, as shown on Appendix A, Figure A-09.

5.2.1.3 *Closure Objectives and Criteria*

The closure objectives and closure criteria for the open pit mine workings are listed in Appendix B, Table B-010.

5.2.1.4 *Consideration of Closure Options and Selection of Closure Activities*

A number of reclamation studies were identified in the preliminary MCRP submitted as part of the DEIS. Several of these studies were discussed during the Feasibility Study (FS) and development of the FEIS. A brief description of the closure activities considered for the open pits is provided below along with the rationale for the selection of the closure activity described in this Plan. For more details see the Project Feasibility Study Report (JDS 2015) and FEIS (Sabina 2015b).

Open Pit Filling and Flooding

The available water for active pit flooding at the Goose Property from Goose, Propeller, and other lakes was evaluated. The study showed that sufficient water would be available for active pit flooding. The water balance completed for the Project (SRK 2020) confirms that, under average hydraulic conditions, all open pits will be passively flooded during the late Operations or the Active Closure Stage and that active pumping is not required. During Sabina's Feasibility Study, the financial and technical considerations of active filling were considered, and it was decided, due to the limited pumping window (primarily freshet) and the associated costs, active filling was not a preferred option. Sabina is confident that without active pumping, the projected water quality results and the proposed flooding timelines will be met.

During Operations, if water quality and acid rock drainage (ARD)/metal leaching (ML) testing results do not align with the projected water balance results, Sabina may reconsider active pumping. If in the future active pumping were to be considered, Sabina notes that this water would be drawn from local freshwater sources. As such, there could be potential effects associated with significant water withdrawal from freshwater bodies. Sabina will weigh these potential water withdrawal effects with updated water quality projections and work with regulatory bodies to ensure that any potential overall effects were minimized as much as feasible.

The potential to backfill any of the pits with waste rock, and the additional option to backfill open pits with tailings was also evaluated. Details of this analysis are found in the Multiple Accounts Analysis submitted in the FEIS Information Request Response Package (Sabina 2016). The passive flooding of the pits was evaluated during the Feasibility Study (JDS 2015) and the waste management strategy selected involves using both Llama Pit to hold tailings. Once mining in Llama Pit is complete, Llama Pit will operate as a tailings facility (Llama TF). At Closure of Llama TF, the deposited tailings will be covered with a water cover which is sufficiently deep to avoid resuspension of tailings solids. Flooding will include passive flooding with site runoff and direct precipitation.

During Operations, the mined-out Umwelt Pit will be converted to a water reservoir (Umwelt Reservoir). A portion of the Saline Water Pond will be pumped to the bottom of Umwelt Reservoir to create meromictic conditions. Umwelt Reservoir will be passively flooded during late Operations with site runoff and precipitation such that it can become a natural outflow system.

The flooding of the Umwelt Pit and Goose Main Pit, as well as Llama TF will reduce the exposure of high pit walls that might otherwise pose an acid generating and metal leaching risk.

Open Pits Geotechnical Stability

The open pit slopes are designed to be stable under operating conditions. During pit development, a pit wall monitoring program, including geotechnical structural mapping, will be implemented to confirm design assumptions and to rapidly detect any unexpected condition for follow-up and identify the adaptive measures to be undertaken. It is also noted that the partial backfilling with tailings (of Llama TF) and the flooding of all three open pits will both increase stability.

Based on the aforementioned activities, no additional closure activities (i.e., re-grading of slopes, erosion protection, revegetation, etc.) have been evaluated for increasing the stability of the pit walls after Closure.

Open Pit Perimeter – People and Wildlife Protection

The open pit may be hazardous to wildlife species as they may be injured by inadvertent access. Environmental design features and mitigation, as well as current wildlife management practices used in other mining projects, will be implemented at the Project to limit wildlife access and injury.

A setback line will be defined in accordance with rock mechanics studies conducted for pit stability. Rock berms will be constructed around each of the open pits outside of the setback line where residual slopes will exist above the final flood levels to reduce inadvertent human and wildlife access to dangerous or potentially unstable slopes. The construction of the rock berms will be mostly completed during Operations as progressive reclamation; the remainder of the perimeter berm will be completed during the Active Closure Stage. The rock berms were selected over fences based on feedback received from communities and reviewers in regard to concerns relating to wildlife safety.

5.2.1.5 Engineering Work Associated with Selected Closure Activity

Guidance on engineering work options or strategies for the closure of open pits is provided in MVLWB/AANDC (2013). The relevant engineering works associated with the permanent closure activities for the open pit mine workings are discussed below.

Mine dewatering infrastructure (i.e., pumps, pipelines and power sources) within the open pits will be either hauled to surface for reuse, or drained of fluids and left in place at the bottom of the pits prior to backfilling with tailings and/or passive flooding. The open pits and TF will be passively flooded such that they can become natural outflow systems. Flooding will provide an adequate depth of water cover over tailings deposited in the Llama TF. Flooding will also ensure adequate meromictic conditions in Umwelt Reservoir and will in all cases reduce the exposure of high walls that might pose an acid generating and metal leaching risk.

In addition, water within the Llama TF will be treated to reduce metal and suspended solids loading in the facility starting in Year 5 and ending in Year 11. Water treatment will be undertaken year-round during the Operations Phase with contingency treatment available during the Closure Phase, if required.

All of the pits will be progressively reclaimed, starting during the Operations Phase if practical, by either flooding or by partially filling with tailings followed by passive flooding. Passive pit flooding times were estimated by SRK (SRK 2020), assuming flooding commences at as soon as possible to reduce overall passive flooding requirements in Closure. Based on average hydrological conditions, Llama TF and Umwelt Reservoir will overflow by Year 11, and Goose Main Reservoir will overflow by Year 13. The engineering works associated with the progressive closure activities for the open pits are described in Section 6.2.1.

The assumptions made in preparing the Plan for pit closure include:

- o Average hydrologic conditions (based on baseline hydrology and meteorology data) persist into the mining and closure periods;
- o About 6.7 Mm³ of tailings will be stored in Llama TF; and
- o Overburden slopes around pit perimeters will be managed for stability during pit development so that additional reclamation work will not be required at Closure. This includes possible cladding of these slopes for thermal stability, if necessary.

All open pits will be allowed to flood naturally in order to submerge as much of the pit walls as possible. Throughout both the Active and Passive Closure stages, water quality monitoring will occur at strategic control points to ensure closure criteria are being met. Monitoring locations at flooding mined-out pits will include the closed-out Llama TF, Umwelt Reservoir, and Goose Main Reservoir. Monitoring will also occur in Goose Lake to ensure that discharge requirements are being met.

Non-contact water diversion berms around Llama Pit and Goose Main Reservoir will be breached during Operations. There will be no non-contact water diversion berm around the Umwelt Pit. Spillways will be excavated at Umwelt Pit and Goose Main Pit; natural drainages exist at Llama Pit. Each flooded pit and TF will discharge to the environment on a seasonal basis. Discharge locations for the Goose Property are shown as breach locations on Appendix A, Figure A-07.

Predictions of open pit and TF overflow water quality were developed by SRK (SRK 2020). It is expected that the overflow water discharged from the flooded pits and Llama TF will meet MDMER Schedule 4 limits and all applicable limits outlined in the Licence at the time of flooding.

Results of the water balance indicate that, based on passive flooding commencing as early as Year 5, Llama TF and Umwelt Reservoir will be flooded by Year 11, and Goose Main Reservoir will be flooded by Year 13, under average hydrological conditions (see Figure 4.3-1). Based on lag time calculations completed for the waste rock, it is possible that acidic conditions could develop in some of the PAG rock that is exposed in the pit walls. This was taken into account in developing water quality predictions for the flooded pits (SRK 2015b). Nonetheless, results from the water and load balance indicate that water from these pits will meet applicable discharge criteria which will enable passive discharge into nearby watercourses. In addition, passive flooding is planned to start early during Operations once each facility is no longer required, potentially reducing exposure durations and cumulative loadings.

Water from Llama TF will be treated throughout the Operations Phase until closure objectives have been met, which is expected to be in Year 11. Additional details on geochemical pit wall characterization can be found in the SRK Water and Load Balance Report (SRK 2020).

In summary, the closure measures for each pit or TF are as follows:

- o **Umwelt Reservoir** – In Year 5, the exhausted Umwelt Pit will be converted to a water reservoir during the Operations Phase. The bottom of Umwelt Reservoir will be partially filled with saline water pumped from the Saline Water Pond to form meromictic conditions. The Umwelt Reservoir will continue to passively flood, reaching capacity in about Year 11. Overflow from the Umwelt Reservoir is expected to meet discharge requirements without water treatment.
- o **Llama TF** – After open pit mining of the Llama Pit concludes, it will be used to store tailings in Years 5 to 12. The pit will then be allowed to passively flood. Water in the TF will be continuously treated and returned back to the TF starting in Year 5 until Year 11. The Llama TF is expected to meet discharge requirements in Year 11 and throughout Post-Closure and beyond.

- o **Goose Main Reservoir** – Mining of the Goose Main Pit will conclude in Year 8, after which it will then be allowed to passively flood reaching capacity in about Year 13 (early in the Closure Phase). The flooded pit is expected to meet discharge requirements without water treatment.

Specifically for Llama TF, based on site data and ongoing monitoring collected during Operations, adjustments may be required by Sabina to the site water management strategy in this area to ensure the Llama TF supernatant meets water quality objectives for reconnection to the receiving environment. The most logical adjustment identified, which will be confirmed during Operations data collection, would be maintaining the contact and non-contact water infrastructure around the Llama Pit to reduce the amount of natural recharge collecting in the Llama TF, or pumping a portion of the Llama TF supernatant water volume to Goose Main Reservoir. Any approach would be implemented to ensure that MDMER requirements are being met and would be supported with the circular water treatment strategy being used during Operations at this mined out pit.

Sabina will be conducting more field characterization studies in support of final design of the infrastructure, and further characterization in the form of percolation testing will be carried out immediately prior to construction of the Saline Water Pond under the Thermal and Geotechnical Monitoring Plan. This information from the field characterization will verify that the design meets the required intent of managing seepage through both the foundation and the body of any of the Saline Water Pond containment structures. If, based on this additional characterization, Sabina believes that there remain areas where seepage could occur, Sabina will install the necessary monitoring instrumentation to confirm the performance of these structures as part of its thermal and geotechnical monitoring program. As required by the Licence, final facility design will be documented and submitted to the NWB prior to and following construction.

Monitoring of the water quality at control points across the site and in each pit will be important prior to the time at which each pit is expected to overtop to establish that the water can be passively discharged. In the unlikely event that the water in any open pit facility is not suitable for discharge, the water could be batch treated in-pit or at the WTP to address any remaining water quality impairments.

5.2.1.6 *Predicted Residual Effects*

The flooded open pits will be a permanent feature on the landscape. The following residual effects were predicted at the open pits after reclamation:

- o The extent of the effect on terrain, soil quantity, and vegetation communities will consist of approximately 25 ha of residual ground disturbance associated with the flooded open pits. This area excludes the majority of Llama Pit, which will be located in Llama Lake.
- o Flooding of open pits at Closure will result in the retreat of permafrost away from the flooded pit areas. In the case of Umwelt and Goose Main reservoirs, this may result in the formation of through taliks, connecting the surface hydrological regime with the sub-permafrost hydrogeological regime. It is noted that a through talik likely already exists under Llama Lake and will continue to exist after flooding.
- o Water quality changes (e.g., increased concentrations of arsenic, copper, and explosives residues) predicted in the updated Water and Load Balance Report (SRK 2020) may last into Closure and Post-Closure phases for some waterbodies, although levels will steadily decrease.
- o Although wildlife species will be discouraged from using the flooded open pits, some may still do so and they could potentially ingest surficial water.

The operation of the mine will have no long-term effect on the surface albedo; therefore, the effect of solar heating will be the same as on the surrounding landscape. No significant long-term residual effects were identified as part of the FEIS for the open pits despite the creation of new waterbodies. The Post-Closure impacts of these features are expected to be negligible.

5.2.1.7 *Uncertainties*

The following uncertainties were identified during closure planning for the Project open pits.

Water Quality

While surficial water quality within the flooded open pits (with the exception of Llama TF) is predicted to meet requirements for direct discharge to the environment at or before Closure, actual water quality conditions will not be known with certainty until flooding is complete. Water within the Llama TF will be treated until water quality meets requirements for direct discharge, which is predicted to occur in Year 11, but will be confirmed during late Operations. However, Section 5.2.1.9 of this ICRP includes contingencies to minimize this potential risk.

Geotechnical Stability

The open pit slopes are designed to be stable under operating conditions, but the walls of the open pits will have been exposed for a number of years during mine operations, and some weathering will have occurred and there will be changes to the slope conditions. Therefore, the long-term stability of the open pit walls represents an uncertainty in closure planning design. Nonetheless, the partial backfilling of the Llama with tailings, together with the flooding of all open pits, will have a positive effect on long-term stability.

A much better understanding of these uncertainties will be gained by observing the behaviour of the slopes during active mining, and also from the physical inspection to be carried out during Operations and Closure. In addition, Closure monitoring will add insight about the likely long-term behaviour of the slopes. If this indicates potential problems, the rock berm(s) wall can be relocated further from the pit rim.

5.2.1.8 *Post-Closure Monitoring and Maintenance*

The Post-Closure monitoring and maintenance program will be implemented following the Closure Phase described above. Post-Closure monitoring and maintenance for the open pit mine workings is discussed in the following sections, along with the reporting requirements. Some of the sections below are general and apply for the other Project components as well.

The ICRP is a “living” document and includes a commitment to adaptive management and monitoring during all stages of the mine life to demonstrate the safe performance of the mine facilities and to minimize any contamination on the site or in the adjacent area after mine operations cease. Monitoring during Operations and in Closure will identify non-compliant conditions; allow timely maintenance and clean up as needed; allow timely planning for adaptive and corrective measures; and enable successful completion of the ICRP. In this way, the Project is not anticipated to contribute residual contaminants to the environment after the Closure Phase.

Monitoring programs will be initiated during Construction and Operations to provide additional baseline information on which to base the Final Closure and Reclamation Plan. The adaptive management plans to be used in Closure and Post-Closure will follow the actions completed during Operations, and will be coordinated with the operational monitoring programs (e.g., Aquatic Effects Monitoring Plan (AEMP) and

Environmental Management and Protection Plan) to set appropriate trigger levels, and mitigation plans and actions.

Monitoring and maintenance programs that are implemented during the Closure and Post-Closure phases of the mine life will use the data collected during operational monitoring to assess the performance of the reclamation and closure procedures, and to identify long-term maintenance requirements, if any. The data collected during Post-Closure monitoring will allow the procedures and activities to be adjusted or modified as necessary to confirm ongoing environmental protection.

Operational Monitoring Strategies

The overall objectives during Operations are to provide programs to identify and mitigate potential adverse Project-related impacts so that construction and operational activities do not cause any undue harm to water quality, sediment quality, vegetation, biota, wildlife, and wildlife habitats. The AEMP provides the basis for integrating aquatic monitoring efforts with future revisions to the Closure and Reclamation Plan to verify compliance with regulatory instruments and agreements, both federally and territorially.

The AEMP and other operational plans would be reviewed and updated in the final year of Operations to reflect conditions at the site as the mine approaches closure. The changes would allow the basic portions of the plans to continue to be used to cover the Closure period activities. Finally, as the Closure Phase effort is completed and the Post-Closure Phase begins, the management and monitoring plans would be reviewed and updated again to cover the long-term (Post-Closure) monitoring period. It is anticipated in time it may be practical to reduce monitoring to a minimum in the Post-Closure Phase. Requirements of the MDMER would be adhered to.

Closure and Post-Closure Strategies

Development of monitoring and maintenance programs is an iterative process in consultation with communities and regulators as the Project advances. The Closure and Post-Closure monitoring and maintenance programs will be extensions of efforts undertaken during the Operations Phase and would reflect the success of the management of the site during Operations to limit contamination. The actual conditions or impact from the Operations within the mine footprint would be understood at Closure and this information would be used to modify monitoring plans moving to Closure and Post-Closure.

Closure and Post-Closure monitoring and maintenance will be carried out at a reduced frequency depending on the results of the monitoring and the measures of success selected for closure.

The following presents the relevant monitoring and maintenance strategies for the planned open pit facilities during Closure and Post-Closure (further guidance on generic monitoring and maintenance programs for Closure and Post-Closure is provided in MVLWB/AANDC [2013]):

- o visual inspections of the reclaimed areas;
- o identify unstable areas;
- o check stability of pit walls and overburden slopes above the pit water level at the start of the post-closure period to confirm the slopes are stable and that conditions remain as predicted;
- o sample surface water and profiles of flooded pits;
- o identify and test water management points (including seepage) that were not anticipated; and
- o inspect remaining barriers such as breached berms.

Water quality monitoring will occur at each open pit/tailings facility until water quality objectives are met at which time they would be allowed to overflow. It is anticipated that after five years in the Post-Closure Phase, monitoring would no longer be required. The Closure and Post-Closure monitoring described above will determine the long-term maintenance that would be required for the Post-Closure Phase. Sabina notes that an allowance for long term monitoring beyond the Post-Closure Phase (e.g., Post Closure (i.e., years 1 to 5, 7, 10, 15, 25 beyond Post-Closure) has been included in the cost estimate.

5.2.1.9 *Contingencies*

Any additional water needed for dilution or water covers for the open pits will be available from Goose Lake or potentially Big Lake (SRK 2020).

Although treatment of water in the Llama TF is predicted to cease in Year 11, the WTP will be maintained at minimum until discharge criteria are met, complete flooding is achieved, and overflow to the environment occurs. As a contingency, the WTP will be maintained for two additional water treatment seasons, should additional water treatment be required.

The need for water treatment will be ultimately analyzed prior to open pit overflow. Prior to flooding of the open pits, the quality of surface water and any groundwater seepage reporting from the pit walls will be sampled to assess potential for contamination of the pit water during flooding. In addition, the surface water and profiles of the flooded pits and tailings facilities will be sampled. If the results of water quality monitoring indicate that water in the flooded open pits is not suitable for direct discharge, the following alternatives will be considered as contingencies for the treatment of the flooded pit water:

- o in-pit treatment; and
- o pumping to the WTP for active treatment prior to discharge into the receiving environment.

As a contingency, Sabina is including an alternative option for closure of future TFs that aligns with the TSF closure strategy; namely, a 5-m cover of NPAG waste rock and overburden material could be placed over a tailings-filled open pit. The supernatant water in the pit would be reclaimed to the Process Plant once the tailings space was exhausted in the TF, and then waste rock would be placed over the exposed tailings surface, comparable to the TSF closure.

As with all WRSAs, thermistors will be installed in each WRSA to monitor the rate of freeze back and permafrost development progress in the facilities during the Operations Phase. The locations for the thermistors and monitoring schedule will be determined during the final detailed design stage and confirmed during Operations. Should Sabina choose this closure option for TFs, all applicable management plans, including the ICRP, will be updated to reflect these changes, and Sabina will adhere to all appropriate requirements of the Back River Project Certificate (PC No. 007) and the Type A Water Licence (2AM-BRP1831).

5.2.2 **Underground Mine Workings**

5.2.2.1 *Project Component Description*

The Umwelt Underground will be spatially located below Umwelt Pit; however underground access will be from a portal and ramp system outside of the open pit itself. Underground mining activities will occur from Year -3 to Year 9, as per the mining schedule in Figure 4.3-1. The Umwelt underground will extend to 900 m depth. Figure A-12, in Appendix A, shows the design of the underground operations. The Underground access portal location is shown on the Goose Property general arrangement plan provided

in Appendix A, Figure A-02. The location of the portal was chosen such that environmental offset limits from streams and lakes were maintained.

The post pillar cut-and-fill method was selected for the Umwelt deposit, which requires backfill to maintain ground stability and to provide a work base for the equipment on the next cut above. The primary source for backfill material is planned to be development waste from the underground mine. In the Umwelt Underground, there will be a net shortage of backfill material. The shortfall will be made up by utilizing potentially acid-generating waste rock from the open pit operations.

Ventilation systems, consisting of fresh air raises and main fans, for the Project underground operations have been designed to dilute and remove dust, diesel emissions, and blasting fumes, and to thus maintain compliance with Nunavut mine regulations. Based on ventilation modelling results, a twinned 4-m diameter Fresh Air Raise (FAR) system would be required at Umwelt Underground. In addition, a 4-m diameter Exhaust Air Raise (EAR) system will be required midway down the Umwelt deposit.

Groundwater inflows are expected at Umwelt Underground mine, and these inflows are expected to be saline. Inflows are anticipated where mine workings extend below the base of permafrost, which correlates to about 320 to 350 mbgs. In mining areas above the permafrost, no groundwater inflows are expected. The predicted groundwater inflow rates at the cessation of underground mining at Umwelt 400 m³/d in Year 9.

During Operations, thermal and inflow monitoring will be undertaken to verify predictions and the ability of underground workings to manage saline groundwater and minimize the impacts to permafrost, soil, surface water, vegetation and wildlife. This monitoring will be undertaken through the Thermal and Geotechnical Monitoring Plan and the Saline Water Management Plan.

After the underground mining is completed and the potential for an extension of the underground operations has been dismissed, dewatering will cease and the underground workings at Umwelt will be flooded with water from the Saline Water Pond.

5.2.2.2 *Pre-Disturbance, Existing, and Final Site Conditions*

The surface area associated with the underground workings are limited to an access portal and vent raises. The pre-disturbance underground site conditions based on baseline data collection programs are summarized in Section 2. Appendix A, Figure A-10 presents an aerial photo of the mine site area taken in 2019.

The existing conditions at the Umwelt portal area is the same as the pre-disturbance conditions.

A description of site conditions at the end of Operations is provided in Section 5.2.5.1. The ultimate mine development of the Project is shown on Appendix A, Figure A-02. Once closure and remediation activities are complete, there will be no new features due to underground mining on the landscape, as shown on Appendix A, Figure A-09.

5.2.2.3 *Closure Objectives and Criteria*

The closure objectives and closure criteria for the underground mine workings are listed in Appendix B, Table B-011.

5.2.2.4 *Consideration of Closure Options and Selection of Closure Activities*

Backfilling the portal with waste rock and capping the vent raises is considered to be the only viable option for eliminating access to the underground mine workings.

As part of the Feasibility Study (JDS 2015), water management for the Project was optimized to reduce the surface disturbance footprint, and pumping from the Saline Water Pond to the underground workings was preferred over allowing workings to flood passively with groundwater inflows.

5.2.2.5 *Engineering Work Associated with Selected Closure Activity*

Guidance on generic engineering work options or strategies for closure of underground mine workings is provided in MVLWB/AANDC (2013). The relevant engineering works associated with the permanent closure activities for the underground mine workings are discussed below:

- o surface openings will be sealed: the portal will be backfilled with NPAG waste rock, and the vent raises will be capped with concrete to eliminate access to the underground mine workings;
- o any equipment or infrastructure left underground will be cleaned, drained of fluids, inspected, and remediated as appropriate to eliminate the risk of contaminant leakage;
- o hazardous materials (fuels, oils, glycol, batteries, explosives, etc.) will be removed and disposed at an approved disposal facility;
- o contamination associated with vehicle and equipment fuelling areas will be identified and remediated;
- o disturbed surface areas will be re-contoured to stabilize and establish positive natural drainage patterns and blend in with the surrounding topography to the extent possible;
- o un-used explosives will be consumed on-site or removed and shipped off-site;
- o areas with excessive hydrocarbon contamination will be removed and cleaned in the on-site landfarm if appropriate; and
- o the underground workings will be flooded with water from the Umwelt Reservoir within approximately 1 year of completion of mining.

5.2.2.6 *Predicted Residual Effects*

No significant long-term effects have been identified for the underground mine workings. After Closure, the only surface expression of the underground workings will be the vent raise rock fill pads, and the backfilled portal and ramp leading to the portal. It is expected that the temperature of the underground mine workings will return to that of the pre-existing permafrost. The Post-Closure impacts of these features are expected to be negligible.

5.2.2.7 *Uncertainties*

The long-term stability of the Umwelt crown pillar will be a function of the final dimensions (i.e., stope width and crown pillar thickness) as well as actual local bedrock conditions and the extent of backfilling. A rock mechanics study will be carried out at the end of underground mining to determine if any potentially unstable crown pillar exist and to specify any remedial actions if necessary.

There are currently no other identified uncertainties associated with the closing of the surface openings to the underground or flooding the underground works.

5.2.2.8 *Post-Closure Monitoring and Maintenance*

The overall Post-Closure monitoring and maintenance program for the Project are discussed in Section 5.2.1.8. The following presents the relevant monitoring and maintenance strategies for the underground mine (further guidance on generic monitoring and maintenance programs for Closure and Post-Closure is provided in MVLWB/AANDC [2013]):

INTERIM CLOSURE AND RECLAMATION PLAN

- o visual inspections of the reclaimed areas (specially at and around the backfilled portal and closed vent raises);
- o check for surface expression (subsidence) of underground failure;
- o periodically backfill areas of subsidence as required; and
- o instrumentation for groundwater monitoring will be placed in vent raises or manways as mining operations is completed to allow for Post-Closure monitoring of flooding.

5.2.2.9 Contingencies

If crown pillar or shallow drifts collapse back to surface resulting in subsidence, then the subsidence area will be backfilled to grade with waste rock. If subsidence continues, the area will be delineated with a rock berm and signs will be posted warning of the subsidence area.

5.2.3 Waste Rock Storage Areas

5.2.3.1 Project Component Description

The storage design requirement for the Project is approximately 6.5 Mt of overburden, 50.4 Mt of PAG waste rock, and 36.2 Mt of NPAG waste rock. Approximately 1.5 Mt of PAG waste rock has been slated for use as underground mine backfill. Approximately 58% of the waste material to be generated by the Project is anticipated to be PAG. Suitable NPAG waste rock is planned to be used for road construction, laydown areas, and for construction of the TSF Containment Dam. The remaining waste rock and the overburden will be co-disposed in the WRSAs.

The Llama and Umwelt WRSAs will be fully constructed and covered with NPAG material by the end of Year 5 such that the majority of final reclamation can be undertaken progressively before the end of the Operations Phase. The exception is the TSF WRSA, which will have the majority of waste rock cover placed by Year 6, and then will pause waste rock placement until the TSF supernatant is fully reclaimed through the Process Plant in Year 12. The small outstanding portion of waste rock cover will then be placed at the TSF WRSA during Year 12 and 13. The Project phases and stages, along with waste rock disposal scheduling is shown in Figure 4.3-1.

The planned WRSA locations are shown in Appendix A, Figure A-02. To reduce haul distances, there will generally be a separate WRSA for each open pit, with the exception of waste rock from Goose Main Pit which will be placed on the decommissioned TSF (TSF WRSA, see Section 5.2.4). The WRSA layouts were designed with the following basic criteria:

- o Depending on the potential to generate acid, waste will be segregated into three categories: overburden, NPAG waste rock, and PAG waste rock.
- o PAG material will be encapsulated within the WRSA, beneath a 5-m cap of NPAG cover material with some overburden. The intention is that the active zone will remain within the NPAG cover and will not penetrate into the PAG material, which will ultimately remain permanently frozen. A waste rock disposal schedule was developed to confirm there will be sufficient run-of-mine (ROM) NPAG material to achieve the 5-m cap over the PAG waste. There will be minimal rehandling of waste rock during Closure to place the NPAG cover over the PAG materials.
- o 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. Alternately, overburden may be used during reclamation.

- o PAG material has been shown to not react rapidly and thus the need for placing the PAG to achieve seasonal freeze back is not mandatory. As such, placement of PAG material can be driven by reasonable operational lift thicknesses, as defined by hauling equipment.
- o Waste rock storage areas will be located to minimize flow-through drainages, and diversions will be constructed to minimize surface runoff entering WRSAs.
- o Some PAG material will be placed underground as backfill for ground stability, which will provide containment and ultimate freeze back of the backfilled waste material.

Approximate dimensions for the WRSAs at the end of Operations are provided in Appendix B, Table B-012.

The waste rock disposal criteria, specifically the PAG waste rock disposal criteria, was developed based on thermal models that considered average freezing and thawing depths of waste rock calculated using climactic inputs from representative regional climate stations, thermistors installed on-site, and typical material parameters. The active freezing layer depth of the storage areas ranges from approximately 1.3 to 4.2 mbgs; due to the presence of salinity of some surficial groundwater, the active layer may take up to 60 days to refreeze in some areas.

PAG and NPAG waste rock will be placed in lifts in order to maximize stability and promote aggradation of permafrost. The WRSAs will be stockpiles constructed with final overall slopes at 3H:1V or less. The WRSAs are expected to be stable over the long-term, and no additional regrading will be carried out at Closure. It is expected that the final WRSAs will be frozen except for an active layer within the NPAG cap. Since the final covers will mostly be applied during the Operations Phase, it will be possible to monitor the aggradation of permafrost and improvements in the quality of runoff through the Operations and Closure phases prior to allowing release. It is anticipated that the surface of the facilities will revegetate naturally over time.

Permafrost monitoring to monitor and mitigate impacts from WRSAs will be undertaken under the Thermal and Geotechnical Monitoring Plan. Geotechnical monitoring will also be conducted under that plan to mitigate impacts on sensitive landforms. Sabina will undertake additional geotechnical investigations as required to identify sensitive landforms, modify engineering design for project infrastructure and develop and implement mitigation and monitoring measures to prevent or minimize impacts of the Project's activities and infrastructure on sensitive landforms. To limit the potential impacts to the receiving environment from contact site water associated with waste rock storage areas will be managed in accordance with the Site Water Monitoring and Management Plan

Refer to the Mine Waste Rock Management Plan for further details on waste rock scheduling and possible contingency measures.

5.2.3.2 *Pre-Disturbance, Existing, and Final Site Conditions*

The pre-disturbance surface areas of the Umwelt and Llama WRSAs are located on land. Waste rock from the Goose Main Pit which will be place on the TSF is addressed in Section 5.2.4.2 (Tailings Management Facilities). The pre-disturbance site conditions based on baseline data collection programs are summarized in Section 2. Appendix A, Figure A-10 presents an aerial photo of the mine site area taken in 2019. The existing conditions at the WRSA sites are the same as the pre-disturbance conditions.

A description of site conditions at the end of Operations is provided in Section 5.2.3.1. The ultimate mine development of the Goose Property is shown on Appendix A, Figure A-02. Once closure and remediation

activities are complete, the natural re-vegetated WRSAs will be new features on the landscape, as shown on Appendix A, Figure A-09.

5.2.3.3 *Closure Objectives and Criteria*

The closure objectives and closure criteria for the WRSAs are listed in Appendix B, Table B-013.

5.2.3.4 *Consideration of Closure Options and Selection of Closure Activities*

As part of the FEIS, a comprehensive Waste Management Multiple Accounts Analysis (MAA) report on the mine waste rock and tailings disposal alternatives was prepared. The detailed report was included as an appendix to the Information Request Responses (Sabina 2016). The criteria used to evaluate the alternatives included closure considerations such as management of ARD/ML potential and landowner opinion and relative preferences. The waste rock management presented in this document is the one recommended in the MAA report.

The proposed 5-m NPAG waste rock cover has been selected based on thermal modelling and water quality predictions carried out to date to assess the chemical stability of the WRSAs in the short and long terms (including long-term predictions of climate change). 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. The cover design will be confirmed in the next phases of design and during Operations as the covers will be progressively placed.

Construction/development of WRSAs with long-term stable slopes is the most appropriate closure plan for physical stability. No other options were considered.

5.2.3.5 *Engineering Work Associated with Selected Closure Activity*

Guidance on engineering work options or strategies for closure of WRSAs is provided in MVLWB/AANDC (2013). The relevant engineering works associated with the permanent closure activities for the WRSAs are discussed below.

As mentioned in Section 5.2.3.1, Llama and Umwelt WRSAs will be fully developed by Year 5 and the TSF WRSA will be mostly developed by Year 6. A small volume of PAG waste rock will be required as backfill for underground operations during Operations, but otherwise, the majority of final NPAG waste rock capping can be carried out during the Operations Phase as a progressive reclamation measure, with the final small portion associated with TSF WRSA being placed by Year 13.

PAG and NPAG waste rock will be placed concurrently during Operations such that there is a 5-m cover of NPAG waste rock surrounding and over the final PAG waste rock-containing core. A disposal plan has been developed that maximizes the placement of NPAG waste rock over final PAG lifts during mine operations by using NPAG waste rock sourced directly from the open pits. This approach will reduce the amount of dedicated capping that will be required, both during Operations (as progressive reclamation) and in the Closure Phase. Overburden will have been co-disposed in the WRSAs and a portion may also be used for capping material.

Based on thermal models, the active layer depth of the WRSAs will range from approximately 1.3 to 4.2 mbgs; the active layer may take up to 60 days to refreeze in some areas. The WRSAs are expected to be stable over the long-term, and no additional re-grading will be carried out at closure.

5.2.3.6 *Predicted Residual Effects*

The WRSAs will be permanent features on the landscape. Active revegetation of the coarse rock cover is not practical as they cannot support vegetation, however the WRSAs may be naturally colonized by plants over the subsequent decades. The Post-Closure impacts of these features are expected to be negligible.

5.2.3.7 *Uncertainties*

The following uncertainties have been identified during closure planning of the WRSAs:

Permafrost Development

The thermal conditions within the WRSAs and the performance of the closure cover will depend on the actual waste placement plan and schedule, initial waste temperatures when placed, and thermal conditions of the original ground before the waste materials are placed. Therefore, thermistors will be installed in each WRSA to monitor the rate of freeze back and permafrost development progress in the facilities during the Operations Phase. The locations for the thermistors and monitoring schedule will be determined during the final detailed design stage and confirmed during Operations and the monitoring program will be defined in the Thermal and Geotechnical Monitoring Plan.

Revegetation Considerations

Active revegetation of the Property as part of closure is not planned given the cold climate setting of the Project as well as the precedents that have been established for mine closure in Nunavut. With respect to the WRSAs, the extent and coarse rock nature of the cover material makes any revegetation measures particularly unsuitable.

5.2.3.8 *Post-Closure Monitoring and Maintenance*

Guidance on generic monitoring and maintenance programs for Closure and Post-Closure is provided in MVLWB/AANDC (2013). The overall Post-Closure monitoring and maintenance program for the Project are discussed in Section 5.2.1.8. The following presents the relevant Post-Closure monitoring and maintenance strategies for the WRSAs:

- o periodic inspections will be performed by a geotechnical engineer to visually assess stability and performance of the WRSAs (including the TSF embankments);
- o ground conditions in the WRSAs will be monitored to confirm permafrost conditions are being established as predicted;
- o thermistor data will be monitored to determine thermal conditions within the WRSAs to confirm predicted permafrost aggradation/encapsulation;
- o water quality and water volumes from controlled discharge points around the WRSAs will be monitored to confirm that drainage is performing as predicted and is not adversely affecting the environment; and
- o any water discharge areas that were not anticipated will be identified and monitored for seepage volume and quality.

Ground temperature and water quality monitoring will be undertaken at each WRSA throughout Closure under the Thermal and Geotechnical Monitoring Plan. Further details on the contact water management system in Closure is presented in Section 5.2.9.

5.2.3.9 Contingencies

It should be noted that conservative estimates of NPAG to PAG ratios were used for designing of WRSAs and for predicting water quality of seepage and runoff. A geochemical model will be developed during Operations to refine water quality predictions for the WRSAs prior to Closure.

Cover design will be confirmed through further modelling and through monitoring of temperatures, completion of energy balance on model inputs during the freeze-back period, and monitoring of permafrost aggradation and active layer thaw in WRSA. Since most final covers will be applied during the Operations Phase, it will be possible to monitor the aggradation of permafrost and improvements in the quality of runoff through the Operations and Closure phases. While it is expected that the WRSAs will be substantively closed during Operations, a monetary allowance has been made to account for some final WRSA capping.

Mine waste rock will be monitored during Operations under the WRMP, and in the event that the ratio of PAG to NPAG waste rock might be different than expected, specifically should a higher volume of PAG material be encountered during mining compared to the currently estimated volume contingencies have been identified in the WRMP. These include the potential use of a geosynthetic liner, disposal of a portion of PAG material in exhausted open pits upon closure or sourcing additional NPAG material locally.

As a contingency, Sabina is including an alternative option for closure of future TFs that aligns with the TSF closure strategy; namely, a 5-m cover of NPAG waste rock and overburden material could be placed over a tailings-filled open pit. The supernatant water in the pit would be reclaimed to the Process Plant once the tailings space was exhausted in the TF, and then waste rock would be placed over the exposed tailings surface, comparable to the TSF closure.

As with all WRSAs, thermistors will be installed in each WRSA to monitor the rate of freeze back and permafrost development progress in the facilities during the Operations Phase. The locations for the thermistors and monitoring schedule will be determined during the final detailed design stage and confirmed during Operations. Should Sabina choose this closure option for TFs, all applicable management plans, including the ICRP, will be updated to reflect these changes, and Sabina will adhere to all appropriate requirements of the Back River Project Certificate (PC No. 007) and the Type A Water Licence (2AM-BRP1831).

5.2.4 Tailings Management Facilities

5.2.4.1 Project Component Description

The tailings management system will entail deposition of 12.4 Mt of tailings at two separate locations. The tailings from the initial approximate five years of production will be deposited in a purpose-built TSF located about 2 km south of the Goose Main Pit. Tailings deposition will then transition to in-pit deposition into the mined-out Llama Pit (referred to as Llama TF) for the remaining seven years of the mine life.

To mitigate potential impacts to the receiving environment caused by remobilization of arsenic, under the Tailings Management Plan Sabina will conduct tests of the tailings and treatment sludges as they are produced to evaluate the potential for remobilization from these materials.

A description of the two Tailings Management Facilities is provided below with dimensions summarised in Appendix B, Table B-014.

Tailings Storage Facility / Waste Rock Storage Area

The TSF will store tailings solids and process water as well as waste rock from the Goose Main Pit. The TSF will be situated south of the Goose Main Pit, and will be composed of two embankments:

- o the TSF Containment Dam will be a 1,744-m long embankment at its centerline, 14 m high; this will be situated at the very north end of the facility and will be oriented east-west; and
- o the South Dike will be a 200-m long embankment at its centerline, with a maximum height of 3m; this will be situated at the very south end of the facility.

The TSF Containment Dam will be constructed as a frozen foundation rockfill dam (built from NPAG waste rock) with a geosynthetic liner. The liner will be frozen into the key trench permafrost; thermal modelling has confirmed that, over the life of the structure, the foundation will not thaw deep enough to compromise this seal. Any seepage through the TSF will be collected using a downstream berm, called the TSF WRSA Diversion Berm, with an impermeable liner keyed into the permafrost.

Tailings geochemical characterization confirms that the tailings will be PAG, albeit with very slow reaction rates. It also indicates that most of the tailings are metal leaching, with the exception of some samples from the Goose Main deposit. Exposed tailings beaches are likely to be an ongoing source of sulphate and arsenic leaching, and if they are left exposed for an extended period of time (estimated to be decades), pH changes may result in increased concentrations of other trace elements. However, the development of acidic conditions is expected to be delayed considerably by the cold temperatures, with the alkalinity from the deposition of fresh tailings helping to maintain neutral pH conditions (Geochem Characterization Report, FEIS Appendix V2-7D).

The TSF will begin transitioning to a WRSA (TSF WRSA) in Year 3 of Operations with the waste rock storage area created on and around the pre-existing TSF. The placement of the waste rock at the TSF WRSA along with the closure measurements will be as described in Section 5.2.4.5; a 5-m NPAG cover will be progressively placed over the PAG rock and tailings in the facility to encapsulate these materials and to promote freezing conditions. The TSF WRSA will be closed out by reclaiming all of the TSF supernatant water through the Process Plant and by completing the NPAG cap on the facility.

Once closure criteria are met, the TSF WRSA Diversion Berm will be breached and water will be allowed to flow to the mined-out Goose Pit (then Goose Main Reservoir).

Llama Tailings Facility

At Closure, Llama Main TF will contain tailings, water from precipitation, runoff and groundwater inflows; water will be treated until closure criteria for water quality are met, which is expected to be in Year 11.

Once closure criteria are met in the TF, water will be allowed to flow to the environment. The Llama TF does not require construction of a spillway as the natural channels to the dewatered Llama Lake will be employed.

5.2.4.2 Pre-Disturbance, Existing, and Final Site Conditions

The TSF WRSA is the only facility at the Goose Property which is on crown land (as opposed to IOL). The majority of pre-disturbance surface area of the TSF WRSA is located on land; however, four small ponds and streams also exist within the future TSF WRSA footprint. The pre-disturbance site conditions based on baseline data collection programs are summarized in Section 2. Appendix A, Figure A-10 presents an aerial photo of the mine site area taken in 2019.

The existing conditions at the TSF WRSA area are the same as the pre-disturbance conditions. The existing conditions at the Llama TF are also the same as the pre-disturbance conditions, as mentioned in Section 5.2.1.2.

A description of site conditions at the end of Operations are provided in Section 5.2.4.1. The ultimate mine development of the Goose Property is shown on Appendix A, Figure A-02. Once closure and remediation activities are complete, the TSF WRSA and flooded TF will be new features on the landscape as shown on Appendix A, Figure A-09 and will be left for natural revegetation process to take place.

5.2.4.3 *Closure Objectives and Criteria*

The closure objectives and closure criteria for the TF and TSF WRSA are covered under Appendix B, Table B-010 and Appendix B, Table B-013, respectively.

5.2.4.4 *Consideration of Closure Options and Selection of Closure Activities*

As part of the FEIS, a comprehensive Waste Management Multiple Accounts Analysis (MAA) report for the mine waste rock and tailings disposal alternatives was prepared. The detailed report was included as an appendix to the Information Request Responses (Sabina 2016). Sabina received notice that the Schedule 2 listing required under the Metal and Diamond Mining Effluent Regulations for the TSF was completed in June 2020. The criteria used to evaluate the alternatives included closure considerations such as management of ARD/ML potential and landowner opinion and relative preferences. The tailings management closure plan presented in this document is based on the MAA Report.

The TSF will receive a conventional tailings slurry with an expected solids content of about 50%. Placement of waste rock over the tailings in decommissioned TSF is beneficial in that it will prevent erosion, reduce oxygen flux to the tailings, and will promote aggradation of permafrost into the tailings. The use of water covers over the tailings placed in the Llama TF will prevent wind erosion and will limit oxygen flux to the tailings. Furthermore, the depth of the water covers will be sufficient to reduce wave erosion of the placed tailings.

5.2.4.5 *Engineering Work Associated with Selected Closure Activity*

Guidance on engineering options or strategies for closure of Tailings Management Facilities are provided in MVLWB/AANDC (2013). The relevant engineering works associated with the permanent closure activities for these facilities are discussed below.

The TSF will begin being closed out by removing the tailings discharge infrastructure upon reaching TSF capacity and switching to tailings storage in Llama TF in Year 5. The TSF will then begin being converted to a WRSA. The ultimate closure of this WRSA is addressed in Section 5.2.3 of this Plan.

Llama Tailings Facility (Llama TF) will be closed by removing tailings deposition infrastructure and by actively treating the water in the TF until it meets closure criteria. Water will be pumped from Llama TF to the WTP at a your-round rate of 8,500 m³/d and treated water will be pumped back to Llama TF in a parallel pipeline.

5.2.4.6 *Predicted Residual Effects*

The Llama TF is addressed in Section 5.2.1.6. The TSF WRSA is addressed in Section 5.2.3.6.

5.2.4.7 *Uncertainties*

The uncertainties identified during Closure planning for Llama TF and the TSF WRSA are presented in Sections 5.2.1.7 and 5.2.3.7, respectively.

5.2.4.8 *Post-Closure Monitoring and Maintenance*

The overall Post-Closure monitoring and maintenance program for the Project are discussed in Section 5.2.1.8. The relevant Post-Closure monitoring and maintenance strategies for the TF and TSF WRSA are presented in Sections 5.2.1.8 and 5.2.3.8, respectively.

Further details on the water contact management system are presented in Section 5.2.9.

5.2.4.9 *Contingencies*

As described in Sections 5.2.1.9 and 5.2.3.9 for the TF and TSF WRSA, respectively.

5.2.5 **Buildings and Equipment**

The main supporting facilities for development of the Project described in the following sections include:

- o Goose Property: explosives and ammonium nitrate storage facility; fuel tank farm; maintenance and service buildings; laydown area including heated, unheated and outdoor storage; operations center at the airstrip; Goose camp; two water intakes; water treatment facilities; diesel power plant and power utility building; and machinery and mobile equipment.
- o MLA: explosives and ammonium nitrate storage pad; fuel storage facility; maintenance and service buildings; laydown area; MLA camp; modular desalination water treatment system; water intake and discharge; diesel power plant and power utility building; and machinery and mobile equipment.
- o WIR: Three service emergency camps and supporting infrastructure, maintenance shop, laydowns, and water intakes.

The Process Plant is addressed in Section 5.2.6. Buildings and equipment related to waste and domestic wastewater management are addressed in Section 5.2.8. Rock fill pads which underlie buildings, laydowns and equipment storage areas are addressed with roads and airstrips in Section 5.2.7. See Appendix A, Figure A-02 and Figure A-03 for Project infrastructure locations.

5.2.5.1 *Project Component Description*

Explosives and ammonium nitrate storage

The main storage of ammonium nitrate will be located at the Goose Property at the AN Facility laydown pad. A temporary storage area (for transit) will also be developed at the MLA. Packaged explosives and explosive detonators will be stored in approved explosive magazines located on separate pads at the Goose site. Bulk AN will be stored in one-tonne tote bags within seacans. Fuel oil will be stored in a double-wall fuel tank also located on the AN Facility pad. ANFO will be manufactured in the AN Facility.

Fuel tank farms

There will be movable double walled fuel tanks situated throughout the Goose Property that will be utilized as day tanks at the underground mine portal, incinerator, Explosives Storage and ANFO Plant, boilers, and power plants in addition to other portable double walled fuel tanks. Bulk fuel storage at the MLA will consist of up to a 60.5 ML tank farm; this fuel will be divided between the MLA Fuel Storage Area (60 ML), and the MLA Fuel Transfer Area (0.5 ML). The Goose Property will also have a bulk fuel storage facility.

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The fuel tank farms will be designed to have bermed spill containment and an impervious HDPE liner membrane. Fuel will be delivered to the MLA in the summer and transported to the Goose Property in the winter.

Camps

The Goose Property accommodations will expand from the existing exploration camp to include a new camp located at the Goose Plant Site to accommodate the personnel required for the Operations Phase. The camp, used during the Operations Phase, will be decommissioned during the Active Closure Stage and replaced with a small camp (approximately 20-man) for on-going closure activities.

A camp is established at the MLA to support Construction and Operations seasonally, and three camps will be constructed along the WIR route to service the WIR seasonally and provide emergency shelter.

Potable water treatment facilities

Freshwater required for the Goose Camp will be pumped from either Big Lake or Goose Lake. The domestic (potable) water supply will be treated and disinfected. The treatment plant will likely consist of multimedia filtration and activated carbon filtration, followed by UV disinfection and chlorination.

Water for the MLA camp will be drawn from Bathurst Inlet and a desalination facility will be constructed as part of the Project.

Water to support the WIR camps will be metered and sourced from waterbodies proximal to the WIR. The treatment plant will likely consist of multimedia filtration followed by UV disinfection and chlorination.

Diesel power plant

A main power plant will be used to meet the electrical power demand necessary to support the Goose Property operation including the underground mine. To maximize overall efficiency and energy conservation, the power plant will operate as a combined heat and power plant. The airstrip will have a back-up generator.

Power at the MLA will be generated on-site with the use of three 500 kW diesel generators or similar. To maximize overall efficiency and energy conservation, this power plant will also operate as a combined heat and power plant. Smaller generators will also be used to support the WIR service/emergency camps.

Other power equipment and materials including oil-filled transformers will be drained and disposed of on-site. The transformer oil will be incinerated on-site or removed for off-site disposal with other hazardous wastes.

Machinery and mobile equipment

The main production equipment and earth-moving machinery that will be used during Operations includes various drills, hydraulic shovels, loaders, haulage trucks, forklifts, fuel trucks, lube trucks, water trucks, dozers, surface graders, portable welders, light duty service trucks, and mobile pit dewatering pumps. A fleet of mobile site support equipment is utilized to provide support to operations at each of the sites.

5.2.5.2 *Pre-Disturbance, Existing, and Final Site Conditions*

The pre-disturbance surface areas of all buildings and equipment are located on land. The pre-disturbance site conditions based on baseline data collection programs are summarized in Section 2. Appendix A, Figure A-10 and Figure A-11 present aerial photos of the Goose Property and MLA, respectively, taken in 2019 and 2017.

The existing exploration camp and supporting facilities, listed in Section 3, are located near the future Goose Main Pit area. The existing conditions at all other buildings and laydown areas are the same as the pre-disturbance conditions.

A description of site conditions at the end of Operations are provided in Section 5.2.5.1. The ultimate mine development of the Goose Property and MLA are shown on Appendix A, Figure A-02 and Figure A-03, respectively. Once closure and remediation activities are complete, there will be no new features on the landscape of either Project sites as a result of buildings and laydown areas, as shown on Appendix A, Figure A-08 and Figure A-09, respectively.

5.2.5.3 *Closure Objectives and Criteria*

The closure objectives and closure criteria for the buildings and equipment are listed in Appendix B, Table B-015.

5.2.5.4 *Consideration of Closure Options and Selection of Closure Activities*

An option at the end of Project life is for part, or all, of the infrastructure to remain in place for other use. Sabina will consider transferring the facilities to a third party should there be such interest. However, this Plan assumes that all infrastructure associated with the Project will be removed.

If not properly reclaimed, wildlife maybe injured by entering reclaimed areas with depressions and if subsidence occurs. Environmental design features and mitigation, as well as current wildlife management practices used in other mining projects will be implemented at the Project to limit wildlife injury such as re-contouring reclaimed areas to reduce hazards to wildlife. Equipment not required for Post-Closure activities will be drained and landfilled or removed from the site. Buildings will be demolished and buried in a landfill.

5.2.5.5 *Engineering Work Associated with Selected Closure Activity*

Guidance on engineering options or strategies for closure of buildings and general infrastructure is provided in MVLWB/AANDC (2013). The relevant engineering works associated with the permanent closure activities for the supporting building and equipment removal are discussed below.

- o The salvage value of equipment and machinery is expected to be limited due to the remoteness of the site and consequently, high backhaul transport costs. As such, it has been assumed that all buildings, machinery, and equipment will be disposed of in an on-site landfill when they are no longer needed and after any hazardous material has been removed.
- o Sabina will consider transferring the facilities to a third party should there be such interest.
- o Fluid hydrocarbons drained from equipment will be burned in generators or incinerated where approved. Other fluids will be removed from site for recycling or disposal at a licenced facility.
- o Above grade concrete structures will be demolished to ground level and broken up, and the rubble will be disposed of in an on-site landfill. Concrete slabs on grade will be perforated and covered with waste rock or overburden. Rebar will be cut so that it is flush with grade and cut

rebar will be disposed of in an on-site landfill. Subgrade concrete structures will be infilled with NPAG waste rock, if needed.

- o Any unused petroleum products will be burned in the generators or incinerated where approved. Unused chemicals will be sold, returned to suppliers, or shipped offsite for disposal at a licensed facility.
- o All hazardous wastes will be removed from the site and transported to a licenced facility for disposal.
- o Explosives and inert components still in their original packing may be returned to vendors for restocking, if economic to do so. All other explosives will be used up or destroyed on-site.
- o Fuel tanks will be steam cleaned, cut up, and landfilled. The rinse water will be treated before disposal.
- o Fuel not required during the closure and reclamation activities will be sold, returned to suppliers, or incinerated.
- o A new 20-man camp will be established to support ongoing activities during the Passive Closure Stage and Post-Closure Phase.
- o Equipment used for closure activities and long-term maintenance (e.g., trucks, backhoes, etc.) will be disposed once they are no longer required. Most of the mobile equipment will be disposed once the Closure Phase is complete. A small subset of equipment will be retained on-site for the Post-Closure Phase.

5.2.5.6 *Predicted Residual Effects*

There will be no permanent buildings, equipment or infrastructure left on the rock fill pads of either the Goose Property or MLA following the completion of closure activities and no residual impact to the environment. Closure conditions of the pads are addressed in Section 5.2.7.

5.2.5.7 *Uncertainties*

As all buildings, equipment or infrastructure will be removed there are no uncertainties. Conditions of the remaining pads are addressed in Section 5.2.7.

5.2.5.8 *Post-Closure Monitoring and Maintenance*

The overall Post-Closure monitoring and maintenance program for the Project are discussed in Section 5.2.1.8. The following presents the relevant Post-Closure monitoring and maintenance strategies for the supporting buildings and equipment (guidance on generic monitoring and maintenance programs for Closure and Post-Closure is provided in MVLWB/AANDC [2013]):

- o Periodic inspections will be performed to visually assess the reclaimed areas.
- o All buildings left on-site during Closure will be maintained until they are no longer required, after which they will be demolished and disposed of in an on-site landfill.
- o Mobile equipment left on-site during Closure will be maintained until they are no longer required, after which they will be landfilled or removed from the site.

5.2.5.9 *Contingencies*

Wherever possible, mobile equipment will be salvaged and shipped off-site for reuse. Likewise, materials will be sold and shipped off-site for scrap where possible. Given the remoteness of the site, the extent of such salvage and scrap sales is expected to be limited by economics. Once mobile equipment has been

drained of fluids, they may be disposed of in one of the flooded open pits in the event the landfill active at Closure is at capacity or has already been closed.

There are no other activities proposed as contingencies for the closure of the buildings and equipment. As noted previously, some infrastructure may stay in place should local communities, KIA, GN, federal government bodies, or other appropriate parties choose to take ownership of it. However, this ICRP assumes that all infrastructure associated with the Project will be removed.

5.2.6 Mine Infrastructure

Aside from the buildings and laydown areas discussed in Section 5.2.5, the key mine infrastructure at the Goose Property will include: ore stockpiles, a crusher plant, and a Process Plant.

5.2.6.1 Project Component Description

Ore will be hauled from the open pit and underground mines to the Process Plant and sorted based on ore grade into one of three stockpiles: low grade (LG), mid-grade (MG), or high grade (HG). The three stockpiles will be located on the same pad southeast of the Process Plant. At the end of Operations, all ore stockpiles will be processed at the Process Plant. Foundation design of the ore stockpiles will follow the site-wide infrastructure foundation design criteria to achieve short- and long-term thermal stability of underlying permafrost. All surface runoff and seepage from the Ore Stockpile is contained within the Plant Site Pond (previously called the Ore Stockpile Pond), which is addressed as part of the water management system.

Ore will be fed by front end loader from the stockpiles to a crusher. Fine crushed ore will be transported in a covered conveyor to the enclosed Fine Ore Stockpile. Reclaim belt feeders located underneath the fine ore stockpile will draw material from the Fine Ore Stockpile onto a covered conveyor which feeds the Process Plant.

5.2.6.2 Pre-Disturbance, Existing, and Final Site Conditions

The pre-disturbance surface areas of all supporting mine infrastructure are located on land. The pre-disturbance site conditions based on baseline data collection programs are summarized in Section 2. Appendix A, Figure A-10 presents and aerial photos of the mine site area taken in 2019.

The existing conditions are the same as the pre-disturbance conditions.

A description of site conditions at the end of Operations are provided in Section 5.2.6.1. The ultimate mine development of the Goose Property is shown on Appendix A, Figure A-02. Once closure and remediation activities are complete, there will be no new features on the landscape as a result of supporting mine infrastructure, as shown on Appendix A, Figure A-09.

5.2.6.3 Closure Objectives and Criteria

The closure objectives and closure criteria for the mine infrastructure are listed in Appendix B, Table B-016.

5.2.6.4 Consideration of Closure Options and Selection of Closure Activities

Refer to Section 5.2.5.4.

5.2.6.5 *Engineering Work Associated with Selected Closure Activity*

Guidance on engineering options or strategies for closure of mine infrastructure is provided in MVLWB/AANDC (2013). The relevant engineering works associated with the permanent closure activities for the mine infrastructure are discussed below.

- o The salvage value of components and materials is expected to be limited due to the remoteness of the site. As such, it has been assumed that all mine infrastructure components and materials will be disposed of in an on-site landfill at Closure.
- o Sabina will consider transferring the facilities to a third party should there be such interest.
- o Above grade concrete structures will be broken up and the rubble will be disposed of in an on-site landfill. Concrete slabs on grade will be perforated and covered with waste rock or overburden. Rebar will be cut so that it is flush with grade and cut rebar will be disposed of in an on-site landfill. Subgrade concrete structures will be infilled with NPAG waste rock, if needed.
- o Any unused petroleum products will be burned in the generators or incinerated where approved. Unused chemicals will be sold, returned to suppliers or shipped offsite for disposal at a licensed facility.
- o All hazardous wastes will be removed from the site and transported to a licenced facility for disposal.
- o Fuel not required during the closure and reclamation activities will be sold, returned to suppliers, or incinerated.

5.2.6.6 *Predicted Residual Effects*

There will be no permanent features on the landscape of the Goose Property as a result of supporting mine infrastructure. The remaining rock fill pads are addressed in Section 5.2.7. The post-closure impacts of these features are expected to be negligible.

5.2.6.7 *Uncertainties*

Refer to Section 5.2.5.7.

5.2.6.8 *Post-Closure Monitoring and Maintenance*

The overall Post-Closure monitoring and maintenance program for the Project are discussed in Section 5.2.1.8. The following presents the Post-Closure monitoring and maintenance strategies for the mine infrastructure (guidance on monitoring and maintenance programs for Closure and Post-Closure is provided in MVLWB/AANDC [2013]):

- o periodic inspections will be performed to visually assess the reclaimed areas.

5.2.6.9 *Contingencies*

Wherever possible, process equipment will be salvaged and shipped off-site for reuse. Likewise, materials will be sold and shipped off-site for scrap where possible. Given the remoteness of the site, the extent of such salvage and scrap sales is expected to be limited by economics.

There are no other activities proposed as contingencies for the closure of the mine infrastructure.

5.2.7 Rock Fill Pads, Roads and Airstrips

The Project sites will be accessible year-round through air transportation. There is an existing all-weather airstrip at the Goose Property and the MLA that will be extended for continued use. Both the Goose Property and the MLA will be serviced by ice airstrips in the winter, as well as float planes, if required. Freight will be brought in by sea during the summer and hauled over the WIR to the Goose Property during the winter. See Section 4.1 for further details on Project sites access. Site roads will be established within each of the MLA and Goose Project areas and sections of the WIR will be upgraded with rock fill to improve winter operations. Rock fill pads will underlie all infrastructure and laydown areas, including WIR service/emergency camps.

5.2.7.1 *Project Component Description*

Rock fill pads will underlie all infrastructure and comprise all pad and laydown areas at the MLA and Goose as well as the three WIR service/emergency camps. Construction materials for both roads and pads will be sourced from locally developed geochemically suitable locations. Rock will be placed directly onto the tundra to preserve the permafrost, and a layer of graded surfacing material will be placed to provide a protective trafficking layer. Laydown areas will be constructed at the Goose Property and at the MLA, respectively, to store equipment, materials and supplies for the Project. In addition, small laydown areas will be located in the vicinity of the underground workings, for temporary stockpiling of waste rock prior to use as backfill material as well as at the WIR camps. By the end of Operations, all waste rock on these laydown areas will have been hauled back underground or relocated to a WRSA and all other materials will have been consumed, landfilled, or backhauled.

The existing all-weather exploration airstrip at the Goose Property will be upgraded for use during Construction and Operations. The proposed upgrade mainly entails extending the airstrip from the current length of 914 m to 1,830 m and widening the airstrip from the current 30 m to 60 m. A 1,524 m by 60 m airstrip will also be constructed at the MLA. Airstrips will be equipped with lights, communications equipment, and instrumentation in accordance with appropriate Federal regulations. The airstrips will continue to be used during the Closure and Post-Closure phases.

The site roads within the Goose Property and MLA will be constructed as all-weather roads. Goose Property will have approximately 4 km of service roads and approximately 9 km of haul roads. Haul roads will be constructed in accordance with mine haul road specifications, which require safety barricades. The MLA will have approximately 2 km of service roads and no haul roads.

Freight and fuel will be transported from the MLA to the Goose Property annually on the WIR during the winter seasons. The WIR will be approximately 160 km long and travel over both land and water. Up to 15 km of the WIR will be upgraded with aggregate. A shoreline pad will be developed at the MLA for the offloading of sealift materials. This pad will have a 420 m² in-water footprint.

5.2.7.2 *Pre-Disturbance, Existing, and Final Site Conditions*

The pre-disturbance site conditions based on baseline data collection programs are summarized in Section 2. Appendix A, Figure A-10 and Figure A-11 present aerial photos of the Goose Property and MLA, respectively, taken in 2019 and 2017. In particular, the creek which flows from Gander Pond to Goose Lake, located between the Airstrip Quarry area and the airstrip at the Goose Property, includes fair spawning and good rearing habitat for Arctic Grayling and was rated as important overall. Prior to initial construction and use of the WIR, baseline conditions underlying the road were documented and reported to the NIRB.

The Goose Property currently includes existing on-site roads, listed in Section 4.3, as well as the Goose Property existing all-weather airstrip existing airstrip and associated pads. At the MLA, camp pads, laydown areas and some structures have been constructed (Appendix A, Figure A-03). The rest of the road areas at both Project sites are the same as the pre-disturbance conditions.

A description of site conditions at the end of Operations is provided in Section 5.2.7.1. On-site access roads, as well as airstrip construction, would require crossing of the Gander Outflow and installation of a fish-bearing culvert as well as up to four other culvert crossings. The ultimate mine development of the Goose Property and MLA are shown on Appendix A, Figure A-02 and Figure A-03, respectively. Once closure and remediation activities are complete, the roads, airstrips and pads will remain but will be reconfigured where needed to avoid pooling or diversion of water, as shown on Appendix A, Figure A-08 and Figure A-09, respectively.

5.2.7.3 *Closure Objectives and Criteria*

The closure objectives and closure criteria for the transportation routes and pads are listed in Appendix B, Table B-017.

5.2.7.4 *Consideration of Closure Options and Selection of Closure Activities*

An option at the end of Project life is for part, or all, of the infrastructure to remain in place for other use. Sabina will consider transferring the facilities to a third party should there be such interest. The Plan assumes that all roads and airstrip associated with the Project will be decommissioned.

5.2.7.5 *Engineering Work Associated with Selected Closure Activity*

Guidance on generic engineering work options or strategies for closure of transportation routes is provided in MVLWB/AANDC (2013). The relevant engineering works associated with the permanent closure activities for the pads, roads and airstrip are discussed below.

- o Developed areas at each of the Project sites will be re-graded and contoured to stabilize, remove uneven ground for public and wildlife safety, to reduce the potential for erosion, and to blend with the surrounding landscape. Cover materials may be required for erosion and dust control. It is anticipated that a succession of native plant species will naturally revegetate the surface over time.
- o Rock bases extending into the marine environment will be left in place and capped at the substrate so not as to disturb the in-water environment.
- o An assessment will be carried out to identify areas where soils may be contaminated by hydrocarbons; contaminated soils will be excavated and hauled to the landfarm area for remediation per the Government of Nunavut's Environmental Guideline for Site Remediation, (2010).
- o Once the all-weather roads are no longer required for Closure and Post-Closure activities, the culverts will be removed, and the natural drainage will be restored as practicable. Measures shall be implemented to minimize erosion and sedimentation.
- o The remaining all-weather road sections (with no culverts) as well as pads will be scarified but will otherwise remain intact to ensure preservation of permafrost.
- o The airstrip will remain functional with a gravel surface for use during Post-Closure monitoring. Final closure of the airstrip will be similar to the all-weather roads.
- o It is anticipated that a succession of native plant species will naturally revegetate the roads and airstrip surface over time.

5.2.7.6 *Predicted Residual Effects*

As discussed in Section 5.2.7.5, the granular fill from the airstrip and the roads will be scarified and left in place. The granular fill pads will remain as permanent features on the landscape. Changes to aquatic habitat caused by water crossings could result in some alteration or loss of some aquatic populations; however, the disturbed surfaces are localized and are expected to regenerate over time. Changes to terrain caused by the construction and subsequent reclamation of the Goose airstrip could result in some alteration or loss of plant populations and plant communities; however, the disturbed surfaces are expected to naturally revegetate over time. The post-closure impacts of these features are expected to be negligible.

5.2.7.7 *Uncertainties*

With the exception of WIR subbase upgrades and service emergency camp pads, active revegetation of the Property as part of Closure is not planned given the cold climate setting of the Project as well as the precedent established for mine closure in Nunavut. The isolated areas of WIR subbase upgrades as well as WIR service emergency camp pads will be scarified and reseeded on closure to promote revegetation to the extent reasonable. In other areas, strategies that support or encourage natural revegetation and recovery will be used where appropriate.

5.2.7.8 *Post-Closure Monitoring and Maintenance*

The overall Post-Closure monitoring and maintenance program for the Project are discussed in Section 5.2.1.8. The following presents the Post-Closure monitoring and maintenance strategies for the transportation routes (guidance on generic monitoring and maintenance programs for Closure and Post-Closure is provided in MVLWB/AANDC [2013]):

- o periodic inspections will be performed to visually assess the reclaimed areas;
- o all roads to be used during Closure and Post-Closure will be maintained until they are no longer required; and
- o the airstrip will be maintained during Closure and Post-Closure.

5.2.7.9 *Contingencies*

There are no activities proposed as contingencies for the closure of the pads, roads and airstrip.

5.2.8 **Waste Management Sites**

5.2.8.1 *Project Component Description*

The waste management infrastructure at the Goose Property will consist of:

- o a sewage treatment plant;
- o an incinerator for combustion of nonhazardous and combustible wastes;
- o a landfarm for the treatment of contaminated soils, ice, and snow;
- o a waste sorting facility;
- o landfills for disposal of non-hazardous solid wastes; and
- o a hazardous waste storage area.

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The waste management infrastructure at the MLA will consist of:

- o Pacto or incinerating toilets;
- o an incinerator for combustion of nonhazardous and combustible wastes;
- o a landfarm for the treatment of contaminated soils, ice, and snow;
- o a waste sorting facility; and
- o a hazardous waste transfer laydown area.

Sewage at the Goose Property will be treated using a packaged Wastewater Treatment Facility (WWTF), such as a Membrane Bioreactor, or similar. The WWTF will be located in the Goose Plant Site area. During Construction, effluent will be discharged to the tundra (Appendix A, Figure A-02); during Operations, effluent will be discharged to the active Tailings Management Facility. During Closure and Post-Closure, the Goose Camp will convert to Pacto or incinerating toilets and effluent discharge will not be necessary. Sludge will be incinerated.

The waste management philosophy on-site will be to reduce, reuse, recycle, or recover material where practical and these principles are implemented through Sabina's various waste management plans. Non-salvageable, non-degradable solid waste material generated during Construction, Operations, and Closure will be disposed of in inert, non-hazardous solid waste landfills within the Umwelt WRSA and TSF WRSA. Approximately 5,000 t of non-hazardous waste is expected to be disposed of in the landfills over the mine life. As the various WRSAs are closed progressively during Operations, some of the landfills within them may also be closed, if they have reached capacity. Additional closure landfills could be established within other WRSAs if an alternative location is more suitable or if the Operations Phase landfills reach capacity. Landfilled material will be placed in lifts, compacted, and covered with a minimum 300-mm layer of material before placing subsequent landfill materials. This is an ongoing process throughout Construction, Operations, and Closure and will minimize potential settlement. The landfills will be in use from Construction through to Closure, and as a result, any landfill settlement can be addressed throughout the operational period. Consistent with standard NWB licence terms and conditions an annual geotechnical inspection (during operations and active closure) of earthworks will be undertaken as part of the Thermal and Geotechnical Monitoring Plan. Any evidence of landfill settlement during operations will be observed and addressed on annual basis as required.

An industrial incinerator will be located at each of the Goose Property and the MLA. Incinerators selected for the Project will incorporate technologies capable of satisfying the criteria set forth in Environment and Climate Change Canada's Technical Document for Batch Waste Incineration (EC 2010). The incinerator will accept waste such as organic matter, containers and wrappings, medical waste, and used oils and waste fuel (see the Incineration Management Plan for details).

Hazardous waste will be hauled to the MLA and later backhauled by sealift during the open water season to authorized waste disposal areas in southern Canada; refer to the Hazardous Materials Management Plan for more information. A dedicated and lined storage pad will be constructed at the MLA to receive and temporarily store hazardous wastes pending the sealift. All waste material will be handled, stored, and transported in accordance with the Canadian and Territorial waste regulations and Sabina's Hazardous Materials Management Plan.

Hydrocarbon contaminated soil, snow, and ice will be treated within dedicated landfarms to be located at both the Goose Property and MLA. Landfarming is a widely used bioremediation treatment that uses naturally occurring microorganisms to metabolize and breakdown petroleum hydrocarbons in soils. The Goose landfarm will be located adjacent to the Goose Plant Site. The landfarm at the Goose Property

will consist of three soil cells and one snow/ice cell so that soil can be segregated and treated based on level on petroleum hydrocarbon (PHC) impact. The landfarm at the MLA Property will consist of one soil cell and one smaller snow/ice cell. The facilities will be bermed and lined with an HDPE liner. The berm height will be approximately 1.5 m above the bottom of the treatment area. A rock structural pad will be constructed below the landfarm cells. Non-woven geotextile fabric will be placed on either side of the liner, with compacted granular fill also placed above and below the liner to protect it from tears.

Soil will be considered remediated and removed from the landfarm when sampling demonstrates that soils meet Nunavut's Environmental Guideline for Site Remediation (Government of Nunavut, 2010). At the Goose Property, the remediated soil may be used for construction of the WRSA covers if needed or disposed of in one of the non-hazardous solid waste landfills. At the MLA, the remediated soil may be used for closure site grading.

5.2.8.2 *Pre-Disturbance, Existing, and Final Site Conditions*

The pre-disturbance surface areas of the waste management facilities at both Project sites are located on land. The pre-disturbance site conditions based on baseline data collection programs are summarized in Section 2. Appendix A, Figure A-10 and Figure A-11 present aerial photos of the Goose Property and MLA, respectively, taken in 2019 and 2017.

The existing conditions at the waste management facilities at both Project sites are the same as the pre-disturbance conditions.

A description of site conditions at the end of Operations are provided in Section 5.2.8.1. The ultimate mine development of the Goose Property and MLA are shown on Appendix A, Figure A-02 and Figure A-03, respectively. The impact on the landscape of the landfills located within the WRSAs at the Goose Property are addressed in Section 5.2.3.2. Once closure and remediation activities are complete, there will be no other new features on the landscape of either the Goose Property or MLA as a result of the waste management facilities, as shown on Appendix A, Figure A-08 and Figure A-09, respectively.

5.2.8.3 *Closure Objectives and Criteria*

The closure objectives and closure criteria for the waste management facilities are listed in Appendix B, Table B-018.

5.2.8.4 *Consideration of Closure Options and Selection of Closure Activities*

Refer to Section 5.2.5.4.

5.2.8.5 *Engineering Work Associated with Selected Closure Activity*

Guidance on generic engineering work options or strategies for closure of waste management facilities is provided in MVLWB/AANDC (2013). The relevant engineering works associated with the permanent closure activities for the waste management facilities are discussed below.

The closure schedule will allow for substantial closure of landfills and removal of most hazardous materials off-site during the 2 year of the Active Closure Stage. The Project will continue for another 6 years of Passive Closure while monitoring occurs. After closure criteria have been met in Llama TF, which is expected to occur late in the Operations Phase, and the contingency period for water quality has finalized (WTP will be maintained for two additional water treatment seasons), a final decommissioning operation at the WTP will be required. In addition, at the end of the Passive Closure Stage, the Closure camp will require final decommissioning. The final camp, mobile equipment, pipelines, and pumping systems will require landfilling, and any remaining hazardous wastes will require removal from site. Post-

Closure monitoring will continue in Year 21; however, there is not expected to be significant landfilling necessary after Passive Closure concludes. If necessary, a designated area of the landfill will be maintained for Post-Closure activities and it will be closed when it is no longer required. The landfills at both Project sites will be covered with 5 m of NPAG waste rock.

The landfarms at both Project sites will be managed as long as it is efficient for the overall Project closure activities and closure schedule. After removal of all remediated material and prior to closure and reclamation of each landfarm, the berm and base of will be sampled to determine if these soils are free from Petroleum Hydrocarbons (PHC) contamination. If the soils meet the required criteria, the landfarm area would then be regraded to confirm positive surface drainage. The HDPE liner will be left in place and covered with overburden. If they do not meet the required criteria, the landfarm will be covered with 2 m of waste rock or other material used for reclamation. The surrounding berm will be breached to avoid water accumulation on the landfarm.

Domestic waste will be burned in the incinerator located at each property during Operations and Closure as part of camp maintenance.

Used oils and waste fuel will be burned in the generators or incinerated if approved.

Hazardous wastes will be removed and shipped off-site for disposal at a licensed facility.

Developed areas at each of the Project sites will be regraded and contoured to remove uneven ground for public and wildlife safety, to reduce the potential for erosion, and to blend with the surrounding landscape. Cover materials may be required for erosion and dust control. It is anticipated that a succession of native plant species will naturally revegetate the surface over time.

5.2.8.6 *Predicted Residual Effects*

At the MLA, a closed landfarm will remain after Closure. At the Goose Property, non-hazardous landfills will remain; however, these will be integrated into the closed, covered WRSAs. A closed, covered landfarm may also remain. Changes to terrain caused by the Construction and subsequent reclamation of the waste management facilities could result in some alteration or loss of plant populations and plant communities; however, the disturbed surfaces are expected to revegetate naturally over time.

No significant long-term effects were identified as part of the FEIS for the closure of waste management facilities. The post-closure impacts of these features are expected to be negligible.

5.2.8.7 *Uncertainties*

The length of time it will take to bio-remediate and treat materials in the landfarms is dependent on the final quantity of contaminated materials at closure. The landfarms at both Project sites will be managed as long as it is efficient for the overall Project closure activities and closure schedule.

Active revegetation of the Project sites as part of Closure is not planned given the cold climate setting of the Project as well as the precedent established for mine closure in Nunavut.

5.2.8.8 *Post-Closure Monitoring and Maintenance*

Guidance on generic monitoring and maintenance programs for Closure and Post-Closure is provided in MVLWB/AANDC [2013]. The overall Post-Closure monitoring and maintenance program for the Project are discussed in Section 5.2.1.8. The following presents the Post-Closure monitoring and maintenance strategies for the waste management facilities:

- o periodic inspections will be performed to visually assess the reclaimed areas;
- o all waste management facilities to be used during Closure and Post-Closure will be maintained until they are no longer required; and
- o visual observations will be completed periodically for cracking or slumping of the landfill cover and for underlying waste material pushing its way up through the cover.

5.2.8.9 Contingencies

There are no activities proposed as contingencies for the closure of the landfill and other disposal areas.

5.2.9 Water Management Systems

5.2.9.1 Project Component Description

For detailed description of site water management infrastructure refer to the Water Management Plan. A site-wide water and load balance for the Goose Property is provided in SRK 2020.

Freshwater Intake Pipelines

At the Goose Property, water intake structures will be constructed in Goose and Big lakes to supply domestic, industrial, and process make-up water. The selected locations for these intake pipelines are deep and close to shore. These structures are expected to consist of an insulated PVC pipe installed into the lake on a small rockfill base to keep the pipe off the lake bottom. Washed, rock armour will be placed over the pipelines to provide ice scour protection. Insulated HDPE pipelines will convey all freshwater from the intakes to dedicated pumphouses for the Goose Process Plant and Goose Camp. A potable water treatment plant will be constructed at the end of the domestic supply pipeline.

At the MLA, ocean water will be drawn from Bathurst Inlet and will be desalinated using a reverse osmosis plant (or equivalent) to achieve appropriate criteria, to supply freshwater. The desalination facility will discharge brine as a by-product of the desalination process. Discharge of brine water from the desalination plant will meet the CCME salinity guideline for the protection of marine life and will not cause the salinity of the receiving environment to fluctuate by more than 10% of the natural expected salinity (CCME 1999).

Goose Property Water – Contact, Non-Contact, and Saline

Site water at Goose Property is categorized into three types:

- o Contact water: surface water that is impacted by/contacts mine workings (runoff over waste rock, ore stockpiles, open pits, tailings, etc.);
- o Non-contact water: surface water that is not impacted by/does not contact mine workings; and
- o Saline water: groundwater that flows into Llama Open Pit and Umwelt Underground workings.

Each type of water is managed separately throughout each Project phase, to the extent practicable. Contact water is contained within event ponds and Tailings Management Facilities and is conveyed on site via diversions and pumped pipelines. Non-contact water is diverted off site through berms, and culverts.

Three types of berms will be constructed to support water management across the Project area:

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- o Unlined non-contact water diversion berms;
- o Lined contact water containment dams and berms; and
- o Unlined contact water diversion berms.

All diversion berms will be constructed directly onto the tundra surface with non-potentially acid generating (NPAG) run of mine or run of quarry material that contains sufficient fines to contain and convey water. All containment dams and berms will be constructed with run of mine or run of quarry material; in addition, all lined structures will contain a geosynthetic clay liner (GCL) that will be tied into the active permafrost layer. Table 5.2-1 summarizes the conveyance structures at Goose Property; it includes details on structure lining and purpose.

Table 5.2-1: Goose Property Diversion and Containment Structure Summary

Structure	Lining Details	Notes
Llama Pit North Berm, Llama Pit West Berm	Unlined	Divert upstream non-contact runoff. Minimize non-contact water volumes entering Llama Pit and assists with general water management at the pit.
Primary Pond Containment Dam	Lined	Contains contact water in the Primary Pond to the east, alignment along haul road. Will be designed to Canadian Dam Association (CDA 2013, 2014) standards.
Llama WRSA Diversion Berm	Unlined	Diverts seepage and runoff from the Llama WRSA towards the Llama WRSA Pond
Llama WRSA Containment Dam and Llama East Pit Berm	Lined	Contains runoff from Llama WRSA into Llama WRSA Pond.
Plant Site Pond Containment Dam	Lined	Contains contact water from Ore Stockpile and runoff from the Plant Pond, along norther edge of the Plant Pad area (along the Goose AWR). Ore Stockpile placed in sub catchment area that naturally directed (via topography) towards Plant Site Pond. Base pad of ore stockpile also will assist to promote surface water drainage towards the Plant Site Pond.
Saline Water Pond Containment Dam	Lined	South section of dam containing saline water, around former Umwelt Lake footprint / outlet of former Umwelt Lake. Will be designed to Canadian Dam Association (CDA 2013, 2014) standards.
Goose Main Diversion Berm	Unlined	Diverts non-contact runoff around Goose Main Pit
TSF WRSA Diversion Berm	Partially Lined	Collects seepage and runoff from the TSF WRSA. Will only be lined with non-woven geotextile to promote a higher hydraulic conductivity contract along the upstream to better promote seepage capture. TSF Main Containment Dam not included in list (as for tailings) but this dam will also be designed to Canadian Dam Association (CDA 2013, 2014) standards.

Saline water is pumped out of the underground workings, as well as Llama Open Pit, and stored in the Saline Water Pond (previously Umwelt Lake). During Operations, saline water is pumped back into the bottom of the mined-out Umwelt Open Pit (then called Umwelt Reservoir) and into the mined-out Umwelt Underground.

Llama TF water will be treated year-round during Operations (Year 5 to Year 11) until the TF overflows to Goose Lake in Year 11, under average hydrological conditions. Treated water will be recirculated back to Llama TF for the entire Operations treatment period (approximately 7 years) for a total of

approximately 24 Mm³. The purpose of this water treatment is to remove for ammonia and copper, and if required, TSS and arsenic (SRK 2020) from the Llama TF water prior to the facility overflowing to Goose Lake. Final treatment rates will be based on the detailed design of the water treatment plants; refined engineering, pending tender, will determine the treatment system(s) to be utilized. Treatment sludge will be landfilled on-site if sampling demonstrates that the sludge is not considered a hazardous waste; otherwise the treatment sludge will be shipped off-site for disposal at a licensed facility. Details of the water treatment strategy are provided in the Water and Load Balance Report (SRK 2020).

At the Goose Property, mine contact water will be treated to levels specified in the MDMER or SSWQOs prior to release at the final discharge point. Sabina will meet water quality objectives for entry into receiving waters (Goose Lake) as per the Type A Water Licence (2AM-BRP1831).

Details on water management during closure along with expected water quality predictions for the open pits, and the TF and the TSF during Operations and Closure are provided in Section 5.2.1 and Section 5.2.4, respectively.

Stream Diversions

The majority of Project infrastructure has been located to avoid fish bearing waters and, wherever possible, to avoid encroaching on freshwater fish habitat. Additional mitigation to avoid adverse effects on fish is required for streams that may experience reduced discharge resulting in the potential for increased fish and egg stranding. In these cases, all potential fish use (migration, spawning, rearing, and egg incubation) will be prevented by creating fish barriers at migratory pathways into channels prior to ice melt. This includes permanent barriers constructed at the following locations (Appendix A, Figure A-13):

- o Umwelt Outflow at the limit of the southern flowing downstream end where the stream connects to eastern flows toward Goose Lake; and
- o Goose Inflow East (GIE) at the downstream limit where the stream enters Goose Lake.
- o Rascal Stream East (RSE): upstream of the airstrip.

Blocking fish access to these locations will involve creating a permanent impassable fall or cascade barrier to prevent fish access to upstream water management areas.

MLA Contact Water

The MLA does not require any ditches or ponds for water management purposes. A desalination plant will produce domestic and industrial water, and greywater will be discharged to the tundra. Roads and pads will be designed to have runoff disperse as sheet flow to minimize channelized flow. As described in the Fuel Management Plan, water which accumulates within the tank farm bund will be tested and then released on surface. Runoff from pads will discharge towards Bathurst Inlet along the same flow paths as the predevelopment topography. Site contact water that reaches the marine environment is predicted to meet the CCME water quality guidelines for the protection of marine aquatic life.

5.2.9.2 Pre-Disturbance, Existing, and Final Site Conditions

The pre-disturbance site conditions based on baseline data collection programs are summarized in Section 2. Appendix A, Figure A-10 and Figure A-11 present aerial photos of the Goose Property and MLA, respectively, taken in 2019 and 2017.

The existing conditions at the water management areas are the same as the pre-disturbance conditions.

A description of site conditions at the end of Operations are provided in Section 5.2.9.1. The ultimate mine development of the Goose Property and MLA are shown on Appendix A, Figure A-02 and Figure A-03, respectively.

The flooded pits and WRSAs are addressed in Section 5.2.1.2 and Section 5.2.3.2, respectively. The breached diversion/containment berms and permanent fish barriers will be new features on the landscape as shown on Appendix A, Figure A-09 and Figure A-13, respectively.

5.2.9.3 *Closure Objectives and Criteria*

The closure objectives and closure criteria for the water management facilities are listed in Appendix B, Table B-020.

5.2.9.4 *Consideration of Closure Options and Selection of Closure Activities*

Diversion structures will be required around the main facilities to divert non-contact water away from mining areas. This strategy will reduce the total amount of contact water generated by the Project. Mine water runoff management has been optimized based on the plans assessed in the FEIS. The management strategies will continue to evolve and will be finalized during detailed design. Closure actions have been selected to establish a passive and physically stable state.

5.2.9.5 *Engineering Work Associated with Selected Closure Activity*

Water management will be an important element of the Active Closure Stage at the Goose Property. Discharge infrastructure associated with the TSF will be decommissioned once the TSF is no longer required for active tailings deposition, and capping of PAG rock with NPAG rock will be largely completed prior to cessation of mining as described in Section 5.2.4. Pumping and pipeline infrastructure will then be dismantled and landfilled and the remaining portion of the TSF Containment Dam and TSF WRSA Diversion Berm will be breached during the Active Closure Stage.

Water from Llama TF will be treated at the WTP for ammonia and copper during the Operations Phase, until closure criteria are met, as described in Section 5.2.1. Currently, it is not expected that water from Llama TF will require treatment during the Closure Phase. Pumping and pipeline infrastructure from the WTP will then be dismantled and landfilled once they are no longer required; as a contingency, the WTP will be maintained for two additional water treatment seasons after water quality from the mine site meets licence criteria for direct discharge which is expected to happen in Year 11.

The Saline Water Pond (SWP) will be dewatered and decommissioned during the Operations Phase, once all saline water has been pumped to Umwelt Reservoir in Year 3 and 4. Once the SWP has been dewatered, sediments will be tested and if the chloride content is too high, it will be removed and placed in the Llama TF. The SWP Containment Dam will then be breached allowing Umwelt Lake to re-establish.

Sediments that have accumulated in the SWP will be tested and, if necessary, will be excavated and deposited in Llama TF once the SWP has been dewatered. The metals in the sediments will primarily be in the solid particles. Sediment solids excavated from the SWP and placed in Llama TF will settle once deposited. Based on average hydrological conditions, Llama TF is expected to overflow in Year 11. As such, the SWP sediments will have approximately six years to settle in the Llama TF prior to discharge to the environment. Six years is ample time for these solids to settle and/or be removed via treatment from the facility.

Collection ponds will have been breached, liners removed and landfilled, and the areas re-contoured and armoured (if necessary) to allow for passive runoff. Breached diversion structures will remain in place beyond the Closure Phase.

At Closure, all pumphouses will be drained, decommissioned, and landfilled. All water intake and discharge pipelines will be cut at the shoreline, decommissioned, and landfilled (Goose Property) or removed from site (MLA). The pipelines extending into the water, along with the surrounding rock armour and rock bases, will be left in place and capped at the substrate so not as to disturb the in-water environment.

Upon decommissioning pumping and pipeline infrastructure during the late Operations and the Active Closure Stage, water management berms will also be breached in strategic locations to restore natural surface water drainages. Many berms will be breached during the Operations Phase with the remainder of diversion berms will be breached during the Active Closure Stage. Appendix B, Table B-021 outlines the berm/dam breaching schedule.

The MLA does not require any pond or diversion infrastructure for water management purposes and remains in the same condition for both the Construction and Operations phase.

5.2.9.6 *Predicted Residual Effects*

No significant long-term effects were identified as part of the FEIS for the water management facilities but changes to terrain caused by the construction and subsequent reclamation of the facilities, including the residual breached diversion berms, could result in some alteration or loss of plant populations and plant communities; however, the disturbed surfaces are expected to revegetate naturally over time.

Flooded pits and WRSAs are addressed in Section 5.2.1 and 5.2.3, respectively. The breached diversion/containment berms and permanent fish barriers will be new features on the landscape as shown on Appendix A, Figure A-09 and Figure A-13, respectively. There will be no other new features on the landscape of the MLA as a result of water management facilities, as shown on Appendix A, Figure A-08. The Post-Closure impacts of these features are expected to be negligible at both Project sites.

5.2.9.7 *Uncertainties*

Water quality modeling predicts that year-round water treatment in the Llama TF will result in water quality that is suitable for discharge by Year 11 in Operations. The actual time required may vary depending on actual water quality and treatment efficiency.

Active revegetation of the Project sites as part of Closure is not planned given the cold climate setting of the Project as well as the precedent established for mine closure in Nunavut.

Water quality monitoring will occur at strategic control points during Operations to track trends in the site water quality and to provide additional information for future closure water quality prediction and planning modifications.

5.2.9.8 *Post-Closure Monitoring and Maintenance*

The overall Post-Closure monitoring and maintenance program for the Project are discussed in Section 5.2.1.8. The following presents the Post-Closure monitoring and maintenance strategies for the water management facilities (guidance on generic monitoring and maintenance programs for closure and post-closure is provided in MVLWB/AANDC [2013]):

- o surface and groundwater will be sampled if site-specific conditions dictate during the Closure Phase;
- o water management points (including seepage) that were not anticipated will be identified and monitored;

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- o ongoing inspection and maintenance of passive or active water treatment facilities associated with non-compliant mine water or runoff discharge will be conducted;
- o periodic inspections will be performed to visually assess the reclaimed areas;
- o unstable areas will be identified and monitored; and
- o all water management facilities to be used during Closure will be maintained until they are no longer required.

5.2.9.9 Contingencies

Water Quality

The WTP will be decommissioned once it is no longer required on-site. Once water quality from the mine components meets MDMER and Licence criteria for direct discharge, the WTP will be maintained for two additional water treatment seasons as a contingency before being dismantled and disposed of in an appropriate landfill facility.

Water Flow

At select water crossings, pumping or siphoning may be employed to facilitate the transfer of water from one side of the structure to the other side. Pumping may be required at crossings where culverts were not installed, culverts were improperly installed, or culverts were installed with insufficient capacity. Pumping can also serve as a temporary solution during freshet or prior to a culvert installation.

5.2.10 Quarries and Borrow Sites

5.2.10.1 Project Component Description

At Goose Property aggregate will be required for construction of the TSF dam and other Goose infrastructure, including:

- o Haul roads connecting to mine workings;
- o Pads for mine infrastructure and laydown;
- o Goose Airstrip (upgrade of existing exploration airstrip);
- o Tailings Storage Facility;
- o Fuel storage and other containment areas; and
- o Water management berms and structures.

The Goose Airstrip Quarry was initially permitted for exploration use but will be expanded for mine use. This quarry will be used for construction of the facilities located at the Goose Property.

Additional material necessary for construction will be sourced from the cut/fill balance of the Goose Plant Site area and from open pit mining. Overburden removal will occur during the preparation of mining and construction activities. The site overburden material and excavated material will either be handled as run of mine waste and stored in WRSAs, or it will be segregated and used where possible in reclamation activities.

At the MLA, aggregate will be required for construction of service roads, laydown pads, infrastructure foundations, and fuel storage and other containment areas. All material will be sourced from the

excavation for the fuel storage laydown foundation. Cut material will be used to fill all other infrastructure areas.

Quarries will also be required along the WIR to improve some sections of ground along the route and establish laydown and camp pad areas. A seasonal WIR is used to haul equipment and supplies annually from the MLA to the Goose Property where mining occurs. Some minor WIR sections were difficult to build and maintain due to steep grades, dense boulder fields, undulating terrain, limited snow cover, and areas with reduced access to water. These sections are difficult to traverse and operate, and pose increased safety, environmental, and operational risks to success of the annual WIR hauling program. Sabina will be upgrading select WIR sections through the placement of aggregate along key areas of the WIR alignment. These quarries and/or borrow areas will be determined and approved as needed and all will meet the requirements of the Borrow Pits and Quarry Management Plan.

Borrow areas and quarry sites will be operated and closed as per the Borrow Pits and Quarry Management Plan. Quarries will only be developed in areas which have been drilled off and geochemically tested in advance and shown to be sources of NPAG material which is suitable for construction. It is therefore unlikely, but not impossible, that PAG materials will be exposed in the backslopes or base of the quarries. Should PAG be exposed, all loose blast-damaged PAG material would be removed and disposed of in the WRSAs. Thus, the only PAG materials that could be left exposed in the quarries would be comprised of intact bedrock. All final borrow areas and quarry sites will be graded to drain and will not result in topographic low points.

To mitigate the impacts of runoff/sedimentation into freshwater aquatic habitat, Sabina shall maintain an appropriate setback distance between project quarries and fish-bearing or permanent waterbodies, or implement appropriate mitigation measures, as required to prevent acid rock drainage or metal leaching into such waterbodies in accordance with NIRB PC Term and Condition 23.

5.2.10.2 Pre-Disturbance, Existing, and Final Site Conditions

The pre-disturbance surface areas of the quarries are located on land. The pre-disturbance site conditions based on baseline data collection programs are summarized in Section 2. Appendix A, Figure A-10 and Figure A-11 present aerial photos of the Goose Property and MLA, respectively, taken in 2019 and 2017.

The Airstrip Quarry is an expansion of the existing quarry located west of the Goose all-weather airstrip. The exploration-related site disturbance area is less than 1 ha. The existing conditions at all other borrow pits and quarries are the same as the pre-disturbance conditions.

A description of site conditions at the end of Operations are provided in Section 5.2.10.1. The ultimate mine development of the Goose Property and MLA are shown on Appendix A, Figure A-02 and Figure A-03, respectively. The footprints of the Umwelt Quarry, and the cut and fill locations at Goose Property and the MLA will have been used for other Project facilities during Operations and are addressed in previous sections. Once closure and remediation activities are complete, the excavated areas will be contoured and they will be graded so that they drain naturally, as shown on Appendix A, Figure A-09 and Figure A-08, respectively.

5.2.10.3 Closure Objectives and Criteria

The closure objectives and closure criteria for the quarries and granular borrow sites are listed in Appendix B, Table B-022.

5.2.10.4 *Consideration of Closure Options and Selection of Closure Activities*

If not properly reclaimed, wildlife may be injured by steep slopes in borrow or quarry areas. Environmental design features and mitigation, as well as current wildlife management practices used in other mining projects will be implemented at the Project to limit wildlife injury. Such measures may include flattening steep slopes, constructing boulder walls, and re-contouring reclaimed areas to reduce hazards to wildlife.

5.2.10.5 *Engineering Work Associated with Selected Closure Activity*

The relevant engineering works associated with the permanent closure activities for the quarries and granular borrow sites are discussed below. While reclamation and closure will depend on the individual site conditions and may commence prior to the end of mining, proposed closure activities for quarries and granular borrow pits will generally include the following:

- o All mobile and stationary equipment will be removed.
- o An excavator will be used to trim and flatten any backslopes and the quarry floor will be graded to eliminate topographic low points and to allow free drainage.
- o When Operations are complete, the overall reclamation objective for the quarry/borrow areas is to return the site to a condition that blends in with the existing topography and surrounding landscape. It is anticipated that a succession of native plant species will naturally revegetate the surface over time.
- o Final closure of the quarry areas will include water quality monitoring. Since no extraction will occur below water level and the areas will be contoured to drain positively, there will be no residual ponds once the sites are closed.
- o Quarry wall areas identified as PAG during quarrying activities will be covered with 2m of NPAG rock on closure

5.2.10.6 *Predicted Residual Effects*

Development of borrow pits and quarries will form depressions in the landscape at both the Goose Property and MLA; however, these areas will be contoured and graded to drain positively. Changes to terrain caused by the construction and subsequent reclamation of the facilities could result in some alteration or loss of plant populations and plant communities; however, the disturbed surfaces are expected to revegetate over time.

5.2.10.7 *Uncertainties*

Should quarry water quality indicate additional measures are needed to address quarry wall PAG, NPAG wall cover thickness may be increased from the prescribed 2 m thickness or alternate management measures considered.

Active revegetation of the Project sites as part of Closure is not planned given the cold climate setting of the Project as well as the precedent established for mine closure in Nunavut.

5.2.10.8 *Post-Closure Monitoring and Maintenance*

The overall Post-Closure monitoring and maintenance program for the Project are discussed in Section 5.2.1.8. The following presents the Post-Closure monitoring and maintenance strategies for the quarries and granular borrow sites:

- o periodic inspections will be performed to visually assess the reclaimed areas; and

- o all quarries and granular borrow sites will be maintained until they are no longer required.

5.2.10.9 Contingencies

In addition to the sampling and testing that will be required to identify and segregate NPAG quarry rock for use in construction, further QA/QC sampling and testing will be completed to verify that the geochemical characteristics of quarry rock used in construction are within expected ranges. Should acid-generating bedrock be exposed, this material will either be handled as with all other PAG waste rock on-site, or, if left in place at the end of quarry operations, these areas will be covered with a minimum of a 2 m thick layer of non-acid generating soil or rock.

5.3 REPORTING

The preparation of the following reports is required by the MVLWB/AANDC (2013) guidelines for closure and reclamation of all components of mine sites:

- o **Annual Closure and Reclamation Plan Progress Report:** The general purpose of these annual reports is to provide an opportunity for all parties to track, modify, and report on reclamation. The annual review of research results also provides an opportunity to identify missing research tasks, which allows the research plans to continually evolve. The progress reports keep all parties informed about closure planning and allow NWB to confirm that the proponent has remained on schedule. Any proposed changes to the ICRP with supporting rationale should be presented in these reports for NWB approval.
- o **Reclamation Completion Report:** The general purpose of the reclamation completion report is to provide details, including figures, of the actual reclamation work completed, and an explanation of any work that deviated from the original or approved ICRP. The report should also provide a preliminary assessment on whether appropriate closure objectives and criteria have been achieved. With each reclamation completion report, there may be an opportunity to revise the financial security estimate depending on the stage of the operation and the current ICRP.
- o **Performance Assessment Report:** A performance assessment report is prepared at the completion of the reclamation work and following submission of the reclamation completion report. The general purpose of the performance assessment report is to provide a detailed comparison of conditions at the site against the appropriate closure objectives and closure criteria. With each performance assessment report, there may be an opportunity to revise the security estimate depending on the stage of the operation and the current ICRP.

The anticipated timelines for preparation and submission to NWB of the above described reports are as follows:

- o **Annual Closure and Reclamation Plan Progress Report:** Annually during Operations.
- o **Reclamation Completion Report:** Upon completion of the Active and Passive Closure components (such as decommissioning and reclaiming mine buildings and infrastructure, completion of passive pit flooding, etc.).
- o **Performance Assessment Report:** Performance assessment reports will be prepared a maximum of five years following the completion of the closure effort and will recur a maximum of every five years until ultimate closure conditions have been met. Performance assessment reporting will be used to determine at what time the effluent quality is of a suitable quality for discharge without the respective management measures (where applicable).

6. Progressive Reclamation

6.1 DEFINITION OF PROGRESSIVE RECLAMATION

Progressive reclamation takes place prior to permanent closure to reclaim components and/or to decommission facilities that are no longer required for the ongoing operation of the mine. It is a requirement of the Project Certificate No. 007 that Sabina have a Progressive Reclamation Plan as part of the ICRP (Term and Condition 15). Progressive reclamation can be initiated during the mine operations once a particular activity has been completed (e.g., the TSF, quarries and borrows), or when the facilities no longer serve a purpose (e.g., starting to flood mined-out underground mine workings and open pits). Progressive reclamation is defined as the opportunistic reclamation activities completed during the operational phase of a project before permanent closure (MVLWB/AANDC, 2013). Progressive reclamation takes advantage of cost and operating efficiencies by utilizing available mining resources to conduct reclamation activities during the revenue-generating phase of the Project. Progressive reclamation typically reduces risks, final closure costs, and the time frame for achieving closure objectives.

6.2 OPPORTUNITIES FOR PROGRESSIVE RECLAMATION

The key closure activities that have been identified for progressive reclamation are summarized in the following sections for each individual component of the Project. The progressive reclamation activities provided in this ICRP will be updated in future versions to include new opportunities for progressive reclamation identified during Operations.

6.2.1 Open Pits and the Tailings Facility

Following completion of mining at each of the open pits, progressive reclamation will commence. In summary, the progressive closure measures for each pit or TF are as follows:

- o **Umwelt Reservoir** – In Year 5, the exhausted Umwelt Pit will be converted to a water reservoir during the Operations Phase. The bottom of Umwelt Reservoir will be partially filled with saline water pumped from the Saline Water Pond to form meromictic conditions. The Umwelt Reservoir will continue to passively flood, reaching capacity in about Year 11. Overflow from the Umwelt Reservoir is expected to meet discharge requirements without water treatment.
- o **Llama TF** – After open pit mining of the Llama Pit concludes, it will be used to store tailings in Years 5 to 12. The pit will then be allowed to passively flood. Water in the TF will be continuously treated and returned back to the TF starting in Year 5 until Year 11. The Llama TF is expected to meet discharge requirements in Year 11 and throughout Post-Closure and beyond.
- o **Goose Main Reservoir** – Mining of the Goose Main Pit will conclude in Year 8, after which it will then be allowed to passively flood reaching capacity in about Year 13 (early in the Closure Phase). The flooded pit is expected to meet discharge requirements without water treatment.

In addition, the following generic reclamation activities will occur:

- o Establishing partial or full boulder fences around open pits, where physical barriers are required to reduce the likelihood of entry by people or animals;
- o Installing proper signage around mine openings and open pits; and
- o Constructing open pit outflow structures, where necessary.

Boulder fencing and signage are not necessary in areas that do not represent a physical hazard, such as pit walls that will be submerged after flooding. The engineering works presented in Section 5.2.1.5 will be carried out to the extent possible prior to Closure.

6.2.2 Underground Mine

Underground workings will be backfilled with waste rock during the mining process for underground support and to reduce the quantity of exposed PAG waste rock on surface. Once Umwelt underground mining and backfilling is complete, the remaining void volume will be filled with saline water from the Umwelt Reservoir in Year 10 of Operations.

The engineering works presented in Section 5.2.2.5 will mainly be carried out during progressive reclamation.

6.2.3 Waste Rock Storage Areas

PAG waste rock within the WRSAs, including the TSF WRSA, will be progressively capped using NPAG waste rock and overburden sourced from adjacent or nearby active open pit operations. The Llama and Umwelt WRSAs will be fully constructed and covered with NPAG material by the end of Year 5 such that the majority of final reclamation can be undertaken progressively before the end of the Operations Phase. The exception is TSF WRSA, which will have the majority of waste rock cover placed by Year 6, and then will pause waste rock placement until the TSF supernatant is fully reclaimed through the Process Plant in Year 12. The small outstanding portion of waste rock cover will be placed at the TSF WRSA during Year 12 and 13.

Application of a final cover over PAG waste rock using NPAG waste rock and overburden from active pit operations represents the most substantial progressive reclamation effort proposed. As such, the engineering works presented in Section 5.2.3.5 will mainly be carried out during progressive reclamation.

6.2.4 Tailings Storage Facility

Tailings deposition in the TSF will cease in Year 5 of Operations. Tailings in the TSF will be progressively capped using PAG rock during waste rock deposition in the converted TSF WRSA. Ultimately, a 5 m NPAG cover, composed of NPAG rock and overburden, will be placed over the tailings and PAG rock. The NPAG rock will originate from active open pit mining activities with the majority of cover material placed in the TSF WRSA from Year 3 through 6. As such, the engineering works presented in Section 5.2.4.5 will mainly be carried out during progressive reclamation in late Operations, with the exception of water management facilities.

This covering of the TSF WRSA, along with all WRSAs, represents the most substantial progressive reclamation effort proposed.

6.2.5 Buildings, Equipment, and Infrastructure

Potential progressive reclamation activities for the buildings and equipment include:

- o demobilize, remove, and decommission equipment and facilities as the facilities are identified as no longer being required for Operations; and
- o reduce inventories of consumables leading up to the end of Operations.

6.2.6 Contaminated Materials and Waste Disposal

Materials (e.g., soil, snow, ice) that may become contaminated during Construction and Operations due to fuel or other spills will be cleaned up immediately following the spill. Soil will be remediated on-site in lined landfills. Final disposal of remediated soil will be in a WRSA or other reuse on-site, if appropriate, once the soil meets Nunavut Site Remediation criteria for industrial land use. At the MLA, the remediated soil may be used for closure site grading.

Inert, non-hazardous landfills will be established within WRSAs at Goose Property during the Construction and Operations phases. As the various WRSAs are closed, so may some of the landfills within them, if they have reached capacity. The engineering works presented in Section 5.2.8.5 will be carried out to the extent possible prior to Closure.

Hazardous wastes will be shipped off-site periodically to reduce the amount of waste requiring removal at Closure.

6.3 PROGRESSIVE REVEGETATION STUDIES

With the exception of WIR subbase upgrades and service emergency camp pads, active revegetation of the Property as part of Closure is not planned given the cold climate setting of the Project as well as the precedent established for mine closure in Nunavut. The isolated areas of WIR subbase upgrades as well as WIR service emergency camp pads will be scarified and reseeded on closure to promote revegetation to the extent reasonable. In other areas, strategies that support or encourage natural revegetation and recovery will be used where appropriate, as outlined in the Progressive Reclamation and Permanent Closure sections above.

A revegetation research program has been initiated and a review of revegetation programs and studies completed at other northern mine sites has been conducted. The results of this review are provided in Appendix E, Table 1. This review included studies undertaking active revegetation, seeding, and/or soil amendment. Based on this review, it is concluded that the limited benefits of active revegetation continue to be outweighed by their logistical and cost constraints and potential for environmental impacts to other aspects of the environment. This includes concerns related to Arctic growing conditions, availability of native seed, lack of suitable growth medium, unavailability of soil amendments, and potential for adverse impacts to the physical stability of surficial soils.

Further work in this field will be conducted by Sabina in the future and would be outlined in future revisions to this Plan. As required by Project Certificate No. 007, Term and Condition 35 and 36, these studies will include additional exploration of the feasibility and practicality of topsoil/organic matter salvage through Project development. Research may also include updates to the previously conducted review as well as observational or experimental field-based studies of re-vegetation of progressively reclaimed areas of the Project. Within three years from the commencement of construction, information regarding the revegetation strategies developed and implemented will be included in the annual report to the Nunavut Impact Review Board, per Project Certificate Term and Condition 35. Subsequently, information regarding progress in fulfillment of this Term and Condition will be provided annually in the annual report to the Nunavut Impact Review Board, per Project Certificate Term and Condition 36.

6.4 COMPLETED PROGRESSIVE RECLAMATION

Progressive reclamation has not been carried out at either the Goose Property or MLA to date. Progressive reclamation measures will be considered successful if they are completed as described in this section and monitoring confirms that the completed work is consistent with the stated closure objectives.

7. Temporary Closure

Temporary closure (also termed Care and Maintenance) is defined as the cessation of mining and processing operations for a finite period of time with the intention of resuming operations upon resolution of the cause of the cessation (MVLWB/AADNC 2013). Possible reasons for implementing temporary closure measures include economic factors (severely depressed gold price, major mechanical failure, late delivery of critical supplies), environmental factors (investigation following unintentional discharge to the environment), or social factors (labour conflict). Temporary closure could last for several weeks or as long as several years depending on the nature of the contributing factor(s).

As a requirement of PC No. 007, Sabina has assessed the potential impacts and risks related to temporary closure. This evaluation gave particular consideration to how communities in the Kitikmeot region may be affected by temporary closure of the mine, including economic, social, and cultural effects. See the Appendix B, Table B-03 for more details, which will be updated as prescribed by the PC.

It is also possible that temporary closure could lead to permanent closure without resumption of mining. This unlikely event would be triggered by a commercial decision by Sabina not to continue operating. This decision would require the Final Closure Plan to be filed with the NWB, or a notification to the NWB that the company intends to execute the latest ICRP as its Final Closure Plan. Following any required NWB approval, the final closure and reclamation measures described in Section 0 would be executed.

This section provides and general principles and approach that will be undertaken in the event of a temporary closure. The Licence requires Sabina provide a Care and Maintenance Plan at least 30 days prior to entering Care and Maintenance (per 2AM-BRP1831 Part J, Item 4). This Care and Maintenance Plan will expand on the information provided in this section and will be based on the specific developmental stage of the mine at the time of temporary closure initiation. Should the Project remain in Care and Maintenance, an updated estimate of total mine closure restoration liability must be submitted within 12 months of entering Care and Maintenance and every three years thereafter (per 2AM-BRP1831 Part J, Item 5).

7.1 TEMPORARY CLOSURE GOAL AND CLOSURE OBJECTIVES

Temporary closure is focused on the care and maintenance activities that are required during the cessation of a mining operation. Temporary closure could occur during the Construction or Operations phases for the Project and, as such, temporary closure activities are phase and development stage-dependent.

The overall objective of temporary closure is to ensure that the Project facilities are kept in a manner that is safe for humans, wildlife, and the environment, and will include physically and chemically stabilizing mine components. The success of the temporary closure provisions will be monitored by conducting routine physical and chemical inspections. Additional details are provided in the following sections.

7.2 TEMPORARY CLOSURE ACTIVITIES

The following temporary closure scenarios have been considered:

- o **Short-term temporary closure:** this would apply to any anticipated short-term shut down or closure period of less than one year and could last for a period of weeks or several months (up to 12 months) based on economic, environmental, social or health factors. This includes potential for Planned Operational Shutdown as defined under the Wildlife Mitigation and Management Plan.
- o **Long-term temporary closure:** or indefinite shutdown is a cessation of mining and processing operation for an indefinite period of time greater than one year. The intention is that the mine will resume operations as soon as possible after the cause for the indefinite shutdown has been addressed. The site must maintain safety and environmental stability during this time. Possible causes for an indefinite shutdown could include prolonged adverse economic conditions, extended labour disputes, or shutdowns necessitated or mandated due to external conditions such as disease, war, terrorism or natural disaster. A decision on the estimated length of the indefinite shutdown would be made after the initial one-year period. Decisions on possible extensions to the indefinite shutdown would be made every 6 months thereafter and would be based on the conditions at that time. At present, the maximum length of time or number of extensions for interim shutdown before moving to final closure has not been defined.

The proposed short-term and long-term temporary closure activities are presented in the following subsections.

7.2.1 Short-term Temporary Closure

The following short-term temporary closure activities will be implemented as needed depending on the phase at which the cessation of Operations takes place.

- o **Access and Security:** Adequate staffing levels will be maintained to carry out care and maintenance. Mechanical, hydraulic, and electrical systems will be locked out and maintained in a secure state (i.e., in a no-load condition) if they are not required to operate through the temporary closure phase. Mobile heavy equipment that is not required during temporary closure will be stored in appropriate areas in a no-load condition.
- o **Mine Openings:** Warning signs will be posted around open pits and other mine openings. Mine openings will be barricaded.
- o **Monitoring Programs:** All physical, chemical, and biological treatment and monitoring required to comply with applicable regulatory instruments will be continued. Routine geotechnical stability monitoring and maintenance will continue at a reduced rate compared to that conducted during Operations. Monitoring details will be described in the Care and Maintenance Plan submitted prior to the initiation of temporary closure.
- o **Hazardous Materials:** An inventory of hazardous materials will be completed, including process chemicals, reagents, and petroleum products. Fuel, lubricants, and hydraulic fluids will be removed from the open pit and underground areas and stored in designated areas. Hazardous materials and other chemicals will be properly stored or removed from site.
- o **Bulk Fuel Storage:** Fluid levels in all fuel tanks will be recorded and the tanks will be routinely inspected for leaks or potential hazards.
- o **Explosives:** Explosives will be relocated to the main magazine and secured, disposed of, or removed from site.

- o **WRSAs and Stockpiles:** WRSAs and ore stockpiles will be maintained such that they are physically stable. The WRSAs and stockpiles will be routinely inspected to ensure their stability or to implement any required mitigation measures.
- o **Water Management:** Surface water management measures, including mine dewatering, will continue through temporary closure, and will be monitored to ensure proper operation. Surface water quality will be monitored to ensure that regulatory requirements are being met. Depending on the stage at which temporary closure occurs, the water level in the active Tailings Management Facility at the time will need to be monitored, as there will be a net buildup of water because no water is being removed for processing. Any unused water distribution lines will be drained but would be left in place.
- o **Infrastructure:** Access roads will be maintained, including plowing snow from active roads and airstrips, clearing and repairing berms and culverts, employing erosion and sediment control measures, etc. Infrastructure, including ditches and spillways, will be routinely inspected to ensure proper operation or to implement contingency measures. Camp facilities will be operated for reduced staffing levels; however, all camp facilities will be maintained. Critical facilities (Process Plant and camp) will have nominal heat to prevent freezing of the facilities and possible damage.

7.2.2 Long-term Temporary Closure

In addition to the short-term closure activities presented previously, the following long-term temporary closure activities will be implemented as needed depending on the phase at which the temporary closure takes place.

- o **WRSAs and Stockpiles:** WRSAs and ore stockpiles will be maintained such that they are physically stable. As the WRSAs will be designed and operated for long-term stability, it is anticipated that any grading required will be localized and minor. The WRSAs and stockpiles will be routinely inspected to ensure their stability or to implement any required mitigation measures.
- o **TSF and/or TF:** Minimum 0.75 to 1 m cover of non-potentially acid generating waste rock will be placed over the exposed tailings to control dust. Where feasible, a shallow water cover may be allowed to form as an alternative to a rock fill cover.
- o **Water Management:** Depending on water levels, it may be necessary to begin pumping from the active Tailings Management Facility and treating the excess water for discharge. Surface water control structures will be maintained as required. Any unused water distribution lines will be drained.
- o **Infrastructure:** Depending on circumstances, the decision may be made to not construct the WIR in a particular winter season. In such a case, access to the Goose Property would be via air only.

7.3 TEMPORARY CLOSURE MONITORING AND MAINTENANCE

The numbers of personnel on-site would be substantially reduced from operational levels. The staff present at site during temporary closure would be sufficient in number and expertise to successfully carry out care and maintenance and monitoring duties, and to address any potential problems that may arise. Sufficient equipment and supplies/reagents would be left on-site for any maintenance or reclamation activities that may need to take place.

Programs will be conducted to monitor the physical and chemical stability of mine components, to maintain security of the site, and to carry out monitoring required for compliance with relevant regulatory instruments. Physical inspections will be conducted to ensure that infrastructure, including

embankments, berms, diversions, access roads, surface water management measures, etc., are all performing as designed.

Monitoring, maintenance, and records that will be kept include the following:

- o Recordings of pond water levels and pumping volumes;
- o Recordings of meteorological and hydrological data;
- o Physical inspections of TSF embankments, pipelines, intake structures, and progressively reclaimed areas;
- o Ongoing water quality monitoring (as prescribed in the Type A Water Licence and other applicable approvals);
- o Regular site inspections by the Environmental Superintendent or designate for potential issues;
- o Annual dam safety inspections of the TSF and physical inspections of the WRSAs by a qualified Geotechnical Engineer to observe that the embankments and stockpiles are performing as designed and that the TSF is being operated in accordance with the design intent;
- o Ongoing maintenance of access roads;
- o Enforcement of security and access protocols;
- o Site inspections to assess any less obvious signs of potential problems; and
- o Detailed site inspections by the Environmental Superintendent or designate following any extreme events, including freshet. These inspections are needed to identify and assess any damage caused by erosion or settlement or pooling water that requires attention.

The inspections will be formally recorded and will include details on the inspection results. A brief summary following each inspection will be provided to Sabina management in order to identify any urgent concerns or maintenance measures. Physical and chemical monitoring and the associated maintenance activities will be conducted until the Project changes status by either resuming operation or advancing to final closure.

Care and Maintenance monitoring and management measures will be further detailed in the required Care and Maintenance Plan submitted to the NWB 30 days prior to entering a Care and Maintenance phase.

7.4 TEMPORARY CLOSURE CONTINGENCY PROGRAM

The key staff present at site during temporary closure would be sufficient in number and expertise to successfully address and remediate any conditions or unforeseen events that may arise through the monitoring programs. The key staff at the site would also have access to external consultants and advisors, as required.

The contingency options and actions for events or incidents defined for Operations would be also implemented during the temporary closure (i.e., spill responses and reports).

7.5 TEMPORARY CLOSURE SCHEDULE

The temporary closure schedule would depend on when temporary closure occurs (i.e., what year of the operations stage and what time of year) and its duration, which are commonly uncertain. Therefore, the schedule for the activities presented in Section 7.2 would be developed as temporary closure advances.

In summary, the sequence of activities for short-term and long-term temporary closure would be as follows:

- o Restrict access to the site, buildings, and infrastructure to authorized personnel as required.
- o Carry out an inventory of chemicals and reagents, petroleum products, and other hazardous materials and either secure these materials appropriately or remove them from site.
- o Post warning signs and berms as needed around the open pit perimeters.
- o Remove all mobile equipment except for small service equipment required for open pit inspections and place them in secure on-site storage.
- o Temporary closure of unnecessary facilities and systems.
- o Continue with environmental and geotechnical monitoring and sampling required for care, maintenance and monitoring as described in the Care and Maintenance Plan and in accordance with all applicable acts, regulations, licenses, permits, and authorizations.

7.6 TEMPORARY CLOSURE REPORTING

The Licence requires Sabina provide notice 60 days prior entering Care and Maintenance, or as soon as practically possible (per 2AM-BRP1831 Part J, Item 3). In addition, Sabina must provide the NWB a Care and Maintenance Plan within 30 days of the submission of the notification (2AM-BRP1831 Part J, Item 4). Should the Project remain in Care and Maintenance, an updated estimate of total mine closure restoration liability must be submitted within 12 months of entering Care and Maintenance and every three years thereafter (2AM-BRP1831 Part J, Item 5).

If there have been significant changes in the Project or socio-economic conditions since the last socio-economic risk assessment of temporary closure (Sabina 2018), this assessment must be updated and provided to the NIRB, per PC Term and Condition 69.

Sabina will continue to file reports with the NWB, NIRB, the KIA and other regulatory bodies as required by the licences, permits and authorizations. These reports will provide jurisdictionally appropriate information on the monitoring undertaken. Care and Maintenance monitoring and reporting will be further detailed in the Care and Maintenance Plan to be submitted 30 days prior to entering a Care and Maintenance phase. Monitoring reports will be prepared to present the findings of the inspections in accordance with licence requirements and will be submitted to the NWB and NIRB annually. Recommendations for maintenance and any suggested modifications to the monitoring program will be included in the reports. It is anticipated that monitoring and reporting will be consolidated to the extent possible to focus on ensuring the maintenance of the chemical and physical stability of the site.

8. Post-Closure Site Assessment

The ICRP is a “living” document and includes a commitment to adaptive management and monitoring during all stages of the mine life to demonstrate the safe performance of the mine facilities and to reduce any contamination on the site or in the adjacent area after mine operations cease. Monitoring during Operations and in Closure will: identify any non-compliant conditions; allow timely maintenance and clean up as needed; allow timely planning for adaptive and corrective measures; and enable successful completion of the ICRP.

To complete a post closure site assessment Sabina is required under Part J, Item 2 of the Type A Water Licence, 2AM-BRP1831, to submit a Final Closure and Reclamation Plan at least twelve (12) months prior to the expected end of planned mining, the FCRP will reflect the pending closed status of the mine and include:

- a. Soil Quality Remediation Objectives reflecting the applicable *CCME Guidelines* and the *Government of Nunavut Environmental Guideline for Site Remediation*;
- b. Environmental Site Assessment plans in accordance with the applicable Canadian Standards Association (CSA) criteria; and
- c. An evaluation of the human health and ecological risks associated with the Closures options proposed.

Post-Closure monitoring is expected to be required for five years after completion of Active and Passive Closure activities in Year 20. Five years of Post-Closure monitoring has been selected at this stage of Project planning based on the following:

- o The TSF will be decommissioned and begin conversion into a WRSA after Year 5;
- o Umwelt and Llama WRSAs will be fully constructed by the end of Year 5 and will be progressively reclaimed prior to the end of the Operations Phase;
- o The TSF WRSA will have the majority of cover material placed by Year 6;
- o The TSF WRSA and other WRSAs will be frozen and covered with NPAG material; and
- o The Closure Phase (inclusive of Active and Passive Closure stages) is sufficiently long as to have allowed for considerable Post-Closure monitoring prior to the formal 5-year Post-Closure Phase.

As discussed in Section 6, a number of project components will be closed out progressively during the Operations Phase or during the Active Closure Stage. At the end of the 5-year Post-Closure monitoring period, WRSAs will have been monitored for at least 12 years, and all open pits will also have been monitored for at least 12 years after passively filling.

The proposed Post-Closure timeframe may be revisited in future versions of this plan. Post-Closure monitoring is expected to include:

- o Geotechnical inspections of the TSF embankments, WRSAs, pit walls, and other areas for physical stability and to ensure that permafrost encapsulation of PAG waste rock and tailings is occurring as expected.
- o Water quality sampling at mine effluent discharge locations in accordance with MDMER discharge limits and applicable receiving water quality objectives.

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- o Final Environmental Effects Monitoring (EEM) studies in accordance with the water quality objectives needed to obtain status from Environment and Climate Change Canada as a recognized closed mine.

Adaptive management is proposed through this ICRP. This may include:

- o Carrying out Post-Closure monitoring beyond the stated 5-year Post-Closure monitoring period if closure objectives have not been met; specifically, Sabina has included an allowance for long term monitoring beyond the Post-Closure Phase (i.e., years 1 to 5, 7, 10, 15, 25 beyond Post-Closure).
- o Carrying out water treatment for longer (or shorter) time periods than initially planned should water quality not meet (or sooner meet) closure criteria within specific timeframes; and
- o Modification to the Plan as a result of the findings of the reclamation studies conducted.

Adaptive management will document monitoring and mitigation measures to ensure long-term containment of the TSF and WRSAs. The need for adaptive management will be triggered by monitoring results indicating trends that could affect the reclamation and closure objectives. Specific adaptive management actions will be developed through the Closure and Post-Closure periods based on identified, anticipated or potential needs.

9. Financial Security

Sabina is required to maintain a financial security for the Project reflective of the costs associated with closing and reclaiming the Project as described in this Plan, which based on the modified mine plan. The 2017 cost estimate for mine closure and reclamation has been revised to reflect the changes in this Plan and can be found Appendix F. This Cost Estimate covers the closure and reclamation of all Project facilities as described in this Plan and was prepared using RECLAIM Version 7.0 for permanent closure of the Project.

As required by the Water Licence, 2AM-BRP1831 Part J, Item 7, this Cost Estimate will be updated on a prescribed schedule linked to significant milestones. These revision milestones include:

- a. Twelve (12) months following the commencement of the Operation Phase with an updated Interim Closure and Reclamation Plan (Part J, Item 1);
- b. At least twelve (12) months prior to the expected end of planning mining with submission of a Final Closure and Reclamation Plan (Part J, Item 2), and
- c. with a Care and Maintenance Plan within twelve (12) months of entering Care and Maintenance and every three (3) years thereafter (Part J, Item 5).

As noted previously, Sabina currently holds Type B Licences (2BE-GOO2028 and 2BE-GEO2025) for the Back River Project exploration activities. The facilities at the Goose and George properties approved under the Type B Licences are not covered in this ICRP as they are covered under their respective closure plans and cost estimates.

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Appendix A. Figures

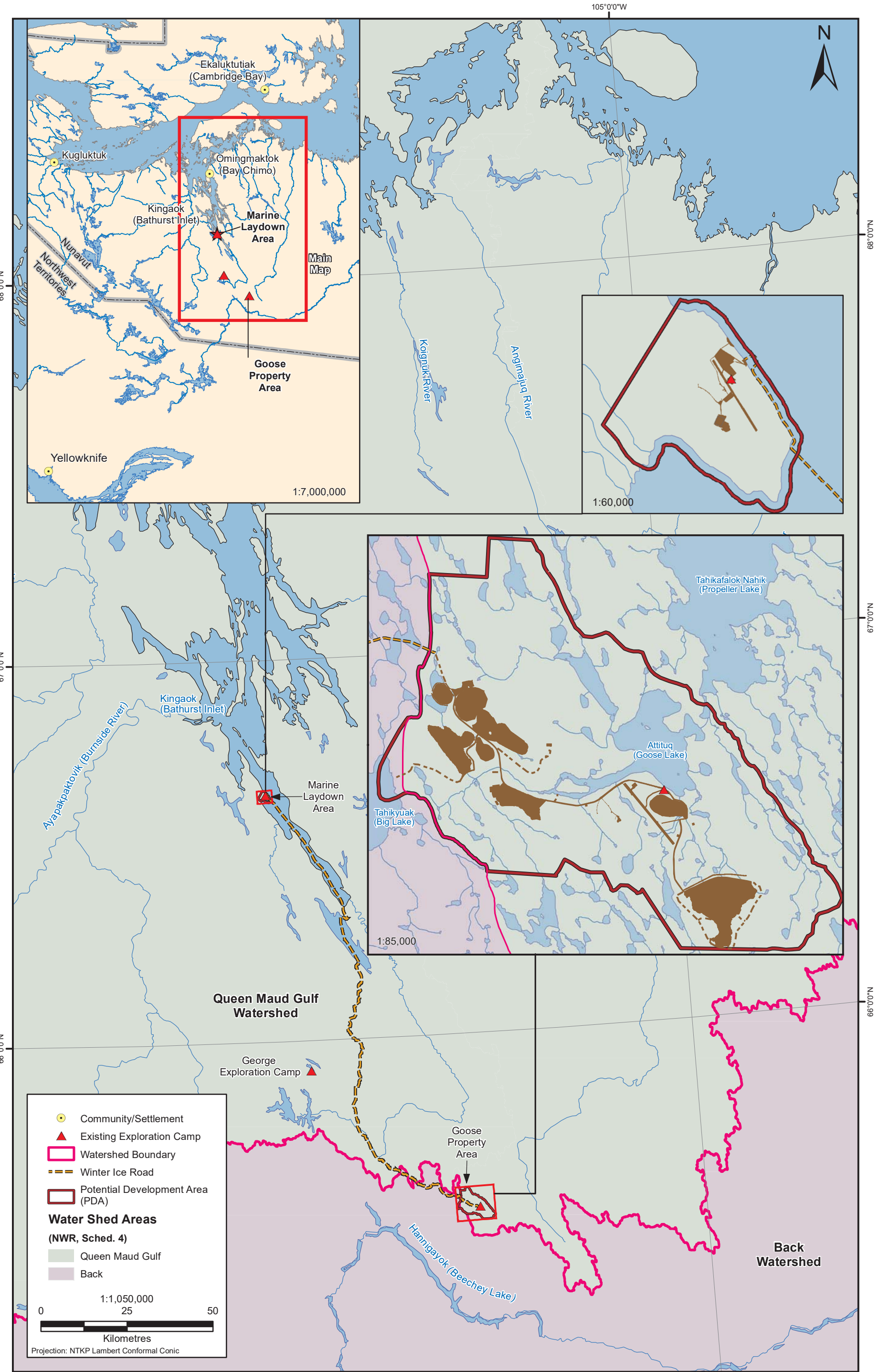
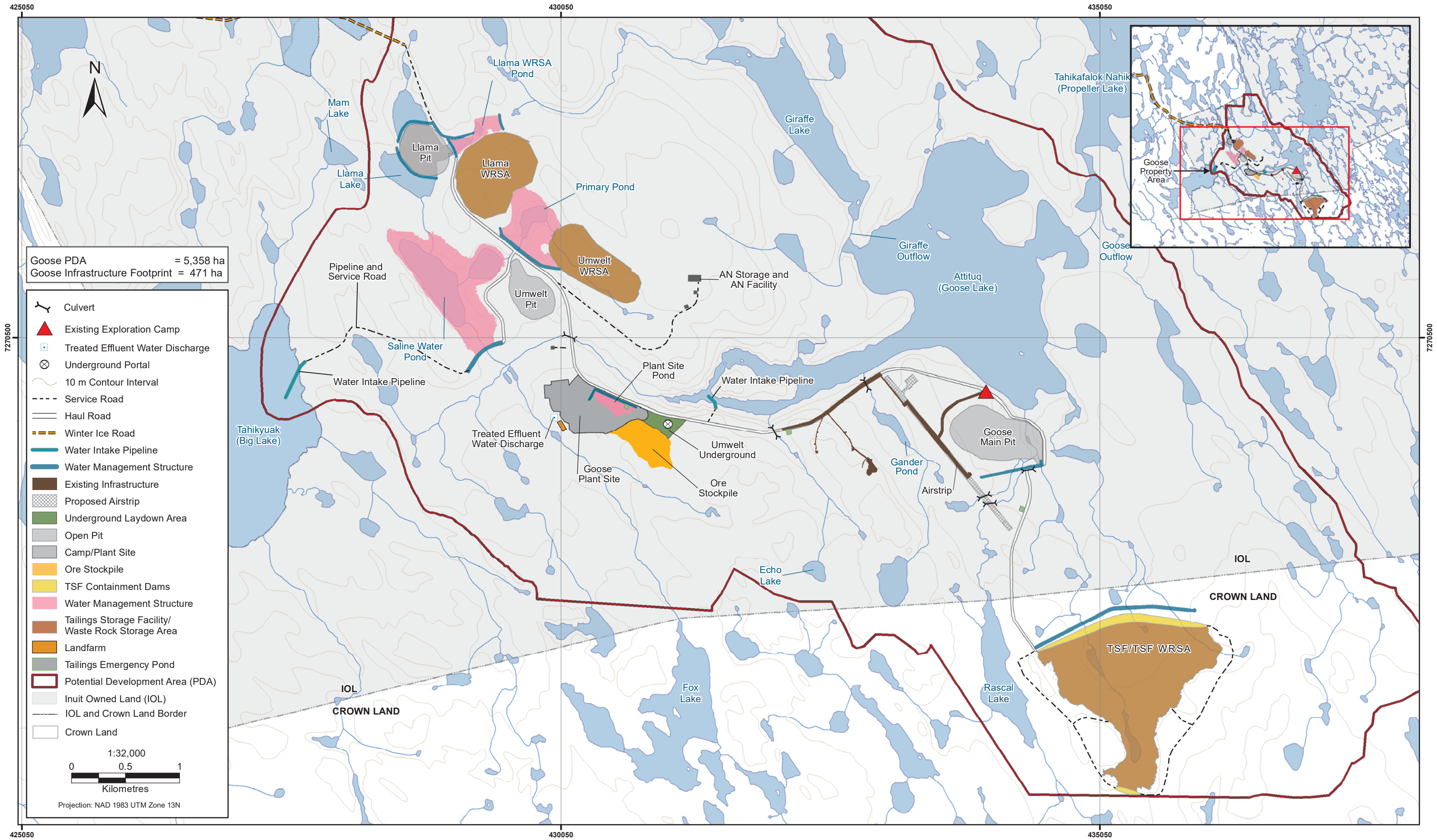
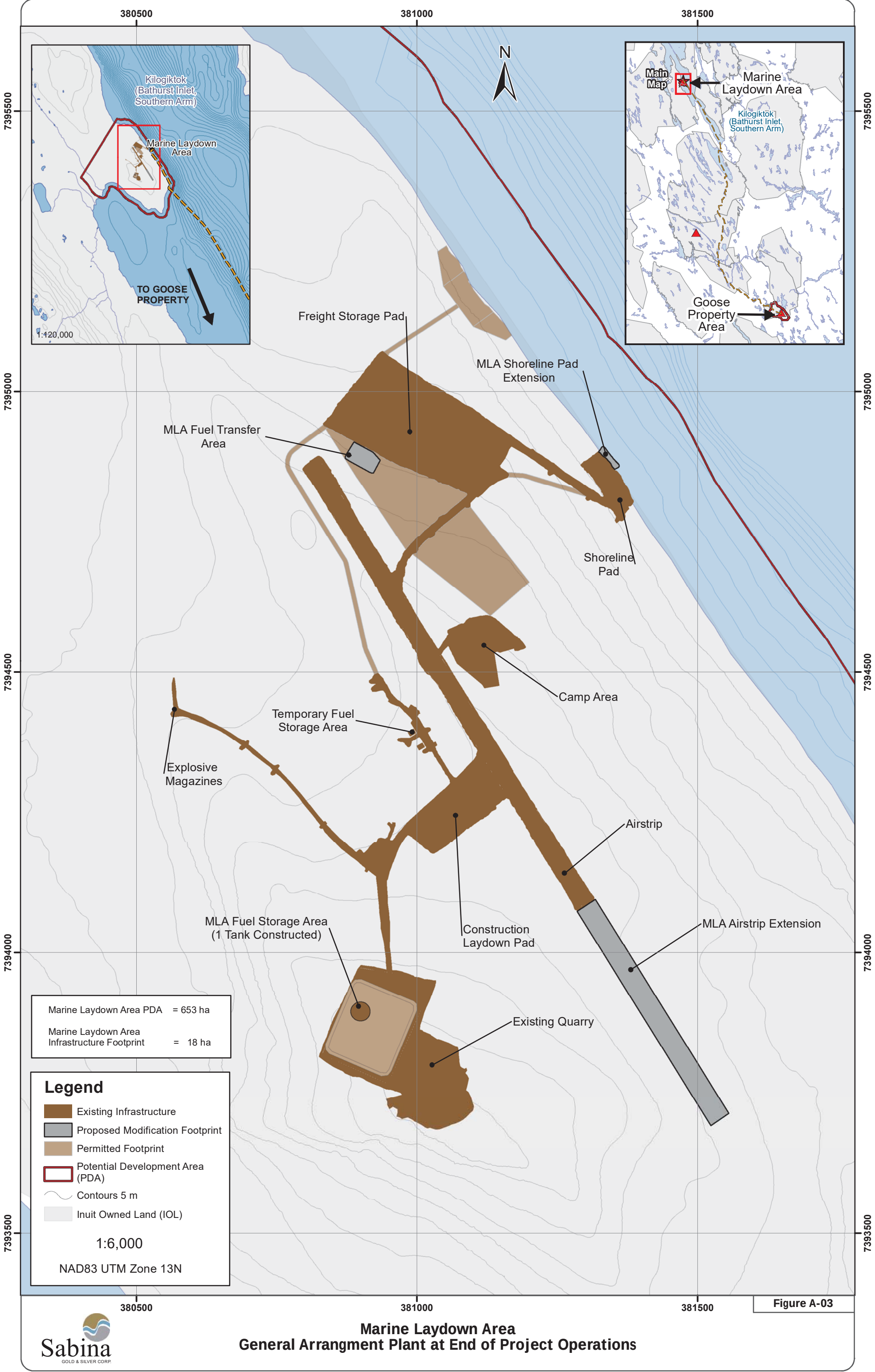
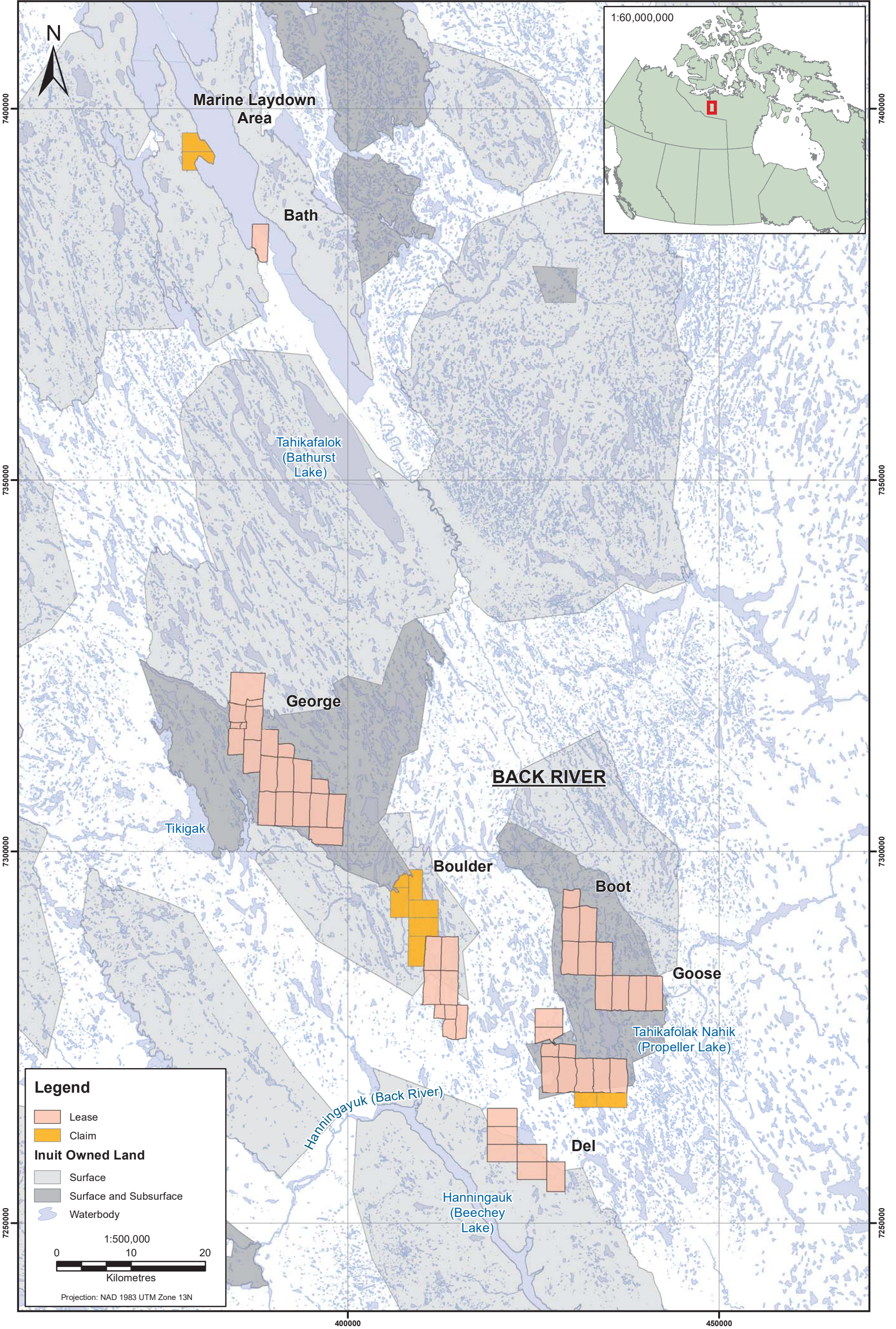
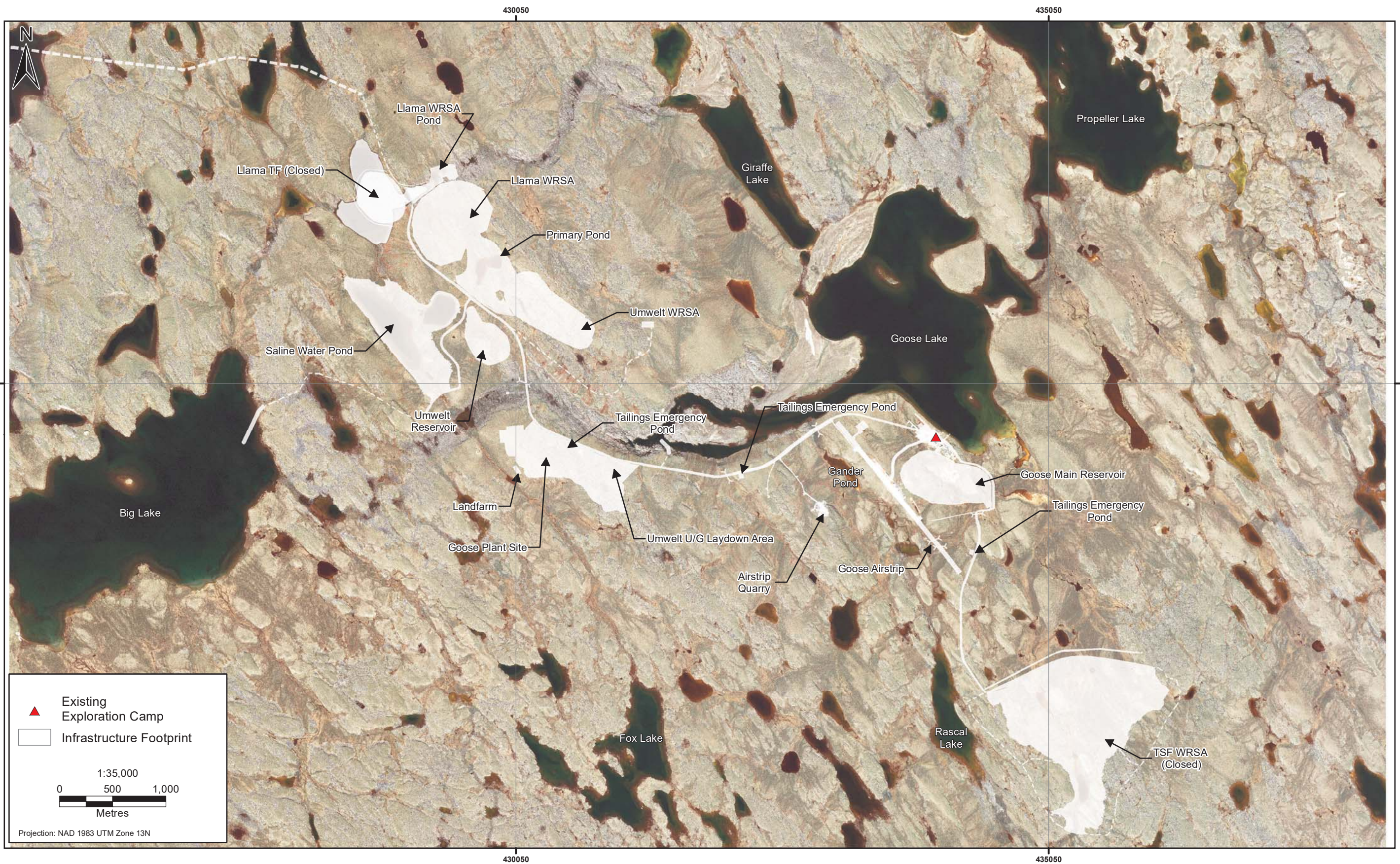


Figure A-01

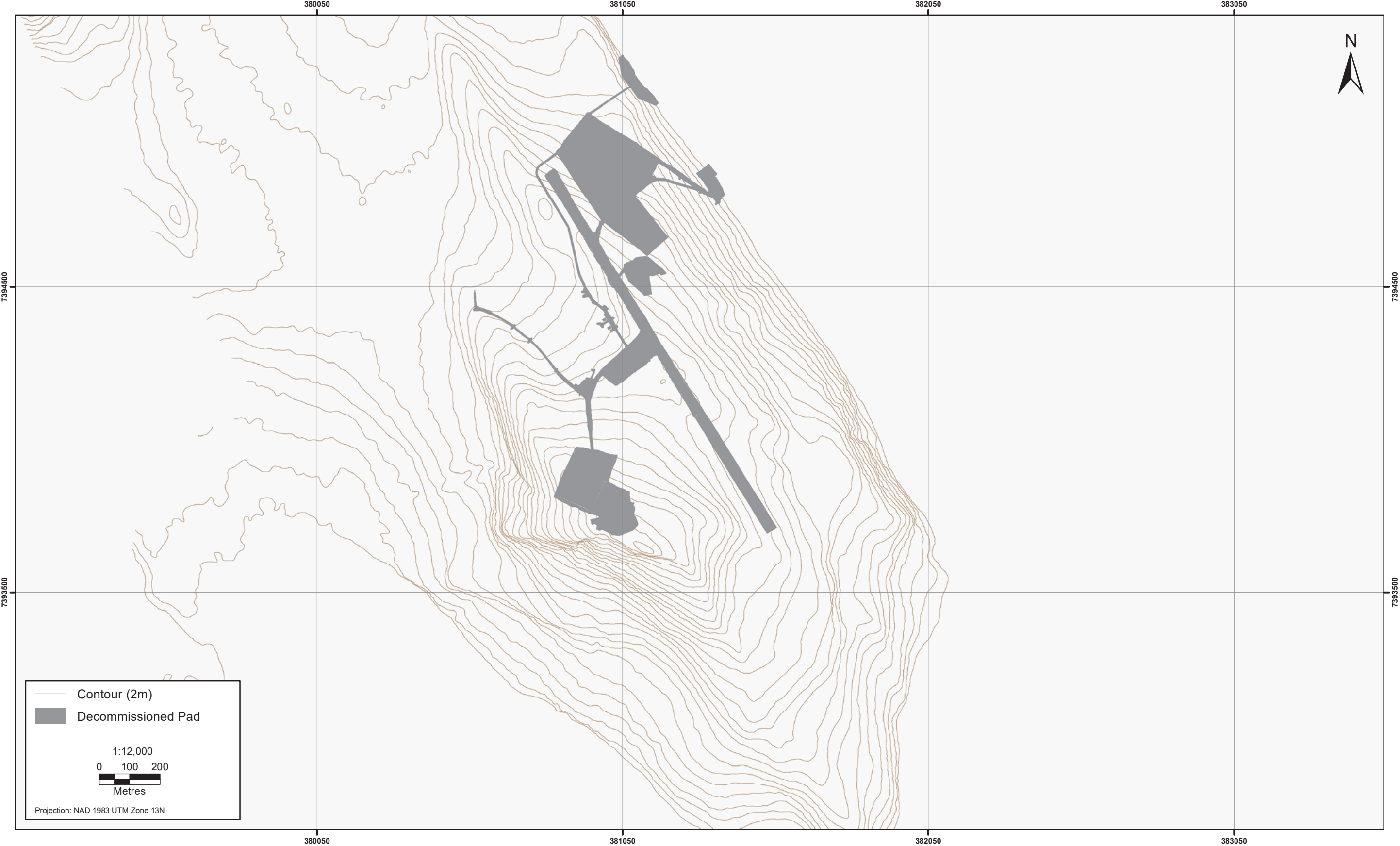


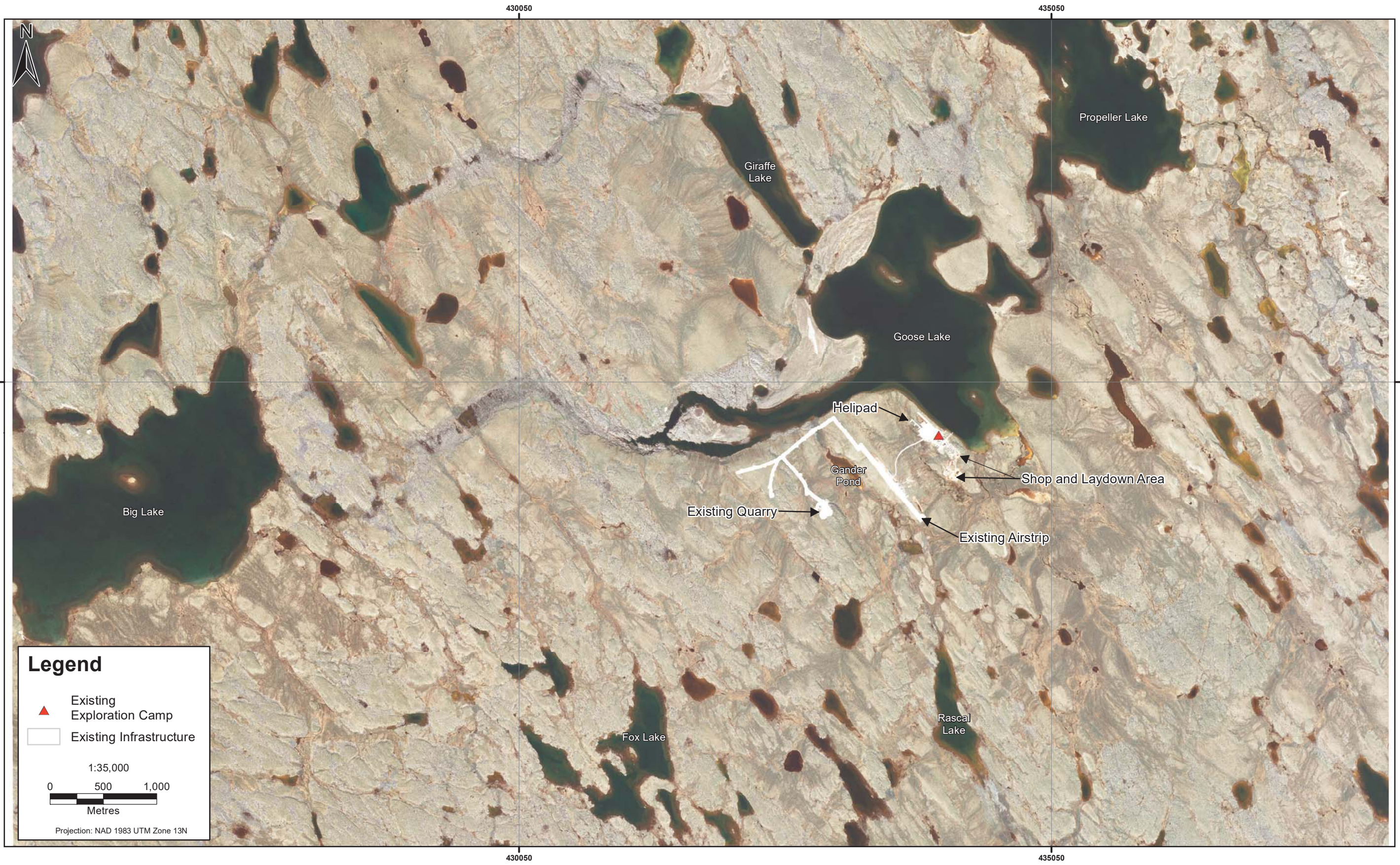




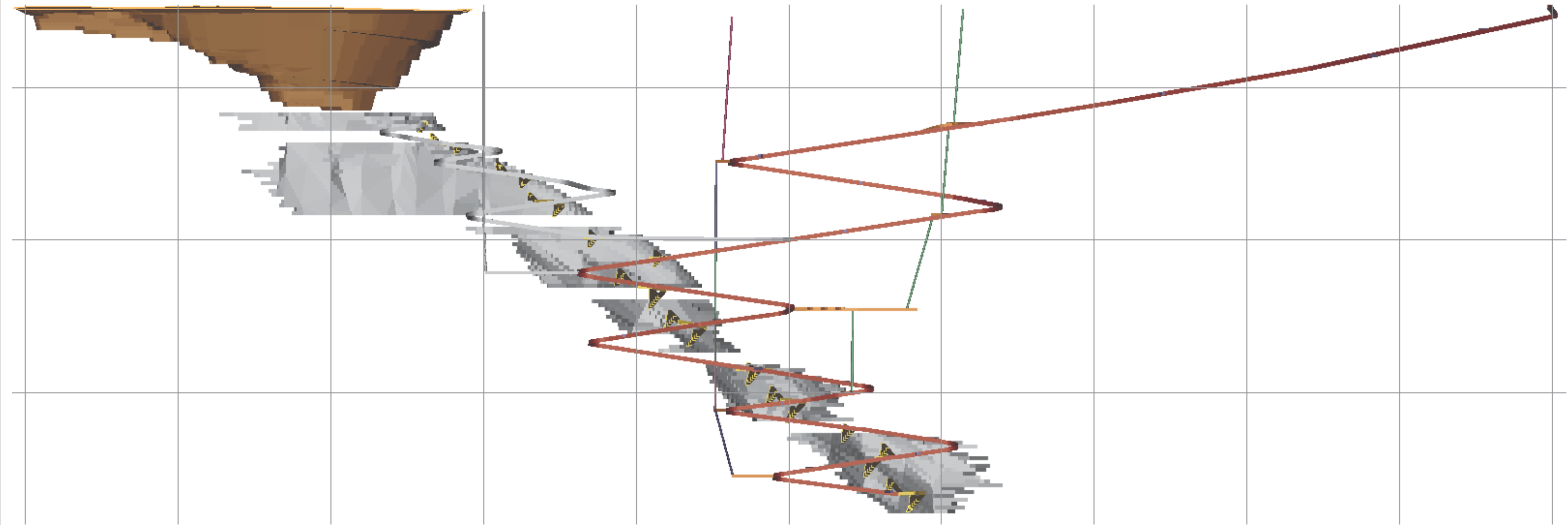


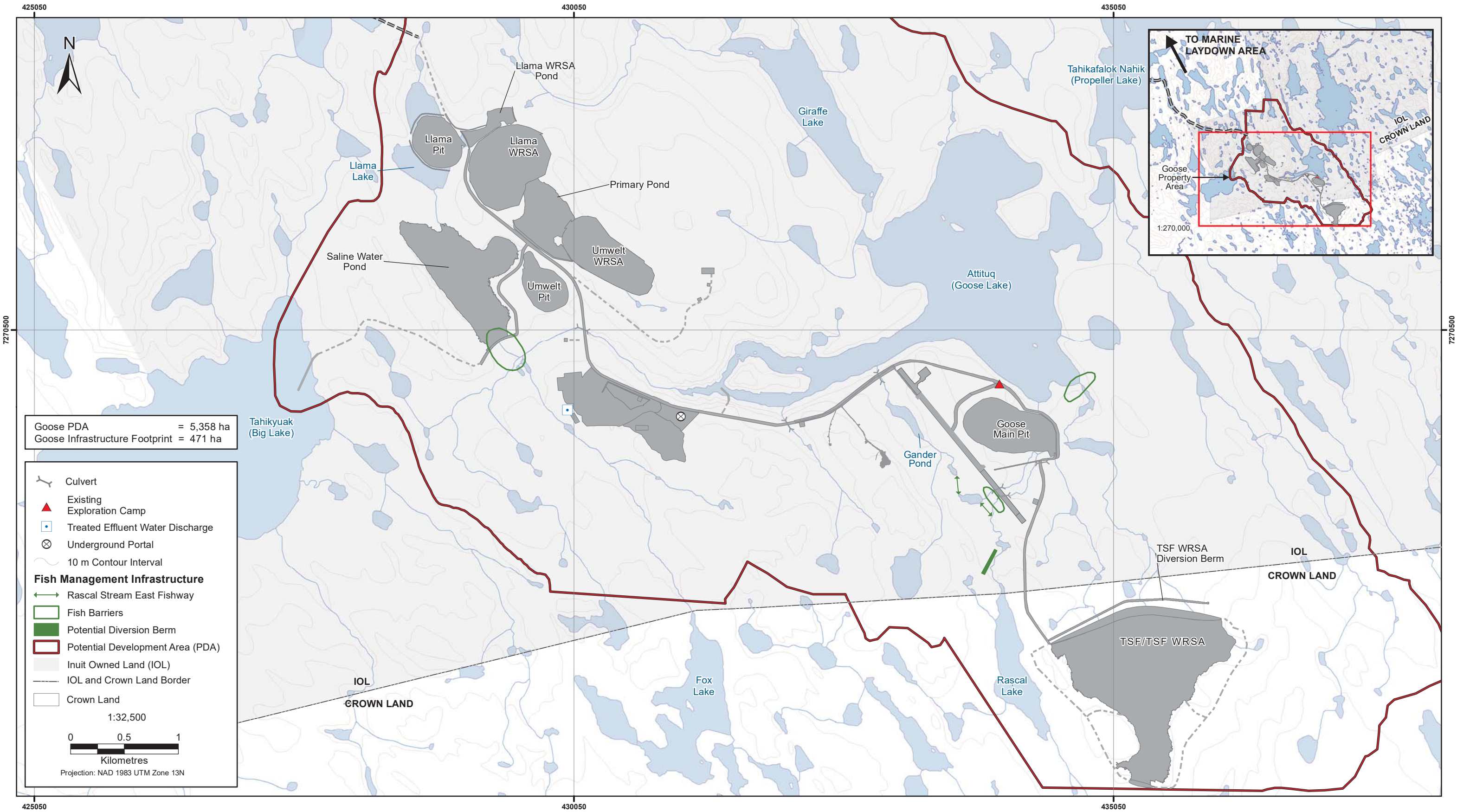












Appendix B. Tables

Table B-01. Primary Applicable Acts, Regulations, and Guidelines Applicable to Closure and Reclamation

Acts	Regulations	Guidelines
Federal		
<i>Canadian Environmental Protection Act</i> (1999 c.33)	<i>Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations</i> (SOR/2008-197) <i>Environmental Emergency Regulations</i> (SOR/2019-51) <i>Interprovincial Movement of Hazardous Waste and Hazardous Recyclable Material Regulations</i> (SOR/2002-301) <i>Release and Environmental Emergency Notification Regulations</i> (SOR/2011-90)	<i>Canadian Council of the Ministers of Environment - Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products</i> Notice with respect to substances in the National Pollutant Release Inventory Canada-Wide Standards for Particulate Matter (PM) and Ozone Canada-Wide Standards for Petroleum Hydrocarbons (PHC) In Soil CCME – Freshwater Aquatic Life Quality Guidelines; Soil Quality Guidelines.
<i>Canada Wildlife Act</i> (1985 w9)		
<i>Species at Risk Act</i> (2002 c.29)		Species at Risk Policies
<i>Canadian Transportation Accident Investigation and Safety Board Act</i> (S.C. 1989, c. 3)		
<i>Transportation of Dangerous Goods Act</i> (Canada 1992)	<i>Transportation of Dangerous Goods Regulations</i> (Canada 2001)	
<i>Canadian Navigable Waters Act</i> (R.S. 1985 c. N-22)	<i>Navigable Waters Works Regulations</i> (C.R.C., c. 1232) <i>Navigable Waters Bridges Regulations</i> (C.R.C., c. 1231)	
<i>Fisheries Act</i> (R.S.C. 1985, c. F-14)	<i>Metal and Diamond Mining Effluent Regulations</i> (SOR/2002-2222) <i>Marine Mammal Regulations</i> (SOR/93-56)	Fisheries and Fish Habitat Protection Policy Statement (DFO 2019a) Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the <i>Fisheries Act</i> (DFO 2019b) DFO Measures to Protect Fish and Fish Habitat (DFO 2019c), including those for the Timing Window to Conduct Projects In or Around Water, Sediment Control, and other applicable measures (DFO Standards and Codes of Practice (DFO 2020), including those for End-of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater (also see DFO 1995), Culvert Maintenance, Temporary Stream Crossings, and other applicable standards

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Acts	Regulations	Guidelines
		Protocol for Winter Water Withdrawal from Ice-Covered Waterbodies in the Northwest Territories and Nunavut (DFO 2010) Freshwater Intake End-of-Pipe Fish Screen Guideline (DFO 1995) Method for Determining Available Winter Water Volumes for Small-Scale Projects (April 27, 2020, MVLWB)
<i>Canada Labour Code</i> (R.S.C., 1985, c. L-2)	<i>Canada Labour Standards Regulations</i> (C.R.C., c. 986) <i>Canada Occupational Health and Safety Regulations</i> (SOR/86 304)	
<i>Territorial Lands Act</i> (R.S. 1985, c. T-7)	<i>Nunavut Mining Regulations</i> (SOR/2014-69) <i>Territorial Land Use Regulations</i> (C.R.C. 1524) <i>Territorial Quarrying Regulations</i> (C.R.C. c. 1527)	
<i>Nunavut Planning and Project Assessment Act</i> (S.C. 2013, C.14, s.2)		
<i>Nunavut Waters and Nunavut Surface Rights Tribunal Act</i> (S.C. 2002, c. 10)	<i>Nunavut Waters Regulations</i> (SOR/2013, 69)	
<i>Nunavut Act</i> (1993 c.28)	<i>Nunavut Archaeological and Paleontological Sites Regulations</i> (SOR/2001-220)	
<i>Nunavut Agreement Act</i> (1993, c. 29)		
Territorial – Nunavut		
<i>Environmental Protection Act</i> (RSNWT (Nu) 1988, c E-7, Amended 2011)	<i>Spill Contingency Planning and Reporting Regulations</i> (NWT Reg (Nu) 068-93)	Guideline on Dust Suppression Guideline for the General Management of Hazardous Waste in Nunavut Environmental Guideline for Waste Asbestos Guideline for Industrial Waste Discharges in Nunavut Guideline for Industrial Projects on Commissioner's Land
<i>Historical Resources Act</i> (S. Nu. 2013, c.20, s.16)		
<i>Territorial Parks Act</i> (RSNWT (Nu) 1988, c T-4, Amended 2011)	<i>Territorial Parks Regulations</i> (RRNWT (Nu) 1990 c T-13)	
<i>Wildlife Act</i> (S. Nu. 2003, c.26, Amended 2018)	<i>Wildlife General Regulations</i> (NWT Reg (Nu) 026-92) <i>Wildlife Licenses and Permits Regulations</i> (NWT Reg (Nu) 027-92)	

Acts	Regulations	Guidelines
	<i>Wildlife Management Barren-Ground Caribou Areas Regulations</i> (NWT Reg (Nu) 099-98) <i>Wildlife Management Zones Regulations</i> (RRNWT (Nu) 1990 c W-17) <i>Wildlife Regions Regulations</i> (NWT Reg (Nu) 108-98)	
<i>Commissioner's Land Act</i> (RSNWT 1988, c C-11, Amended 2012)	<i>Commissioner's Land Regulations</i> (RRNWT 1990, c C-13)	
<i>Mine Health and Safety Act</i> (SNWT (Nu) 2012, c17, s.20)	<i>Mine Health and Safety Regulations</i> (S.Nu, 2013, c.13, s.6, R-020-2018 and R-025-2018)	
<i>Explosives Use Act</i> (RSNWT. 1988, C.E-10, Amended 2010)		

Table B-02. Summary of Land and Water Access Permits/Licenses for the Project

Authorization No.	Expiry (year-mo-day)	Agency	Description
PC No. 007	N/A	NIRB	Back River Project NIRB Project Certificate
2AM-BRP1831	2031-12-31	NWB	Back River Type A Water Licence
N/A	2038-06-31	KIA	Inuit Impact and Benefit Agreement
KTCL-18D001	2038-04-20	KIA	Commercial Lease - Goose
KTCL-18D002	2038-04-20	KIA	Commercial Lease - MLA
KTCL-18D003	2038-04-20	KIA	Commercial Lease - Winter Road
KTAEL-18C001	2023-04-20	KIA	Advanced Exploration Lease - George
LUL-XX	5 years from Effective Date	KIA	Land Use Licence as per KIA Framework Agreement
KTL312C004	2020-04-25	KIA	Wishbone-Malley Exploration Activities (renewal submitted)
N2018F0021	2023-10-29	CIRNAC	CAT Train Beechy Lake Area
N2017F0016	2022-07-20	CIRNAC	CAT Train connecting Bathurst Inlet - Back River Project
Authorization No.	Expiry (yr-mo-day)	Agency	Description
N2016C0011	2021-10-26	CIRNAC	Back River Exploration Activities
N2018F0017	2023-10-11	CIRNAC	Winter Ice Road Back River Project
Lease No. 76J/12-7-2	2048-08-14	CIRNAC	Marine environment land lease - adjacent to MLA
Lease No. 76J/9-1-2	2048-04-26	CIRNAC	Goose Lake Tailings Storage Facility
PC 2020-0333	N/A	ECCC	Amendment to the Metal and Diamond Mining Effluent Regulations Schedule II allowing for the operation of the Tailings Storage Facility
2BE-GOO2028	2028-02-18	NWB	Goose Water Licence (Type B)
2BE-GEO2025	2025-05-29	NWB	George Water Licence (Type B)
2BE-MLL1722	2022-06-29	NWB	Wishbone-Malley Water Licence (Type B)
2BC-BRP1819	2019-04-30	NWB	Type B Development Works Water Licence (Replaced by Type A)
12-HCAA-CA7-00007	2031-12-31	DFO	Fisheries Act Authorization - Back River Project
18-HCAA-00185	N/A	DFO	Letter of Authorization - Gander Culvert
18-HCAA-00971	N/A	DFO	Letter of Authorization - MLA
18-HCAA-01626	N/A	DFO	Letter of Authorization - Winter Ice Road
04 009 19R-M	2020-12-31	NRI	Back River Project Scientific Research License (renewal submitted)

Authorization No.	Expiry (year-mo-day)	Agency	Description
2012-600767-002	N/A	TC	Navigation Protection Act – MLA Discharge Pipeline Authorization
2012-600767-003	N/A	TC	Navigation Protection Act – MLA Intake Pipeline Authorization
2012-600767-006	N/A	TC	Navigation Protection Act – MLA Lightering Barge Authorization
2012-600767-004	N/A	TC	Navigation Protection Act – Umwelt Lake Dewatering Authorization
2012-600767-005	N/A	TC	Navigation Protection Act – Llama Lake Dewatering Authorization

Table B-03. ICRP Concordance with Project Certificate No 007 and Water Licence 2AM-BRP1831

Regulatory Instrument	Term or Condition	Term or Condition/Reporting Requirement	Where Addressed in ICRP
PC No. 007	7	The Proponent shall maintain a Mine Closure and Reclamation Plan designed to: identify the processes that may act upon the mine components after closure and reclamation so that they can be factored within the design and operation of the mine; ensure physical and chemical stability of mine components that remain after closure; ensure mine components that remain after closure will not require long-term active care; and consider future use and aesthetics of the area with the surrounding lands. This plan should include:	This Plan as a whole
		a. An adaptive management component that documents monitoring and mitigation measures to ensure long-term containment of the Tailings Storage Facility and Waste Rock Storage Areas;	8
		b. Details for monitoring the thermal condition and stability of storage facilities;	Monitoring details will be reported in annual reports and relevant information included in future ICRP updates if needed.
		c. Details on the triggers for implementing alternative mitigation options;	5.2.1.8
		d. Details pertaining to ongoing monitoring and research being conducted to supplement the adaptive management protocols;	Appendix E
		e. Details on the plans to maintain the integrity of the groundwater quality within and adjacent to the Project; and	5.2.2
PC No. 007	15	f. Details on how the Proponent will carry out continued analyses over time to confirm or update the approximate fill time for the mine pits.	5.2.1
		Reporting: The plan should be submitted to the Nunavut Impact Review Board (NIRB) at least 60 days prior to the start of construction, with results submitted annually thereafter or as may otherwise be required by the NIRB.	This submission
		The Proponent shall have in place a plan for the progressive reclamation of project components, areas, and infrastructure throughout the life of the Project. The plan shall detail:	6
		a. projected timelines for the reclamation of project features, methodologies for undertaking such activities, and monitoring measures to ensure the effectiveness of reclamation methods employed;	1.3; 4.3; 5; 8
		b. specific measures for adaptive management and triggers for their application, should monitoring results reveal trends that could affect the reclamation and closure objectives.; and,	8
		c. how Inuit Qaujimagatuqangit and Traditional Knowledge was collected and used to inform closure plans and the design of project components.	1.4; Appendix B Tables 010, 011, 013, 015, 016, 017, 018, 020, 022. Inuit Qaujimagatuqangit and Traditional Knowledge collection and integration into Project assessment and design is detailed in Sabina's FEIS

Regulatory Instrument	Term or Condition	Term or Condition/Reporting Requirement	Where Addressed in ICRP
		Reporting: The plan should be submitted to the Nunavut Impact Review Board (NIRB) at least 90 days prior to the start of construction, with results and details submitted annually thereafter or as may otherwise be required by the NIRB.	This submission
PC No. 007	35	The Proponent shall develop a progressive revegetation program for disturbed areas that are no longer required for operations, such as a program to incorporate measures for the use of test plots, reseeding, and replanting of native plants as necessary. It is further recommended that this program be directly associated with the management plans for erosion control established for the Project.	6.3
		Reporting: The program and associated revegetation results should be provided within the Proponent's annual report submitted to the Nunavut Impact Review Board.	6.3
PC No. 007	36	The Proponent shall include revegetation strategies within its Mine Closure and Reclamation Plan that support progressive reclamation, and promote natural revegetation and recovery of disturbed areas compatible with the surrounding natural environment. These strategies should include exploration of the feasibility and practicality of topsoil/organic matter salvage through Project development. The Closure and Reclamation Plan should be updated on an on-going basis as more information becomes available from similar reclamation efforts at other northern projects, as applicable.	6.3
		Reporting: Within 3 (three) years from the commencement of construction, information regarding the revegetation strategies developed and implemented by the Proponent in fulfillment of this Term and Condition shall be included in the Proponent's annual report to the Nunavut Impact Review Board. Subsequently, information regarding the Proponent's progress in fulfillment of this Term and Condition shall be provided annually in the Proponent's annual report to the Nunavut Impact Review Board.	6.3
WL 2AM-BRP1831	Part C, Item 10	The Licensee shall submit, within the updated Interim Closure and Reclamation Plan as per Part J, Item 1, an updated reclamation cost estimate of the total mine closure restoration liability, using the most current version of CIRNAC's RECLAIM Reclamation Cost Estimating Model, its equivalent or other similar method approved by the Board in writing, in accordance with principles of the INAC (as CIRNAC was previously known as) "Mine Site Reclamation Policy in Nunavut" (2002).	Although Part J Item 1 is not specifically applicable at this time, an updated reclamation cost estimate is addressed Section 9 and Appendix F of this Plan.
WL 2AM-BRP1831	Part C, Item 11	The Licensee shall submit, within the Final Closure and Reclamation Plan as per Part J, Item 2, an updated reclamation cost estimate of the total mine closure restoration liability, using the most current version of CIRNAC's RECLAIM Reclamation Cost Estimating Model, its equivalent or other similar method approved by the Board in writing, in accordance with principles of the "Mine Site Reclamation Policy for Nunavut" (2002). Upon the Project entering into or being maintained in Care and Maintenance, an updated estimate of total mine closure reclamation liability shall be submitted, as above, within twelve (12) months of entering Care and Maintenance and every three (3) years thereafter.	Not applicable at this time.
WL 2AM-BRP1831	Part J, Item 1	The Licensee shall implement the approved Interim Closure and Reclamation Plan. The Licensee shall submit to the Board for approval within twelve (12) months following the commencement of the Operation Phase an updated Interim Closure and Reclamation Plan.	Although not applicable at this time, this updated Plan is being submitted to reflect the amended Project as described in Sabina's 2020 Modification Package.

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Regulatory Instrument	Term or Condition	Term or Condition/Reporting Requirement	Where Addressed in ICRP
WL 2AM-BRP1831	Part J, Item 2	The Licensee shall submit to the Board for approval, at least twelve (12) months prior to the expected end of planned mining, a Final Closure and Reclamation Plan. The Final Closure and Reclamation Plan shall incorporate revisions, which reflect the pending closed status of the mine, and include: Soil Quality Remediation Objectives reflecting the applicable CCME Guidelines and the Government of Nunavut Environmental Guideline for Site Remediation; Environmental Site Assessment plans in accordance with the applicable Canadian Standards Association (CSA) criteria; and An evaluation of the human health and ecological risks associated with the Closure options proposed.	Not applicable at this time.
WL 2AM-BRP1831	Part J, Item 3	The Licensee shall submit to the Board, at least sixty (60) days prior to, or as soon as practically possible, written notification of the Licensee's intention to enter into a Care and Maintenance Phase.	Not applicable at this time.
WL 2AM-BRP1831	Part J, Item 4	The Licensee shall provide the Board, within thirty (30) days of the Licensee providing notice of intent to enter into Care and Maintenance under Part J, Item 3, a Care and Maintenance Plan that details the Licensee's plans for maintaining compliance with the Terms and Conditions of the Licence.	Not applicable at this time.
WL 2AM-BRP1831	Part J, Item 5	The Licensee shall, should the Project remain, or be in Care and Maintenance, submit an updated estimate of total mine closure restoration liability, within twelve (12) months of entering Care and Maintenance and every three (3) years thereafter.	Not applicable at this time.
WL 2AM-BRP1831	Part J, Item 6	The Licensee shall review the Plans referred to in this Part as required by changes in operation and/or technology and modify the Plans accordingly. Revisions to the Plans should incorporate design changes and adaptive engineering required and implemented during Construction and reflect actual site conditions and monitoring results over the life of the Project.	This revised Plan is being provided to reflect the proposed changes to the Project.
WL 2AM-BRP1831	Part J, Item 7	The Licensee shall include, with the Plan submitted under Part J, Items 1, 2, and 5, an updated reclamation cost estimate of the total mine closure restoration liability, using the most current version of CIRNAC's RECLAIM Reclamation Cost Estimating Model, its equivalent or other similar method approved by the Board in writing, in accordance with principles of the INAC (as CIRNAC was previously known as) "Mine Site Reclamation Policy in Nunavut" (2002).	Part J, Items 1, 2, and 5 are not applicable at this time.
WL 2AM-BRP1831	Part J, Item 8	The Licensee shall complete all reclamation work in accordance with the Plan(s) referred to in this Part, as and when approved by the Board in writing.	1.1
WL 2AM-BRP1831	Part J, Item 9	The Licensee shall implement Progressive Reclamation of any component of the Project no longer required by the Project.	Acknowledged and agreed. See Section 6 for Progressive Reclamation approach.
WL 2AM-BRP1831	Part J, Item 10	The Licensee shall remove any culverts and restore, as practicable, the drainage to match the natural channel. Measures shall be implemented to minimize erosion and sedimentation.	1.2.1; 5.2.7
WL 2AM-BRP1831	Part J, Item 11	All roads and airstrip, if any, shall be re-graded, as practicable, to match natural contours to reduce erosion.	1.2.1; 5.2.7

Regulatory Instrument	Term or Condition	Term or Condition/Reporting Requirement	Where Addressed in ICRP
WL 2AM-BRP1831	Part J, Item 12	Areas that have been contaminated by hydrocarbons from normal fuel transfer procedures shall be reclaimed to meet objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation, (2010 version or current version in place at the time of Reclamation).	1.2.1; 1.5.1; 5.2.7; 5.2.8.1; 8
WL 2AM-BRP1831	Part J, Item 13	To the extent practical, the Licensee shall contour and stabilize all disturbed areas to a pre-disturbed state upon completion of work.	1.2.1; 5.2.2; 5.2.7.5; 5.2.8.5; 5.2.9; 5.2.10
WL 2AM-BRP1831	Part J, Item 14	The Licensee shall submit to the Board, at least sixty (60) days prior to the Licensee intending to seek Recognized Closed Mine status for the Project, written notification of the intent to seek closure status.	Not applicable at this time.

Table B-04. Historical Ownership Milestones

Dates	Milestones
1982	BRJV formed.
1985	F.W. Hill (Hill) and Esso Minerals Canada (Esso) was investor and operator.
1985 to 1986	Kerr-McGee Corp. acquired interest in BRJV and was operator in 1986.
1987 to 1996	Homestake Mineral starts to earn into BRJV and becomes operator in 1991.
1997 to 1998	Arauco (later changed name to Kit Resources) acquires BRJV.
1999 to 2002	Kinross starts to earn into BRJV and becomes operator.
2003 to 2004	Miramar starts to earn into BRJV and becomes operator.
2005 to 2008	Dundee Precious Metals (DPM) starts to earn into BRJV and becomes operator.

Source: Summary by AMC Mining Consultants (Canada) Ltd. based on table provided by Sabina Gold & Silver Corp. 2015

Table B-05. Historical Exploration Summary

Operator	Period	Exploration Completed	Drill Holes Completed	Reports or Studies Completed
TWOCL on behalf of BRJV	1982	Reconnaissance exploration	-	-
Back River Joint Venture	1983-1985	Gridding, geological mapping, sampling, exploration drilling, and aeromagnetic surveys	36	-
Hill and Esso	1985	Airborne magnetics and electromagnetic surveys	-	-
Bow Valley	1986	Soil sampling at Del prospect, trenching, exploration drilling	11	-
Kerr-McGee Corp.	1986	Exploration drilling	31	-
Homestake Mineral	1987-1996	Geological mapping, panel and till sampling, exploration and infill drilling, geochemical study, geophysics, legal surveying	656	Prefeasibility and Feasibility Study (George)
Kit Resources	1997-1998	Geological mapping, sampling, exploration, and infill drilling	184	Resource Estimate (George)
Kinross	1999-2002	Spectral induced polarization (IP)/resistivity survey, till sampling, geological mapping, channel sampling, soil sampling, exploration and infill drilling	126	Resource Estimate and Conceptual Study (Goose)
Miramar	2003-2004	Exploration and infill drilling	41	NI 43-101 Report
Dundee Precious Metals	2005-2008	Trench sampling, geological mapping, exploration and infill drilling, structural analysis, airborne magnetic, electromagnetic, and radiometric surveys, geochemistry and rock samples	186	NI 43-101 Report

Note: Trigg, Woollett, Olsen Consulting Limited (TWOCL) was the founder of the BRJV.

Table B-06. Characteristics of the Infrastructure Constructed at the Goose Property

Potential Development Area	PDA is 5358 ha with ~15% of area being waterbodies Footprint of facilities is 471 ha
Site Roads	All-weather roads (service road widths of 4.5 m or 8 m; haul road widths of 20 m) will be constructed with run-of-quarry rock placed directly onto the tundra to preserve the permafrost. Construction materials are from locally developed, geochemically suitable rock quarries. Roads will be private and not for public use.
Quarry Sites and Borrow Areas	Number of rock quarries: two Number of borrow areas: none
Water Management	Water supply sources: Big Lake and Goose Lake (domestic and industrial) Umwelt Lake used as Saline Water Pond Saline Water pumped back underground to flood Umwelt U/G workings, and bottom of mined-out Umwelt Pit Water management ponds at Llama (1), Umwelt (1), and Plant Site (1)
Fuel Storage	On-site 45 ML fuel tank farm. Seacans at the underground mine portal, AN facility, incinerator, boilers, and power plant.
Power Generation	Combined heat and power plant consisting of five (N + 1) diesel fired reciprocating engine generator sets. Three generators will be rated for continuous duty 6.6 MW and two generators will be rated for continuous duty 5.1 MW. Seasonal open pit dewatering will be handled by diesel pumps.
Process Plant	Ore production: 12.4 million tonnes of mill feed over 12 years. Standard gravity separation and cyanide leaching circuit.
Explosives	Ammonium nitrate/fuel oil (ANFO) facility Bulk storage area for ammonium nitrate (AN): with capacity for up to 3,900 tonnes of inert AN in seacans Explosive magazines with capacity for 32 tonnes of packaged explosives and 600 cases of detonators within 40-ft and 20-ft magazines, respectively. Bulk ANFO mixing truck. During Closure, unused explosives will be consumed on-site or removed and shipped off-site.
Laydown and Storage Area	General laydown area for material and supplies. Secure seacans for hazardous materials, e.g., mill reagents. Cold storage building.
Waste Management (other than waste rock and tailings)	Waste sorting facility – adjacent to the Process Plant. Landfill(s) – for disposal of non-hazardous, non-leaching, inorganic garbage, located in one or more Waste Rock Storage Areas. Landfarm – for treatment of hydrocarbon contaminated soils or snow. Incinerator – at camp for incineration of camp combustible waste including sewage treatment plant sludge /pacto waste (3.0 kg/person/day). Hazardous waste - temporary storage area at site. Dispose off-site in an approved facility. Used tires and machinery - Remove hazardous waste from equipment not being salvaged, clean and dispose of in active landfill or mine workings.

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Airstrip	An all-weather airstrip and aprons capable of servicing passenger and large cargo aircraft will be constructed at the Goose Property Area. Ice airstrips will continue to be used as required. Dimensions: up to 6,000 ft long, 200 ft wide. An operations center and automated weather observation station (AWOS) will be located at the airstrip. An emergency back-up diesel generator will be located at the operations center.
Wastewater Treatment	Wastewater Treatment Plant provided for camp. Membrane bioreactor plant housed in 20 ft. container with a separate sludge drying system housed in a 40-ft container. Treated effluent discharged to active Tailings Management Facility during Operations. If effluent discharge from the STP meets discharge criteria, effluent will be discharged to land. Oily water treatment plant. For light vehicle and mine maintenance shops – water treated and recycled within shop. Oil to be collected and either burned in an approved waste-heat generator or drummed and removed from site as hazardous waste.
Buildings	Process Plant and crusher buildings; Assay laboratory; explosives magazines; Detonator magazines; AN facility; Reagent storage; Core logging facility; Warehousing facility; Emergency facilities (fire and ambulance station); General maintenance building (site services); Mine maintenance and dry building; Waste management building; Light vehicle maintenance workshop; Heavy equipment maintenance workshop; Wash bay; camp complete with kitchen, Recreational facilities; Administration complex; Modular potable water treatment system; Modular sewage treatment system; Diesel power plant; Power utility building.
Tailings Management	Tailings Storage Facility (TSF) (footprint 105.7 ha) Tailings storage in Umwelt open pit (Llama TF)
Overburden, Waste Rock Areas and Ore stockpiles	Waste rock storage areas (WRSAs) for Umwelt (33.0 ha), Llama (42.8 ha), and TSF WRSA (154.8 ha; includes 105.7 ha of TSF). Overburden from quarry and mining areas to be placed in the WRSAs Ore stockpile at the Goose Plant Site. Small temporary stockpiles located at each U/G laydown.
Water Crossings	Up to five water crossings (culverts) with diameters ranging from 1.0 to 2.5 m.

Table B-07. Characteristics of the Infrastructure Constructed at the Marine Laydown Area

Potential Development Area	653 ha Footprint of facilities = 18 ha
Site Roads	All-weather roads (all are service roads, widths of 4.5 m or 8 m) will be constructed on the site. Construction materials are from locally developed, geochemically suitable rock quarries. Roads will be private and not for public use.
Quarry Sites and Borrow Area	Estimated aggregate extracted: 1.3 Mt Number of rock quarries: none, cut from MLA Fuel Storage area used as fill for remaining pads. Number of borrow areas: none
Water Management	Water supply source: Bathurst Inlet - Desalination unit No water management ponds
Fuel Storage	On land storage of 60 ML plus a separate 500,000 L fuel transfer storage tank. Fuel delivered by sealift during open water season Seacans as required (camp/shop facility)
Power Generation	Combined heat and power plant consisting of three (N + 1), 500 kW diesel fired reciprocating engine generator sets.
Laydown and Storage Area	Ammonium nitrate storage area: up to 3,900 tonnes inert AN in seacans
Waste Management	Landfarm – for treatment of hydrocarbon contaminated soils or snow Incinerator – at camp for incineration of combustible waste including sewage Pacto waste Hazardous waste: lined hazardous waste storage area. Hazardous waste temporarily stored then shipped off-site for ultimate disposal during annual sealift season.
Airstrip	An all-weather airstrip capable of servicing passenger and cargo aircraft will be constructed at the MLA. Ice airstrips and float planes will continue to be used as required. Dimensions: up to 5,000 ft long, 200 ft wide.
Wastewater Treatment	Oily water treatment plant. Oil to be collected and either burned in an approved waste-heat generator, or drummed and removed from site as hazardous waste.
Sewage Treatment	Waste collected from Pacto systems will be incinerated.
Buildings	Laydown areas; Explosives magazines; Reagent storage; Warehousing facility; Emergency facilities (fire and ambulance station); General maintenance building (site services); Waste management building; camp and Administration complex (workforce with contingency) complete with kitchen, dry and recreational facilities; Administration complex; Modular desalination water treatment system; Diesel power plant; Power utility building.
In Water Construction	MLA Shoreline Extension Pad (permanent in-water footprint of up to 420 m ²). Floating temporary terminal/lightering barges may be employed.

Table B-08. Characteristics of the Infrastructure Constructed along the WIR

Winter Ice Road sub-LSA	83,310 ha WIR = 160 km long; Footprint of WIR subbase upgrades = 15 km; Footprint of camps = 3 ha (three 1-ha camps)
Site Roads	WIR with approximately 15 km of subbase aggregate upgrades. Aggregate construction materials are from locally developed, geochemically suitable rock quarries. WIR will be private and not for public use.
Quarry Sites and Borrow Area	Rock quarries and/or borrow sites will be established along the WIR as needed for WIR subbase upgrades and service/emergency camp pads.
Water Management	Water supply source: Surface water sources proximal to WIR and camps and suitable for withdrawal per DFO under ice water withdrawal protocols and within water licence allowances. No water management ponds
Fuel Storage	Portable double walled fuel tanks contained within berms located at camps.
Power Generation	Portable generators at camps.
Laydown and Storage Area	Small laydown areas associated with camps.
Waste Management	Small incinerators at camps for incineration of combustible food waste and sewage Pacto waste. All other waste transported to either the MLA or Goose Property.
Wastewater Treatment	Camp greywater will be discharge to tundra at least 31 m from any waterbody and in a manner so as reduce erosion.
Sewage Treatment	Waste collected from Pacto systems will be incinerated.
Buildings	Each camp will have accommodations area, kitchen, washrooms (pacto-type), emergency equipment repair facilities, power generator, and water supply facilities.

Table B-09. Dimensions of Open Pits at End of Operations

Open Pit	Length	Width (m)	Depth (m)
Umwelt	600	350	135
Llama	550	420	200
Goose Main	850	400	180

Table B-010. Closure Objectives and Criteria - Open Pit Workings

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices for controlling fugitive and exhaust emissions during active reclamation will be implemented	Routine air quality monitoring
Land	Reduce the potential for inadvertent access by humans to slopes that are dangerous or unstable – mostly completed during Operations as progressive reclamation	Stabilize all slopes to the extent possible. It is noted that the partial backfilling with tailings (Llama TF) and flooding will both increase stability.	Physical inspection by a qualified engineer; construction of the safety berms during Operations as progressive reclamation to extent possible
		Define a setback line in accordance with rock mechanics studies conducted for pit stability	
		Berms will be constructed around the open pit outside of the setback lines where slopes will exist above final water levels	
	Meet appropriate design levels for engineered structures for closure	The pit overflow structures and pipeline to WTP (Llama TF and other pits if needed) will be designed and constructed according to the extreme precipitation event selected for its design	Design and construction of the overflow structures and pipeline
Water	Reduce and control contaminated drainage from the flooded pits	Integrate a water management plan to reduce and control contaminated drainage from the flooded pits	Routine monitoring and sampling; water treatment if required
		Implement a system to manage these waters, and to treat as necessary to meet site permit water quality objectives before release	
	Ensure outflow from the flooded open pits meets water licence criteria	Prior to overflow, the water quality will be profiled, and the most appropriate treatment method will be determined if necessary (e.g., in-pit treatment or through the WTP)	Routine monitoring and sampling; in-pit or water treatment at the WTP if required
	Control pit flooding	The bottom of Umwelt Pit will be partially filled with saline water to form meromictic conditions. Llama Pit will be partially filled with tailings. After that, all pits will be passively flooded with natural runoff and precipitation such that they can become natural outflow systems.	Routine monitoring and sampling; in-pit water treatment or water treatment at the WTP as necessary prior to release of open pit water
Wildlife	Discourage access to open pit - – mostly completed during Operations as progressive reclamation	A plan will be developed to allow for reasonable exit should access occur	Physical inspection; construction of rock barricades during Operations as progressive reclamation
	Reduce the possibility that water in the flooded open pits will affect wildlife health	All pit access ramp will be secured by rock berm barricades	
		Prior to overflow, the water quality will be profiled, and the most appropriate treatment method will be determined if necessary (e.g., in-pit treatment or through the WTP)	Routine monitoring and sampling; in-pit water treatment or water treatment at the WTP, if required

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Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Health and Safety	Allow emergency access and exit from flooded pits – mostly completed during Operations as progressive reclamation	A plan will be developed to allow for reasonable exit should inadvertent access occur	Physical inspection
	Reduce the potential for inadvertent access by humans to slopes that are dangerous or unstable – mostly completed during Operations as progressive reclamation	Define a setback line in accordance with rock mechanics studies conducted for pit stability. Berms will be constructed around the open pit outside of the setback line where slopes will exist above the final water line	Physical inspection by a qualified engineer; construction of the berms during Operations as progressive reclamation to extent possible
	Reduce the possibility that water quality of downstream flows will affect human health	The effluent water quality will be monitored, and the most appropriate treatment method will be determined if necessary	Routine monitoring and sampling downstream of the decommissioned pits; in-pit water treatment or water treatment at the WTP as necessary prior to release of open pit water
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-011. Closure Objectives and Criteria - Underground Mine Workings

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	N/A	N/A	N/A
Land	Eliminate access to underground mine workings and surface openings	The portals will be backfilled with waste rock and the vent raises will be capped to eliminate the access to the underground mine workings	Physical inspection and monitoring
	Remove hazardous materials from the underground mine	Fuels, oils, chemicals, etc. will be removed for disposal offsite at a licensed facility prior to flooding	Physical inspection and monitoring
Water	Eliminate access to underground mine workings and surface openings	The portal will be backfilled with waste rock and the vent raises will be capped to eliminate the access to the underground mine workings	Physical inspection and monitoring
	Allow underground to flood.	The Umwelt U/G workings will be flooded with water from the Saline Water Pond.	Initial physical monitoring to check flooding but limited once ventilation is turned off.
Wildlife	Eliminate access to underground mine workings and surface openings	The portal will be backfilled with waste rock and the vent raises will be capped to eliminate the access to the underground mine workings	Physical inspection and monitoring
Health and Safety	Eliminate access to underground mine workings and surface openings	The portal will be backfilled with waste rock and the vent raises will be capped to eliminate the access to the underground mine workings	Physical inspection
	Ensure the stability of underground workings after closure	The underground will be designed and mined to be physically stable; it will be back-filled as needed during Operations	Meet appropriate design levels, physical inspection and crown pillar stability assessment by a qualified engineer and monitoring
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-012. Dimensions of Waste Rock Storage Areas at End of Operations

WRSA	Footprint (ha)	Height (m)	Tonnage (Mt)
Umwelt	33.0	34	15.4
Llama	42.8	30	30.4
TSF WRSA	154.8	14	47.3

Table B-013. Closure Objectives and Criteria - Waste Rock Storage Areas

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices for controlling fugitive and exhaust emissions will be implemented during active reclamation	Routine air quality monitoring
Land	Confirm the WRSA slopes and top are stable	The WRSAs will be designed for closure and will account for seismic and permafrost conditions	Physical inspection by a qualified engineer, and monitoring
		A thermal cover of NPAG rock will be placed on the WRSAs surface during progressive reclamation and closure to limit acid generating reactions	Thermistors to monitor and verify that the piles are frozen throughout except for the predicted active layer
Water	Confirm runoff and seepage is collected	The runoff and seepage from the WRSAs will continue to be directed to the contact water storage ponds or the active TF and eventually pumped for treatment in the WTP, as per operational practices, until monitoring results demonstrate that water quality conditions from the WRSAs are acceptable for direct discharge	Physical inspection. Routine monitoring and sampling
	Confirm runoff and seepage from the WRSAs meet water licence criteria	As above	Routine monitoring and sampling
Wildlife	Ensure the WRSA surfaces are safe for wildlife	WRSAs at post-closure will not compromise wildlife safety	Physical inspection
	Reduce the possibility that water from the WRSAs will affect wildlife health	The runoff and seepage from the WRSAs will continue to be directed to the contact water storage ponds or the active TF and eventually pumped for treatment in the WTP, as per operational practices, until monitoring results demonstrate that water quality conditions from the WRSAs are acceptable for direct discharge	Routine monitoring and sampling
Health and Safety	Ensure the WRSAs are safe for monitoring and physical inspections	WRSAs at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

WRSA = waste rock storage area; WTP = water treatment plant

Table B-014. Dimensions of Tailings Management Facilities at End of Operations

Tailings Facility	Footprint (ha)	Height (m)	Tonnage (Mt)	Volume (Mm³)
Tailings Storage Facility (TSF)	105.7*	14	4.4**	3.8**
Llama Tailings Facility (TF)	within mined-out Llama Pit	5 (mbgs)	8.0	6.7

Notes: * Includes capacity for storage of waste rock from Goose Main OP; ** TSF only

Table B-015. Closure Objectives and Criteria - Buildings and Equipment

Component	Closure Objectives	Closure Criteria	Actions/Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices reclamation will be implemented for controlling fugitive and exhaust emissions during active	Routine air quality monitoring
	Control dust generation from demolition and active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Maintain required site infrastructure during active reclamation	Reduce the use of facilities after closure to promote early decommissioning	Physical inspection
	Clean up and remove machinery, materials, and equipment	Machinery, materials, and equipment will be disposed of in an on-site landfill	Physical inspection
		Fluid hydrocarbons drained from equipment will be burned in generators or incinerated where approved. Other fluids will be removed from site for recycling or disposal at a licenced facility	Physical inspection
	Remove all hazardous wastes	Hazardous wastes will be shipped offsite for disposal at a licensed facility	Physical inspection
	Remove all fuels, chemicals, and industrial wastes	During or prior to closure, a site inventory of all these products will be updated	Physical inspection
		Any unused petroleum products will be burned in generators or incinerated where approved. Other chemicals will be sold, returned to suppliers, or shipped offsite for disposal at a licensed facility.	
	Remove surface infrastructure	Any above-ground infrastructure will be offered to third parties at closure for potential reuse elsewhere, otherwise it will be dismantled and buried in a landfill	Physical inspection

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
	Remove contaminated soils	Remaining concrete structures at grade will be perforated and covered or removed to a landfill. The area will be re-graded to promote natural drainage	
		An assessment will be carried out to identify areas where soils may be contaminated by hydrocarbons	Physical inspection
		A more detailed investigations will be carried out of the potential soil contaminated areas (i.e., Phase 1 and 2 ESA investigations) to determine the extent of the contamination	Environmental Site Assessment
		Selected hydrocarbon contaminated soils will be excavated and hauled to the landfarm area for remediation in alignment with Government of Nunavut's Environmental Guideline for Site Remediation	Physical inspection
Water	Ensure runoff is channelled through the watershed	Surfaces will be re-graded to promote natural drainage	Physical inspection and monitoring
Wildlife	Ensure the remaining surface areas are safe for wildlife use and access	Remaining areas will be scarified and remaining concrete structures at grade will be perforated and covered and rebar will be cut in pieces and buried or removed to a landfill	Physical inspection
Health and Safety	Ensure reclaimed areas support continuation of human land use activities	Human land use of the reclaimed area at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-016. Closure Objectives and Criteria - Mine Infrastructure

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices will be implemented for controlling fugitive and exhaust emissions during active reclamation	Routine air quality monitoring
	Control dust generation from demolition and active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Clean up and remove components or materials	All components and materials will be disposed of in an on-site landfill	Physical inspection
		Fluid hydrocarbons drained from components will be burned in generators or incinerated where approved. Other fluids will be removed from site for recycling or disposal at a licenced facility	Physical inspection
	Remove all reagent and hazardous wastes	Unused reagents will be returned to suppliers or shipped off-site by a licenced handler	Physical inspection
		Hazardous wastes will be removed for disposal at a licensed facility	
	Remove all fuels, chemicals and industrial wastes	During or prior to closure, a site inventory of all these products will be updated	Physical inspection
		Any unused petroleum products will be burned in generators or incinerated where approved. Other chemicals will be sold, returned to suppliers, or removed for disposal at a licensed facility	
	Remove surface infrastructure	Any above-ground infrastructure will be offered to third parties at closure for potential reuse elsewhere; otherwise, it will be dismantled buried in an on-site landfill	Physical inspection
		Remaining concrete structures at grade will be perforated and covered or removed to a landfill. The area will be re-graded to promote natural drainage	
	Remove contaminated soils	An assessment will be carried out to identify areas where soils may be contaminated by hydrocarbons	Physical inspection
		A more detailed investigations will be carried out of the potential soil contaminated areas (i.e., Phase 1 and 2 ESA investigations) to determine the extent of the contamination	Environmental Site Assessment
		Selected hydrocarbon contaminated soils will be excavated and hauled to the landfarm area for remediation	Physical inspection
Water	Ensure runoff is channelled through the watershed	Surfaces will be re-graded to promote natural drainage	Physical inspection and monitoring
Wildlife	Ensure the remaining surface areas are safe for wildlife use and access	Remaining areas will be scarified and remaining concrete structures at grade will be perforated and covered or removed to a landfill	Physical inspection

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Health and Safety	Ensure reclaimed areas support continuation of human land use activities	Human land use of the reclaimed area at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-017. Closure Objectives and Criteria - Rock Fill Pads, Roads and Airstrips

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices will be implemented for controlling fugitive and exhaust emissions during active reclamation	Routine air quality monitoring
	Control dust generation from decommissioning and active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Ensure preservation of permafrost	Culverts will be removed, and the natural drainage restored. Roads and the airstrip will be scarified when they become redundant; they will otherwise remain intact for preservation of permafrost	Physical inspection
Freshwater	Ensure drainage is restored	Culverts will be removed, and the natural drainage restored	Physical inspection
Marine	Ensure chemical and physical stability	Shoreline pad based will be left in place so as not to disturb the in-water environment	Physical inspection
Wildlife	Ensure the remaining surface areas are safe for wildlife use and access	The roads and airstrip will be designed to be safe for wildlife use and access for Operations - no additional work is expected at closure except for scarification and the removal of the culverts	Physical inspection
Health and Safety	Ensure reclaimed areas support continuation of human land use activities and do not become a source of contamination	Human land use of the reclaimed area at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-018. Closure Objectives and Criteria - Waste Management Facilities

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Meet Canadian Ambient Air Quality standards	Best management practices will be implemented for controlling fugitive and exhaust emissions during active reclamation	Routine air quality monitoring
	Control dust generation from decommissioning and active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Treat contaminated soils, ice and snow in the landfarm areas	As per operational practices contaminated soils, ice and snow will be treated in the landfarm areas during the Active Closure Stage	Physical inspection
		Remediated soils will be hauled and disposed of in landfills or used for construction of the WRSAs cover	Physical inspection
	Clean up and remove waste management system components or materials	All components or materials will be cleaned up and disposed in the on-site landfill when they are no longer required	Physical inspection
		Metals will be separated and shipped off-site as scrap if economical to do so or disposed of in the on-site landfill	
	Remove all hazardous wastes	Hazardous wastes will be removed for disposal at a licensed facility Used oils and waste fuel could be burned in the on-site incinerators if required and approved	Physical inspection
	Remove surface infrastructure	Any above-ground infrastructure will be demolished/dismantled, and the non-hazardous debris will be disposed in the on-site landfill or within the mined-out open pits	Physical inspection
		Remaining concrete structures at grade will be perforated and covered. Any rebar will be cut in pieces and buried or removed and the area re-graded to promote natural drainage	
	Landfills are encapsulated	The landfill areas will be covered with 5 m NPAG waste rock when they are no longer required	Physical inspection
Water	Ensure runoff is channelled through the watershed	Surfaces will be re-graded to promote natural drainage	Physical inspection
Wildlife	Ensure the remaining areas are safe for wildlife use and access	Keep wildlife out of the landfills as per operational practices. Place the 5 m NPAG cover when they are no longer required The remaining areas will be re-graded to reduce hazards to wildlife	Physical inspection
Health and Safety	Ensure reclaimed areas support continuation of human land use activities	Human land use of the reclaimed area at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-019. Site-Specific Water Quality Objectives for Arsenic and Copper

Parameter	MDMER (mg/L)	CCME (mg/L)	Site-Specific Water Quality Objective (mg/L)
Total Arsenic	0.5	0.005	0.01
Total Copper	0.1	0.002*	0.0042

*hardness dependant

Table B-020. Closure Objectives and Criteria - Water Management Facilities

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Control dust generation from active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Maintain surface water drainage control systems	Fresh water intakes and distribution system will be reclaimed after active closure	Physical inspection
		Maintain water management components until they are no longer required	Physical inspection
	Ensure berms and dams are stable	Berms and dams will be breached once water quality meets licence criteria for direct discharge	Physical inspection by qualified engineer
	Remove surface infrastructure (i.e., pipelines, culverts, pump systems, WTP)	All components or materials will be cleaned up and disposed in the on-site landfill when they are no longer required	Physical inspection
		Any above ground pipelines will be dismantled, and associated distribution equipment will be disposed in the on-site landfill	Physical inspection
		Reclaimed areas will be re-graded	Physical inspection
		Any culverts and equipment will be removed and will be disposed in the on-site landfill	Physical inspection
		Any above-ground infrastructure will be demolished/dismantled, and the non-hazardous debris will be disposed in the on-site landfill or within the mined-out open pits	Physical inspection
		Remaining concrete structures at grade will be perforated and covered. Any rebar will be cut in pieces and buried or removed and the area re-graded to promote natural drainage	Physical inspection
	Remove all hazardous wastes	Hazardous wastes will be removed for disposal at a licensed facility	Physical inspection

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Water	Ensure runoff is channelled through the watershed	Surfaces will be re-graded to promote natural drainage	Physical inspection
	Ensure collected runoff and seepage meets water licence criteria	Runoff and seepage collected in the Llama TF will be treated through the WTP until water quality meets licence criteria for direct discharge	Routine monitoring and sampling
	Remove facilities when treatment is no longer required	When water quality from the mine components is deemed suitable for direct discharge to the environment the berms will be breached	Routine monitoring and sampling
Wildlife	Discourage wildlife from entering the facilities	Wildlife will be discouraged from entering the facilities until water quality is acceptable	Physical inspection
Health and Safety	Ensure the remaining areas are left in a healthy state that supports continuation of human land use activities	Human land use of the reclaimed areas at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Table B-021. Water Management Structure Breach Schedule during Operations Phase and Closure Stages

Water Management Structure	Timing of Breach	Approx. No. of Breach Locations
Saline Water Pond Containment Dam	Operations	1
Primary Pond Containment Dam	Operations	2
Plant Site Pond Containment Dam	Active Closure	1
Llama WRSA and Pit diversion berms	Operations	5
Goose Main Pit Diversion Berm	Operations	1
TSF Containment Dam and TSF WRSA Diversion Berm	Active Closure	3

Table B-022. Closure Objectives and Criteria - Quarries and Granular Borrow Sites

Component	Closure Objectives	Closure Criteria	Actions/ Measurements
Air	Control dust generation from active reclamation activities	Best management practices to control dust	Implement controls and routine air quality monitoring
Land	Surfaces are stabilized	Quarries and granular borrow sites will be contoured to achieve gentle side slopes	Physical inspection
Water	Channel runoff through the watershed	Surfaces will be re-graded to promote natural drainage, new surface drainage patterns will be established if needed	Physical inspection
	Meet Water Licence criteria for runoff	A water management strategy will be implemented to control the transport of sediments out of borrow and quarry areas should it be encountered.	Physical inspection
Wildlife	Ensure surfaces are safe for wildlife use and access	Quarries and granular borrow sites will be re-contoured to reduce hazards to wildlife	Physical inspection
Health and Safety	Ensure surfaces are left in a healthy state that supports continuation of human land use activities	Land use of the areas at post-closure will not compromise people's health	Routine monitoring and physical inspection
Community	Consider community land use expectations and traditional knowledge in the closure planning	Community engagement will continue to be implemented	Public engagement
	Consider transition plans	Community programs will be established to transition into closure	Physical inspection

Appendix C. Glossary of Terms and Definitions

Glossary of Terms and Definitions

Term	Definition
Acid Base Accounting (ABA)	Acid base accounting; a static test that defines the amounts, and relative balance, of potentially acid-generating and acid-neutralizing (or base) minerals in a sample.
Active layer	The layer of ground above the permafrost which thaws and freezes annually.
Acid rock drainage (ARD)	Acidic pH rock drainage due to the oxidation of sulphide minerals that includes natural acidic drainage from rock not related to mining activity; an acidic pH is defined as a value less than 6.0.
Advanced mineral exploration	Any appurtenant undertaking in which the proponent requires a Type A or Type B water licence in order to carry out the proposed activities.
Quarries and Granular Borrow Sites	Site from where soils and aggregates are obtained for use in earthworks construction.
Care and maintenance	The status of a mine when it undergoes a temporary closure.
Closure goal	The guiding statement that provides the vision and purpose of reclamation. Attainment of the closure goal happens when the proponent has satisfied all closure objectives. By its nature, the closure goal is a broad, high-level statement and not directly measurable.
Closure principles	The four core closure principles are 1) physical stability, 2) chemical stability, 3) no long-term active care requirements, and 4) future use (including aesthetics and values). The principles guide the selection of closure objectives.
Closure objectives	Statements that describe what the selected closure activities are aiming to achieve; they are guided by the closure principles. Closure objectives are typically specific to project components, are measurable and achievable, and allow for the development of closure criteria.
Closure options	A set of proposed alternatives for closing and reclaiming each mine component. The closure options are evaluated to determine the selected closure activity, which must be approved by the NWB.
Closure criteria	Standards that measure the success of selected closure activities in meeting closure objectives. Closure criteria may have a temporal component (e.g., a standard may need to be met for a pre-defined number of years). Closure criteria can be site-specific or adopted from territorial/federal or other standards and can be narrative statements or numerical values.
Contaminant	1) any physical, chemical, biological or radiological substance in the air, soil, or water that has an adverse effect; and 2) any chemical substance with a concentration that exceeds background levels or which is not naturally occurring in the environment.
Effluent	Water flows being discharged to the environment.
Engagement	The communication and outreach activities a proponent undertakes with affected communities and Aboriginal organizations/governments prior to and during the operation of a project, including closure and reclamation phases.
Environmental Site Assessment (ESA)	Phase I ESA: A review of available information to determine the likelihood of actual or potential environmental impacts. Phase II ESA: An intrusive investigation involving sampling and testing to better define the nature and scope of any environmental impacts.
Explosives	Gunpowder, blasting powder, nitroglycerine, gun-cotton, dynamite, blasting gelatine, gelignite, fulminates of mercury or of other metals and every other substance made, manufactured or used with a view to produce a violent effect by explosion.
Humidify cell test (HCT)	A type of kinetic test in which a small sample (about 1 kg) is placed in an enclosed chamber in a laboratory, alternating cycles of moist and dry air is constantly pumped through the chamber, and once a week the sample is rinsed with water; chemical analysis of rinse water yields concentrations of elements and other parameters used to calculate reaction rates.

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Term	Definition
Kinetic test	A geochemical procedure for characterizing the chemical status of a sample through time during continued exposure to a known set of environmental conditions, such as a humidity cell.
Landfarm	Infrastructure that uses biological and physical processes to treat (remove contaminants) contaminated soil.
Land owner	The responsible authority with administrative control and ownership of a type of land classified as crown land, commissioners land or Inuit Owned Land. Crown land is land belonging to Her Majesty or in respect of which Government has the power of disposition. In Nunavut, this power rests with Crown Indigenous Relations Northern Affairs Canada (CIRNAC). Commissions land is land belonging to the Commissioner for the Government of Nunavut; which typically is land within an established municipality administered by a Municipal Corporation and/or the Department of Community Government and Services (CGS) Inuit Owned Land (IOL) are those lands vested in the Designated Inuit Organization (DIO) pursuant the Nunavut Agreement. For this Project, the DIO is the Kitikmeot Inuit Association.
Land use permit	For Crown land a Class A Permit or Class B Permit as required by the Territorial Land Use Regulations SOR/82-217, s.1; SOR/88-169, s.2 administered by CIRNAC Lands Department. For IOLs- Land Use Licence I, II or III or Commercial Lease I, II, III as defined by the DIO. For Commissioners land - a permit or lease as required by the Municipal Land Administration Policy.
Leachate	Water or other liquid that has washed (leached) from a solid material, such as a layer of soil or water; leachate may contain contaminants.
Long-term active care	A post-closure mine site is in long-term active care when sustained monitoring and maintenance of active facilities is required (e.g., for more than 25 years). This should be avoided whenever possible.
Metal leaching (ML)	The release of a metal from its solid-phase mineral into mine site drainage; described by concentrations in static tests and by metal release rates obtained from kinetic tests.
Long-term passive care	Occasional monitoring coupled with infrequent maintenance or repairs that takes place following reclamation in the Post-Closure Phase of the mine site. Many mine sites require ongoing passive care, which can be an acceptable practice.
Ore	Rock that is considered economic according to the parameters used in the ore reserve estimate. Ore will be processed at the mineral processing plant after it is mined from the Project underground mine and open pits.
Overburden	A general term referring to soil and broken rock, lying above ore and mine rock, that can usually be removed without blasting; at mines in soft sedimentary rock like coal, overburden can be synonymous with mine rock.
Potentially acid generating (PAG)	Rock with an NP/AP ratio less than 2 as determined by static tests, as defined by MEND (2009). PAG rock can also be operationally defined based on the results of static testing such as ABA and NAG testing.
Passive treatment	Treatment technologies that can function with little or no maintenance over long periods of time (e.g., use of wetlands).
Permafrost	Bedrock or soil that maintains a temperature at or below 0° C for a continuous period of two years or more.
Progressive reclamation	Selected closure activities that can be taken at advanced mineral exploration and mine sites before permanent closure. Progressive reclamation takes advantage of cost and operating efficiencies by using the resources available from an operation to reduce the overall reclamation costs incurred. It enhances environmental protection and shortens the timeframe for achieving the closure objectives.
Proponent	Applicant for, or a holder of, a water licence and/or land use permit.

Term	Definition
Reclamation	The process of returning a disturbed site to its natural state or which prepares it for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.
Reclamation research	Literature reviews, laboratory or pilot-scale tests, engineering studies, and other methods of resolving uncertainties. Proponents conduct reclamation research to answer questions pertaining to environmental risks; the design of reclamation research plans aims to provide data and information which will reduce uncertainties for closure options, selected closure activities, and/or closure criteria.
Remediation	The removal, reduction, or neutralization of substances, wastes, or hazardous material from a site in order to prevent or minimize any adverse effects on the environment and public safety now or in the future.
Risk assessment	Analysis of potential threats and options for mitigation for a given site, component, or condition. Risk assessments consider factors such as risk acceptability, public perception of risk, socio-economic impacts, benefits, and technical feasibility. It forms the basis for risk management.
Salvageable Materials	Decommissioned materials which can be sold or reused elsewhere.
Security deposit	Funds held by the Crown (Aboriginal Affairs and Northern Development Canada) or land owner that can be used in the case of abandonment of an undertaking to reclaim the site or carry out any ongoing measures that may remain to be taken after the abandonment of the undertaking.
Selected closure activity	The closure and reclamation activity chosen from the closure options for each Project component.
Stakeholders	Industry, federal agencies, the territorial government, Aboriginal organizations/governments, land owners, affected communities, proponent, and other parties with an interest in the Project.
Tailings	Material rejected from a mill after the recoverable valuable minerals have been extracted.
Talik	Unfrozen ground surrounded by permafrost.
Traditional Knowledge	Accumulative, collective body of knowledge, experience, and values built up by a group of people through generations of living in close contact with nature. It builds upon the historic experiences of a people and adapts to social, economic, environmental, spiritual, and political change.
Type A Water Licence	A Type A Water Licence is required if the use is of a type set out in column 2 of Schedule 2 and satisfies a criterion set out in column 5 in respect of an undertaking set out in column 1 of the Nunavut Water Regulations SOR/2013-69 <i>(Note: despite definition of Type B water licence item a), a Type A licence is the appropriate licence for a use of waters if a Type A licence is required for another use of waters, or a deposit of waste, in respect of the same undertaking.)</i>
Type B Water Licence	A Type B water licence is required if the use is of a type set out in column 2 of Schedule 2 and satisfies a criterion set out in column 4 in respect of an undertaking set out in column 1 of the Nunavut Water Regulations SOR/2013-69, or The use satisfies the criterion set out in paragraph 4(1)(a) but does not satisfy one or more criterion set out in paragraphs 4(1)(b) to (d)
Waste rock	All unprocessed rock materials that a mining operation produces.

Appendix D. List of Acronyms, Abbreviations, Units, and Symbols

List of Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AANDC	Aboriginal Affairs and Northern Development Canada (formerly known as Indian and Northern Affairs Canada, now known as Crown Indigenous Relations and Northern Affairs Canada)
ABA	Acid-Base Accounting
AEMP	Aquatic Effects Monitoring Plan
ARD	Acid Rock Drainage
ANFO	Ammonium Nitrate/Fuel Oil
AWAR	All-weather Access Road
BIF	Banded Iron Formation
CCME	Canadian Council for Ministers of the Environment
CIRNAC	Crown Indigenous Relations and Northern Affairs Canada; formerly AANDC
CLARC	Community Lands and Resources Committee
CLEY	Culture, Language, Elders and Youth
CGS	Community and Government Services
ICRP	Interim Closure and Reclamation Plan
DFO	Fisheries and Oceans Canada
FCRP	Final Closure and Reclamation Plan
FEIS	Final Environmental Impact Statement
Golder	Golder Associates Ltd.
GN	Government of Nunavut
HADD	Harmful Alteration Disruption or Destruction
HTO	Hunters and Trappers Organizations
ISQG	Interim Sediment Quality Guidelines
KIA	Kitikmeot Inuit Association
Licence	Type A Water Licence 2AM-BRP1831
LSA	Local Study Area
ML	Metal Leaching
MDMER	Metal and Diamond Mining Effluent Regulations
MVLWB	Mackenzie Valley Land and Water Board
NIRB	Nunavut Impact Review Board
NPAG	non-Potentially Acid Generating
NRC	Natural Resources Canada
NWB	Nunavut Water Board
PAG	Potentially Acid-Generating
Project	Back River Project
PEL	Probable Effect Level
RSA	Regional Study Area
SFE	Shake Flask Extraction
SRK	SRK Consulting Canada Ltd.

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TDS	Total Dissolved Solids
TF	Tailings Facility
TSF	Tailings Storage Facility
TSS	Total Suspended Solids
WRSA	Waste Rock Storage Area
WTP	Water Treatment Plant

List of Units and Symbols

Units/Symbols	Definition
%	percent
°	degrees
°C	degrees Celsius
bgs	below ground surface
dBA	Decibels (A-weighted)
g	gram
H:V	horizontal to vertical
ha	hectares
km	kilometre
km/h	kilometres per hour
km ²	square kilometres
m	metres
m ²	square metres
m ³	cubic metres
m ³ /day	cubic metres per day
masl	metres above sea level
mbgs	Metres below ground surface
mm	millimetres
mm/year	millimetres per year
mg/L	milligrams per litre
mg/kg	milligrams per kilogram
m ³	cubic metres
Mm ³	million cubic metres
Mt	million tonnes
t	tonnes
tpd	tonnes per day

Appendix E. Reclamation Studies

Table 1: Comparison of Active Revegetation Planning at Northern Mine Sites

Mine Site Owner Region	Current Phase of Project Mine Closure Projected Date	Revegetation Plan Summary Interim Closure Summary/Commitments	Restrictions Identified	References
Polaris Mine Teck Metals Ltd. Little Cornwallis Island, Qikiqtani Region, NU	Post-Closure September 2002	Donald (2005) provided a summary of the reclamation for Polaris Mine. The vegetation at Polaris was classified as Arctic Tundra and it was identified as located in a “bare” area with scarce vegetation, low biological sensitivity, and low potential for wildlife use. Teck claimed that there was little to no vegetation present prior to mine construction. The proposed reclamation programs included recontouring close to the original topography and restoration of natural drainage paths.	It was not possible to remove all traces of land disturbance due to permafrost.	Donald, B.J. (2005). Polaris Mine – A Case Study of Reclamation in the High Arctic. British Columbia Mine Reclamation Symposium https://open.library.ubc.ca/cIRcle/collections/59367/items/1.0042473
Nanisivik Breakwater Resources Baffin Island, NU	Post-Closure 2002	In the 2002 Closure and Reclamation Plan, Breakwater stated that 96.5% of the area was identified to have sparse vegetation prior to mining. Vegetation damage due to borrow source activity was identified as “not conspicuously different from their surroundings” and only recontouring was considered as a reclamation activity. BGC presentation dated 2015, claimed that “Revegetation is not necessary” and post-closure disturbed areas will resemble natural surroundings.	N/A	CanZinco Lt. (2002). Nanisivik Mine-Closure and Reclamation Plan – Volume 1 of 2. ftp://ftp.nwb-oen.ca/registry/1%20INDUSTRIAL/1A/1AR%20-%20Remediation/1AR-NAN1419/3%20TECH/10%20A%20and%20R%20(J)/2002%20Renewal/020307NWB1NAN9702%20vol1text-ILAE.pdf BGC (2015). Presentation Nanisivik Mine – Closure Design and Performance Monitoring. RPIC Federal Contaminated Site Regional Workshop. http://www.rpic-ibic.ca/documents/2015_FCS_RW/Presentations/4-Cassie_FINAL.pdf
Mary River Baffinland Baffin Island, NU	Operations 2040	In the 2016 Interim Closure and Reclamation Plan, Baffinland committed to develop a progressive revegetation program for disturbed areas that are no longer required for operations. The progressive revegetation program is planned to incorporate measures for the use of test plots, reseeding, and replanting of native plants, and management plans for erosion control established for the Project. The objective of the reclamation research program is to identify methods to successfully achieve a sustainable vegetation cover, and the ability of a vegetation cover to enhance physical stability and/or achieve the desired aesthetic conditions for the project site at closure. The research is planned to commence in 2018 and the objective is to determine the most effective substrates and the group and individual native species able to establish and survive. Baffinland also conducted a review of baseline revegetation data collection. The findings indicate that approximately 20 plots were historically established on old road surfaces, pads, and other disturbed sites in the past. In the 2014 Exploration Closure and Reclamation Plan, Baffinland committed to promote the growth of vegetation by ripping, grading, or scarifying disturbed surfaces to meet the natural topography.	Low capacity for soil to retain moisture. Abundant surface water ponding.	Baffinland (2017). Baffinland Iron Mines 2016 Annual Report to the Nunavut Impact Review Board. http://www.baffinland.com/downloadocs/2016-nirb-annual-report-for-the-mary-river-project_2017-11-01-55.pdf Baffinland (2014). Exploration Closure and Reclamation Plan. Rev. 1 http://www.baffinland.com/downloadocs/baf-ph1-830-p16-0038-r1---exploration-closure-and-reclamation-plan_2017-01-29-17.pdf
Meliadine Agnico Eagle Kivalliq Region, NU	Construction 2035	Agnico Eagle committed in the 2015 Updated Technical Report to allow the waste rock storage facility to naturally revegetate and ditches and ponds to be scarified to allow revegetation and natural drainage.	Poor growth medium.	Agnico Eagle (2015). Updated Technical Report on Meliadine Gold Project. https://s21.q4cdn.com/374334112/files/doc_downloads/operations/meliadine/Feb-11-2015-Meliadine-Technical-Report.pdf
Meadowbank Agnico Eagle Kivalliq Region, NU	Operations 2020	Agnico Eagle committed in the 2008 Closure and Reclamation Plan to consult with the Nunavut Water Board and the Kivalliq Inuit Association as well as other northern mine’s (e.g., Ekati and Diavik) revegetation strategies and experiences. Some of the revegetation strategies discussed throughout the report included scarifying surfaces, recontouring, and seeding with native plant species to encourage a natural succession of indigenous plant species. A layer of ultramafic capping rock is also proposed to be placed on rock slopes to ensure long-term revegetation succession.	Lack of available local soils. Lack of a source of seed for native plants and Arctic growing conditions.	Agnico Eagle (2008). Meadowbank Water Licenses 8BC-TEH0809 and 2AM-MEA0815. ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-MEA1525%20Agnico/3%20TECH/10%20A%20and%20R%20(J)/080904%202AM-MEA0815%20Closure%20and%20Reclamation%20Plan%20Development%20Phase-ILAE.pdf

Mine Site Owner Region	Current Phase of Project Mine Closure Projected Date	Revegetation Plan Summary Interim Closure Summary/Commitments	Restrictions Identified	References
Whale Tail <i>Agnico Eagle</i> Kivalliq Region, NU	Pre-Development 2022	Agnico Eagle, committed in the 2017 Final Hearing Report to initiate design and implementation of revegetation studies to gain a better understanding of applicable reclamation strategies at similar northern mines. However, the duration of the Whale Tail project is too short for meaningful revegetation research to be accomplished for the specific site.	2017 Technical Report reported large scale revegetation considered unfeasible due to lack of seed material. Lack of available organic soil and short cold growing seasons make revegetation challenging.	Agnico Eagle (2018). Technical Report on the Mineral Resources and Mineral Reserves at Meadowbank Gold Complex including the Amaruq Satellite Mine Development. https://s21.q4cdn.com/374334112/files/doc_downloads/operations/meadowbank/Meadowbank-Technical-Report-Feb-14-2018-Final-poasted-on-Sedar.pdf Nunavut Impact Review Board (2017). Final Hearing Report. NIRB File No. 16MN056. https://www.scribd.com/document/363953331/NIRB-Whale-Tail-Pit-Project-Final-Hearing-Report
Doris North Mine <i>TMAC Resources</i> Kitikmeot Region, NU	Operation 2021	In the 2015 Interim Closure and Reclamation plan, TMAC committed to revegetate with active seeding in areas with suitable soil substrate. Active revegetation of rock fill pads was considered impractical because they cannot support vegetation however it was expected that lichen would naturally revegetate on a timescale of decades. TMAC also recommended in the post-closure monitoring and maintenance plan to hire an Arctic vegetation specialist to confirm suitability of the revegetation efforts at post-closure with subsequent inspections.	Improper growth medium at rock fill pads.	TMAC Resources (2015). Doris North Mine – Interim Closure and Reclamation Plan. ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-DOH1323%20TMAC/3%20TECH/10%20A%20and%20R%20(L)/2016/160211%202AM-DOH1323%20P5-2%20Interim%20Closure%20Plan%20June%202015%203%20of%204-ILAE%20(3).pdf
Lupin Mine <i>Lupin Mines Incorporated</i> Kitikmeot Region, NU	Inactive and in care and maintenance since February 2005 <i>Planning for final closure (FCRP) underway for 2021</i>	The 2017 Interim Abandonment and Restoration Plan discusses closure revegetation commitments for covered tailings and abandoned roadways. The esker deposit which is the major source of material planned to be used for the reclamation activities, lacks the organic/nutrient content for vegetation establishment. The procedure of scarifying reclaimed surfaces and contouring to provide proper drainage patterns and avoid ponding has successfully enhanced natural plant growth at Lupin (especially for native plants). It has been demonstrated that rough surfaces enhanced seed entrapment, moisture retention, and wind protection. Sod transplanting was discussed as a potential method of revegetation at Lupin, but it was concluded that placement of sod on a site with minimal growth medium does not justify removing it from its established area.	Lack of growth medium, unavailable soil amendments.	Lupin Mines Incorporated (2017). Interim Abandonment and Restoration Plan. ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-LUP1520%20LMI/3%20TECH/10%20A%20and%20R%20(I)/2017/170810%202AM-LUP1520-IARP_Updated-ILAE.pdf
Kiggavik Project <i>AREVA Resources Canada Inc.</i> Kivalliq region, NU	Environmental Assessment <i>Suspended</i>	In the Preliminary Decommissioning Plan dated September 2014, AREVA committed to implement progressive reclamation at earliest possible and conduct studies on mine rock test plots during the operations phase to evaluate methods of revegetation. The results of test plots were planned to be used to determine an optimal seed/planting mix and optimal use of fertilizers to encourage natural succession. Field observations at former drill sites at the Kiggavik exploration project indicated that a small number of native plants (e.g., polar grass, dwarf birch, Bigelow's sedge, arctic willow, and tea leaf willow) tend to dominate during natural revegetation. AREVA has also gained valuable revegetation experience from its Cluff Lake Project, located in north-western Saskatchewan. The most successful planting method at Cluff Lake Project included drill seeding with subsequent fertilization.	Tundra soils are considerably nutrient poor (especially in nitrogen and phosphorous). Seeded areas failed.	AREVA (2014). Final Environmental Impact Statement – Tier 3 Technical Appendix 2R – Preliminary Decommissioning Plan. ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-KIG----%20Areva/1%20APPLICATION/Management%20Plans/2R%20-%20Preliminary%20Decommissioning%20Plan.pdf
Jericho Diamond Mine <i>Tahera Diamond Corporation</i> NU	Mining ceased 2008, abandoned, Care Custody Control INAC. <i>Remediation began in 2017</i>	The 2004 Abandonment and Restoration Plan included commitments to look for a cooperative approach with Ekati, Diavik, and Snap Lake diamond mines to exchange reclamation research results in Arctic environments and develop reclamation trials throughout the mine life. The main revegetation strategy proposed to use undisturbed islands as a seed sources for reclamation as demonstrated by Bittman (1995) and preliminary trials at Ekati Diamond Mine (Reid, 2002). Tahera proposed to provide soil conditions similar to pre-disturbance conditions to encourage revegetation with native species, retard wind and water erosion, and design rehabilitation covers to minimize negative effects to the active layer (permafrost) and prevent melting of ice lenses that can lead to slumping and erosion.	The availability of native Arctic vegetation, except for natural seed sources, is extremely limited. Caribou and arctic hares grazing and trampling could be problematic.	Tahera Diamond Corporation (2004). Abandonment and Restoration Plan. ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-JER1119%20Shear/1%20APPLICATION/2004%20New%20Application/040826NWB1JER----%20Appendix%20A%20AMEC%20A%20and%20R%20Plan.pdf

Mine Site Owner Region	Current Phase of Project Mine Closure Projected Date	Revegetation Plan Summary Interim Closure Summary/Commitments	Restrictions Identified	References
Ekati Diamond Mine <i>BHP Diamonds Inc.</i> Lac de Gras, NT	Operations 2050	The 1998 Reclamation Plan included commitments to research the proposed revegetation programs during progressive reclamation activities. The proposed revegetation programs included revegetation of temporary or permanent stockpiled materials (i.e., lake sediment, till, and topsoil) generated during mining activities, revegetation of kimberlite tailings mine waste facilities, revegetation of contoured/closed laydown areas, and revegetation of engineered channels to improve establishment of fish habitat. The Ekati Reclamation Research Program started during the exploration phase of the Project in 1995. The revegetation research program includes testing of a variety of amendments (i.e., fertilizers, lake sediment, peat or sewage sludge) to promote growth on mine soil and kimberlite tailings, identifying the most successful plant species (i.e., graminoids, forbs, and shrubs) in establishing on mine disturbed areas and evaluating various planting techniques (i.e., cuttings, transplants, seeding, sprigging). Monitoring of substrate and vegetation has aided BHPB to identify the native species with higher potential for recovery after mine closure and the most favorable conditions for natural colonization.	Kimberlite's low capacity to retain soil moisture and plant nutrients. Grazing presents a limiting factor on the establishment and maintenance of seeded and native plant cover. Soils with high salinity. Species competition.	ABR Inc. – Environmental Research & Services. (2001 and 2002). Ekati Diamond Mine Revegetation Research Project. Report prepared for BHP Billiton Ltd. Harvey Martens & Associates Inc. (2001). Ekati Diamond Mine Processed kimberlite tailings Reclamation Research Program. Report prepared for BHP Billiton Ltd. Burton, Neil. (2001). Ekati Diamond Mine Processed kimberlite tailings vegetation research. Report prepared for BHP Billiton Ltd.
Giant Mine <i>Miramar Mining Corporation</i> Yellowknife, NT	Care Custody Control INAC <i>Abandoned in 2004 Permanent closure measures underway</i>	Forested site near Yellowknife – not analogous to Back River.		
Con Mine <i>Newmont Mining Corporation</i> NT	Post-Closure 2003	Forested site near Yellowknife – not analogous to Back River.		
Diavik Diamond Mine <i>Rio Tinto and Dominion</i> North Slave Region, NT	Operations 2030	The 2004 Revegetation of Disturbed Site at Diavik Mine Report provides details of the research plots established in the summer of 2004. The trials included assessing the revegetation effectiveness for various substrate treatments (i.e., glacial till, fine processed kimberlite, till mix with kimberlite, and no substrate addition), amendment treatments (i.e., inorganic fertilizer, topsoil or sewage sludge), seeding treatments, and plant species (i.e., grasses, forbs, bryophytes, and shrubs). Soil moisture and soil temperature sensors were installed at the centre of the plots and soil samples were collected at each plot for lab testing.	Kimberlite may have a negative effect on plant growth due to its physical and chemical properties. Till treatment was eliminated from the experimental design as it would not be an appropriate substrate capable of supporting plant growth.	Naeth et al. (2004). Revegetation of disturbed sites at Diavik Diamond Mine, NWT. – 2004 Annual Report. http://registry.mvlwb.ca/Documents/N7L2-1645/K-RegrowthResearch.pdf
Snap Lake <i>De Beers Canada Inc.</i> NT	Care and Maintenance 2015	The 2013 Interim Mine Closure & Reclamation Plan included commitments to conduct research focused on development of methods to successfully achieve a sustainable vegetation cover, and the ability of a vegetation cover to enhance physical stability and/or achieve the desired aesthetic conditions for the project site at closure. The research plan also included to carry out a literature review revegetation programs of the disturbed areas in northern climates and establishment of test plots for each ecological land classification units with the project area.	Slow rates or unsuccessful revegetation. Potential adverse impacts to physical stability of surficial soils, unacceptable concentrations of chemicals in vegetation at the North Pile.	Arktis Solutions (2013). Snap Lake Mine – Interim Mine Closure and Reclamation Plan. http://registry.mvlwb.ca/Documents/MV2011L2-0004/MV2011L2-0004%20-%20De%20Beers%20Snap%20Lake%20-%20Interim%20Closure%20and%20Reclamation%20Plan%20-%20Version%203.2%20-%20Jul11-13.pdf

Appendix F. Interim Closure Cost Estimate

pending KIA and CIRNAC review