

REPORT

Environmental Monitoring and Adaptive Management Plan Coffee Gold Mine

Prepared for:

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July 4, 2025

REVISION TRACKING LOG

Revision Tracking Log			
Version	Date	Section Updated	Description of Update
0	November 2023	-	First submission of the Environmental Monitoring and Adaptive Management Plan
1	April 2024	Appendix A Appendix B Appendix L Appendix M	Updated with responses to Type A WUL IR4
2	July 2025	Table 4.1	Edited based on Type A WUL IR7 response
		Section 9.0	Edited based on updates to the Wildlife Monitoring Plan
		Section 10.0	Edited based on updates to the Vegetation Monitoring Plan
		Section 11.0	Edited based on updates to the Air Quality and Greenhouse Gas Monitoring Plan
		Section 12.0	Edited based on updates to the Noise Monitoring Plan

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
AAQS	Ambient Air Quality Standards
AP	Acid Potential
BCAAQO	British Columbia Ambient Air Quality Objectives
BCMOE	British Columbia Ministry of Environment
BOD	Biological oxygen demand
CCME	Canadian Council of Ministers of the Environment
CO	Carbon Monoxide
COD	chemical oxygen demand
EDI	Environmental Dynamics Inc.
EEM	Environmental Effects Monitoring
EMAMP	Environmental Monitoring and Adaptive Management Plan
EMR	Yukon Energy, Mines and Resources
FALMP	Fish and Aquatic Life Monitoring Plan
FC-RAA	Forthmile Caribou Regional Assessment Area
FMCH	Fortymile Caribou Herd
GHGs	Greenhouse Gases
HLF	Heap Leach Facility
ICs	Intermediate Components
Lorax	Lorax Environmental Services Ltd.
LSA	Local Study Area
LOM	Life of mine
ML/ARD	Metal Leaching/Acid Rock Discharge
MDMER	Metal and Diamond Mining Effluent Regulations
MMU	Moose Management Unit
NAR	Northern Access Route
N ₂	nitrogen
NO ₂	nitrogen dioxide
NO _x	Nitrogen Oxides
NP	Neutralization Potential
PPE	personal protective equipment
QA/QC	Quality Assurance/Quality Control
QEP	Qualified Environmental Professional
RCP	Reclamation and Closure Plan
RISC	Resource Inventory Standards Committee
RSA	Regional Study Area
ROM	Run-of-mine
S	Sulphide
SER	Sustainability and External Relations

Acronym / Abbreviation	Definition
SOP	Standard operating procedure
SO ₂	Sulphur Dioxide
TDS	Total Dissolved Solids
TH	Tr'ondëk Hwëchin
TH TWG	Tr'ondëk Hwëch'in Technical Working Group
TK	Traditional Knowledge
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
VCs	Valued Components
VWP	Vibrating Wire Piezometer
WMO	World Meteorological Organization
WRSF	Waste Rock Storage Facility
WTP	Water Treatment Plant
YESAA	<i>Yukon Environmental and Socio-Economic Assessment Act</i>
YESAB	Yukon Environmental and Socio-Economic Assessment Board
YWB	Yukon Water Board

LIST OF SYMBOLS AND UNITS OF MEASURE

Symbol / Unit of Measure	Definition
%	percent
° C	degrees Celsius
dB	decibel
km	kilometre
km ²	square kilometres
L/s/km ²	Litres per Second per Square Kilometer (Unit Yield)
m	metre
m ²	square metres
m ³	cubic metre
mb	Millibar
mm	millimetre
m/s	Metres per second
m ³ /s	Cubic Metres per Second
Mt	million tonnes
t/d	tonnes per day
W/m ²	watt per square metre

INFORMATION REQUIREMENTS FOR QUARTZ MINE LICENSE AND WATER LICENSE

	Information Requirement ¹	Location in this Plan
	Revision Log	Page i
	<p>Summarize the regulatory monitoring required or proposed for the project and of the programs that will be completed to satisfy the regulatory requirements. Also provide an outline of key staff with responsibilities for the management of the Plan.</p> <p>Provide a table of concordance that outlines all applicable Newmont commitments made during the environmental assessment the decision document terms and conditions and license conditions and show how these terms have been addressed in this plan.</p> <p>For all revisions to this plan provide a table which indicates all areas where changes have been made.</p>	<p>Summaries: Sections 3 - 13</p> <p>Concordance / commitments: Section 1.0</p> <p>Appendix M</p> <p>Revision Tracking Log: page i</p>
Water Monitoring Program	Surface water monitoring is normally expected to include stations upstream and downstream of the project and stations within the project sufficient to map and monitor the progressive use of water from all sources to all subsequent (if any) releases to the environment. Specific monitoring of water flowing into pits or pit lakes should be included.	<p>Appendix A</p> <p>Hydrology Monitoring Plan</p> <p>Appendix B</p> <p>Surface Water Quality Monitoring Plan</p> <p>Appendix C</p> <p>Groundwater Monitoring Plan</p>
	Flow monitoring of surface water may take various forms from simple seasonal spot checks (stream gauging, bucket tests, etc.) to near continuous measurement with flow meters or pressure transducers. It is important to identify the rationale for selected flow measurement methods and frequency.	
	Groundwater monitoring should include monitoring wells and piezometers up gradient and down gradient of proposed activities and should be sufficient to monitor all known aquifers that may be affected by the project. Ground water monitoring should also include monitoring of water entering into underground workings (if any). Ground water flow will normally be measured indirectly based on well water levels and piezometric pressures.	
	Quality Assurance/Quality Control (QA/QC) procedures for water monitoring activities and should encompass calibration and validation of field measurement equipment as well as sample QA/QC measures.	
Geochemical Monitoring Program	<p>This section of the Plan should identify all geochemical monitoring activities including but not limited to:</p> <ul style="list-style-type: none"> Field and laboratory geochemical characterizations tests of exposed or mined materials (assays, ICP scans, etc.) Predictive tests including humidity cells, leach columns, field test pads or bins, pit or mine wall washing stations and kinetic tests that will be conducted to monitor the acid rock or metal leaching potential of exposed and residual materials Field validation tests of placed materials such as tailings and paste backfill to monitor their actual physical and geochemical properties over time including (where appropriate) in situ density, hydraulic conductivity, leachate quality and the development of secondary minerals. 	<p>Appendix E</p> <p>Geochemical Monitoring Plan</p>
	QA/QC procedures for geochemical monitoring activities.	

¹ Guidance provided in Plan Requirement Guidance for Quartz Mining Project (YWB and EMR 2013) & Information Package for Applicants (YWB 2012)

	Information Requirement ¹	Location in this Plan
Meteorological Monitoring Program	<p>A description of the location and type of weather station(s) installed, the parameters that are measured, the frequency of measurement, and how often the data is downloaded from the station. This section must also include any snow surveys that are conducted on site and the frequency and locations of these surveys.</p> <p>Identify how the collected data will be used to update the predictions for extreme events or for performance predictions for the project that have been based on the baseline climatic data that was previously available.</p>	Appendix D Meteorological Monitoring Plan
Mine Infrastructure and Working Monitoring Program	<p>Outline activities that will be completed to monitor the physical performance of key mine infrastructure and of mine workings. This would include but not be limited to monitoring of tailings impoundments or dry stacks, water supply dams, water conveyance networks, sediment and treatment ponds, heap leach pads and stacks, overburden and waste rock waste dumps, open pit walls, access roads and underground workings. Key issues that should be addressed are:</p> <ul style="list-style-type: none"> • The physical stability of slopes and dams • The integrity of liners and covers • The occurrence of deformation and settlement of structures and mine openings • The stability of conveyance channels and spillways (i.e., the development of scour or erosion of channel materials) • The development of surface erosion on structures. <p>Normally it is expected that physical performance monitoring will include frequent, routine inspections by field staff, collection and interpretation of instrumentation data and at least annual inspections and reviews of collected data by professional engineers. Special inspections following severe events such as large floods or seismic events are also expected to be identified in the physical monitoring program. Structures with a significant environmental or life safety risk will often be expected to have a specific operations, maintenance and surveillance manual developed that will include identifying physical monitoring requirements.</p>	Appendix K Physical Monitoring Plan
Aquatic Environmental Monitoring	<p>Both the Water Use Licence and the metal Mining Effluent Regulations of the <i>Fisheries Act</i> will require some specific monitoring of the aquatic environment that could be impacted by the project. This section should present proposed or required aquatic monitoring activities that at least satisfy the regulatory requirements. In general, such activities will include sampling, testing and analysis of sediment and biota from the aquatic environment.</p>	Appendix F Fish and Aquatic Life Monitoring Plan
Terrestrial Environmental Monitoring	<p>The Quartz Mine Licence and permits issued under the Environment Act will normally identify a requirement to monitor the potential effects of the project on the terrestrial environment. Typical requirements include activities and management plans related to:</p> <ul style="list-style-type: none"> • Fugitive dust • Metals uptake in vegetation • Permafrost degradation • Wildlife. <p>This section should present or summarize all proposed or required terrestrial effects monitoring.</p>	Appendix G Wildlife Monitoring Plan Appendix H Vegetation Monitoring Plan Appendix I Air Quality and Greenhouse Gas Monitoring Plan Appendix K Physical Monitoring Plan

Information Requirement ¹		Location in this Plan
YWB EMR Plan Requirements Applicable to the EMAMP		
Information Requirement	Location in this Plan	Referenced From
Provide a detailed description of the monitoring program that will be used to assess the pit wall stability. Include a list of all instrumentation equipment, where it will be installed, and the frequency of monitoring. Describe both the instrumental monitoring and visual observations that will take place.	Appendix K Physical Monitoring Plan	General Mine Development Plan Mine Operations Plan
Provide detailed descriptions of proposed monitoring programs and infrastructure (e.g., slope inclinometers, survey hubs, thermistors, etc.) for water quality, flow, physical stability, and climate. Describe programs for evaluating and interpreting the results of monitoring programs, and how these will be used to influence operational decisions and maintenance requirements.	Appendix A Hydrology Monitoring Plan Appendix B SWQ Monitoring Plan Appendix D Meteorological Monitoring Plan Appendix K Physical Monitoring Plan	Waste Rock and Overburden Management Plan
Provide a detailed description of proposed operations, maintenance and monitoring programs for rock and overburden management.	Appendix E Geochemical Monitoring Plan Appendix K Physical Monitoring Plan	Waste Rock and Overburden Management Plan
Describe the monitoring program to monitor movement and stability of the waste dumps as well as water quality and flow conditions. Provide details that include monitoring frequency and locations and describe how the monitoring data will be evaluated, interpreted and reported.	Appendix A Hydrology Monitoring Plan Appendix B SWQ Monitoring Plan Appendix K: Physical Monitoring Plan	Waste Rock and Overburden Management Plan
Provide detailed sampling programs for characterizing rock and overburden during operations, including how materials will be tested to meet requirements of segregation protocols (e.g., acid generation or metal leaching potential, or the suitability for reclamation purposes). Provide the testing protocols, including how often drill cuttings are sent for assay, what tests are completed on site, and how the assay results are used to lay out field polygons.	Appendix E Geochemical Monitoring Plan	Waste Rock and Overburden Management Plan

REVISION LOG

Revision Tracking Log		
Date	Section(s) Updated	Description of Update
May 2022	-	First draft of the Environmental Monitoring and Adaptive Management Plan for review.
January 2023	All sections updated	EMAMP summary document updated to reflect incorporation of indicators and linkages to monitoring. Appended monitoring plans updated to reflect incorporation of feedback and to reduce duplication between summary document and monitoring plans.

1.0 INTRODUCTION

1.1 Project Summary

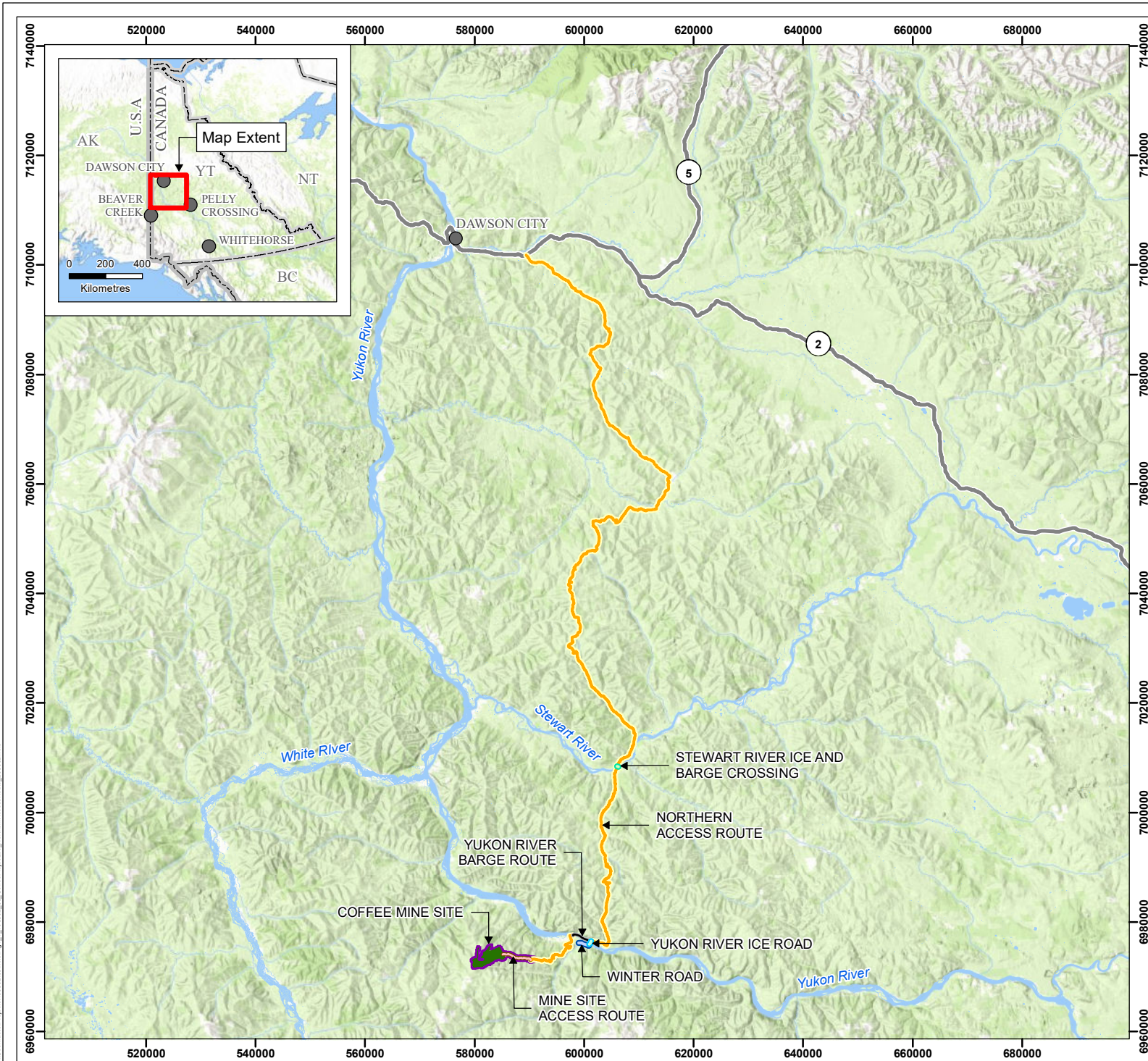
The proposed Coffee Gold Mine (the Project) is an open-pit gold mine owned by Goldcorp Kaminak Ltd., a wholly owned subsidiary of Newmont Corporation (Newmont), located on the south side of the Yukon River in the White Gold District of west-central Yukon. The Project site is approximately 130 km south of the City of Dawson, 140 km west of Pelly Crossing, 95 km north-east of Beaver Creek, and 340 km northwest of Whitehorse. The Project is located wholly within the traditional territory of Tr'ondëk Hwëch'in (TH), partially within the traditional territory of Selkirk First Nation (SFN) and First Nation of Na-cho Nyäk Dun (FNNND), and partially within the asserted territory of White River First Nation (WRFN). The Project contains several gold occurrences within an exploration concession covering an area of more than 600 km². The Mine Site will be accessed by road from Dawson via a 16-km stretch of Klondike Highway and 192-km all-season road, referred to as the Northern Access Route (NAR) (Figure 1-1). The NAR includes seasonal barge crossings on both the Stewart and Yukon rivers, with ice bridges and a seasonal winter road in the winter months.

The Project is comprised of four open pits: Supremo, Latte, Double Double, and Kona. Waste rock is proposed to be permanently stored in the Alpha Waste Rock Storage Facility (WRSF) (Figure 1-2). The ore production rate is proposed to be up to approximately 9.0 million tonnes (Mt) per year, producing an estimated total of 67 Mt of heap leach feed over the 10-year Operation Phase. The conceptual-level estimate for waste material to be moved over the life of mine (LOM) is up to approximately 330 Mt based on an average strip ratio of 5.0:1. The ore will be crushed and transported to the Heap Leach Facility (HLF) via overland conveyor or trucks for nine months of the year. During the three coldest months of winter, run-of-mine (ROM) ore will be stockpiled in the ROM stockpile. Gold will be extracted from gold-bearing leach solution by a six tonnes per day (t/d) adsorption, desorption, recovery carbon plant with mercury retorting to produce a final gold doré product. A total of 2.6 million ounces of gold is planned to be recovered over a 10-year mine life.

The Project phases are defined as follows:

- Construction Phase: Q2 Year –3 to end of Year –1 (30 months)
- Operation Phase: Year –1 to end of Year 9 (10 years)
- Reclamation and Closure Phase: Year 10 to end of Year 21, including a 6-year Post-Mining Closure Stage and a 5-year Active Closure Stage (11 years)
- Post-Closure Phase: Year 21 onwards as determined to be required.

These phases broadly describe the activities occurring within a particular time period; however, some activities will continue from one phase to another as mine site development advances with operational activities (e.g., Open Pits, WRSF). When areas that support mine operations are no longer required, they will be progressively reclaimed. The overall Project schedule is the general expected scenario for mine construction and operation; detailed activities are subject to change depending on detailed mine planning and the timing of receipt of authorizations.



COFFEE GOLD MINE

Coffee Project Location and Northern Access Route

- Legend**
- Stewart River Ice and Barge Crossing
 - Yukon River Barge Route
 - Yukon River Ice Road
 - Winter Road
 - Mine Site Access Route
 - Northern Access Route
 - Project Area
 - Project Footprint
 - Highway
 - Waterbody

- Notes**
1. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.
 2. Contains information licensed under the Open Government Licence - Yukon Territory
 3. Basemap: ESRI World Topographic Map
 4. Inset Basemap: ESRI World Topographic Map

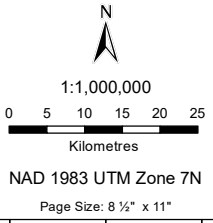


Figure 1.1	Date: Mar 2, 2023	Drawn by: AS	Reviewed: KP
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COFFEE GOLD MINE

General Arrangement - Mine Site

Legend

- Double Double Pit
- Kona Pit
- Latte Pit
- Supremo Pit

Notes

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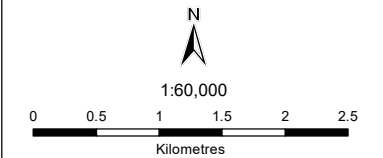
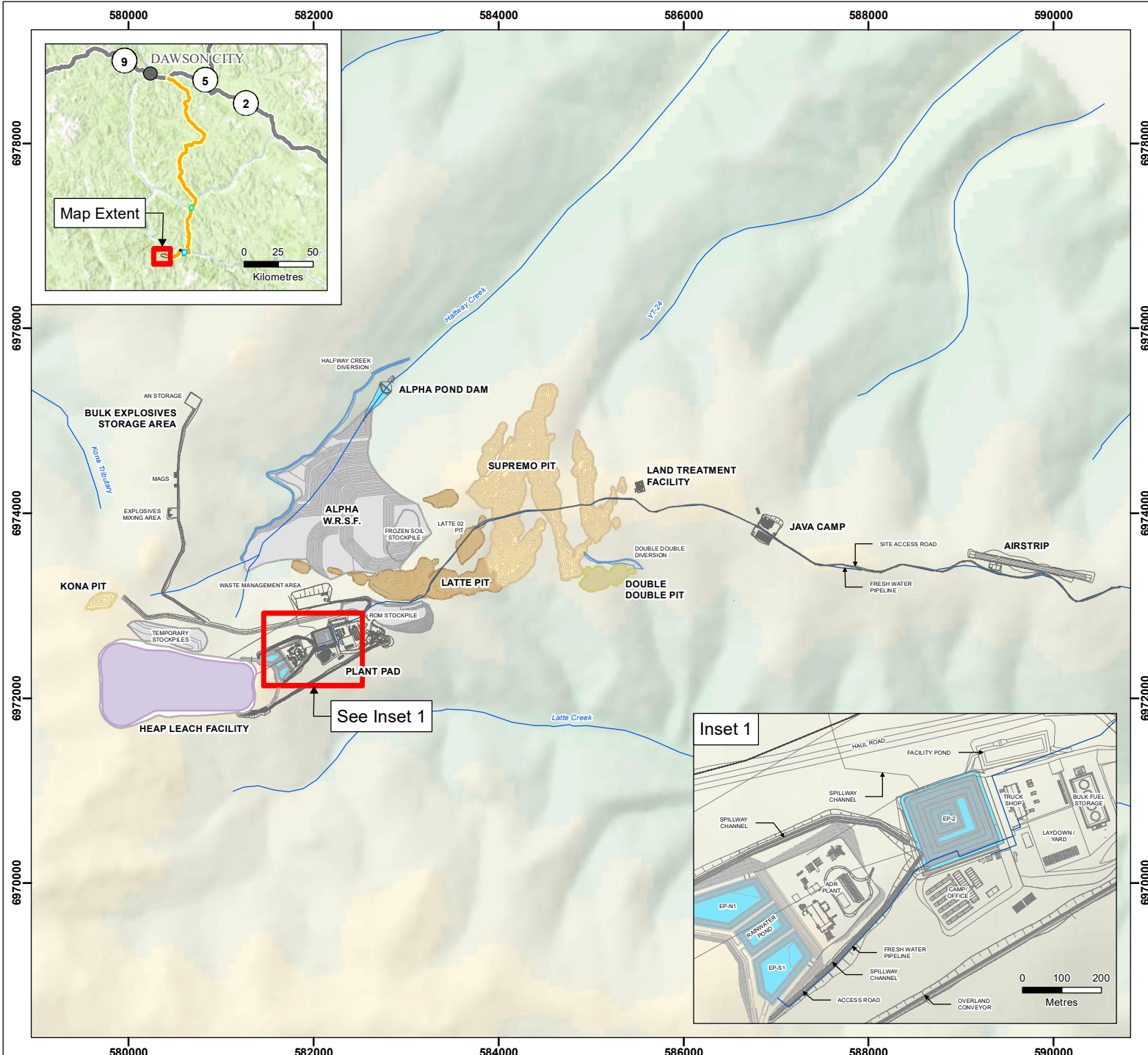


Figure 1.2	Date: Oct 6, 2023	Drawn by: AS	Reviewed: CH
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1.2 Scope and Objectives

This Environmental Monitoring and Adaptive Management Plan (EMAMP) is provided in conjunction with several other plans to meet the requirements for a Quartz Mining License application and a Water Use Licence application under the *Quartz Mining Act* and the *Waters Act*, respectively, and has been written to meet the guidance provided in the Plan Requirement Guidance for Quartz Mining Project (YWB and EMR 2013), under Section 7.0 Environmental Monitoring, Surveillance and Reporting Plan. The monitoring and adaptive management summarized herein is also derived from requirements outlined in the following territorial and federal guidance documents:

- *Yukon Water Board, Type A And B Quartz Mining Undertakings: Information Package For Applicants* (YWB 2012)
- *Government of Yukon, Guidelines for Developing Adaptive Management Plans in Yukon: Water-related components of quartz mining projects* (Government of Yukon 2021)
- *Environment Canada, Metal Mining Technical Guidance for Environmental Effects Monitoring* (Environment Canada 2012)
- *Environment Canada, Environmental Code of Practice for Metal Mines* (Environment Canada 2009).

The EMAMP outlines the interactions and predicted Project-related effects, and subsequent monitoring to verify those predictions and detect change in the receiving environment. The EMAMP also includes the Physical Monitoring Plan which describes monitoring activities for mine infrastructure such as the HLF, Alpha WRSF, and water management infrastructure. Additionally, the EMAMP details the methodology for surface water quality and aquatic life adaptive management. Details on monitoring during the reclamation and closure and post-closure phases are contained within the Reclamation and Closure Plan.

The approach to monitoring and adaptive management has been developed based on Project interactions and predicted effects outlined in the Project Proposal for Executive Committee Screening (Goldcorp 2017) under the *Yukon Environmental and Socio-economic Assessment Act (YESAA)* and subsequent information requests submitted as part of Project Assessment 2017-0211 to the Yukon Environmental and Socio-economic Assessment Board (YESAB).

This plan will be updated as necessary following the review of the results of on-going monitoring, evaluation of results and adaptive management activities throughout Project construction and operations. The EMAMP may also be updated if governing regulations (e.g., the Metal and Diamond Mine Effluent Regulations (MDMER); the *Fisheries Act*; etc.) are amended. The results collected as part of the monitoring detailed in the EMAMP will be evaluated and reported regularly in annual reports to the various regulatory authorities as per the expected requirements in the major licences and permits governing the construction and operation of the Project. Data may be evaluated more regularly to identify trends and the potential need for monitoring program adjustments and/or adaptive management. On-going analysis requirements are detailed in the specific monitoring plans provided in the appendices to the EMAMP.

Updates will be tracked in the Revision Tracking Log (page i).

1.3 Incorporation of Traditional Knowledge and Consultation Feedback

Newmont has committed to a consultation and engagement approach that informs all potentially affected First Nations and communities, as well as interested persons and other stakeholders of the Project, and receives and incorporates the feedback from these groups into Project design, studies, mitigation, and management. Specifically, Newmont's consultation and engagement program related to environmental monitoring and adaptive management is guided by the commitment to work closely with all consulted parties to incorporate local knowledge into the design of monitoring programs.

During preparation of the YESAB Project Proposal, Newmont exerted a focused effort on discussing the role of monitoring and adaptive management in the construction and operation of the Project. Some specific concerns heard during consultation were:

- Cyanide management; as a result, a water quality monitoring station near the confluence of Coffee Creek and the Yukon River was added
- Semi-passive and active water treatment; Newmont committed to a selection of water quality monitoring stations based on these concerns
- The number and locations of monitoring stations; in response, Newmont has incorporated feedback into the development of this EMAMP and committed to ongoing evaluation of monitoring programs to implement adjustments to programs and/or adaptive management
- Attainment, and a request to monitor attainment based on dissolved metal concentrations
- Dust deposition on plants and subsequent update in small mammals. Suggest plant and small mammal monitoring
- The monitoring plan needs to be able to detect the changes that the adaptive management plan is associated with:
 - Variance in metals uptake in plant; requests to identify residual effects of metal contamination, receive information about monitoring and management of dust. Consider different species for monitoring as willow may be too variable – consider lichen instead. Consider setting thresholds for metal concentrations in vegetation to the Canadian Council of Ministers of the Environment (CCME) agricultural consumption guidelines.
- Splitting out caribou and moose monitoring activities
- Clear connections between monitoring and adaptive management activities
- Additional spawning surveys.

Commitments that were made during the YESAB screening process related to the Environmental Monitoring Plans as well as mitigations and monitoring requirements set out by the Decision Document terms are incorporated into the plan where possible and are summarized in the EMAMP Table of Concordance (Appendix M). As detailed in the Coffee Gold Mine – YESAB Project proposal Addendum to Section 3.0 – Consultation (Goldcorp 2017), Newmont has further committed to the following Project Commitments related to environmental monitoring:

- **Project Commitment 5:** Newmont and TH agree on the following water quality monitoring stations:
 1. 1 station upstream of YT-24 on Yukon River.
 2. 1 station upstream of Halfway Creek on Yukon River.

3. 1 station downstream of Halfway Creek on Yukon River.
 4. 1 station downstream of the Halfway Creek mixing zone.
 5. 1 station in an upstream location that is not necessarily YUK 2.0.
- **Project Commitment 6:** Newmont and TH agree that two water quality monitoring stations in the receiving environment in Halfway Creek are required
 - **Project Commitment 7:** Newmont and TH agree that the YT-24 water quality monitoring station is appropriate as a water quality objective attainment location
 - **Project Commitment 8:** Newmont and TH agree that the CC-1.5 water quality monitoring station on Latte Creek is an appropriate water quality objective attainment location
 - **Project Commitment 9:** Newmont and TH agree that the CC-X water quality monitoring station and CC- 4.5 water quality monitoring station on Coffee Creek are appropriate attainment stations. TH agrees that Newmont can drop CC-4.5 as an attainment station if non-degradation can be shown at CC-X (Latte Mix) station.

In addition to providing review and feedback on the EMAMP, Newmont continues to collaborate with TH and Yukon College to develop a fully accredited Environmental Monitor program in order to involve community members directly in the execution of monitoring programs. The Environmental Monitor program is delivered in two-week modules, taught at the Project site, and includes TH Elders. Course completion by First Nation students will allow students to be hired as Environmental Monitors with Newmont and potentially with other projects. This program ensures ongoing involvement of community members in the monitoring and reporting of Project construction and operations.

1.4 Synergies with Newmont Standards and Requirements and Other Project Documents

As an important part of Newmont's internal governance process, Newmont has implemented Global Policies and Standards (Global Standards) that are reviewed and preliminarily approved by a Global Policies & Standards Committee. The Global Standards provide the framework and standards for Newmont sustainability management and ensures a consistency of approach for implementing these global policies across the Company.

The Global Standards apply to all directors, officers and employees of Newmont Corporation, its subsidiaries, and any other entities that it controls. A variance request process for existing or future conditions is in place. The process provides an alternative mechanism for those instances where a Newmont site/operation cannot logistically or feasibly conform to a requirement established in a Standard due to special conditions or unique hardships. The Global Standards are intended to be fully integrated into all core business functions, and they emphasize sustainability, responsibility, and accountability at all organizational levels. The list of Global Standards is provided in Table 1-1.

Table 1-1 Newmont Global Standards

Global Standards	
Air Emissions Management Standard	Land Acquisition and Involuntary Resettlement Standard
Biodiversity Management Standard	Local Procurement and Employment Standard
Closure and Reclamation Management Standard	People Policy
Code of Conduct	Product Stewardship Standard
Community Investment and Development Standard	Social Baseline and Impact Assessment Standard
Cultural Resource and Management Standard	Stakeholder Relationship Management Standard
Drug and Alcohol Policy (Coffee-Specific)	Tailings Storage Facility and Heap Leach Facility Environmental Standard
Hazardous Materials Management Standard	Tailings Storage Facilities Technical and Operations Standard
Health and Safety Policy	Waste Management Standard
Human Resources Standard	Waste Rock and Ore Stockpile Management Standard
Human Rights Standard	Water Management Standard
Indigenous Peoples Standard	

The EMAMP has been developed to meet the applicable Newmont standards. While this Plan can be reviewed in isolation to understand the environmental monitoring, physical monitoring and adaptive management program, this plan should be viewed in concert with the following additional management plans in order to attain a holistic understanding of the Project:

- Wildlife Protection Plan
- Vegetation Protection Plan
- Water Management Plan
- Erosion and Sediment Control Plan
- Reclamation and Closure Plan.

The Erosion and Sediment Control Plan describes the Erosion and Sedimentation Control Good Management Practices for protection of aquatic resources, as well as the associated effectiveness monitoring program. The Reclamation and Closure Plan describes the monitoring activities that are planned for the Closure Phase and, if relevant, the Post-closure Phase to confirm the effectiveness of the reclamation and closure measures.

1.5 Roles and Responsibilities of Key Personnel

The following table outlines the roles and responsibilities of key project personnel as they relate to this Environmental Monitoring and Adaptive Management Plan, a more detailed list is included below.

Table 1-2 Key Project Personnel

Role	Responsibility
Mine General Manager	Overall responsibility for Mine Site management.
Operations Manager	Responsible for mine planning and production, mine technical monitoring, and mine regulatory compliance.
Health and Safety Manager	Responsible for conducting regular safety site inspections and implementing the appropriate controls in a timely manner. The H&S Manager shall maintain records of all safety inspections as well as any actions taken because of these inspections throughout the life of the Project. Where safety inspections show the potential for environmental effects, the H&S Manager will work in collaboration with the Environment Department.
Sustainability and External Relations (SER) Department	Responsible for recording and addressing any complaints received from nearby land users, or other interested parties regarding Project-related impacts off-site. The SER department shall maintain records of all complaints received as well as any actions taken because of these complaints.
Environmental Manager	Responsible for permitting, environmental monitoring, and regulatory compliance.

The designated Environmental Manager will have overall responsibility for the effective implementation of the Monitoring Plans, and will be assisted by site personnel, as well as external consultants. Site personnel will be responsible for the following tasks:

- Scheduled site sampling visits, calibration of in-site probe, preparation of sampling bottles, preservative, etc.
- Personal health and safety, including hazard identification and avoidance, wearing appropriate personal protective equipment (PPE), etc.
- Initial data management activities including QA/QC of data, archiving and backup
- Compilation and analysis of data for monthly reports to mine operations managers and annual reports to regulatory agencies
- Compilation of data for dissemination to other qualified professionals
- Training of other site staff to ensure redundancy in the monitoring program
- Review and updates of the monitoring protocols, manuals, etc. as necessary, and/or as required by permit and license conditions.

External consultants (i.e., qualified professionals engaged by Newmont) or qualified professionals within Newmont may be responsible for the following tasks related to the collection and interpretation of data:

- Secondary QA/QC of data collected by the program.
- Updates of existing analyses and new analyses that utilize the site data, as required.
- Maintaining a record of changes made to the data following the QA/QC exercise, and a record of suggested alterations to the monitoring program (including frequency, monitoring locations, monitoring and data management protocols, etc.).
- Maintaining backups of all data and associated maintenance records, field notes, reports, etc. on a secondary server.

For the Physical Monitoring Plan the Mine Engineering Department will be responsible for carrying out the plan and follow-up activities.

2.0 ENVIRONMENTAL MONITORING APPROACH

The environmental monitoring programs are built on the effects assessments that were completed as part of the environmental and socio-economic assessment. The environmental systems and components that have been selected for on-going monitoring are directly tied to those components selected as Valued Components (VCs) and Intermediate Components (ICs) used in the effects assessment for the Project (Goldcorp 2017), as summarized in Table 2-1¹. The VCs and ICs were based on Project relevance and importance to First Nations, government agencies, and stakeholders, and were identified during the Project's consultation and engagement activities. Those components listed in Table 2-1 are those that have at least one potential interaction with proposed Project activities and are likely to experience Project-related adverse residual effects, whether significant or not significant. "Subcomponents" (Table 2-1) are environmental sub-systems that, as a whole, provide information on the function of the associated valued and intermediate component.

Each monitoring plan summarized in this document describes the indicators and parameters that will be monitored and how they are tied to other disciplines. Table 2-1 summarizes the component, subcomponents and indicators. The parameters specific to each indicator are described further in this document under the applicable monitoring plan summary section (i.e., Sections 3.0 through 13.0).

¹ Some indicators have been modified since the environmental and socio-economic assessment.

Table 2-1 Environmental Components, Subcomponents, and Indicators

Component	Subcomponents	Indicators Used for the Analysis ¹	Associated Monitoring Plan	NAR monitoring included
Surficial Geology, Terrain, and Soils	Terrain Stability	<ul style="list-style-type: none"> Change in terrain stability class Change in terrain stability as a result of permafrost disturbance 	Physical Monitoring Plan	No
	Unique Landforms	<ul style="list-style-type: none"> Disturbance of unique landforms 	Geochemical Monitoring Plan	Yes
	Soil Quality	<ul style="list-style-type: none"> Soil disturbance Soil degradation Soil salvage and handling 		
Surface Water Quality	N/A	<ul style="list-style-type: none"> TSS and turbidity concentration Physical parameters Cyanide species Nutrient concentrations Biological oxygen demand and chemical oxygen demand Total and dissolved metals concentrations 	Surface Water Quality Monitoring Plan	No
Groundwater	Groundwater Quantity	<ul style="list-style-type: none"> Groundwater levels Surface water low flows 	Groundwater Monitoring Plan	No
	Groundwater Quality	<ul style="list-style-type: none"> Predicted / observed pit lake water quality Predicted / observed waste rock seepage quality Baseflow and observation well water quality 		
Surface Hydrology	N/A	<ul style="list-style-type: none"> Annual runoff Monthly runoff distribution Low flows Peak flows Duration and frequency of flow 	Hydrology Monitoring Plan	No

Component	Subcomponents	Indicators Used for the Analysis ¹	Associated Monitoring Plan	NAR monitoring included
Fish and Fish Habitat	Arctic Grayling	<ul style="list-style-type: none"> Habitat suitability Habitat accessibility Contaminant toxicity Stream productivity Fish mortality 	Fish and Aquatic Life Monitoring Plan	Yes
	Chinook Salmon	<ul style="list-style-type: none"> Habitat suitability Habitat accessibility Contaminant toxicity Stream productivity Fish mortality 		
	Chum Salmon	<ul style="list-style-type: none"> Habitat suitability Fish mortality 		
Aquatic Life	Benthic Macroinvertebrates	<ul style="list-style-type: none"> Physical disturbance Toxicity Productivity 	Fish and Aquatic Life Monitoring Plan	Yes
	Periphyton	<ul style="list-style-type: none"> Physical disturbance Toxicity Productivity 		
Vegetation	Ecological Communities	<ul style="list-style-type: none"> Area of ecological communities that will be lost 	Vegetation Monitoring Plan	Yes
	Wetland Habitats	<ul style="list-style-type: none"> Area of wetland habitats that will be lost 		
	Traditional and Medicinal Plants	<ul style="list-style-type: none"> Area of berry producing ecological communities that will be lost 		
	Rare Plants	<ul style="list-style-type: none"> Area of potential rare plant habitat that will be lost 		
	Vegetation Health	<ul style="list-style-type: none"> Risk of increased concentration of trace metals in selected indicator species 		

Component	Subcomponents	Indicators Used for the Analysis ¹	Associated Monitoring Plan	NAR monitoring included
Wildlife and Wildlife Habitat	Fortymile Caribou	<ul style="list-style-type: none"> Habitat availability Mortality risk Movement patterns 	Wildlife Monitoring Plan	Yes
	Klaza Caribou	<ul style="list-style-type: none"> Habitat availability 		
	Moose	<ul style="list-style-type: none"> Habitat availability Mortality risk 		
	Thinhorn Sheep	<ul style="list-style-type: none"> Habitat availability Movement patterns 		
	Grizzly Bear	<ul style="list-style-type: none"> Individual den sites / den habitat quantity Habitat availability Mortality risk 		
	Wolverine	<ul style="list-style-type: none"> Individual den sites / den habitat quantity Mortality risk 		
	Little Brown Myotis	<ul style="list-style-type: none"> Roost habitat availability 		
Birds and Bird Habitat	Sharp-tailed Grouse	<ul style="list-style-type: none"> Number of available lek sites 	Wildlife Monitoring Plan	Yes
	Cliff-nesting Raptors	<ul style="list-style-type: none"> Number of available nest sites 		
	Passerines	<ul style="list-style-type: none"> Amount of high-suitability habitat 		
	Upland-associated Species at Risk	<ul style="list-style-type: none"> Amount of high suitability habitat 		
	Wetland-associated Species at Risk	<ul style="list-style-type: none"> Amount of high-suitability habitat 		
	Bank Swallow	<ul style="list-style-type: none"> Number of available colony sites 		

Component	Subcomponents	Indicators Used for the Analysis ¹	Associated Monitoring Plan	NAR monitoring included
Air Quality and Greenhouse Gas Emissions	N/A	<ul style="list-style-type: none"> • Total suspended particulate • Particulate matter <10 µm in diameter • Particulate matter <2.5 µm in diameter • Dust fallout and mineral content • Nitrogen oxides • Sulphur dioxide • Carbon monoxide • Greenhouse gases 	Air Quality and Greenhouse Gas Monitoring Plan	Yes
Noise	N/A	<ul style="list-style-type: none"> • Noise levels 	Noise Monitoring Plan	Yes

1 – some indicators have been modified since the environmental and socio-economic assessment.
Adapted from Table 5.1-1 and Table 5.1-2 of Goldcorp 2017

Environmental monitoring builds on the monitoring conducted prior to Project construction (i.e., baseline data collection) and on the prediction of effects conducted in the Project Proposal, to compare and contrast environmental conditions during Project construction and operation to pre-Project conditions and to the predicted effects. Monitoring during construction and operations also allows for any gaps in knowledge or understanding related to assessments findings to be addressed. On-going monitoring includes the evaluation of the effectiveness of mitigation measures and provides metrics against which Project activities can be measured, evaluated, and adjusted (Figure 2-1).

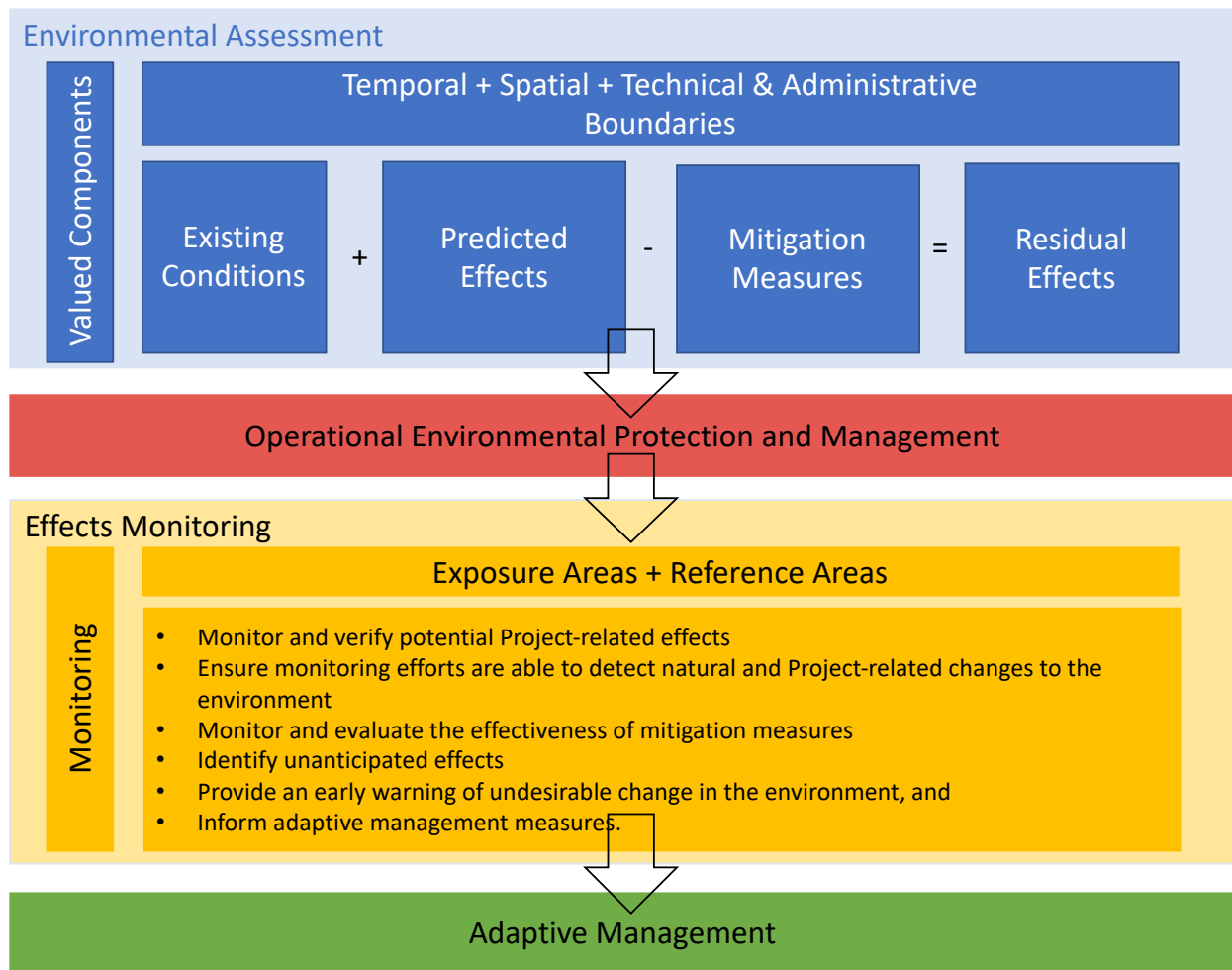


Figure 2-1 Environmental Assessment, Effects Monitoring and Adaptive Management Frameworks

Monitoring activities must also be evaluated as a whole in order to identify trends, statistically evaluate change, and discover the reasons for the changes, whether they are caused by natural causes or due to effects of Project activities. For example, as fish and aquatic life are directly linked to the quality and quantity of available habitat (i.e., water), measurable parameters and supporting variables are collected under the Hydrology Monitoring Plan (Appendix A), Surface Water Quality Monitoring Plan (Appendix B), the Groundwater Monitoring Plan (Appendix C), the Vegetation Monitoring Plan (Appendix H) and the Air Quality and Greenhouse Gases Monitoring Plan (Appendix I). Additionally, the supporting components, such as hydrology, are further informed by data collected in the Meteorological Monitoring Plan

(Appendix D). Monitoring of all these components, subcomponents and indicators (Figure 2-2) in combination with the direct monitoring of fish, fish habitat and aquatic life (Fish and Aquatic Life Monitoring presented in Appendix F) will help to inform the identification of effects on fish and aquatic life.

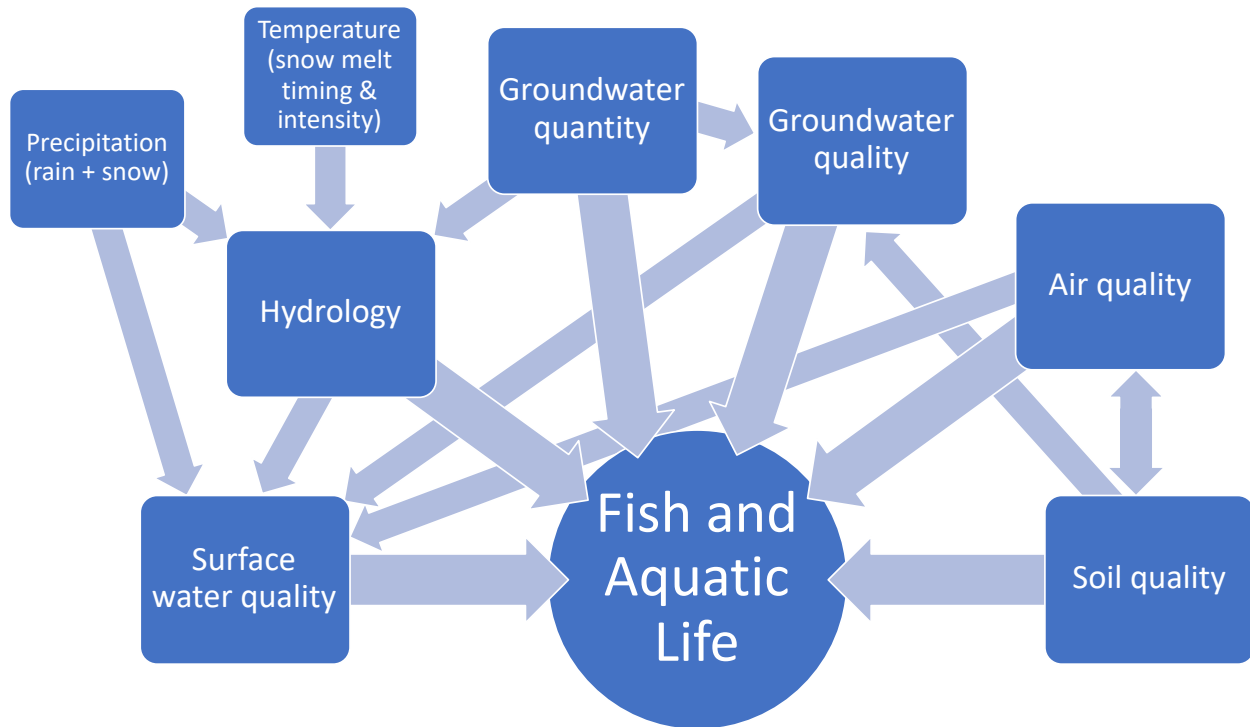


Figure 2-2 Fish and Aquatic Life Monitoring Linkages with Other Monitoring Programs.

2.1 Monitoring Boundaries

Monitoring for the Project will be consistent with the spatial and temporal boundaries established in the Project Proposal (Goldcorp 2017), based on the spatial characteristics of the Project and the areas where Project-Environmental Component interactions and effects were expected to occur. The spatial boundaries were also determined considering Traditional Knowledge (TK), scientific and other information, including pertinent ecological, social, and cultural values, as identified through baseline studies and input received from First Nations, government agencies, local communities, the public, and other interested parties. The types of spatial boundaries established for the assessment of potential Project-related changes or effects to individual components are defined in Table 2-2. Specific details on the areas and monitoring locations for each component are provided in Appendix A through Appendix L.

Table 2-2 Monitoring Program Spatial Boundaries

Spatial Boundary	Description of Monitoring Area
Project footprint	Area in which Project-related physical disturbance will occur, plus a 50-m buffer. The Project footprint includes a total of 3,402 hectares.
Project area	Area encompassing the mine site and airstrip, plus a 250-m buffer. Area encompassing the footprint of the access road between the Mine Site and airstrip, and the footprint of the Northern Access Route (licensed separately) footprint, plus a 500-m buffer on either side of the centreline. The Project area includes a total of 22,006 hectares.
Local Study Area	Encompasses the area within which the Project is expected to interact with and potentially result in changes or effects to the component.
Regional Study Area	Provides the regional context for the analysis of potential Project-related changes or effects within the LSA; unless otherwise indicated, the RSA will also encompass the area where residual Project-related changes to the component or subcomponent are likely to combine with the residual changes of other projects and activities to result in a cumulative change to the component or subcomponent.

(Adapted from Table 5.1-3 in Goldcorp 2017)

The temporal boundaries identified for component monitoring is also consistent with the boundaries established in the Project Proposal (Goldcorp 2017) and is limited to encompass periods when the Project is expected to affect the environmental components. These boundaries were determined based on the timing and duration of the Project. Potential effects to be considered for each phase of the Project are described in Table 2-3.

Table 2-3 Monitoring Program Temporal Boundaries

Spatial Boundary	Project Year	Description of Activities
Construction	-3 to -1	<ul style="list-style-type: none"> • Construction of Northern Access Route and Mine Site • Pre-production activities.
Operation	-1 to 9	<ul style="list-style-type: none"> • Mining activities • Operational closure activities.
Reclamation and Closure	10 to 21	<ul style="list-style-type: none"> • Post-mining Closure Stage from Year 10 to Year 15: ore processing continues, but no active mining • Active Closure Stage from Year 16 to Year 21: water treatment and reclamation and closure activities at Northern Access Route and Mine Site.
Post-closure	21 onwards	<ul style="list-style-type: none"> • Ongoing monitoring.

2.2 Adaptive Management Approach

Adaptive management is the response to unforeseen or unpredicted effects to the receiving environment identified through on-going monitoring activities. Unforeseen or unpredicted effects may be due to effects of the environment on the Project (e.g., climate change, wildfires, earthquakes, etc.), or due to unpredicted responses of the natural systems to Project activities. Adaptive management is a set of actions governed

by threshold or “trigger” values that gradually increase the level of response in accordance with the magnitude of the unforeseen change. Guidance for adaptive management in Yukon is provided in Section 10 of *Appendix B: Recommended Table of Contents for Water Use Licence Application Reports for Quartz Mining Undertakings* (YWB 2012), and *Guidelines for Developing Adaptive Management Plans In Yukon: Water-related components of quartz mining projects* (Government of Yukon 2021).

For the Project, the adaptive management approach is intended to provide a framework to evaluate observed changes in the water quality, aquatic life, fish and fish habitat in receiving streams that fall outside of the predicted range, develop an appropriate response to mitigate the observed changes if they have the potential to cause adverse effects to the receiving aquatic system (or if actual effects are evident), assess the effectiveness of that response, and report out to the appropriate regulatory agencies and First Nations partners. Specific adaptive management plans have not been developed for Project components not directly related to water quality, aquatic life, fish, and fish habitat; however, if unanticipated outcomes from monitoring or additional consultation identifies adaptive management requirements for these components, an adaptive management strategy will be developed. Newmont is committed to upholding the adaptive management related commitments made during the Environmental Assessment, as well as requirements of the Decision Document. Newmont is also committed to implementing routine evaluation of the monitoring plans and results during all phases of the Project and will update the monitoring and/or management plans to adapt to the results of the Project effects monitoring.

The adaptive management approach builds on the environmental monitoring approach by adding adaptive management to the effects monitoring programs for surface water quality and aquatic life. An overview of this approach is provided in Figure 2-1. Adaptive management for the project applies a trigger (low, medium, and high) to each monitored parameter. If the trigger levels are exceeded, an investigation of cause or other management technique is applied and, if the exceedance is found to be due to Project activities, appropriate mitigation measures are implemented. Monitoring of the additional mitigation is then resumed, and the cycle begins again (Figure 2-3). The Surface Water Quality and Aquatic Life Adaptive Management Plan (AMP) is attached in Appendix L.

It should be noted that the Surface Water Quality and Aquatic Life AMP complements the other Management and Monitoring Plans for the Project, which are intended to address the Project effects that have been predicted with a high degree of certainty. The development and implementation of an AMP is not intended to defer the requirement for the development and implementation of these other management plans.

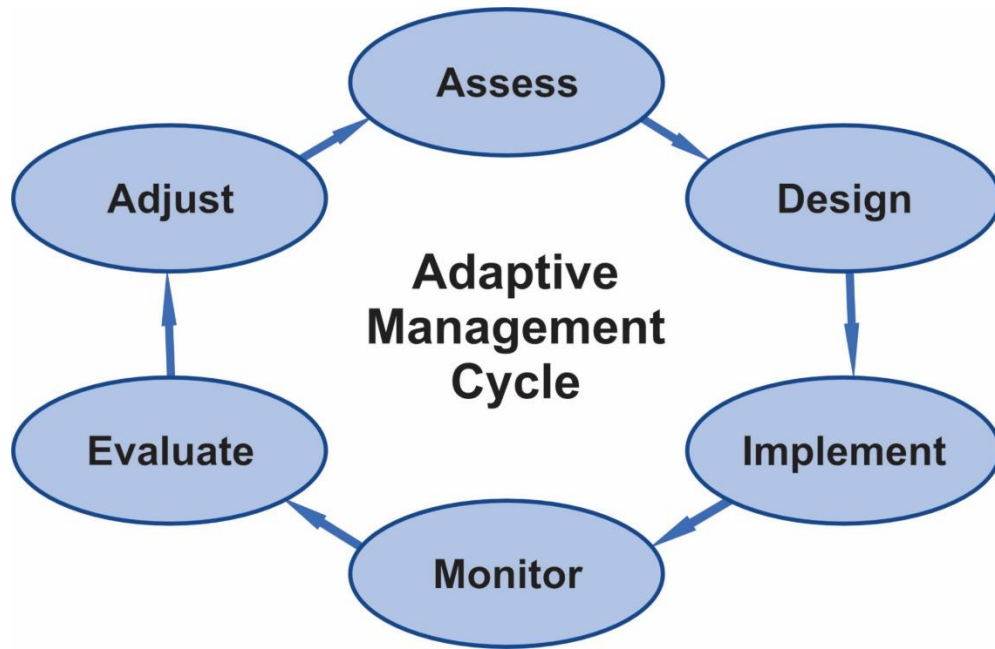


Figure 2-3 Adaptive Management Cycle (adapted from Murray and Marmorek 2003)

3.0 HYDROLOGY

The Hydrology Monitoring Plan (Appendix A) describes hydrological monitoring of surface streams for the Coffee Gold Project (the Project). Hydrological monitoring is the systematic measurement of the quantity of surface water within the mine site, discharged as mine effluent, and in the receiving environment, to ensure that water quantity is within expected ranges. The Hydrology Monitoring Plan is based on the Project Description mine layout and water management infrastructure. It reflects the current understanding of the baseline surface water and groundwater systems, including both quantity (flows) and quality. It includes a description of monitoring methods, baseline conditions, monitoring locations and frequency, and outlines monitoring procedures, including QA/QC protocols. In addition, it outlines some key considerations for implementation. The Hydrology Monitoring Plan describes hydrological monitoring across the Baseline, Construction, and Operations phases of the Project. These, and other aspects of this Plan, will be updated periodically, as mine planning and development proceed.

3.1 Indicators and Monitoring Links

The scope of the monitoring plan is based on the relationship between the component selected during the environmental and socio-economic assessment, indicators, parameters, and links to other disciplines. The following subsections describe the linkages.

3.1.1 Indicators and Hydrology Monitoring

During the environmental and socio-economic assessment completed with YESAB, hydrology (streamflow and mine site effluent discharges) was selected as an IC linked to the surface water quality and fish and fish habitat VCs. Hydrology is also linked to the groundwater IC. Hydrology was selected as an IC based on traditional knowledge noting the importance of local watercourses to First Nations and for its linkages to

other disciplines. Indicators for each VC and IC were identified to assess potential effects of the project. The selected indicators will be monitored to evaluate potential adverse changes, the subsequent effectiveness of mitigation measures, and to characterize potential residual adverse changes. The hydrology indicators are listed below in Table 3-1.

The streamflow effects assessment conducted for the YESAB submission outlined specific objectives for the implementation of a strategic and flexible water monitoring program at the mine site:

- Enhance baseline understanding of local hydro-meteorological processes
- Verify the accuracy of the residual change and residual cumulative change predictions
- Assess the efficacy of proposed mitigation measures and the need for modifications to those measures
- Identify analysis discrepancies that may arise related to the Surface Hydrology IC
- Implement additional mitigation measures as per the surface water quality and aquatic life adaptive management plans as required.

To accomplish these objectives, the Hydrology Monitoring Plan includes multiple flow monitoring stations within the mine site, at the effluent discharge point, and within the down-gradient receiving streams. The monitoring system will be implemented in a systematic manner to ensure that reliable and consistent data is obtained. Key considerations include assignment of responsibilities, data management, and data interpretation and reporting.

As detailed in the *Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada* (DFO 2013), various methods can be used to assess the potential impact of flow alterations on fish habitat in the receiving streams. The hydrological methods category of analysis seeks to characterize the natural flow paradigm, where "...the management goal is maintenance of the many natural or historic characteristics of the hydrograph (amplitude, timing, frequency, duration, variability, etc.)." Quantification of a hydrological regime is conducted through calculation of the key metrics of the streamflow regime, including annual runoff, monthly runoff distribution, low flows, and peak flows (Table 3-1).

Table 3-1 Indicators for Hydrology and Links to Monitoring

Indicator	Rationale for Selection	Monitoring
Annual Runoff	Project activities (e.g., pit dewatering, water diversions, water use) have the potential to change the proportion of precipitation that reports as surface runoff on an annual basis.	Flow, discharge – stream flow, discharge – mine site effluent
Monthly Runoff Distribution	Water management ponds, open pits, pit lakes and WRSFs are known to alter (e.g., attenuate, enhance) the runoff signatures of mine-affected catchments on a monthly and seasonal basis.	Flow, discharge – stream flow, discharge – mine site effluent
Low Flows	Alterations to the existing groundwater regime and shallow interflow may result from Project development (e.g., pit development, waste rock placement).	Flow, discharge – stream flow, discharge – mine site effluent

Indicator	Rationale for Selection	Monitoring
Peak Flows	Alteration of the land surface and diversion of water via ditches may increase peak flows in the vicinity of the Project. Conversely, reductions in basin area may have the potential to reduce peak flows via reduction in contributing areas.	Flow, discharge – stream flow, discharge – mine site effluent

The metrics are calculated using the measured parameters listed in Table 3-2, including measurements of water level and stream discharge. The frequency with which these parameters will be recorded will vary from 15-minute to monthly intervals, depending on the monitoring location and measurement method (refer to Hydrology Monitoring Plan, Appendix A). Discharge rates are calculated using a stage-discharge rating curve, which allows 15-minute continuous measurements of water level (stage) to be converted to the commensurate discharge rate. For mine site discharges, these will be measured either using flow totalizers on pumps, or rated structures (e.g., weirs) at the outlet of sediment ponds.

Table 3-2 Hydrological Measured Parameters

Parameter	Rationale for Selection	Frequency	Method
Water Level (Stage)	Required to base calculations of streamflow upon	15-minute	Pressure Transducer and Staff Gauge
Discharge (Streamflow)	Required to calculate dilution ratios, monitor potential mine related effects to baseline streamflow regime	Manual (monthly, as required for rating curve maintenance)	Flow meter, salt dilution, ADCP ¹
Discharge (Mine Site Effluent)	Required to calculate effluent loads discharged to receivers, determine rates of WRSF seepage and pit inflows	15-minute, daily, weekly (station specific)	Pump totalizers, rated structures

Notes: ¹Acoustic Doppler Current Profiler

3.1.2 Links to Other Disciplines

Streamflow and discharge data collected as part of the hydrology monitoring also support monitoring conducted in other disciplines, as shown in Figure 3-1 and Table 3-3, which will be used collectively to assess effects of the Project on the environment. For example, short-term trends in water quality at a monitoring location may be caused by wetter or drier than average conditions, and not by changing geochemical factors. The flow records collected from both the mine site and receiving environment monitoring stations will also be critical in the management of the HLF, open pit mining operations, dust control, future exploration activities and water management infrastructure.

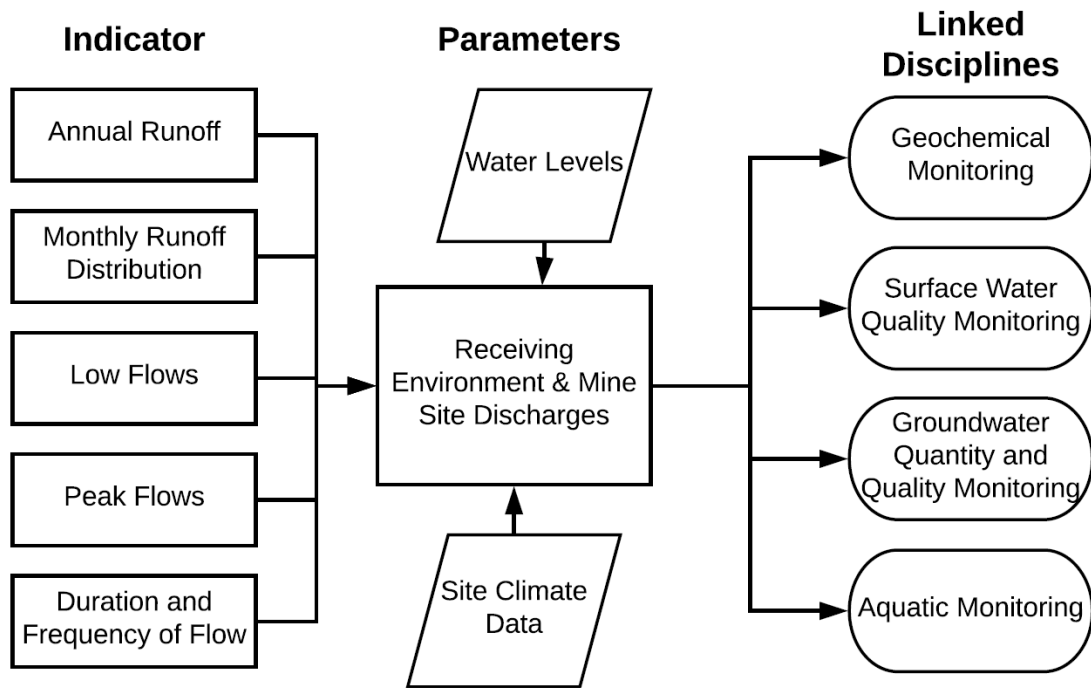


Figure 3-1 Linkages between Hydrological Monitoring Indicators and Other Disciplines

Table 3-3 Summary of Hydrology Variable Linkages to other Monitoring Plans

Monitoring Component	Description
Geochemical Monitoring Plan	Mine site effluent discharge rates
Groundwater Monitoring Plan	Mine site effluent discharge rates, pit sump dewatering rates, receiver stream low flows
Surface Water Quality Monitoring Plan	Mine site effluent discharge rates, pit sump dewatering rates, receiver stream low flows
Aquatic Monitoring Plan	Mine site effluent discharge rates, hourly receiving stream flow rates
Meteorology Monitoring Plan	Mine site effluent discharge rates, hourly receiving stream flow rates

Hydrology includes streamflow and mine site effluent discharges, pond and pit lake levels and volumes, and is directly linked to other aquatic ecosystem components, including surface water quality, groundwater quality and fish and fish habitat as follows:

- Groundwater quality:
 - Precipitation abstracted to groundwater recharge is not available for surface runoff.
 - Groundwater discharge to valley bottoms contributes to baseflows year-round, and the formation of channel ice (aufeis) in the winter months.

- Leakage from future pit lakes and/or sediment ponds may report to nearby streams via shallow groundwater flow pathways.
- Surface water quality:
 - Concentrations of parameters of concern (e.g., arsenic, uranium) in the receiving streams are a function of the load (mass) multiplied by the flow (volume/time).
 - Some chemical parameters are controlled by the rate of groundwater discharge, which forms the majority of surface flow during the winter months (and during extended dry periods in the open water season). This represents a three-way linkage between Surface Hydrology, Groundwater and Surface Water Quality.
 - The relative timing and direction (routing) of mine contact waters (e.g., pit dewatering, WRSF seepage) in relation to the timing (peak and low flows) of discharge in receiving streams will influence surface water quality (the rate of contact water discharge divided by the flow in the receiving stream equals the dilution ratio) conditions during Construction, Operation, Reclamation and Closure and Post-closure Phases of the Project.
- Fish and fish habitat:
 - Fish habitat is defined in part by the volume of water in a watercourse during critical times (e.g., over-wintering, rearing, spawning).
 - Streamflow is linked to the wetted channel width, which is a key habitat indicator.
 - Timing of melt (snow and aufeis) plays a role in the timing of potential fish access to the Project area streams.
 - Altered rainfall-runoff responses (e.g., flashier runoff as a potential result of stripping and grubbing of Project footprint) can alter stream channel morphology (e.g., remove pools).

4.0 SURFACE WATER QUALITY

The Surface Water Quality Plan (Appendix B) describes surface water quality monitoring for the Project. Surface water quality monitoring is the systematic measurement of the quality of water within the mine site, discharged as mine effluent, and in the receiving environment, to ensure that it is within expected ranges. This plan reflects the current understanding of the baseline surface water and groundwater systems, including both quantity (flows) and quality. It includes a description of monitoring methods, monitoring locations and frequency, and outlines monitoring procedures, including quality assurance/quality control (QA/QC) protocols. In addition, it outlines some key considerations for implementation.

The Surface Water Quality Monitoring Plan describes surface water quality monitoring across Baseline, Construction, and Operations phases of the Project. The Plan will be updated periodically, as mine planning and development proceed.

4.1 Indicators and Monitoring Links

The scope of the monitoring plan is based on the relationship between the component selected during the environmental and socio-economic assessment, indicators, parameters, and links to other disciplines. The following subsections describe the linkages.

4.1.1 Indicators and Surface Water Quality Monitoring

During the environmental and socio-economic assessment completed with YESAB, surface water quality was selected as a VC. Surface water quality was selected as a VC based on it being highly valued by First Nations, local people, territorial and federal governments and represents a key aspect of environmental health, holds inherent value in traditional knowledge and for its linkages to other disciplines. The following VCs are informed by surface water quality: fish and fish habitat, vegetation, wildlife and wildlife habitat, birds and bird habitat, social economy, land use resource use and community health and well-being. Indicators for each VC were identified to assess potential effects of the project. The selected indicators will be monitored to evaluate potential adverse changes, the subsequent effectiveness of mitigation measures, and to characterize potential residual adverse changes. The indicators for surface water quality are listed below in Table 4-1.

The surface water quality effects assessment conducted for the YESAB submission outlined specific objectives for the implementation of a strategic and flexible water monitoring program at the mine site:

- To verify and update water quality predictions for all phases of the Project, based on monitoring results, as necessary
- To assess compliance with applicable water quality discharge limits for mine site effluent
- Identify analysis discrepancies that may arise related to the Surface Water Quality VC
- Verify the accuracy of the residual change and residual cumulative change predictions
- Assess the efficacy of proposed mitigation measures and the need for modifications to those measures
- Implement additional mitigation measures as per the surface water quality and aquatic life adaptive management plans as required.

To accomplish these objectives, the Surface Water Quality Monitoring Plan includes multiple monitoring stations within the mine site, at the effluent discharge point, and within the down-gradient receiving streams. The monitoring system will be implemented in a systematic manner to ensure that reliable and consistent data is obtained. Key considerations include assignment of responsibilities, data management, and data interpretation and reporting. The monitoring station locations are listed in Table 4-1 of the Surface Water Quality Monitoring Plan (Appendix B).

Table 4-1 Indicators for Surface Water Quality and Links to Monitoring

Indicator	Rationale for Selection	Monitoring
TSS and turbidity concentration	<p>A measurable increase from background levels will identify Project related effects from:</p> <ul style="list-style-type: none"> • Erosion and sedimentation - associated with surface disturbance and/or elevated suspended sediments in mine effluent discharges • Atmospheric deposition – associated with surface disturbance, roadway traffic, and particulate emissions from plant site. 	Water sampling of surface water on the mine site, effluent discharge point and receiving environment.
Physical parameters (conductivity, pH, hardness, TDS)	<p>A measurable change from background levels will identify Project-related effects from:</p> <ul style="list-style-type: none"> • Leaching of disturbed mine materials/waste – associated with contact water from waste rock storage facilities (WRSFs), ore stockpiles, exposed pit surfaces, or surface disturbances (e.g., new road construction). • Groundwater and surface water interactions and seepage – associated with seepage and groundwater (higher in major ions) recharging to surface waters (lower in major ions). 	Water sampling of surface water on the mine site, effluent discharge point and receiving environment.
Cyanide species (CNWAD, CNT)	<p>A measurable increase from background levels will identify Project related effects from:</p> <ul style="list-style-type: none"> • Leaching of HLF residues – associated with application of cyanide for gold extraction at the HLF. 	Water sampling of surface water on the mine site, effluent discharge point and receiving environment.
Nutrient (TP, NH3, NO2, NO3) concentrations	<p>A measurable increase from background levels will identify Project related effects from:</p> <ul style="list-style-type: none"> • Leaching of nitrogen residues generated from blasting – associated with nitrogen-based explosive use. • Leaching of HLF residues – associated with application of cyanide for gold extraction at the HLF. • Discharge of camp wastewater – associated with effluent from the camp and administrative facilities 	Water sampling of surface water on the mine site, effluent discharge point and receiving environment.

Indicator	Rationale for Selection	Monitoring
Total and dissolved metals concentrations (e.g., Al, As, Sb, Co, Cr, Fe, Pb, Hg, Ni, Se, U and Zn.)	<p>A measurable increase from background levels will identify Project related effects from:</p> <ul style="list-style-type: none"> Erosion and sedimentation – with increase total (not dissolved) metal fraction only, associated with surface disturbance and/or elevated suspended sediments in effluent discharged from Project ponds. Atmospheric deposition – associated with surface disturbance, roadway traffic, particulate or soluble emissions from plant site. Leaching of disturbed mine materials/waste – associated with contact water from WRSFs, ore stockpiles, exposed pit surfaces, or surface disturbances (e.g., new road construction). Leaching of HLF residues – associated with application of cyanide for gold extraction at the HLF. Groundwater and surface water interactions and seepage – associated with seepage and groundwater (higher in certain trace elements) recharging to surface waters (lower in certain trace elements). 	Water sampling of surface water on the mine site, at the effluent discharge point and in the receiving environment.

The surface water quality monitoring program will measure the parameters outlined in Table 4-2.

Table 4-2 Surface Water Quality Measured Parameters

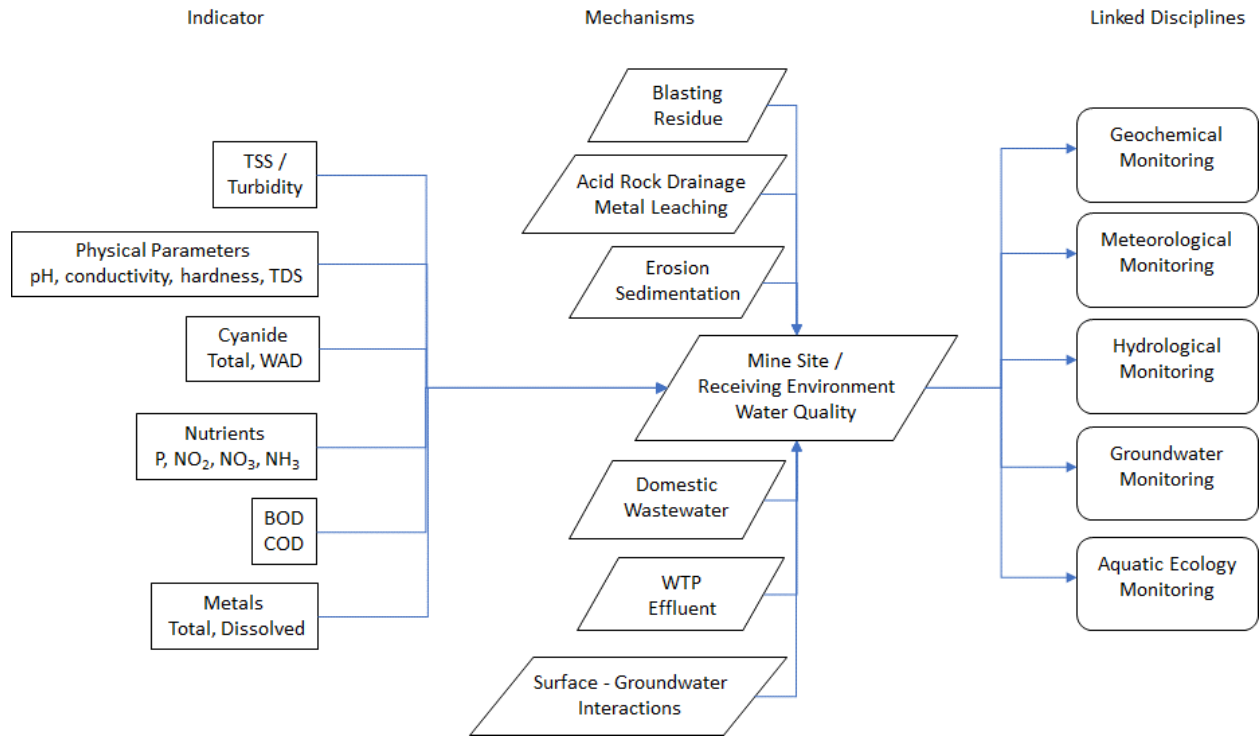
Parameter ¹	Rationale for Selection	Frequency	Method
Physical Parameters	Verify and update water quality predictions, assess compliance with effluent quality standards, assess whether any mitigation or adaptive management is required.	Monthly and weekly	Grab sample
Major Ions and Nutrients	Verify and update water quality predictions, assess compliance with effluent quality standards, assess whether any mitigation or adaptive management is required.	Monthly and weekly	Grab sample
Cyanide	Verify and update water quality predictions, assess compliance with effluent quality standards, assess whether any mitigation or adaptive management is required.	Monthly and weekly	Grab sample
Organic Carbon	Verify and update water quality predictions, assess compliance with effluent quality standards, assess whether any mitigation or adaptive management is required.	Monthly and weekly	Grab sample
Total and Dissolved Metals	Verify and update water quality predictions, assess compliance with effluent quality standards, assess whether any mitigation or adaptive management is required.	Monthly and weekly	Grab sample

Notes:

¹ Full parameter list presented in Table 5-1 of Surface Water Quality Monitoring Plan (Appendix B)

4.1.2 Links to Other Disciplines

Surface water quality is linked to several other disciplines, listed below in Figure 4-1 and Table 4-3. Surface water quality data collected as part of the surface water quality monitoring is supported by several other disciplines (e.g., groundwater and hydrological monitoring) and supports monitoring of aquatic ecology receptors, as shown in Figure 4-1, which will be used collectively to assess effects of the Project on the environment. The surface water quality records collected from both the mine site and receiving environment monitoring stations will also be critical in the management of the HLF, open pit mining operations, dust control, future exploration activities and water management infrastructure.



Notes: TSS-Total Suspended Solids; TDS – Total Dissolved Solids; BOD – Biological Oxygen Demand; COD – Chemical Oxygen Demand; WTP – Water Treatment Plant

Figure 4-1 Linkages between Surface Water Quality Monitoring Indicators and other Disciplines

Table 4-3 Summary of Surface Water Quality Variable Linkages to other Monitoring Plans

Monitoring Component	Description
Geochemical Monitoring Plan	ML/ARD potential of waste materials
Groundwater Monitoring Plan	Receiving environment groundwater input
Hydrology Monitoring Plan	Mine site effluent discharge rates, pit sump dewatering rates, receiver stream low flows
Aquatic Monitoring Plan	Mine site effluent discharge quality, receiving environment quality
Meteorology Monitoring Plan	Hourly receiving stream flow rates

Surface water quality includes mine site effluent discharges, and effects in the receiving environment. It is directly linked to wildlife as well as other aquatic ecosystem components, including fish and fish habitat, hydrology, and groundwater quality. The linkages between these components are as follows:

Wildlife:

- Surface water quality (including the concentration of contaminants) will affect the condition and availability of resources for wildlife habitat and consumption.

Hydrology:

- Surface water flows will affect the timing and magnitude of contaminant concentrations.
- Surface water flows will determine the degree of dilution that occurs, and where within the mine site and receiving environment mine effluent is diluted.
- Surface water flows will affect the duration and extent to which mine effluent can be retained, to allow contaminants to settle, prior to discharge to the receiving environment.

Groundwater quality:

- Leakage from mine facilities including future pit lakes and/or sediment ponds may influence groundwater quality and subsequently report to nearby streams via shallow groundwater flow pathways.
- Groundwater discharge to valley bottoms contributes to the quantity and quality of baseflows year-round, and the formation of channel ice (aufeis) in the winter months.
- Precipitation that contributes to groundwater recharge is not available to dilute (improve the quality of) surface runoff.

Fish and fish habitat:

- Fish habitat is defined in part by the quality of surface water in a watercourse, especially during critical times (during low flow periods).
- Degradation of water quality may cause habitat avoidance, and thereby influence habitat availability.
- Surface water quality may also affect the abundance and diversity of aquatic ecosystems, sediment quality, as well as riparian ecosystems.

5.0 GROUNDWATER MONITORING

The Groundwater Monitoring Plan (Appendix C) describes monitoring of groundwater associated with the Project. Groundwater monitoring is the systematic measurement of the quantity and quality of groundwater within the mine site and in the receiving environment, to ensure that groundwater quantity and quality is within expected ranges. The objectives of the groundwater monitoring program are to build on the baseline dataset, and to monitor for variations in groundwater quantity and quality that may be attributable to mine Construction and Operations phases. The plan includes a description of the existing baseline monitoring network, monitoring methods, locations and frequencies, and outlines procedures, including QA/QC protocols. The groundwater monitoring program herein described includes groundwater monitoring across the Baseline, Construction and Operations phases of the Project. The Plan will be updated periodically, as mine planning and development proceed.

This Plan acknowledges that First Nations view protection of headwaters as canon and that water quality impacts to groundwater arising from mine operations is considered pollution regardless of whether those impacts are considered benign by environmental guidelines. This plan acknowledges that unplanned discharges to groundwater should be actively avoided.

5.1 Indicators and Monitoring Links

The scope of the monitoring plan is based on the relationship between the component selected during the environmental and socio-economic assessment, indicators, parameters, and links to other disciplines. The following subsections describe the linkages.

5.1.1 Indicators and Groundwater Monitoring

During the environmental and socio-economic assessment completed with YESAB, groundwater was selected as an IC linked the following VCs and ICs: Surficial Geology, Terrain and Soils, Surface Water Quality, Hydrology, Fish and Fish Habitat, Social Economy, Land and Resource Use and Community Health and Well-being. Groundwater was selected as an IC based on traditional knowledge noting protection of headwaters and for its linkages to other disciplines. Indicators for each VC and IC were identified to assess potential effects of the project. The selected indicators will be monitored to evaluate potential adverse changes, the subsequent effectiveness of mitigation measures, and to characterize potential residual adverse changes. The indicators for groundwater are listed below in Table 5-1.

The effects assessment conducted for the YESAB submission employed the results of a numerical groundwater model and a site-wide water balance and water quality model to conservatively determine potential changes to groundwater quality and quantity arising from Project activities. A monitoring program is required to:

- Verify the accuracy of the residual change and residual cumulative change predictions, and the value of proposed mitigation measures.
- Assess the efficacy of proposed mitigation measures and the need for modifications to those measures to ensure change predictions remain valid.
- Identify problems that may arise related to groundwater.
- Implement additional mitigation measures, if necessary, as per surface water the surface water quality and aquatic life adaptive management plans.

To accomplish these objectives the groundwater monitoring plan includes a network of conventional monitoring wells (standpipe), multilevel (Westbay installations) wells, stand-alone vibrating wire piezometer (VWP) installations and VWP/thermistor installations to groundwater collect samples representative of background, mine site and receiving environment conditions.

Table 5-1 Indicators for Groundwater and Links to Monitoring

Indicator	Rationale for Selection	Monitoring
Groundwater levels	Pit dewatering, collection of meteoric water (rain, snow) in pit shells, enhanced recharge in disturbed areas may manifest as changes in groundwater levels. Water levels are easy to measure and can be used to determine groundwater flow directions and fluxes.	Groundwater level measurements in background, mine site and receiving environment groundwater monitoring network.
Surface water low flows	Alteration to groundwater recharge patterns resulting from the Project may result in changes to groundwater volume discharging at creeks. Surface water flows are included as an indicator under the hydrology monitoring plan.	Surface water flow monitoring completed as part of hydrology monitoring plan.
Predicted / observed pit lakes water quality	<p>Water that accumulates in open pits represents the integrated effect of pit development and, where applicable, waste rock backfill. Pit water may also serve to recharge groundwater flowpaths and/or may discharge to surface water receptors. As a result, pit lake water quality serves as a key indicator of Project changes to groundwater quality.</p> <p>Disturbed materials, when exposed to the atmosphere, can oxidize and release metals into solution and other ions. In broad terms, total and dissolved metals, anions, nitrogen species and field parameters (pH and temperature) are key parameters of pit lake water quality.</p> <p>The presence of certain metals in solution can indicate redox conditions, which can impart controls metal mobility in groundwater.</p>	<p>Pit water quality monitoring completed as part of surface water quality monitoring program.</p> <p>Mine area groundwater monitoring network.</p> <p>Receiving environment groundwater monitoring network.</p>
Predicted / observed waste rock seepage quality (Double Double)	<p>Minerals in excavated material may oxidize when exposed to the atmosphere and/or may leachate constituents (e.g., sulfate and metals) when flushed with incident precipitation. In addition, waste rock is likely to contain finite quantities of explosive residues that will leach nitrogen (e.g., nitrate). The backfilled Double Double pit is only facility where waste rock is anticipated to interact with groundwater, therefore, Double Double waste rock seepage is proposed as a representative analog or indicator for potential Project-related changes to groundwater quality.</p> <p>In broad terms, key WRSF seepage parameters include total and dissolved metals, anions, nitrogen species and field parameters (pH and temperature).</p>	<p>Mine area groundwater monitoring network.</p> <p>Receiving environment groundwater monitoring network.</p>

Indicator	Rationale for Selection	Monitoring
Baseflow and observation well water quality	<p>Baseflow in surface streams is an expression of groundwater discharge and therefore an indicator of groundwater quality.</p> <p>Groundwater quality from observation wells is a direct measurement of groundwater quality.</p> <p>Both of these groundwater quality indicators function to establish baseline conditions from which potential Project-related changes are compared. Changes in these indicators may also be used to verify and/or validate predicted changes to groundwater quality and associated linkages to surface water systems, as described above.</p>	Groundwater quality monitoring in background, mine site and receiving environment groundwater monitoring network.

The groundwater monitoring program will measure the parameters outlined in Table 5-2.

Table 5-2 Groundwater Measured Parameters

Parameter ¹	Rationale for Selection	Frequency ²	Method
Ground temperature	Verify and update water modelling predictions, assess permafrost conditions, assess whether any mitigation or adaptive management is required.	Continuously	Vibrating wire perimeter / thermistor installations, dataloggers
Groundwater levels	Verify and update water modelling predictions, assess groundwater conditions, assess whether any mitigation or adaptive management is required.	Continuously or quarterly	Conventional monitoring wells and multilevel groundwater monitoring wells, manual and dataloggers
Groundwater Quality (Physical parameters, inorganics, organic/inorganic carbon, anions and nutrients, cyanides, total and dissolved metals)	Verify and update water modelling predictions, assess groundwater conditions, assess whether any mitigation or adaptive management is required.	Quarterly	Collection of water sample from conventional monitoring wells and multilevel groundwater monitoring wells

Notes:

1 Full parameter list presented in Table 2-6 of Groundwater Monitoring Plan (Appendix C); 2 Details on frequencies are presented in the Groundwater Monitoring Plan (Appendix C)

5.1.2 Linkages to Other Disciplines

Groundwater quantity and quality data collected as part of groundwater monitoring are linked to other physical environment disciplines, including: Surficial Geology, Terrain and Soils, and Surface Water Quality, and to one biophysical environment discipline; Fish and Fish Habitat. Groundwater quantity and quality data collected as part of the hydrogeologic monitoring program support monitoring conducted in these other disciplines, which will be used collectively to assess impacts from the Project on the environment. A summary of the groundwater linkages to other disciplines, monitoring plans and/or management plans is shown on Figure 5-1 and Table 5-3.

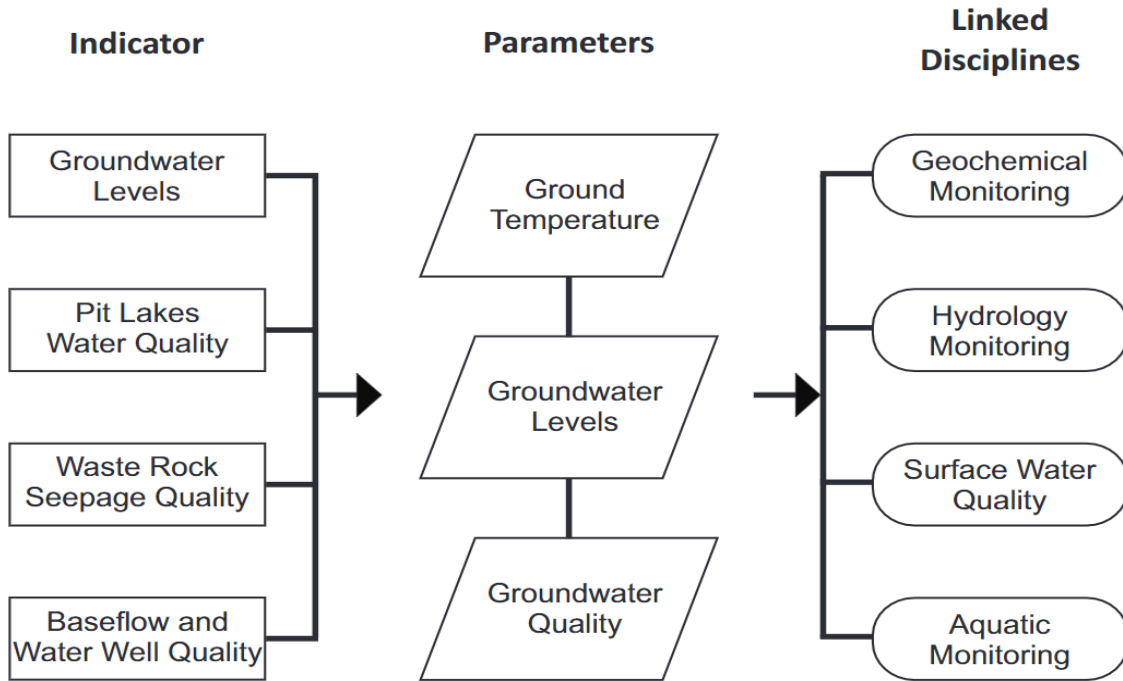


Figure 5-1 Linkages between Groundwater Monitoring Indicators and Other Disciplines

Table 5-3 Monitoring Plans Linked to the Groundwater Monitoring Plan

Monitoring/Management Component	Description
Hydrology Monitoring Plan	Monitoring of drainage low flows (baseflow), serves as calibration target for groundwater model and indication of increased or decreased groundwater recharge in basin headwaters
Surface Water Quality Monitoring Plan	Monitoring of winter baseflow quality in receiving environment reflects integration of upstream groundwater quality; prescribes monitoring of Alpha Pond and Event Pond water quality which are either probable (Alpha Pond) or unlikely seepage source areas.
Water Management Plan	Monitoring of pit lake water levels, pumping rates and water quality which influence groundwater recharge and groundwater quality in drainage headwaters.
Physical Monitoring Plan	Specifies physical monitoring of key project infrastructure including leak detection within the HLF. Specifies ground temperature (permafrost) monitoring outside of groundwater instruments.
Heap Leach and Process Facilities Plan	Specifies construction and operation of the HLF.
Waste and Hazardous Materials Management Plan	Specifies construction, operation and monitoring of the contaminated soil treatment facility and landfill to ensure protection of the environment
Reclamation and Closure Plan	Specifies long term monitoring of groundwater and linked disciplines through closure and reclamation.

6.0 METEOROLOGICAL MONITORING

The Meteorological Monitoring Plan (Appendix D) details routine climate monitoring as well as specific surveillance monitoring, and outlines both site-specific and regional climate data, climate reporting and analysis, and considers regional weather station records and climate change scenario outputs. Meteorological monitoring refers to the collection of high-quality and site-specific climate data, including air temperature, precipitation, wind speed and direction, relative humidity, atmospheric pressure, and solar radiation. The actual site-specific climate data will be reviewed against the climate projections for the Project area to allow for development of flexible responses to early signs of climate change.

The plan describes meteorological monitoring across all phases of the Project, including Baseline, Construction, Operations, Closure, and Post-closure phases. Data collected by the meteorological monitoring program will inform mine infrastructure design and will be a critical input to the management of mine infrastructure, such as sediment ponds, the HLF and open mine pit dewatering. The Plan will be updated periodically, as mine planning and development proceed.

6.1 Indicators and Monitoring Links

The scope of the monitoring plan is based on the relationship between the component selected during the environmental and socio-economic assessment, indicators, parameters, and links to other disciplines. The following subsections describe the linkages.

6.1.1 Indicators and Meteorological Monitoring

During the environmental and socio-economic assessment completed with YESAB, meteorology was not selected as an VC, IC or subcomponent. Meteorology is included in the monitoring program based on its strong linkages to other disciplines. The meteorological monitoring program is designed to capture temporal and spatial variability in key climate parameters at the site in such a way that these data can be robustly linked to the data collected by other monitoring programs, as illustrated by the linkages outlined in Table 6-1. For example, short-term trends in water quality at a monitoring location may be caused by wetter or drier than average conditions, and not by changing geochemical factors.

The reporting and analysis outputs described herein aim to manage risk and minimize residual environmental effects. The ongoing monitoring of site climate conditions will provide valuable updates to the site climate and hydrological models and will aid in the interpretation of the monitoring results from other monitoring programs (e.g., water quality, aquatic biota, Heap Leach and Process Facilities Plan).

Table 6-1 Summary of Meteorological Variables Linked to other Monitoring Plans

Monitoring Component	Description
Physical Monitoring Plan	Temperature, precipitation, snow depth and water equivalent, wind speed and direction, relative humidity
Geochemical Monitoring Plan	Temperature, precipitation, snow depth and water equivalent
Vegetation Monitoring Plan	Temperature, precipitation, snow depth and water equivalent
Hydrology Monitoring Plan	Temperature, precipitation, snow depth and water equivalent, wind speed and direction, relative humidity, solar radiation

Monitoring Component	Description
Surface Water Quality Monitoring Plan	Temperature, precipitation, snow depth and water equivalent
Groundwater Monitoring Plan	Temperature, precipitation, snow depth and water equivalent
Aquatic Monitoring Plan	Temperature, precipitation, snow depth and water equivalent
Wildlife Monitoring Plan	Temperature, precipitation, snow depth and water equivalent
Air Quality and GHG Monitoring Plan	Temperature, precipitation, snow depth and water equivalent, wind speed and direction, barometric pressure, relative humidity, solar radiation

7.0 GEOCHEMICAL

The scope of the Geochemical Monitoring Plan (Appendix E) includes the monitoring of metal leaching and acid rock drainage (ML/ARD) potential associated with geologic materials that will be excavated as part of the Project at the mine site. Geological materials that will be excavated include: waste rock and ore, overburden, haul road construction material, leach tailings and pit walls. Excavation of materials associated with the construction of the NAR are not included in this report and will be included in a separate water use licence. This monitoring program will provide continuous characterization of the ML/ARD potential of ore, overburden, waste rock and leach tailings as it is produced. The objectives of further characterization and monitoring are as follows:

- Confirm that the ML/ARD potential is predicted in geochemical characterization work conducted prior to mine construction.
- Confirm that the block model is providing accurate predictions of spatial variability of As leaching potential in waste rock and in-pit overburden.
- Provide continuous characterization of geologic material sent to various storage facilities or used in construction.
- Inform periodic revisions and updates to the Reclamation and Closure Plan (RCP).

Regular sampling will consist of: rinse pH to confirm in-situ pH of mine rock and stockpiles; an NP measurement to confirm ARD potential and carbonate content, total S measurements to confirm AP, and total metals analysis to monitor metal enrichment. Sample frequency will vary depending on the type of geologic material and the material source (e.g., elevated sample frequency in Kona Pit). A more complete set of analysis at a commercial laboratory will be conducted for every tenth sample collected as part of the QA/QC program.

The Geochemical Monitoring Plan may be updated periodically as mine planning and development proceed.

7.1 Indicators and Monitoring Links

During the environmental and socio-economic assessment completed with YESAB, ML/ARD was not selected as an VC, IC, or subcomponent. Geochemical monitoring is included in the monitoring program based on its strong linkages to other disciplines described in Table 7-1.

Table 7-1 Summary of Geochemical Variable Linkages to other Monitoring Plans

Monitoring/Management Component	Description
Groundwater Monitoring Plan	Groundwater quality verify effectiveness of management of waste rock materials
Surface Water Quality Monitoring Plan	Surface water quality verify effectiveness of management of waste rock materials
Waste Rock and Overburden Management Plan	Results of geochemical monitoring program informs the management of waste rock and overburden
Heap Leach and Process Facilities Plan	Results of geochemical monitoring program informs the management of leach tailings
Water Management Plan	Results of geochemical monitoring program informs management of water on the mine site
Mine Operations Plan	Results of geochemical monitoring program informs materials use and management during mine development and operations

8.0 FISH AND AQUATIC LIFE

The Fish and Aquatic Life Monitoring Plan (FALMP) (Appendix F) provides a statistically robust aquatic environmental monitoring program that will characterize physical, chemical, and biological conditions in the aquatic receiving environment adjacent to the Project and monitor / evaluate potential effects of the Project on the aquatic receiving environment by comparison to baseline conditions, reference conditions, and environmental quality guidelines. The FALMP will also include assessment of change over time.

8.1 Indicators and Monitoring Links

The scope of the monitoring plan is based on the relationship between the component selected during the environmental and socio-economic assessment, indicators, parameters, and links to other disciplines. The following subsections describe the linkages.

8.1.1 Indicators and Fish and Aquatics Monitoring

During the environmental and socio-economic assessment completed with YESAB, fish and fish habitat were selected as a VC and periphyton and benthic invertebrates were selected as an IC. Both were selected based on their importance to local First Nation communities and other residents and because of their broad interest to regulators and other stakeholders. Indicators were identified to assess potential effects of the project, and will be monitored to evaluate potential adverse changes, the subsequent effectiveness of mitigation measures, and to characterize potential residual adverse changes. The indicators are listed below in Table 8-1.

Table 8-1 Indicators for Fish and Aquatic Life and Links to Monitoring

Indicator ¹	Rationale for Selection	Monitoring
Physical Disturbance	Importance to fish population recruitment; consultation with regulators, First Nations; regulatory requirement of Section 20 and Section 35 of the <i>Fisheries Act</i> .	Fish community sampling – fish use, species diversity and size/condition
Toxicity	Importance to fish population health; consultation with regulators, First Nations; water quality guidelines (CFIA, CCME, US EPA), regulatory requirement of Section 36 of the <i>Fisheries Act</i> and Part 2, 7(1) of the <i>Metal Mining Effluent Regulations</i> .	Fish community sampling – providing data on fish use, species diversity and size/condition. Sediment quality monitoring.
Productivity	Importance to fish population recruitment; consultation with regulators, First Nations, regulatory requirement of Part 2, 7(1) of the <i>Metal Mining Effluent Regulations</i> . Importance to fish population recruitment; consultation with regulators, First Nations.	Fish community sampling – providing data on fish use, species diversity and size/condition Water temperature.

¹ Indicators have been updated since the environmental and socio-economic assessment.

The fish and aquatics monitoring program will measure the parameters outlined in Table 8-2.

Table 8-2 Fish and Aquatics Measured Parameters

Parameter	Rationale for Selection	Frequency ¹	Method
Watercourse Survey (channel width, pool depth/frequency, bed material)	Assess the key Project interactions and predicted residual effects in comparison to baseline and reference conditions in a quantitative and statistically robust manner, and to comprehensively monitor aquatic environments that could potentially be influenced by Project activities	Ranging from annually, every two years and every three years	As per BC Fish Habitat Assessment Guidelines (Johnston and Slaney 1996). Habitat units delineated and physical measurements recorded. Wolman Pebble Counts.
Fish Community	Required under MDMER; Assess the key Project interactions and predicted residual effects in comparison to baseline and reference conditions in a quantitative and statistically robust manner, and to comprehensively monitor aquatic environments that could potentially be influenced by Project activities	Ranging from annually, every two years and every three years	Standard fish capture (e.g., electrofishing, beach seining, minor trapping)
Fish Condition	Required under MDMER; Assess the key Project interactions and predicted residual effects in comparison to baseline and reference conditions in a quantitative and statistically robust manner, and to comprehensively monitor aquatic environments that could potentially be influenced by Project activities	Ranging from annually, every two years and every three years	Data collected from fish during fish community monitoring and will include length, weight and condition measurements and assessments.
Water Temperature	Assess the key Project interactions and predicted residual effects in comparison to baseline and reference conditions in a quantitative and statistically robust manner, and to comprehensively monitor aquatic environments that could potentially be influenced by Project activities	Hourly	Water temperature tidbit loggers

Parameter	Rationale for Selection	Frequency ¹	Method
Benthic Macroinvertebrates (Productivity, Community, Tissue Quality)	Required under MDMER; Assess the key Project interactions and predicted residual effects in comparison to baseline and reference conditions in a quantitative and statistically robust manner, and to comprehensively monitor aquatic environments that could potentially be influenced by Project activities	At least once during Construction, annually in upper creek stations for the first three years of Operation and every two years after the first three years of Operations, in lower creek stations for every two years during Operation	Productivity and Community: Hess Sampler with 500 µm mesh (3 sub-sample composite); taxonomy to lowest practical level. Tissue Quality: kick-and sweep and by hand (overturning rocks), taxon composition proportional to biomass
Periphyton Surveys (Productivity and Community Structure)	Assess the key Project interactions and predicted residual effects in comparison to baseline and reference conditions in a quantitative and statistically robust manner, and to comprehensively monitor aquatic environments that could potentially be influenced by Project activities	At least once during Construction, annually in upper creek stations for the first three years of Operation and every two years after the first three years of Operations, in lower creek stations for every two years during Operation	Periphyton samples will be collected at five stations per area by scraping carefully recorded surface areas to provide three samples, one for ash free dry mass, one for chlorophyll-a, and one for taxonomy.
Sediment Quality (Particle size distribution, total organic carbon content, total nitrogen, total metals)	Assess the key Project interactions and predicted residual effects in comparison to baseline and reference conditions in a quantitative and statistically robust manner, and to comprehensively monitor aquatic environments that could potentially be influenced by Project activities	At least once during Construction, every two years during Operations	Sediment samples will be collected at five stations per area. Sampling areas will include locations of sediment deposition on Latte Creek, Coffee Creek, lower YT-24 Creek, and Halfway Creek. No sampling will be undertaken at reference areas.

Notes:

¹ Details on frequencies are presented in the Fish and Aquatics Monitoring Plan (Appendix F)

8.1.2 Links to Other Disciplines

As fish and aquatic life are directly linked to the quality and quantity of available habitat (i.e., water quality, habitat condition), measurable parameters and supporting variables collected under the water quality, hydrology, groundwater quality and quantity monitoring plans, will help inform the identification of effects on fish and aquatic life. Additionally, the monitoring conducted for fish and aquatic life will help inform potential effects on wildlife and human health. Figure 8-1 and Table 8-3 outline links to other disciplines.

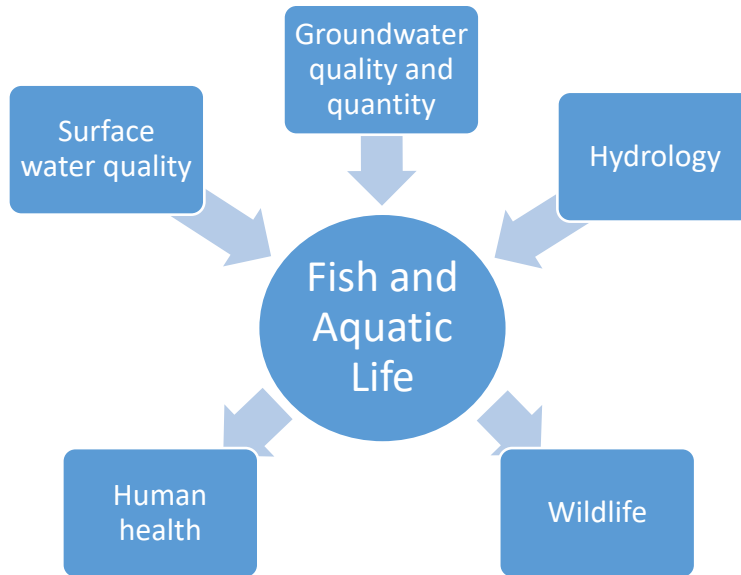


Figure 8-1 Diagram of the Relationships Fish and Aquatic Life have with other Disciplines.

Table 8-3 Summary of Fish and Aquatic Life Variable Linkages to other Monitoring Plans

Monitoring Component	Description
Groundwater Monitoring Plan	Groundwater quality and quantity are directly linked to the quality and quantity of available fish and aquatic life habitat.
Surface Water Quality Monitoring Plan	Surface water quality is directly linked to the quality of available fish and aquatic life habitat.
Hydrology Monitoring Plan	Surface water quantity is directly linked to the quantity of available fish and aquatic life habitat.
Wildlife Monitoring Plan	Monitoring conducted for fish and aquatic life helps to inform effects on wildlife.

9.0 WILDLIFE

The Wildlife Monitoring Plan (Appendix G) is intended to identify and demonstrate how appropriate management techniques will reduce the potential for any wildlife-related adverse effects to the environment and describes the measures that will be undertaken to control adverse affects to wildlife generated by Project activities. The wildlife monitoring program outlines how wildlife and wildlife habitat will be monitored and how this information will be used to confirm the predictions of the environmental assessment or detect unanticipated effects.

The monitoring framework is based on the following principles:

- Monitor and verify potential effects related to the Project
- Implement monitoring efforts that are able to detect natural and Project-related changes to the environment
- Monitor and evaluate the effectiveness of mitigation measures
- Identify unanticipated effects
- Provide an early warning of undesirable change to wildlife or wildlife habitat
- Inform monitoring and management measures.

A Qualified Environmental Professional (QEP) will oversee the monitoring activities and complete the final reporting of results. The QEP will be familiar with wildlife species being monitored and will have a working knowledge of all applicable acts and regulations related to the protection of wildlife and wildlife habitat in the Yukon.

The Wildlife Monitoring Plan is intended to work in tandem with the Wildlife Protection Plan, which presents wildlife mitigation measures to reduce or eliminate potential Project effects on wildlife and wildlife habitat. The wildlife protection measures in the Wildlife Protection Plan are supported by the Project effects monitoring framework described in the Plan.

9.1 Indicators and Monitoring Links

The scope of the monitoring plan is based on the relationship between the component selected during the environmental and socio-economic assessment, indicators, parameters, and links to other disciplines. The following subsections describe the linkages.

9.1.1 Indicators and Wildlife Monitoring

During the environmental and socio-economic assessment completed with YESAB, both mammals and birds were identified as VCs. The effects assessment focused on key wildlife species that interact with the Project, are of primary importance to First Nations and/or are considered species at risk. These were included in the assessment as VCs. For mammals, these include: Fortymile caribou, Klaza caribou, moose, thinhorn sheep, grizzly bear, wolverine, American marten and little brown myotis. For birds, these include Sharp-tailed Grouse (*Tympanuchus phasianellus*), cliff-nesting raptors, passerines, upland-associated species at risk, wetland-associated species at risk and bank swallow (*Riparia riparia*).

Indicators for each VC and IC were identified to assess potential effects of the project. The selected indicators will be monitored to evaluate potential adverse changes, the subsequent effectiveness of

mitigation measures, and to characterize potential residual adverse changes. The indicators are listed below in Table 9-1. Table 9-1 and Table 9-2 provide high level summaries of the indicators and measurable parameters for wildlife. The monitoring programs are designed to work together to evaluate potential changes. For more details refer to the Wildlife Monitoring Plan (Appendix G).

Table 9-1 Indicators for Wildlife and Links to Monitoring

Indicator	Rationale for Selection	Monitoring
Habitat Loss	Habitat loss will result from the ground clearing and vegetation removal required for the Project footprint. Habitat loss was considered a likely residual effect for all mammal and bird subcomponents except Sharp-tailed Grouse (no residual adverse effect anticipated). The effects are expected to occur over the life of the Project but are largely reversible following mine closure and site reclamation.	Wildlife Observation Monitoring Moose Monitoring Caribou Monitoring Thinhorn Sheep Monitoring Mineral Lick Monitoring
Reduced Habitat Effectiveness	Sensory disturbance due to noise, light, dust and other Project emissions, and human presence, may result in wildlife avoiding areas adjacent to the Project footprint or may increase the risk of stress to animals using these habitats. Reduced habitat effectiveness was considered a likely residual effect for all mammal and bird subcomponents. The effects are expected to occur over the life of the Project but are fully reversible following mine closure and site reclamation.	Wildlife Observation Monitoring Moose Monitoring Caribou Monitoring Thinhorn Sheep Monitoring Mineral Lick Monitoring
Increased Mortality Risk	Mortality risk due to collisions with Project-related vehicles, entrapment in Project facilities (e.g., open pits, events ponds etc.), and/or increased harvest due to improved hunter access was considered a possible Project effect on all mammal and bird subcomponents; however, following the application of Project mitigation, a likely residual effect was identified for only Fortymile caribou and moose. The effect is expected to occur over the life of the Project but is fully reversible following mine closure and site reclamation.	Wildlife Observation Monitoring Wildlife Mortality Monitoring Moose Monitoring Thinhorn Sheep Monitoring Paired Site Wildlife Road Monitoring

Alteration to Movement	Project infrastructure may present a physical or sensory barrier or filter to natural patterns of animal movement through or to important habitat. The potential effect was assessed for Fortymile caribou, moose, thinhorn sheep, grizzly bear, and wolverine; however, after consideration of Project mitigation, a likely residual effect was identified for only Fortymile caribou and thinhorn sheep. The residual effect is expected to occur over the life of the Project but is fully reversible following closure and reclamation.	Moose Monitoring Caribou Monitoring Thinhorn Sheep Monitoring
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Wildlife measured parameters are described in Table 9-2; for more details refer to Appendix G.

Table 9-2 Wildlife-Related Measured Parameters

Parameter	Rationale for Selection	Frequency	Method
Occurrence of wildlife use	The Project may result in habitat loss, sensory disturbance, and increased mortality risk for wildlife.	Wildlife observation monitoring will be opportunistic and will be ongoing throughout the life of the Project. Wildlife observation monitoring combined with the other listed programs will evaluate habitat loss and sensory disturbance.	Observational
Occurrence of Project-related wildlife mortality	The Project has the potential to increase mortality risk for wildlife directly through vehicle collisions and interaction with mine site infrastructure.	The documentation and tracking of any Project-related mortality will be ongoing, as required, throughout the life of the Project.	Observational
Late winter abundance and distribution of moose (and incidental observations of caribou)	The Project may result in habitat loss, sensory disturbance and increased mortality risk for moose.	The late winter moose survey will be conducted annually between mid-February and mid-March during construction and after the first three years of operation.	Survey
Caribou distribution and migration patterns	The Project may result in habitat loss, sensory disturbance, and reduced occurrence of caribou near Project infrastructure. Project infrastructure or Project-related sensory disturbances may also result in effects to caribou movement through the Project area.	Analysis will be conducted in Year 3 of Operations. The analysis will focus on the Wildlife RSA; however, use of the RSA will be assessed within the context of caribou use of the broader Fortymile Caribou Herd Study Area and Klaza Caribou Herd Study Area.	Analysis of FMCH and KCH satellite collar data from government-sponsored satellite collaring program, data from ungulate surveys, and other available information to inform caribou distribution patterns within the RSA and migration movements.
Thinhorn Sheep presence in the Ballarat Creek area.	Project activities may create sensory disturbances and/or temporarily reduce the effectiveness (usefulness) of habitats adjacent to the Project footprint, resulting in changed distribution and use.	Monitoring will consist of one aerial survey conducted annually during the post-lambing period (June/July) and remote camera monitoring which will be conducted year-round. Monitoring will be conducted during construction and for two additional years. Continued monitoring beyond the third year of monitoring will be subject to review of survey results.	Aerial survey, remote camera monitoring

Parameter	Rationale for Selection	Frequency	Method
Level of ungulate use at the lick	Project activities, primarily traffic using the NAR, may increase sensory disturbance to wildlife using the mineral lick.	Remote camera monitoring at Mineral Lick 1 will occur year-round. One camera will monitor the mineral lick through the construction period and first three years of operations. Data collected will be used to determine future monitoring requirements.	Remote camera monitoring
Trends in wolf/predator use of Project access roads	Cleared roads give predators easier access in winter to parts of the range that would otherwise be inaccessible to predators. Winter maintenance along the NAR may facilitate additional predation on wildlife (particularly caribou and moose).	The Wildlife Road Use Study will continue through the construction period and the first three years of operation. Continued monitoring beyond the third year of operations will be dependent on survey results.	Remote camera monitoring

9.1.2 Links to Other Disciplines

As terrestrial wildlife are directly linked to the quality and quantity of available habitat (i.e., vegetation), monitoring information collected under the **Vegetation Monitoring Plan**, including habitat loss (i.e. mine site footprint), reclamation effectiveness, vegetation health (i.e. trace metals), and invasive plant monitoring, will help inform the identification of effects on wildlife and wildlife habitat. Similarly, the monitoring conducted for wildlife may help inform potential effects on land and resource use, and human health. Figure 9-1 and Table 9-3 outline the relationships to other disciplines.

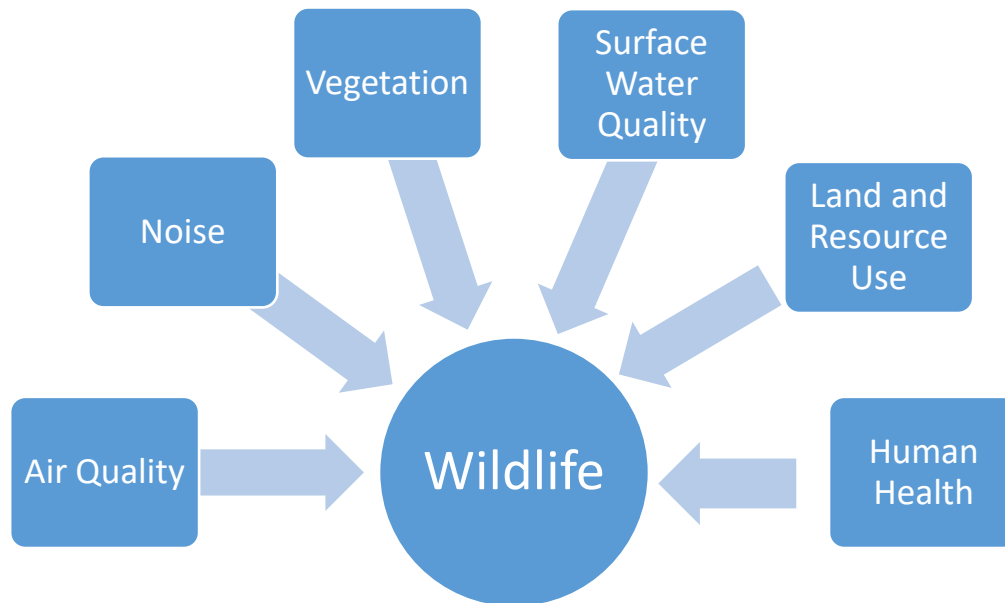


Figure 9-1 Diagram of the Relationship between Wildlife and Other Disciplines

Table 9-3 Summary of Wildlife Variable Linkages to other Monitoring Plans

Monitoring Component	Description
Air Quality and Greenhouse Gases Monitoring Plan	Air quality has the potential to effect wildlife health.
Noise Monitoring Plan	Noise generated from the Project has the potential to effect habitat suitability and movement of wildlife.
Vegetation Monitoring Plan	Vegetation monitoring informs habitat loss (i.e., mine site footprint), reclamation effectiveness, vegetation health (i.e., trace metals), and invasive plant monitoring all of which effect wildlife.
Surface Water Quality Monitoring Plan	Surface water quality has the potential to effect wildlife health.

10.0 VEGETATION

The Vegetation Monitoring Plan (Appendix H) is intended to identify and demonstrate how appropriate management techniques will reduce the potential for any vegetation-related adverse effects to the environment and describes the measures that will be undertaken to control adverse affects generated by Project activities.

The monitoring framework is based on the following principles:

- Monitor and verify potential effects related to the Project
- Implement monitoring efforts that can detect natural and Project-related changes to the environment
- Monitor and evaluate the effectiveness of mitigation measures
- Identify unanticipated effects
- Provide an early warning of undesirable change to vegetation
- Inform monitoring and management measures.

A Qualified Environmental Professional (QEP) will oversee the monitoring activities and complete the final reporting of results. The QEP will be familiar with vegetation being monitoring and will have a working knowledge of all applicable species, status ranks, thresholds, and regulations related to the management of vegetation in Yukon.

The Vegetation Monitoring Plan is intended to work in tandem with the Vegetation Protection Plan, which includes a summary of baseline information and how it relates to monitoring.

10.1 Indicators and Monitoring Links

The scope of the monitoring plan is based on the relationship between the component selected during the environmental and socio-economic assessment, indicators, parameters, and links to other disciplines. The following subsections describe the linkages.

10.1.1 Indicators and Vegetation Monitoring

During the environmental and socio-economic assessment completed with YESAB, vegetation was selected as a VC. This VC was selected based on its importance to local First Nation communities and other residents and because of the broad interest to regulators and other stake holders. Indicators were identified to assess potential effects of the project, and will be monitored to evaluate potential adverse changes, the subsequent effectiveness of mitigation measures, and to characterize potential residual adverse changes. The indicators are listed below in Table 10-1.

Table 10-1 Indicators for Vegetation and Links to Monitoring

Indicator	Rationale for Selection	Monitoring
Habitat Loss/Habitat Reclaimed	The Project will result in the loss of vegetation due to the clearing of the Project footprint; this may include changes to ecological communities, wetland habitats, traditional and medicinal plants, and rare plants. The Habitat Loss/Habitat Reclaimed monitoring program will track the extent of habitat loss within the mine area due to clearing of the Project footprint, and as areas are progressively reclaimed, will track the area revegetated.	Reclamation effectiveness monitoring
Trace Metals	The Project has the potential to affect vegetation health by increasing trace metals levels present in vegetation adjacent to the Project footprint through dust deposition and other Project-related emissions. Trace metals monitoring will track trace metals in select plant species at various distances from the mine site.	Trace metal monitoring Dust monitoring
Invasive Plants	Potential Project-related effects to vegetation may include changes to plant composition and loss of native plants due to the introduction and spread of invasive plants. Invasive plant monitoring will document the presence and abundance of invasive plants in the Project area south of the Stewart River.	Invasive species surveys

Vegetation measured parameters are described in Table 10-2.

Table 10-2 Vegetation-Related Measured Parameters

Parameter	Rationale for Selection	Frequency	Method
Size of footprint (comparison of proposed footprint and actual area disturbed)	Direct habitat loss in the mine area footprint (either temporary or permanent). Project activities will result in direct loss of ecological communities including wetland habitats, traditional and medicinal plants, and rare plants.	Once annually during construction and operation	Survey
Increased concentration of trace metals in soil and selected plant species	Dust and air emissions released into the environment have the potential to increase trace metal concentrations in soil and vegetation affecting vegetation health which may lead to a loss of native species and changes in plant composition. If metals are absorbed by plants, then they may be ingested by wildlife or humans, which may influence the health of individuals.	Trace metals monitoring will be completed once in construction and every three years during operations or as triggered by Project monitoring.	Soil and vegetation sampling and laboratory analysis
Presence of invasive plants in the Project Footprint	Introduction of invasive plant species causing habitat loss for native plant species and possible change of plant composition	Invasive plant monitoring will be completed annually during construction and operation. Two surveys per year will be conducted during the snow-free period to ensure that both early and late blooming plants are captured or as triggered by observations of invasive plant species.	Survey

10.1.2 Links to Other Disciplines

There is the potential for vegetation to be affected by Project-related dust, erosion and sediment, water runoff, and reclamation activities. Monitoring associated with these variables will help inform the identification of effects on vegetation. Additionally, the monitoring conducted for vegetation will help inform potential effects on wildlife and human health. This relationship is illustrated in Figure 10-1 below where the direction of the arrow indicates the potential effect of one discipline on another. Figure 10-1 and Table 10-3 outline the relationships to other disciplines.

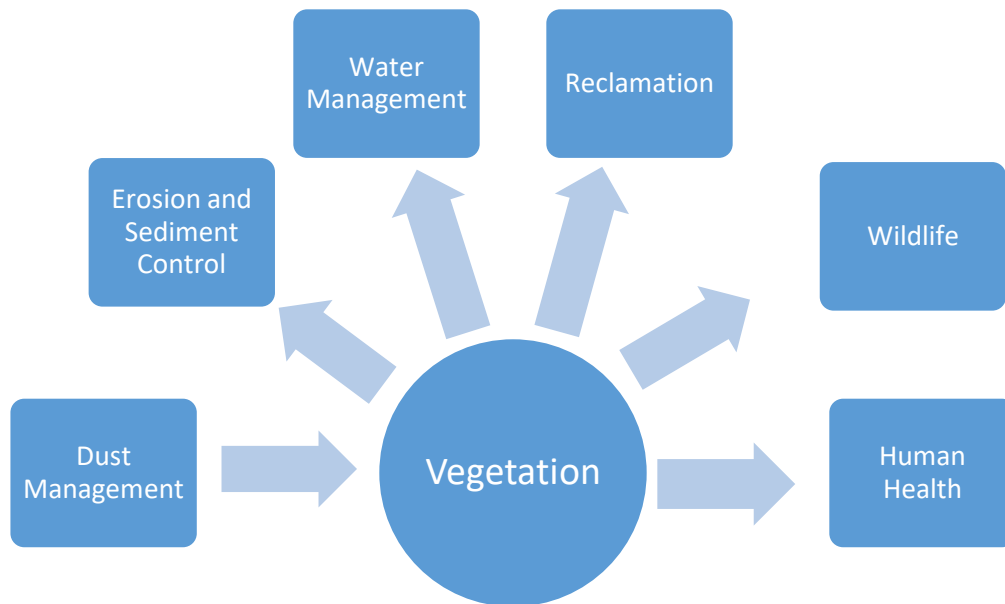


Figure 10-1 Diagram of the Relationship between Vegetation and Other Disciplines

Table 10-3 Summary of Vegetation Variable Linkages to other Monitoring Plans

Monitoring Component	Description
Air Quality and Greenhouse Gases Monitoring Plan	Air quality has the potential to effect vegetation health.
Surface Water Quality Monitoring Plan	The quality of surface water has the potential to effect the vegetation health.
Hydrology Monitoring Plan	The quantity of surface water effects the quantity of available vegetation habitat.
Wildlife Monitoring Plan	The results of the vegetation monitoring program has implications to the health of wildlife.

11.0 AIR QUALITY AND GREENHOUSE GASES

The Air Quality and Greenhouse Gases Monitoring Plan (Appendix I) describes on-going air quality and greenhouse gas (GHG) monitoring for the Project. Data collected by the air quality and GHG monitoring program will inform on regulatory compliance and mitigation of air quality impacts beyond the property boundaries.

With respect to air quality, Project-related emissions of criteria air contaminants (CAC) are expected to be typical of an open pit mining operation, consisting mainly of particulate matter as a result of intensive earth-moving activities (e.g., clearing of overburden, blasting, material loading and unloading, processing of raw materials, travel on unpaved haul roads, wind erosion of stockpiles, etc.) with minor emissions of gaseous contaminants, most significantly oxides of nitrogen (NO_x), sulphur dioxide (SO₂), and GHGs due to diesel fuel combustion from heavy machinery, vehicle exhaust, generators and other smaller point sources related to camp activities.

With respect to particulate matter, total suspended particulate (TSP) describes all size fractions of airborne particulate matter. The finer fractions of TSP are respirable and can cause chronic and acute effects on pulmonary and respiratory function in humans and animals.

11.1 Indicators and Monitoring Links

The scope of the monitoring plan is based on the relationship between the component selected during the environmental and socio-economic assessment, indicators, parameters, and links to other disciplines. The following subsections describe the linkages.

11.1.1 Indicators and Air Quality and Greenhouse Gases Monitoring

During the environmental and socio-economic assessment completed with YESAB, air quality and greenhouse gas emissions was selected as an IC because it is an intermediate position along a pathway of effects leading to one or more receptors or VCs. Air quality and greenhouse gases were selected as an IC based on being an important aspect of the natural environment. Indicators for each VC and IC were identified to assess potential effects of the project. The selected indicators will be monitored to evaluate potential adverse changes, the subsequent effectiveness of mitigation measures, and to characterize potential residual adverse changes. The indicators are listed below in Table 11-1.

Table 11-1 Indicators for Air Quality and Greenhouse Gases and Links to Monitoring

Indicator	Rationale for Selection	Monitoring
Airborne Particulate Matter	<ul style="list-style-type: none"> Regulated under Yukon Ambient Air Quality Standards (AAQS) Mining operations have the potential to elevate local airborne particulate matter levels Major sources include wind erosion, road dust, earth-moving operations May cause visual changes May have deleterious effect on vegetation and the subsequent food chain Can contribute to elevated metal concentrations in soil and water. 	<ul style="list-style-type: none"> Ongoing air quality monitoring and dust plume tracking Weather Station: air temperature, relative humidity, wind speed and direction, solar radiation, precipitation
Combustion By-Products	<ul style="list-style-type: none"> Regulated under Yukon AAQS Can contribute to TSP formation and/or acid rain fallout. Generated as a by-product of fuel combustion The proposed mining operations will elevate combustion by-products in the local atmosphere GHGs contribute to global climate change. 	<ul style="list-style-type: none"> Ongoing air quality monitoring GHG emissions estimation and analysis

Air Quality and Greenhouse Gases measured parameters are described in Table 11-2.

Table 11-2 Air Quality and Greenhouse Gases-Related Measured Parameters

Parameter	Rationale for Selection	Frequency	Method
Total Suspended Particulate Matter (TSP)	<ul style="list-style-type: none"> Regulated under Yukon AAQS Includes all size-fractions of particulate matter, typically defined under 100 µm in aerodynamic diameter Mining operations have the potential to elevate local airborne TSP levels Major sources include wind erosion, road dust, earth-moving operations May cause visual changes. 	Discrete	Commercially available discrete analyzers for reference equipment
Particulate Matter <10 µm in diameter (PM ₁₀)	<ul style="list-style-type: none"> Monitored using British Columbia Ambient Air Quality Objectives (BCAAQO) PM₁₀ is the size fraction of TSP that is less than 10 µm in aerodynamic diameter, and has the potential to cause health effects Mining operations have the potential to elevate the local airborne PM₁₀ levels. 	Continuously	Commercially available continuous analyzers

Parameter	Rationale for Selection	Frequency	Method
Particulate Matter <2.5 µm in diameter (PM _{2.5})	<ul style="list-style-type: none"> Regulated under Yukon AAQS PM_{2.5} is the size fraction of TSP that is small enough, less than 2.5 µm in aerodynamic diameter, is respirable and has the potential to cause health effects. Can be transported for kms from the emission source Mining operations have the potential to elevate local airborne PM_{2.5} levels Diesel-powered vehicle and generator emissions contain small-fraction PM_{2.5}. 	Continuously	Commercially available continuous analyzers
Dust Fallout & Mineral / Metallic Content	<ul style="list-style-type: none"> Dust fallout may have a deleterious effect on vegetation and the subsequent food chain. The mineral / metallic fraction of TSP that falls out as dust can contribute to elevated metal concentrations in soil and water. As mining activities commence, the fraction of TSP that is mineral / metallic in nature will increase. 	Discrete	Discrete dustfall collection with metals analysis
Nitrogen Oxides (NO _x)	<ul style="list-style-type: none"> Regulated under Yukon AAQS NO_x can contribute to TSP (nitrates) formation and/or acid rain fallout. NO_x is generated as a by-product of fuel combustion when nitrogen (N₂) combusts to form nitrogen oxide (NO) and nitrogen dioxide (NO₂) which together are known as NO_x. The proposed mining operations will elevate NO_x in the local atmosphere. 	Continuously	Commercially available continuous analyzers
Sulphur Dioxide (SO ₂)	<ul style="list-style-type: none"> Regulated under Yukon AAQS SO₂ Can contribute to TSP (sulphates) formation and/or acid rain fallout. SO₂ is generated as a by-product of diesel fuel combustion, when sulphur (S) in the fuel combusts to form SO₂ (<15 ppm as prescribed in the Canadian Ultra-low Sulphur Diesel Regulation). The proposed mining operations will elevate SO₂ in the local atmosphere. 	Continuously	Commercially available continuous analyzers
	<ul style="list-style-type: none"> 		

Parameter	Rationale for Selection	Frequency	Method
Greenhouse Gases (GHGs) (listed below): Carbon Dioxide (CO ₂) Methane (CH ₄) Nitrous Oxide (N ₂ O)	<ul style="list-style-type: none"> GHGs in the atmosphere contribute to global climate change. The proposed mining operations will contribute GHGs to the atmosphere. CO₂ is generated as a product of combustion when the majority of the carbon in fuel combusts to form CO₂. CO₂ is the primary GHG of concern related to mining activities generated as a product of partial fuel combustion much like CO. CH₄ is a GHG with a global warming potential of approximately 28 times that of CO₂ generated as a by-product of fuel combustion much like NO_x. N₂O is a GHG with a global warming potential of approximately 265 times that of CO₂. 	Weekly, monthly, and quarterly	Greenhouse gas monitoring will follow the guidance provided by the Mining Association of Canada. Information to be used to inform the GHG emissions estimation and analysis include fuel bills, fuel consumption tracking, energy use, and mine production reports.

11.1.2 Links to Other Disciplines

There is the potential for air quality and greenhouse gases to inform other disciplines. Monitoring will help inform the identification of effects of air quality and greenhouse gases on vegetation, wildlife, surface water quality and human health. Figure 11-1 and Table 11-3 outline the relationships to other disciplines.

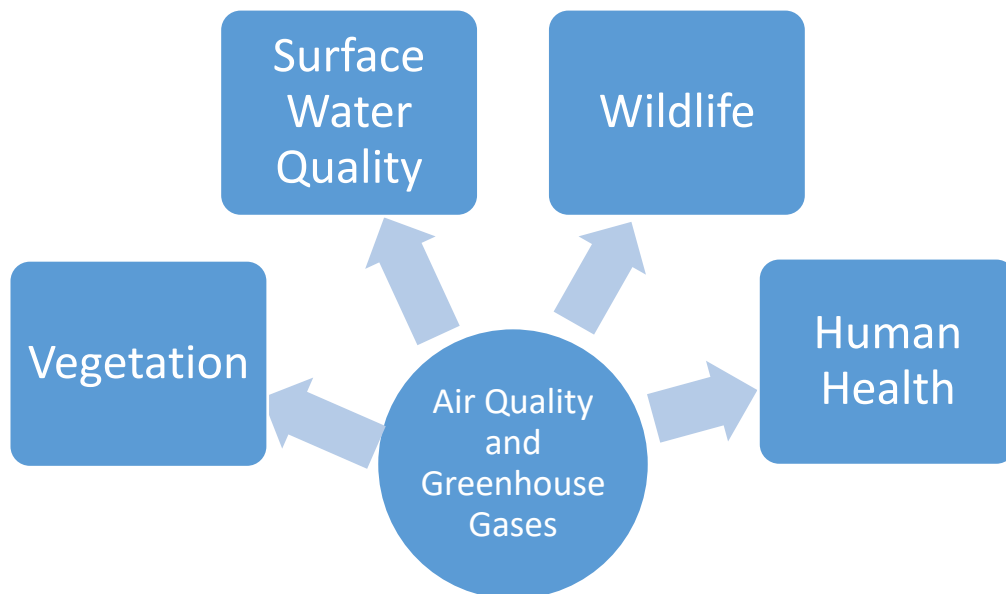


Figure 11-1 Diagram of the Relationship between Air Quality and Greenhouse Gases and Other Disciplines

Table 11-3 Summary of Air Quality and Greenhouse Gases Variable Linkages to other Monitoring Plans

Monitoring Component	Description
Vegetation Monitoring Plan	Particulate matter and dust have the potential to effect vegetation health.
Surface Water Quality Monitoring Plan	Particulate matter and dust have the potential to effect surface water quality.
Wildlife Monitoring Plan	Particulate matter and dust have the potential to effect wildlife habitat, water, and food sources.

12.0 NOISE

The Noise Monitoring Plan is attached in Appendix J. Airborne sound can potentially affect human and wildlife health and well-being and noise levels are important to individuals and wildlife for several reasons such as sleep disturbance, annoyance, habitat avoidance, and stress. Noise will be generated by Project activities and has the potential to interact with other Project components like wildlife and community health and well-being. The objective of the monitoring plan is to confirm that noise produced by the Project remains within acceptable levels.

12.1 Indicators and Monitoring Links

The scope of the monitoring plan is based on the relationship between the component selected during the environmental and socio-economic assessment, indicators, parameters, and links to other disciplines. The following subsections describe the linkages.

12.1.1 Indicators and Noise Monitoring

During the environmental and socio-economic assessment completed with YESAB, noise was selected as an IC linked to the wildlife and wildlife habitat and community health and well-being VCs. Noise was selected as an IC because airborne sound can potentially affect human and wildlife health and well-being. Noise levels are important to individuals and wildlife for several reasons such as sleep disturbance, annoyance, habitat avoidance, and stress. One indicator was selected, noise levels, and will be monitored to evaluate potential adverse changes, the subsequent effectiveness of mitigation measures, and to characterize potential residual adverse changes.

The noise measured parameter, rationale for selection, frequency and methods are described in Table 12-1.

Table 12-1 Noise-Related Measured Parameters

Parameter	Rationale for Selection	Frequency	Method
Recorded Noise Data	<ul style="list-style-type: none"> Potential for disturbance or loss of wildlife and/or bird habitat due to noise from Project activities. Potential impacts to human receptors both within and outside of the Project site. Potential for impacts to recreational areas where human receptors might be. Impacts could potentially deter use of plant/berry collection sites, hunting areas, and other such recreational areas. 	Discrete: 6 occasions over the life-of-mine	Noise samples are collected using a Larson Davis 831 or equivalent sound level meter that meets the requirements of IEC 61672-1:2002 for Class I measurements and is capable of logging octave band data.
		Continuous (Wildlife)	Continuous sampling will be conducted using Autonomous Recording Units (ARUs) (Wildlife Acoustics SongMeter SM4 or similar) to passively monitor the soundscape adjacent to Project infrastructure.

12.1.2 Links to Other Disciplines

There is the potential for noise to inform other disciplines. Monitoring will help inform the identification of effects of noise on wildlife and human health and well-being.

13.0 PHYSICAL MONITORING PLAN

Physical monitoring refers to the monitoring of the physical stability of key mine infrastructure and mine workings. The scope of the Physical Monitoring Plan (Appendix K) is to identify and demonstrate an early detection system of ground movement and performance of Project facilities and structures to help inform management of the potential for any physical stability-related adverse effects to the environment and help identify measures that will be undertaken to control physical stability of Project-related structures and facilities.

The plan describes physical monitoring across the Construction and Operations phases of the Project. Physical monitoring during the Closure, and Post-closure phases is discussed in the Reclamation and Closure Plan. Data collected by the physical monitoring program will inform management of mine infrastructure and contribute to confirming design assumptions. This plan details three types of physical monitoring: routine monitoring and inspections, annual inspections, and event-driven inspections.

The objectives of the monitoring and inspections conducted as per the Physical Monitoring Plan are to:

- Assess/confirm compliance with design parameters and engineering standards
- Allow the management of mine infrastructure in a way that promotes human health and safety and reduce potential adverse effects to the environment
- Provide opportunities to verify and refine design assumptions for mine infrastructure during the construction and operations phases.

13.1 Indicators and Monitoring

The Physical Monitoring Plan is unique when compared to the other monitoring plans discussed in the EMAMP. Surficial Geology, Terrain and soils was selected as a VC during the environmental and socio-economic assessment completed with YESAB, Physical stability of mine workings were not identified as a VC or IC but have been included in the monitoring plan based on the importance of mine engineering and operations. The indicators listed in Table 13-1 were not included in the environmental and socio-economic assessment but will be used as part of the monitoring program:

Table 13-1 Indicators for Physical Stability and Links to Monitoring

Indicator	Rationale for Selection	Monitoring
Ground movement	<ul style="list-style-type: none"> • Assist with mine management planning • Indicate when actions are required • Help identify and implement follow-up monitoring at targeted locations. • Assist with management potential large-scale instabilities. 	Monitoring of ground movement in locations of mine infrastructure, lateral and differential ground movement, ground temperature and pore water profiles.
Performance of civil works	<ul style="list-style-type: none"> • Assist with mine management planning • Indicate when actions are required • Help identify and implement follow-up monitoring at targeted locations. • Evaluate integrity and stability of mine infrastructure. 	Monitoring of surface movement of structures, lateral and differential ground movement, ground temperature and pore water profiles. Comparison of engineered designs to constructed infrastructure.

Physical monitoring measured parameters are described in Table 13-2.

Table 13-2 Physical Monitoring Related Measured Parameters

Parameter	Frequency	Method
Ground surface movement	Daily during operations, as needed as determined by geotechnical engineer	<ul style="list-style-type: none"> • Visual inspections, supported by instrumentation that can be operated remotely for areas that cannot be accessed safely by foot. • Inclinometers • Time Domain Reflectometry • Inclinometers
Ground sub-surface movement	Daily during operations, as needed as determined by geotechnical engineer	<ul style="list-style-type: none"> • Visual inspections, supported by instrumentation that can be operated remotely for areas that cannot be accessed safely by foot. • Geodetic surveys • Cross-crack measurements • Imaging • Ground-based slope stability radar interferometry • Wireline extensometers • Microseismic emissions • Laser scanning • Vibrating wire piezometer • Inclinometers.
Surface movement of engineered structures	Daily during operations, as needed as determined by geotechnical engineer	<ul style="list-style-type: none"> • Visual inspections, supported by instrumentation that can be operated remotely for areas that cannot be accessed safely by foot. • Survey hubs
Permafrost condition	Monthly during operations, as needed as determined by geotechnical engineer	<ul style="list-style-type: none"> • Visual inspections, supported by instrumentation that can be operated remotely for areas that cannot be accessed safely by foot. • Thermistor strings • Drone-supported aerial geospatial data collection • Permafrost distribution mapping • Permafrost distribution modelling • Climate data review
Physical stability of HLF	Daily, weekly, monthly	<ul style="list-style-type: none"> • Instrumentation for measurement of phreatic levels and pore pressures • Level gauge to monitor solution levels in ponds • Flow meter located between top and bottom liners of HLF

13.1.1 Links to Other Disciplines

There is the potential for air quality and greenhouse gases to inform other disciplines. Monitoring will help inform the identification of effects of air quality and greenhouse gases on vegetation, wildlife, surface water quality and human health. Figure 13-1 and Table 13-3 outline the relationships to other disciplines.

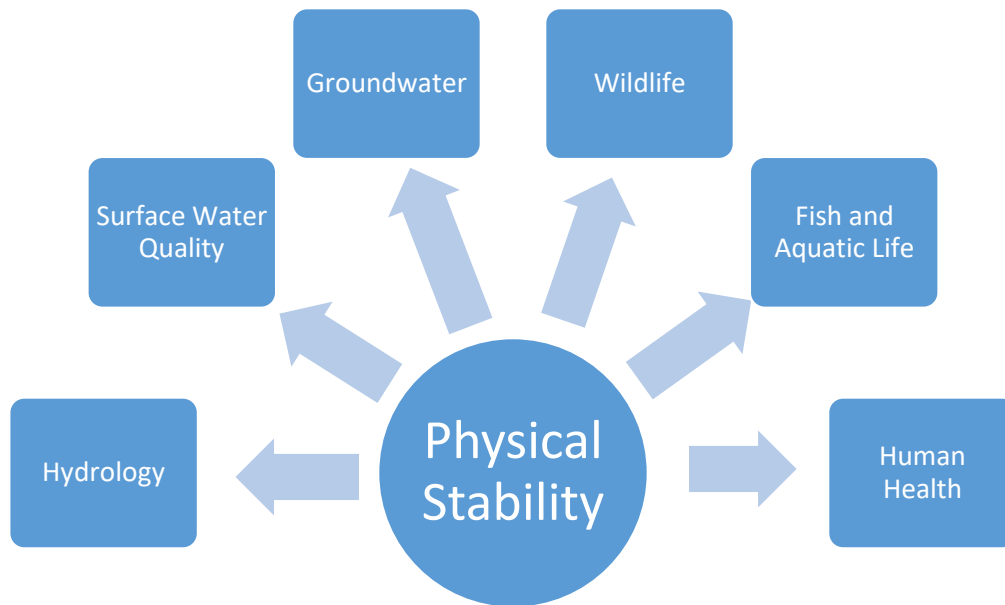


Figure 13-1 Diagram of the Relationship between Physical Stability and Other Disciplines

Table 13-3 Summary of Physical Stability Variable Linkages to other Monitoring Plans

Monitoring Component	Description
Hydrology Monitoring Plan	Physical stability of ground and mine site infrastructure has the potential to impact water conveyance structures which can affect surface water quantity.
Surface Water Quality Monitoring Plan	Physical stability of ground and mine site infrastructure has the potential to impact water conveyance structures and transport of contaminants which can affect surface water quality.
Groundwater Monitoring Plan	Physical stability of ground and mine site infrastructure has the potential to impact water conveyance structures and transport of contaminants which can affect groundwater water quantity and quality.
Wildlife Monitoring Plan	Physical stability of ground and mine site infrastructure has the potential to impact water conveyance structures and transport of contaminants which can affect habitat and food and water sources for wildlife.
Fish and Aquatic Life Monitoring Plan	Physical stability of ground and mine site infrastructure has the potential to impact water conveyance structures and transport of contaminants which can affect habitat and food sources for fish and aquatic life.

14.0 REPORTING AND REVIEW

Reporting and review details are outlined in the monitoring plans presented in Appendix A through K and the Surface Water Quality and Aquatic Life Adaptive Management Plan (Appendix L). At a minimum reporting will meet Quartz Mining License and Water Use Licensing requirements and commitments made during consultation.

15.0 REFERENCES

- Environment Canada. 2009. Environmental Code of Practice for Metal Mines. Available at: <https://www.ec.gc.ca/lcpe-cepa/documents/codes/mm/mm-eng.pdf>. Accessed July 2022.
- Environment Canada. 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring. Available at: [https://www.ec.gc.ca/eseee-eem/AEC7C481-D66F-4B9B-BA08-A5DC960CDE5E/COM-1434---Tec-Guide-for-Metal-Mining-Env-Effects-Monitoring_En_02\[1\].pdf](https://www.ec.gc.ca/eseee-eem/AEC7C481-D66F-4B9B-BA08-A5DC960CDE5E/COM-1434---Tec-Guide-for-Metal-Mining-Env-Effects-Monitoring_En_02[1].pdf). Accessed July 2022.
- Goldcorp Inc. 2017. The Coffee Gold Mine, Project Proposal for Executive Committee Screening, Pursuant to the Yukon Environmental and Socio-economic Assessment Act. March 2017; December 6, 2017.
- Government of Yukon. 2021. Guidelines for Developing Adaptive Management Plans In Yukon: Water-related components of quartz mining projects. January 2021.
- Johnston, N.T. and P.A. Slaney. 1996. Fish Habitat Assessment Procedures. Watershed Restoration Technical Circular No. 8, revised April 1998. BC Ministry of Environment, Lands and Parks and Ministry of Forests.
- Murray, C and D. Marmorek, 2003. Adaptive Management: A Science-Based Approach to Managing Ecosystems in the Face of Uncertainty. Prepared for presentation at the Fifth International Conference on Science and Management of Protected Areas: Making Ecosystem Based Management Work, Victoria, British Columbia, May 11-16, 2003.
- Newmont Goldcorp Inc. 2017. The Coffee Gold Mine, Project Proposal for Executive Committee Screening, Pursuant to the Yukon Environmental and Socio-economic Assessment Act. March 2017.
- Yukon Water Board (YWB). 2012. Type A and B Quartz Mining Undertakings Information Package for Applicants. February 2012. Available at: www.yukonwaterboard.ca. Accessed April 2018.
- Yukon Water Board (YWB) and Yukon Energy, Mines and Resources (EMR). 2013. Plan Requirement Guidance for Quartz Mining Project. Yukon Government, Whitehorse, YT. Available at: http://www.emr.gov.yk.ca/mining/pdf/mml_plan_requirement_guideline_quartz_mining_projects_aug2013.pdf. Accessed April 2018.

APPENDIX A

Hydrology Monitoring Plan

APPENDIX B

Surface Water Quality Monitoring Plan

APPENDIX C

Groundwater Monitoring Plan

APPENDIX D

Meteorological Monitoring Plan

APPENDIX E

Geochemical Monitoring Plan

APPENDIX F

Fish and Aquatic Life Monitoring Plan

APPENDIX G

Wildlife Monitoring Plan

APPENDIX H

Vegetation Monitoring Plan

APPENDIX I

Air Quality and Greenhouse Gas Monitoring Plan

APPENDIX J

Noise Monitoring Plan

APPENDIX K

Physical Monitoring Plan

APPENDIX L

Surface Water Quality and Aquatic Life Adaptive Management Plan

APPENDIX M

EMAMP Table of Concordance