
# Lynn Lake Gold Project: Surface Water Management and Monitoring Plan

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# Document History

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## Revision History

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## Approvals

This document requires the following approvals:

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# Acronyms and Abbreviations

| | |
|---|---|
| ADCP | Acoustic Doppler Current Profiler |
| ADV | Acoustic Doppler Velocimeter |
| AEMP | Aquatic Effects Monitoring Plan |
| Alamos | Alamos Gold Inc. |
| ARD/ML | Acid Rock Drainage / Metal Leaching |
| BACI | Before-After-Control-Impact |
| BC WQG-FAL | British Columbia Water Quality Guideline for the Protection of Freshwater Aquatic Life |
| Bq/L | becquerels per litre |
| CCME | Canadian Council of Ministers of the Environment |
| CDA | CDA Dam Safety Guidelines |
| CEAA 2012 | *Canadian Environmental Assessment Act, 2012* |
| CWQG-FAL | Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life |
| DFO | Fisheries and Oceans Canada |
| DOC | Dissolved organic carbon |
| ECCC | Environment and Climate Change Canada |
| EDF | Environmental Design Flood |
| EIS | Environmental Impact Statement |
| EEM | Environmental Effects Monitoring |
| EMMP | Environmental Management and Monitoring Program |
| GWMMP | Groundwater Management and Monitoring Plan |
| FDS | Federal Decision Statement |
| FEQG | Federal Environmental Quality Guideline |

| | |
|---|---|
| IAAC | Impact Assessment Agency of Canada |
| IDF | Inflow Design Flood |
| $km^2$ | square kilometres |
| L/day | litres per day |
| LAA | Local Assessment Area |
| LOM | Life of Mine |
| MAD | mean annual discharge |
| MDMER | Metal and Diamond Mine Effluent Regulation |
| MECC | Manitoba Environment and Climate Change (formerly Manitoba Environment, Climate and Parks, and formerly Manitoba Conservation and Climate) |
| mg/L | milligrams per litre |
| µg/L | Micrograms per litre |
| $Mm^3$ | Million cubic metres |
| MMER | Metal Mining Effluent Regulations |
| MRSA | Mine Rock Storage Area |
| MWQSOG | Manitoba Water Quality Standards, Objectives and Guidelines |
| N | nitrogen |
| NA | Not applicable |
| NOA | Notice of Alteration |
| NOC | Notice of Change |
| PDA | Project Development Area |
| PMF | Probable Maximum Flood |
| POPC | Parameter of Potential Concern |
| the Project | Lynn Lake Gold Project |

| | |
|---|---|
| QA/QC | Quality Assurance/Quality Control |
| RAA | Regional Assessment Area |
| RGMP | Responsible Gold Mining Principles |
| RTK | Real Time Kinematic |
| SWMMP | Surface Water Management and Monitoring Plan |
| TARP | Trigger Action Response Plan |
| TMF | Tailings Management Facility |
| TSS | total suspended solids |
| VC | valued component |
| WAD | Weak acid dissociable |

# 1.0 INTRODUCTION

The following presents the Surface Water Management and Monitoring Plan ('SWMMP' or 'the Plan'), which considers the construction, operation, and decommissioning/closure phases of the Lynn Lake Gold Project ('LLGP' or 'the Project') and the mitigation, management, and monitoring of Project-related effects to surface water quantity and quality in the lakes, rivers, and streams in the downstream receiving environment. It is one component of the overall Environmental Management and Monitoring Program ('EMMP') for the Project. 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 SWMMP is to describe the surface water management and monitoring measures that will be implemented to assess effects of Project activities against predictions described in the Project Environmental Impact Statement (EIS), address regulatory and permit requirements, and outline how monitoring results will be used to guide management, such as the implementation of additional mitigation measures. The SWMMP addresses planning, management and/or monitoring activities related to surface water during construction, operation, and decommissioning of both the Gordon and MacLellan sites. The SWMMP focuses primarily on surface water quantity and quality management. Individual activity-specific plans may be developed that are additional to this Plan described herein (e.g., for one-off activities and/or if the activity is of short duration – e.g., dewatering of the historical open pits at the Gordon site to the Hughes River [pending approval]). Monitoring requirements specified in activity-specific plans will be specific to that activity and will be in addition to that outlined in the SWMMP. Activity-specific plans will not supersede this document.

## 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.

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 SWMMP that consider key Project interactions and compliance obligations:

- Establish and/or maintain baseline monitoring locations to differentiate between natural seasonal or climatic variability in surface water quantity and quality as the Project progresses.
- Monitoring of surface water quantity in lakes, rivers, streams and wetlands to document changes in water levels and surface water flows from dewatering of historical underground workings, open pits (including the historical East and Wendy pits), operation of the interceptor wells at the Gordon site, and changes in recharge due to Project components (e.g., Mine Rock Storage Area [MRSAs] and Tailings Management Facility [TMF]).
- Monitoring of surface water quality to document the effects of changes in surface water quality associated with Project components.
- Validate the prediction of environmental effects of the Project on surface water quantity and quality as presented in the EIS (Stantec 2020a), which included the cumulative effect of mitigation measures on surface water quantity and quality.
- Maintain a surface water monitoring network sufficient to assess if a trigger, as defined in the adaptive management plan (Section 5.0), is exceeded and to assess the effectiveness of subsequent adaptive mitigation measures.
- Validate the initial Water Balance and Water Quality models reported in the EIS (Stantec 2020a) and update, if required, with new data at routine intervals throughout life of the Project.
- Maintain compliance with applicable permits and approvals.

## 1.3 RELATIONSHIP TO OTHER MANAGEMENT PLANS

The SWMMP is limited to monitoring of potential changes in surface water quantity and quality in the receiving environment downstream of the Gordon and MacLellan sites. However, the SWMMP relies on, or contributes information to, the following management and monitoring plans that contribute to the mitigation, management, or monitoring of surface water:

- Acid Rock Drainage and Metal Leaching (ARD/ML) Management and Monitoring Plan
- Aquatic Effects Monitoring Plan (AEMP)
- Blasting Management and Monitoring Plan
- Closure Plans
- Environmental Effects Monitoring (EEM) Plan
- Emergency Response and Spill Prevention and Contingency Plan
- Erosion and Sediment Control Plan
- Explosives Management Plan
- Groundwater Management and Monitoring Plan (GWMMP)

- Soil Management and Rehabilitation Plan
- Waste Management Plan

The scope of the SWMMP is limited to surface water in the aquatic receiving environment. End-of-pipe effluent quality will be monitored at the Gordon and MacLellan sites under the EEM Plan. The EEM Plan includes characterization of effluent sources as required by Schedule 5 of the MDMER. Additional monitoring for the characterization of effluent water may be required under Project permitting and will be included in the EEM Plan.

The ARD/ML Management and Monitoring Plan includes monitoring of contact water in sumps, ditches and pit lakes at the Gordon and MacLellan sites and tailings supernatant at the MacLellan site.

The GMMP includes the monitoring of subsurface water in the vicinity of the open pits, the TMF (MacLellan site only), the MRSAs, the interceptor wells (Gordon site only), the water pumped from the open pits, and the historical underground workings (MacLellan site only).

# 1.4 REGULATORY CONTEXT

The Project EIS was submitted to the Impact Assessment Agency of Canada (IAAC; formerly the Canadian Environmental Assessment Agency) pursuant to the *Canadian Environmental Assessment Act* (CEAA) *2012*, and to Manitoba Environment and Climate Change (MECC; formerly Manitoba Conservation and Climate) as an Environment Act Proposal pursuant to *The Environment Act* of Manitoba. Within the EIS, and with Project approval, federal and provincial regulatory requirements were identified. The relevant federal and provincial regulatory requirements related to surface water are outlined below.

## 1.4.1 Federal Regulatory Requirements

### *1.4.1.1 Fisheries Act*

Section 36 of the *Fisheries Act* prohibits the deposition of deleterious substances into waters frequented by fish in Canada unless authorized by regulation. The MDMER under the *Fisheries Act* regulates the deposit of deleterious mine effluents, tailings, and mine rock into waters frequented by fish, as authorized by Environment and Climate Change Canada (ECCC). The MDMER came into effect on June 1, 2018 and amends the *Metal Mining Effluent Regulations* (MMER). The MDMER defines mine effluent as:

> *"(a) hydrometallurgical facility effluent, milling facility effluent, mine water effluent, tailings impoundment area effluent, treatment pond effluent or treatment facility effluent other than effluent from a sewage treatment facility; or (b) any seepage or surface runoff containing any deleterious substance that flows over, through or out of the site of a mine."*

The MDMER applies to metal and diamond mines with an effluent flow rate of greater than 50 cubic metres per day based on effluent deposited from all final discharge points of the mine. For these mines, the MDMER allows the discharge of mine effluent containing deleterious substances listed in Schedule 4 if:

1. the effluent is not acutely lethal
2. the pH is ≥6.0, but not greater than 9.5
3. concentrations of deleterious substances do not exceed concentration limits identified in Schedule 4 of the MDMER at the final discharge point(s).

New mines are metal and diamond mines that begin commercial operations within three years of the amended MDMER coming-into-force on June 1, 2021 (i.e., mines which begin operation on or after June 1, 2018) or, in the case of a recognized closed mine, that return to commercial operation on or after June 1, 2021. The Project will be in commercial operations after June 1, 2021, and, therefore, will be subject to the more stringent effluent discharge limits for new mines (Table 1-1).

**Table 1-1 Metal and Diamond Mining Effluent Regulation (MDMER) Authorized Effluent Limits for New Mines in Canada**

| Substance | Maximum Authorized Monthly Mean Concentration (mg/L) | Maximum Authorized Concentration in a Composite Sample (mg/L) | Maximum Authorized Concentration in a Grab Sample (mg/L) |
|---|---|---|---|
| Arsenic | 0.10 | 0.15 | 0.20 |
| Copper | 0.10 | 0.15 | 0.20 |
| Cyanide | 0.50 | 0.75 | 1.00 |
| Lead | 0.08 | 0.12 | 0.16 |
| Nickel | 0.25 | 0.38 | 0.50 |
| Zinc | 0.40 | 0.60 | 0.80 |
| Unionized ammonia | 0.50 | NA | 1.00 |
| Total suspended solids | 15.00 | 22.50 | 30.00 |
| Radium 226 | 0.37 | 0.74 | 1.11 |

Notes:
All units in milligrams per litre (mg/L), except for Radium 226, which is expressed in Becquerels per litre (Bq/L), and unionized ammonia which is expressed as mg/L nitrogen (N)
NA = not applicable

Deposition of mine effluent, tailings, and mine rock into waters frequented by fish is prohibited by the *Fisheries Act* unless those waters are designated as a Mine Waste Disposal Area by the Parliament of Canada and listed in Schedule 2 of the MDMER. Amendment of Schedule 2 of the MDMER is not anticipated for the Project. This is because the TMF and MRSAs have been sited away from all fish-bearing waterbodies and watercourses.

Schedule 5 of the MDMER outlines the requirements for federal EEM for mines that discharge effluent to the receiving environment. EEM requires effluent characterization, sublethal toxicity testing, water quality monitoring, and biological studies, if the effluent concentration is ≥1% within 100 metres (m) or 250 m from the final discharge point, if the annual mean concentration of mercury in the effluent is ≥0.10 micrograms per litre (µg/L), if the total selenium concentration in the effluent is ≥10 µg/L, or if the annual mean concentration of selenium in the effluent is ≥5 µg/L.

This SWMMP focuses on monitoring surface water quality in the receiving environment. A separate EEM Plan has been developed and the EEM Study Design for the Project will be provided to federal authorities and potentially affected Indigenous Nations at least six months prior to effluent discharge at the Gordon and MacLellan sites. This EEM Study Design will be prepared to meet requirements in Schedule 5 of the MDMER as guided by the Metal Mining Technical Guidance for Environmental Effects Monitoring (EC 2012).

#### 1.4.1.2 Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life

The Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL) are established by the Canadian Council of Ministers of the Environment (CCME; CCME 2020) and are regularly updated to incorporate current guideline derivation approaches and toxicological data. The CWQG-FAL are intended to be protective of all forms of aquatic life and all aspects of the aquatic life cycle due to acute (i.e., short term) and/or chronic (i.e., long-term) exposure. These guidelines will be used, in conjunction with the most stringent of the Tier I, II, and III Manitoba Water Quality Standards, Objectives, and Guidelines (MWQSOG) for the protection of aquatic life (MWQSOG-FAL; MWS 2011), and/or Federal Environmental Quality Guidelines (see Section 1.4.1.3 below) to identify parameters of potential concern (POPCs) during surface water quality monitoring and to provide benchmarks for adaptive management of effects to surface water quality, as appropriate.

#### 1.4.1.3 Federal Environmental Quality Guidelines

Federal Environmental Quality Guidelines (FEQG) are recommended chemical thresholds in sediment and surface water below which there is a low likelihood of direct adverse effects from the chemical on aquatic life. FEQGs are developed by ECCC and are based on known toxicological effects on the growth, reproduction, or survival of aquatic organisms. FEQGs are developed by ECCC for chemical contaminants that either currently do not have a CWQG-FAL or for which more recent science is available than previously used to develop a CWQG-FAL but is unlikely to be used to update the CWQG-FAL in the reasonably foreseeable future by the CCME.

#### 1.4.1.4 Framework for Assessing Ecological Flow Requirements to Support Fisheries in Canada

The *Framework for Assessing Ecological Flow Requirements to Support Fisheries in Canada* (DFO 2013) provides guidance on the management of flows required to maintain the ecological functions that sustain fisheries in streams and rivers potentially affected by water withdrawals or diversions. The guidance promotes the maintenance of natural flow regimes to sustain riverine ecosystems, with the understanding that the probability of degrading riverine ecosystems increases with increasing alteration of the natural flow regime. To manage this risk in Canadian rivers and streams, the Framework (DFO 2013) recommends:

- Cumulative flow alterations less than 10% in amplitude of the actual “instantaneous” flow in the river relative to a “natural flow regime” have a low probability of detectable effects to ecosystems that support fish habitat. Such projects can be assessed with “desk-top” methods.
- Cumulative flow alterations that result in instantaneous flows less than 30% of the mean annual discharge (MAD) have a heightened risk of impacts to fisheries.
- For cumulative flow alterations greater than 10% of instantaneous discharge or that results in flows less than 30% of MAD, a more rigorous level of assessment is recommended to evaluate potential impacts on ecosystem functions which support fisheries.
- If the "natural flow regime” must be calculated with hydrologic modelling, it is recommended that data with the finest available time scale be used.
- Floor values or “cut-off limits” should be part of the overall prescription to conserve and protect fisheries and should not be considered only during low flow events.
- Given the inherent uncertainty in many ecological flow setting methods, the use of adaptive management based on long-term and follow-up monitoring, with multiple control locations, is recommended.

### 1.4.2 Provincial Regulatory Requirements

#### *1.4.2.1 The Environment Act*

Alterations to stream channels that affect fish mobility and/or fish habitat and works resulting in modifications to lake or river levels for a water surface area greater than 2 square kilometres ($km^2$) are considered Class 2 developments under section 3(9) of the Classes of Development Regulations pursuant to The *Environment Act* of Manitoba. Consequently, any proposed alteration to streams in Manitoba is subject to provincial assessment and licensing requirements.

#### *1.4.2.2 The Manitoba Mines and Minerals Act*

The *Mines and Minerals Act* requires that water removed from the workings under a mine lease be disposed of in a safe and secure manner. Regulation 67/99 of the Act stipulates requirements for restoration of watercourses during mine closure.

### *1.4.2.3 The Water Rights Act*

The *Water Rights Act* provides protection of domestic water users, the general public, and the environment with respect the use, extraction, or diversion of groundwater or surface water from Manitoba's lakes and streams. Licenses are issued for proponents wishing to extract or divert more than 25,000 litres per day (L/day) for municipal, agricultural, irrigation, or industrial purposes.

### *1.4.2.4 The Water Protection Act*

*The Water Protection Act* provides protection and stewardship of Manitoba's water resources and aquatic ecosystems. Part 2 of the Act allows for setting and adoption of Manitoba Water Quality Standards, Objectives, and Guidelines (MWQSOG; MWS 2011) and requires consideration of relevant MWQSOG for approvals or decisions issued under The *Environment Act* of Manitoba or other relevant acts or regulations.

### 1.4.2.5 Manitoba Water Quality Standards, Objectives, and Guidelines

MWQSOG for the protection of aquatic life (MWQSOG-FAL; MWS 2011) include Tier I (Standards), II (Objectives), and III (Guidelines) that, when followed, protect drinking water, water for livestock, and fish and aquatic biota from short-term and long-term effects of water quality deterioration. The MWQSOG identify the minimum standards for water quality and include:

- Tier I standards describe minimum technology-based standards for industrial and municipal wastewater and other effluents.
- Tier II water quality objectives are defined for a limited number of common pollutants, including dissolved metals, and are based on a water quality-based approach when additional restrictions need to be developed to protect important uses of groundwater and surface water beyond those defined in Tier I standards. Tier II objectives for metals typically are for one maximum four-day period every three years during periods of infrequent or extreme low streamflow to avoid aquatic communities being in continual recovery.
- Tier III water quality guidelines include federal water quality, sediment quality, and fish tissue guidelines for the protection of freshwater aquatic life, wildlife consumers, and human consumers of fish or other aquatic life tissues. They also include narrative water quality guidelines for those parameters for which numerical guidelines cannot be reasonably developed. Tier III guidelines, including those for total metals, are used to evaluate ambient water quality data in relation to the protection of freshwater aquatic life and human uses, including drinking water, irrigation, and recreation.

### 1.4.3 Other Provincial Water Quality Guidelines

During its review of the EIS and Notice of Alteration, ECCC indicated that Alamos should use guidelines from other provinces for parameters where there is no federal or Manitoba water quality guidelines for the protection of freshwater aquatic life. To meet this requirement, Alamos has incorporated the British Columbia Water Quality Guidelines for the Protection of Freshwater Aquatic Life (BC WQG-FAL) for the following parameters:

- Sulphate
- Cyanide (weak acid dissociable; WAD)
- Total antimony
- Total barium
- Total beryllium.

### 1.4.4 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 has a series of guiding corporate sustainability standards, including:

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

These policies are described in Table 1-2.

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 1-2 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 and 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 any 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. |
| 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:<br>• Health and Safety of our workforce and communities,<br>• Environmental impacts of our activities (local and downstream),<br>• Societal and community impacts, and<br>• Security and protection of people and property. |

| Corporate Policy | Requirement |
|---|---|
| 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.<br>Assessments shall consider all site activities including:<br>• Contractor works,<br>• Regulatory requirements<br>• Permit or licence requirements,<br>• Alamos Sustainability Standards requirements, and<br>• 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.<br>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):<br>1. Elimination – remove the hazard<br>2. Substitution – replace the hazard<br>3. Engineering control – physically control or isolate the hazard (e.g., dikes, guarding, interlocks)<br>4. Administrative control – control response/avoidance of hazard (e.g., training, procedures, reducing employee exposure to hazards, signage)<br>5. PPE (personal protective equipment) or mitigation – protect people (PPE) or the environment (spill kits) from the hazard. This is the last line of defense.<br>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. |

| 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:<br>• Alamos Executive and Management,<br>• Country Managers,<br>• General Managers; and<br>• 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 that thresholds are consistent with the Alamos Enterprise Risk Management system. |

### 1.4.5 Approval-Related Requirements

The conditions relating to surface water, including annual reporting requirements, laid out in the federal Decision Statement issued under CEAA 2012, provincial Environment Act Licence No. 3390 (Gordon), and provincial Environment Act Licence No. 3391 (MacLellan) are outlined in Table 1-3. While there is some overlap in conditions between surface water quantity and quality, groundwater quantity and quality, and fish and aquatic resources, Table 1-3 does not include all the conditions relating to these components; those conditions are included in the AEMP, Fish Habitat Offsetting Plan, GMMP, and ML/ARD Management Plan.

## Table 1-3 Approval Related Requirements

| Licence | Condition | Corresponding SWMMP Section |
|---|---|---|
| CEAA, 2012 | 2.1 The Proponent shall ensure that its actions, in meeting the conditions set out in this Decision Statement during all phases of the Designated Project, are considered in a careful and precautionary manner, promote sustainable development, are informed by the best information and knowledge available at the time the Proponent takes action, including policies, guidelines and directives and community and Indigenous knowledge, are based on methods and models that are recognized by standard-setting bodies, are undertaken by qualified individuals, and have applied the best available economically and technically feasible technologies. | All |
| CEAA, 2012 | 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:<br>2.5.1 the methodology, location, frequency, timing, and duration of monitoring associated with the follow-up program;<br>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;<br>2.5.3 the minimum frequency at which the follow-up program must be reviewed and, if necessary, updated;<br>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;<br>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<br>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. | 5.1, 5.2, 6.1, 6.2, 8.1, 8.2 |
| CEAA, 2012 | 2.6 The Proponent shall update the information determined for each follow-up program pursuant to condition 2.5 during the implementation of each follow-up program, at the minimum frequency determined pursuant to condition 2.5.3 and in consultation with Indigenous groups and any other parties being consulted during the development of each follow-up program. | 4.1, 4.2, 6.1, 6.2 |

| Licence | Condition | Corresponding SWMMP Section |
|---|---|---|
| CEAA, 2012 | 2.7 The Proponent shall provide details of the follow-up programs referred to in conditions 3.12, 3.13, 3.14, 3.15, 4.5, 4.6, 6.3, 6.4, 6.5, 9.3, 10.5 and 12.2, including the information determined for each follow-up program pursuant to condition 2.5, to the Agency and to Indigenous groups and any other parties being consulted during the development of each follow-up program prior to the implementation of each follow-up program. The Proponent shall also provide any update made pursuant to condition 2.6 to the Agency and to Indigenous groups and any other parties being consulted during the development of each follow-up program within 30 days of the follow-up program being updated. | All |
| CEAA, 2012 | 2.8 The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement:<br>2.8.1 implement the follow-up program according to the information determined pursuant to condition 2.5;<br>2.8.2 conduct monitoring and analysis to verify the accuracy of the environmental assessment as it pertains to the particular condition and/or to determine the effectiveness of any mitigation measure;<br>2.8.3 determine whether modified or additional mitigation measure(s) are required based on the monitoring and analysis undertaken pursuant to condition 2.8.2;<br>2.8.4 if modified or additional mitigation measure(s) are required pursuant to condition 2.8.3, develop and implement these mitigation measure(s) as soon as feasible and monitor them pursuant to condition 2.8.2. The Proponent shall notify the Agency in writing within 48 hours of any modified or additional mitigation measure being implemented. If the Proponent implements any additional or modified mitigation measure not previously submitted to the Agency pursuant to condition 2.5, the Proponent shall submit a detailed description of the measure(s) to the Agency within 7 days of their implementation; and<br>2.8.5 report all results of the follow-up program to the Agency no later than March 31 following each reporting year during which the follow-up program is implemented and, subject to information determined pursuant to 2.5.2, to the parties being consulted during the development of the follow-up program. | 8.1, 8.2, 9.0 |
| CEAA, 2012 | 2.9 Where consultation with Indigenous groups is a requirement of a follow-up program, the Proponent shall discuss the follow-up program with each group and shall determine, in consultation with each group, opportunities for their participation in the implementation of the follow-up program, including the conduct of monitoring, the analysis and reporting of follow-up results and the determination of whether modified or additional mitigation measure(s) are required, as set out in condition 2.8, and opportunities for training to support participation in monitoring. The Proponent shall permit the participation of any interested Indigenous group in the identified follow-up program and training. | 7.0 |

| Licence | Condition | Corresponding SWMMP Section |
|---|---|---|
| CEAA, 2012 | 2.10 The Proponent shall prepare an annual report for each reporting year that sets out:<br>2.10.1 the activities undertaken by the Proponent to comply with each of the conditions set out in this Decision Statement;<br>2.10.2 how the Proponent complied with condition 2.1;<br>2.10.3 for conditions set out in this Decision Statement for which consultation is a requirement, how the Proponent considered any views and information that the Proponent received during or as a result of the consultation, and the resources provided to support their participation in consultation activities;<br>2.10.4 the information referred to in conditions 2.5 and 2.8 for each follow-up program;<br>2.10.5 a summary of the available results of the follow-up program requirements identified in conditions 3.12, 3.13, 3.14, 3.15, 4.5, 4.6, 6.3, 6.4, 6.5, 9.3, 10.5 and 12.2;<br>2.10.6 for any plan that is a requirement of a condition set out in this Decision Statement, any update(s) to the plan that have been made during the reporting year; and<br>2.10.7 any modified or additional mitigation measure implemented or proposed to be implemented by the Proponent, as determined pursuant to condition 2.8. | 9.0 |
| CEAA, 2012 | 2.11 The Proponent shall submit to the Agency the annual report referred to in condition 2.10, including a plain language executive summary in both official languages, no later than March 31 following the reporting year to which the annual report applies. | 9.0 |
| CEAA, 2012 | 2.12 The first reporting year for which the Proponent shall prepare an annual report pursuant to condition 2.10 shall start on the day the Minister of the Environment issues the Decision Statement pursuant to subsection 54 (1) of the Canadian Environmental Assessment Act, 2012. | 9.0 |
| CEAA, 2012 | 2.13 The Proponent shall publish on the Internet, or any medium which is publicly available, the annual reports and the executive summaries referred to in conditions 2.10 and 2.11, the reports related to accidents and malfunctions referred to in conditions 12.6.4 and 12.6.5, the accident and malfunction communication plan referred to in condition 12.7, the schedules referred to in conditions 13.1 and 13.2, and any update or revision to the above documents, upon submission of these documents to the parties consulted in the respective conditions. The Proponent shall keep these documents publicly available for 25 years following the end of operation, or until the end of decommissioning of the Designated Project, whichever comes first. The Proponent shall notify the Agency and Indigenous groups in writing of the availability of these documents within 48 hours of their publication. | N/A |
| CEAA, 2012 | 3.4 The Proponent shall develop, prior to construction and in consultation with relevant authorities, and implement and maintain, during all phases of the Designated Project, measures to mitigate any potential effects to water levels in Farley Lake and Gordon Lake due to groundwater drawdown resulting from Designated Project activities. In doing so, the Proponent shall intercept and/or redirect groundwater flowing towards the open pits with wells and/or other mitigation measures, as applicable, before it enters the open pits. The Proponent shall submit these measures to the Agency before implementing them. | 4.1 |

| Licence | Condition | Corresponding SWMMP Section |
|---|---|---|
| CEAA, 2012 | 3.5 The Proponent shall, when releasing any collected water into Farley Lake and Gordon Lake, including groundwater intercepted pursuant to condition 3.4 and water from dewatering the East and Wendy pit lakes:<br>3.5.1 aerate, or treat by other means, water collected from the East and Wendy pit lakes, prior to release into Farley Lake and Gordon Lake, in accordance with condition 3.7, to precipitate oxides, increase dissolved oxygen concentrations, and prevent chemical stratification; and<br>3.5.2 release collected water into Farley Lake and Gordon Lake in a manner that maintains the lake temperature at the point of release within baseline temperature variations to protect fish and fish habitat, unless otherwise authorized by Fisheries and Oceans Canada. | 6.1 |
| CEAA, 2012 | 3.6 The Proponent shall adjust, during construction, the rate of release of water into Farley Lake and Gordon Lake from dewatering the East and Wendy pit lakes and from groundwater intercepted pursuant to condition 3.4 in order to maintain lake levels within the range of natural variability predicted in Volume 2 Chapter 10 of the Environmental Impact Statement and Appendix A Attachment IAAC-48 of the Proponent's Information Request Responses Round 1, Package 1 (Canadian Impact Assessment Registry Reference Number 80140, document #54). | 4.1 |
| CEAA, 2012 | 3.7 The Proponent shall collect contact water and seepage from the Project development areas, including seepage and recharge from the tailings management facility (TMF), mine rock storage areas (MRSA), 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 Metal and Diamond Mining Effluent Regulations and the pollution prevention provisions of the *Fisheries Act*. When treating contact water and seepage, the Proponent shall take into account Manitoba's Water Quality Standards, Objectives, and Guidelines, the Canadian Council of Ministers of the Environment's Canadian Water Quality Guidelines of the Protection for Aquatic Life, and Environment and Climate Change Canada's Federal Environmental Quality Guidelines. | 3.2 |
| CEAA, 2012 | 3.11 The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, and implement and maintain during all phases of the Designated Project, measures to control erosion and sedimentation within the Project development areas in a manner consistent with the *Fisheries Act* and its regulations, and taking into account ECCC's Environmental Code of Practice for Metal Mines, and Fisheries and Oceans Canada's Measures to Protect Fish and Fish Habitat. The Proponent shall submit these measures to the Agency before implementing them. As part of these measures, the Proponent shall:<br>3.11.1 install intake pipes pointing upwards and away from sediment; and<br>3.11.2 equip contact water discharge pipes with diffusers. | 4.1, 4.2 |

| Licence | Condition | Corresponding SWMMP Section |
|---|---|---|
| CEAA, 2012 | 3.12 The Proponent shall develop, prior to construction and in consultation with Indigenous groups, Fisheries and Oceans Canada, Environment and Climate Change Canada and any other relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and determine the effectiveness of the mitigation measures as they pertain to adverse environmental effects of the Designated Project on water quality, taking into account ECCC's Metal Mine Technical Guidance for Environmental Effects Monitoring. The Proponent shall implement the follow-up program during all phases of the Designated Project. As part of the follow-up program, the Proponent shall:<br>3.12.1 determine, in consultation with Indigenous groups, Environment and Climate Change Canada, and any other relevant authorities, the location and extent of mixing zones in water bodies that may be affected by the Designated Project;<br>3.12.2 monitor water quality in the East and Wendy pit lakes, newly formed pit lakes, tailings management facility, mine rock storage areas, contact water collection ponds, and receiving water bodies and watercourses upstream and downstream of the Project development areas, including at the edge and downstream of the edge of mixing zones identified pursuant to condition 3.12.1, Arbor Lake, Burge Lake, Cockeram Lake, Ellystan Lake, Farley Creek, Farley Lake, Gordon Lake, the Hughes River, the Keewatin River, the unnamed tributary of the Keewatin River, Minton Lake, Payne Lake, Susan Lake and Swede Lake, for all contaminants that may have adverse effects on fish and fish habitat, including aluminum, antimony, arsenic, calcium, copper, cyanide, fluoride, hexavalent chromium, iron, magnesium, methylmercury, phosphorus, selenium, and total and dissolved cadmium. Monitoring shall be conducted as follows:<br>3.12.2.1 beginning during construction and continuing through decommissioning, except in the East and Wendy pit lakes, and the newly formed pit lakes; and<br>3.12.2.2 beginning during construction in the East and Wendy pit lakes, and beginning during decommissioning and continuing through post-closure in the newly formed pit lakes, until water quality is stable and improving and any contact water or seepage potentially released meets the Canadian Council of Ministers of the Environment's Canadian Water Quality Guidelines of the Protection for Aquatic Life and Manitoba's Water Quality, Standards, Objectives, and Guidelines pursuant to condition 3.7;<br>3.12.3 monitor, beginning during construction, water quality in groundwater near the open pits, Farley Lake, Gordon Lake, the Keewatin River, the unnamed tributary of the Keewatin River, Minton Lake, the unnamed lakes northeast of Minton Lake, Payne Lake, Pump Lake and Susan Lake, up and down gradient from the tailings management facility, mine rock storage areas, ore and overburden stockpiles, and seepage collection systems. Monitoring shall be conducted for all contaminants that may have adverse effects on fish and fish habitat, including antimony, arsenic, iron, sodium, sulphate, and uranium at the Gordon site and aluminum, antimony, arsenic, cobalt, total cyanide, iron, lead, nitrate, nitrite, sodium, and sulphate at the MacLellan site; | 6.0, 7.0 |

| Licence | Condition | Corresponding SWMMP Section |
|---|---|---|
| | 3.12.4 monitor, during construction and operation, total suspended solids and turbidity in fish-bearing water bodies where Designated Project activities are undertaken in or near water frequented by fish; and<br>3.12.5 develop, in consultation with relevant authorities, and implement modified or additional mitigation measures, if the results of monitoring conducted pursuant to condition 3.12.2, 3.12.3 and 3.12.4 demonstrate any unanticipated effects attributable to the Designated Project, taking into account the Canadian Council of Ministers of the Environment's Canadian Water Quality Guidelines of the Protection for Aquatic Life or Manitoba's Water Quality Standards, Objectives, and Guidelines, whichever is most protective of fish and fish habitat, and predicted concentrations identified in Volume 1 Chapter 9 of the Environmental Impact Statement. | |
| CEAA, 2012 | 3.13 The Proponent shall develop, prior to construction and in consultation with Indigenous groups, Fisheries and Oceans Canada, Environment and Climate Change Canada and any other relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and determine the effectiveness of the mitigation measures as they pertain to adverse environmental effects of the Designated Project on water quantity. The Proponent shall implement the follow-up program during all phases of the Designated Project. As part of the follow-up program, the Proponent shall:<br>3.13.1 monitor, during all phases of the Designated Project, surface water instantaneous flows, lake levels and pH levels within Arbor Lake, Burge Lake, Cockeram Lake, Ellystan Lake, Farley Creek, Farley Lake, Gordon Lake, the Keewatin River, the unnamed tributary of the Keewatin River, Minton Lake, Payne Lake, Susan Lake, Swede Lake, fish-bearing wetlands within the local assessment areas, the East and Wendy pit lakes, newly formed pit lakes, the tailings management facility, and contact water collection ponds to verify the environmental assessment predictions identified in Volume 2 Chapter 10 of the Environmental Impact Statement and Appendix A Attachment IAAC-48 of the Proponent's IR Responses Round 1, Package 1 (Canadian Impact Assessment Registry Reference Number 80140, document #54);<br>3.13.2 monitor, during all phases of the Designated Project, groundwater levels, gradients and hydraulic conductivity of all hydrogeological units, as identified in the groundwater model in Volume 5 Appendix F and G of the Environmental Impact Statement, with well depths ranging from near surface to a minimum of 115 meters below ground to characterize contaminant transport via groundwater at the depth of the groundwater model for the Designated Project. Monitoring wells shall be installed near the open pits, the tailings management facility, mine rock storage areas, ore and overburden stockpiles, and fish-bearing wetlands within the local assessment areas that intersect with the Project development areas; and<br>3.13.3 develop, in consultation with relevant authorities, and implement modified or additional mitigation measures, if the results of monitoring conducted pursuant to condition 3.13.1 and 3.13.2 demonstrate unanticipated effects attributable to the Designated Project. | 4.0, 5.0, 6.0, 7.0 |

| Licence | Condition | Corresponding SWMMP Section |
|---|---|---|
| Environment Act Licence No. 3390 (Gordon) | Respecting the Environmental Management and Monitoring Plans<br>19. The licensee shall, prior to operation of the development:<br>a) prepare and submit to the director for approval, the following comprehensive environmental management plans:<br>i) Surface Water Monitoring and Management Plan… and<br>b) implement the environmental management plans in accordance with the Director of the Environmental Approvals Branch's approval. | All |

| Licence | Condition | Corresponding SWMMP Section |
|---|---|---|
| Environment Act Licence No. 3390 (Gordon) | Respecting the Site Water Management Pond<br>49. The licensee shall maintain a containment liner within the site water management pond at all times.<br>50. The licensee shall direct all collected contact water, including seepage and runoff from stockpiles to the water management pond.<br>51. The licensee shall not release any effluent from the site water management pond into the environment:<br>a) other than through the final discharge point of the water management pond;<br>b) if the effluent is acutely lethal to fish, as defined in clause 14 of the MDMER;<br>c) if the quality of the effluent is in non-compliance with the water quality criteria set out in Schedule 4, Table 1, of the MDMER;<br>d) where the quality of the effluent is having an adverse impact on or is likely to result in, a downstream degradation of the water quality relative to the Manitoba Water Quality Standards, Objectives, and Guidelines, unless otherwise authorized; and<br>e) when such a discharge would cause or contribute to flooding in or along the effluent drainage route.<br>52. The licensee shall take such corrective action and within such a time frame as is satisfactory to the director, to mitigate any seepage losses from the site water management pond, where such seepage losses and their quality are determined by the director to be unacceptable. | 3.0, 4.1, 4.2, 7.1 |
| Environment Act Licence No. 3390 (Gordon) | Respecting Annual Monitoring<br>57. The licensee shall during each year maintain the following records:<br>a) the monthly average and peak hauling rates (expressed as tonnes/day) at the development;<br>b) the total volume (expressed as cubic metres) of water used within the development;<br>c) the monthly average and total volume (expressed as cubic metres) of mine water discharged from the site water management pond;<br>d) the total volume of ore (expressed as tonnes/day) mined from the development;<br>e) the total volumes of mine rock (expressed as tonnes) stored on site at the development;<br>f) the complaints received as part of the complaint reporting in clause 13 of this licence;<br>g) equipment maintenance and repairs; and<br>h) other reporting as requested by the director.<br>58. The licensee shall submit an annual report to the environment officer by February 28 of the following year including all records required by clause 57 of this licence. | 9.0 |

| Licence | Condition | Corresponding SWMMP Section |
|---|---|---|
| Environment Act Licence No. 3391 (MacLellan) | Respecting the Environmental Management and Monitoring Plans<br>19. The licensee shall, prior to operation of the development:<br>a) prepare and submit to the director for approval, the following comprehensive environmental management plans:<br>i) Surface Water Monitoring and Management Plan…<br>b) implement the environmental management plans in accordance with the Director of the Environmental Approvals Branch's approval; and<br>c) prepare air pollution control device manuals in accordance with clause 52 of this licence. | All |
| Environment Act Licence No. 3391 (MacLellan) | Respecting Annual Monitoring<br>78. The licensee shall during each year maintain the following records:<br>a) the total volume (expressed as cubic metres) of wastewater pumped to the Tailings Management Area;<br>b) the wastewater sample dates from the wastewater treatment plant;<br>c) the original copies of laboratory analytical results of the sampled wastewater from the wastewater treatment plant and site water management pond;<br>d) the monthly average and peak milling production rates (expressed as tonnes/day) at the development;<br>e) the total volume (expressed as cubic metres) of process water recycled within the development;<br>f) the total volume of ore (expressed as tonnes/day) mined from the development;<br>g) the total volumes of mine rock (expressed as tonnes) stored on site at the development;<br>h) the updated organization charts identifying all certified wastewater treatment plant operators, including backup operators;<br>i) equipment maintenance and repairs; and<br>j) other reporting as requested by the director.<br>79. The licensee shall submit an annual report to the environment officer by February 28 of the following year including all records required by clause 78 of this licence. | 9.0 |

# 2.0 ENVIRONMENTAL SETTING

Three spatial scales were used to characterize the environmental setting and to assess potential effects of the Project on surface water: a Project Development Area (PDA); a Local Assessment Area (LAA); and a Regional Assessment Area (RAA). The PDAs and LAAs encompass the anticipated areas of direct physical disturbance to streams, lakes, and fish bearing wetlands due to the Project, and the RAA supports the assessment of cumulative effects. The setting for each of these are described below.

## 2.1 GORDON SITE

The Gordon site PDA (Appendix A, Map 2-1) includes the two existing open pits (Wendy Pit and East Pit) and an existing diversion channel between Gordon and Farley lakes. Mine infrastructure within the PDA includes a new, larger open pit that will encompass the existing Wendy and East pits, a MRSA, an ore storage area, an overburden storage area, a topsoil storage area, a facility area, a stockpile barrow source, a communication tower, and water management infrastructure (i.e., sumps, diversion ditches, contact water ditches, collection pond, groundwater interceptor wells, ponds, and discharge pipelines, a water intake, and an effluent discharge pipeline and diffuser).

The PDA abuts Gordon Lake and Farley Lake, two fish-bearing headwater lakes in the Ellystan Lake watershed. Except for the access road, the Gordon site is located entirely within the Farley Lake watershed. The PDA at the Gordon site is approximately 5 $km^2$.

The Gordon site LAA (inclusive of the PDA) includes lakes, streams, and fish-bearing wetlands in the Ellystan Lake watershed, a sub-watershed of the Hughes River system (Table 2-1) (Appendix A, Map 2-2). It also includes Susan Lake, a headwater lake in the Hughes River watershed that may be affected by changes in groundwater quantity or quality. The LAA extends to the outlet of Ellystan Lake at its confluence with the Hughes River. The LAA at the Gordon site is approximately 47.5 $km^2$.

The RAA is the same for the Gordon and MacLellan sites and includes the drainage area that encompasses the Gordon PDA, Gordon LAA, MacLellan PDA and LAA (see Section 2.2), plus the streams and lakes that drain these areas to the common downstream confluence of run-off from the Gordon LAA and the MacLellan LAA at Granville Lake (Appendix A, Map 2-3). It also includes lakes, streams, and fish-bearing wetlands in the Keewatin River watershed upstream of the PDAs and LAAs to provide regional context for the lakes and streams within the two LAAs. The RAA is used to capture potential “control” sites for comparison to “impact” sites. The RAA is approximately 9,929 $km^2$.

## Table 2-1 Waterbodies and Watercourses in the Local Assessment Area at the Gordon Site

| Waterbody / Watercourse | Description |
|---|---|
| Gordon Lake and its inlet tributaries | • Fish-bearing lake located adjacent to Wendy pit and downslope from overburden stockpile, topsoil stockpile, and MRSA<br>• Lake receiving groundwater from interceptor wells installed west of the new open pit |
| Diversion Channel | • Human-made channel draining Gordon Lake to Farley Lake. |
| Farley Lake and its inlet tributaries | • Fish-bearing lake located adjacent to East pit and downslope from ore storage stockpile, facility area, and MRSA.<br>• Lake receiving contact water<br>• Lake receiving groundwater from interceptor wells installed east of the new open pit.<br>• Lake receiving mine outflow at post-closure. |
| Farley Creek | • Fish-bearing stream draining Farley Lake to Swede Lake.<br>• Potential changes in water quality and quantity due to mine construction, operation, and closure. |
| Marie Lake and its outlet | • Fish-bearing lake potentially affected by changes in groundwater quantity and quality |
| Marnie Lake and its outlet | • Fish-bearing lake potentially affected by changes in groundwater quantity and quality |
| Pump Lake and its outlet | • Non-fish-bearing lake located closest to MRSA.<br>• Potentially affected by changes in groundwater quality or quantity. |
| Simpson Lake | • Fish-bearing lake downstream of Pump Lake.<br>• Potential changes in water quality due to changes to Pump Lake water quality. |
| Swede Lake and its outlet | • Fish-bearing lake immediately downstream of Farley Lake.<br>• Potential changes in water quality and quantity due to mine construction, operation, and closure. |
| Ellystan Lake and its outlet | • Fish-bearing lake downstream of Swede Lake that drains to Hughes River.<br>• Potential changes in water quality and quantity due to mine construction, operation, and closure. |
| Susan Lake | • Fish-bearing lake located in watershed adjacent to MRSA.<br>• Potentially affected by changes in groundwater quality or quantity. |

## 2.2 MACLELLAN SITE

Mine infrastructure within the MacLellan PDA (Appendix A, Map 2-4) includes a new, open pit, a TMF, a MRSA, a perimeter road and contact water collection ditch, an overburden storage area, a topsoil storage area, a processing plant, a temporary crushing area, a worker's camp, a communication tower, an explosives magazine, an explosives mixing plant, a construction lay-down area and operation parking area, and water management infrastructure (i.e., sumps, diversion ditches, contact water ditches, collection pond, a freshwater pumping station and intake, and an effluent discharge pipeline and diffuser).

The MacLellan PDA is adjacent to East Pond and its outlet stream to the Keewatin River, Dot Lake and its outlet stream to the Keewatin River, and the Keewatin River at the existing mine access road crossing. It also includes the Keewatin River at the proposed water intake and effluent discharge locations. The MacLellan site PDA is approximately 11.2 $km^2$.

The MacLellan LAA (inclusive of the PDA; Appendix A, Map 2-5) includes the Keewatin River from Burge Lake to Cockeram Lake, two Keewatin River tributary watersheds adjacent to the MacLellan PDA (i.e., Dot Lake and Payne Lake), fish-bearing headwater lakes of the Cockeram River watershed (i.e., Lobster Lake, Minton Lake), and the Cockeram River. The MacLellan site LAA extends downstream to the outlet of Cockeram Lake and is approximately 126.9 $km^2$.

**Table 2-2 Waterbodies and Watercourses in the Local Assessment Areas at the MacLellan Site**

| Waterbody / Watercourse | Description |
|---|---|
| Keewatin River (from its confluence with the outlet of Payne Lake to its mouth at Cockeram Lake) | • The watercourse into which mine effluent will be discharged<br>• The source of freshwater required for the Project |
| Payne Lake and its outlet | • Located adjacent to the TMF.<br>• Potentially affected by TMF seepage and/or changes in groundwater quality or quantity. |
| Lobster Lake and its outlet | • Located near the TMF.<br>• Potentially affected by changes in groundwater quality or quantity. |
| Minton Lake and its outlet | • Lake immediately down-gradient of the TMF.<br>• Potentially affected by TMF seepage and/or changes in groundwater quality or quantity.<br>• Potentially affected by inflow reductions due to encroachment of the TMF and MRSA into its watershed. |
| Unnamed lake downstream of Minton Lake and its outlet to the confluence with the Cockeram River | • Downstream of Minton Lake and the TMF.<br>• Potentially affected by TMF seepage and/or changes in groundwater quality or quantity.<br>• Potentially affected by inflow reductions due to encroachment of the TMF and MRSA into its watershed. |
| Unnamed lake upstream of Minton Lake and its outlet to Minton Lake | • Located near the TMF.<br>• Potentially affected by changes in groundwater quality or quantity. |

| Waterbody / Watercourse | Description |
|---|---|
| Cockeram River (from Lobster Lake to Cockeram Lake) | • Potentially affected by TMF seepage and/or changes in groundwater quality or quantity.<br>• Potentially affected by inflow reductions due to encroachment of the TMF and MRSA into its watershed. |
| Dot Lake and its outlet to the Keewatin River | • Lake located adjacent to the MacLellan site access road |
| East Pond and its outlet to the Keewatin River | • Waterbody and watercourse located adjacent to the open pit and mine infrastructure. |
| Cockeram Lake | • First downstream lake receiving inflow from Keewatin River, Lynn River, and Cockeram River.<br>• Lake where potential change in streamflow or water quality caused by water withdrawals, mine effluents or TMF seepage may occur. |

# 3.0 SURFACE WATER MANAGEMENT OVERVIEW

## 3.1 WATER MANAGEMENT OBJECTIVES

Runoff at the Gordon and MacLellan sites is classified as “contact” water or “non-contact” water. Non-contact water is surface runoff that has not been in contact with any disturbed surface within the PDA. Any non-contact water that mixes with contact water becomes contact water.

The main objective of surface water management at the Gordon and MacLellan sites is to limit the amount of contact water that is produced during construction, operation, and decommissioning/closure of the Project. By doing so, the amount of potentially contaminated water that must be stored, and potentially treated before release to the receiving environment, is reduced. Other objectives for surface water management at the Gordon and MacLellan sites, as developed by Golder (2020), are:

- Provide a continuous supply of make-up water to the processing plant at the MacLellan site.
- Intercept and divert surface water runoff that naturally drains toward the mine facilities (i.e., non-contact water) by implementing flow diversions along the mine boundaries to limit the quantity of contact water that will require management or treatment.
- Intercept groundwater flowing toward the open pits from adjacent lakes (i.e., non-contact water) at the Gordon site through installation of interceptor wells.
- Intercept and store contact water[1] generated on the Gordon site and treat contact water that does not meet water quality guidelines in a collection pond prior to its release to Farley Lake.
- Intercept and store contact water[2] generated on the MacLellan site in the TMF pond or storage and treat contact water that does not meet water quality guidelines in a collection pond prior to its release to the Keewatin River
- Provide erosion and sediment control for surface water runoff from mine facilities so that contact water can be managed and discharged to the receiving environment while meeting water quality guidelines for total suspended solids (TSS).
- Allow safe operation of the TMF, stockpiles, and associated water management components for a wide range of climatic and operating conditions in facilities that will be continuously growing and expanding.

[1] Contact water at the Gordon site includes water pumped from the open pit and surface runoff and seepage from the overburden stockpile, topsoil stockpile, ore storage area, and the MRSA.
[2] Contact water at the MacLellan site includes water pumped from the open pit, tailings effluent from the processing plant, direct precipitation on the tailings pond, surface runoff from the tailing beach, and seepage through the TMF dam, surface runoff from the processing plant area, sewage treatment plant, crushing area, and camp, and runoff and seepage from the MRSA, overburden storage area and topsoil storage area

## 3.2 CONTACT WATER

At the Gordon and MacLellan sites, collection ditches, sumps, and collection ponds will be constructed around Project infrastructure to manage contact water during construction, operation, and decommissioning/closure phases. Water collected in the sumps and collection ponds will be diverted to water management ponds sized for the retention times required to settle suspended solids.

During construction, contact water in the two existing open pits at the Gordon site will be mixed and discharged to the Hughes River. Contact water in the existing underground workings at the MacLellan site will be pumped to the TMF pond for use in the milling process.

During operation, contact water in the open pit will be pumped to the collection pond at the Gordon site and then discharged to Farley Lake. At the MacLellan site, contact water in the open pit will be pumped to the TMF for use in the milling process; all other contact water will be diverted to a collection pond and discharged to the Keewatin River. Contact water will be diverted into the open pits at closure.

Contact water will be discharged to the environment if it meets applicable federal and provincial regulatory discharge requirements. These include Schedule 4 effluent limits of the MDMER. If contact water quality does not meet federal and provincial regulatory requirements, contact water will be stored or treated or both. Treatment technologies, if required, will be determined during detailed Project design and after final water quality modelling.

## 3.3 NON-CONTACT WATER

At the Gordon and MacLellan sites, diversion ditches will be constructed to divert non-contact water around Project facilities. Whether the channels remain as is or are re-configured during decommissioning/closure will be determined during finalization of the Closure Plan.

## 3.4 DESIGN CRITERIA OF WATER MANAGEMENT INFRASTRUCTURE

Information on water balance modelling and the design flow assessments conducted for ditch sizing, non-contact water diversions, culverts, and contact water collection and conveyances are provided in Golder (2016, 2020). The design criteria for water management infrastructure at the Gordon and Maclellan sites are:

- diversion ditches designed to convey the 1 in 25-year rainfall storm event.
- collection ditches designed to convey the 1 in 25-year rainfall storm event.
- culverts sized to convey the 1 in 25-year rainfall storm event.
- collection sumps sized to manage the 1 in 25-year rainfall storm event through a combination of water storage and pumping while maintaining a minimum freeboard of 0.3 m.

- collection ponds have capacity to store the Environmental Design Flood[3] (EDF) above the maximum operating water level
- tailings pond at the MacLellan site has capacity to store the EDF above the maximum operating water level and below the invert of the emergency spillway for the TMF
- TMF emergency spillway at the MacLellan site allows safe routing of the Inflow Design Flood4 (IDF) to maintain a minimum freeboard and prevent dam overtopping.

[3] The 100-year, 24-hour rainfall storm event (i.e., 85 mm of precipitation) that can be stored and does not result in an unscheduled discharge of water to the environment.

[4] The most severe inflow flood for which a dam and its associated facilities are designed. The IDF is the runoff resulting from the largest discrete storm event that can be safely routed through a basin without overtopping a dam. The IDF was selected as 1/3rd between the 1 in 1,000 year and the probable maximum flood (PMF), according to the CDA Dam Safety Guidelines (CDA) for a high consequence classification dam during the operating period.

# 4.0 SURFACE WATER QUANTITY MITIGATION AND MANAGEMENT

Mitigation measures to avoid or reduce potential effects of the Project on surface water quantity (i.e., lake levels, streamflow) were described in Section 9.4.1 of the EIS (Volume I, Chapter 9 – Assessment of Potential Effects on Surface Water). These measures were derived from the water management feasibility study completed in 2020 (Golder 2020), the Project Closure Plans (Alamos 2024a and 2024b), and site-specific measures identified during the assessment of potential effects on surface water quantity. Where applicable, these mitigation measures were updated based on information provided in response to information requests received from the provincial and federal governments and Indigenous Nations during review of the EIS (Stantec 2020a) and based on the conditions issued under the federal Decision Statement and Provincial Licences. Additional mitigation measures were described in a Notice of Alteration (NOA) submitted to Manitoba and a Notice of Change (NOC) submitted to IAAC in February, 2024. These measures, and the potential effects they are intended to avoid or reduce, are described in the sections below.

## 4.1 GORDON SITE

### 4.1.1 Potential Effects

Potential effects of the Project on surface water quantity at the Gordon site during construction, operation, and decommissioning/closure phases were detailed in Section 9.4 of the EIS (Stantec 2020a) and are summarized in Appendix B. One potential effect, change in surface water quantity, was assessed. During construction, the pathways to this potential effect are:

- Dewatering of Wendy Pit and East Pit.
- Concurrent operation of groundwater interceptor wells, which may increase water levels in Gordon Lake and Farley Lake and increase flows in Farley Creek.
- Site preparation and mine component construction will compact ground surfaces which may reduce ground infiltration and increase surface runoff.
- Site preparation and mine component construction will alter local drainage areas within the PDA and may affect downstream lake levels and streamflow.
- Stripping topsoil, timber harvesting, and vegetation removal in the PDA may decrease infiltration rates where impervious surfaces remain or increase infiltration rates where vegetation is removed.

- Construction of water management facilities, including diversion ditches, sumps, collection ditches and collection ponds, may reduce infiltration and alter local runoff patterns.
- Collection of seepage and contact water from the perimeters of the overburden storage area, borrow source stockpile, topsoil storage area, ore storage area, facility area, and MRSA and from the open pit may reduce infiltration and alter local runoff patterns.

Of these Project components and activities, surface water quantity may be most affected by dewatering of the two existing pits. Together, these pits contain approximately 2.3 $Mm^3$ of water (Golder 2015), water that needs to be pumped out to develop the new open pit. The other Project components and activities during construction of the Gordon site are expected to have small, localized effects on lake levels and streamflow.

During operation, potential pathways that may result in a change in surface water quantity at the Gordon site are:

- Operation of the groundwater interceptor wells may increase water levels in Gordon Lake and Farley Lake and increase flows in Farley Creek.
- Development of the open pit may lower the surrounding groundwater table and, therefore, lower water levels and reduce streamflow within the “zone of influence” surrounding the open pit.
- Development of the overburden storage area, borrow source stockpile, topsoil storage area, ore storage area, facility area, and MRSA, may affect surface water quantity by reducing infiltration and increasing surface run-off.
- Collection and diversion of contact water from the open pit and from the perimeter ditching around the overburden storage area, borrow source stockpile, topsoil storage area, ore storage area, facility area, and MRSA to the collection pond may reduce water levels in Gordon Lake and increase water levels in Farley Lake, the lake into which the collection pond will discharge.

Surface water quantity may be most affected by operation of the groundwater interceptor wells as these wells are expected to increase the volume of water reporting to Gordon and Farley lakes; groundwater that would otherwise not report to either lake for decades or centuries. However, the spatial extent of the potential groundwater table drawdown created by development of the open pit is larger and may affect lakes and streams further afield (e.g., Marie Lake, Susan Lake) than the Gordon Lake and Farley Lake watersheds.

During decommissioning/closure, potential pathways that may result in a change to surface water quantity at the Gordon site are:

- Surface water runoff from the overburden storage area, borrow source stockpile, topsoil storage area, ore storage area, facility area, and MRSA will be directed to the open pit which may reduce water levels in Gordon and Farley lakes and flows in Gordon and Farley Lake tributaries and in Farley Creek downstream of the PDA.

- Groundwater interceptor wells will operate until the open pit has filled with water and, may alter water levels in Gordon and Farley lakes and alter the timing, frequency, and magnitude of flows in Farley Creek.
- Removal of Project infrastructure and reclamation and revegetation of associated land may decrease surface runoff while increasing ground infiltration.
- Closure and reclamation of water management facilities (i.e., collection ditches, diversion ditches, sumps, collection ponds) will result in changes to surface water drainage patterns from the overburden storage area, borrow source stockpile, topsoil storage area, ore storage area, facility area, and MRSA and, therefore, may alter water levels in Gordon and Farley lakes and flows in Gordon and Farley lake tributaries and alter the timing, frequency, and magnitude of flows in Farley Creek.
- The MRSA will be covered with soil and revegetated which will alter infiltration and run-off rates and, therefore, may alter the timing, frequency, and magnitude of flows in Gordon and Farley Lake tributaries and in Farley Creek.
- Changes to catchment areas within the PDA during construction and operation are anticipated to remain through decommissioning/closure and into post-closure and, therefore, may alter water levels in Gordon and Farley lakes, and alter the timing, frequency, and magnitude of changes in local streamflow.

Filling of the open pit is expected to have the greatest potential effect on water levels in Gordon and Farley lakes and on flows in Farley Creek downstream of the PDA. Filling of the open pit at the Gordon site is anticipated to take approximately 11 years under average climate conditions. Once filled, the open pit will drain into Farley Lake.

### 4.1.2 Mitigation Measures

Descriptions of the mitigation measures that will be implemented to reduce the potential effects of the Project on surface water quantity are provided in Appendix B.

#### 4.1.2.1 Construction

Mitigation measures included in the Project design, or that have been developed specifically to avoid or reduce potential effects of the Project on water levels in lakes and ponds and flows in streams near the Gordon site during construction, are summarized in Table 4-1.

The original plan presented in the EIS was to pump water in the existing open pits to Farley Lake prior to mine construction. However, Alamos submitted an NOA/NOC in February, 2024 to provincial and federal regulators requesting that water in the existing open pits be pumped directly to the Hughes River instead of Farley Lake. This would reduce the duration of pumping to less than three months instead of greater than one year and would not only reduce the risk of significant increases in streamflow, but also reduce potential unintended effects on habitat in Farley Creek, the natural outlet channel of Farley Lake. No residual effects on surface water quantities in the Hughes River are expected to occur because the volume of water pumped to the Hughes River would not exceed 5% of the streamflow in the river.

## Table 4-1 Measures to Mitigate Potential Effects on Surface Water Quantity Gordon Site Construction

| Issue | Mitigation Measure(s) |
|---|---|
| On Site Water Quantity Management[1] | • Limit construction footprint to the extent possible to reduce the potential for reductions in groundwater recharge and limit the number of watersheds overprinted by the Project.<br>• Construct water management structures to collect, divert, and release non-contact water to the environment and to collect, store, and re-use contact water if required prior to discharging to the environment.<br>• Grade perimeter and access roads of open pits to divert runoff away from the open pits to reduce contact water.<br>• Maintain access roads by periodically regrading and ditching to improve water flow.<br>• Maintain existing drainage patterns with the use of culverts. Inspection of culverts periodically to remove accumulated material and debris to avoid erosion, flooding, habitat damage, property damage, and mobilization of sediment.<br>• Collect, store, and reuse contact water (runoff and seepage), only discharging excess water after reuse and treatment, as necessary.<br>• Collect seepage and runoff from the MRSA, ore stockpiles, overburden stockpile, and facility area in the site collection pond and store and treat, as required, prior to release to Farley Lake.<br>• Divert non-contact water away from the Project components.<br>• Limit water withdrawals from Farley Lake to water required for fire suppression, dust suppression, and truck washes; not for potable water.<br>• Install and operate groundwater interceptor wells between the Wendy pit lake and Gordon Lake and between the East pit and Farley Lake, prior to the start of dewatering and discharge the intercepted groundwater to each lake to maintain water levels<br>• Pump the existing water within each of the existing pits to Hughes River via an ~8 km temporary flexible hose pipeline to be located adjacent to the existing road. A diffuser will be installed at the pipe outlet to encourage rapid flow mixing |
| Contact Water Management[2] | • Gordon open pit dewatering to be pumped to the collection pond.<br>• Collect seepage and runoff from the MRSA, ore stockpiles, overburden stockpile, and workshop area and pump to the site collection pond.<br>• Install sediment control in the site collection pond prior to discharging the water directly to Farley Lake.<br>• Size new culverts to convey the 1:25-year flood event<br>• Construct contact-water collection ditches around the MRSA, overburden storage area, topsoil storage area, and ore pad to convey the 1:25 year storm event to collection ponds |

Notes:
[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)
[2] Water Management Feasibility Level Design Report (Golder 2020)

#### 4.1.2.2 Operation

Mitigation measures included in the Project design, or that have been developed specifically to avoid or reduce potential effects of the Project on water levels in lakes and ponds and flows in streams near the Gordon site during operation, are summarized in Table 4-2.

Groundwater wells installed between Farley and Gordon lakes and the new open pit at the Gordon Site will be used to intercept groundwater before it enters the pit. On the west side of the pit, groundwater water will be pumped to a collection pond located southwest of the open pit, aerated, and discharged to the deepest area of Gordon Lake via an approximately 50 m pipe. On the east side of the pit, groundwater will be pumped to the contact water collection pond, aerated, and discharged into the western basin of Farley Lake via an approximately 150 m long pipe. Both effluent pipes will be fitted with a manifold and "duck-bill" nozzles pointed at 45° angles from the bottom.

**Table 4-2 Measures to Mitigate Potential Effects on Surface Water Quantity Gordon Site Operation**

| Issue | Mitigation Measure(s) |
|---|---|
| On Site Water Quantity Management[1] | • Operate groundwater interceptor wells between the pits and Gordon and Farley lakes and discharge collected groundwater to each lake<br>• Operate water management infrastructure to collect, divert, and release non-contact water to the environment<br>• Operate water management infrastructure to collect, store, and treat, as necessary, contact water prior to its release to Farley Lake, including water entering the open pit<br>• Pump water from Farley Lake as required to fill on-site storage tanks<br>• Truck-in potable water from the Keewatin River<br>• Limit the mine footprint to the extent possible to reduce the potential for reductions in infiltration and limit the number of watersheds overprinted by the Project<br>• Grade perimeter and access roads to divert runoff away from the open pits to reduce contact water<br>• Maintain access roads by periodically regrading and ditching to improve water flow<br>• Maintain existing drainage patterns with the use of culverts<br>• Operate water management infrastructure to collect, divert, and release non-contact water to the environment<br>• Operate water management infrastructure to collect, store, and treat as necessary contact water prior to its release to Farley Lake.<br>• Construct perimeter and contact-water collection ditches to collect overland flow, toe seepage, and groundwater recharge (EIS Chapter 8, Sections 8.4.2.2 and 8.4.3.2), and to divert non-contact water away from the Project components.<br>• Pump excess water to collection ponds as needed.<br>• Design contact-water collection ditches to convey the 1:25-year storm event and with positive gradients to limit standing water and maintain positive flow.<br>• Design contact-water collection ponds with active water storage that considers ice thickness during winter.<br>• Intercept groundwater flowing into the open pit thereby reducing the volume of contact water and reducing the potential dewatering of Gordon and Farley lakes.<br>• Design collection pond inlets and outlets to reduce water velocities/scour and meet sedimentation requirements. |

| Issue | Mitigation Measure(s) |
|---|---|
| Contact Water Management[2] | • Collect seepage and runoff from the mine rock storage area, ore stockpiles, overburden stockpile, and workshop area and pump to the site collection pond.<br>• Install sediment control in the site collection pond prior to discharging the water directly to Farley Lake.<br>• Design contact-water collection ditches to convey the 1:25-year storm event with positive gradients to limit standing water and maintain positive flow.<br>• Design contact-water collection ponds with active water storage that considers ice thickness during winter. |
| Notes:<br>[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)<br>[2] Water Management Feasibility Level Design Report (Golder 2020) | |

### 4.1.2.3 Decommissioning/Closure

Mitigation measures included in the Project design, or that have been developed specifically to avoid or reduce potential effects of the Project on water levels in lakes and ponds and flows in streams near the Gordon site during decommissioning/closure, are summarized in Table 4-3.

At the end of operation, collection ditches will be re-graded and/or realigned, or additional ditches will be constructed to direct all contact water to the open pit by gravity. The ditch alignments will be reassessed at the end of operation to optimize ditch gradients. Ultimately, collection ditches will be graded to match the surrounding topography and riprap will be placed, where necessary, in the ditches to prevent scour. A plan view of the closure trenching system is shown in Figure 4-1 and profile views of all the trenches are presented in Figure 4-2.

The collection pond will be dewatered and any accumulated sediments at the bottom of the pond will be excavated, dewatered, and disposed of in the open pit or in an approved off-site facility. The collection pond will be backfilled and re-vegetated.

Operation of the groundwater interceptor wells will continue while the open pit is filling with water. However, the number of operating wells and/or the well pumping rates will be gradually reduced as the hydraulic gradients between the pit and the lakes are reduced by the increasing water level in the pit. Once the hydraulic gradients are eliminated, operation of the groundwater interceptor wells will cease, and the wells and associated ponds and infrastructure will be decommissioned.

**Table 4-3 Measures to Mitigate Potential Effects on Surface Water Quantity Gordon Site Decommissioning/Closure**

| Issue | Mitigation and Management Measure(s) |
|---|---|
| On Site Water Quantity Management[1] | • Revegetate impacted areas.<br>• Grade infrastructure areas to promote surficial flow out of the immediate area.<br>• Restore original drainage patterns and catchment areas as close to pre-mine conditions as possible<br>• Refill open pits with contact water at closure to return groundwater levels to near baseline conditions.<br>• Gradually reduce groundwater interceptor wells as hydraulic gradient between the open pit and the lakes decreases<br>• Continue groundwater pumping until water level in open pit reaches 260 m elevation<br>• Divert contact water to the open pit to reduce filling duration to approximately 11 years, under average climate conditions<br>• Refill open pits with contact water at closure to eliminate the hydraulic gradient between the pit and Farley and Gordon lakes and return the groundwater table elevation to near baseline conditions<br>• Maintain diversion ditch between Gordon and Farley lakes for duration of pit filling period.<br>• Restore original drainage patterns and catchment areas as close to pre-mine conditions as possible |

Note:
[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)

## 4.2 MACLELLAN SITE

### 4.2.1 Potential Effects

Potential effects of the Project on surface water quantity at the MacLellan site during construction, operation, and decommissioning/closure phases were detailed in Section 9.4 of the EIS (Stantec 2020a) and are summarized in Appendix C. One potential effect, change in surface water quantity, was assessed. During construction, the pathways to this potential effect are:

- Site preparation and mine component construction will remove vegetation, strip topsoil, and compact ground surfaces which may reduce ground infiltration and increase surface runoff.
- Site preparation and mine component construction will alter local drainage areas within the PDA and, therefore, may affect water levels in nearby ponds and lakes and flows in unnamed Keewatin River tributaries.
- Construction of water management facilities, including diversion ditches, sumps, collection ditches and collection ponds, may reduce infiltration and alter local runoff patterns.
- Temporary dewatering for construction of building foundations may affect water levels and streamflow in adjacent ponds and streams.

- Construction of the TMF and MRSA, and installation of perimeter collection ditches and sumps, will reduce the catchment areas of Payne Lake and Minton Lake and, therefore, may alter their water levels.
- Dewatering of the existing underground workings may affect the surrounding groundwater table and, therefore, may affect water levels and flows in adjacent ponds and streams.
- A temporary diversion ditch will be constructed to divert non-contact water near the MRSA to Keewatin River tributary KEE3-B2 in Year -2 of construction and, therefore, may intercept shallow groundwater and increase surface runoff in this tributary.
- Collection of seepage and contact water from the perimeters of the overburden stockpile, topsoil storage area, camp, temporary crushing area, processing plant, ore storage area, sewage treatment plant, and lay-down areas may reduce infiltration and alter local runoff patterns.

Of these Project components and activities, surface water quantity at the MacLellan site is likely to be most affected by construction of the TMF and MRSA. This is because these facilities have the largest physical footprints and, when surrounded by collection ditches and sumps to capture seepage and contact water run-off, have the greatest potential to affect water levels in Payne Lake and Minton Lake, the two headwater lakes whose watersheds these two facilities will encroach.

During operation, potential pathways that may result in changes to surface water quantity at the MacLellan site are:

- Development of the open pit may lower the surrounding groundwater table and, therefore, lower water levels and reduce streamflow within the “zone of influence” surrounding the open pit.
- Development of the MRSA and TMF, and associated water management infrastructure, will alter infiltration, evapotranspiration, and surface runoff rates and, therefore, may affect water levels in Payne Lake and Minton Lake and alter flows in their inlet and outlet streams.
- Development of the MRSA and TMF may increase groundwater volumes reporting to adjacent surface waterbodies and watercourses with the “zone of influence”.
- Mine rock, overburden, and ore stockpiles will capture infiltrated water and store it as pore-water; this may decrease inputs to surficial groundwater aquifers and to hydraulically connected surface waterbodies and watercourse.
- Water withdrawals from the Keewatin River for make-up water in the processing plant during the first year of operation and for fire suppression, dust control, potable water, and truck washes in all years of operation may alter the timing, frequency, and magnitude of flows in the river.
- Development of the overburden storage area, topsoil stockpile, ore storage area, camp, processing plant, crushing area, sewage treatment plant will reduce infiltration and increase surface run-off and, therefore, may alter water levels in adjacent ponds and flows in downstream streams.
- Collection, diversion, and management of seepage and contact water from overburden stockpile, topsoil storage area, camp, temporary crushing area, processing plant, ore storage area, sewage treatment plant, and lay-down areas may alter water levels and flows in adjacent ponds and streams.

- Contact water in the open pit will be pumped to the TMF which may affect the surrounding groundwater table and, therefore, may affect water levels in ponds (e.g., East Pond) and flows in streams within and downstream of the "zone of influence" of groundwater table draw-down.
- The temporary diversion ditch constructed to divert non-contact water near the MRSA to Keewatin River tributary KEE3-B2 will continue to operate until Year 3 of operation and, therefore, may intercept shallow groundwater and increase surface runoff in this tributary.
- Development of the TMF and MRSA will decrease the catchment area of Minton Lake and, therefore, may progressively alter inflows, water levels, and outflows.

Of these Project components and activities, decreases in surface water quantity at the MacLellan site during operation are likely to occur due to development and dewatering of the open pit and its resulting effect on the surrounding groundwater table and ponds and streams within, and downstream, of the "zone of influence". Conversely, increases in surface water quantity at the MacLellan site during operation may occur in the ponds, lakes, and streams adjacent to the TMF and MRSA due to their "ponding" effect on the surrounding groundwater table. However, any increases may be moderated by the contrary effect of collection, diversion, and management of contact water from these facilities.

During decommissioning/closure, potential pathways that may result in a change to surface water quantity at the MacLellan site are:

- Filling of the open pit from groundwater inflow, direct precipitation, diverted contact water, and water from the TMF pond will eventually eliminate the hydraulic gradient between the pit and the surrounding groundwater table and restore water levels in East Pond and surface run-off patterns in the East Pond outlet (KEE3-B2-A1 and KEE3-B1).
- The TMF and MRSA will be covered with soil and revegetated which will alter infiltration and run-off rates and, therefore, may alter the timing, frequency, and magnitude of flows in Payne Lake and Minton Lake tributaries.
- Closure and reclamation of water management facilities (i.e., collection ditches, diversion ditches, sumps, collection ponds) will result in changes to surface water drainage patterns from the overburden storage area, topsoil stockpile, ore storage area, camp, processing plant, crushing area, sewage treatment plant, and, therefore, may alter the timing, frequency, and magnitude of flows in unnamed Keewatin River tributaries.
- Closure plan run-off patterns will increase the catchment area of East Pond and, therefore, may increase flows in the East Pond outlet (KEE3-B2-A1 and KEE-B1) once the open pit has filled with water, a period of approximately 21 years under average climate conditions.

Of these Project components and activities, filling of the open pit with water and the resulting effect on the groundwater table is expected to have the greatest effect on surface water quantity at the MacLellan site during decommissioning/closure. Once filled with water, water levels in East Pond are expected to return to pre-mine levels. Flows in the East Pond outlet (KEE3-B2-A1) and the unnamed Keewatin River tributary (KEE3-B1) are expected to be similar or slightly larger than pre-mine flows due to the slight increase in upstream catchment area post-closure.

### 4.2.2 Mitigation Measures

Descriptions of the mitigation measures that will be implemented to reduce the potential effects of the Project on surface water quantity at the MacLellan site are provided in Appendix C.

Mitigation measures that were included in the Project design or that have been developed specifically to avoid or reduce potential effects of the Project on water levels in lakes and ponds and/or flows in streams near the MacLellan site include, but are not limited to:

- Pump water from the existing underground workings to the TMF pond during construction to reduce the amount of freshwater required from the Keewatin River as make-up water in the processing plant during the first year of mine operation.
- Pump seepage from the TMF and MRSA back to the TMF pond for use in the processing plant.
- Recycle water between the TMF Pond and the processing plant to reduce the amount of freshwater required from the Keewatin River for make-up water during operation.
- Use pre-leach thickener to increase the density of processing plant slurry and reduce the amount of water diverted to the TMF from the processing plant.
- Use carbon stripping technology in the processing plant to increase freshwater removal during ore processing.
- Construct and maintain diversion ditches around the ore stockpile, overburden storage area, topsoil storage area, processing plant, crushing area, sewage treatment plant, and camp to divert non-contact water to the Keewatin River.
- Grade perimeter roads to divert run-off away from the open pit
- Construct and maintain collection ditches and sumps that convey contact water from access roads, topsoil storage area, overburden storage area, ore storage area, crushing area, sewage treatment plant, camp, and facility area and seepage from the TMF and MRSA to a collection pond for treatment prior to discharge to the Keewatin River
- Maintain existing drainage patterns to the extent possible using culverts sized to convey the 1:25-year storm event flood runoff
- Limit water withdrawals from Keewatin River to less than 10% of instantaneous discharge at any time during the life of mine
- Divert contact water, groundwater seepage, and TMF pond water to the open pit at closure
- Remove mine infrastructure and regrade and revegetate disturbed areas to increase ground infiltration at closure

#### 4.2.2.1 Construction

At the MacLellan site, non-contact drainage ditches will be constructed around the MRSA and TMF as well as the stockpiles, processing plant, camp, and associated buildings. These ditches will be used to collect, divert, and release clean, non-contact water to the receiving environment.

Collection ditches will be constructed to convey contact water to sumps constructed at low spots around the PDA, including around the perimeters of the TMF, MRSA, and stockpiles. A central collection pond for the site will be constructed, water in the pond not required for re-use will be piped to the Keewatin River for discharge. The pipe will be equipped with a duck-bill diffuser, which is designed to prevent sediment and fish from entering the pipe.

Water in the existing underground works will be pumped to the TMF pond once the TMF is constructed. This water will be used to supplement makeup water requirements during the initial start-up of the ore processing facility.

A freshwater intake pipe will be constructed in the Keewatin River to supply make-up water for the processing plant, fire suppression, truck wash, and non-potable water supply for the camp. This intake pipe will be fitted with a fish-screen designed in accordance with the Fisheries and Oceans Canada's (DFO) "End-of-Pipe Screen Size Tool" and withdrawals will not exceed 5% of instantaneous flow in the Keewatin River.

No watercourse re-alignments are required at the MacLellan site. Additionally, no fish-bearing waterbodies will be overlain with mine rock or tailings. As a result, no amendment to Schedule 2 of the MDMER is anticipated. However, it is expected that water in the fish-bearing East Pond will passively drain into the open pit as the hydraulic gradient between the pit and the pond increases as the depth of the pit increases. Alamos will apply for a paragraph 35(2)(b) *Fisheries Act* authorization from DFO for all unavoidable harmful alteration, disruption or destruction of fish habitat that may occur at the MacLellan site.

Mitigation and management measures for reducing potential effects on surface water quantity from Project activities at the MacLellan site during the construction phase are summarized in Table 4-4.

## Table 4-4 Mitigation and Management Measures for Surface Water Quantity at the MacLellan Site during Construction

| Issue | Mitigation Measure(s) |
|---|---|
| On-site Water Quantity Management[1] | • Limit construction footprint to the extent possible to reduce the potential for reductions in groundwater recharge and limit the number of watersheds overprinted by the Project.<br>• Design contact-water collection ponds with active water storage that considers ice thickness during winter.<br>• Design collection pond inlets and outlets to reduce water velocities/scour and meet sedimentation requirements.<br>• Construct diversion ditches to collect, divert, and release non-contact water to the environment.<br>• Construct perimeter collection ditches to collect overland flow, toe seepage, and groundwater from the historical underground workings, the open pit, overburden and ore stockpiles, TMF, and MRSA for conveyance to the TMF or collection pond.<br>• Grade access roads to divert runoff away from the open pit to reduce contact water volume.<br>• Maintain existing drainage patterns with the use of culverts.<br>• Design for collection, storage, and reuse of contact water<br>• Limit water withdrawals from the Keewatin River to the extent necessary to meet freshwater requirements. Additional water that may be required for fire suppression, dust suppression, and truck washes may be sourced from the collection water pond, if the quality of the water allows<br>• Use water from the Keewatin River for potable water; water withdrawals will not exceed 5% of instantaneous discharge measured upstream of the withdrawal location. |
| Contact Water Management[2] | • Pump water from historical underground workings to TMF pond<br>• Design contact-water collection ditches to convey the 1:25-year storm event and with positive gradients to limit standing water and maintain positive flow.<br>• Collect contact water runoff and seepage from overburden and topsoil stockpiles and the TMF and MRSA in perimeter ditches, collection ditches, sumps, and collection ponds<br>• Size the water management pond to allow settling of sediment prior to discharge to the Keewatin River |

Notes:

[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)

[2] Water Management Feasibility Level Design Report (Golder 2020)

#### 4.2.2.2 Operation

During operation, contact water and seepage in the collection ditches and sumps will be pumped to the collection pond or TMF. Accumulated water in the TMF pond will be used to meet water demands in the ore milling process. This water will include reclaim water from the TMF, contact water pumped from the open pit, and/or contact water in the collection ditches and sumps. A spillway in the TMF, at a final design elevation of 376.25 m, will be present during operation as an overtopping prevention measure.

Tailings from the processing plant will be piped to the TMF during operation. Current engineering feasibility studies show that no discharge from the TMF will be required during normal operation (Alamos 2023). If discharge from the TMF is required, effluent quantity and quality will be monitored and, if needed, the effluent will be treated to meet relevant federal (i.e., Schedule 4 effluent quality limits under the MDMER) and provincial (i.e., MWQSOG) regulatory requirements prior to discharge to the environment, where applicable.

Accumulated contact water in the collection pond will be pumped to the Keewatin River via a buried pipeline with terminal diffuser. The collection pond will be sized to allow settling of suspended solids to meet provincial suspended sediment concentrations. Water in the pond will be routinely tested to determine if the water quality meets federal (i.e., Schedule 4 effluent limits of the MDMER) and provincial (MWQSOG) effluent guidelines.

Mitigation and management for reducing potential effects on surface water quantity from Project activities at the MacLellan site during the operation phase are summarized in Table 4-8.

**Table 4-5 Mitigation and Management Measures for Surface Water Quantity at the MacLellan Site during Operation**

| Issue | Mitigation Measure(s) |
|---|---|
| On-site Water Quantity Management[1] | • Collect, store, and re-use contact water in the TMF pond in the processing plant.<br>• Maintain access roads by periodically regrading and ditching to improve water flow.<br>• Inspect culverts periodically to remove accumulated material and debris to avoid erosion, flooding, habitat and infrastructure damage, and sediment mobilization.<br>• Collect and pump runoff and groundwater seepage from open pit, overburden and ore stockpiles, MRSAs, and TMF dam to TMF pond.<br>• Balance the timing of process water recycling from sources to relieve storage pressures on contact-water collection ponds.<br>• Pump excess water to collection ponds as needed.<br>• Operate the TMF with no discharge to the environment by reclaiming and recycle surplus water from the TMF to meet mill demand during operation. |

| Issue | Mitigation Measure(s) |
|---|---|
| Contact Water Management[2] | • Pump water from the open pit to the collection pond during summer; 75% of pit water will be pumped to the TMF and the remaining 25% to the site collection pond in spring; no pumping of water from the open pit will be required in winter.<br>• Collect and pump seepage and runoff from the plant site, topsoil, and overburden stockpiles, and approximately 55% of the MRSA water to the collection pond.<br>• Collect and pump seepage and runoff from approximately 45% of the MRSA to the TMF pond.<br>• Control sediment concentrations in the collection pond prior to discharging contact water to the Keewatin River.<br>• Store tailings water and TMF seepage and contact water run-off in the TMF pond.<br>• Recirculate water in the TMF to the mill.<br>• Do not discharge water from the TMF to the environment during operation under average climatic conditions.<br>• Discharge TMF pond water via the emergency spillway only in an extreme precipitation event that exceeds the design storage criteria for the TMF. |
| Keewatin River Water Withdrawls[3,4] | • Limit water withdrawals from the Keewatin River by recycling water between the TMF pond and the processing plant<br>• Use contact water in the collection pond water for the truck shop, water trucks, and truck wash<br>• Store freshwater in a water tank for fire suppression.<br>• Treat river water in a freshwater treatment plant for use as potable water<br>• Extract freshwater from the Keewatin River for process make-up water, potable water, and fire and dust suppression at rates that will not exceed 5% of instantaneous stream discharge. |
| Ore Milling and Processing Plant Approaches to Reduce Water Consumption[3] | • Use a Pre-Leach Thickener unit to increase the density of the mill circuit slurry stream which, in turn, requires less fresh make-up water. This pre-leach thickener unit is projected to reduce the freshwater demand by between 5 to 10 $m^3/h$ (0.0014 to 0.0028 $m^3/s$)<br>• Use Pressure Zadra Carbon Stripping Technology to increase the freshwater recycling rate by up to 4 $m^3/h$ (i.e., 6.0 tonnes x 0.47 $t/m^3$ x 3.0 BV tank x 25% bleed vs. 6.0 tonnes x 0.47 $t/m^3$ x 8.0 BV 100% bleed). |

Notes:

1 Assessment of Potential Effects on Surface Water (Stantec 2020a)

2 Water Management Feasibility Level Design Report (Golder 2020)

3 Federal Information Request IAAC-29 (Stantec 2020c)

4 Federal Information Request IAAC-47 (Stantec 2020i)

#### 4.2.2.3 Decommissioning/Closure/Post Closure

The seepage water collection system will be kept in operation during closure until water quality monitoring shows that water is acceptable for release to the environment. At that time, the sumps and ponds will be pumped dry. Sediment in the sumps and ponds will be tested and, if sediment quality complies with regulatory requirements, the sediment will be used for site rehabilitation. If sediment quality does not comply with regulatory requirements, the sediment will be removed and deposited in the open pit or at an off-site approved landfill. Sumps will be backfilled and regraded to restore original drainage to the extent possible.

At closure, the open pit will become the preferred receiver of surface water runoff from the MacLellan site. Pit dewatering will be terminated shortly after completion of operation, and the area surrounding the pit perimeter will be contoured to convey surface drainage into the pit. Collection ditches around the MRSA, processing plant and other mine infrastructure will be re-graded. Riprap will be placed, where necessary, at the end of the collection ditches to prevent scour. Perimeter berms in the collection ponds will be graded to match surrounding topography.

Where necessary, additional trenches will be constructed to direct all site runoff to the open pit by gravity. These trenches would be connected to the operation collection ditches at the topographic lows and former sumps. Minor earthworks may be required along the proposed closure trench system. Pipe may need to be recovered from the tailings delivery and water return systems for use along the closure trenches if the water table is intersected or the trench intersects a wetland designated for habitat re-establishment. The trenching system alignment will be reassessed at the end of operation to optimize trench grades. A plan view of the closure trenching system is shown in Figure 4-3 and profile views of all the trenches are presented in Figure 4-4.

Water in the TMF pond also will be directed to the open pit at closure. However, the TMF pond will remain at closure to act as a sediment trap. The drainage system around the TMF will remain in place during closure to direct contact water and seepage to the to the open pit via the closure trench system (Figure 4-3).

The open pit at the MacLellan site is expected to take 21 years to fill under average climatic conditions. Once the open pit has filled and water quality is acceptable for discharge to the downstream receiving environment, water in pit lake will be directed to the unnamed tributary (i.e., KEE3-B1) that formerly drained East Pond to the Keewatin River.

Water level in the MacLellan pit lake will be controlled post-closure by an outlet channel spillway at the eastern edge. The outlet channel spillway will connect to tributary KEE3-B1 just downstream of the former outlet of East Pond. Draining the pit to the east to tributary KEE3-B1 instead to the west to the Keewatin River was selected to eliminate excavation of a drainage channel between the pit and the river that had the potential to become a preferred flow pathway for the river at extreme flood events. A preliminary design of the outlet channel spillway is presented in Golder (2020); the design addresses concerns from DFO to limit fish migration into the pit lake.

The TMF spillway will be upgraded to meet closure requirements. The invert of the spillway will be lowered at closure to direct water to the closure trench system. The spillway will be lowered again post-closure to drain the pond.

Mitigation and management measures for reducing potential effects on surface water quantity from Project activities during the decommissioning/closure/post closure phase are summarized in Table 4-6.

### Table 4-6 Mitigation and Management Measures for Surface Water Quantity at the MacLellan Site during Decommissioning/Closure/Post Closure

| Issue | Mitigation Measure(s) |
|---|---|
| On-site Water Quantity Managementl[1] | • Refill open pit with contact water at closure.<br>• Re-grade collection ditches and constructing closure trenches to convey contact water and seepage to the open pit.<br>• Use closure trenching to convey TMF pond water to the open pit at closure.<br>• Construct pit outlet channel spillway to convey pit lake water to the Keewatin River via unnamed tributary KEE3-B1 once the pit lake has filled.<br>• Lower the TMF spillway invert to drain the supernatant pond post-closure, once water meets discharge criteria |
| Note:<br>[1] Assessment of Potential Effects on Surface Water (Stantec 2020a) | |

# 5.0 SURFACE WATER QUANTITY MONITORING PLAN

Monitoring is the continuation of observation, measurement, or assessment of environmental conditions at and surrounding the Project, its components or activities. Two types of monitoring are typically undertaken for environmental assessments: environmental monitoring to verify predictions and implemented mitigation measures; and compliance monitoring to verify practices or procedures to meet legislated requirements. Monitoring will be carried out on select valued components (VCs) using environmental indicators and measurable parameters identified in the EIS. Components to be monitored have been determined based on regulatory instrument requirements as per legislation, environmental importance, sensitivity and vulnerability, and licence requirements.

The following describes the sampling procedures (location, design, parameters to be measured, applicable regulatory instruments, and schedule), quality control and assurance programs, laboratory methods and protocols, and laboratory accreditations. Reporting requirements are described in Section 9.0. The plans also provide details on the Engagement of Indigenous Nations in monitoring is incorporated into the monitoring plan where appropriate and applicable.

Monitoring of potential changes in surface water quantity due to construction, operation, and/or decommission and closure of the Project described in this SWMMP is guided by baseline (i.e., existing conditions) surface water quantity data, Project-related effect pathways, predicted residual effects to surface water quantity described in Chapter 9 of the EIS (Stantec 2020a), responses to Information Requests from federal and provincial regulators, and potentially affected Indigenous nations during review of the EIS, and conditions in the federal Decision Statement and Provincial Licences.

## 5.1 MONITORING LOCATIONS

A surface water quantity (i.e., hydrometric) monitoring network has been established, which will be maintained for the life of the Project, to continue to refine the understanding of the local hydrologic system. The purpose of this monitoring network is to verify the accuracy of the effects assessment, determine the effectiveness of measures implemented to mitigate the adverse effects of the Project, monitor compliance with regulatory approvals, permits and authorizations, and inform the need for adaptive management (i.e., actions to confirm a Project-related effect and subsequent mitigation and/or remedial actions). The hydrometric network will be refined throughout the final design and detailed engineering process and hydrometric station locations, and the methodology and frequency of data collection will be informed by requirements outlined in the permitting and licensing processes. Where feasible, water quantity monitoring locations will be paired with water quality monitoring stations for consistency between the water quantity and water quality programs. Potential monitoring locations for surface water quantity at the Gordon and MacLellan sites are listed in Table 5-1 and Table 5-2 (Maps 5-1 and 5-2).

## Table 5-1 Potential Monitoring Locations for Surface Water Quantity at the Gordon Site

| Location | Station ID | Monitored Parameter | Nearest Surface Water Quality Station | Monitoring Rationale |
|---|---|---|---|---|
| **Lakes and Watercourses** | | | | |
| East Pit | N/A | water level | AQF4 | • Monitoring requirement listed in federal Decision Statement. Until pit is drained. |
| Wendy Pit | N/A | water level | AQF6 | • Monitoring requirement listed in federal Decision Statement. Until pit is drained. |
| Gordon Lake (outlet/diversion channel) | QF03[1, 2] | streamflow and water level | AQF2 | • Average monthly or annual model results at this node experience project-related effects greater than 10%<br>• Monitoring receiving waterbodies and watercourses, both upstream and downstream of discharge flows to identify effects of discharge flows on the environment and confirm compliance with regulatory approvals, including Gordon and Farley Lakes at the Gordon site.<br>• Monitoring requirement listed in federal Decision Statement |
| Farley Lake West | FAR5.2<br>FAR5.1[1, 2] | water level | AQF34 | • Average monthly or annual model results at this node experience project-related effects greater than 10%<br>• Monitoring receiving waterbodies and watercourses, both upstream and downstream of discharge flows to identify effects of discharge flows on the environment and confirm compliance with regulatory approvals, including Gordon and Farley Lakes at the Gordon site.<br>• Monitoring requirement listed in federal Decision Statement |
| Farley Lake East and Farley Creek (outlet of Farley Lake) | QF05[1] | streamflow and water level | AQF39 | • Average monthly or annual model results at this node experience project-related effects greater than 10%<br>• A greater than 30% change is predicted during the operation phase only<br>• Monitoring requirement listed in federal Decision Statement<br>• Monitoring commitment resulting from information requests during EIS review |

| Location | Station ID | Monitored Parameter | Nearest Surface Water Quality Station | Monitoring Rationale |
|---|---|---|---|---|
| Farley Creek (Reach 1) | QF05C | streamflow and water level | AQF9 | • Average monthly or annual model results at this node experience project-related effects greater than 10%<br>• A greater than 30% change is predicted during the operation phase only |
| Farley Creek (Reach 2) | N/A | streamflow and water level | | • Monitoring requirement listed in federal Decision Statement |
| Farley Creek (HEC-Ras modelling reach) | N/A | streamflow and water level | | • Monitoring commitment to Install pressure transducers at the top and bottom of the modelled section in Farley Creek |
| Swede Lake (outlet) | QF07[1] | streamflow and water level | AQF15<br>AQF16 | • Average monthly or annual model results at this node experience project-related effects greater than 10%<br>• Monitoring requirement listed in federal Decision Statement |
| Ellystan Lake | N/A | water level | AQF19<br>AQF20 | • Monitoring requirement listed in federal Decision Statement |
| Ellystan Lake (outlet) | QF08[1] | streamflow and water level | AQF19<br>AQF20 | • Average monthly or annual model results at this node experience project-related effects greater than 10%<br>• Monitoring requirement listed in federal Decision Statement |
| Susan Lake | Susan Lake | water level | AQF11 | • Monitoring requirement listed in federal Decision Statement |
| Marie Lake | QF04C | water level | AQF7 | • Monitoring commitment resulting from information requests during EIS review |
| Marnie Lake | N/A | water level | AQF38 | • Monitoring commitment resulting from information requests during EIS review |
| Simpson Lake | QF06 | water level | AQF29 | • Monitoring commitment resulting from information requests during EIS review |
| Hughes River | QF11B | streamflow and water level | AFQ41 | • Monitoring commitment resulting from information requests during EIS review |
| **Fish-Bearing Wetlands** | | | | |
| FAR6-A1 | FAR6-A1-1 | water level | AQF28 | • Monitoring requirement listed in federal Decision Statement Inside the predicted maximum extent of groundwater drawdown. |
| FAR7-A1 | FAR7-A1-1 | water level | AQF10 | • Monitoring requirement listed in federal Decision Statement Inside the predicted maximum extent of groundwater drawdown. |

| Location | Station ID | Monitored Parameter | Nearest Surface Water Quality Station | Monitoring Rationale |
|---|---|---|---|---|
| SUS3-B1 | SUS3-B1-2 | water level | AQF11 | • Monitoring requirement listed in federal Decision Statement Outside the predicted maximum extent of groundwater drawdown. |
| FAR2-WHI3 | FAR2-WHI3-1 | water level | AQF14 | • Monitoring requirement listed in federal Decision Statement Outside the predicted maximum extent of groundwater drawdown. |
| **Reference Stations (potential)** | | | | |
| White Owl Lake | N/A | streamflow and water level | AQF13 | • Monitoring commitment resulting from information requests during EIS review |
| Low Lake Outlet | Qref01 | streamflow and water level | N/A | • Monitoring commitment resulting from information requests during EIS review |
| Mac Lake | N/A | streamflow and water level | N/A | • Monitoring commitment resulting from information requests during EIS review |
| Marsh Lake | N/A | streamflow and water level | N/A | • Monitoring commitment resulting from information requests during EIS review |

Notes:
[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)
[2] Closure Plan (Alamos 2024a and 2024b)
N/A: station required but not currently installed or active

An additional monitoring location will be established in a reach of Farley Creek. In this reach pressure transducers will be installed at the top and bottom of the modelled section in Reach 1 of Farley Creek. Data from these pressure transducers will be used to validate a 2-D hydrodynamic model developed for this reach and will also represent the upstream and downstream controls on water surface elevation, that when coupled with discharge can also be used to verify model results. Pressure transducers may be installed at each transect location to record changes in water surface elevation through the open-water season. In combination with the discharge information collected, average cross-sectional velocity can be derived for each transect and compared with modelled results.

## Table 5-2 Potential Monitoring Locations for Surface Water Quantity at the MacLellan Site

| Location | Station ID | Monitored Parameter | Nearest Surface Water Quality Station ID | Monitoring Rationale |
|---|---|---|---|---|
| **Lakes and Watercourses** | | | | |
| Unnamed tributary of the Keewatin River (KEE3-B1) | QM04B | streamflow and water level | AQM71 | • Average monthly or annual model results at this node experience project-related effects greater than 10%<br>• A greater than 30% change is predicted during all Project phases.<br>• Monitoring requirement listed in federal Decision Statement |
| East Pond | N/A | water level | AQM18 | • Monitoring commitment resulting from information requests during EIS review |
| Minton Lake | QM07 | water level | AQM-16 | • Monitoring requirement listed in federal Decision Statement |
| Minton Lake (outlet) | QM07B | streamflow and water level | AQM21 | • Average monthly or annual model results at this node experience project-related effects greater than 10%<br>• Monitoring requirement listed in federal Decision Statement |
| Cockeram Lake | QM08 | streamflow and water level | AQM9 | • Monitoring requirement listed in federal Decision Statement |
| Cockeram River | QM11 | streamflow and water level | AQM10 | • Monitoring commitment resulting from information requests during EIS review |
| Payne Lake | QM12 | streamflow and water level | AQM31 | • Monitoring requirement listed in federal Decision Statement |
| Keewatin River (Burge Lake Outlet; upstream of PDA) | QM01 | streamflow and water level | AQM4 | • Monitoring requirement listed in federal Decision Statement |

| Location | Station ID | Monitored Parameter | Nearest Surface Water Quality Station ID | Monitoring Rationale |
|---|---|---|---|---|
| Keewatin River (upstream of PDA) | QM02B | streamflow and water level | AQM7 | • Monitoring receiving waterbodies and watercourses, both upstream and downstream of discharge flows to identify effects of discharge flows on the environment and confirm compliance with regulatory approvals, including selected monitoring stations in the Keewatin River at the MacLellan site.<br>• Instantaneous discharge of the Keewatin River will be monitored as part of a SWMMP. This plan will include an adaptive management component that sets a water withdrawal limit to less than 10% instantaneous stream discharge.<br>• Monitoring requirement listed in federal Decision Statement |
| Keewatin River (downstream of PDA) | QM06B | streamflow and water level | AQM8 | • Monitoring receiving waterbodies and watercourses, both upstream and downstream of discharge flows to identify effects of discharge flows on the environment and confirm compliance with regulatory approvals, including selected monitoring stations in the Keewatin River at the MacLellan site. |
| Keewatin River (downstream of Lynn River confluence) | QM13 | streamflow and water level | AQM29<br>AQM29B | • Monitoring commitment resulting from information requests during EIS review |
| Lynn River | QM05 | streamflow and water level | AQM28 | • Monitoring commitment resulting from information requests during EIS review |
| **Fish-Bearing Wetlands** | | | | |
| KEE3-B2-A2 | KEE3-B2-A2-1 | water level | AQM18 | • Monitoring requirement listed in federal Decision Statement Inside the predicted maximum extent of groundwater drawdown. |
| COC2-LOB2-MIN4 | COC2-LOB2-MIN4-1 | water level | AQM16 | • Monitoring requirement listed in federal Decision Statement Inside the predicted maximum extent of groundwater drawdown. |
| COC2-LOB1 | COC2-LOB1-1 | water level | N/A | • Monitoring requirement listed in federal Decision Statement Outside the predicted maximum extent of groundwater drawdown. |

| Location | Station ID | Monitored Parameter | Nearest Surface Water Quality Station ID | Monitoring Rationale |
|---|---|---|---|---|
| KEE3-PAY2 | KEE3-PAY2-1 | water level | AQM31 | • Monitoring requirement listed in federal Decision Statement Outside the predicted maximum extent of groundwater drawdown. |
| KEE3-DOT3 | KEE3-DOT3-1 | water level | N/A | • Monitoring requirement listed in federal Decision Statement Outside the predicted maximum extent of groundwater drawdown. |
| **Reference Stations (potential)** | | | | |
| Keewatin River | QM01 | streamflow and water level | AQM4 | • Station is upstream of potential project effects, will also serve as reference station for streamflow<br>• Monitoring requirement listed in federal Decision Statement |
| Arbor Lake | Burge Lake | water levels | AQM15 | • Monitoring requirement listed in federal Decision Statement |
| Burge Lake | Burge Lake | water levels | AQM23 | • Monitoring requirement listed in federal Decision Statement |
| Carr Lake | N/A | streamflow and water level | AQM91 | • Monitoring commitment resulting from information requests during EIS review |
| Desieyes Lake | N/A | streamflow and water level - | AQM14 | • Monitoring commitment resulting from information requests during EIS review |

Notes:
[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)
[2] Closure Plans (Alamos 2024a and 2024b)
N/A: station required but not currently installed or active

## 5.2 MONITORING SCHEDULE

Surface water quantity (water level, streamflow measurements, levelling surveys) will be monitored during all Project phases. Annual monitoring events at locations outlined in Section 5.1 and Table 5-3 will occur monthly during the open water season (June to October), and once during the winter season.

Additionally, instantaneous discharge of the Keewatin River will be monitored year-round at a station upstream of the PDA (likely QM02B). This monitoring will include an adaptive management component that sets a water withdrawal limit to less than 10% instantaneous stream discharge.

Table 5-3 summarizes the schedule for monitoring activities of the Hydrometric Monitoring Network by Project phase.

### Table 5-3 Monitoring Schedule

| Monitoring Activity | Frequency | | | | |
|---|---|---|---|---|---|
| | **Construction** | **Operation** | **Decommissioning** | **Closure** | **Post- Closure** |
| Hydrometric Monitoring (water level, discharge measurements, level surveys) | ✓ | ✓ | ✓ | ✓ | ✓ |
| Notes:<br>✓ Indicates when a monitoring activity is scheduled.<br>– Indicates no monitoring activity is scheduled. | | | | | |

Monitoring will be completed throughout the life of the Project and into closure until the sites are restored to a satisfactory condition in accordance with federal and/or provincial legislation and guidelines. Monitoring at existing surface water quantity stations, as well as new stations, commenced at least one year prior to the start of construction.

The SWMMP will be implemented throughout construction and operation with monitoring locations and frequency reviewed on an annual basis and adjusted, as necessary, based on results of monitoring and any required adaptive management. Prior to cessation of open pit dewatering, the SWMMP will be reviewed to confirm monitoring locations and frequency with respect to anticipated effects of closure activities on surface water quantity. Surface water quantity is expected to stabilize during post-closure after the open pits have filled and are draining to the downstream receiving environment. The SWMMP will continue to be implemented at the Gordon and MacLellan sites during pit filling and six years (estimated) post-pit filling.

# 5.3 MONITORING METHODS

## 5.3.1 Monitoring Station Setup

Hydrometric monitoring stations will be set up within the Project area to obtain water level and flow data at selected lakes and watercourses. The stations will consist of streamflow and water level measurements or water level measurements only as appropriate and determined by a qualified professional. Hydrometric stations will consist of pressure transducers (OTT Ecolog 800, Diver Level Logger, or PT2X Smart Sensor integrated data logger, or Hobo MX2001 Water Level Loggers), which measure water depth and temperature. At sites measuring only water level during open water (i.e., ice free) months (June to October), pressure transducers will be winterized or removed ahead of the winter season. All data loggers will be programmed to record water levels at 15-minute intervals.

Monitoring potential changes in surface water quantity will follow guidelines recommended for collection of surface water quantity data (e.g., BC MOE 2018, Terzi 1981, ISO 2010). At each hydrometric station monitoring streamflow, current velocity measurements will be taken throughout the year to obtain a range of flows under varying water levels to develop stage-discharge relations. Manual flow measurements will be carried out at each site using an Acoustic Doppler Velocimeter (ADV) in wadable streams, or an Acoustic Doppler Current Profiler (ADCP) in non-wadable rivers. The location of the metered section at each site will be determined based on channel geometry and flow conditions at time of measurement. Generally, the watercourse will be measured along a straight reach near the station, where the bed is as uniform as possible. Areas with submerged vegetation and/or immovable rocks will be avoided where possible. Throughout the monitoring period, differential levelling surveys will be completed, which involve measuring water surface elevation at the pressure transducers relative to permanent benchmarks established at each site. Each benchmark will be georeferenced using Real Time Kinematic (RTK) survey equipment.

Stage-discharge relationships, expressed as rating curves, will be developed for hydrometric stations monitoring streamflow using applicable software. Rating curves are used to convert water level data (stage) recorded by the streamflow monitoring stations into a continuous discharge time series or hydrograph. Annual hydrographs, presented as mean daily discharge, and multiple hydrometric indices will be generated for hydrometric stations where rating curves are established. For stations monitoring water level only, continuous stage hydrographs will be produced, and water level fluctuation, maximum, and minimum levels will be computed. Quality assurance and quality control information is available in EIS Volume 4, Appendix G (Stantec 2020d).

## 5.3.2 Quality Assurance and Quality Control

Quality Assurance and Quality Control processes were used in all stages of this monitoring program. Field data collection quality was improved by the installation of additional benchmarks and the use of standardized field forms. Discharge measurement equipment with built-in quality assurance processes (such as the Sontek ADV and the RiverRay ADCP) were used for the majority of measurements. Peer reviews and data checks were conducted on the data sets as they were input into Microsoft Excel and the Aquarius database, and during analysis.

### 5.3.3 Data Analysis

Field data analysis will include the development of stage-discharge rating curves, the production of daily discharge or stage hydrographs, and the calculation of hydrometric indices such as annual runoff, monthly distribution of annual runoff, mean annual discharge, peak flow and low flow and water level fluctuations.

Data from reference sites will be compared with data from sites downstream of the Project to determine if observed changes are due to larger phenomena occurring in the region or are due to Project-related effects.

### 5.3.4 Methods for Surface Water Quantity Monitoring

Monitoring potential changes in surface water quantity will be based on a "before-after-impact-control" (BACI) study design. The BACI study will compare surface water quantity metrics described in Section 5.3.5 measured before mine construction (i.e., baseline condition) to these same metrics measured during construction, operation, and closure of the Project and to these same metrics measured in lakes and streams that will not be affected by the Project (i.e., reference sites). Surface water quantity parameters will also be screened against the *Framework for Assessing Ecological Flow Requirements to Support Fisheries in Canada* (DFO 2013), described in Section 1.5.1.3.

### 5.3.5 Water Quantity Metrics and Thresholds

Metrics and thresholds have been identified to evaluate changes in surface water quantity during the life of the Project. These metrics include:

- Mean annual, monthly and instantaneous streamflow ($m^3/s$).
- Water levels (masl).

Surface water quantity will be monitored with respect to both regulatory approval (compliance) limits and trigger thresholds, which indicate when contingency measures may be required.

The *Framework for Assessing Ecological Flow Requirements to Support Fisheries in Canada* (DFO 2013) provides guidance on the management of flows required to maintain the ecological functions that sustain fisheries in streams and rivers potentially affected by flow withdrawals.

Thresholds for adaptive management are described in Section 8.1.

# 6.0 SURFACE WATER QUALITY MITIGATION AND MANAGEMENT

Mitigation and management measures, as they relate to reducing potential effects to surface water quality, are summarized for the Gordon Site in Section 6.1 and for the MacLellan Site in Section 6.2. The main objectives for water management at the Gordon and MacLellan sites, as developed by Golder (2020), are the same for surface water quality and surface water quantity. Accordingly, many measures to avoid or reduce potential effects on surface water quantity are also used to avoid or reduce potential effects on surface water quality.

Changes in surface water quality may occur and are associated with mine effluent releases or surface runoff during construction, operation, and closure of the open pits, TMF, MRSAs, and associated mine infrastructure.

Project activities and components that have the potential to affect surface water quality at the Gordon and MacLellan sites during construction, operation, and decommissioning/closure phases include water development and control, and emissions, discharges, and waste from various project activities.

The Project will result in changes to surface water quality within the Gordon site and MacLellan site LAAs. Project-induced changes to surface water quality in the aquatic receiving environment have the potential to cause adverse effects to fish and other aquatic biota exposed to elevated concentrations of the identified POPCs.

Although with mitigation concentrations of some water quality parameters are predicted to exceed federal and/or provincial water quality guidelines for the protection of freshwater aquatic life (WGQ-FAL) and baseline concentrations by more than 20% (i.e., POPCs), the predicted concentrations are below the toxicological thresholds at which adverse effects are expected to occur in fish and other aquatic biota. Project-specific mitigation measures presented to avoid or reduce potential effects on surface water quantity are also used to avoid or reduce potential effects on surface water quality.

## 6.1 GORDON SITE

### 6.1.1 Potential Effects

Potential effects of the Project on surface water quality at the Gordon site during construction, operation, and decommissioning/closure phases were detailed in Section 9.4 of the EIS (Stantec 2020a) and are summarized in Appendix D. One potential effect, change in surface water quality, was assessed.

A summary of Project-related pathways of effects, mitigation and management measures, residual effects, and monitoring for surface water quality at the Gordon site is outlined for all Project phases in Appendix D. Without mitigation, the Project activities and components that have the potential to affect surface water quality (i.e., the pathways of effects) at the Gordon site are:

- Dewatering of Wendy and East pits during construction.
- Discharge of groundwater pumped from the groundwater interceptor wells installed between the open pit and Gordon Lake and Farley Lake during construction, operation, and decommissioning/closure. The predicted water quality of the groundwater well discharge to the receiving environment is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios. Fluoride and total phosphorus concentrations are predicted to exceed modelled baseline by more than 20% and applicable long-term water quality guidelines in modelled waterbodies.
- Discharge of contact water from the collection pond during operation. Water quality of each potential source of discharge to the receiving environment at the Gordon site is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios. Fluoride and total phosphorus concentrations are predicted to exceed modelled baseline by more than 20% and applicable long-term water quality guidelines in modelled waterbodies.
- Outflow from the open pit at closure. Water quality of each potential source of discharge to the receiving environment at the Gordon site is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios. Fluoride and total phosphorus concentrations are predicted to exceed modelled baseline by more than 20% and applicable long-term water quality guidelines in modelled waterbodies

### 6.1.2 Mitigation Measures

Descriptions of the mitigation measures that will be implemented to reduce the potential effects of the Project on surface water quantity are provided in Appendix D.

#### 6.1.2.1 Construction

Mitigating measures for reducing potential effects on surface water quality from Project activities at the Gordon site during the construction phase are summarized in Table 6-1.

**Table 6-1 Mitigation and Management Measures for Surface Water Quality at the Gordon Site during Construction**

| Issue | Mitigation and Management Measure(s) |
|---|---|
| On-site Water Quantity Management[1] | • Construct perimeter and contact-water collection ditches to collect overland flow, toe seepage, and groundwater recharge, and to divert non-contact water away from the Project components. |
| On Site Water Quality Management[1] | • Implement fugitive dust measures such as frequent watering of haul and access roads.<br>• Aerate Wendy and East pits prior to dewatering to encourage mixing to achieve required regulatory criteria for discharge. Water from the existing pits will be discharged into the Hughes River via a pipeline with a terminal diffuser (pending regulatory approval).<br>• Pump groundwater interceptor wells to management ponds and aerate prior to discharging into Gordon and Farley lakes<br>• Implement dust suppression measures for exposed ground areas of the PDA, to reduce atmospheric deposition to surface water.<br>• Install sediment and erosion control measures during construction to limit the release of TSS and turbidity (see Erosion and Sediment Control Plan).<br>• Treat and handle building material that is used in water to avoid the release or leaching of substances that would reduce water quality. |
| Contact Water Management[2] | • Install sediment control in the site collection pond prior to discharging the water directly to Farley Lake. |
| Notes:<br>[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)<br>[2] Water Management Feasibility Level Design Report (Golder 2020) | |

### 6.1.2.2 Operation

During operation, water from the groundwater interceptor wells between the open pit and Gordon and Farley lakes will be pumped to water management ponds where it will be combined with site contact water. Water in the water management pond will be discharged to Farley Lake if it meets federal and provincial water quality standards, including Schedule 4 MDMER effluent limits. If required, water in the water management pond will be aerated and/or treated prior to discharge to Farley Lake. Water in the water management pond will be pumped to Farley Lake via buried pipeline with a terminal diffuser.

Mitigating measures for reducing potential effects on surface water quality from Project activities at the Gordon site during the operation phase are summarized in Table 6-2.

## Table 6-2 Mitigation and Management Measures for Surface Water Quality at the Gordon Site during Operation

| Issue | Mitigation and Management Measure(s) |
|---|---|
| On-site Water Quantity Management[1] | • Balance the timing of recycling from sources to relieve storage pressures on contact-water collection ponds.<br>• Construct perimeter and contact-water collection ditches to collect overland flow, toe seepage, and groundwater recharge (EIS Chapter 8, Sections 8.4.2.2 and 8.4.3.2), and to divert non-contact water away from the Project components.<br>• Pump excess water to collection ponds as needed.<br>• Intercept groundwater flowing into the open pit (EIS Chapter 8, Section 8.4.2.2) thereby reducing the volume of contact water and reducing the potential dewatering of Gordon and Farley lakes. |
| On-site Water Quality Management[1] | • Design water management facilities to collect and treat (as required) contact water such that effluent meets applicable federal and provincial regulatory requirements, including the authorized limits of deleterious substances specified in Schedule 4 of the MDMER (amended), prior to discharge to the environment.<br>• Implement fugitive dust measures such as frequent watering of haul and access roads.<br>• Transport domestic waste to the sewage treatment plant at the MacLellan site.<br>• Aerate groundwater from groundwater interceptor wells to encourage precipitation of elements that form oxides (e.g., iron oxide) and to increase dissolved oxygen concentrations prior to discharge to Gordon and Farley lakes.<br>• Implement dust suppression measures for exposed ground areas of the PDA, to reduce atmospheric deposition to surface water.<br>• Treat and handle building material that is used in water to avoid the release or leaching of substances that would reduce water quality. |
| Contact Water Management[2] | • Install sediment control in the site collection pond prior to discharging the water directly to Farley Lake |

Notes:

[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)

[2] Water Management Feasibility Level Design Report (Golder 2020)

#### 6.1.2.3 Decommissioning/Closure/Post Closure

Mitigation and management measures for reducing potential effects on surface water quality from Project activities at the Gordon site during the decommissioning/closure/post closure phase are summarized in Table 6-3.

**Table 6-3 Mitigation and Management Measures for Surface Water Quality at the Gordon Site during Decommissioning/Closure/Post Closure**

| Issue | Mitigation and Management Measure(s) |
|---|---|
| On-site Water Quality Management[1] | • Expedite re-filling of open pits during decommissioning/closure to reduce exposure of pit walls. |
| Best Management Practices for ARD/ML[3] | • The construction of domes will be evaluated as a potential mitigation option for ore stockpiles if water quality cannot be managed using alternative options (as per ARD/ML Management and Monitoring Plan) |
| Notes:<br>[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)<br>[2] Water Management Feasibility Level Design Report (Golder 2020) | |

## 6.2 MACLELLAN SITE

### 6.2.1 Potential Effects

Potential effects of the Project on surface water quality at the MacLellan site during construction, operation, and decommissioning/closure phases were detailed in Section 9.4 of the EIS (Stantec 2020a). One potential effect, change in surface water quality, was assessed. A summary of Project-related pathways of effects, mitigation and management measures, residual effects, and monitoring for surface water quality at the MacLellan site is provided in Appendix E. In the absence of mitigation, the Project activities and components that have the potential to affect surface water quality (e.g., the pathways of effects) at the MacLellan site are:

- Discharge of mine effluent from the collection pond to the Keewatin River during construction and operation.
- Groundwater seepage from the TMF to unnamed Keewatin River tributaries draining East Pond (KEE3-B1) and Payne Lake (KEE3-PAY1) and to Minton Lake (mine phases and seepage travel times depend on the model scenario).
- Groundwater seepage from the MRSA to the unnamed Keewatin River tributary draining East Pond (KEE3-B1) and to Minton Lake (mine phases and seepage travel times depend on the model scenario).
- Overflow from the open pit to the unnamed Keewatin River tributary (KEE3-B1) at closure.

### 6.2.2 Mitigation Measures

Descriptions of the mitigation measures that will be implemented to reduce the potential effects of the Project on surface water quantity are provided in Appendix E.

#### 6.2.2.1 Construction

Mitigation and management measures for reducing potential effects on surface water quality from Project activities at the MacLellan site during the construction phase are summarized in Table 6-4.

**Table 6-4 Mitigation and Management Measures for Surface Water Quality at the MacLellan Site during Construction**

| Issue | Mitigation and Management Measure(s) |
|---|---|
| On-site Water Quantity Management[1] | • Discharge contact water to ground prior to developing water management infrastructure.<br>• Construct perimeter and contact-water collection ditches to collect overland flow, toe seepage, and groundwater recharge, and to divert non-contact water away from the Project components. |
| On-site Water Quality Management[1] | • Implement dust suppression measures for exposed ground areas of the PDA, to reduce atmospheric deposition to surface water.<br>• Install sediment and erosion control measures during construction to limit the release of TSS and turbidity (see Erosion and Sediment Control Plan) |
| Contact Water Management[2] | • Install sediment control in the collection pond prior to discharging the water directly to the environment toward the Keewatin River.<br>• Do not discharge water from the TMF to the environment during operation under normal climatic conditions.<br>• TMF dam seepage and runoff from the TMR dam downstream shells is assumed to be pumped back to the TMF if water supply does not meet the discharge criteria. |
| Notes:<br>[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)<br>[2] Water Management Feasibility Level Design Report (Golder 2020) | |

#### 6.2.2.2 Operation

Mitigation and management measures for reducing potential effects on surface water quality from Project activities at the MacLellan site during the operation phase are summarized in Table 6-5.

## Table 6-5 Mitigation and Management Measures for Surface Water Quality at the MacLellan Site during Operation

| Issue | Mitigation and Management Measure(s) |
|---|---|
| On-site Water Quantity Management[1] | • Balance the timing of recycling from sources to relieve storage pressures on contact-water collection ponds.<br>• Construct perimeter and contact-water collection ditches to collect overland flow, toe seepage, and groundwater recharge, and to divert non-contact water away from the Project components.<br>• Pump excess water to collection ponds as needed.<br>• Design and operate the TMF with no discharge to the environment during operation through reclaiming and recycling surplus water from the TMF to meet mill demand during operation.<br>• Reuse process water to the extent feasible between the TMF and the ore processing facility. |
| On-site Water Quality Management[1] | • Design water management facilities to collect and treat (as required) surplus contact water such that effluent meets applicable federal and provincial regulatory requirements, including the authorized limits of deleterious substances specified in Schedule 4 of the MDMER (amended), prior to discharge to the environment.<br>• Operate the TMF as a non-discharging facility during operation through decommissioning/closure.<br>• Recycle water between the TMF and the processing facility to the maximum extent possible during operation to reduce freshwater make-up requirements.<br>• Use a closed circuit for cyanide use and cyanide destruction in the processing plant (via Air/SO2 oxidation and precipitation of metals) to reduce cyanide concentrations in tailings slurry prior to release of the slurry for storage in the TMF.<br>• Construct groundwater cut-off ditches to reduce groundwater seepage from the TMF reaching Minton Lake.<br>• Treat domestic waste in an average 60,000 L/day sewage treatment plant so that it meets “Wastewater Systems Effluent Regulations” under the *Fisheries Act* prior to discharge to the Keewatin River via a pipeline and diffuser.<br>• Install dust suppression measures for exposed ground areas of the PDA, to reduce atmospheric deposition to surface water. |
| Contact Water Management[2] | • Install sediment control in the collection pond prior to discharging the water to the Keewatin River.<br>• Do not discharge water from the TMF to the environment during operation under normal climatic conditions.<br>• Pump TMF dam seepage and runoff from the dam downstream shells back to the TMF. |

Notes:

[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)

[2] Water Management Feasibility Level Design Report (Golder 2020)

### 6.2.2.3 Decommissioning/Closure/Post Closure

Mitigation and management measures for reducing potential effects on surface water quality from Project activities at the MacLellan site during the decommissioning/closure/post closure phase are summarized in Table 6-6.

**Table 6-6 Mitigation and Management Measures for Surface Water Quality at the MacLellan Site during Decommissioning/Closure/Post Closure**

| Issue | Mitigation and Management Measure(s) |
|---|---|
| On-site Water Quantity Management[1] | • Refill open pits with contact water at closure to return groundwater levels to near baseline conditions. |
| On-site Water Quality Management[1] | • Operate the TMF as a non-discharging facility during operation through decommissioning/closure.<br>• Implement passive treatment options (e.g., controlled pit stratification, fertilizer amendment, flow segregation) in the open pit should monitoring show that pit water quality is not suitable for release to the environment during the anticipated 21 years to fill the open pit with contact water at the conclusion of mine operation. |
| Best Management Practices for ARD/ML[3] | • The construction of domes will be evaluated as a potential mitigation option for ore stockpiles if water quality cannot be managed using alternative options (as per ARD/ML Management and Monitoring Plan) |

Notes:
[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)
[2] Water Management Feasibility Level Design Report (Golder 2020)
[3] Federal Information Request IAAC-15 (Stantec 2020e)

# 7.0 SURFACE WATER QUALITY MONITORING PLAN

Monitoring of potential changes in surface water quality due to construction, operation, and decommission and closure of the Project described in this SWMMP is guided by baseline (i.e., existing conditions) surface water quality data, Project-related pathways of effects, predicted residual effects to surface water quality described in Chapter 9 of the EIS (Stantec 2020a), responses to Information Requests from federal and provincial regulators and potentially affected Indigenous nations during review of the EIS, and conditions in the federal Decision Statement and Provincial Licences.

## 7.1 MONITORING LOCATIONS

Surface water quality monitoring sites will be established for the life of the Project. Surface water quality sites, and the methods and frequency of data collection, will be finalized following consultation with federal and provincial regulatory agencies and Indigenous Nations. Where feasible, surface water quality monitoring sites will be paired with hydrometric monitoring stations for consistency between the hydrology and water quality programs and with sediment and biological monitoring sites included in the AEMP.

Section 3.12.2 of the Federal Decision Statement (FDS) identifies where surface water quality monitoring must be conducted at the Gordon and MacLellan sites. These sites are identified in Table 7-1 (Gordon Site) and Table 7-2 (MacLellan Site) and described below.

### 7.1.1 Gordon Site

Near-field water quality monitoring sites are located in potentially affected watercourses and waterbodies in the receiving environment downstream of the Gordon site and include: the west basin of Farley Lake (AQF34), the north basin of Farley Lake (AQF33), Farley Lake outlet (AQF9), and Gordon Lake (AQF2) (Table 7-1 and Maps 7-1 and 7-2). Additional near-field sites that may be impacted by changes in the groundwater table due to the Project and, therefore, require surface water quality monitoring include: Pump Lake (AQF12), Lake (AQF11), Marie Lake (AQF7) and Marnie Lake (AQF38). Water quality monitoring will be conducted in Wendy Pit (AQF4) and East Pit (AQF6) will only during construction, prior to and during pit dewatering. Water quality monitoring will be conducted in the collection ponds during all mine phases from construction through to closure/decommissioning as required by Section 3.12.2.1 of the FDS.

Mid-field water quality monitoring sites are located in Swede Lake (AQF16) and the Swede Lake outlet (AQF15) (Table 7-1 and Map 7-1). Far-field monitoring associated with the Gordon site will occur in watercourses and waterbodies where Project-related effects are anticipated to be negligible and/or unmeasurable. Far-field sites will be finalized during construction but are anticipated to include: Ellystan Lake (AQF37), Ellystan Lake outlet (AQF20), and the Hughes River (AQF44).

Water quality in the receiving environment will be compared to historical baseline conditions at the same monitoring sites, as well as to unimpacted reference sites that will be monitored throughout the Life of Mine (LOM) at the Gordon site. Because the Gordon site is at the headwaters of the Ellystan Lake watershed,

there are no suitable reference sites upstream of the Gordon site. Therefore, reference sites will be in adjacent watersheds. Reference sites for the Gordon site are listed in Table 7-1. The reference water quality sites include two stream sites: Mac Lake outlet (for comparison to data collected in Farley Creek) and the Hughes River upstream of the access road bridge (for comparison to data collected in the Hughes River downstream of the access road bridge). The reference water quality sites include to lake sites: White Owl Lake (for comparison to data collected in Swede Lake) and Low Lake (for comparison to data collected in Gordon and Farley Lakes). Multiple reference sites are necessary so that potential long-term Project effects to surface water quality can be differentiated from naturally occurring phenomenon (e.g., fires; beaver dams) that may preclude the utility of monitoring data from a single reference site. Other reference sites will be investigated during the construction phase of the Project (e.g., Marsh Lake).

**Table 7-1 Surface Water Quality Monitoring Locations for the Gordon Site**

| Station ID | Location | Location Type | Monitoring Rationale and Notes |
|---|---|---|---|
| AQF4 | Wendy Pit | Water Management Infrastructure | • Required in Section 3.12.2 of Federal Decision Statement (FDS)<br>• Sampling beginning during construction until pit is dewatered |
| AQF6 | East Pit | Water Management Infrastructure | • Required in Section 3.12.2 of FDS<br>• Sampling beginning during construction until pit is dewatered |
| TBD | New open pit | Water Management Infrastructure | • Required in Section 3.12.2.2 of FDS<br>• Sampling to occur only during pit filling (closure/decommissioning) and after pit has filled until water quality is stable and improving (post-closure) |
| TBD | Collection pond near Farley Lake | Water Management Infrastructure | • Required in Section 3.12.2 of FDS<br>• Sampling to occur during construction, operation, and closure/decommissioning only |
| TBD | Collection pond near Gordon Lake | Water Management Infrastructure | • Required in Section 3.12.2 of FDS<br>• Sampling to occur during construction, operation, and closure/decommissioning only |
| AQF2[1,2] | Gordon Lake | Near-field | • Required in Section 3.12.2 of FDS<br>• Receiving waterbody for groundwater interceptor well discharge |
| TBD | Gordon Lake | Near-field | • Edge of mixing zone around effluent pipe installed in Gordon Lake<br>• Receiving waterbody for groundwater interceptor well discharge<br>• Required in Section 3.12.2 of the FDS |
| AQF34[1,2] | West Farley Lake | Near-field | • Required in Section 3.12.2 of FDS<br>• Receiving waterbody for combined contact water and groundwater interceptor well discharge |
| TBD | West Farley Lake | Near-field | • Edge of mixing zone around effluent pipe installed in Gordon Lake<br>• Receiving waterbody for combined contact water and groundwater interceptor well discharge<br>• Required in Section 3.12.2 of the FDS |

| Station ID | Location | Location Type | Monitoring Rationale and Notes |
|---|---|---|---|
| AQF33 | North Farley Lake | Near-field | • First basin of Farley Lake downstream of Gordon Lake |
| AQF9[1,2] | Farley Lake outlet | Near-field | • Required in Section 3.12.2 of FDS |
| AQF16[1] | Swede Lake | Mid-field | • Required in Section 3.12.2 of the FDS<br>• First lake downstream of Farley Lake |
| AQF15 | Swede Lake outlet | Mid-field | • Outlet of first lake downstream of Farley Lake |
| AQF7 | Marie Lake | Near-field | • Lake potentially affected by changes to groundwater table |
| AQF38 | Marnie Lake | Near-field | • Lake potentially affected by changes to groundwater table |
| AQF12 | Pump Lake | Near-field | • Required in Section 3.12.2 of the (FDS)<br>• Lake potentially affected by changes to groundwater table |
| AQF37 | Ellystan Lake | Far-field | • Required in Section 3.12.2 of FDS |
| AQF20 | Ellystan Lake outlet | Far-field | • Outlet of downstream-most lake in Ellystan Lake watershed |
| AQF40A | Hughes River | Near-field | • Mixing zone downstream of effluent discharge during pit dewatering (pending approval to discharge to the Hughes River)<br>• Required in Section 3.12.2 of FDS |
| AQF44 | Hughes River | Far-field | • Required in Section 3.12.2 of FDS<br>• Downstream of confluence of Ellystan Lake outlet with the Hughes River |
| **Reference Stations** | | | |
| AQM13 | White Owl Lake | Reference4 | • Reference site for comparison to Swede Lake |
| AQM47A | Low Lake | Reference5 | • Reference site for comparison to Gordon and Farley Lakes |
| AQM46 | Mac Lake outlet | Reference6 | • Reference site for comparison to Farley Creek |
| AQF41 | Hughes River | Reference7 | • Upstream reference site for comparison to sites in Hughes River downstream of pit dewatering effluent (AQM40A; construction only [and if approved]) and Ellystan Lake outlet confluence (AQM44) |
| TBD | Marsh Lake | Reference8 | • Potential reference site for comparison to Gordon and Farley lakes |

Notes:
[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)
[2] Closure Plans (Alamos 2024a and 2024b)
[3] Federal Information Request IAAC-15 (Stantec 2020e)
TBD= to be determined

### 7.1.2 MacLellan Site

Near-field surface water quality monitoring sites are located in potentially affected watercourses and waterbodies downstream of the MacLellan site and include: Minton Lake (AQM16), Payne Lake (AQM31), tributary KEE3-B1 (AQM71), the Keewatin River at the edge of the mixing zone (AQM76) and downstream of tributary KEE3-B1 confluence (AQM8) (Table 7-2 and Map 7-3). An additional near-field site that may be impacted by changes in the groundwater table due to the Project and, therefore, requires surface water quality monitoring is in Dot Lake (AQM5). Water quality monitoring will be conducted in the collection pond, TMF pond during all mine phases from construction through to closure/decommissioning as required by Section 3.12.2.1 of the FDS. Monitoring of water quality in the new open pit will only occur during closure/decommissioning as the pit fills with water. Monitoring of water quality in the new open pit will continue until water quality is stable and improving as required in Section 3.12.2.2 of the FDS.

A mid-field water quality monitoring site is located in the unnamed lake downstream of Minton Lake (AQM21) (Table 7-2 and Map 7-3). Far-field water quality monitoring associated with the MacLellan site will occur in watercourses and waterbodies where Project-related effects are anticipated to be negligible and/or unmeasurable. Far-field sites will be finalized during construction but are anticipated to include: Cockeram River (AQM10), Cockeram Lake (AQM9), and the Keewatin River downstream of the Lynn River confluence (AQM29C) (Table 7-2 and Map 7-3).

Water quality in the receiving environment will be compared to historical baseline conditions at the same monitoring sites, as well as to unimpacted reference sites that will be monitored throughout the LOM at the MacLellan site. Reference sites for the MacLellan site are listed in Table 7-2 and shown on Map 7-3. Reference water quality sites include two stream sites: Carr Lake outlet (for comparison to data collected in KEE3-B1) and the Keewatin River near the outlet of Burge Lake (for comparison to data collected in the Keewatin River downstream of the effluent pipe discharge). Reference water quality sites include three lake sites: Burge Lake (for comparison to data collected in Cockeram Lake) and Carr Lake and Desieyes Lake (for comparison to data collected in Minton and Payne Lakes). Multiple reference sites are necessary so that potential long-term Project effects to surface water quality can be differentiated from naturally occurring phenomenon (e.g., fires; beaver dams) that may preclude the utility of monitoring data from a single reference site. Other reference sites will be investigated during the construction phase of the Project, as necessary.

## Table 7-2 Surface Water Quality Monitoring Locations for the MacLellan Site

| Station ID | Location | Location Type | Monitoring Rationale |
|---|---|---|---|
| TBD | Collection pond | Water Management Infrastructure | • Required in Section 3.12.2 of FDS<br>• Sampling to occur during construction, operation, and closure/decommissioning only |
| TBD | New open pit | Water Management Infrastructure | • Required in Section 3.12.2.2 of FDS<br>• Sampling to occur only during pit filling (closure/decommissioning) and after pit has filled until water quality is stable and improving (post-closure |
| TBD | TMF pond | Water Management Infrastructure | • Required in Section 3.12.2 of FDS<br>• Sampling to occur during operation and closure/decommissioning only |
| AQM71[1] | Unnamed tributary of Keewatin River KEE3-B1 | Near-field | • Required in Section 3.12.2 of FDS<br>• Keewatin River tributary that currently drains East Pond to the river<br>• Keewatin River tributary that will be downslope from water management infrastructure associated with the open pit and MRSA<br>• Keewatin River tributary that will drain the new open pit post-closure |
| AQM16 | Minton Lake | Near-field | • Required in Section 3.12.2 of FDS<br>• Lake downslope from MRSA |
| AQM21 | Unnamed lake downstream of Minton Lake | Mid-field | • Required in Section 3.12.2 of FDS<br>• Lake immediately downstream of Minton Lake |
| AQM31 | Payne Lake | Near-field | • Required in Section 3.12.2 of FDS<br>• Lake downslope from MRSA |
| AQM5 | Dot Lake | Near-field | • Potentially affected lake due to change in groundwater table |
| AQM10 | Cockeram River | Far-field | • Required in Section 3.12.2 of FDS<br>• River draining run-off from Minton Lake watershed |
| AQM76 | Keewatin River | Near-field | • Required in Section 3.12.2 of FDS<br>• Site located at edge of mixing zone downstream of effluent pipe in Keewatin River |
| AQM8 [1] | Keewatin River | Near-field | • Required in Section 3.12.2 of FDS<br>• Site located downstream of effluent pipe and confluence of tributary KEE3-B1 but upstream of Lynn River confluence |
| AQM29C | Keewatin River | Far-field | • Required in Section 3.12.2 of FDS<br>• Site located downstream of Lynn River confluence |
| AQM9 | Cockeram Lake | Far-field | • Required in Section 3.12.2 of FDS<br>• First lake downstream of MacLellan site effluent pipe discharge |

| Station ID | Location | Location Type | Monitoring Rationale |
|---|---|---|---|
| **Reference Stations** | | | |
| AQM4 | Keewatin River | Reference | • Upstream site for comparison to data collected in the Keewatin River downstream of the effluent pipe discharge |
| AQM23 | Burge Lake | Reference | • Upstream lake for comparison to Cockeram Lake |
| AQM91 | Carr Lake | Reference[2] | • Reference lake for comparison to Minton and Payne lakes |
| TBD | Carr Lake outlet | Reference | • Reference site for comparison to KEE3-B1 |
| AQM14 | Desieves Lake | Reference[2] | • Reference lake for comparison to Minton and Payne lakes |

Notes:

[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)

[2] Reference sites selected instead of Arbor Lake due to their more similar physical characteristics to Minton and Payne lakes; Arbor Lake was identified in Section 3.12.2 of the FDS

## 7.2 MONITORING SCHEDULE

Except for the new open pits and the TMF pond (MacLellan site only), surface water quality monitoring will be conducted monthly at all the locations identified in Section 7.1 during construction, operation, and decommissioning/closure phases of the Project (Table 7-3). Monitoring of surface water quality in the new open pits will begin during decommissioning/closure as the pits begin to fill with water and will continue until water quality in the pits is stable, improving, and meeting CWQG-FALs, FEQGs and/or MWQSOGs and required by Section 3.12.2.2 and Section 3.7 of the FDS. Monitoring of water quality in the TMF pond will occur only during operation and decommissioning/closure phases.

Monitoring locations and sampling frequency will be reviewed on an annual basis and adjusted, as needed, based on results of monitoring and any required adaptive management. Prior to cessation of open pit dewatering and/or the decommissioning phase, the SWMMP will be reviewed to confirm monitoring locations and sampling frequency with respect to anticipated closure effects on surface water quality. Surface water quality is expected to stabilize during post-closure after the open pits have filled. The SWMMP will be implemented at the Gordon and MacLellan sites for a minimum of six years post-pit filling.

The measurable end points for concluding the surface water quality monitoring program will be based on confirming the accuracy of the environmental assessment and the effectiveness of mitigation measures. These end points will be achieved at permanent closure or earlier if it can be demonstrated that there are no further impacts warranting continued monitoring.

**Table 7-3 Frequency of Surface Water Quality Monitoring**

| Monitoring Phase and Duration | Water Quality Monitoring Frequency | |
|---|---|---|
| | Gordon Site Sampling | MacLellan Site Sampling |
| Construction | Monthly | Monthly |
| Operation | Monthly | Monthly |
| Decommissioning and Closure | Monthly | Monthly |
| Post-Closure | To be determined[1] | To be determined[1] |
| All Phases, TSS sampling[2] | Following large (>12.5 mm) rainfall events | Following large (>12.5 mm) rainfall events |

Notes:

1 The sampling frequency for the Post-Closure phases will be confirmed during Decommissioning/Active Closure

2 TSS monitoring will occur at the same frequency as the regular SWMMP, except following large rainfall events >12.5 mm when additional TSS samples will be collected at near-field monitoring locations.

## 7.3 MONITORING METHODS

Monitoring potential changes in surface water quality will be based on a BACI study design. The BACI study provides a framework with which to observe potential Project-related effects by comparing measured concentrations of water quality parameters during the construction, operation, and closure of the Project to concentrations measured before mine construction (i.e., baseline condition) and to measured concentrations of water quality parameters collected at the same time from unaffected “control” (i.e., reference) sites.

### 7.3.1 Water Quality Parameters and Criteria

Monitoring of receiving environment water quality will include the analysis of field and laboratory-analyzed parameters to evaluate changes in water quality throughout the life of the Project. Water quality monitoring will include analyses of the following parameters, which include MDMER Schedule 4 (i.e., total arsenic, total copper, total cyanide, total lead, total nickel, total zinc, TSS, and un-ionized ammonia) and Schedule 5 (i.e., total aluminum, total cadmium, total iron, total mercury, total molybdenum, total selenium, nitrate (as N), chloride, total chromium, total cobalt, sulphate, total thallium, total uranium, phosphorus, and total manganese) parameters:

- Physical parameters (e.g., temperature, hardness, alkalinity, electrical conductivity, pH, dissolved oxygen concentration, turbidity, TSS, etc.)
- Total and dissolved metals (including low-level mercury) and metalloids (including arsenic and selenium)
- Nutrients (nitrogen species, phosphorus)
- Major anions (including sulphate)

- Cyanide species (MacLellan site only)
- Organics (total and dissolved organic carbon)
- Chlorophyll a concentration in lakes

Methylmercury, the toxic and bioavailable form of mercury, is not anticipated to become elevated in the water in any stream or lake because of the Project. Therefore, monitoring methylmercury concentrations in water will not be conducted unless annual average concentrations of mercury in effluent water samples collected as part of the Project's EEM Plan equal or exceed 0.10 µg/L, based on a calendar year (as per MDMER Schedule 5, Part 2).

If selenium is identified as trending toward becoming a POPC in the receiving environment, selenium thresholds will be identified, and adaptive management measures will be developed (as per Section 8.0).

### 7.3.2 Water Quality Criteria

Water quality criteria include federal and provincial WQG-FAL and, if necessary, site-specific water quality objectives. Water quality criteria applicable to monitoring the aquatic receiving environment and effluent water quality are described below.

#### 7.3.2.1 Receiving Environment Water Quality

Measured water quality parameters in the aquatic receiving environment will be screened against short-term and long-term MWQSOG-FAL and CWQG-FAL and available FEQGs to assess the potential for adverse effects to fish and other aquatic biota and the need for adaptive management.

No site-specific criteria have been developed for the receiving environment at this time. However, site-specific criteria may be developed based on identified POPCs through ongoing surface water quality modelling of effluent and the aquatic receiving environment and post-construction water quality monitoring data. Site-specific water quality objectives may also be required under the terms and conditions of authorizations or licenses associated with the operation of the mine and may be developed if monitoring results identify POPCs that exceed trigger levels (see Section 8.2) or generic water quality guidelines in the receiving environment.

#### 7.3.2.2 Effluent Water Quality

A plan for monitoring and characterizing end-of-pipe effluent will be described in the EEM Study Design that will be developed prior to effluent discharge. Effluent samples will be screened against short-term and long-term MWQSOG-FAL and CWQG-FAL and available FEQGs to assess the potential for adverse effects to fish and other aquatic biota in the receiving environment and the need for adaptive management. However, end-of-pipe effluent quality will be compared only to MDMER Schedule 4 limits; MDMER

Schedule 4 limits cannot be exceeded, as the owner or operator of a new mine will only be authorized to discharge effluent if:

- the concentration of a Schedule 4 deleterious substance in the effluent does not exceed the maximum authorized concentration (as per Schedule 4 of the MDMER; Table 4-1).
- the pH of the effluent is equal to or greater than 6.0 but is not greater than 9.5.
- the effluent is not acutely lethal to rainbow trout or *Daphnia magna*.

No site-specific criteria beyond existing guidelines or regulatory limits have been developed for effluent quality at this time. However, site-specific effluent quality criteria may be required under the terms and conditions of authorizations or licenses associated with the operation of the mine.

### 7.3.3 Sample Collection

Sample collection for surface water quality monitoring programs will follow the Protocols Manual for Water Quality Sampling in Canada (CCME 2011). POPCs and supporting parameters will be measured in the field and laboratory. Field parameters (i.e., temperature, alkalinity, pH, conductivity, dissolved oxygen, and turbidity) will be measured using a YSI multimeter, a YSI photometer, a La Motte turbidimeter, and a secchi disk.

During construction, operation, and closure, water samples from streams, rivers, lakes, and ponds, (and open pit lakes during closure) will be collected from a boat or by wading, in accordance with the Protocol for Safety in Sampling by Wading described in CCME (2011). Samples collected by wading (in streams and ponds) will be taken as surface grabs at mid-stream (or as close to mid-stream as safe and practical), and upstream of the area disturbed by wading. Samples collected by boat (surface grabs and deeper samples in lakes) will be taken from the upstream side to reduce the potential for sample contamination by gas or oil from the outboard motor. During sampling of the open pit lakes, the boat will be anchored, and samples will be collected at the bow, with the boat pointed into the wind to reduce potential contamination from the boat or motor. Sample bottles will be provided by ALS Environmental Laboratory, Winnipeg, Manitoba. Field staff will wear fresh powder free latex gloves at each site. Laboratory instructions regarding sample filtration and preservation will be followed in the field.

Water samples to be collected at depths near the lake bottom, if required, will be collected using a Beta bottle (Wildo Beta™). Sample sites will be selected in the deepest portion of these lakes based on available bathymetry maps. If no bathymetry data is available, sites will be selected near the center of the lake or where the deepest area of the lake was assumed to be based on surrounding topography.

Vertical arrays of multi-parameter (i.e., water temperature, conductivity, pH, dissolved oxygen, turbidity) sondes will be installed in the deepest location in Gordon Lake (~2.5 m) and in the deepest locations in the three basins of Farley Lake to continuously monitor water quality in the open-water season during all Project phases.

Monitoring of turbidity is typically used as a surrogate for TSS in the field. To develop site specific relationships between turbidity and TSS, turbidity is represented in Nephelometric Turbidity Units (or NTUs), and TSS-turbidity calibration curve(s) will be developed to support TSS-turbidity monitoring for the Project. Construction of a robust TSS-turbidity relationship will allow discrete and continuous sample of turbidity to be transformed into TSS. A number of concurrent TSS-turbidity samples will be obtained throughout the open water period. A laboratory will analyze TSS for the most accurate possible characterization of low TSS concentrations. Unique calibration curves will be produced for each system. Construction of a robust TSS-turbidity calibration curve relies on obtaining samples over a wide range of turbidity-TSS conditions. If insufficient in-situ sampling events occur at these times, then the protocol may be shifted to a 'lab-based' methodology. In this methodology, sediment samples from the site will be obtained and mixed into a slurry. Known concentrations of the slurry will be progressively added to a well-mixed bucket where a sonde measures turbidity. At each step, turbidity in the bucket is noted and TSS samples are obtained. The advantage of this process is that TSS-turbidity calibration is constructed from points distributed over the range of turbidities recorded in the field. The disadvantage is that it assumes that sediment subsample from which the slurry was obtained is representative of in-situ TSS.

Methods for the sampling end-of-pipe effluent will be described in the EEM Study Design developed in accordance with the MDMER (see EEM Plan).

### 7.3.4 Laboratory Analysis

Surface water quality samples will be sent to ALS Environmental Laboratory in Winnipeg for analysis of the parameters listed in Section 7.3.1.

The QA/QC program will include the collection of field duplicate samples (1 for every 20 samples collected), one field blank, and one trip blank per sampling campaign, totaling 10% of the samples collected.

Field duplicates will be collected at randomly selected sampling sites along with the parent sample and submitted to the laboratory for analysis. Duplicates will be submitted blind, without the location, name, or time indicated on the label, to test precision of the laboratory analysis.

Field blanks will be used to assess the potential for contamination in the field. The field blank will consist of Reverse Osmosis di-Ionized water provided by ALS Environmental Laboratories, which will be exposed to the same field conditions as the water samples collected. This will include opening the bottle in the field and filtering and preserving as required.

Trip blanks will be used to assess the potential for sample contamination during transit. Sealed trip blanks will be provided by ALS and accompanied water samples to and from the field and will be opened only when they arrived at the laboratory for analysis.

### 7.3.5 Data Analysis

Surface water quality data analysis will include data processing and compilation, quality screening of in-situ and lab data, treatment of censored data (e.g., non-detects), comparison to applicable federal and provincial guidelines, and graphical/visual representations of data.

#### 7.3.5.1 Federal and Provincial Water Quality Guidelines

A summary of the federal and provincial water quality guidelines for the protection of freshwater aquatic life that will be used for comparison to water quality data collected during the SWMMP is provided in Table 7-4.

**Table 7-4 Federal and Provincial Water Quality Guidelines for the Protection of Freshwater Aquatic Life**

| Parameter | Units | CWQG-FAL | | FEQG | Manitoba WQSOG | | BC WQG-FAL |
|---|---|---|---|---|---|---|---|
| | | Long-term (chronic) | Short-term (acute) | | Long-term (chronic) | Short-term (acute) | Long-term (chronic) |
| **Field parameters** | | | | | | | |
| pH | pH units | 6.5-9.0 | - | - | 6.5-9.0 | - | - |
| TSS | mg/L | Background dependent[28] | Background dependent[29] | - | Background dependent[30] | Background dependent[31] | - |
| Dissolved oxygen | mg/L | 6.5 | - | - | 6.0 | - | - |
| **Nutrients, Major Anions, and Cyanide** | | | | | | | |
| Ammonia (as N) | mg/L | Look up table[1] | - | - | Look up table[1] | - | - |
| Nitrate | mg/L | 3.0 | 124.0 | - | - | - | - |
| Nitrite | mg/L | 0.06 | - | - | 0.06 | - | - |
| Nitrate+Nitrite | mg/L | - | - | - | 10.0 | - | - |
| chloride | mg/L | 120 | 640 | - | - | - | - |
| fluoride | mg/L | 0.12 | - | - | 0.12 | - | - |
| sulphate | mg/L | - | - | - | - | - | 128 |
| phosphorus | mg/L | Framework[2] | - | - | 0.025 | - | - |
| Cyanide (Free) | mg/L | 0.005 | - | - | 0.0052 | 0.022 | - |
| Cyanide (WAD) | mg/L | - | - | - | - | - | 0.005 |

| Parameter | Units | CWQG-FAL | | FEQG | Manitoba WQSOG | | BC WQG-FAL |
|---|---|---|---|---|---|---|---|
| | | Long-term (chronic) | Short-term (acute) | | Long-term (chronic) | Short-term (acute) | Long-term (chronic) |
| **Dissolved Metals** | | | | | | | |
| Arsenic | mg/L | - | - | - | 0.15 | 0.34 | - |
| Cadmium | mg/L | - | - | - | Equation[3] | Equation[4] | - |
| Chromium (trivalent) | mg/L | - | - | - | Equation[5] | Equation[6] | - |
| Chromium (hexavalent) | mg/L | - | - | - | 0.011 | 0.16 | - |
| copper | mg/L | - | - | BLM[7] | Equation[8] | Equation[9] | - |
| lead | mg/L | - | - | Equation[10] | Equation[11] | Equation[12] | - |
| manganese | mg/L | Look up table[13] | Equation[14] | - | - | - | - |
| nickel | mg/L | - | - | - | Equation[15] | Equation[16] | - |
| strontium | mg/L | - | - | 2.5 | - | - | - |
| Zinc | mg/L | Equation[17] | Equation[18] | - | Equation[19] | Equation[20] | - |
| **Total Metals** | | | | | | | |
| Aluminum | mg/L | 0.005 at pH≤6.5<br>0.1 at pH>6.5 | - | Equation[1] | 0.005 at pH≤6.5<br>0.1 at pH>6.5 | - | - |
| Antimony | mg/L | - | - | - | - | - | 0.009 |
| Arsenic | mg/L | 0.005 | - | - | - | - | - |
| Barium | mg/L | - | - | - | - | - | 1.0 |
| Beryllium | mg/L | - | - | - | - | - | 0.00013 |
| Boron | mg/L | 1.5 | 29 | - | 1.5 | - | - |
| Cadmium | mg/L | Equation[21] | Equation[22] | - | - | - | - |
| Chromium (trivalent) | mg/L | 0.0089 | - | - | - | - | - |
| Chromium (hexavalent) | mg/L | 0.001 | - | 0.005 | - | - | - |
| cobalt | mg/L | - | - | Equation[23] | - | - | - |
| copper | mg/L | Equation[24] | - | - | - | - | - |
| iron | mg/L | 0.3 | - | Calculator[25] | 0.3 | - | - |
| lead | mg/L | Equation[26] | - | - | - | - | - |
| mercury | mg/L | 0.000026 | - | - | 0.000026 | - | - |
| molybdenum | mg/L | 0.073 | - | - | 0.073 | - | - |
| nickel | mg/L | Equation[27] | - | - | - | - | - |

| Parameter | Units | CWQG-FAL | | FEQG | Manitoba WQSOG | | BC WQG-FAL |
|---|---|---|---|---|---|---|---|
| | | Long-term (chronic) | Short-term (acute) | | Long-term (chronic) | Short-term (acute) | Long-term (chronic) |
| selenium | mg/L | 0.001 | - | - | 0.001 | - | - |
| silver | mg/L | 0.00025 | - | - | 0.0001 | - | - |
| Strontium | mg/L | - | - | 2.5 | - | - | - |
| Thallium | mg/L | 0.0008 | - | - | 0.0008 | - | - |
| Uranium | mg/L | 0.015 | 0.033 | - | 0.015 | - | - |
| Vanadium | mg/L | - | - | 0.12 | - | - | - |

Notes:

CWQG-FAL = Canadian Water Quality Guideline for the Protection of Freshwater Aquatic Life

FEQG – Federal Environmental Quality Guideline

WQSOG = Water Quality Standards, Objectives, and Guidelines

BC WQG-FAL = British Columbia Water Quality Guideline for the Protection of Freshwater Aquatic Life

WAD = weak acid dissociable

mg/L = milligrams per litre

[1] pH and temperature-dependent guideline based on Table 1 in CCME (2010) and converted to ammonia (as N) by multiplying the unionized ammonia ($NH_3$) guidelines by 0.8224.

[2] framework based on trophic status of waterbody as described in Table 1 of CCME (2004)

[3] guideline for dissolved cadmium (mg/L) = 0.001*[(exp(0.7409*(ln(Hardness))-4.719))*(1.101672-(ln(Hardness)*0.041838))] where hardness is in mg/L as $CaCO_3$

[4] guideline for dissolved cadmium (mg/L) = 0.001*[(exp(1.0166*(ln(Hardness))-3.924))*(1.136672-(ln(Hardness)*0.041838))] where hardness is in mg/L as $CaCO_3$

[5] guideline for dissolved trivalent chromium (mg/L) = 0.001*[(exp(0.819*(ln(Hardness)) + 0.6848))*(0.86)] where hardness is in mg/L as $CaCO_3$

[6] guideline for dissolved trivalent chromium (mg/L) = 0.001*[(exp(0.819*(ln(Hardness)) + 3.7256))*(0.316)] where hardness is in mg/L as $CaCO_3$

[7] biotic ligand model (BLM); see ECCC (2021)

[8] guideline for dissolved copper (mg/L) = 0.001*[exp(0.8545[ln(Hardness)]-1.702]*[0.960] where hardness is in mg/L as $CaCO_3$

[9] guideline for dissolved copper (mg/L) = 0.001*[exp(0.9422[ln(Hardness)]-1.700]*[0.960] where hardness is in mg/L as $CaCO_3$

[10] guideline for dissolved lead (mg/L) = (exp(0.514*(ln(DOC))+0.214*(ln(Hardness))+0.4354)) where hardness is in mg/L as $CaCO_3$

[11] guideline for dissolved lead (mg/L) = 0.001*[(exp(1.273*(ln(Hardness)) - 4.705))*((1.46203-(ln(Hardness))*0.145712))] where hardness is in mg/L as $CaCO_3$

[12] guideline for dissolved lead (mg/L) =0.001*[(exp(1.273*(ln(Hardness)) – 1.460))*((1.46203-(ln(Hardness))*0.145712))] where hardness is in mg/L as $CaCO_3$

[13] found in Appendix B of CCME (2019)

[14] guideline for dissolved manganese (mg/L) = 0.001*exp(0.878[ln(hardness)] + 4.76) where hardness is in mg/L as $CaCO_3$

[15] guideline for dissolved nickel (mg/L) = 0.001*[(exp(0.846*(ln(Hardness))+0.0584))*(0.997)] where hardness is in mg/L as $CaCO_3$

[16] guideline for dissolved nickel (mg/L) = 0.001*[(exp(0.846*(ln(Hardness))+2.255))*(0.998)] where hardness is in mg/L as $CaCO_3$

| Parameter | Units | CWQG-FAL | | FEQG | Manitoba WQSOG | | BC WQG-FAL |
|---|---|---|---|---|---|---|---|
| | | Long-term (chronic) | Short-term (acute) | | Long-term (chronic) | Short-term (acute) | Long-term (chronic) |

Notes (cont'd):

[17] guideline for dissolved zinc (mg/L) = 0.001*(exp(0.947[ln(Hardness)] - 0.815[pH] + 0.398[ln(DOC)] + 4.625)) where hardness is in mg/L as $CaCO_3$ and dissolved organic carbon (DOC) is in mg/L

[18] benchmark guideline for dissolved zinc (mg/L) = 0.001*(exp(0.833[ln(Hardness)] + 0.240[ln(DOC)] + 0.526)) where hardness is in mg/L as $CaCO_3$ and DOC is in mg/L; benchmark equation is valid between hardness of 13.8 and 250.5 mg/L $CaCO_3$ and DOC between 0.3 and 17.3 mg/L

[19] guideline for dissolved zinc (mg/L) = 0.001*[(exp(0.8473*(ln(Hardness))+0.884))*(0.986)] where hardness is in mg/L as $CaCO_3$

[20] guideline for dissolved zinc (mg/L) = 0.001*((exp(0.8473*(ln(Hardness))+0.884))*(0.978)) where hardness is in mg/L as $CaCO_3$

[21] guideline for total cadmium (mg/L) = 0.00037 mg/L at hardness >280 mg/L or is calculated as 0.001*[10^(1.016*(log10(Hardness))-1.71)] at hardness between 17 and 280 mg/L where hardness is in mg/L as $CaCO_3$

[22] guideline for total cadmium (mg/L) = 0.001*10^(01.016*log10(Hardness)-1.71) where hardness is in mg/L as $CaCO_3$

[23] guideline for total cobalt (mg/L) = exp{(0.414[ln(hardness)] – 1.887} where hardness is in mg/L as $CaCO_3$

[24] guideline for total copper (mg/L) = 0.004 mg/L at hardness >180 mg/L or is calculated as 0.001*0.2*[exp(0.8545*(ln(Hardness]))-1.465)] at hardness between 82 and 180 mg/L

[25] guideline for total iron (mg/L) is a calculator or look-up table found in ECCC (2024)

[26] guideline for total lead (mg/L) = 0.007 mg/L at hardness >180 mg/L or is calculated as 0.001*[exp(1.273*(ln(Hardness]))-4.705)] at hardness between 60 and 180 mg/L where hardness is in mg/L as $CaCO_3$

[27] guideline for total nickel (mg/L) = 0.15 mg/L at hardness >180 mg/L or is calculated 0.001*[exp(0.76*(ln(Hardness]))+1.06))] at hardness between 60 and 180 mg/L where hardness is in mg/L as $CaCO_3$

[28] ≤25 mg/L increase from background levels at any time when background TSS concentrations are between 25 and 250 mg/L or less than 10% increase from background TSS concentrations when background is ≥250 mg/L

[29] ≤25 mg/L increase from background levels for short-term (i.e., <24 hour) exposure

[30] <5 mg/L increase from background TSS concentrations when background concentrations are ≤25 mg/L

[31] ≤25 mg/L increase from background TSS concentrations when background concentrations are ≤250 mg/L or less than 10% increase from background TSS concentrations when background is >250 mg/L

#### 7.3.5.2 Quality Assurance and Quality Control (QA/QC)

Upon receipt of analytical results for each sampling event, the data will be reviewed for QA/QC. The QA/QC process will involve a review of lab-analyzed results to check that the field blank, trip blank, and equipment blank samples have concentrations less than the detection limit for each parameter, and that duplicate samples are within a suitable range (e.g., the relative percent difference is less than 25%). Results that indicate a failure of controlled sampling will be investigated for potential causes and implications.

For parameters with both total and dissolved fractions (e.g., metals and metalloids), the ratio of dissolved vs. total concentrations will be calculated. A dissolved concentration greater than 1.25x the corresponding total concentration will be flagged and investigated. Cases where detection limits are above applicable guidelines or are elevated due to analytical limitations will be flagged and considered in the analysis of results.

Results will be plotted for visual inspection of the data and identification of potential outliers. Outliers identified by visual inspection (or by statistical methods) will be investigated for potential causes. If no reasonable causes are identified (i.e., the outlier cannot be explained by a sampling, analytical, or data processing error or anomaly), then the outlier will be considered a real observation and incorporated into subsequent interpretation of the water quality results.

Parameters sampled in situ will be reviewed for consistent use of units, and that the results are within the range that can be correctly measured with the field equipment used. If in situ data appear unusual, the field notes will be reviewed to identify abnormal conditions (e.g., heavy rain) and confirm that calibration records indicate successful instrument calibration prior to the suspect measurement.

For both lab-analyzed and field parameters, excluded data will be transparently identified and summarized in reports (i.e., flagged as excluded from the interpretation of results).

# 8.0 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. Results from monitoring will be used through an adaptive management process to adjust mitigation measures and to modify plans on an ongoing basis, if required.

Adaptive management will be used with respect to surface water to identify, assess the environmental significance of, and as appropriate, respond to an effect of the Project on surface water beyond that predicted in the EIS. Important aspects of the adaptive management framework for surface water are as follows:

- Risk narrative: description of the component and potential environmental effect and/or conditions that implementation of the adaptive management plan will limit (i.e., potential effects described in Section 4.0 and Section 6.0).
- Monitoring component: monitoring location and physical parameters to be monitored and assessed.
- Trigger: a specific threshold that initiates action when exceeded. Trigger thresholds are staged to accommodate levels of concern and a diversity of actions. This allows timely and informative responses to be initiated before higher potential impact trigger thresholds are met or exceeded. Trend analysis is an early warning tool to determine potential for exceeding subsequent thresholds. Thresholds for groundwater will include groundwater level and quality.
- Response Actions: staged according to specific thresholds and describe the actions to be implemented should a threshold be crossed. The response actions will include a hierarchical plan to investigate the potential causes of a threshold exceedance to determine if the threshold exceedance is related to measurement error, equipment malfunction, a single anomalous event, a naturally occurring local phenomenon, a regional phenomenon, or a Project-related effect. A hierarchical plan will be used to implement remedial actions to existing mitigation measures or to implement additional or new mitigation measures to reduce or eliminate threshold exceedances. Mitigation measures may include additional monitoring, or modifications to Project infrastructure.
- Reporting and Review: a plan to report Project-related threshold exceedances to the appropriate regulatory authorities, Indigenous Nations, and stakeholders.

This adaptive management framework allows for a systematic approach to data evaluation and the identification of actions that are commensurate with the degree of risk potentially associated with the occurrence of data that is different than baseline. Data that are elevated above triggers and indicate a higher degree of risk to the environment would have more substantial response actions compared with minor changes in data that would be appropriately followed, monitored, and acted upon as necessary

## 8.1 WATER QUANTITY THRESHOLDS FOR ADAPTIVE MANAGEMENT

Results of the surface water monitoring program will be compared with the observations collected during the baseline programs as well as the surface water quantity predictions made in the water balance models for the Project (Stantec 2020g; Stantec 2020h). The SWMMP includes an adaptive management component that will be used to determine if, and what, mitigation actions need to be taken to reduce the magnitude, timing, or duration of changes in water levels in lake or flows in streams used by fish that are part of commercial, recreational or Aboriginal fisheries, and which contingency measures may be required (i.e., a Trigger Action Response Plan [TARP]). This adaptive management component is expected to include:

- Lake level elevation and stream discharge thresholds.
- A hierarchical plan to investigate the potential causes of threshold exceedance to determine if the threshold exceedance is related to measurement error, equipment malfunction, a single anomalous event, a naturally occurring local phenomenon (e.g., beaver activity), a regional phenomenon, or a project-related effect. This includes review of regional long-term Water Survey of Canada stations to check whether changes in surface water quantity may also be related to regional climatic conditions.
- A hierarchical plan to implement remedial actions to existing mitigation measures or to implement additional or new mitigation measures to reduce or eliminate threshold exceedances.
- A plan to report any project-related threshold exceedances to the appropriate federal and provincial agencies, and to local Indigenous Nations.

To support adaptive management, two levels of thresholds, each with varying levels of sensitivity and associated response are identified: Tier 1 “proactive trigger values” and Tier 2 “action threshold values”. For water quantity changes, flow-based exceedances for lotic systems and depth-based changes for lotic systems will be established.

Proactive trigger values” would be water quantity changes that, if exceeded, would provide an early warning of potential changes in channel morphology or lake littoral habitat availability, prior to aquatic effects occurring downstream of the Project. These “proactive trigger values” would be set to values below those identified as being high magnitude of change (i.e., either greater than or less than 30% of background flows) beyond what was predicted in the EIS. For example, cross sections would be established in creeks downstream of the Project, in addition to the hydrometric monitoring program, to monitor if the flow increases are resulting in channel changes such as thalweg depth and width, wetted perimeter, or floodplain width. Similar monitoring programs would be established in lentic environments where high magnitude

changes have been observed, such as establishing shoreline transects to monitor if lake level increases are resulting in changes in littoral habitat availability, mean and maximum depth, and/or surface area.

“Active threshold values” would be based on exceedances in water quantity changes in the waterbody associated with the observed exceedances. Linkages between surface water quantity and monitoring associated with the AEMP will be established prior to program implementation.

For the water quantity monitoring and adaptive management plan Tier 2 would be based on observed exceedances of the “action threshold values”. Any exceedance of a “active threshold value” would initiate the following response. First, a field-based assessment of the exceedance would be conducted to confirm that it is Project-related and not measurement error, not a regional or single anomalous event, or a result of seasonal variability. This assessment may include re-measurement, more detailed geomorphic assessment, and comparison to other monitoring locations upstream or downstream of the mine. Third, a quantitative risk evaluation would be undertaken. This may include assessing the magnitude, geographic extent, duration, and biological relevance of the exceedance, and/or determining whether to proceed to identify and implement appropriate mitigation or to re-evaluate the water quantity “action threshold value” and develop an appropriately protective value (with input from federal and provincial regulators and the Indigenous Environmental Advisory Committee as appropriate). Fourth, mitigation options to reduce the magnitude of the water quantity change would be assessed and implemented. These options may include, but not be limited to, rerouting of contact water to other systems, retention of water in existing lakes (to attenuate downstream effects) or redesign of water management infrastructure. Finally, the effectiveness of the mitigation measure(s) to reduce surface water quantity in the receiving environment would be monitored.

### 8.1.1 Trigger Response Monitoring Locations

The monitoring stations are presented in Section 5.1, of these stations seven of the Gordon site monitoring locations and four of the MacLellan site monitoring locations have been chosen for trigger threshold monitoring, prior to aquatic effects occurring downstream of the Project. This sub-set of stations includes stations in lakes and streams immediately downstream of the Gordon and MacLellan sites plus the reference sites identified for each site. This is because these are the monitoring locations closest to the mine infrastructure at the Gordon and MacLellan sites and, therefore, the lakes and streams most likely to be affected by the Project. They are also the lakes and streams most likely to show measurable changes earlier than in lakes and streams further downstream. A preliminary list of threshold monitoring locations to be used to inform adaptive management is provided in Table 8-1.

## Table 8-1 Surface Water Quantity Trigger Threshold Monitoring Locations and Parameters

| Location | Trigger Threshold Monitoring Station | Frequency of Measurement | Trigger Threshold Parameter | Rationale |
|---|---|---|---|---|
| **Gordon Site** | | | | |
| Gordon Lake (southern inlet) | QF01[1] | Monthly (open water) | water level | • Average monthly or annual model results at this location experience project-related effects greater than 10% |
| Gordon Lake (outlet) | QF03[1, 2] | Monthly (open water); one winter flow measurement | streamflow and water level | • Average monthly or annual model results at this location experience project-related effects greater than 10%<br>• Monitoring receiving waterbodies and watercourses, both upstream and downstream of discharge flows to identify effects of discharge flows on the environment and confirm compliance with regulatory approvals, including Gordon and Farley Lakes at the Gordon site. |
| Farley Lake (inlet) | QF02B[1,3] | Monthly (open water) | water level | • Average monthly or annual model results at this location experience project-related effects greater than 10% |
| Farley Lake | FAR5.2 and FAR5.1[1, 2] | Monthly (open water) | water level | • Average monthly or annual model results at this location experience project-related effects greater than 10%<br>• Monitoring receiving waterbodies and watercourses, both upstream and downstream of discharge flows to identify effects of discharge flows on the environment and confirm compliance with regulatory approvals, including Gordon and Farley Lakes at the Gordon site. |
| Eastern outlet of Farley Lake (Farley Creek) | QF05[1] | Monthly (open water); one winter flow measurement | streamflow and water level | • Average monthly or annual model results at this location experience project-related effects greater than 10% |
| Swede Lake (outlet) | QF07[1] | Monthly (open water); once (winter) | streamflow and water level | • Average monthly or annual model results at this location experience project-related effects greater than 10% |
| Ellystan Lake (outlet) | QF08[1] | Monthly (open water); one winter flow measurement | streamflow and water level | • Average monthly or annual model results at this location experience project-related effects greater than 10% |

| Location | Trigger Threshold Monitoring Station | Frequency of Measurement | Trigger Threshold Parameter | Rationale |
|---|---|---|---|---|
| **MacLellan Site** | | | | |
| Unnamed tributary of the Keewatin River (KEE3-B1) | QM04B[1,4] | Monthly (open water); one winter flow measurement | streamflow | • Average monthly or annual model results at this location experience project-related effects greater than 10% |
| Minton Lake outlet | QM07B[1] | Monthly (open water); one winter flow measurement | streamflow and water level | • Average monthly or annual model results at this location experience project-related effects greater than 10% |
| Keewatin River (upstream of PDA) | QM02B[2,5] | Daily (open water); Weekly winter flow measurement | streamflow | • Monitoring receiving waterbodies and watercourses, both upstream and downstream of discharge flows to identify effects of discharge flows on the environment and confirm compliance with regulatory approvals, including selected monitoring stations in the Keewatin River at the MacLellan site. |
| Keewatin River (downstream of PDA) | QM06B[2,6] | Monthly (open water); one winter flow measurement | streamflow | • Monitoring receiving waterbodies and watercourses, both upstream and downstream of discharge flows to identify effects of discharge flows on the environment and confirm compliance with regulatory approvals, including selected monitoring stations in the Keewatin River at the MacLellan site. |

Notes:
[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)
[2] Closure Plans (Alamos 2024a and 2024b)
[3] Previous station ID: QF02
[4] Previous station ID: QM04
[5] Previous station ID: QM02
[6] Previous station ID: QM06

### 8.1.2 Trigger Thresholds and Response Plans

Trigger thresholds for surface water quantity have been defined for the respective indicator parameters that would initiate specific adaptive management actions depending on the severity of the action level triggered. Two trigger thresholds are defined below, each with a varying level of sensitivity and associated level of response. The purpose of establishing multiple action levels is to identify potential water quantity issues early through routine screening and to identify the appropriate action level to address potential impacts to water resources as a result of the Project. If the trigger threshold is exceeded, an associated response plan would be initiated.

Water level and streamflow are defined as the two trigger threshold parameters for surface water quantity. A water quantity response plan would be initiated in the event that one of the following trigger thresholds is exceeded:

- The lake level at a lake monitoring station decreases to 3 cm higher than the predicted minimum water level elevation or increases to 3 cm lower than the maximum predicted water level for the given monitoring location (refer to Table 8-2). For lake monitoring stations that have less than one year of baseline data, the minimum lake level elevation may be adjusted to account for anticipated seasonal water level variations at the given location. Seasonal lake water thresholds may be developed if continued monitoring shows that they would be more appropriate.
- The predicted minimum and maximum monthly streamflow (as presented in Table 8-3) for the adaptive management stations.

**Table 8-2 Preliminary Water Level Trigger Thresholds**

| Trigger Monitoring Location | Modelled Minimum Water Level (masl) | Modelled Maximum Water Level (masl) | Minimum Water Level Trigger Threshold (masl) | Maximum Water Level Trigger Threshold (masl) |
|---|---|---|---|---|
| **Gordon Site** | | | | |
| Gordon Lake | 315.06 | 315.32 | 315.09 | 315.29 |
| Farley Lake | 313.50 | 314.13 | 313.53 | 314.16 |
| Swede Lake | 297.09 | 297.53 | 297.12 | 297.56 |
| Ellystan Lake | 282.81 | 283.11 | 282.84 | 283.08 |
| **MacLellan Site** | | | | |
| Minton Lake outlet | 329.84 | 330.20 | 329.87 | 330.17 |
| Note:<br>Trigger thresholds may be updated as additional baseline data is collected and water balance modelling updates are made over the life of the Project. | | | | |

## Table 8-3 Preliminary Streamflow Trigger Thresholds

| Trigger Monitoring Location | Streamflow Trigger Threshold (Predicted Minimum Monthly Streamflow) ($m^3/s$) | Streamflow Trigger Threshold (Predicted Maximum Monthly Streamflow) ($m^3/s$) |
|---|---|---|
| **Gordon Site** | | |
| Eastern outlet of Farley Lake (Farley Creek) | 0.016 | 0.329 |
| Swede Lake (outlet) | 0.037 | 0.710 |
| Ellystan Lake (outlet) | 0.055 | 1.284 |
| **MacLellan Site** | | |
| Unnamed tributary of the Keewatin River (QM04) | 0.000 | 0.177 |
| Minton Lake (QM07) | 0.010 | 0.123 |
| Keewatin River (QM02) | 3.915 | 23.663 |
| Keewatin River (QM06) | 3.966 | 24.008 |
| Note:<br>Trigger thresholds may be updated as water balance modelling updates are made over the life of the Project. | | |

If one of the trigger thresholds for water quantity is exceeded, then the following response plan ("Actions") will be initiated:

**Action 1** Confirm the Result: – re-measure the water level or streamflow to confirm the value. Confirm the equipment used to make the measurement is operating as intended by the manufacturer.

- If re-measuring indicates a value that is equal to or below the defined water quantity trigger threshold, then no action is required; continue with the overall monitoring plan.
- If the original measurement is validated, then proceed to Action 2.

**Action 2** Evaluate the Dataset:

- Compare the water level and streamflow data to the historic and modelled dataset, check for beaver activity, and consider meteorological data and regional streamflow data from long-term WSC stations. Determine if the exceedance is related to a single anomalous event, such as a meteorological event, seasonal variation, or is a Project-related effect.
- If the trigger threshold exceedance is not Project-related, then continue with ongoing monitoring. Otherwise proceed to Action 3.

**Action 3** Complete an Investigation: determine if an adverse Project-related effect is occurring in the receiving environment.

- Based on the information derived from the investigation, the potential relevance of the exceedance event to surface water features, aquatics, and wetlands will be evaluated through a qualitative risk evaluation. Based on the risk evaluation, more rigorous monitoring may be recommended for the nearby surface water features, aquatic resources, and/or wetlands.
- Notify IAAC, MECC, and the Indigenous Environmental Advisory Committee if new mitigation is required. Document the results of the event and investigation in the annual report (refer to Section 9.0).

## 8.2 WATER QUALITY THRESHOLDS FOR ADAPTIVE MANAGEMENT

As part of the adaptive management framework, a TARP will be developed for Project-related POPCs identified for the aquatic receiving environment. The TARP will define the water quality trigger levels (i.e., threshold concentrations) for POPCs predicted during the EIS and/or identified as the water quality monitoring program progresses, and will define the corresponding adaptive management actions that will be initiated when surface water quality monitoring indicates a trigger level is exceeded or if POPC concentrations are trending toward an exceedance.

The purpose of water quality trigger levels is to serve as an early warning for potential Project-induced adverse effects in the aquatic receiving environment. Preliminary trigger levels will be developed for water quality parameters that are expected to exceed existing WQG-FAL in the receiving environments of the Gordon and MacLellan mine sites and will be based on a percentage of the relevant WQG-FAL (i.e., MWQSOG-FAL, CWQG-FAL, or Federal Environmental Quality Guidelines). In cases where a generic federal or provincial WQG-FAL is not based on the most relevant and/or defensible approaches for guideline development (e.g., outdated data, toxicity data that are not suitable for site-specific biological receptors, large arbitrary safety factors, etc.), a site-specific water quality objective (SSWQO) will be developed for monitoring potential effects in the receiving environment. In these cases, trigger levels will be based on a percentage of the SSWQO instead of the WQG-FAL.

In addition to WQG-FAL and SSWQOs, trigger levels may also incorporate spatiotemporal trend analyses and statistical comparisons to baseline and reference conditions for the identification of Project-induced trigger level exceedances.

Section 7.3 describes the currently identified POPCs and locations selected for trigger response monitoring in the aquatic receiving environment of the Gordon and MacLellan mine sites.

### 8.2.1 Trigger Response Monitoring Locations

Four of the monitoring sites identified in Section 7.1 at the Gordon site and three of the monitoring sites identified in Section 7.1 at the MacLellan site have been chosen as trigger threshold monitoring stations to alert changing surface water quality downstream of effluent discharges (Table 8-4): Gordon Lake, West Farley Lake, East Farley Lake, and Swede Lake at the Gordon site and tributary KEE3-B1, Minton Lake, and the Keewatin River downstream of new open pit drainage (decommissioning/closure and post-closure), downslope of groundwater seepage from the MRSA and TMF, and downstream of effluent discharge, respectively.

The trigger threshold monitoring stations at the Gordon and MacLellan sites were selected based on the location of predicted POPCs in the EIS (Stantec 2020a). If a parameter was a predicted POPC at any receiving environment location in the EIS, then it was considered a trigger threshold parameter to be monitored at each trigger threshold monitoring station.

Monthly sampling of the trigger threshold monitoring stations will enable development of trigger threshold parameter trends and to differentiate whether fluctuations in water quality are due to sample variation, single anomalous events (e.g., meteorological event, seasonal variation), or a Project-related effect.

**Table 8-4 Surface Water Quality Trigger Threshold Monitoring Locations and Parameters**

| Trigger Threshold Monitoring Station | Frequency of Measurement | Trigger Threshold Parameter | Rationale |
|---|---|---|---|
| **Gordon Site** | | | |
| Gordon Lake | Monthly | Fluoride and total phosphorus | Average monthly or annual model results at this location experience project-related effects greater than 10% Monitor for potential Project-related changes in fluoride and total phosphorus concentrations in the immediate receiving environment in excess of the modelled predictions in the EIS. Fluoride is a predicted POPC for all Project phases in Gordon Lake. Phosphorus is not a predicted POPC in Gordon Lake but is a trigger threshold parameter because it was identified as a POPC in West Farley Lake during the construction phase. |
| West Farley Lake | Monthly | Fluoride and total phosphorus | Monitor for potential Project-related changes in fluoride and total phosphorus concentrations in the immediate receiving environment. Fluoride and total phosphorus are predicted POPCs either in the construction phase (phosphorus) or all Project phases (fluoride) in West Farley Lake. |

| Trigger Threshold Monitoring Station | Frequency of Measurement | Trigger Threshold Parameter | Rationale |
|---|---|---|---|
| East Farley Lake | Monthly | Fluoride and total phosphorus | Monitor for potential Project-related changes in fluoride and total phosphorus concentrations. Fluoride is a predicted POPC in East Farley Lake in all Project phases. Phosphorus is not a predicted POPC in East Farley Lake but is a trigger threshold parameter because it was identified as a POPC in West Fairly Lake during the construction phase. |
| Swede Lake | Monthly | Fluoride and total phosphorus | Monitor for potential Project-related changes in fluoride and total phosphorus concentrations. Fluoride is a predicted POPC in Swede Lake in all Project phases. Phosphorus is not a predicted POPC in Swede Lake but is a trigger threshold parameter because it was identified as a POPC in West Fairly Lake during the construction phase. |
| **MacLellan Site** | | | |
| KEE3-B1 | Monthly | Total Al, As, Cd, Cu, F, Sb, Se, Zn; dissolved Cd, Cr(VI) | Monitor for potential Project-related effects to surface water quality in the immediate receiving environment. Total Al, As, Cd, Cu, F, and dissolved Cd are predicted POPCs in KEE3-B1 in post-closure (due to groundwater seepage from the TMF and MRSA and overflow from the open pit). |
| AQM16 (Minton Lake) | Monthly | Total Al, As, Cd, Cu, F, Sb, Se, Zn; dissolved Cd, Cr(VI) | Monitor for potential Project-related effects to surface water quality in the immediate receiving environment. Total Cd was identified as a POPC in Minton Lake in post-closure (due to groundwater seepage from the TMF and MRSA). Total Al, As, Cu, F, Sb, Se, Zn and dissolved Cd and Cr(VI) are predicted POPCs in KEE3-B1 in post-closure. |
| AQM8 (Keewatin River) | Monthly | Total Al, As, Cd, Cu, F, Sb, Se, Zn; dissolved Cd, Cr(VI) | Monitor for potential Project-related effects to surface water quality in the near-field receiving environment. Total Al was identified as a POPC at AQM8 in post-closure (due to groundwater seepage from TMF and MRSA and overflow from the open pit). Total Al, As, Cu, F, Sb, Se, Zn and dissolved Cd and Cr(VI) are predicted POPCs in KEE3-B1 in post-closure. |

Notes:
Al = aluminum; As = arsenic; Cd = cadmium; Cu = copper; F = fluoride
POPC = Parameter of Potential Concern

### 8.2.2 Trigger Thresholds and Response Plans

Trigger thresholds have been defined as concentrations for the trigger threshold parameters (i.e., Table 8-2) that would initiate specific adaptive management actions depending on the severity of the action level triggered. Two trigger thresholds for surface water quality have been defined each with varying levels of sensitivity and associated levels of response. The purpose of establishing multiple action levels is to identify potential water quality issues early through routine screening and to identify the appropriate action level to address potential impacts to groundwater resources as a result of the Project. The two surface water quality trigger thresholds and response plans are defined as follows.

**Trigger Threshold 1**

The early identification of increasing trends in the concentration of indicator parameters, prior to guideline exceedance, is a primary component of the water quality adaptive management plan. Trigger Threshold 1 is meant to identify potential issues associated with the Project before they have the potential to result in a measurable adverse effect on the receiving environment. The goal of Trigger Threshold 1 is to obtain more information about a trigger threshold parameter, identify the source of the trend, if possible, and generally provide increased attention, information, and awareness of a potential water quality issue before it reaches a Trigger Threshold 2 concentration. Trigger Threshold 1 is defined as a statistically significant upward trend for a given indicator parameter or for a water quality monitoring station that has had a statistically significant upward trend in the baseline data and has shown an increase in the magnitude of the trend compared with baseline.

Ongoing trend analysis will be completed using the Mann-Kendall test (Mann 1945; Kendall 1970, Walker and Harrison 2013). The Mann-Kendall test has been found to be a simple and effective way to measure whether an indicator parameter is rising or falling. The test can be applied to as few as four points. For this application, the Mann-Kendall test will be applied to the entire dataset for a given monitoring location. Using the method cited by Walker and Harrison (2013), the Mann-Kendall test statistic (S) and the coefficient of variation will be calculated and applied using the 90% confidence level chart.

If Trigger Threshold 1 is exceeded the following responses (“Actions”) will be initiated:

**Action 1** Quality Review of the Reported Data: Complete a QA/QC review of the sampling methods, laboratory reports, and chain of custody. Assess the validity of outliers that may be biasing the trend analysis. Resample the location and/or re-run the laboratory sample (if the sample’s hold time has not been exceeded) to confirm the reported result.

- If the QA/QC review indicates sampling or laboratory error and upon further analysis the applicable trigger threshold is not exceeded, then continue with overall monitoring.
- If the QA/QC review confirms that the trigger threshold has been exceeded, then proceed to Action 2.

**Action 2** Field Level Assessment: Complete a field level assessment to investigate whether the source of the exceedance at the monitoring location can be identified. This should include completing an investigation of the area adjacent to the monitoring location (for example, look for noticeable bank erosion if in a riverine environment or for upwellings and disturbance if in a lacustrine environment).

- If the field level assessment reveals that the issue is localized and that containment or future releases can be prevented, complete resampling of the location once the source has been isolated and determine whether the applicable trigger threshold is still exceeded.
- If the field level assessment does not identify a source of the exceedance and there is no obvious reason for the exceedance of the applicable trigger threshold, then proceed to Action 3.

**Action 3** Review Additional Available Data: Review available data to determine if a cause for the trigger threshold exceedance can be determined. For example, is the exceedance related to a single anomalous event such as a meteorological event, seasonal variation, or a natural event (scour of the river bed or disturbance of sediments on the lake bed) or the potential for a Project-related effect.

- If the review indicates the occurrence is anomalous or may subside, such as for non-Project related effects, document the assessment in the annual report (refer to Section 9.0) and continue monitoring to confirm reduction in parameter concentration.
- If the review suggests concentrations are increasing or remaining elevated above predicted concentrations for extended periods and/or has the potential to be related to the Project, proceed to Action 4.

**Action 4** Refer to Trigger Threshold 2 Action Plan

**Trigger Threshold 2**

An exceedance of Trigger Threshold 2 is defined as:

1. an exceedance of Trigger Threshold 1 and
2. an exceedance of the predicted water quality concentrations at the monitoring location for the specific Project phase that the exceedance has occurred in (e.g. construction vs operation).

Trigger Threshold 2 is defined to alert to the need for additional investigation prior to an adverse effect greater than predicted for the Project phase. If the concentration of an indicator parameter does not exceed Trigger Threshold 2, then continue monitoring as planned. If the concentration of an indicator parameter exceeds Trigger Threshold 2, the following actions will be undertaken.

**Action 1** Complete an Investigation: Complete an investigation to assess whether the exceedance is Project-related. The investigation will be designed, implemented, and interpreted by a Qualified Professional. The investigation may include the following key aspects:

- Assess whether the exceedance event is isolated to the one sampling location or multiple sampling locations.

- Migration pathway: based on the first assessment (one sampling location or multiple) define a potential pathway for contamination, include a review of the collection ponds, groundwater and seepage pathways, and modelling predictions.
- Additional parameter(s): assess whether there are changing trends associated with other parameters at the impacted monitoring location(s).
- Magnitude of exceedance: assess whether the exceedance represents a minor or significant deviation from the trigger threshold. Review the concentration of the source of the exceedance relative to predicted concentrations to assess the potential for the parameter to further degrade surface water quality.
- If required, augment the monitoring network to the delineate the source or increase sample frequency.

**Action 2** Qualitative Risk Evaluation: Based on the information derived from the Trigger Threshold 1 action plan and/or Trigger Threshold 2 investigation, the potential relevance of the exceedance will be evaluated through a qualitative risk evaluation. Based on the results of the risk evaluation, more rigorous monitoring or additional analytical methods may be recommended for the monitoring location (e.g., increased sampling frequency, additional sample locations, additional parameters, chemical speciation).

**Action 3** Determine Project Influence: Conclude whether exceedance is related to the Project and, if so, whether it is incidental (accident/malfunction), operational (related to an operational procedure that may be mitigated), and/or the result of seepage from mine components.

- If the exceedance is not related to the Project, continue with the monitoring plan with modifications recommended by the Qualified Professional based on the outcomes of the investigation, and document the assessment in the annual report (refer to Section 9.0).
- If the exceedance is deemed related to be Project-related, proceed to Action 4.

**Action 4** Notification: Notify IAAC, MECC, and the Indigenous Environmental Advisory Committee of the trigger threshold exceedance and the results of the Actions taken. Proceed to Action 5.

**Action 5** Mitigate Effects of the Project: If mitigation is deemed necessary, options designed to reduce the contamination pathway at the monitoring location might include:

- If source is an identifiable feature, isolate source from the environment and treat water, if necessary, prior to discharging to the environment.
- If the source is linked to an operational activity that can reasonably be temporarily halted, halt activity until a mitigation can be implemented to prevent further incidences.,
- If the source is a result of seepage flows detected in the seepage collection ditches that cannot be adequately captured by existing sump stations, installation of larger seepage collection pumps, where necessary, can be used to direct seepage to the appropriate facility (e.g., pumped back to TMF).
- Modifications to the existing ditch system to increase seepage collection efficiency (e.g., modification of ditch geometry, alignment, or construction materials), to reduce ponding in the ditch that may have resulted in the additional seepage.

- Installation of one or multiple groundwater pump-back wells could serve as a hydraulic barrier (i.e., collection of plume waters and pump back to TMF) if source of contamination is known.
- Installation of a barrier wall that could include sheet pile, grout curtain or localized grouting of bedrock, if source of contamination is known.
- For some parameters and flow paths, either active or passive treatment options may offer a viable alternative to other contingency measures. A variety of active treatment systems exist, the configuration of which will depend on the trigger threshold parameter(s) that requires treatment, the reduction in the concentration of the trigger threshold parameters required, and the treatment rate. Passive treatment measures could include permeable reactive barriers, bioreactors or engineered wetlands, to name a few.

# 9.0 REPORTING

Reports from the SWMMP monitoring programs will be submitted annually to regulatory authorities and shared with interested Indigenous Nations and stakeholders.

The annual report will incorporate data collected during a calendar year and will be submitted to regulatory authorities in the year following the reporting year (e.g., data collected in 2030 would be submitted in 2031). The initial report will be submitted the year after the start of construction at either the Gordon or MacLellan site, whichever occurs first. The report will be separated into two volumes, one for each site. The report(s) will be factual and may include the following:

- Summary of monitoring activities that were conducted.
- Tabulated results of the data collected through the SWMMP.
- Comparison of data to trigger thresholds, identification if a trigger threshold was exceeded, and the mitigation and/or adaptive management that was implemented, if required.

Results of the surface water monitoring program will be presented to show long-term trends, statistical differences (if any) between near- and far-field monitoring sites and reference sites, and comparison to applicable Manitoba and/or Canadian water quality guidelines and/or site-specific water quality objectives. The monitoring results will be used to validate predictions and inform model updates by providing yearly data, which will be added to growing databases for groundwater, hydrology and water quality, that will then be used to conduct qualitative, graphical, and quantitative (i.e., statistical) analysis comparing data collected during construction, operation, closure/decommissioning, and post-closure phases to groundwater, water balance, and water quality model predictions. Increasing larger datasets will provide increasingly greater statistical power and precision to compare field data and model predictions over time. Statistically significant differences between model predictions and field data will be used to signal when model updates are required. These updates, when necessary, will be driven by sensitivity analyses which will identify which model inputs, constants, or assumptions have the greatest influence on the models and, therefore, should be changed for improving model predictions

Investigations completed due to a trigger threshold exceedance under the Surface Water Trigger Thresholds and Response Plans (Section 8.0) will be documented as stand-alone technical memorandums at the time of the investigation and appended to the annual report. Notifications regarding the trigger threshold exceedances and associated investigation report will be documented in the annual report.

If modifications to the monitoring program are warranted, based on sufficient supporting information, a request will be made in writing to IAAC.

# 10.0 REFERENCES

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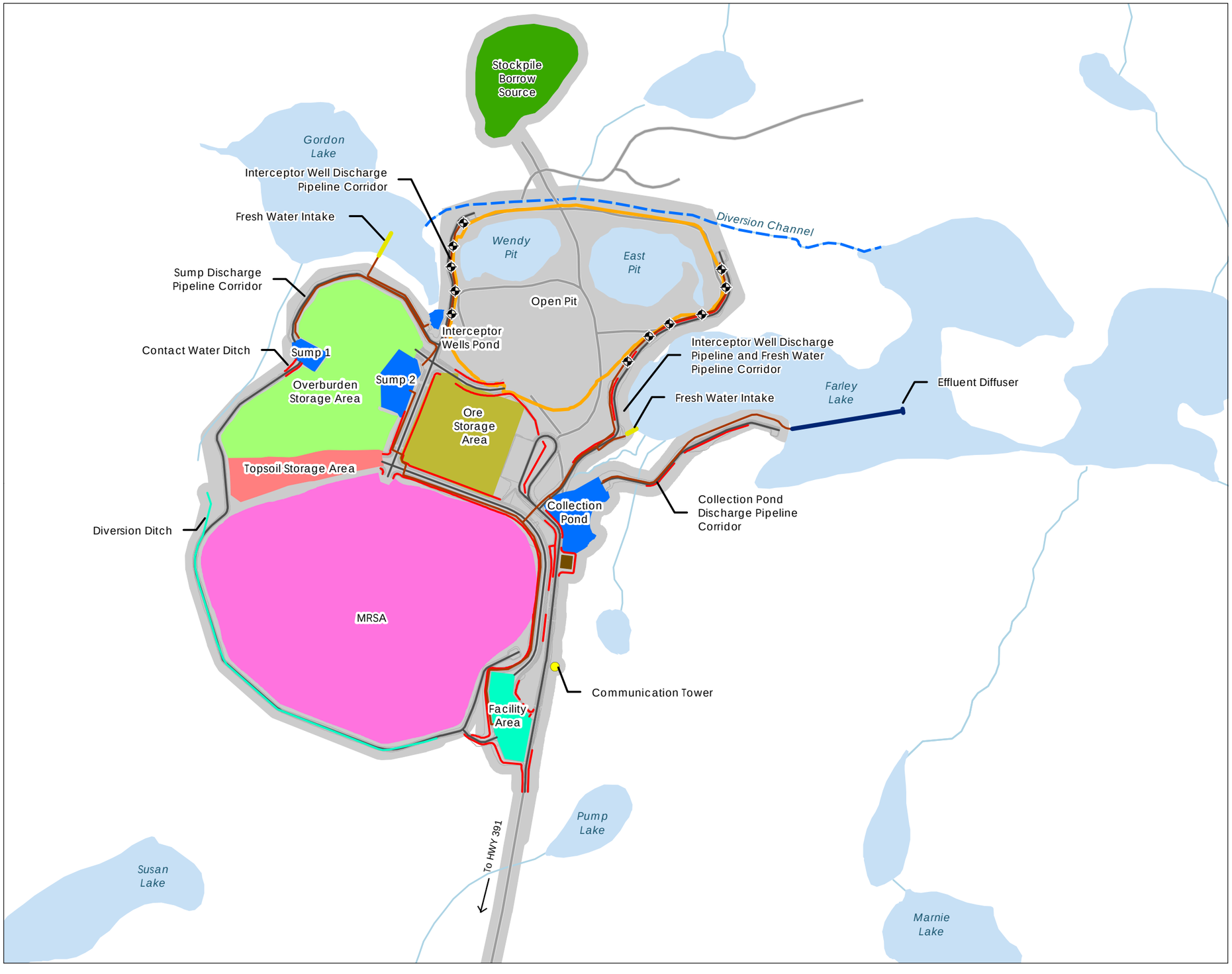
# Appendix A Maps




Stantec

**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 Area
- Gen Set Area
- Mine Rock Storage Area
- Open Pit
- Ore Storage
- Overburden Storage
- Topsoil Storage Area
- Stockpile Borrow Source
- Project Development Area (PDA)

**Landbase**

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

N

0 250 500 Metres

(At original document size of 11x17)
1:12,000

***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 2024-06-19
Technical Review by KMathers on 2024-06-19

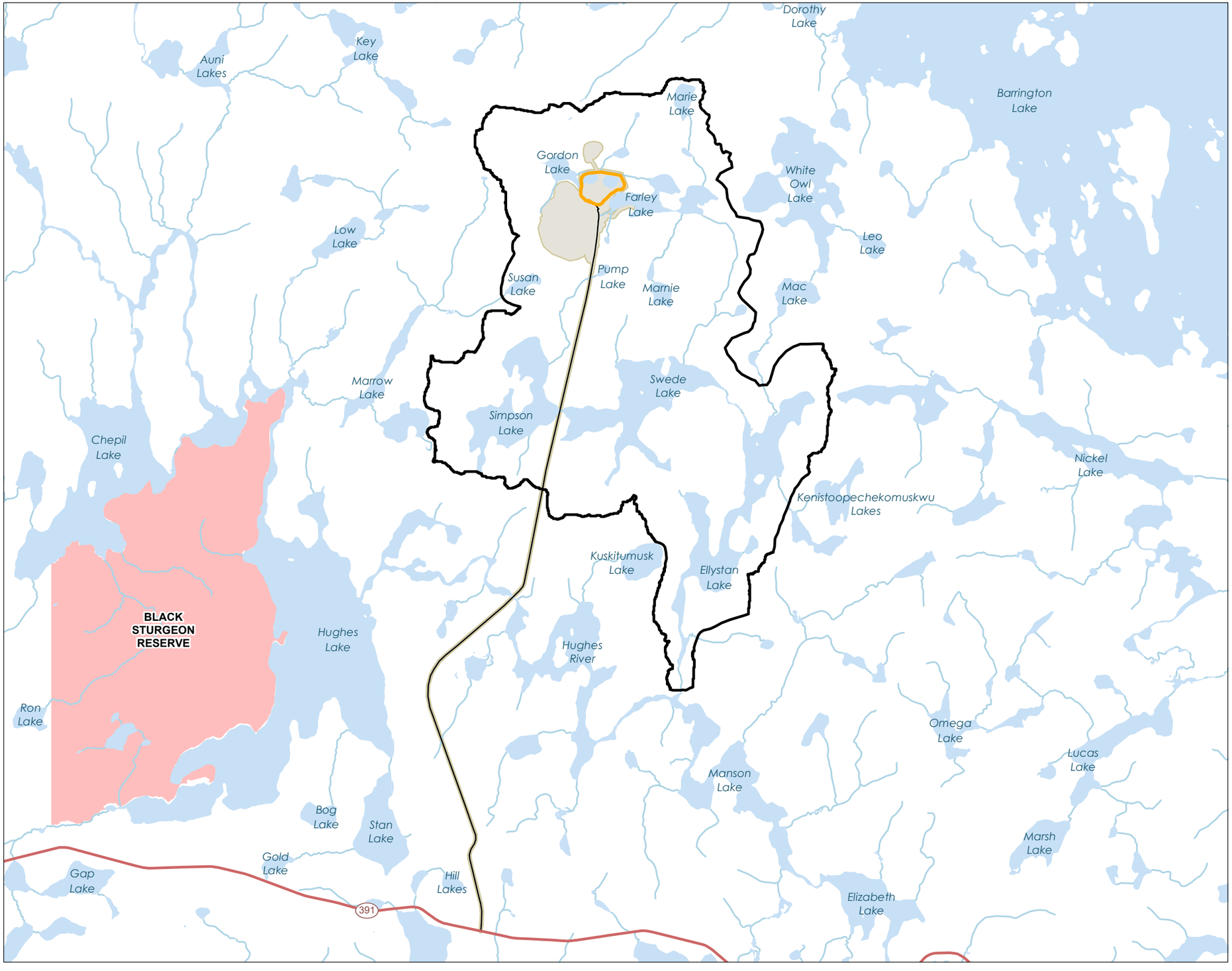
*Client/Project*
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473076

*Map No.*
**2-1**

*Title*
**Gordon site**

G:\ GIS Project Folder\111473808 LGP EA\RI\SWMP_AEMMP_sampling_2024\Map2-1 SWMMP Gordon_site_20240828.mxd Revised: 2024-08-28 By: ACampigotto




Stantec

**Project Infrastructure**

- Proposed Open Pit
- Project Development Area

**Study Area**

- Surface Water Local Assessment Area (LAA)

**Landbase**

- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

N

0 1 2 Kilometres

(At original document size of 11x17)
1:75,000

***Notes***

**1.** Coordinate System: NAD 1983 UTM Zone 14N
**2.** Base Data Sources: Government of Manitoba and Government of Canada.

*Project Location*
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-08-28
Technical Review by KMathers on 2024-08-28

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

111473076

*Map No.*
**2-2**

*Title*
**Surface Water Local Assessment Area - Gordon Site**

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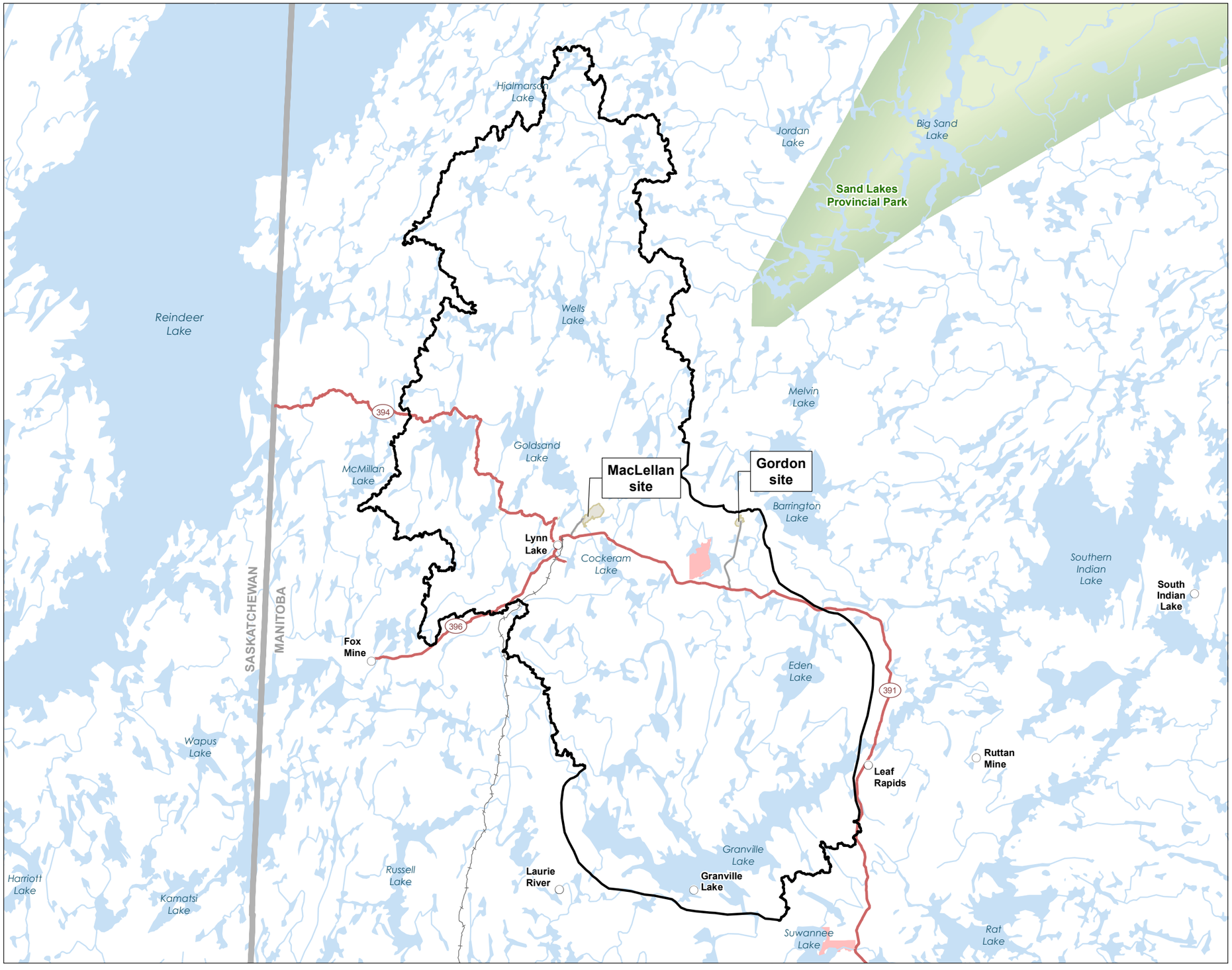


Stantec

Alamos Gold Inc.

**Project Infrastructure**
- Project Development Area

**Study Area**
- Surface Water Regional Assessment Area (RAA)

**Landbase**
- Community
- Highway
- Access Road
- Rail
- Watercourse
- Waterbody
- First Nation Reserve
- Provincial Park
- Provincial Border

N

0 10 20 Kilometres

(At original document size of 11x17)
1:800,000

***Notes***
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada

*Project Location*
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-08-28
Technical Review by JJackson on 2024-08-28
Senior GIS Review by GKroupa on 2020-03-30

*Client/Project*
111473008
ALAMOS GOLD INC.
Lynn Lake Gold Project

*Map No.*
**2-3**

*Title*
**Surface Water - Regional Assessment Area**

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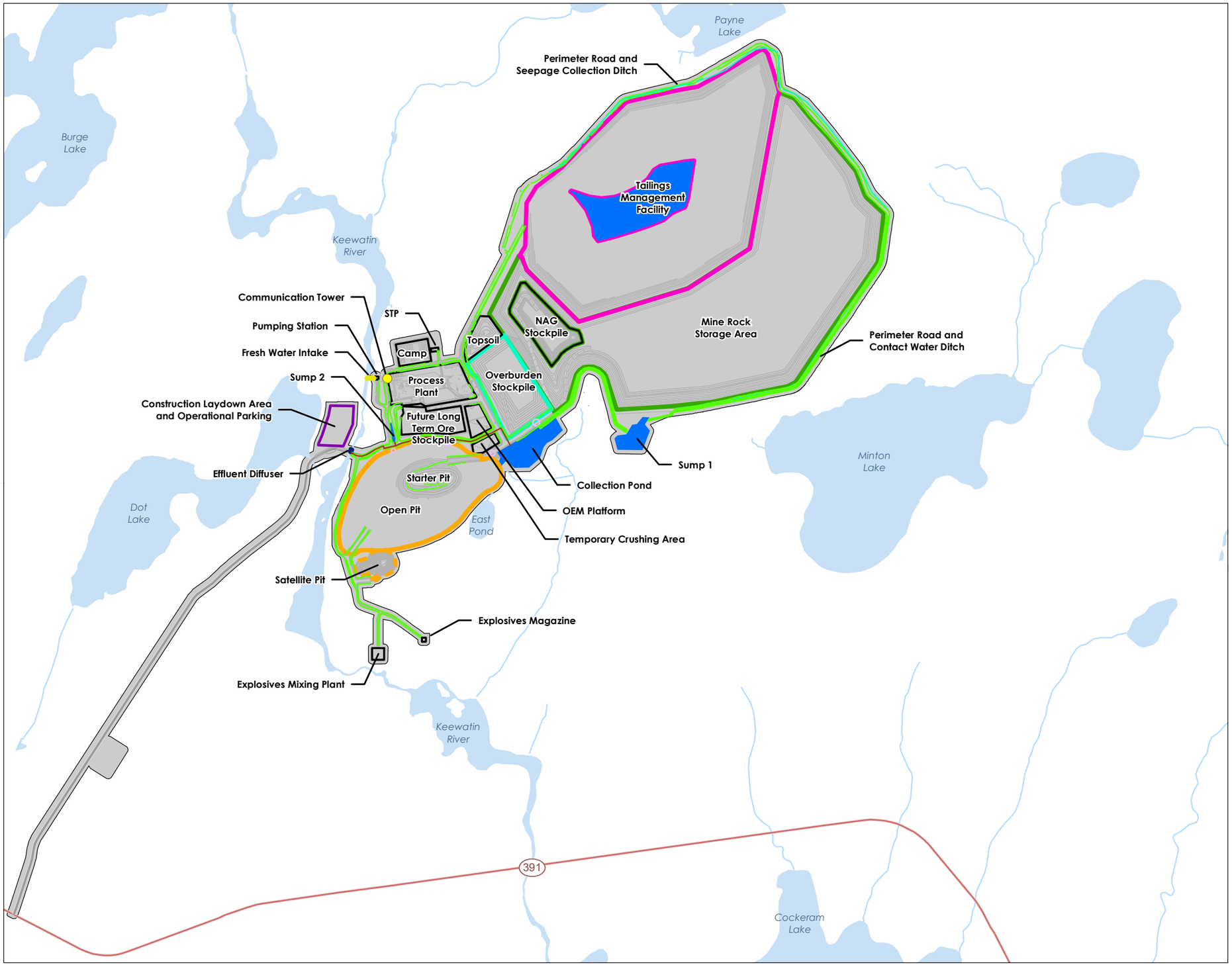



Stantec

**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

N

0 0.5 1 Kilometres

(At original document size of 11x17)
1:30,000

***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

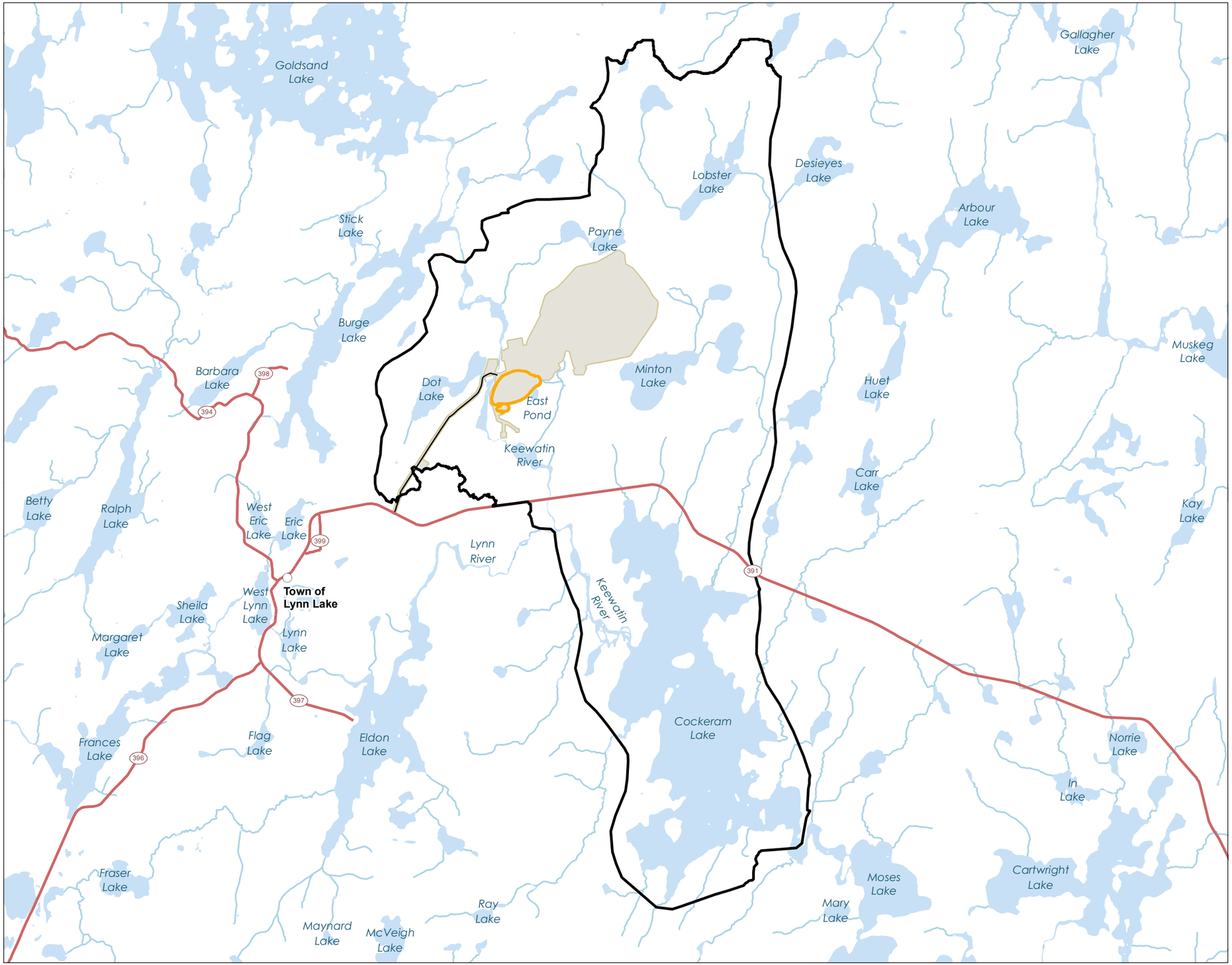
*Client/Project*
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473076

*Map No.*
**2-4**

*Title*
**MacLellan site**

G:_GIS Project Folder\111473008_LGP_EA\Rs\SWMAP_AEMAP_compling_2024\Mxp2-4 SWMAP_MacLellan_site_20240928.mxd Revised: 2024-09-28 By: ACampigotto




Stantec

**Project Infrastructure**
- Proposed Open Pit
- Project Development Area

**Study Area**
- Surface Water Local Assessment Area (LAA)

**Landbase**
- Existing Access Road
- Highway
- Watercourse
- Waterbody

N

0 1.5 3 Kilometres
(At original document size of 11x17)
1:100,000

***Notes***
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

*Project Location*
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-08-28
Technical Review by KMathers on 2024-08-28

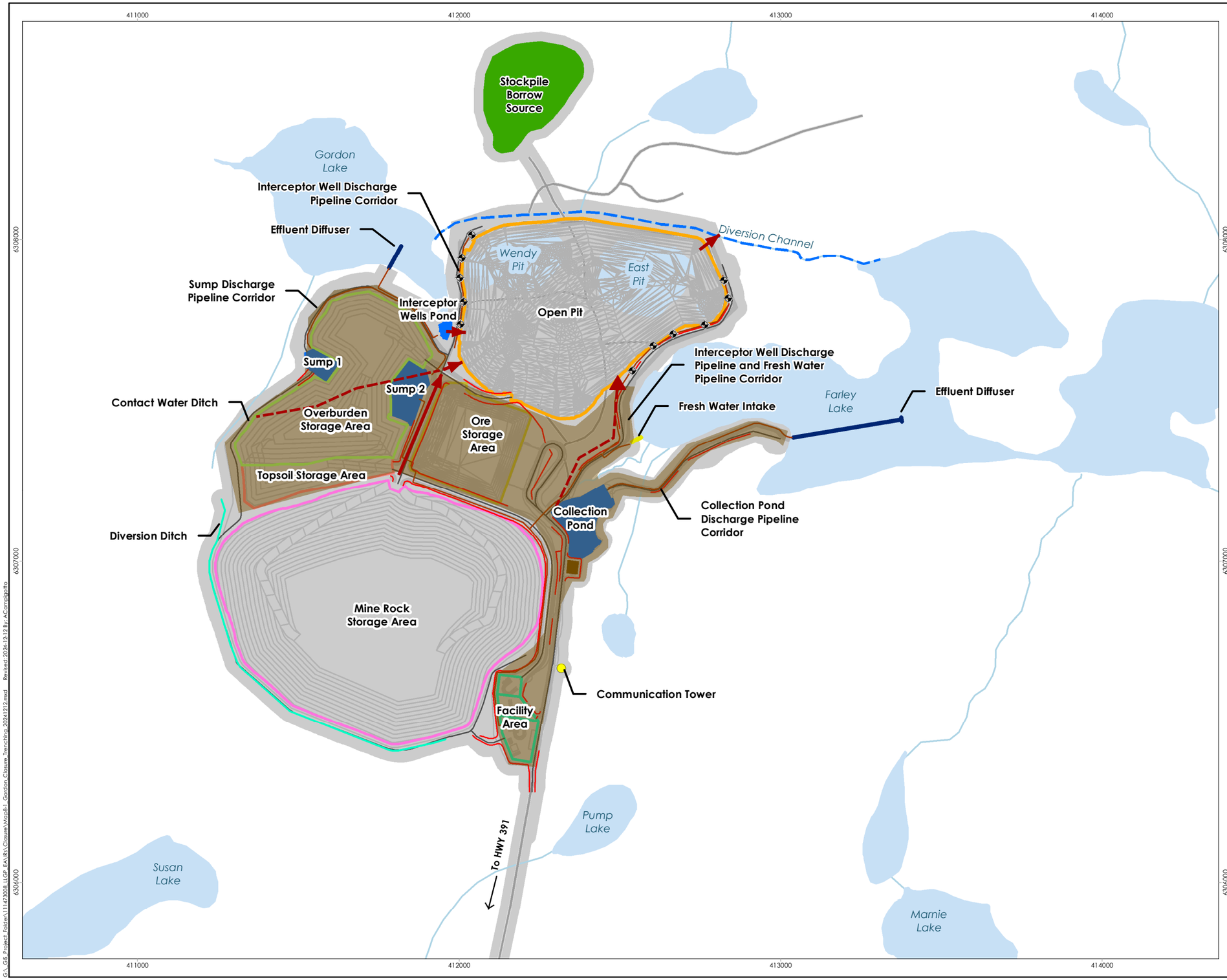
*Client/Project*
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473076

*Map No.*
**2-5**

*Title*
**Surface Water Local Assessment Area - MacLellan Site**

G:_GIS_Project_Folder\111473008_LGP_EA\R1\SWMVP_AEMVP_sampling_2024\Vasp2-5 SWMVP LAA_MacLellan_ste_20240828.mxd Revised: 2024-08-28 by: ACampigotto




Stantec

**Project Infrastructure**

- Interceptor Well
- Communication Tower
- Contact Water Ditch
- 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
- Removed Infrastructure
- Project Development Area (PDA)

**Closure Features**

- Ditches at Closure

**Landbase**

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

N

0 250 500 Metres

(At original document size of 11x17)
1:12,000

***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 2024-12-12
Technical Review by KMathers on 2024-12-12

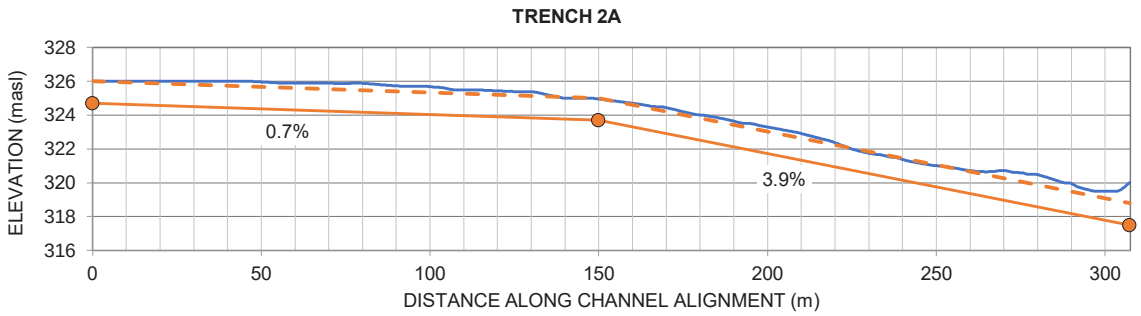
*Client/Project*
ALAMOS GOLD INC.
Lynn Lake Gold Project

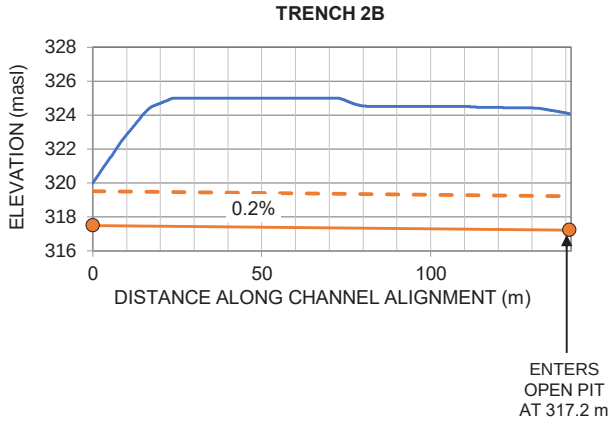
111473076

*Map No.*
**4-1**

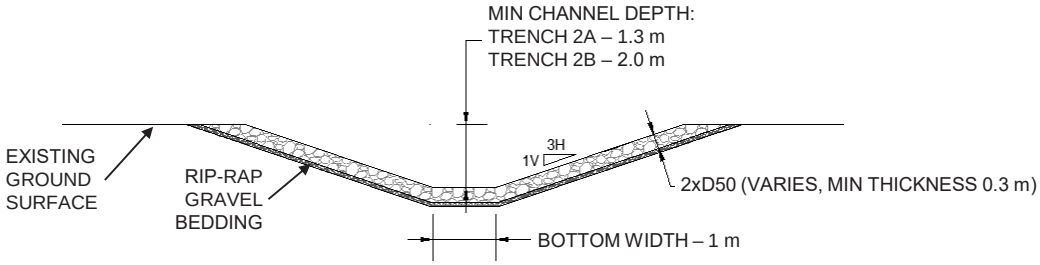
*Title*
**Closure Trench System**
**Gordon Site**

G:_GIS_Project_Folder\111473008 LLGP EA\IRX\Closure\Map81_Gordon_Closure_Trenching_20241212.mxd Revised: 2024-12-12 By: ACampigotto




**SECTIONS B & C – TRENCH 2A & 2B, TYP.**




**PRELIMINARY**
**NOT FOR CONSTRUCTION**

*Document Reference Source:* WSP;
Permanent Closure Trenches - Profiles and Cross-Sections,
Lynn Lake Closure Plan - Gordon Water Management
Project No.: 'CA-GLD-22516342'
June 21, 2024.

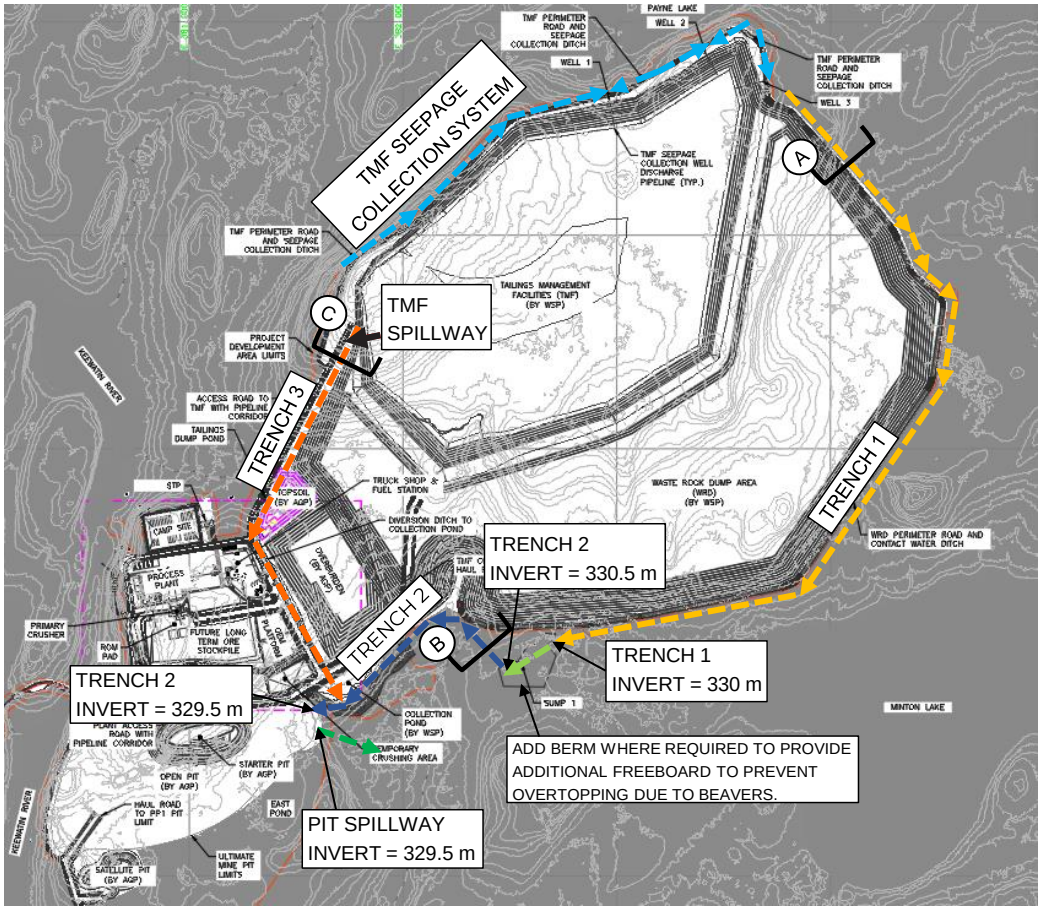
*Client/Project*
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473076

Prepared by ACampigotto on 2024-02-29
Reviewed by KMathers on 2024-02-29

*Figure No.*
**4-2**

*Title*
**Closure Drainage Trenches**
**Profile View Gordon Site**




**LEGEND:**

- TMF SEEPAGE COLLECTION SYSTEM REMAINS IN PLACE, PUMPING TO TMF, UNTIL WATER QUALITY IS ACCEPTABLE FOR DIRECT DISCHARGE TO ENVIRONMENT.
- TRENCH 1: OPERATIONS DITCH D-1 UPGRADED AT CLOSURE FOR 1000-YR 24-HR STORM EVENT.
- SUMP 1 TO BE KEPT IN PLACE TO ACT AS WETLAND / PONDED AREA.
- TRENCH 2: CONSTRUCTED AT CLOSURE TO 1000-YR 24-HR STORM EVENT. SHALLOW WIDE DITCH WITH MINIMAL SLOPE (~0.08%).
- TMF SPILLWAY: CONSTRUCTED AT CLOSURE TO 1000-YR 24-HR STORM EVENT.
- TRENCH 3: CONSTRUCTED AT CLOSURE TO 1000-YR 24-HR STORM EVENT. WILL CONVEY FLOW FROM LOWERED TMF SPILLWAY.
- PIT SPILLWAY: CONSTRUCTED AT CLOSURE. SIZED TO PMP STORM EVENT (INVERT 329.5 M).

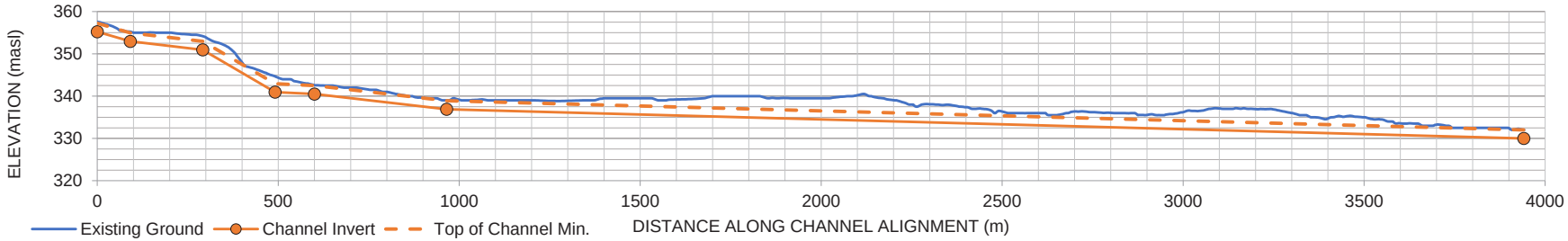
**PRELIMINARY**
**NOT FOR CONSTRUCTION**

*Document Reference Source:* WSP;
Lynn Lake Closure Plan: MacLellan Water Management, Closure Trenches;
Figure 1, PROJECT No.: CA-GLD-22516342, June 21, 2024.

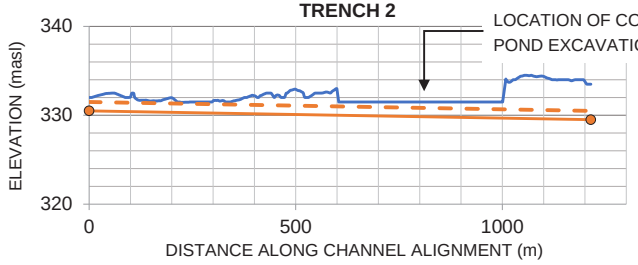
*Client/Project* 111473076
ALAMOS GOLD INC.
Lynn Lake Gold Project
Prepared by ACampigotto on 2024-02-29
Reviewed by KMathers on 2024-02-29

*Figure No.*
**4-3**

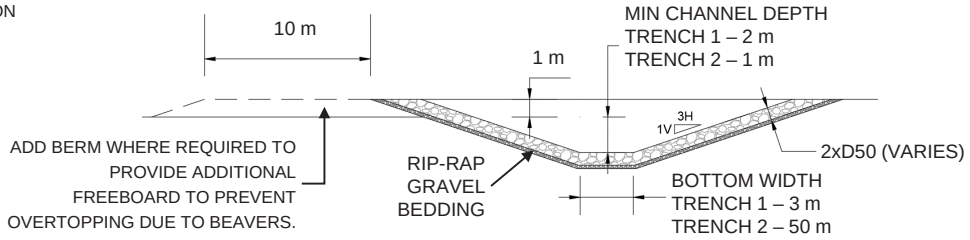
*Title*
**Closure Trench System**
**MacLellan Site**



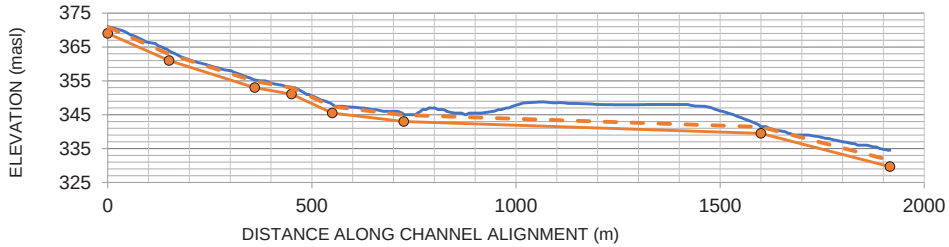

**TRENCH 2**



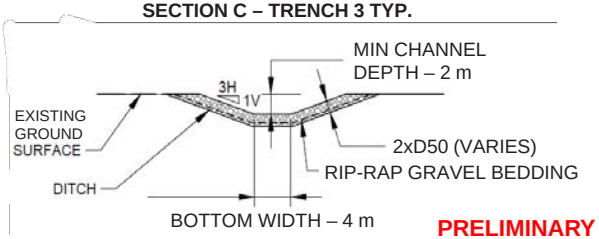

**SECTIONS A & B – TRENCH 1 AND TRENCH 2 TYP.**




**TRENCH 3**




**SECTION C – TRENCH 3 TYP.**



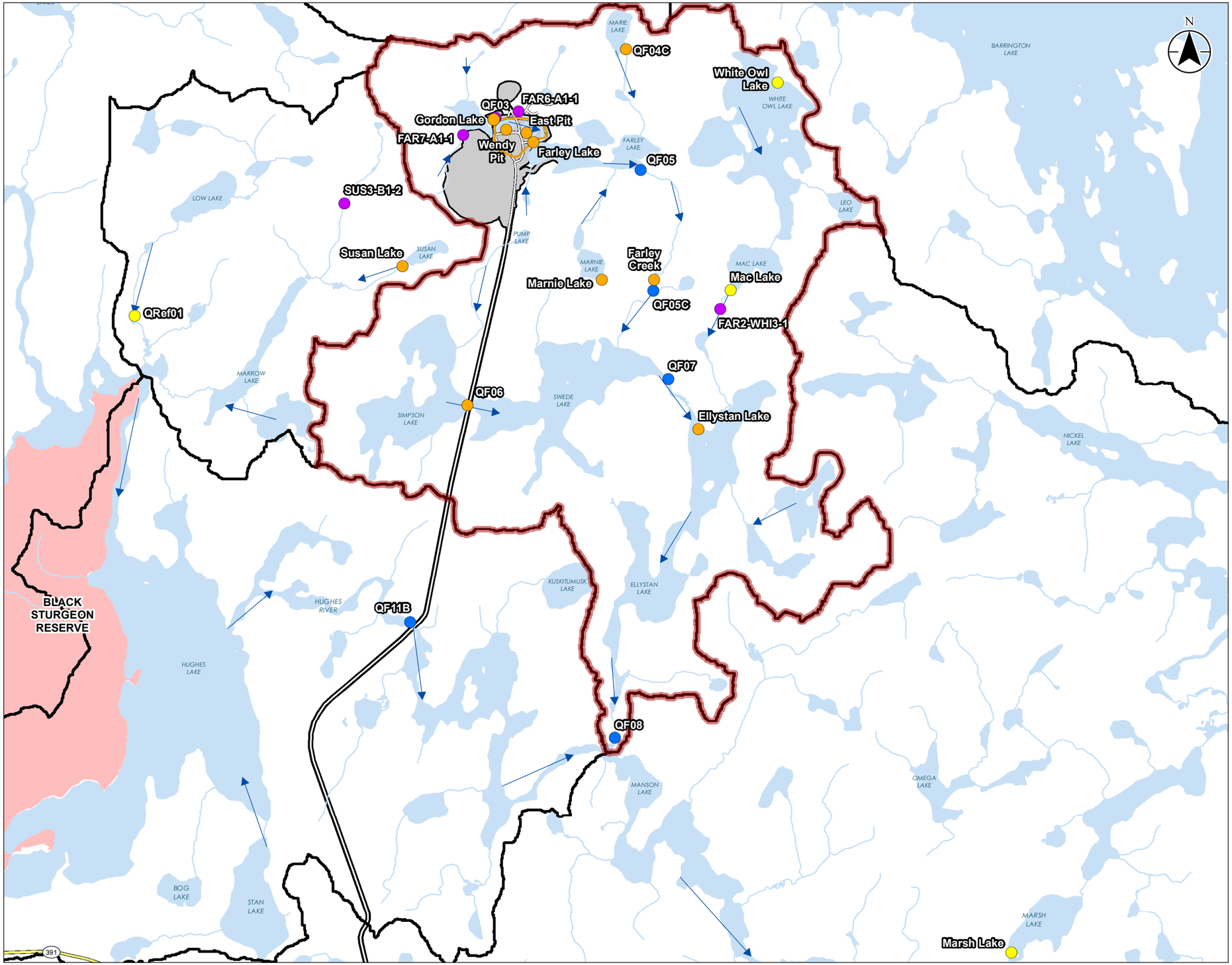

**PRELIMINARY**
**NOT FOR CONSTRUCTION**

*Document Reference Source:* WSP;
Lynn Lake Closure Plan: MacLellan Water Management, Closure Trenches-Profiles;
Figure 2, PROJECT No.: CA-GLD-22516342, December 6, 2023.

*Client/Project* 111473076
ALAMOS GOLD INC.
Lynn Lake Gold Project
Prepared by ACampigotto on 2024-02-29
Reviewed by KMathers on 2024-02-29

*Figure No.*
**4-4**

*Title*
**Closure Drainage Trenches**
**Profile View MacLellan Site**




Stantec

**Project Infrastructure**
- Proposed Open Pit
- Project Development Area

**Hydrology Monitoring Stations**
- Streamflow and Water Level
- Water Level
- Wetland Water Level
- Reference Site (Potential)
- Surface Water Flow Direction

**Study Area**
- Local Study Area
- Subwatersheds

**Landbase**
- Existing Access Road
- Provincial Road
- Watercourse
- Waterbody
- First Nation Reserve

0 1 2 Kilometres
1:62,500 (At original document size of 11x17)

**Notes**
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-08-14
Technical Review by TStainton on 2024-08-14

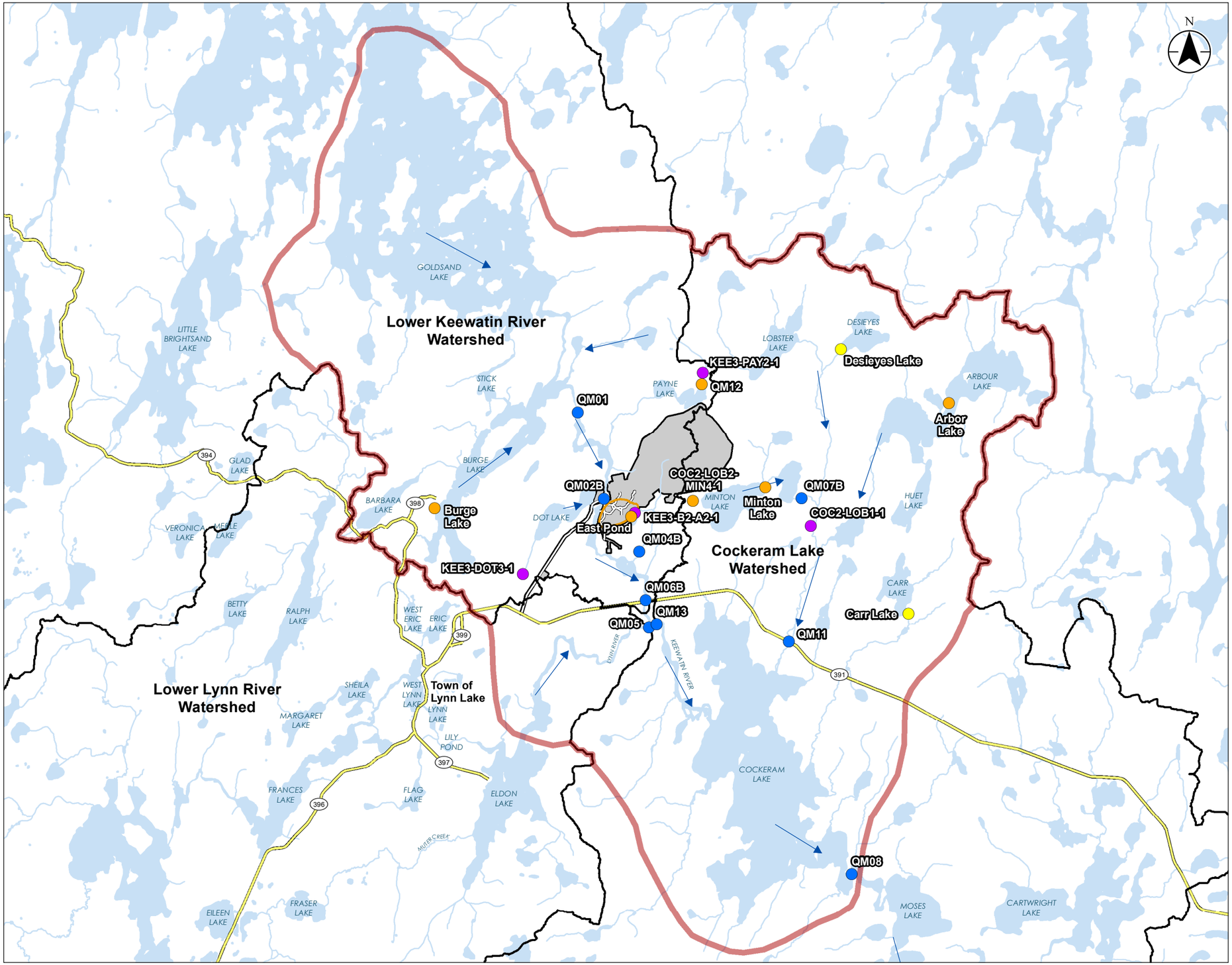
Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473076

Map No.
**5-1**

Title
# 2024 Hydrometric Monitoring Stations - Gordon

G:\...GIS Project Folder\111473076 AuRico\Figures\Hydrology\2024 Hydrology Monitoring\2024 HydrologyMonitoring3Stations_Gordon_20240814.mxd Revised: 2024-08-14 By: ACampigotto




Stantec

## Project Infrastructure
- Proposed Open Pit
- Project Development Area

## Hydrology Monitoring Stations
- Streamflow and Water Level
- Water Level
- Wetland Water Level
- Reference Site (Potential)
- Surface Water Flow Direction

## Study Area
- Local Study Area
- Subwatersheds

## Landbase
- Existing Access Road
- Provincial Road
- Watercourse
- Waterbody

0 2 4 Kilometres
1:125,000 (At original document size of 11x17)

**Notes**
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-08-14
Technical Review by TStainton on 2024-08-14

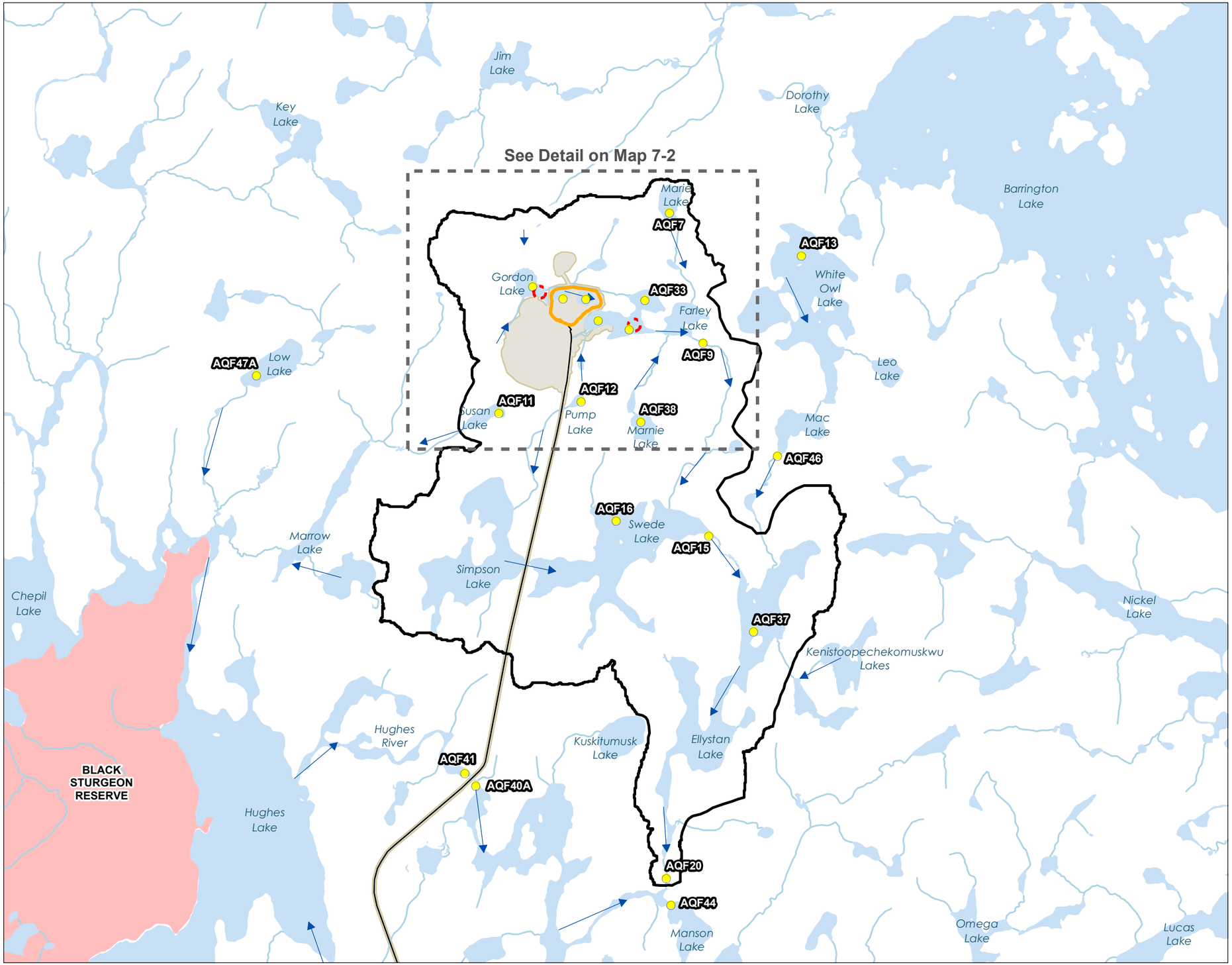
Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473076

Map No.
**5-2**

Title
# 2024 Hydrometric Monitoring Stations -MacLellan

G:\...\GIS Project Folder\111440293 AuRico\Figures\Hydrology\2024 Hydrology Monitoring\2024 HydrologyMonitoringStations_MacLellan_20240814.mxd Revised: 2024-08-14 By: ACampigotto




Stantec

**Project Infrastructure**
- Proposed Open Pit
- Project Development Area
- Effluent Mixing Zones

**Study Area**
- Surface Water Local Assessment Area (LAA)

**Sample Locations**
- Water Quality Sample Location
- Surface Water Flow Direction

**Landbase**
- Existing Access Road
- Watercourse
- Waterbody
- First Nation Reserve

N

0 1 2 Kilometres
(At original document size of 11x17)
1:65,000

***Notes***
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

*Project Location*
Lynn Lake, Manitoba

Prepared by ACampigotto on 2025-01-23
Technical Review by BHorne on 2025-01-23

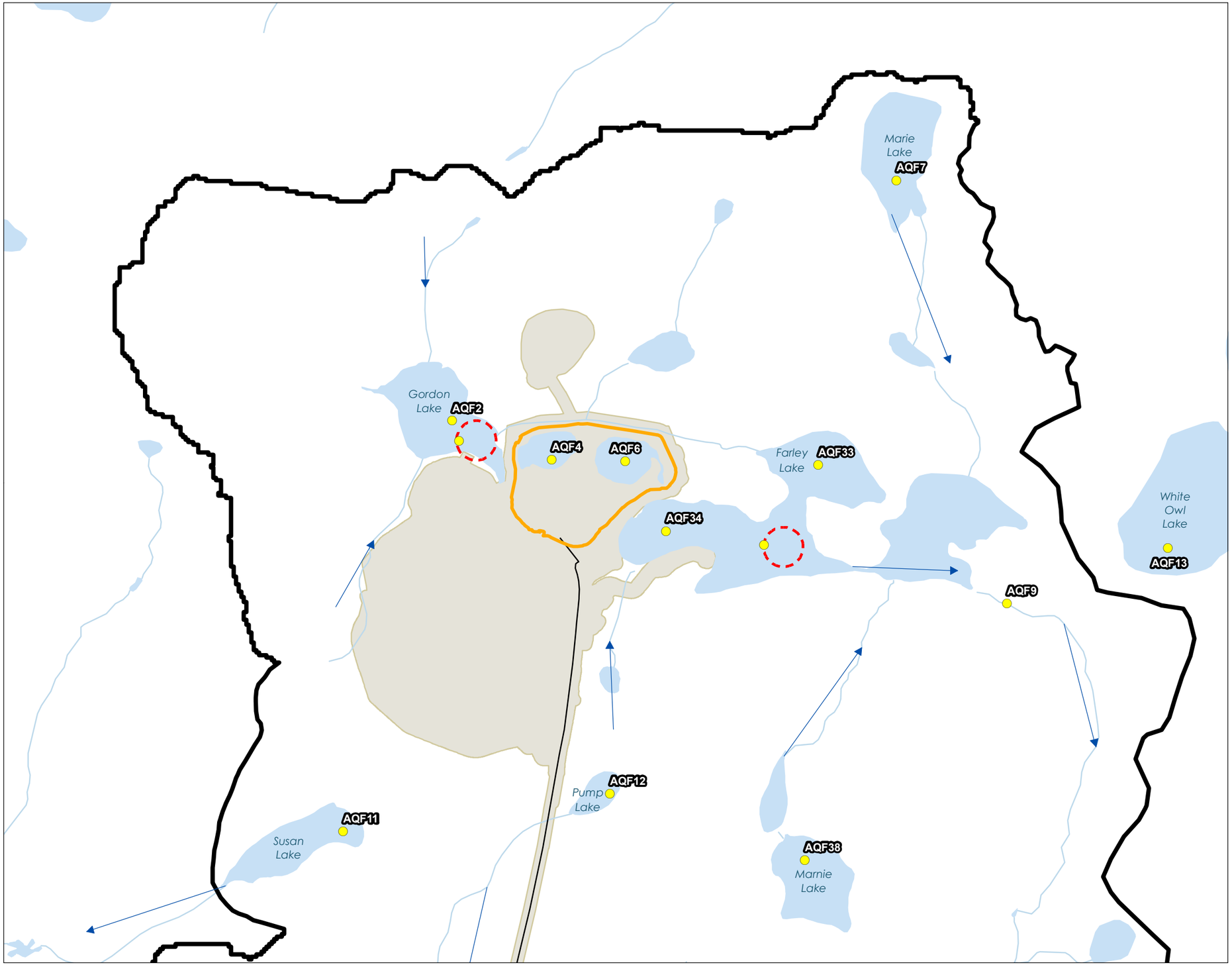
*Client/Project*
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473084

*Map No.*
**7-1**

*Title*
**Water Quality Sample Sites - Gordon**

G:_GIS_Project Folder\111473008_LGP_EA\R1\SWAMP_AEMP_sampling_2024\Vsap2-1 SWAMP_WaterQualitySites_Gordon_Overview_20250123.mxd Revised: 2025-01-23 By: ACampigotto




Stantec

**Project Infrastructure**
- Proposed Open Pit
- Project Development Area
- Effluent Mixing Zones

**Study Area**
- Surface Water Local Assessment Area (LAA)

**Sample Locations**
- Water Quality Sample Location
- Surface Water Flow Direction

**Landbase**
- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres
(At original document size of 11x17)
1:20,000

***Notes***
**1.** Coordinate System: NAD 1983 UTM Zone 14N
**2.** Base Data Sources: Government of Manitoba and Government of Canada.

*Project Location*
Lynn Lake, Manitoba

Prepared by ACampigotto on 2025-01-23
Technical Review by BHorne on 2025-01-23

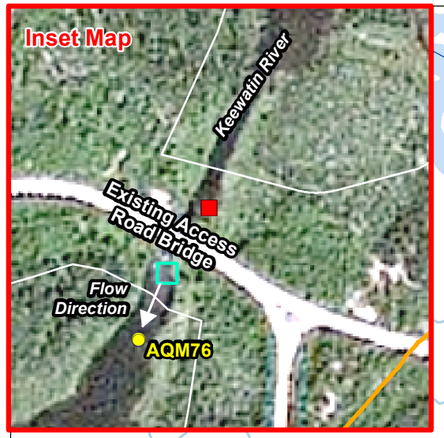
*Client/Project*
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473084

*Map No.*
**7-2**

*Title*
**Water Quality Sample Sites - Gordon detailed**

G:_GIS Project Folder\111473008_LGP_EA\R\1\WMP_AEMMP_sampling_2024\Map7-2_SWMMP_WaterQualitySites_Gordon_Zoom_20250123.mxd Revised: 2025-01-23 By: ACampigotto




Goldsand Lake
Gallagher Lake
Lobster Lake
Desieyes Lake
AQM14
Arbour Lake
Stick Lake
Payne Lake
AQM31
AQM4
Keewatin River
Burge Lake
AQM23
AQM5
See Inset Map for Detail
AQM76
AQM21
AQM16
Minton Lake
Muskeg Lake
Huet Lake
Barbara Lake
398
394
Dot Lake
East Pond
AQM71
AQM91
Carr Lake
Betty Lake
Ralph Lake
West Eric Lake
Eric Lake
399
AQM8
AQM28
AQM29C
AQM9
AQM10
Lynn River
Kay Lake
391
Keewatin River
West Lynn Lake
Town of Lynn Lake
Sheila Lake
Lynn Lake
Margaret Lake
Cockeram Lake
397
Frances Lake
396
Flag Lake
Eldon Lake
Norrie Lake
In Lake
Fraser Lake
Maynard Lake
McVeigh Lake
Ray Lake
Mary Lake
Moses Lake
Cartwright Lake

Stantec

**Project Infrastructure**
- Proposed Open Pit
- Project Development Area
- Effluent Location
- Effluent Mixing Zone

**Sample Locations**
- Water Quality Sample Location
- Surface Water Flow Direction
- Surface Water Local Assessment Area (LAA)

**Landbase**
- Existing Access Road
- Highway
- Watercourse
- Waterbody

N

0 1.5 3 Kilometres
(At original document size of 11x17)
1:100,000

***Notes***
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

*Project Location*
Lynn Lake, Manitoba

Prepared by ACampigotto on 2025-01-23
Technical Review by BHorne on 2025-01-23

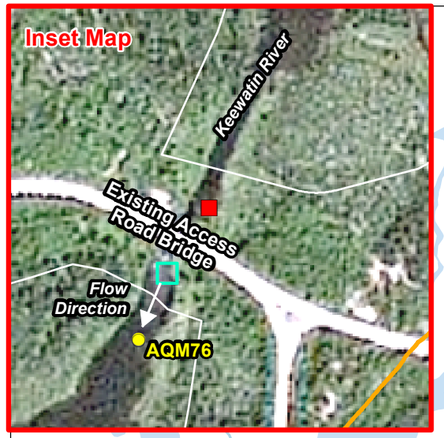
*Client/Project*
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473084

*Map No.*
**7-3**

*Title*
**Water Quality Sample Sites - MacLellan**

G:_GIS_Project Folder\111473008_LLGP_EA\R1\SWMVP_AEMVP_sampling_2024\Vlap2-3_SWMVP_WaterQualitySites_MacLellan_Overview_20250123.mxd Revised: 2025-01-23 By: ACampigotto






Stantec

**Project Infrastructure**
- Proposed Open Pit
- Project Development Area
- Effluent Location
- Effluent Mixing Zone

**Sample Locations**
- Water Quality Sample Location
- Surface Water Flow Direction
- Subwatersheds

**Landbase**
- Existing Access Road
- Highway
- Watercourse
- Waterbody

N

0 0.5 1 Kilometres
(At original document size of 11x17)
1:50,000

***Notes***
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

*Project Location*
Lynn Lake, Manitoba

Prepared by ACampigotto on 2025-01-23
Technical Review by BHorne on 2025-01-23

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

111473084

*Map No.*
**7-4**

*Title*
**Water Quality Sample Sites - MacLellan detailed**

G:_GIS_Project_Folder\111473008_LLGP_EA\RA\SWMMP_AEMMP_sampling_2024\Map7-4_SWMMP_WaterQualitySites_MacLellan_Zoom_20250123.mxd Revised: 2025-01-23 By: ACampigotto

# Appendix B Pathways of Effects, Mitigation Measures, and Residual Effects to Surface Water Quantity at the Gordon Site

## Table B-1 Pathways of Effects, Mitigation Measures, and Potential Residual Effects to Surface Water Quantity at the Gordon Site

| Project Phase | Pathway of Effect | Mitigation Measures | Residual Effect | Carried Forward to Monitoring Plan |
|---|---|---|---|---|
| Construction | Dewatering of the existing pits has the potential to affect water levels in Gordon and Farley lakes and flows in Farley Creek | • Install and operate groundwater interceptor wells between the pits and Gordon and Farley lakes and discharge collected groundwater to each lake<br>• Pump pit water to Hughes River via an ~8 km flexible hose pipeline | • Mean annual flow at the Gordon Lake outlet (QF03) is predicted to increase by 7% due to the addition of pumped flows from the groundwater interceptor wells.<br>• Mean annual flow in Farley Creek outlet (QF05) predicted to increase by 66% due to construction of water management infrastructure and the addition of pumped flows from the groundwater interceptor wells<br>• Predicted water level increase of 0.14 m in Farley Lake due to the addition of pumped flows from the groundwater interceptor wells | Yes (Gordon Lake outlet and Farley Creek only) |
| | Site preparation (i.e., vegetation clearing, topsoil stripping) will result in changes in runoff due to decreased infiltration rates where impervious surfaces are created and increased infiltration rates where vegetation is removed | • Limit mine footprint (i.e., PDA) to the extent possible.[1] | • Mean annual flow of southern inlet of Gordon Lake predicted to decrease by 29% due to construction of water management infrastructure around MRSA, overburden storage area, and topsoil storage area<br>• Mean annual flow of southwestern inlet of Farley Lake is predicted to decrease by 27% due to construction of water management infrastructure around MRSA, overburden storage area, and topsoil storage area<br>• Mean annual flow in Farley Creek outlet (QF05) predicted to increase by 66% due to construction of water management infrastructure and the addition of pumped flows from the groundwater interceptor wells | Yes (Gordon Lake outlet and Farley Creek only) |
| | Construction of mine components (i.e., ore pad, MRSA, overburden and topsoil storage areas, and water management infrastructure) may increase ground compaction and alter infiltration and runoff rates. | • Limit construction footprint (i.e., PDA) to the extent possible.[1]<br>• Construct contact-water collection ditches around the MRSA, overburden storage area, topsoil storage area, and ore pad to convey the 1:25-year storm event run-off to collection ponds<br>• Construct contact water collection ditches with positive gradients to reduce standing water and to maintain positive flow<br>• Construct contact water collection ponds to contain run-off from a 1-100-year storm event with active storage that considers maximum ice thickness in winter<br>• Construct perimeter diversion ditches to divert non-contact water away from Project components.[1] | | |
| | Construction of water management infrastructure (i.e., collection ditches, sumps, collection ponds, diversion ditches) ) will alter local drainage areas and run-off patterns within the PDA. | • Maintain existing drainage patterns, to the extent possible, with culverts.[1]<br>• Size new culverts to convey the 1:25-year flood event run-off<br>• Construct diversion ditches around the MRSA, overburden storage area, topsoil storage area, and the open pit to divert non-contact water to Gordon and Farley lakes.[1]<br>• Grade perimeter roads and access roads to divert runoff away from the open pits to reduce contact water.[1]<br>• Collect, storage, and reuse contact water (runoff and seepage), only discharging excess water after reuse and treatment, as necessary.[1]<br>• Maintain access roads by periodically regrading and ditching to improve water flow.[1]<br>• Collect seepage and runoff from the MRSA, ore stockpiles, overburden stockpile, and facility area in the site collection pond and store and treat, as required, prior to release to Farley Lake.[2] | | |
| | Installation and operation of a freshwater intake in Farley Lake. | • Limit water withdrawals to water required only for fire suppression, dust suppression, and truck washes; not for potable water. | | |

## Table B-1 Pathways of Effects, Mitigation Measures, and Potential Residual Effects to Surface Water Quantity at the Gordon Site

| Project Phase | Pathway of Effect | Mitigation Measures | Residual Effect | Carried Forward to Monitoring Plan |
|---|---|---|---|---|
| Operation | Development of the new open pit will increase the hydraulic gradient between the pit and Gordon and Farley lakes and, therefore, may affect water levels in Gordon and Farley lakes and flows in Farley Creek. | • Operate groundwater interceptor wells between the pits and Gordon and Farley lakes and discharge collected groundwater to each lake<br>• Operate water management infrastructure to collect, divert, and release non-contact water to the environment<br>• Operate water management infrastructure to collect, store, and treat, as necessary, contact water prior to its release to Farley Lake.[1] | • Mean annual flow of southern inlet of Gordon Lake predicted to decrease by 29% due to operation of water management infrastructure around MRSA, overburden storage area, and topsoil storage area<br>• Mean annual flow at the Gordon Lake outlet (QF03) is predicted to increase by 7% due to the addition of pumped flows from the groundwater interceptor wells.<br>• Mean annual flow of southwestern inlet of Farley Lake predicted to decrease by 27% due to operation of water management infrastructure around MRSA, overburden storage area, and topsoil storage area<br>• Mean annual flow in Farley Creek (QF05) is predicted to increase 43% due to operation of water management infrastructure around MRSA, overburden storage area, and topsoil storage area and addition of pumped water from the groundwater interceptor wells.<br>• Predicted water level increase of 0.11 m in Farley Lake due to the addition of pumped flows from the groundwater interceptor wells | Yes (Gordon Lake outlet and Farley Creek only) |
| | Development of the new open pit may lower the groundwater table and, therefore, affect water levels in lakes, ponds, and wetlands and flows in streams | | | |
| | Freshwater demand for fire suppression, truck washes, safety showers, and dust control | • Pump water from Farley Lake as required to fill on-site storage tanks<br>• Truck-in potable water from the Keewatin River | | |
| | Development of the MRSA, overburden storage area, ore stockpile area, topsoil storage area, and facility area will reduce ground infiltration and increase surface runoff. | • Limiting mine footprint (i.e., PDA) to the extent possible.[1] | | |
| | Operation of the water management infrastructure (i.e., collection ditches, sumps, collection ponds) will alter local drainage pattens | • Grading perimeter and access roads to divert runoff away from the open pits to reduce contact water.[1]<br>• Maintaining access roads by periodically regrading and ditching to improve water flow.[1]<br>• Maintaining existing drainage patterns with the use of culverts.[1]<br>• Operate water management infrastructure to collect, divert, and release non-contact water to the environment<br>• Operate water management infrastructure to collect, store, and treat as necessary contact water prior to its release to Farley Lake.[1]<br>• Designing contact-water collection ditches to convey the 1:25-year storm event with positive gradients to limit standing water and maintain positive flow.[1]<br>• Designing contact-water collection ponds with active water storage that considers ice thickness during winter.[1] | | |
| Decommissioning/Closure | Removal of Project infrastructure and reclamation and revegetation of MRSA, overburden storage area, topsoil storage area, and facility area will increase ground infiltration and decrease runoff. Changes to catchment areas within the PDA will remain. | • Revegetation of impacted areas.[1]<br>• Infrastructure areas will be graded to promote surficial flow out of the immediate area.[1]<br>• Restore original drainage patterns and catchment areas as close to pre-mine conditions as possible | • Mean annual flow of southern inlet of Gordon Lake predicted to decrease by 29% due to change in upstream catchment area following closure<br>• Mean annual flow of southwestern inlet of Farley Lake predicted to decrease by 27% due to change in upstream catchment area following closure<br>• Mean annual flow in the Gordon Lake outlet (QF03) is predicted to decrease by 11% during active closure and decommissioning when water management infrastructure is decommissioned and disturbed areas are reclaimed<br>• Mean annual flow in the Gordon Lake outlet is predicted to decrease by 16% during pit filling | Yes (Gordon Lake outlet and Farley Creek only) |
| | Diversion of surface water runoff from the MRSA, overburden storage area, topsoil storage aera, and facility area to fill the open pit with water. Changes to groundwater flow direction may result in changes to water levels in Gordon and Farley lakes and flows in Farley Creek. | • Continue operation of groundwater interceptor wells until water level in open pit reaches 260 m elevation<br>• Diversion of contact water to the open pit will reduce filling duration to approximately 11 years, under average climate conditions<br>• Refilling open pits with contact water at closure will eliminate the hydraulic gradient between the pit and Farley and Gordon lakes and return the groundwater table elevation to near baseline conditions.[1] | | |

**Table B-1 Pathways of Effects, Mitigation Measures, and Potential Residual Effects to Surface Water Quantity at the Gordon Site**

| Project Phase | Pathway of Effect | Mitigation Measures | Residual Effect | Carried Forward to Monitoring Plan |
|---|---|---|---|---|
| Decommissioning/Closure (cont'd) | Closure of water management infrastructure (i.e. collection ditches, sumps, collection ponds, diversion ditches) will result in changes to surface water drainage patterns. Decommissioning of the groundwater interceptor wells once the open pit water level has reached 260 m elevation. | • Restore original drainage patterns and catchment areas as close to pre-mine conditions as possible | • Mean annual flow in Farley Creek (QF05) is predicted to decrease by 6% during active closure and decommissioning when water management infrastructure is decommissioned and disturbed areas are reclaimed<br>• Mean annual flow in Farley Creek is predicted to decrease by 8% during pit filling | |

Notes:
[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)
[2] Water Management Feasibility Level Design Report (Golder 2020)
[3] Federal Information Request IAAC-29 (Stantec 2020c)

# Appendix C Pathways of Effects, Mitigation Measures, and Residual Effects to Surface Water Quantity at the MacLellan Site

## Table C-1 Pathways of Effects, Mitigation Measures, and Potential Residual Effects to Surface Water Quantity at the MacLellan Site

| Project Phase | Project Pathway | Mitigation Measures | Residual Effect | Carried Forward to Monitoring Plan |
|---|---|---|---|---|
| Construction | Site preparation activities (i.e., vegetation clearing, topsoil stripping, and decommissioning and removal of existing buildings) will result in changes in runoff due to reduced infiltration where impervious surfaces are created and increased runoff where vegetation is removed. | • Limit mine footprint (i.e., PDA) to the extent possible.[1] | • Predicted 64% reduction in average annual flow in Keewatin River tributary KEE3-B1 due to pit dewatering, changes in groundwater table, and infiltration, evapotranspiration, and surface run-off rates, and change in catchment area | Yes |
| | Construction of mine components (i.e., ore storage area, crusher pad, overburden and topsoil storage areas, processing plant, camp, sewage treatment facility, facility area, internal roads) and water management infrastructure may increase ground compaction and alter ground infiltration and surface runoff rates. | • Limit mine footprint (i.e., PDA) to the extent possible.[1]<br>• Construct diversion ditches around the ore stockpile, overburden storage area, topsoil storage area, processing plant, crushing area, sewage treatment facility, and camp to divert non-contact water to the Keewatin River.[1]<br>• Grading perimeter roads to divert run-off away from the open pit to reduce contact water[1] | | |
| | Construction of water management infrastructure (i.e., collection ditches, sumps, collection ponds, diversion ditches) will alter local drainage areas and run-off patterns within the PDA and may intercept shallow groundwater and, therefore, alter groundwater elevations and flow paths | • Maintain existing drainage patterns, to the extent possible, with culverts.[1]<br>• Size new culverts to convey the 1:25-year flood event run-off[2]<br>• Construct collection ditches to convey the 1:25-year storm event run-off to collection ponds[1]<br>• Construct collection ditches with positive gradients to reduce standing water and to maintain positive flow[1]<br>• Construct diversion ditches around the ore stockpile, overburden storage area, topsoil storage area, processing plant, crushing area, sewage treatment facility, and camp to divert non-contact water to the Keewatin River.[1]<br>• Construct collection ponds to contain run-off from a 1-100-year storm event with active storage that considers maximum ice thickness in winter[1] | | |
| | Dewatering of the existing underground workings may lower the groundwater table and affect groundwater/surface water interactions | • Pump water from underground workings to the TMF[1]<br>• Collect runoff and groundwater seepage from historical underground workings[1] | | |
| | Construction of a temporary diversion ditch south of the MRSA to collect and divert non-contact water to tributary KEE3-B2. This diversion ditch will increase runoff and may intercept shallow groundwater. | • Construct perimeter ditches to collect overland flow, toe seepage, and to divert non-contact water away from Project components.[1] | | |
| | Construction of the TMF and MRSA and associated water management infrastructure (i.e., seepage collection ditches and sumps) will reduce the catchment areas of Payne Lake and Minton Lake. | • Limit construction footprint (i.e., PDA) to the extent possible.[1]<br>• Construct diversion ditches to collect, divert, and release non-contact water to the Keewatin River and collection ditches and sumps to collect, store, and re-use contact water between the TMF and the processing plant.[1]<br>• Grade perimeter roads around the TMF and MRSA to divert non-contact runoff and to reduce contact water[1] | • Negligible change in water levels in Payne Lake and Minton Lake<br>• Predicted 19% reduction in flow in Minton Lake outlet<br>• No more than 4% decrease in flow in Payne Lake outlet (KEE3-PAY1) due to encroachment of TMF into Payne Lake watershed | Yes (Minton Lake inlet and outlet only) |
| | Construction and operation of the freshwater intake in the Keewatin River | • Limit water withdrawals to those necessary for make-up water for the processing plant, potable water, fire suppression, safety showers, truck washes, and dust suppression<br>• Utilize water storage tank within the PDA | • <2% change in average March flows and <1% change in average monthly flows in all other months in the Keewatin River during construction | Yes |

## Table C-1 Pathways of Effects, Mitigation Measures, and Potential Residual Effects to Surface Water Quantity at the MacLellan Site

| Project Phase | Project Pathway | Mitigation Measures | Residual Effect | Carried Forward to Monitoring Plan |
|---|---|---|---|---|
| Operation | Make-up water (0.27 $Mm^3$) for ore processing in the first year of operation will be pumped from the Keewatin River. | • Freshwater withdrawals from the Keewatin River will not exceed 10% of instantaneous stream discharge [1]<br>• Recycle contact water from the TMF and water pumped from the underground workings and open pit in the processing plant[2]<br>• Use contact water collected from the overburden stockpile, topsoil stockpile, ore storage area, and seepage from the MRSA and TMF in the processing plant.<br>• Use Pre-Leach Thickener to increase the density of the processing plant slurry stream and reduced the amount of water diverted to the TMF from the processing plant. [3]<br>• Use Pressure Zadra Carbon Stripping Technology to increase freshwater removal during ore processing and, therefore, increase water recycled between the TMF and the processing plant.[3] | • <2% change in average March flows and <1% change in average monthly flows in all other months in the Keewatin River during operation | Yes |
| | Freshwater from the Keewatin River will be used to supply potable water and for dust suppression, fire protection, truck washes, safety showers. | • Freshwater withdrawals from the Keewatin River will not exceed 10% of instantaneous stream discharge[1]<br>• Recycle water between the TMF Pond and the processing plant.[3]<br>• Use sedimentation pond water at the truck shop, truck washes, and for dust suppression[3]<br>• Pump water from the Keewatin River to a fresh/fire water storage tank and use this water plant safety showers, process plan reagents, pump glad seal water[3]<br>• Use water in storage tank for producing potable water, once treated.[3] | | |
| | Collection of contact water from pit dewatering, runoff from the processing plant area, and seepage from the overburden, topsoil, and ore stockpiles, and from the MRSA and TMF will alter catchment areas and affect surface runoff patterns.<br>Diversion ditches near the MRSA may intercept shallow groundwater and may affect water levels and streamflow in adjacent ponds and streams, respectively. | • Construct and operate water management structures (i.e., perimeter ditches and sumps) to collect, divert, and release non-contact water to the environment[1]<br>• Collect seepage and runoff from the plant site, topsoil and overburden stockpiles, and the MRSA (approximately 55%) and pump to the collection pond.[2]<br>• Collect seepage and runoff from the MRSA (approximately 45%) and pump to the TMF.[2]<br>• Collect and store contact water in the TMF (i.e., water from pit dewatering and MRSA seepage) for reuse in the mill for ore processing.[2]<br>• Balance timing of water recycling to relieve storage pressures on contact-water collection ponds.<br>• Design the TMF to store the 100-year, 24-hour rainfall event<br>• Pump TMF dam seepage and runoff to the TMF pond[2]<br>• Maintain access roads by periodically regrading and ditching to improve water flow.[1]<br>• Collect seepage and contact water runoff from the ore stockpile, overburden storage area, topsoil storage area, sewage treatment facility, camp, and facility area and direct to the collection pond for storage and treatment, as required, prior to discharge to the Keewatin River[2] | • Negligible change in water levels in Payne Lake and Minton Lake<br>• Predicted 20% reduction in flow in Minton Lake outlet<br>• No more than 4% decrease in flow in Payne Lake outlet (KEE3-PAY1) due to encroachment of TMF into Payne Lake watershed | Yes (Minton Lake inlet and outlet only) |

**Table C-1 Pathways of Effects, Mitigation Measures, and Potential Residual Effects to Surface Water Quantity at the MacLellan Site**

| Project Phase | Project Pathway | Mitigation Measures | Residual Effect | Carried Forward to Monitoring Plan |
|---|---|---|---|---|
| Operation (cont'd) | Pit dewatering will affect groundwater quantity which may affect hydraulically connected surface waterbodies, including East Pond and its outlet. | • Construct and operate water management structures to collect, divert, and release non-contact water to the environment<br>• Grade perimeter roads and access roads to divert runoff away from the open pits to reduce contact water.[1]<br>• Pump water from pit to the collection pond during non-winter months (except April and May).[2]<br>• Pump water from pit in April and May to the TMF.[2] | • Passive dewatering of East Pond<br>• Predicted 63% reduction in mean annual flow in Keewatin River tributary KEE3-B1 | Yes |
| | Development and operation of the MRSA, overburden, topsoil, and ore storage areas, camp, sewage treatment plant, and crushing area will reduce infiltration and evapotranspiration rates and increase surface runoff. | • Limit mine footprint (i.e., PDA) to the extent possible.[1] | • Negligible change in water levels in Payne Lake and Minton Lake<br>• No more than 4% decrease in flows in Payne Lake outlet (KEE3-PAY1) due to encroachment of TMF into Payne Lake watershed<br>• Predicted 20% reduction in mean annual flow in Minton Lake outlet during operation | Yes (Minton Lake inlet and outlet only) |
| | Rock, overburden, and ore stockpiles will capture infiltrated water and store it as pore-water which will decrease inputs to surficial groundwater aquifers and hydraulically connected surface waterbodies. | • Collecting runoff and groundwater seepage from historical underground workings/open pit dewatering, overburden, and ore stockpiles, TMF, and MRSAs. | | |
| | Tailings management and the TMF Pond will affect surface water quantity by decreasing the catchment area of Minton Lake and alter water levels and inlet and outlet flows.<br>The TMF pond will increase groundwater recharge and increase local water levels and streamflow. | • The TMF Pond will be used to store and recycle water for ore processing[1]; no discharge of water from the TMF to the environmental during operation under normal climatic conditions[2]<br>• Develop the TMF with two cells to reduce water management requirements<br>• Collect and store tailings water in the TMF pond.[2]<br>• Collect and store runoff from the TMF footprint and direct precipitation to the tailings pond.[2]<br>• Collect seepage and runoff from the MRSA (approximately 45%) and pump to the TMF.[2]<br>• Collect groundwater seepage from historical underground workings and contact water from pit dewatering and contact water from the overburden and ore stockpiles and pump to the TMF.[1]<br>• Design and operate the TMF with no discharge to the environment during operation[1]<br>• Pump TMF dam seepage and runoff back to the TMF[2]<br>• Discharge through the emergency spillway under an extreme precipitation event that exceeds the design storage criteria for the TMF.[2] | | |

**Table C-1 Pathways of Effects, Mitigation Measures, and Potential Residual Effects to Surface Water Quantity at the MacLellan Site**

| Project Phase | Project Pathway | Mitigation Measures | Residual Effect | Carried Forward to Monitoring Plan |
|---|---|---|---|---|
| Decommissioning/Closure | Filling the open pit with groundwater, direct precipitation, surface contact water, and water from the TMF will affect groundwater levels and alter water levels and flows in adjacent surface water features such as East Pond, the East Pond outlet (KEE3-B2-A1) and Keewatin River tributary KEE3-B1 | • Refilling open pits with groundwater, direct precipitation, surface contact water runoff, and water from the TMF contact water at closure to return groundwater levels to near baseline conditions.[1] | • Modelling predicts that filling of the open pit will take approximately 21 years under average climate conditions.<br>• During pit filling, mean annual flows in Keewatin River tributary KEE3-B1 are predicted to decrease by 56% compared to pre-mine flows<br>• Once the open pit is filled, the pit lake will discharge into the East Pond outlet (KEE3-B2-A1) and reestablish flows in Keewatin River tributary KEE3-B1.<br>• Flows in KEE3-B1 are predicted to be 99% higher than pre-mine flows once the pit is filled with water due to 67% increase in upstream catchment area | Yes |
| | Removal of mine infrastructure and reclamation of disturbed areas will increase ground infiltration and evapotranspiration rates and decrease surface runoff. | • Limit mine footprint (i.e., PDA) to the extent possible.[1]<br>• Recontour and revegetate disturbed areas to restore original drainage paths to the extent possible[1]<br>• Implementing progressive rehabilitation to reduce water infiltration into the TMF, MRSA, and overburden storage area | | |
| | Removal of seepage and contact-water collection ditches, sumps, and ponds will alter surface water drainage patterns around the MRSA, TMF, ore and overburden storage areas. | • Divert contact water to open pit at closure[1]<br>• Maintain seepage collection system around MRSA and TMF until pit is filled with water<br>• Dewater and backfill collection pond.[1]<br>• Recontour seepage collection ditches, surface contact water collection ditches, sumps, and ponds to restore original drainage paths to the extent possible[1] | • Negligible change in water levels in Payne Lake and Minton Lake<br>• No more than 4% decrease in flows in Payne Lake outlet (KEE3-PAY1), post-closure<br>• Predicted 22% reduction in mean annual flow in Minton Lake outlet during closure and post-closure phases | Yes (Minton Lake inlet and outlet only) |

# Appendix D Pathways of Effects, Mitigation Measures, and Residual Effects to Surface Water Quality at the Gordon Site

## Table D-1 Pathways of Effects, Mitigation Measures, and Residual Effects to Surface Water Quality at the Gordon Site

| Project Phase | Project Pathway | Mitigation Measures | Residual Effect | Carried Forward to Monitoring Plan |
|---|---|---|---|---|
| All Project Phases | Discharge of groundwater pumped from the groundwater interceptor wells installed between the open pit and Gordon Lake and Farley Lake during construction, operation, and decommissioning/closure. | • Aerating groundwater from groundwater interceptor wells to encourage precipitation of elements that form oxides (e.g., iron, manganese, etc.) and to increase dissolved oxygen concentrations prior to discharge to Gordon and Farley lakes.[1] | • Water quality of each potential source of discharge to the receiving environment at the Gordon site is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios.<br>• Fluoride and total phosphorus were identified as POPCs; concentrations are predicted to exceed modelled baseline by more than 20% and applicable long-term water quality guidelines in modelled waterbodies.<br>• For the Gordon site, Project residual effects associated with the identification of POPCs are predicted to be limited to the LAA and in West Farley Lake (phosphorus) and Gordon Lake, West Farley Lake, East Farley Lake, and Swede Lake (fluoride). | Yes |
| Construction | Dewatering of Wendy and East pits during construction. | • Aerating Wendy and East pits to encourage precipitation of elements that form oxides (e.g., iron, manganese, etc.) and to break down thermal stratification prior to dewatering.[1] | • Water quality of each potential source of discharge to the receiving environment at the Gordon site is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios.<br>• Fluoride and total phosphorus were identified as POPCs; concentrations are predicted to exceed modelled baseline by more than 20% and applicable long-term water quality guidelines in modelled waterbodies. | Yes |
| Operation | Discharge of contact water from the collection pond during operation. | • Design of water management facilities to collect and treat (as required) contact water such that effluent meets applicable federal and provincial regulatory requirements, including the authorized limits of deleterious substances specified in Schedule 4 of the MDMER (amended), prior to discharge to the environment.[1]<br>• Implementing fugitive dust measures such as frequent watering of haul and access roads as outlined in EIS Volume 1, Chapter 6, Section 6.4.1.3.[1]<br>• Dust suppression measures for exposed ground areas of the PDA, to reduce atmospheric deposition to surface water (EIS Volume 1, Chapter 6).[1]<br>• Sediment and erosion control measures during construction to limit the release of TSS and turbidity.[1]<br>• Treating and handling of building material that is used in water to avoid the release or leaching of substances that would reduce water quality.[1]<br>• Transporting domestic waste to the sewage treatment plant at the MacLellan site.[1]<br>• Sediment control in the site collection pond prior to discharging the water directly to Farley Lake[2] | • Water quality of each potential source of discharge to the receiving environment at the Gordon site is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios.<br>• Fluoride and total phosphorus were identified as POPCs; concentrations are predicted to exceed modelled baseline by more than 20% and applicable long-term water quality guidelines in modelled waterbodies.<br>• For the Gordon site, Project residual effects associated with the identification POPCs are predicted to be limited to the LAA and in West Farley Lake phosphorus) and Gordon Lake, West Farley Lake, East Farley Lake, and Swede Lake (fluoride). | Yes |
| Decommissioning/ Closure/ Post-Closure | Overflow from the open pit at closure. | • Expediting re-filling of open pits during decommissioning/closure to reduce exposure of pit walls.[1] | • Water quality of each potential source of discharge to the receiving environment at the Gordon site is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios.<br>• Fluoride and total phosphorus were identified as POPCs; concentrations are predicted to exceed modelled baseline by more than 20% and applicable long-term water quality guidelines in modelled waterbodies. | Yes |

Notes:
[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)
[2] Water Management Feasibility Level Design Report (Golder 2020)

# Appendix E Pathways of Effects, Mitigation Measures, and Residual Effects to Surface Water Quality at the MacLellan Site

## Table E-1 Pathways of Effects, Mitigation Measures, and Residual Effects to Surface Water Quality at the MacLellan Site

| Project Phase | Project Pathway | Mitigation Measures | Residual Effect | Carried Forward to Monitoring Plan |
|---|---|---|---|---|
| All Project Phases | Groundwater seepage from the TMF to unnamed Keewatin River tributaries draining East Pond (KEE3- B1) and Payne Lake (KEE3-PAY1) and to Minton Lake (mine phases and seepage travel times depend on the model scenario). | • Constructing groundwater cut-off ditches to reduce groundwater seepage from the TMF reaching Minton Lake.[1] | • Water quality of each potential source of discharge to the receiving environment at both the MacLellan site is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios. | Yes |
| | Groundwater seepage from the MRSA to the unnamed Keewatin River tributary draining East Pond (KEE3-B1) and to Minton Lake (mine phases and seepage travel times depend on the model scenario). | • Constructing groundwater cut-off ditches to reduce groundwater seepage from the TMF reaching Minton Lake.[1] | • Water quality of each potential source of discharge to the receiving environment at both the MacLellan site is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios. | Yes |
| Construction & Operation | Discharge of mine effluent from the collection pond to the Keewatin River during construction and operation. | • Design of water management facilities to collect and treat (as required) surplus contact water such that effluent meets applicable federal and provincial regulatory requirements, including the authorized limits of deleterious substances specified in Schedule 4 of the MDMER (amended), prior to discharge to the environment.[1]<br>• Operating the TMF as a non-discharging facility during operation through decommissioning/closure.[1]<br>• Recycling water between the TMF and the processing facility to the maximum extent possible during operation to reduce freshwater make-up requirements.[1]<br>• Using a closed circuit for cyanide use and cyanide destruction in the processing plant (via Air/SO2 oxidation and precipitation of metals) to reduce cyanide concentrations in tailings slurry prior to release of the slurry for storage in the TMF (Chapter 2, Section 2.3.2.1).[1]<br>• Treating domestic waste in an average 60,000 L/day sewage treatment plant so that it meets “Wastewater Systems Effluent Regulations” under the Fisheries Act prior to discharge to the Keewatin River via a pipeline and diffuser.[1]<br>• Dust suppression measures for exposed ground areas of the PDA, to reduce atmospheric deposition to surface water (EIS Volume 1, Chapter 6).[1]<br>• Sediment and erosion control measures during construction to limit the release of TSS and turbidity (see Sediment and Erosion Control Plan).[1]<br>• Sediment control in the collection pond prior to discharging the water directly to the environment toward the Keewatin River.[2]<br>• No discharge of water from the TMF to the environment during operation under normal climatic conditions.[2]<br>• TMF dam seepage and runoff from the TMR dam downstream shells is assumed to be pumped back to the TMF if water supply does not meet the discharge criteria.[2] | • Water quality of each potential source of discharge to the receiving environment at both the MacLellan site is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios. | Yes |

## Table E-1 Pathways of Effects, Mitigation Measures, and Residual Effects to Surface Water Quality at the MacLellan Site

| Project Phase | Project Pathway | Mitigation Measures | Residual Effect | Carried Forward to Monitoring Plan |
|---|---|---|---|---|
| Decommissioning/ Closure/ Post-Closure | Overflow from the open pit to the unnamed Keewatin River tributary (KEE3-B1) at closure. | • Implementing passive treatment options (e.g., controlled pit stratification, fertilizer amendment, flow segregation) in the open pit should monitoring show that pit water quality is not suitable for release to the environment during the anticipated 21 years to fill the open pit with contact water at the conclusion of mine operation.[1]<br>• Construction of covers (domes) over ore stockpiles. This practice is generally used for dust control, but it also effectively eliminates contact of precipitation with ore and migration of contaminants driven by water.[3] | • Water quality of each potential source of discharge to the receiving environment at both the MacLellan site is predicted to be below the short-term applicable water quality guidelines and below Schedule 4 effluent limits of the MDMER for the Expected Case and Upper-Case scenarios.<br>• At the MacLellan site, total aluminum, arsenic, cadmium, copper, dissolved cadmium, and fluoride were identified as POPCs. All POPCs occur in the post-closure phase and maximum concentrations associated with the identification of these POPCs consistently occur at assessment node KEE3-B1 (i.e., the unnamed tributary to Keewatin River that will directly receive overflow from the flooded pit). For the MacLellan site, the maximum:<br>– Total aluminum concentrations are expected to be 0.20 mg/L which is approximately two times the long-term applicable guidelines and 29 times modelled expected baseline.<br>– Total arsenic concentrations are expected to be 0.203 mg/L which is approximately 4.5 times the long-term applicable guidelines and 21 times modelled expected baseline.<br>– Total copper concentrations are expected to be 0.0059 mg/L, approximately 1.5 times higher than the long-term applicable guideline and 17 times the modelled expected baseline.<br>– Total and dissolved cadmium concentrations are expected to be 0.0025 mg/L, approximately 8 times higher than the long-term applicable guideline (total cadmium) and 6 times the applicable guideline (dissolved) and over 490 times the modelled upper baseline.<br>– Total fluoride concentrations are expected to be 0.21 mg/L, approximately 1.7 times higher than the long-term applicable guideline and 4.7 times the modelled expected baseline.<br>• In addition, total antimony, selenium, and zinc, and dissolved Cr(VI) identified as infrequent POPCs for the Post-Closure Project phase. These parameters were predicted to exceed the long-term CWQG-FAL and/or MWQSOG-FAL and exceed baseline by more than 20% in only two model time steps (i.e., 0.1% of modelled months) in Post-Closure. | Yes |

Notes:
[1] Assessment of Potential Effects on Surface Water (Stantec 2020a)
[2] Water Management Feasibility Level Design Report (Golder 2020)
[3] Federal Information Request IAAC-15 (Stantec 2020e)