



**Lynn Lake Gold Project:
Acid Rock Drainage and
Metal Leaching
Management Plan**

Version 0

January 30, 2025

**LYNN LAKE GOLD PROJECT:
ACID ROCK DRAINAGE AND METAL LEACHING MANAGEMENT PLAN**

Document History

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This document requires the following approvals:

Name	Company Title	Date	Signature

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Acronyms and Abbreviations

ABA	acid base accounting
Alamos	Alamos Gold Inc.
AP	acid potential
ARD/ML	acid rock drainage/metal leaching
CEAA 2012	<i>Canadian Environmental Assessment Act, 2012</i>
CIP	carbon-in-pulp
CWQG	Canadian Water Quality Guidelines
DFO	Fisheries and Oceans Canada
EIS	Environmental Impact Statement
HADD	harmful alteration, disruption, or destruction
Km	kilometre
Kt	kilotonnes
LGO	low grade ore
M	metres
MDMER	Metal and Diamond Mining Effluent Regulations
MECP	Manitoba Environment, Climate and Parks
MRSA	mine rock storage area
Mt	million tonnes
NP	neutralizing potential
NAG	non acid-generating
NPR	neutralization potential ratio
PAG	potentially acid generating
pXRF	portable X-ray fluorescence

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QA/QC	quality assurance/quality control
RGMP	Responsible Gold Mining Principles
ROM	run of mine
SFE	shake flask extraction
SOP	standard operating procedure
TIC	total inorganic carbon
TMF	tailings management facility
TSS	total suspended solids

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1.0 INTRODUCTION

The following presents the Acid Rock Drainage and Metal Leaching Management Plan ('ARD/ML MP' or 'the Plan') for the Lynn Lake Gold Project ('LLGP' or 'the Project'). The ARD/ML MP guides the testing and management of materials exposed during the Project.

Procedures and test methods are included in the ARD/ML MP for geochemical characterization of the mined, processed, and exposed materials and the classification of the ARD/ML potential. Criteria for the management of mined materials are defined, including identification of rock that can be used for construction. Materials and water to be managed and monitored include:

- Overburden
- Mine rock
- Open Pit walls and floor
- Ore stockpiles
- Tailings
- Tailings supernatant
- Contact water.

For clarity, the term "follow-up programs" as stated in the federal Decision Statement refers to "management and monitoring programs" as outlined in the provincial Licences. Both terms are used interchangeably but refer to the same monitoring activities that extend over the life of mine through all phases.

1.1 PURPOSE

The purpose of the ARD/ML MP is to reduce and limit the environmental risks of ARD/ML associated with the Project.

1.2 OBJECTIVES

As part of Alamos Gold Inc.'s (Alamos') approach to environmental management, the company sets, implements, and maintains documented environmental objectives that consider the Project's environmental risks and compliance obligations. These obligations are aligned with the Project's Environmental Policy and are communicated to employees, contractors, and interested parties, regularly monitored, and updated as appropriate. Objectives are set to drive continuous improvement in environmental performance and are aligned with the overall strategic goals of the Project. Objectives are measurable (where possible), monitored, communicated, and updated as appropriate.

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Alamos' overarching environmental objective is to avert adverse effects, where technologically and economically feasible, and mitigate adverse effects that are unavoidable. In support of Alamos' underlying environmental objectives (i.e., to work to limit or mitigate adverse environmental effects, meet or surpass regulatory requirements, and strive to continually improve environmental practices and performance), Alamos has established the following performance objectives for the ARD/ML MP that consider key Project interactions and compliance obligations:

- Characterize the ARD/ML potential of the materials exposed by the Project.
- Outline the procedures to monitor and document geochemical characteristics of the materials, including pre-production testing schedules, parameters, and criteria.
- Describe the procedures to monitor contact water quality for early identification of conditions indicative of ARD/ML.
- Document the material management methods to be followed to reduce and limit the risk of ARD/ML generation from each Project component.
- Describe the adaptive management approach to mitigation measures for each Project component.
- Document triggers and procedures for revisions to the ARD/ML MP.

1.3 RELATIONSHIP TO OTHER MANAGEMENT PLANS

The ARD/ML MP is related to the Mine Plan, Closure Plans, the Soil Management and Rehabilitation Plan, the Erosion and Sediment Control Plan, Surface Water Monitoring and Management Plan, and the Groundwater Management and Monitoring Plan, as follows:

- Mine Plan and ARD/ML MP coordination will improve the effectiveness of ARD/ML management. Adjustments to the mining sequence may be necessary to generate non-acid-generating (NAG) construction material or to meet management criteria for the mine rock storage areas (MRSA) or tailings management facility (TMF).
- The Closure Plans provide direction for the development of the rehabilitation strategy for Project components at the end of their life cycle or in the case of unplanned premature closure. Effective management of materials with ARD/ML potential during construction and operation will reduce the risk of ARD/ML following closure.
- The Soil Management and Rehabilitation Plan provides details such as material covers and thickness, as well as soil contamination mitigation measures.
- Management of total suspended solids (TSS) is expected to be required prior to discharge of contact water to the receiving environment. An effective Erosion and Sediment Control Plan will limit the release of sediment from overburden and mine rock stockpiles and will provide management of particulates in contact water.

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- The Surface Water Management and Monitoring Plan includes actions for controlling and monitoring site runoff and seepage; contact-water collection, storage, and reuse; and water management facilities for collection and treatment. Monitoring of contact-water will be conducted as part of the ARD/ML Plan to verify assumptions used in ARD/ML assessment and in water quality models.
- The Groundwater Management and Monitoring Plan provides a framework for monitoring potential changes in groundwater quantity and quality in relation to the Project, including monitoring of groundwater quality associated with potential seepage from Project components (e.g., TMF).

1.4 REGULATORY CONTEXT

1.4.1 Federal Regulatory Requirements

The Project must comply with the *Fisheries Act* and the *Metal and Diamond Mining Effluent Regulations* (MDMER, SOR/2002-222 2020). Alamos will request a paragraph 34.4(2)(b) and 35(2)(b) Fisheries Act Authorization from Fisheries and Oceans Canada (DFO) for the harmful alteration, disruption, or destruction (HADD) of fish habitat that could result from Project activities.

The Project is not anticipated to require an amendment to Schedule 2 of the MDMER for the deposition of tailings into water frequented by fish as the preliminary TMF design was revised to avoid the potential deposition of mine rock or tailings into watercourses or waterbodies frequented by fish.

1.4.2 Provincial Regulatory Requirements

Provincial regulatory requirements that are relevant to the management of ARD/ML include Mine Closure Regulation under *The Mines and Minerals Act* and the Manitoba Water Quality Standards, Objectives, and Guidelines under *The Water Protection Act*.

The Mine Closure Regulation includes the obligation to provide notice of expansion, alteration, suspension, or closure, and to file a closure plan. Under suspension of operation, Section 14(2) states “... *the protective measures* [applicable to the ARD/ML MP] *must include the following:*

(c) *continuation of all monitoring programs;*

(d) *control of all contaminated effluent;*

(f) *rendering of all tailings, dams and piles of earth, rock and waste resulting from work done on the project site in a stable and safe condition.”*

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Following permanent closure of a project, Section 15(2) states “...*protective measures* [applicable to the ARD/ML MP] *must include the following*:

(k) the management of all areas in which tailings are impounded or waste or overburden is accumulated to ensure stability and erosion control;

(m) the restoration of all watercourses to their original courses or directed to new courses that will sustain themselves in the future without maintenance and that are consistent with the intended future use of the land.”

Manitoba Water Quality Standards, Objectives, and Guidelines contain standards regulated under the *Fisheries Act* and the MDMER (Section 1.4)

1.4.3 Corporate or Other Policies

As a member of the World Gold Council, Alamos Gold Inc. (Alamos) is a proud supporter of the Responsible Gold Mining Principles (the RGMPs). The ten RGMPs provide a framework that sets expectations for consumers, investors, and the downstream gold supply chain as to what constitutes responsible gold mining, addressing key environmental, social and governance issues for the gold mining sector. They are designed to provide confidence to governments, investors, employees and contractors, communities, supply chain partners and civil society that gold has been produced responsibly. Following the release of the RGMPs in September 2019, Alamos has implemented and aligned to the framework, and obtained external assurance to provide further confidence that the gold produced by Alamos is responsibly mined. In 2023, Alamos communicated its progress on implementing the RGMPs through Alamos’ 2022 RGMP Progress Report which received independent audit/assurance from EEM EHS Management Inc. (Alamos 2023). The 2022 RGMP Progress Report reflects Alamos’ third year reporting under the RGMP. Alamos will continue to implement the RGMPs through 2024 and beyond. The RGMPs are only applicable to operating mines. The Lynn Lake Gold Project will be incorporated as it transitions through construction into operation.

Working with its members, the World Gold Council has set out RGMPs to address key environmental, social and governance issues for the gold mining sector. One of the key principles is Water, Energy and Climate Change.

Alamos also has a Sustainability Policy. For Alamos, sustainability encompasses excellence in health and safety, environmental management, community engagement, security, and human rights. The Policy outlines Alamos’ commitment to build, operate and close mines in a manner that supports its sustainability vision and promotes the Alamos core values of Safety, Teamwork, Environmental Sustainability, Integrity, and Commitment. The Policy is a key element of the Alamos Sustainability Framework and is supported by Corporate Sustainability Standards that guide site procedures and practices.

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Alamos has a series of guiding corporate sustainability standards (Table 1-1), including:

- Environmental Monitoring
- Hazard Identification & Risk Management
- Incident Classification, Investigation & Reporting

Corporate policies that may be applicable specifically to the ARD/ML MP include:

- Mine Ore & Waste Stockpile Management
- Mine Closure.

Alamos' standards are regularly updated to reflect the latest developments. For the most current and up-to-date standards, please refer to the online version.

Table 1-1 Corporate Sustainability Standards

Corporate Policy	Requirement
Environmental Monitoring (CSS-ENV-10.1)	Sites shall develop and implement an environmental monitoring program. The site's environmental monitoring program will be documented as to list of points monitored, coordinates of points monitored, description of points (including the reason for monitoring (e.g., regulatory compliance, baseline, trend analysis, etc.), frequency of monitoring, anticipated duration of monitoring (e.g., the life of the mine), and parameters monitored. The monitoring program will be of sufficient scope to allow for the timely identification of potential environmental impacts prior to their migration offsite. Sites will regularly review their monitoring programs and update for changes at the mine site as required. At a minimum, the program will meet all environmental regulatory requirements.
Environmental Monitoring (CSS-ENV-10.2)	Compliance monitoring data will be subject to Quality Assurance/Quality Control (QA/QC) verification. Sample results that do not meet QA/QC guidelines will be disregarded and sample collection repeated. Sites must use reliable and accredited labs.
Environmental Monitoring (CSS-ENV-10.3)	Monitoring data will be stored in an electronic database.
Environmental Monitoring (CSS-ENV-10.4)	When compliance monitoring results indicate exceedances of permit or regulatory requirements, or significant deviation from previous results, the results will be reconfirmed with the person or company that did the analysis, and a confirmatory monitoring or sample will be taken immediately if the result is reconfirmed. Sites will also follow permit-specific or jurisdictional requirements.
Environmental Monitoring (CSS-ENV-10.5)	Monitoring data will be reviewed at least quarterly by the responsible manager to identify trends that may indicate potential for future exceedances of permit conditions or applicable standards, and potential risk. The site General Manager will be formally notified of any exceedances and emerging compliance issues. Refer to CSS-GOV-08 Incident Reporting Standard for any moderate, major, or catastrophic incidents.
Environmental Monitoring (CSS-ENV-10.6)	Sites will assess the need for a monitoring program involving external stakeholders.

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Corporate Policy	Requirement
Hazard Identification & Risk Management (CSS-GOV-2.1)	All Alamos locations shall maintain systems to identify, prevent and/or manage sustainability risks that face its operations and those which its activities may pose to others. This includes but is not limited to hazards and risks related to the: <ul style="list-style-type: none"> • Health and Safety of our workforce and communities, • Environmental impacts of our activities (local and downstream), • Societal and community impacts, and • Security and protection of people and property.
Hazard Identification & Risk Management (CSS-GOV-2.2)	Site Managers are responsible to ensure that appropriate resources, both internal and external, are available to identify, quantify, manage, and report sustainability hazards and risks. Assessments shall consider all site activities including: <ul style="list-style-type: none"> • Contractor works, • Regulatory requirements • Permit or license requirements, • Alamos Sustainability Standards requirements, and • Other site-specific requirements.
Hazard Identification & Risk Management (CSS-GOV-2.3)	Sites shall maintain a risk registry of all site risks. The risk registry will be updated at least quarterly or when major changes/incidents occur. Clear responsibility and authority for implementing, managing, reporting, and coordinating updates to the risk registry shall be designated to a specific employee(s).
Hazard Identification & Risk Management (CSS-GOV-2.4)	All corporate, site and task-level risks shall be assessed against the Alamos Risk Matrix, including likelihood and consequence assessments.
Hazard Identification & Risk Management (CSS-GOV-2.5)	Sites shall apply the hierarchy of controls considering (in order of priority): <ol style="list-style-type: none"> 1. Elimination – Remove the hazard 2. Substitution – Replace the hazard 3. Engineering control – physically control or isolate the hazard (e.g., dikes, guarding, interlocks) 4. Administrative control – control response/avoidance of hazard (e.g., training, procedures, reducing employee exposure to hazards, signage) 5. PPE or Mitigation – Protect people (personal protective equipment) or the environment (spill kits) from the hazard. This is the last line of defense. Extreme and high risks that exist after controls have been applied should go through a formal review with the Site Manager.
Hazard Identification & Risk Management (CSS-GOV-2.6)	Sites shall ensure effective communication of risks and controls to the workforce based on the nature of the activity and related risk. The nature of communication may change based on the risk frequency and consequence. For example, communication may include induction training, refresher training, policies, procedures and/or signage.
Hazard Identification & Risk Management (CSS-GOV-2.7)	For each identified risk, management shall assess and manage the risk appropriately with consideration to the risk rating. In considering risk mitigation, management must evaluate the cost of controls versus the benefit derived and ensure the resultant control framework is effective.
Hazard Identification & Risk Management (CSS-GOV-2.9)	The Alamos Executive and Internal Audit Director shall review and verify enterprise risks on a quarterly basis.

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Corporate Policy	Requirement
Incident Classification, Investigation & Reporting (CSS-GOV-8.3)	The Corporate Sustainability Team shall maintain an Incident Alert email group user list comprised of, at a minimum: <ul style="list-style-type: none"> • Alamos Executive and Management, • Country Managers, • General Managers; and • Project Managers.
Incident Classification, Investigation & Reporting (CSS-GOV-8.6)	The Corporate Sustainability Team shall provide a report on significant incidents on a quarterly basis to senior management and the Technical & Sustainability Committee of the Board.
Incident Classification, Investigation & Reporting (CSS-GOV-8.7)	Corporate Sustainability and Risk Management teams shall annually review and revise the Alamos Risk Assessment Consequence Table to ensure thresholds are consistent with the Alamos Enterprise Risk Management system.
Mine Ore & Waste Stockpile Management (CSS-ENV-4.1)	Sites shall complete technical studies to understand the potential for acid generation and leaching of metals or other constituents of concern for the various mine ore and waste stockpiles at the site.
Mine Ore & Waste Stockpile Management (CSS-ENV-4.2)	Sites shall complete technical studies to understand the geotechnical and seismic stability of permanent (>1 year) ore and waste facilities, and facilities shall be constructed, operated, maintained and monitored in a way that provides long-term geotechnical stability.
Mine Ore & Waste Stockpile Management (CSS-ENV-4.3)	Sites shall develop and maintain a current, site-specific, formal Mine Ore and Waste Stockpile Materials Management Plan that outlines procedures, responsibilities and monitoring requirements to identify and manage materials that may be subject to acid generation and metal leaching. The Management Plan will also outline procedures, responsibilities and monitoring requirements for geotechnical stability. This Management Plan may reference the CSS-ENV-10 Environmental Monitoring Standard as required.
Mine Ore & Waste Stockpile Management (CSS-ENV-4.4)	The Mine Ore and Waste Stockpile Management Plan shall establish internal inspection criteria and inspection frequency. Where monitoring or inspections show that these facilities are not meeting site-specific criteria, an action plan shall be developed and implemented.
Mine Ore & Waste Stockpile Management (CSS-ENV-4.5)	Materials that are being considered as a source of fill, road base or for other construction purposes, shall be tested to demonstrate that the material is geochemically and geotechnically suitable for the planned application.
Mine Closure (CSS-ENV-9.4)	Chemical stability shall be addressed specifically in the LOM closure plan, or as a stand-alone study between closure plan amendments including: <ul style="list-style-type: none"> • Demonstrating geochemical stability of waste rock stockpile, ore stockpiles, tailings facilities and heap leach facilities through proper studies, monitoring and laboratory analysis.

1.4.4 Approval Related Requirements

The conditions relating to ARD/ML laid out in the federal Decision Statement issued under the *Canadian Environmental Assessment Act, 2012*, provincial Environment Act Licence No. 3390 (Gordon), and provincial Environment Act Licence No. 3391 (MacLellan) are outlined below (Table 1-2).

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Table 1-2 Excerpts of Approval Related Requirements

Licence	Condition	Corresponding ARD/ML MP Section
Federal Decision Statement, 2023	3.7 The Proponent shall collect contact water and seepage from the Project development areas, including seepage and recharge from the tailings management facility, mine rock storage areas, overburden and ore stockpiles, and seepage input to groundwater that flows into the open pits, and treat it, as necessary, before releasing it into the receiving environment during all phases of the Designated Project to ensure that any deposits are made in accordance with the <i>Metal and Diamond Mining Effluent Regulations</i> and the pollution prevention provisions of the Fisheries Act. When treating contact water and seepage, the Proponent shall take into account Manitoba’s <i>Water Quality Standards, Objectives, and Guidelines</i> , the Canadian Council of Ministers of the Environment’s <i>Canadian Water Quality Guidelines of the Protection for Aquatic Life</i> , and Environment and Climate Change Canada’s <i>Federal Environmental Quality Guidelines</i> .	2.4, 3.2 & 5.7
Federal Decision Statement, 2023	<p>3.10. The Proponent shall manage, during all phases of the Designated Project and in consultation with Environment and Climate Change Canada and any other relevant authorities, acid-generating and metal-leaching and potentially acid-generating and metal-leaching tailings and waste, including from the tailings management facility, mine rock storage areas and ore stockpiles. In doing so, the Proponent shall:</p> <ul style="list-style-type: none"> 3.10.1. characterize, prior to construction, the acid rock drainage and metal-leaching potential of overburden and other mine rock to be used for construction; 3.10.2. only use materials that are not acid-generating, non-potentially acid-generating and non-metal-leaching during construction, including for earthworks and grading, unless not technically or economically feasible. If not technically or economically feasible, the Proponent shall preclude water and oxygen ingress into the materials used; 3.10.3. conduct geochemical testing of generated waste rock and tailings during operation to identify potentially acid-generating and metal-leaching waste material and verify the magnitude and onset of potential acid rock drainage in waste rock and tailings; 3.10.4. taking into account results of geochemical testing referred to in condition 3.10.3, implement measures to delay onset and magnitude of acid rock drainage in waste rock, including blending potentially acid generating with non-potentially acid generating during operation; and 3.10.5. cover all acid-generating, potentially acid-generating, and potentially metal-leaching tailings and waste, including waste in the tailings management facility and mine rock storage areas, during decommissioning with an oxygen-limiting barrier in a manner determined by a qualified individual. 	<p>5.2</p> <p>5.2</p> <p>5.3 & 5.5</p> <p>5.3</p> <p>5.3 & 5.5</p>

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Licence	Condition	Corresponding ARD/ML MP Section
Federal Decision Statement, 2023	<p>2.5 The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement, determine, as part of the development of each follow-up program and in consultation with Indigenous groups and any other parties being consulted during the development, the following information, unless otherwise specified in the condition:</p> <p>2.5.1 the methodology, location, frequency, timing and duration of monitoring associated with the follow-up program;</p> <p>2.5.2 the scope, content and frequency of reporting of the results of the follow-up program to the parties consulted for the development of the follow-up program;</p> <p>2.5.3 the minimum frequency at which the follow-up program must be reviewed and, if necessary, updated;</p> <p>2.5.4 the levels of environmental change relative to baseline that would require the Proponent to implement modified or additional mitigation measure(s), including instances where the Proponent may require Designated Project activities causing the environmental change to be stopped;</p> <p>2.5.5 the technically and economically feasible mitigation measures to be implemented by the Proponent if monitoring conducted as part of the follow-up program shows that the levels of environmental change referred to in condition 2.5.4 have been reached or exceeded; and</p> <p>2.5.6 the specific and measurable end points that must be achieved before the follow-up program can end. Those end points should indicate that the accuracy of the environmental assessment has been verified and/or that the mitigation measures are effective.</p>	All sections
<p><i>Environment Act</i> Licence No. 3390 (Gordon) and No. 3391 (MacLellan)</p>	<p>Definitions – “AP” means the maximum acid-generation potential, expressed as tonnes of CaCO₃ per 1000 tonnes of a material tested, determined in accordance with a static Acid-Base Accounting method satisfactory to the director.</p> <p>Definitions – “Non-acid-generating” (NAG) means having a NPR greater than 2, until or unless an appropriate alternate NPR cut-off value is determined, to the satisfaction of the director, through detailed characterizations, evaluations and interpretations, or through kinetic testing, carried out on representative test material by qualified individuals.</p> <p>Definitions - "NP" means the maximum neutralizing potential, expressed as tonnes of CaCO₃ per 1,000 tonnes of material tested, determined in accordance with a static Acid-Base Accounting method satisfactory to the director</p> <p>Definitions - "NPR" means the neutralizing potential ratio as determined from the ratio of NP/AP;</p> <p>Definitions – “Potentially acid-generating” (PAG) means having the potential or uncertain ability to generate acid as indicated by a NPR of 2 or less, until or unless an appropriate alternate NPR cut-off value is determined, to the satisfaction of the director, through detailed characterizations, evaluations and interpretations, or through kinetic testing, carried out on representative test material by qualified individuals</p>	3.1.3
	<p>43. The licensee shall treat all mine rock at the development as potentially acid-generating rock unless and until it is proven to be non-acid generating through analytical testing or as otherwise approved by the director.</p>	5.3

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Licence	Condition	Corresponding ARD/ML MP Section
<i>Environment Act</i> Licence No. 3390 (Gordon) and No. 3391 (MacLellan) (cont'd)	44. (MacLellan) or 45. (Gordon) The licensee shall: a) not use, nor release to any person, any contaminated soil, or potentially acid generating rock/materials, as a construction material unless this material will be placed where it will not be subject to oxidation; and b) undertake such remedial work as may be specified by the director should any of the construction materials used by the licensee in the course of constructing or altering this development be determined to be contaminated soil or acid generating rock/material.	5.2
	56 (Gordon) or 77 (MacLellan). The licensee shall, upon commencement of operation: a) conduct site specific testing and investigations for prediction of acid rock drainage chemistry in accordance with the Mine Environment Neutral Drainage (MEND) report or other methods approved by the director; b) assess the results of the investigations with respect to the NPR at the mine site; and c) submit testing and investigation results and conclusions to the director within three months of commencement of operation, for approval.	3.1 3.1.3
	17. The licensee shall prepare, implement and continuously maintain in current status, the following plans for the development in a manner acceptable to the director: m) Acid Rock Drainage and Metal Leaching Management and Monitoring Plan.	All sections
<i>Environment Act</i> Licence No. 3390 (Gordon)	42. The licensee shall, unless otherwise specified by the director, transport all ore brought to the surface at the mine site to the MacLellan processing facility or other facility operating under the authority of an <i>Environment Act</i> Licence issued pursuant to The Environment Act.	5.4
	44. The licensee shall not, other than in the designated mine rock stockpile, temporarily store mine rock at the mine site.	5.3

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Project Setting and Development
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2.0 PROJECT SETTING AND DEVELOPMENT

2.1 PROJECT SCHEDULE

The tentative Project schedule and approximate duration of the key Project phases are as follows:

- Construction (i.e., site preparation, physical construction/equipment installation, pre-production, and commissioning) will commence in 2025 and is expected to take approximately 3 years to complete. Some limited pre-production may occur during this period. Project construction activities will be carried out concurrently at both mine sites.
- Operation (i.e., ore and mine rock extraction, processing, and waste management) at the Gordon site will be undertaken for 7 years, while operation at the MacLellan site will be undertaken for the entire life of the Project (i.e., 17 years).
 - Ore stockpiled during mine operation (both sites) will provide additional feedstock to the ore milling and processing plant located at the MacLellan site during Project operation.
- Closure phase will commence at cessation of operation:
 - Active Closure is scheduled to begin in Year 7 at the Gordon site and in Year 17 at the MacLellan site and is expected to take approximately 5 to 6 years to complete at each site.
 - Post-Closure includes the period during which the active rehabilitation measures are complete, but monitoring is still required. Pit flooding is predicted to take 11 years at the Gordon site and 21 years at the MacLellan site under average climate conditions. The expected duration for post-closure is approximately 5 years at the Gordon site and 10 years at the MacLellan site.
 - Permanent Closure occurs when the site is stable, and monitoring is no longer required. Durations and conditions for Post-Closure monitoring and Permanent Closure are detailed further in the respective site Closure Plans.

2.2 GORDON SITE

New infrastructure at the Gordon site includes the open pit, one low/medium grade ore stockpile, one topsoil stockpile, one overburden stockpile, one MRSA, one stockpile borrow source, two sumps, two site water management ponds (i.e., collection pond), and minor supporting infrastructure for equipment storage and maintenance.

2.2.1 Open Pit

Wendy and East pit lakes will be dewatered during construction, and water extracted from the pits will be discharged to the environment. A portion of the historical rock pile that lies within the footprint of the proposed pit will be relocated to a MRSA. During pre-production, approximately 2.3 million tonnes (Mt) of overburden will be removed, 1.4 Mt of NAG waste will be removed, 0.7 Mt of PAG waste will be removed,

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and 6 kilotonnes (kt) of ore will be stockpiled. The total quantity of material to be mined from the Gordon open pit during Project mine operation is approximately 65 Mt of which 7.9 Mt is ore material. The anticipated ultimate depth of the Gordon open pit is approximately 225 metres (m).

2.2.2 Ore, Overburden and Mine Rock Stockpiles/Storage Areas

Ore will be stockpiled at the Gordon site and used as feedstock for the ore milling and processing plant located at the MacLellan site. The capacity of the ore stockpile at the Gordon site will be approximately 3.0 Mt. Depletion of this stockpiled material is anticipated by the end of Year 7. The ore stockpile will be located south of the open pit (Map 1-1, Appendix A).

Run-of-mine (ROM) ore from the Gordon site will be transported via haul trucks to a pad directly adjacent to the ore milling and processing plant at the MacLellan site (Map 1-2, Appendix A) for short-term storage before the ore is used as feedstock for the plant (Stantec 2020a). At Gordon, the overburden stockpile and MRSA will be located to the southwest and south of the open pit and will have capacities of 5.6 Mt and 54.4 Mt, respectively.

2.3 MACLELLAN SITE

The MacLellan site was historically operated as an underground mine and entered “care and maintenance” in 1989. The site consists of a 4.6-kilometre (km) gravel access road and infrastructure from the former underground mine. The underground workings are flooded with water. With the proposed development of this site, the existing headframe, hoist house and maintenance building will be demolished. The existing 4.6 km access road will be used to access the site. Upgrades to the existing access road will also be required (Stantec 2020a).

The Project includes the development of new mine infrastructure at the MacLellan site, including an open pit, a satellite pit, central ore milling and processing plant, associated infrastructure, ore, topsoil and overburden stockpiles, a MRSA, and a TMF.

2.3.1 Open Pit

During pre-production, 3.7 Mt of overburden, 6.4 Mt of NAG waste, and 4.1 Mt of PAG waste will be removed from the open pit and stockpiled. Stockpiled ore (587 kt) will be used to feed the mill during plant commissioning. The total quantity of material to be excavated from the MacLellan open pit and satellite pit is approximately 304 Mt, which includes 39.7 Mt of ore.

The anticipated final open pit dimensions will be 410 m total depth for the main pit and 70 m total depth for the satellite pit. The proposed mine operation is a conventional open pit with shovel and truck removal of the mine rock and ore.

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2.3.2 Ore, Overburden and Mine Rock Stockpiles/Storage Areas

One ore stockpile area is planned for the MacLellan site, located south of the mill (Map 1-2, Appendix A). The ore stockpile at the MacLellan site will have a capacity of approximately 1.0 Mt and is planned to be active until the end of mine operation.

The MacLellan site will contain a stockpile area for overburden and mine rock. The overburden stockpile area is proposed to be located to the southwest of the MRSA and will have a maximum storage volume of approximately 9.5 Mt. The MRSA is proposed to “wrap around” the south and east sides of the TMF and will have an approximate capacity of 260 Mt (Map 1-2, Appendix A).

2.3.3 Mill Feed Storage Area and Crushing Plant

Run of mine (ROM) ore from both sites will be transported to the ore stockpile area (Section 2.3.2) for short-term storage before it is used as feedstock for the plant (Map 1-2, Appendix A). A truck dump and crushing circuit for ROM ore is proposed south of the ore milling facility (Map 1-2, Appendix A). The crushed ore will be transported to the ore milling and processing plant by a conveyor system. Potential dust emissions will be managed through dust containment (e.g., enclosure) and collection systems.

2.3.4 Ore Milling and Processing Plant

The ore milling and processing plant is designed to process 8,000 tonnes/day of ore. Ore will first be crushed in a two-stage crushing circuit, then ground and thickened from 33% to 55% solids for further pre-aeration, cyanide leaching, and carbon-in-pulp (CIP) steps. The slurry from the CIP process will be sent to the cyanide detoxification circuit (Air/SO₂ oxidation process) for cyanide destruction prior to being discharged to the TMF (Stantec 2020b). Process water will be reclaimed from the TMF pond, to reduce the need for fresh surface water demand.

2.3.5 Tailings Management Facility

The TMF will be located approximately 2 km from the ore milling and processing plant (Map 1-2, Appendix A). The TMF will be constructed in four stages. The TMF dams will be raised progressively during the 17-year operating period. The TMF dams will consist of a low permeability core constructed of suitable materials (i.e., clean, non-acid generating, relatively free draining) with internal bedding and filter zones, and upstream and downstream shells of rockfill material. Most of the dam materials are expected to be sourced locally. The dams will have an upstream slope of 3H:1V, a downstream slope of 2H:1V, and a crest width of 10 m.

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2.4 SUMMARY OF ARD/ML CHARACTERIZATION

Geochemical characterization of materials from both sites was presented in the Geochemistry Baseline Technical Data Report and Geochemical Baseline Technical Data Validation Report (Stantec 2017 and 2020a). The geochemical assessment approach for classification of materials used is summarized in this section.

For classification of ARD potential, the neutralization potential ratio (NPR) was calculated using the following equation:

$$\text{NPR} = \frac{\text{NP}}{\text{AP}}$$

Where NP is neutralization potential and AP is acid potential. Licences 3390 and 3391 classify materials with NPR >2 as NAG and materials with NPR of 2 or less as PAG. This classification was also applied to ARD block models developed for both sites.

Acid Potential was calculated from total sulphur. Results of previous investigations indicate that 96% to 100% of sulphur present in overburden, mine rock, and ore from the Gordon and MacLellan sites is present in the sulphide form (Stantec 2020a); therefore, calculation of AP from total sulphur content is considered appropriate. NP was determined using total inorganic carbon (TIC) content and using the modified Sobek method with siderite correction (Meek 1981).

The presence of iron (Fe) and manganese (Mn) in carbonates was evaluated because Fe and Mn released during dissolution of carbonates may subsequently oxidize resulting in acid generation. Mineralogical studies indicate 87% to 100% of TIC is present in carbonate minerals with net acid neutralization capacity. NP determined from TIC content and the modified Sobek NP with siderite correction method were typically similar when NP was greater than 30 kg CaCO₃/t. Below 30 kg CaCO₃/t modified Sobek NP with siderite correction was typically greater than carbonate NP and carbonate NP was conservatively used to evaluate NPR.

Metal leaching potential was evaluated by comparing the concentrations of trace elements in contact water from historical features and leachate from shake flask extraction (SFE), humidity cell tests (HCTs) and field bins to MDMER effluent limits and to the Canadian Water Quality Guidelines for the protection of Freshwater Aquatic Life (CWQG-FAL referred to hereinafter as CWQG). Concentrations exceeding MDMER and/or 10x CWQG in kinetic tests indicated elements with high leaching potential, while concentrations between 10x CWQG and the CWQG value showed moderate leaching potential (Stantec 2017 and 2020a).

Findings of the geochemical assessments are summarized below for each mine material:

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2.4.1 Overburden

Baseline testing of overburden at both sites indicates a low risk of ARD; overburden samples had a median NPR of 13 (Stantec 2017). In addition, there was no indication of ARD downstream of historical overburden storage at the Gordon site (Stantec 2020a).

Results from humidity cell testing indicate moderate ML potential for fluoride (F), aluminum (Al), and copper (Cu) as results exceeded CWQG, but remained less than 10x CWQG (Stantec 2017); however, seepage water quality results from historic overburden storage that phosphorous (P) has been the only parameter of concern (Stantec 2017).

2.4.2 Mine Rock

Approximately 84% and 78% of mine rock from the MacLellan and Gordon open pits, respectively, are expected to be NAG based on ARD block models developed by Alamos. The remaining mine rock is classified as PAG with a predicted ARD onset time between 17 to 30 years. Results from kinetic tests indicate high leaching potential for arsenic (As) in mine rock from MacLellan. Concentrations of As in field bin leachate were greater than 10x CWQG (0.05 mg/L) but remained below the MDMER limit (maximum monthly mean concentration of 0.1 mg/L). Mine rock was determined to have moderate leaching potential for aluminum (Al), cadmium (Cd), copper (Cu), molybdenum (Mo), and selenium (Se). At MacLellan, groundwater monitoring near historical rock storage areas suggests that the pH (minimum pH=5.74) and exceedances of CWQG for As, chromium (Cr), Cu, Cd and Se could be related to leaching from the historic mine rock.

Mine rock from the Gordon site was determined to have high leaching potential for nitrite (NO₂) and Cu and moderate leaching potential for fluoride (F), As, Se, Cd, Cr, Al, and Cu based on leachate from kinetic tests. In ponds located downstream of historical mine rock storage areas at the Gordon site, As, Fe, Se, ammonia (NH₃), and NO₂ occasionally exceed the CWQG but remained below MDMER limits. Monitoring records from historical operation also do not report exceedances of MDMER or acidification of water in ditches surrounding rock disposal areas. Indications of ARD were not observed downstream of the historical rock storage sites at the Gordon site where PAG and NAG were blended and covered with overburden and soil. Blending of mine rock and cover placement is currently considered the effective mitigation to control ARD/ML from mine rock after closure at both sites.

2.4.3 Ore

Approximately 52% and 66% of ore from the MacLellan and Gordon open pits, respectively, is expected to be NAG, with the remaining ore classified as PAG. ARD is not likely to occur from blended ore stockpiles during operation. The minimum time to ARD onset for Gordon ore is 14 years and Gordon ore will be processed by the end of year 7. The minimum time to ARD onset for MacLellan ore is 100 years and MacLellan ore will be processed within 17 years. Leachate from on-going field kinetic test containing PAG ore from Gordon maintained near neutral pH for five years, which is close to the entire operational phase at that site.

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High leaching potentials were identified for As and Cd for the MacLellan ore based on field kinetic tests. Moderate leaching potentials were determined for Al, F, Ag and Cu for ore from the Gordon site and for silver (Ag), lead (Pb), Cu and Al for ore at the MacLellan site. Contact water from ore stockpiles will be collected and managed during operation. At closure, all ore is anticipated to have been processed.

2.4.4 Tailings

Approximately 57% of tailings generated from ore from both sites will be NAG. Acid rock drainage is not expected during operation because the minimum predicted onset to acid generation is eight years for PAG material. Depletion of NP in near surface tailings will be prevented during operation because most tailings will be saturated and tailings beaches will be frequently covered with a new layer of tailings over the life of mine. MDMER limits could be exceeded for total cyanide (total CN), un-ionized NH₃, Cu, and nickel (Ni) in the TMF pond during operation. Free CN, mercury (Hg), Ag, Fe, Cd, and As may be greater than 10x CWQG based on ageing test results.

If discharge is required from the tailings pond during operation, the water will likely require treatment. Seepage from tailings may have concentrations of total CN and un-ionized NH₃ above the MDMER limits and could exceed 10x CWQG for Al, Cr, Fe, free CN, Cu, As, Cd, F, and Hg. Seepage will be collected and pumped back to the TMF pond during operation. Partial liners under the TMF dikes will reduce risks of groundwater contamination.

At closure, water from the TMF and seepage from TMF will be directed to the open pit. After closure, acidic conditions may develop in PAG tailings based on laboratory NP depletion rates. Under acidic conditions, MDMER limits for Ni and Cu could be exceeded. Arsenic, Cd, Pb, and zinc (Zn) may be greater than CWQG. The risk of ARD/ML from tailings will be managed at closure by placing overburden to limit infiltration of precipitation and ingress of oxygen.

2.4.5 Construction Materials

Rock and overburden from quarries are expected to be NAG with low ML based on testing of proposed sources before extraction and use.

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3.0 MONITORING PLAN

This section provides information on procedures for monitoring of mine materials (e.g., mine rock, ore, and tailings) and contact water (e.g., collection and settling ponds), parameters for analysis, and frequency of sampling for each phase of the Project. Specific monitoring locations will be identified as part of detailed Project design and will be adjusted, as necessary, through the life of the mine. Standard operating procedures (SOPs) will be developed prior to commencement of construction to describe sampling procedures, quality control and assurance programs, laboratory methods and protocols, and laboratory accreditations. The specific and measurable end points for concluding the monitoring program will be set to assess the accuracy of the environmental assessment and the effectiveness of mitigation measures. These end points will be achieved either at permanent closure or earlier if it can be demonstrated that there are no further impacts warranting continued monitoring.

3.1 SAMPLING, TESTING AND ARD CLASSIFICATION OF SOLIDS

Monitoring of mine materials will be conducted in accordance with industry standards and best practices (Price 2009). This section includes sampling frequencies, analytical procedures, and screening criteria to classify mine rock, ore, and tailings based on ARD/ML potential.

3.1.1 Sampling

During construction and operation, sampling will be conducted to refine the ARD block model and delineate PAG and NAG materials. The frequency of mine material sampling is indicated in Table 3-1. The frequency of sampling and analysis at an external laboratory may be reevaluated following validation of the ARD block model.

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Table 3-1 Summary of ARD/ML Monitoring Program

Material Type	Source	Test Parameters	Frequency	QA/QC
Solids				
Mine Rock for construction uses (including historical MRSAs), NAG Quarries, NAG Borrow Pits, and Overburden	Blast holes, test pits, core	Total Sulphur and Total Carbon (on-site laboratory)	1 sample per 10,000 t	1 duplicate every 10 samples to external laboratory
		ABA, SFE, and trace elements ¹ (external laboratory)	1 sample per 100,000 t	1 duplicate every 10 samples
Mine Rock waste characterization (including historical MRSAs), Ore, and Overburden	Blast holes, test pits, core	Total Sulphur and Total Carbon (on-site laboratory)	1 sample per 20,000 t	1 duplicate every 5 samples to external laboratory
		ABA, SFE, and trace elements ¹ (external laboratory)	1 sample per 100,000 t	1 duplicate every 10 samples
Tailings Solids	End-of-pipe, Exposed beaches	Total Sulphur and Total Carbon	Monthly for end-of-pipe every 10,000 m ² of beach prior reclamation	1 duplicate annually 1 duplicate every 10 beach samples
		ABA ² , SFE, and trace elements ¹ (external laboratory)	1 sample per every 10 samples	1 duplicate every 10 samples
Water Treatment Waste Solids	Program to be designed if management of dissolved parameters is required			
Water				
Tailings Supernatant	End-of-pipe	As indicated in Section 3.2.2	Monthly	1 duplicate and 1 blank for each sampling event
Contact Water	Sumps, ditches, and pit lakes			1 duplicate and 1 blank for each sampling event
Kinetic Testing				
Mine rock	Core	pH, sulphate, conductivity, acidity, alkalinity, anions, dissolved metals	6 PAG samples from MacLellan and 2 argillite samples from Gordon following MEND (2009) humidity cell test procedures	1 duplicate and 1 blank for every 10 humidity cells

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Material Type	Source	Test Parameters	Frequency	QA/QC
Tailings Solids	End-of-pipe tailings, initiate testing following achievement of stable operations	pH, sulphate, conductivity, acidity, alkalinity, anions, dissolved metals	One sample following MEND (2009) humidity cell test procedures	
	Rougher tailings, Initiate testing following exhaustion of Gordon Ore	pH, sulphate, conductivity, acidity, alkalinity, anions, dissolved metals	One sample following MEND (2009) humidity cell test procedures	
<p>Notes:*</p> <p>¹ Trace elements include As, Cd, Cr, Co, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, S, Ti, U, Zn.</p> <p>² Monthly samples collected during the first 12 months of operation will be analyzed for the acid-base accounting package at an external laboratory.</p> <p>ABA – acid base accounting m² – square metre MRSA – mine rock storage area PAG – potentially acid generating QA/QC – quality assurance and quality control SFE – shake flask extraction t – tonne</p>				

3.1.2 Analytical Program

Samples of overburden, mine rock, ore, and tailings will be tested at the on-site laboratory for total sulphur, total carbon and trace elements (As, Cd, Cr, Co, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, S, Ti, U, Zn). Equipment for sulphur and carbon determination may include a LECO benchtop carbon and sulphur analyzer or other equipment identified during Project design. Duplicates (1 every 10 samples) will be analyzed at an external laboratory for quality assurance and quality control (QA/QC). External laboratory samples will be analyzed for static testing including:

- ABA package: modified Sobek NP (Lawrence et al. 1989), TIC, fizz rating, paste pH, total carbon and sulphur by LECO, sulphate-sulphur by HCl extraction, and sulphide-sulphur by calculation.
- Solid phase total elemental analysis using aqua regia digestion and inductively coupled plasma mass spectrometry (ICP-MS).
- SFE: rock and overburden samples crushed to minus 6 millimetre (¼"). Tailings samples will be analyzed as received. Continuous mixing of 250 grams of crushed sample with 750 mL of deionized water for 24 hours. Analysis of unfiltered leachate for pH, alkalinity by titration, and sulphate by turbidimetry. Analysis of 0.45-micron filtered leachate for trace elements by ICP-MS and mercury by cold vapour atomic absorption spectroscopy (CVAAS).

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3.1.3 Management Criteria

Following the criteria of Licences 3390 and 3391, samples with NPR >2 are considered NAG and samples with NPR of 2 or less are considered PAG. AP will be evaluated using total sulphur and NP will be evaluated using total carbon. Analysis of a statistically significant quantity of each lithology at the MacLellan and Gordon sites is required to establish the relationship between total carbon and TIC. Following establishment of the total carbon-TIC relationship, total carbon will be used to evaluate NP using a scaling factor to account for organic carbon and a scaling factor to account for the presence of Fe and Mn bearing carbonates.

$$NPR = \frac{\text{Total Carbon} \times 83.33 \times SF_{TIC} \times SF_{Fe,Mn}}{\text{Total Sulphur} \times 31.25}$$

Where:

NPR = neutralization potential ratio

SF_{TIC} = TIC scaling factor (to be determined)

SF_{Fe,Mn} = Fe and Mn bearing carbonate scaling factor (0.87)

Note: SF_{Fe, Mn} and SF_{TIC} should be reviewed periodically and updated as more data is available.

3.2 CONTACT WATER MONITORING, TESTING AND ANALYSIS

A contact water monitoring program will be established to identify early-stage ARD/ML at the source. The contact water monitoring program outlined in this plan is limited to monitoring of contact water sources (e.g., stockpiles [including construction material], TMF, and open pits). Monitoring of point discharges to the environment from features such as collection ponds and pit lake overflow is addressed in the Surface Water Management and Monitoring Plan.

3.2.1 Sampling Locations

Preliminary monitoring locations of contact water associated with overburden, mine rock, ore stockpiles, open pits and TMF (e.g., sumps, ditches) are identified on Maps 1-1 and 1-2 (Appendix A). Tailings supernatant will be monitored from the end-of-pipe prior to discharge to the TMF. Water from these locations will be sampled, tested, and flow monitored on a monthly basis during construction, operation, and active closure. A detailed monitoring schedule will be developed and incorporated into future updates of this Plan when seepage monitoring locations are established during detailed engineering.

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3.2.2 Field and Laboratory Analyses

Measurements of pH, temperature, conductivity, dissolved oxygen, and turbidity will be completed in the field and samples will be collected for laboratory analysis of the following parameters:

- Routine chemistry: pH, total hardness, total dissolved solids (TDS), TSS, alkalinity, acidity, ammonia nitrogen, and selected anions (chloride, fluoride, sulphate, nitrate, and nitrite)
- Total metals (Al, As, Cd, Cr, Co, Cu, Fe, low level Hg, Mn, Mo, Ni, Pb, Se, S, Tl, U, Zn at a minimum)
- Dissolved metals (Al, As, Cd, Cr, Co, Cu, Fe, low level Hg, Mn, Mo, Ni, Pb, Se, S, Tl, U, Zn at a minimum)
- Dissolved organic carbon (DOC)
- Total cyanide for MacLellan site only

This list includes MDMER effluent testing requirements and a set of relevant parameters with CWQG-FAL including parameters required for the calculation of site-specific guidelines (pH, temperature, hardness, and DOC). Analytical requirements for contact water testing will conform with precision, accuracy and detection limits provided in Tables 1 and 2 of Schedule 3 in the MDMER regulation. Preliminary duplicate samples collection frequency is shown in Table 3-1. The detailed QA/QC procedures will be outlined for each sample type in the respective SOPs to be developed as mine planning progresses.

3.2.3 Screening Criteria

Contact water sample results from the laboratory analyses described above will be screened against the maximum authorized monthly mean concentration for parameters included in Schedule 4 of the MDMER presented in Table 3-2. The range for pH of contact water is 6.0 to 9.5 per MDMER regulation.

Table 3-2 Proposed Screening Criteria

Parameter	MDMER Maximum Authorized Monthly Mean Concentration (Schedule 4, Table 1)
Total Cyanide	0.5 mg/L
Total Arsenic	0.1 mg/L
Total Copper	0.1 mg/L
Total Lead	0.08 mg/L
Total Nickel	0.25 mg/L
Total Zinc	0.4 mg/L
Radium 226	0.37 Bq/L
Un-ionized ammonia	0.5 mg/L expressed as nitrogen
Notes: Bq/L – Becquerel per litre MDMER – Metal and Diamond Mining Effluent Regulation mg/L – milligram per litre	

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4.0 COMMISSIONING OF ON-SITE LABORATORY

An on-site laboratory will be established to analyze total carbon and total sulphur for ARD block model verification and confirmatory analysis of construction materials. Samples will be analyzed for total carbon and total sulphur at both the on-site laboratory and an external laboratory during commissioning of the on-site laboratory. Following commissioning of the on-site laboratory, samples will be analyzed at an external laboratory at the frequencies identified in Table 3-1.

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5.0 MANAGEMENT AND MITIGATION MEASURES

Details regarding material-specific management and mitigation measures are provided in the following sections. A summary of management measures is provided in Table 5-1.

Table 5-1 Summary of Material Management Criteria

Material	Criteria	Mine Year	Management Measures
Overburden	NPR >2	All	None. Can be used as construction material.
	NPR ≤2	All	Place in MRSA following mine rock blending procedure (Section 5.1)
Mine Rock	NPR >2	All	None. Can be used as construction material.
	NPR ≤2	All	Place in MRSA following mine rock blending procedure (Section 5.3)
Ore	NPR >2	All	None
	NPR ≤2	All	Preferentially process when grade can be met (Section 5.4)
	NPR ≤0.5 and Total Sulphur >2 wt. %	All	Stockpile separately and process within three years (Section 5.4)
Tailings	NPR >2	All	None
	NPR ≤2	1 to 16	None
		17 and 18	Increase sampling frequency to weekly and initiate beach sampling program (Section 6.2.4)
Notes: MRSA – mine rock storage area NPR – neutralization potential ratio			

5.1 OVERBURDEN

Overburden has a low risk of ARD/ML and may not require special management or mitigation measures. Overburden will be sampled as indicated in Table 3-1. The overburden sampling program may be reviewed after analysis of 200 samples from each site, and a sample frequency reduction to one sample per 100,000 tonnes may be considered if overburden samples from the site are confirmed to be NAG.

Overburden is considered NAG if NPR >2. If PAG overburden is identified by testing, the PAG material will be segregated from NAG overburden and placed in the MRSA in accordance with the management protocols for PAG mine rock (Section 5.3).

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5.2 CONSTRUCTION MATERIAL

Rock and overburden will be characterized for ARD/ML potential prior to use in construction as indicated in Table 3-1. Overburden and rock identified as PAG will be excluded from construction and transported to the MRSA unless materials are covered with water or materials are managed to limit ARD as part of design. Remedial work may be required if PAG rock is found to have been used for construction in areas where it will be exposed to infiltration and oxygen.

Construction materials are considered PAG if NPR is 2 or less. Only NAG mine rock, including rock generated from open pits, will be used for construction of pads, roads, and building foundations above the water table. Current ARD block models indicate that both pits can generate the required amount of NAG rock for construction (Figure 5-1).

5.3 MINE ROCK

Mine rock will be treated as PAG unless, and until, it is proven to be NAG, and rock will be stored in the designated MRSA based on ARD potential. Mine rock will be considered NAG if it has NPR >2 and PAG if it has NPR of 2 or less. At least 84% and 78% of mine rock from the MacLellan and Gordon open pits, respectively, will be NAG based on ARD block models developed by Alamos. The remaining mine rock is assumed to be PAG and has a risk of ARD generation after closure.

Mine rock will be characterized for ARD/ML potential as indicated in Table 3-1. Confirmatory samples of cuttings from reverse circulation drilling in material identified as rock (and not overburden) will be collected along 5 m intervals from holes spaced on a 25 m by 25 m grid. These additional data will be integrated with the ARD block models to improve the accuracy (quantity and delineation) of PAG and NAG rock three to four months ahead of mining. Mine blocks classified as PAG will be marked based on a field survey and materials within the block will be managed as PAG regardless of the presence of NAG layers within the block. Samples will also be collected from blast hole cuttings for additional testing to confirm and refine the data within the block model prior to mining.

Blending of PAG and NAG material, encapsulation and/or covers are considered viable mitigation measures to address long term storage of mine rock with a potential risk of developing ARD/ML conditions. ARD block models indicate that both sites can produce NAG blends on an annual basis (Figure 5-1). The material characterized as PAG rock will be marked after the blast, excavated, and dispatched to the MRSA. NAG rock will be deposited over each layer of PAG rock within the MRSA. A portion of PAG and NAG rock loads will be mixed on the pile face and during grading each lift of the stockpile forming an NAG blend. This blend will be encapsulated with a layer of NAG rock on the final topmost lift(s) of the stockpile (Figure 5-2). Some NAG rock may need to be stockpiled to achieve the required blending ratios. The specifications for construction of the MRSA to achieve the desired blending characteristics are summarized in Table 5-2.

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Table 5-2 Summary of Mine Rock Blending Specifications

Specification	Gordon	MacLellan
Maximum PAG layer thickness (m)	1.0	2.5
Minimum NAG base layer in MRSA ¹ (m)	7.1	3.5
Lift height (m; +/- 1.0 m)	10	15
Encapsulation thickness (m)	2.6	2.0
Minimum PAG distance from final lift face (m)	15	22.5
Notes: m – metre ¹ - Assumes CAT 789D truck PAG – potentially acid generating		

NAG rock will reduce oxygen flux into the interior of the pile and provide alkalinity to infiltrating water. Field tests including confirmatory testing of the MRSA NPR will be initiated to evaluate the effectiveness of the proposed mine rock blending and encapsulation methods as material becomes available during the early operation phase. Blending confirmatory sampling plan will be developed as mine operations commences. During closure, the tops of the MRSAs will be covered with overburden and revegetated to further reduce oxygen and water percolation into mine rock.

**LYNN LAKE GOLD PROJECT:
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Management and Mitigation Measures
January 30, 2025

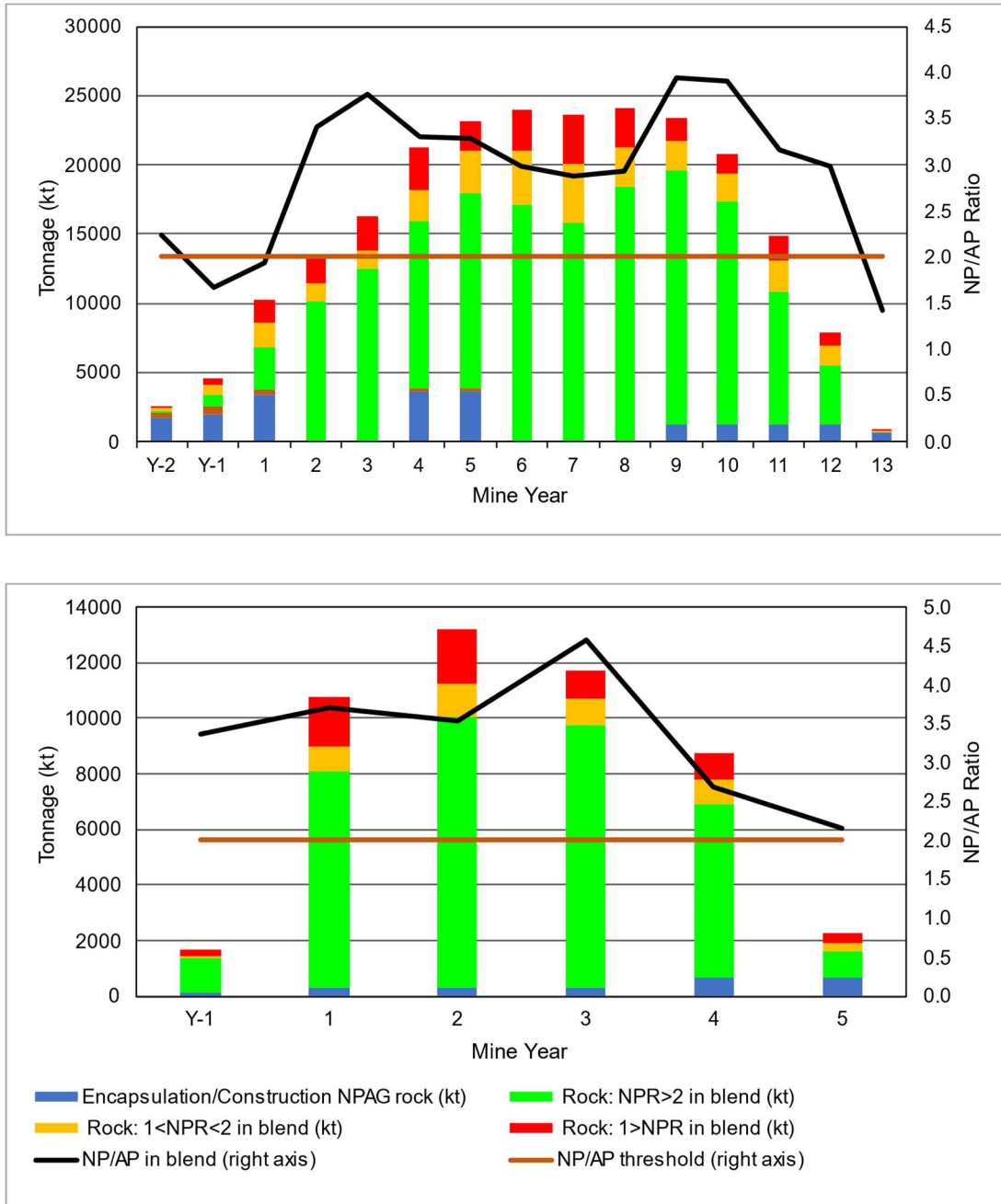


Figure 5-1 Production of ARD Rock types at MacLellan (top) and Gordon (bottom) Sites and Predicted NPR values (NP/AP ratio) of Annual Blends

**LYNN LAKE GOLD PROJECT:
ACID ROCK DRAINAGE AND METAL LEACHING MANAGEMENT PLAN**

Management and Mitigation Measures
January 30, 2025

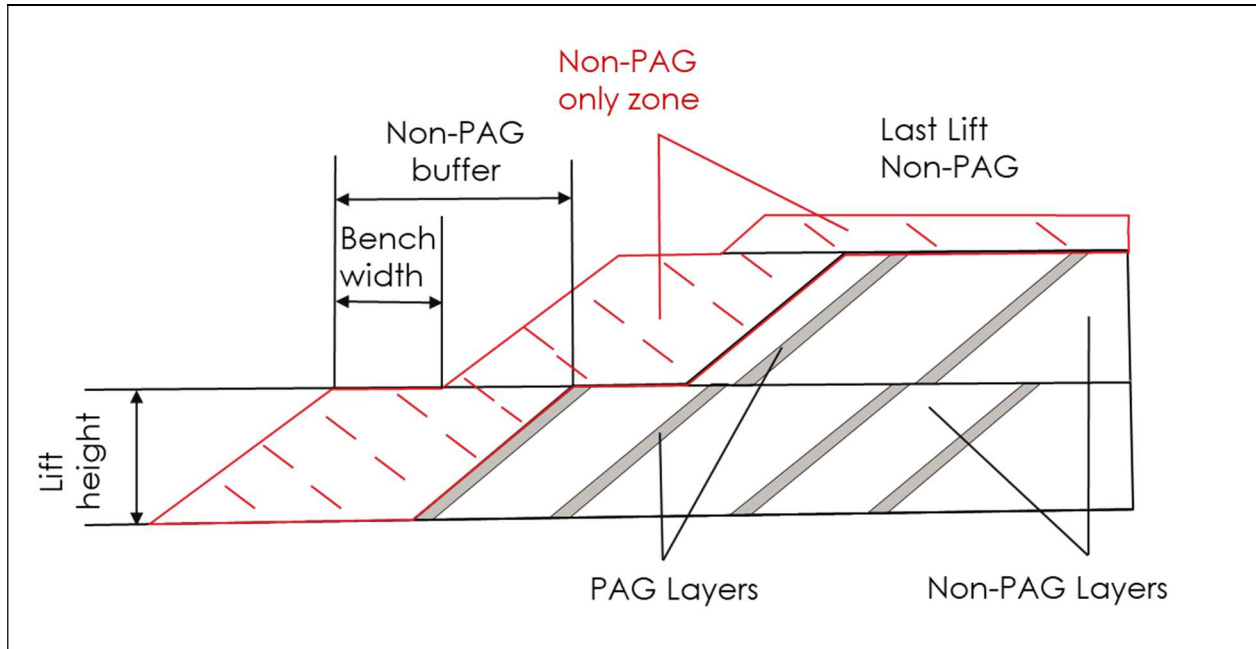


Figure 5-2 Conceptual Cross-Section of Mine Rock Pile

5.4 ORE

Ore is expected to be PAG during the first year of mining at MacLellan and during the first three years of mining at Gordon (Figure 5-3). Because ARD is not expected to occur in the ore stockpiles during the life of mine, grade requirements for mill feed are the primary consideration when processing ore. To limit the potential for ARD and improve the potential for generation of NAG tailings during the last two years of operations, PAG ore will be preferentially directed to the mill feed and NAG ore will be preferentially allocated to the stockpile when grade requirements for the mill feed can be met.

A portion of ore from the Gordon site may have the potential for NP depletion in three to five years. PAG ore from Gordon with more than 2 wt.% total sulphur and NPR below 0.5 will be handled and managed to limit the potential for ARD during life of mine. PAG ore meeting this handling criteria will be delineated during confirmatory sampling for the ARD block model, stockpiled separately, and processed within three years. Separate stockpiling of PAG and NAG ores, particularly for the Gordon site, is recommended to allow for adaptive management. In the event that unprocessed ore remains on surface at closure, a management plan for the remaining ore will be addressed in the closure plan, which will be developed in accordance with Mine Closure Regulation under *The Mines and Minerals Act*.

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Management and Mitigation Measures
January 30, 2025

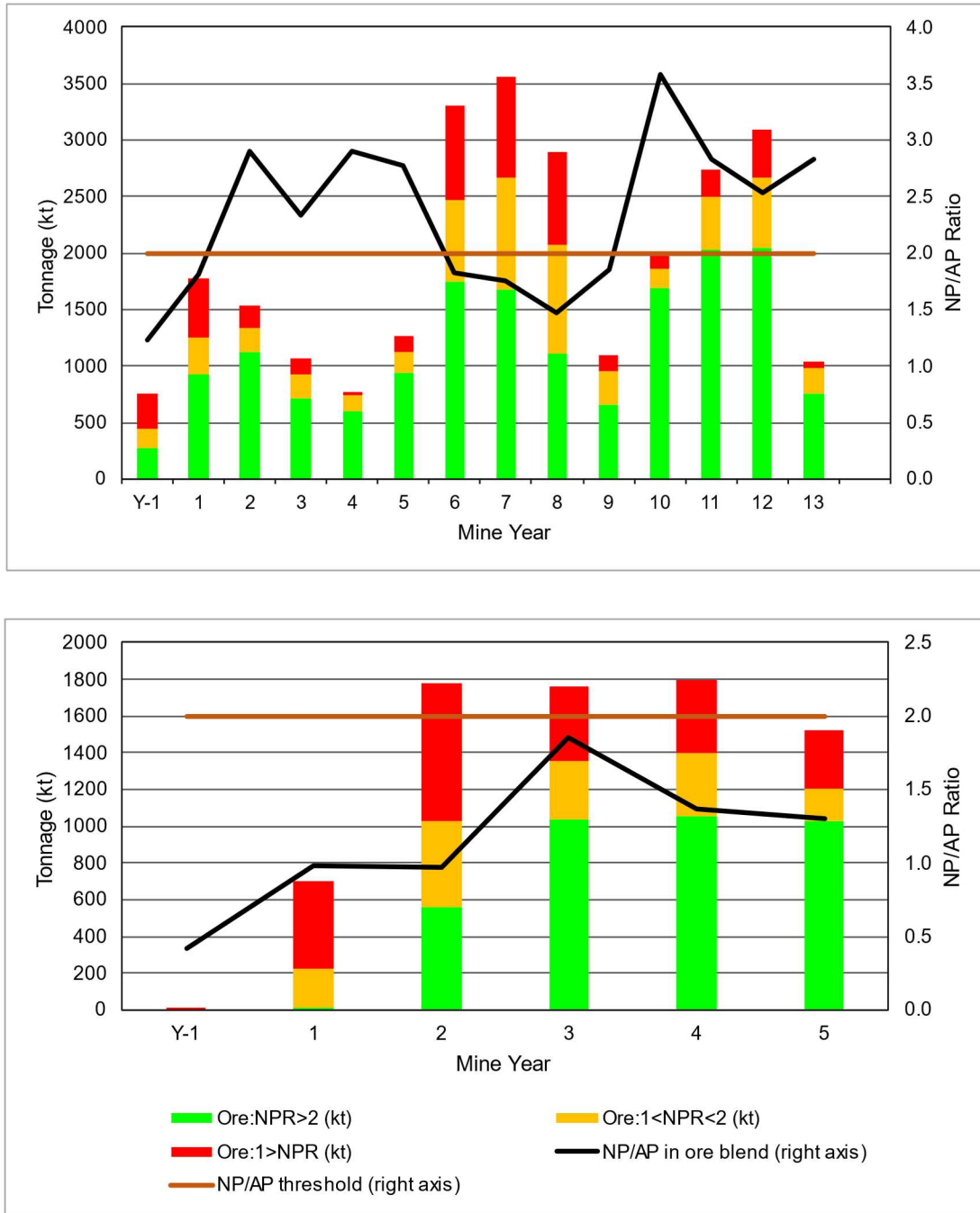


Figure 5-3 Production of ARD Ore Types at MacLellan (top) and Gordon (bottom) Sites and Predicted NPR (NP/AP ratio) of Blends

LYNN LAKE GOLD PROJECT: ACID ROCK DRAINAGE AND METAL LEACHING MANAGEMENT PLAN

Management and Mitigation Measures
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5.5 TAILINGS MANAGEMENT FACILITY

Approximately 57% of tailings will be NAG. Acid rock drainage is not expected during operation because the tailings beaches will frequently be covered with a new layer of tailings that will provide additional sources of NP. Management of ARD in the TMF will be accomplished by deposition of a final NAG layer during the last two years of operation. This upper NAG layer is expected to limit oxygen ingress, limiting long term oxidation and metal leaching from PAG tailings deposited during the early years of the Project. To verify this finding, sampling of rougher-tailings to confirm NAG-characteristics will be implemented in Year 8, after processing of the Gordon ore is complete. Rougher-tailings samples will be collected at the same frequency as end-of-pipe tailings samples for the life of mine to evaluate the geochemical characteristics and variability of the tailings.

Localized acidic conditions may develop in sections of PAG tailings after closure. Under acidic conditions, MDMER limits for Ni and Cu could be exceeded in tailings pore water. To avoid localized ARD, a confirmatory sampling program will be conducted to verify the tailings exposed at closure are NAG prior to rehabilitation of the tailings beaches. A minimum of one tailings sample will be collected every 10,000 m² (100 m x 100 m) from exposed beaches and composited over a depth interval from surface to 0.5 m, where most oxygen is consumed and where ARD may occur in PAG sections. If a PAG sample is identified, additional samples will be collected at closer spacing to identify the extent of PAG tailings and determine further mitigation measures, as described in Section 6.2.3. At closure, tailings beaches will be covered with soil and revegetated to reduce oxygen ingress and water percolation into tailings beaches. TMF cover trials will be conducted during operation to determine final cover design criteria (Stantec 2024a).

5.6 OPEN PITS

The development of the ARD block model and operational monitoring will allow development of a map of PAG materials on pit walls/benches. At closure, saturation of the majority of pit walls following flooding of open pits will reduce the extent of ARD/ML. The results of current modelling indicate that discharges from the pits and pit lakes are expected to have a near-neutral pH and not exceed MDMER limits. The model results are supported by water quality monitoring of pit lakes at the Gordon site and contact water from the MacLellan shaft. Water quality models will be updated as additional information becomes available as part of detailed engineering and permitting. Additional monitoring and mitigation will be considered if updated water quality models indicate water quality concerns or if contact water monitoring identifies ARD/ML.

5.7 CONTACT WATER

Where practicable, water management structures will be constructed to collect, divert, and release non-contact water to the environment. Collection ditches will be constructed around Project infrastructure to manage contact water. Water collected in the sumps and/or small ponds and during open pit dewatering will be pumped to water management ponds located at each site and reused where possible (e.g., mill/plant demands). Excess water will be discharged directly to the environment if the water quality meets applicable federal and provincial regulatory discharge requirements. If the water quality does not meet federal and provincial regulatory requirements, the water will be treated to meet those requirements prior to discharge.

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Management and Mitigation Measures
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Details of the sampling methods and treatment technologies to be used to test and treat contact water will be determined during detailed Project design.

In the TMF pond, MDMER limits could be exceeded for cyanide, un-ionized NH₃, Cu, and Ni during operation, but discharge to the environment from the TMF pond is not expected based on the water balance model. Foundation seepage will be controlled via partial liners and low permeability cutoffs. A downstream seepage collection system, consisting of a series of sumps in combination with a buried weeping tile or rockfill finger drain system, will be installed to capture seepage at the toe of the dam. Seepage will be pumped back to the TMF pond during operation, and water from the TMF pond will be directed to the open pit at closure until the pit is full or seepage quality is suitable for discharge (Stantec 2020b).

Contact water quality will be screened against the criteria presented in Table 3-2. If concentrations are greater than the screening criteria, additional investigations will be considered as discussed Section 6.2.

5.8 SEDIMENT POND AND WATER TREATMENT SOLIDS (SLUDGE)

Water treatment for management of dissolved constituents is not anticipated to be needed for discharges from Gordon or MacLellan sites (Stantec 2020c, 2021). Concentrations of TSS will be reduced by retention and settling in collection ponds prior to discharge of contact water to the environment. Removal of sediment/sludge from collection ponds will be conducted routinely to maintain pond capacity and characterization of material is not required. Material will be transported to the MRSA and TMF at the Gordon and MacLellan sites, respectively, for final storage. Should monitoring of contact water indicate the need for additional water treatment, a program for characterization of water treatment plant sludge will be developed, including kinetic testing if required.

6.0 ADAPTIVE MANAGEMENT

6.1 PRINCIPLES OF ADAPTIVE MANAGEMENT

Adaptive management is a planned process for responding to uncertainty or to an unanticipated or underestimated project effect. Information learned from monitoring actual project effects is applied and compared to predicted effects. Where a variance between the actual and predicted effects occurs, a determination is made as to whether modifications or other actions are necessary to revise the existing mitigation measures. As part of this commitment, we will implement technically and economically feasible mitigation measures if monitoring indicates that specified levels of environmental change have been reached or exceeded. Feasibility and implementation decisions will be made based on the circumstances and considerations at the time. The Project will identify and correct incidents with appropriate measures aimed at preventing recurrence and/or similar occurrences. The Adaptive Management Framework (Stantec 2020a), provides a formalized approach to:

- Monitor and track activities.
- Report and as needed, investigate incidents, including non-conformance and non-compliance events.
- Develop and implement corrective and preventive actions.
- Continue monitoring and update relevant plans within the EMMP.

6.2 NONCONFORMITY AND CORRECTIVE ACTION

If monitoring data indicate that specified trigger levels are exceeded, or other negative effects on the receiving environment are observed, the condition will be logged by the Environmental Monitor. Corrective action shall be undertaken to prevent, mitigate, or control environmental effects. Triggers and contingencies are outlined for the specific material types to be monitored in the following sections.

6.2.1 Construction Rock and Overburden

Rock and overburden samples identified as PAG (NPR is 2 or less) are not suitable for construction material and will be transported to the MRSA for disposal, unless materials are covered with water or materials are managed to limit ARD as part of design. Considering the relatively low percentages of PAG overburden (12% and 4.2% PAG samples from the MacLellan and Gordon, respectively), MRSAs are expected to be able to accommodate this additional PAG. In the unlikely event that the MRSAs do not have capacity to accommodate the additional PAG material, the excess PAG will be segregated and stored on a liner within the footprint of the overburden stockpile and relocated to the open pits at closure.

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Adaptive Management
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If testing of contact water quality from construction rock and overburden indicates exceedances of screening criteria outlined in Section 3.2.3, additional sampling, testing, and assessment of the source will be required. Further management and mitigation measures will be considered, such as include segregation of water flow, engineered covers, water treatment, and other options.

6.2.2 Mine Rock

Adaptive management will be triggered if mine rock deposition planning using the ARD block model indicates that excess PAG materials will be generated. Annual excess of PAG material is defined as the tonnage of PAG resulting in the blend having an NPR value of 2 or less. Mitigation options will be evaluated to store excess PAG rock in exhausted areas of the pit in the final year or two of mining or in stockpiles in temporary locations near the pit (mine rock pile or available/expanded stockpile areas). The preferred closure option is to return excess PAG to the pit for subaqueous disposal following flooding of the pit during closure. Alternative closure scenarios may be considered (such as engineered covers) during finalization and review of the closure plan prior to mine closure.

If testing of contact water quality from the MRSA indicates exceedances of screening criteria identified in Section 3.2.3, additional sampling, testing, and assessment of the source will be required, such as confirmatory sampling to verify the composition of the blended mine rock. If it is confirmed that the MRSA does not meet the blending specifications summarized in Table 5-2, the water quality model will be reviewed and updated to evaluate the potential effects. If water quality model results indicate an unacceptable risk to the receiving environment, further mitigation and management measures will be considered including segregation of problematic rock or water flow, engineered covers, water treatment, and other options.

6.2.3 Ore

Modelling of effluent water quality from ore stockpiles will be updated in 2024 to evaluate water quality compared to MDMER limits. Contact water quality from ore stockpiles will be compared to screening criteria identified in Section 3.2.3 to identify potential onset of ARD/ML. If water quality modelling or contact water analytical results indicate ARD/ML, additional sampling, testing, and assessment of the source will be required. Further mitigation and management measures will be considered, such as segregation of water flow and water treatment at the Gordon site. At MacLellan, contact water drainage from ore stockpiles will be managed as part of the process plant / TMF water cycle. The construction of domes will be evaluated as a potential mitigation option at both sites if water quality cannot be managed using alternative options. Construction of domes will also be considered if Gordon ore with total sulphur greater than 2 wt. % and NPR less than 0.5 cannot be processed within three years.

During closure, remaining ore will be processed, and the ore stockpiles will be rehabilitated. If unprocessed ore remains on surface at closure, ore will be moved to the pit or the TMF pond and will be submerged or covered (engineered cover) to limit the risk of ARD/ML generation (Stantec 2020b).

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6.2.4 Tailings and Supernatant

Tailings ARD potential will be managed by stockpiling of NAG ore for processing in the final two years of operation to generate a NAG cover for the TMF. Consequently, there are no triggers or contingencies associated with tailings sampling until NAG tailings cover generation is initiated. The following triggers and contingencies for end-of-pipe sampling include:

- A tailings sample identified as PAG will trigger an increase in sampling frequency from monthly to weekly and implementation of a tailings beach sampling program.
- A tailings beach sampling program implemented in response to a PAG end-of pipe sample will be conducted in the area where tailings deposition occurred since the most recent NAG sample result. An estimate of PAG tailings volume will be made using the production rates and total solids discharged as tailings since the most recent NAG sample result.
- An investigation will be undertaken to determine the cause of PAG tailings generation, and corrective actions will be implemented to prevent the placement of PAG tailings. For example, PAG tailings will be redirected to a portion of the TMF that will remain saturated at closure, if possible, until weekly sample results verify the generation of NAG tailings.
- The addition of a circuit to remove sulphides from the tailings, with containment of produced concentrate, will be considered if bulk tailings are expected to be PAG during the final two years of operations.

Pre-reclamation tailings beach sampling:

- If results indicate an in-situ tailings beach sample is PAG, four confirmatory samples within a radius of 100 m of the PAG sample will be collected.
- If the PAG result is confirmed, additional management and mitigation measures will be considered including but not limited to:
 - Excavation of the PAG area and disposal in the open pit or in the portion of the TMF that will remain saturated at closure.
 - Addition of NAG materials with high NP to areas with PAG tailings (e.g., tailings, liming).
 - Collection and treatment of contact water using active (during operations/closure) or passive (closure/post-closure) methods.

If the quality of tailings supernatant is substantially different from expectations, an investigation into the potential cause will be initiated. Corrective actions will be implemented if upset conditions within the process plant are identified as the source of the issue. If tailings supernatant composition cannot be addressed within the process plant, the water quality model will be reviewed and updated, and additional mitigation measures will be considered.

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MDMER limits could be exceeded in the tailings pond and TMF seepage during operation, but the water balance model predicts discharge to the environment from the pond will not occur during operation. If the water balance and water quality model indicate the potential for discharge, an evaluation of potential mitigation measures to address TMF water that exceeds MDMER discharge limits will be triggered. If the expected discharge is of a short-term nature due to accidents or a wet year, the open pit can be used as temporary storage. Increase of tailings storage and/or treatment of discharge will be considered as a long-term solution.

At closure, TMF seepage and water from the TMF pond will be directed to the MacLellan open pit until seepage quality is suitable for discharge to the environment. If the pit is full and TMF contact water is not suitable for discharge, passive water treatment will be considered for the MacLellan pit lake.

6.2.5 Open Pits

If testing of contact water quality from the pits exceeds screening criteria identified in Section 3.2.3, additional sampling, testing, and assessment of the source will be completed. Further management and mitigation measures may be required, such as changes in blasting procedure (in case of nitrogen leaching from undetonated explosives), pit water treatment (e.g., liming), and other options evaluated.

During closure, natural development of permanently stratified pit lakes is expected with more concentrated contact water entering the pit at the beginning of pit flooding and cleaner water entering the pit near the end of rehabilitation. This expectation is based on the stratification observed in East and Wendy pit lakes. If natural stratification does not occur and discharges from pit lakes are predicted to exceed screening criteria, mitigation measures such as directing contact water flows to depth, induced stratification, and/or in-pit treatment will be evaluated. Successful examples of full scale in-pit treatments of acidity, metals, and cyanide species with or without stratification are presented in Chapman et al. (2008), Fisher and Lawrence (2006), Flite and Duckett (2012), Kalin et al. (2000), Pieters et al. (2014), and Poling et al. (2003).

6.2.6 Water Treatment Solids (Sludge)

Generation of water treatment plant solids other than removal of settled TSS is not anticipated. If treatment of dissolved constituents is required, a sludge testing program will be developed to evaluate the geochemical characteristics of the sludge and the sludge geochemical stability under the conditions present in the TMF. The water quality model will be updated to assess the potential impact of sludge on receiving water quality prior to deposition of sludge in the TMF.

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Record Keeping
January 30, 2025

7.0 RECORD KEEPING

Routine record keeping will be undertaken in a structured manner and in accordance with the monitoring schedule such that the material handling of mine rock, construction materials, ore and tailings can be accurately tracked by the Mine Manager and Environmental Monitor.

7.1 MONITORING RESULTS

Field results, including the placement locations of waste material, will be recorded when taken, and internal and external laboratory test results will be transferred electronically into a database. The Environmental Monitor is responsible for maintaining the original records (e.g., field notes, raw data, laboratory certificate of analysis) and databases for monitoring components outlined herein.

7.2 INCIDENT RESPONSE RECORDS

The Environmental Monitor will log and evaluate conditions if or when the following are observed:

- Geochemical monitoring data indicates geochemical characteristics are less conservative than predicted or expected by the initial geochemical assessment.
- Geochemical monitoring data exceed specified trigger levels (see Section 6.2).
- Monitoring data and observations from the other management plans indicate effects on the receiving environment.

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Reporting
January 30, 2025

8.0 REPORTING

Results of ARD/ML management and monitoring will be reported in the Annual Report shared to the Federal and Provincial regulatory bodies, and shared with the Environmental Advisory Committee in the first quarter of each year for results obtained during the previous year. ARD/ML results that are non-compliant or deviate substantially from the predicted conditions will be reported to the Chief Inspector of Mines.

**LYNN LAKE GOLD PROJECT:
ACID ROCK DRAINAGE AND METAL LEACHING MANAGEMENT PLAN**

References
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ACID ROCK DRAINAGE AND METAL LEACHING MANAGEMENT PLAN**

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January 30, 2025

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ACID ROCK DRAINAGE AND METAL LEACHING MANAGEMENT PLAN**

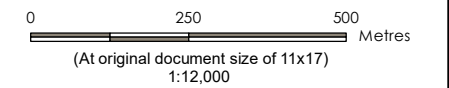
Appendix A Maps

Project Infrastructure

- Interceptor Well
- Communication Tower
- Contact Water Ditch
- Mine Site Road
- Diversion Ditch
- Discharge Pipeline
- Fresh Water Intake
- Effluent Diffuser
- Collection Pond/Sumps
- Facility
- Gen Set
- Mine Rock Storage Area
- Open Pit
- Ore Storage
- Overburden Storage
- Topsoil Storage
- Stockpile Borrow Source
- Project Development Area (PDA)

Landbase

- Existing Access Road
- Existing Diversion Channel
- Watercourse
- Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 14N
 2. Base Data Sources: Government of Manitoba and Government of Canada.
 3. NOA Project Infrastructure features provided by Worley via Alamos.

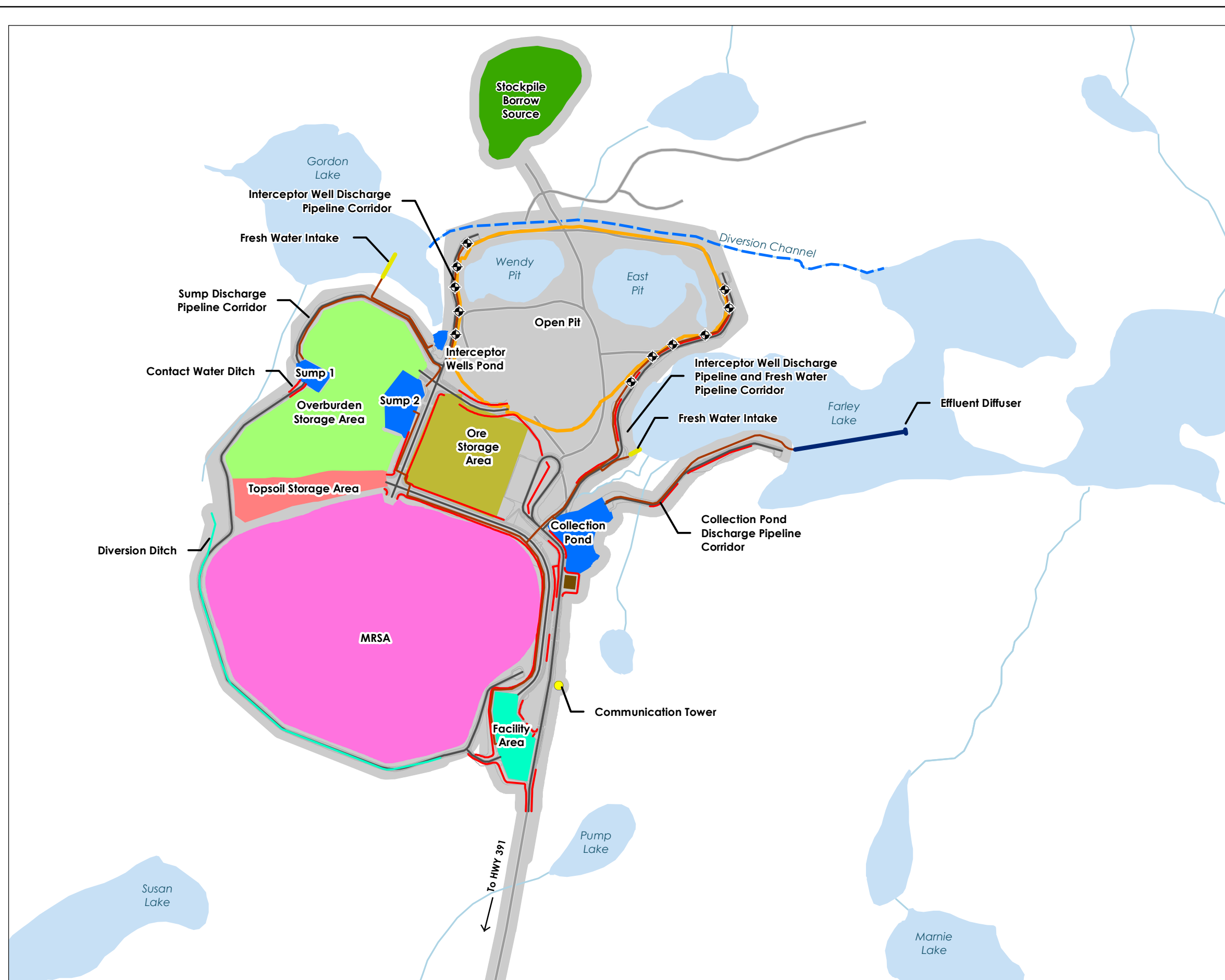
Project Location Lynn Lake, Manitoba
Prepared by ACampigotto on 2024-10-24
 Technical Review by KMathers on 2024-10-24

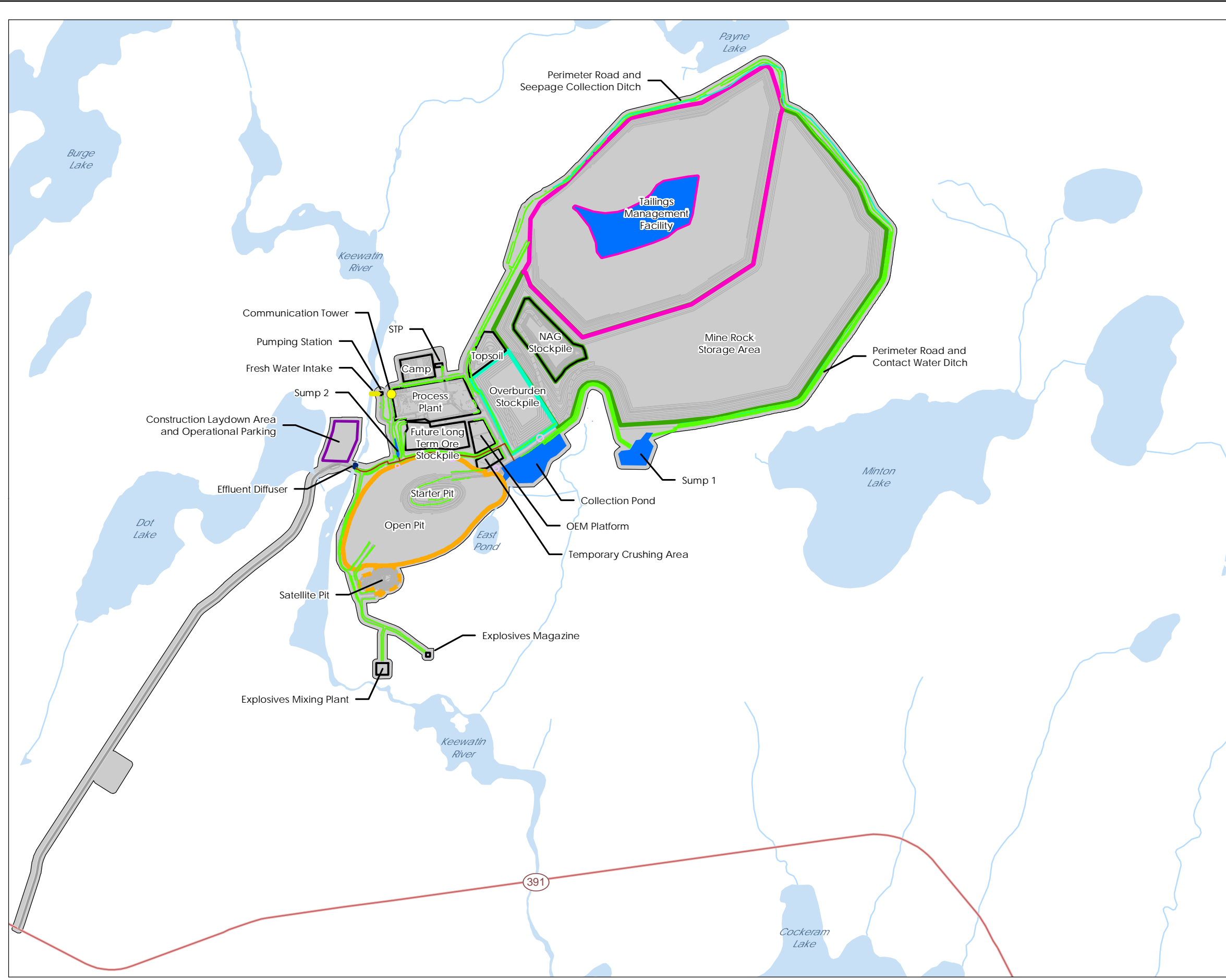
Client/Project ALAMOS GOLD INC.
 Lynn Lake Gold Project
111473076

Map No.
1-1

Title
Gordon site layout

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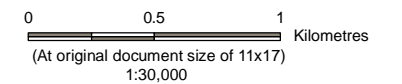


Project Infrastructure

- Communication Tower
- Culvert
- Ditching
- Corridor / Access Road
- Collection Pond Discharge
- Fresh Water Intake
- Effluent Diffuser
- Mine Rock Storage Area
- Overburden Stockpile
- Tailings Management Facility
- Open Pit
- Satellite Pit
- Collection Pond/Sumps
- Other Infrastructure
- Construction Laydown Area
- Project Development Area (PDA)

Landbase

- Highway
- Existing Access Road
- Watercourse
- Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 14N
 2. Base Data Sources: Government of Manitoba and Government of Canada.
 3. Project Infrastructure features provided by QPit and Ausenco.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-04-19
Technical Review by KMathers on 2024-04-19

Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473076

Map No.

1-2

Title

MacLellan site