

APPENDIX L

Surface Water Quality and Aquatic Life Adaptive Management Plan

REPORT

Surface Water Quality and Aquatic Life Adaptive Management Plan Coffee Gold Mine

Prepared for:

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December 9, 2024

REVISION TRACKING LOG

Revision Tracking Log			
Version	Date	Section Updated	Description of Update
0	November 2023	-	First submission of the Surface Water Quality and Aquatic Life Adaptive Management Plan
1	April 2024	Various	Updated with responses to Type A WUL SIR4
2	December 2024	Various	Updated with responses to Type A WUL SIR7

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
AFDM	Ash-free Dry Mass
AL	Aquatic Life
AL-AMP	Aquatic Life-Adaptive Management Plan
AMP	Adaptive Management Plan
BACI	Before-After-Control-Impact
BC	British Columbia
BC WQGs	BC Water Quality Guidelines
CCME	Canadian Council of Ministers of the Environment
CES	Critical Effect Size
EDI	EDI Environmental Dynamics Inc.
EPT	Ephemeroptera
EQS	effluent quality standards
FAL-AMP	Fish and Aquatic Life Adaptive Management Plan
FAL-MP	Fish and aquatic life monitoring program
FFG	Functional Feeding Group
FFH	Fish and Fish Habitat
FFH-AMP	Fish and Fish Habitat Adaptive Management Plan
FHAP	Fish Habitat Assessment Procedures
GWQGs	Generic Water Quality Guidelines
HLF	heap leach facility
HPG	Habit Preference Group
IOC	Investigation of Cause
IOCEM	Investigation of Cause, Extent, and Magnitude
Lorax	Lorax Environmental Services Ltd.
Minnow	Minnow Aquatic Environmental Services Group
Newmont	Goldcorp Kaminak Ltd., a wholly owned subsidiary of Newmont Corporation
POC	Parameter of Concern
POPCs	parameters of potential concern
QML	Quartz Mining License
ROM	Run-of-Mine
SD	standard deviations
TSS	Total suspended solids
UCLM	Upper confidence limit of the mean
US EPA	United States Environmental Protection Agency
WB/WQM	Water balance and water quality model
WQMP	Water Quality Management Plan
WQ-AMP	Water Quality-Adaptive Management Plan
WQOs	Water Quality Objectives

Acronym / Abbreviation	Definition
WRSF	Waste Rock Storage Facility
WUL	Water Use License
YESAA	<i>Yukon Environmental and Socio-economic Assessment Act</i>
YESAB	Yukon Environmental and Socio-economic Assessment Board
YTT	Yukon-Tanana Terrane
YWB	Yukon Water Board

LIST OF SYMBOLS AND UNITS OF MEASURE

Symbol / Unit of Measure	Definition
%	percent
µg	micrograms
dm ²	square decimeters
g/m ²	grams per square metre
km	kilometre
km ²	square kilometre
L	litre
L/s/km ²	litres per second per square kilometre
m	metre
m asl	metres above sea level
m ³	cubic metre
mg	milligrams
mg/L	milligrams per litre
mg/m ²	milligrams per square metre
s	second
t	tonne
t/d	tonnes per day

1.0 INTRODUCTION

Prior to, and coincident with, exploration activities and feasibility studies, Newmont commenced several baseline programs (e.g., meteorology, hydrology, surface water quality, groundwater, soils, air, fish and fish habitat, wildlife) to characterize baseline conditions. The overarching objective of these programs are to provide detailed characterization of the pre-mine condition to be used to define site-specific benchmarks that potential Project effects may be measured against during the operations and closure phases. The Surface Water Quality and Aquatic Life Adaptive Management Plan (AMP) described herein is based upon the information collected by these baseline programs, and water quality predictions for receiving environment water quality predictions generated for the current mine plan. This Surface Water and Aquatic Life AMP is intended to evaluate observed changes in the water quality, aquatic life, fish, and fish habitat in receiving streams that fall outside of the predicted range. Monitoring plans not directly related to water quality, aquatic life, fish, and fish habitat do not have an adaptive management plan; however, Newmont is committed to upholding the adaptive management related commitments made during the Environmental Assessment, as well as requirements of the Decision Document as outlined in Appendix M of the EMAMP.

1.1 Background - Adaptive Management Planning

Adaptive management is a systematic and science-based approach to the management of complex environmental systems, that allows for inherent uncertainty in how best to achieve the desired outcomes. It recognizes that not all possible outcomes can be predicted with high certainty, and therefore, the Surface Water Quality and Aquatic Life AMP provides a framework to account for unforeseen conditions that may fall outside of the other applicable management and mitigation plans. Knowledge that is gained throughout this process is applied to improve the management of a resource developments effects on the surrounding environment. Eberhard *et al.*, (2009) defines it as:

“An adaptive approach involves adjusting actions in response to feedback on progress towards management objectives, as well as responding to contextual changes (anticipated or not) that may arise.”

The adaptive management concept was introduced in the 1970s and has been employed within the resource development industry as a method to manage unexpected conditions objectively and transparently within a Project area.

Mining projects are intensively managed, and extensive effort is expended on the prediction of potential impacts to water quality, aquatic life, fish, and fish habitat in receiving aquatic systems. In spite of this, uncertainty still exists in the predictions, due to many inter-related factors. These include natural variability, uncertainty in the geochemical source term predictions, explosives management practices, site water balance surplus beyond the predicted range, potential mine plan changes and modeling assumptions, among others.

The classical definition of adaptive management is provided by Murray and Marmorek (2003):

“Exploring alternative ways to meet management objectives, predicting the outcomes of each alternative based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn which alternative best meets the management objectives (and testing predictions), and then using these results to update knowledge and adjust management actions.”

In this context, adaptive management is an experimental approach, where varying methods of achieving a desired environmental objective are designed, tested, analyzed, and adjusted over time to achieve the stated objective. In the case of a mine project, the adaptive management cycle provides a useful framework for the tracking, analysis, and response to an unexpected environmental condition (Greig *et al.*, 2008).

1.2 Adaptive Management Plan Objectives

The Surface Water Quality and Aquatic Life AMP is a management tool that provides a framework within which unforeseen and detrimental environmental conditions (*i.e.*, water quality and aquatic health) can be identified, investigated, and mitigated in an efficient and timely manner. The AMP also includes clear provisions for communication and engagement with regulatory agencies and First Nations partners. The overarching objective of the present AMP is to allow the Coffee Gold Project to continuously track and proactively respond to water quality conditions within the Project area receiving streams that deviate from the predicted range. This requires clear linkages between the AMP and other relevant Monitoring and Management Plans, which provide the necessary data with which potential upset conditions could be identified. By nature, the AMP is precautionary, and is intended to ensure that mine influenced changes to the receiving environment are recognized early, and that appropriate action is taken to alter the mine-site water management regime prior to adverse impacts being observed.

The primary goal is to maintain receiving stream concentrations of specific parameters of potential concern (POPCs) below Use Protection Water Quality Objectives (WQOs) in the Project area tributaries, and to ensure that aquatic life in these tributaries is not adversely impacted. Specifically, these Use Protection WQOs will apply at these specific monitoring locations (Appendix B in *Coffee Mine Project – Water Balance Water Quality Model Report, Lorax 2023*):

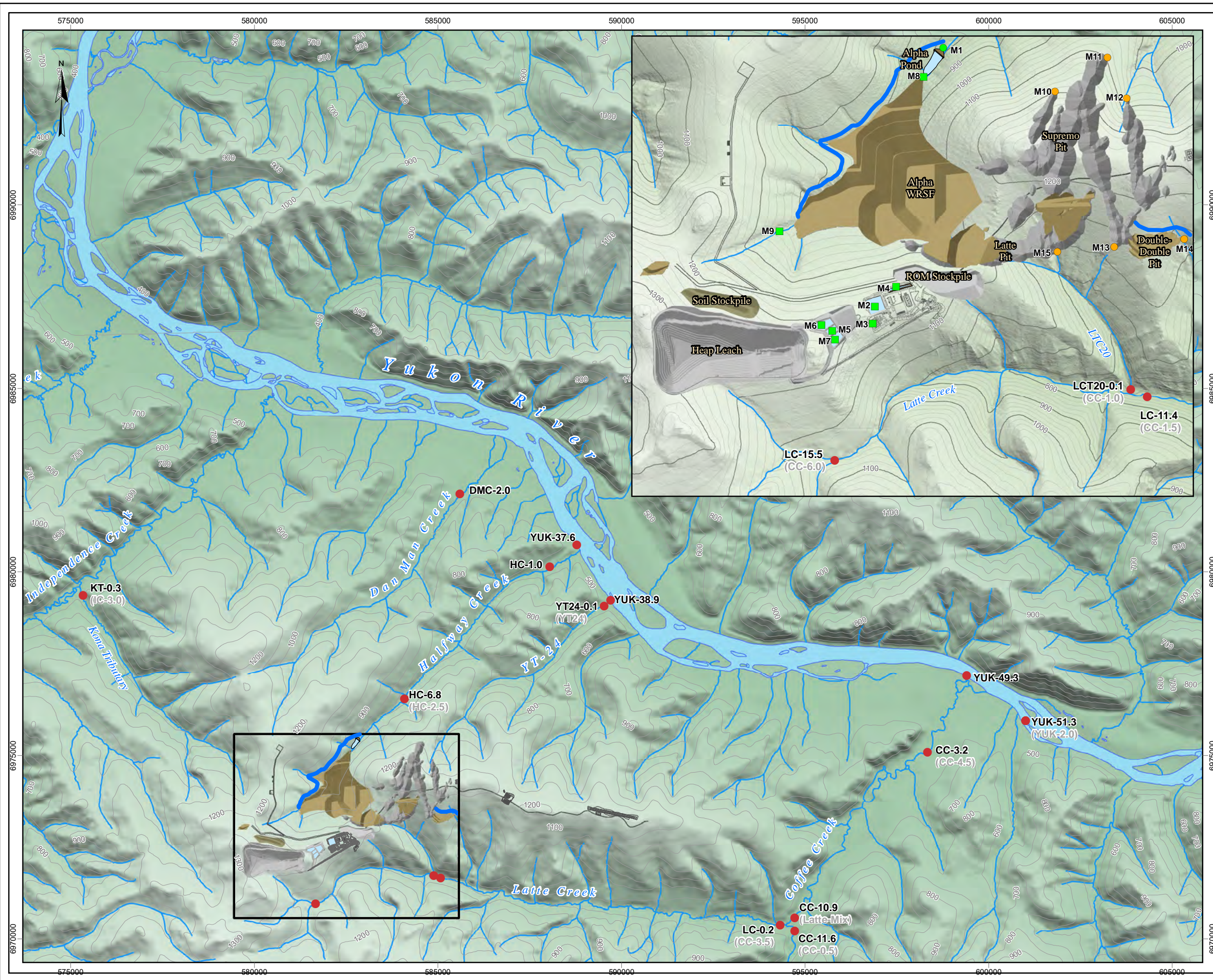
- Halfway Creek at monitoring station HC-1.0
- YT-24 at monitoring station YT24-0.1
- Latte Creek at monitoring station LC-11.4.

In addition, the Surface Water Quality and Aquatic Life AMP includes Non-Degradation WQOs for Coffee Creek and the Yukon River, against which water quality monitoring data will be compared on an annual basis. This comparison will seek to confirm that adherence to Use Protection WQOs maintains POPC concentrations below the Non-Degradation WQOs in Coffee Creek and the Yukon River. If monitoring indicates that the Non-Degradation objectives are being exceeded (following the methodology presented in Section 2.3.2), this will trigger a response by Newmont, including, but not limited to those listed in Section 2.4.

This AMP has been drafted in accordance with the relevant Yukon guidance, and in consultation with Newmont's First Nations partners. The lead authors of this AMP are as follows:

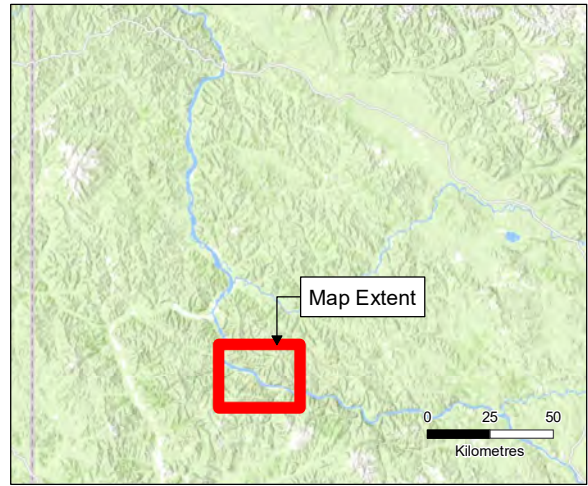
- The Introduction, Regulatory Framework and Water Quality components of the AMP were compiled by Lorax Environmental Services Ltd. (Lorax)
- The Aquatic Life AMP sections were written by Trinity Consultants' Minnow Aquatic Environmental Services Group (Minnow)
- EDI Environmental Dynamics Inc. (EDI) drafted the fish and fish habitat components.

This document is intended to serve as a comprehensive Surface Water Quality and Aquatic Life AMP (as defined in Yukon, 2021a), for submission in the Quartz Mining License (QML) and Water Use License (WUL) applications.



COFFEE GOLD MINE

Surface Water Quality Monitoring Stations



- Legend**
- Receiving Environment Station
 - Pit Sump/Sediment Pond, not subject to MMR
 - Provisional MDMER FPoD
 - MDMER FPoD
 - Watercourses
 - Waterbodies
 - Surface Contours (100m)

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.

1:3,000,000

 Kilometres

 NAD 1983 UTM Zone 7N

 Page Size: 11" x 17"

Figure 1-1	Date: Apr 9, 2024	Drawn by: AL	Reviewed By: SJ
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1.3 Regulatory Framework and Approach

The Surface Water Quality and Aquatic Life AMP is based upon the surface water quality monitoring program and the fish and aquatic life monitoring program (FAL-MP) as well as the site-wide water balance and water quality model (WB/WQM) predictions, which is calibrated to the existing (pre-mine) streamflow and water quality regime in the Project tributaries. Both components of the AMP have strong scientific foundations, and are widely accepted by the mining industry, regulatory agencies, and First Nations as robust methods for the characterization of potential effects of mine development on receiving aquatic environments. The ability to measure, quantify and monitor potential effects to surface water quality and aquatic life is a straightforward and well-established science, which typically entails the measurement of one or more chemical, biological, or physical constituents in a sample. As such, protocols and analytical methods for the collection and analysis of samples to evaluate potential Project-related effects are well-established. Water quality modelling, as a means to predict future potential effects, is also a well-developed discipline, and commonly forms an integral component of mine project design and environmental impact assessment.

1.3.1 Regulatory Framework

Specific guidance on the development and application of AMPs to quartz mining applicants and licensees is provided in Yukon (2021a). The Yukon Water Board (YWB) and Yukon Government, Department of Energy, Mines and Resources joint guidance document “*Plan Requirement Guidance for Quartz Mining Projects*” (2021b) states that an AMP must be included in the application package for both the QML and WUL processes.

The purpose of an AMP is to outline the potential responses that a mine operator might make when water quality monitoring indicates that an adverse effect on receiving aquatic systems may occur, defined in this case as an exceedance of the Use Protection and Non-Degradation WQOs at applicable stations (Figure 1-1) (YWB, 2012). Within this document, this concept is extended to all aquatic environmental monitoring, including aquatic life, fish, and fish habitat. Specifically, the plan must outline the indicators used to track the effectiveness of mine site water management practices, performance thresholds for management actions and potential responses that would be implemented to reduce the potential for adverse impacts to occur.

Once the licenses required to construct and operate the mine have been issued, the AMP provides flexibility within a well-defined framework to identify, investigate, and respond to changing environmental conditions that accompany a dynamic mining and receiving environment. It is the Yukon government’s expectation that the AMP be updated regularly as knowledge of both the site operation and receiving environment characteristics evolves.

Yukon (2021a) provides a timeline of AMP development within the mine lifecycle, duplicated below for reference (Figure 1-2).

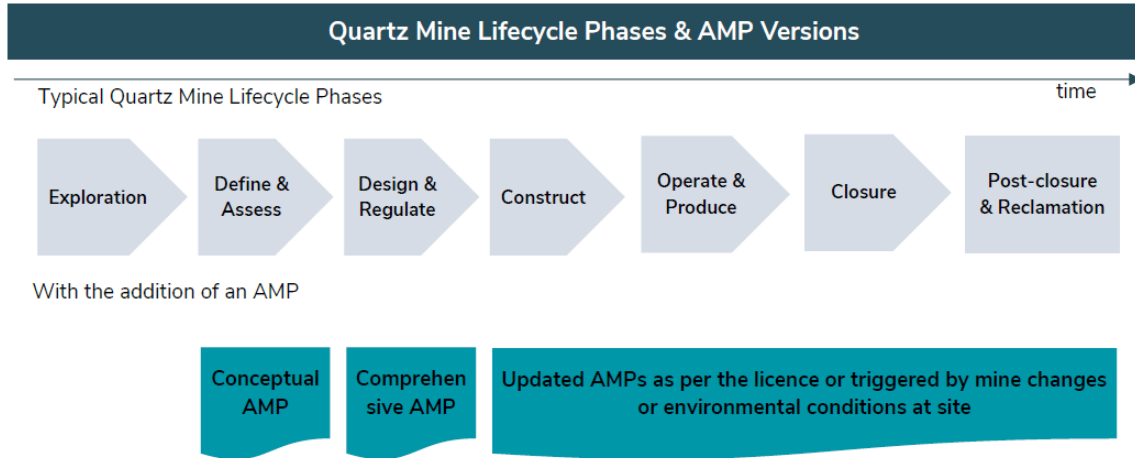


Figure 1-2 Timeline of AMP Development within the Mine Life Cycle (reproduced from Yukon (2021a))

In addition to the background and objectives presented above, the Surface Water Quality and Aquatic Life AMP adheres to the *Environmental Code of Practice for Metal Mines* (Section 4.1.17), which states:

“Mine owners/operators should use adaptive management methods to revise and refine the environmental management strategy. Adaptive management should consider a wide range of factors, including:

- The results of environmental audits or other evaluation activities
- The results of environmental monitoring
- The results of monitoring of the performance or condition of environmental infrastructure, such as containment structures, water management systems or treatment facilities
- Technological developments
- Changing environmental conditions.” (Environment Canada, 2009).

The Surface Water Quality and Aquatic Life AMP explicitly addresses the above points, noting that technological developments are not specifically addressed herein, rather they form a key component of Newmont’s commitment to continuous improvement. Continuous improvement will be an ongoing objective throughout the life of mine to optimize processes based on actual site conditions to achieve a common end goal for Newmont, stakeholders, First Nations, and the local community. This will be carried out through the implementation of the reclamation research program, which will commence during the construction phase, as well as through established technical working groups and committees. Reporting on continuous improvement related to water quality will be included in the Annual Report.

1.3.1.1 YESAB Process and Outcomes

During preparation of the YESAB Project Proposal and throughout the Executive Committee Screening process, Newmont exerted a focused effort on discussing the role of adaptive management in the construction and operation of the Project. Therefore, 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).

Conclusions of the Executive Committee Screening process related to water quality have been incorporated into the Surface Water Quality and Aquatic Life AMP. Specifically, the outcomes of the Final Screening Report informed development the adaptive management approach related to, but not limited to, the following components:

- The non-degradation thresholds for Coffee Creek (Section 2.3.2)
- Monitoring seepage quality downgradient of the ROM ore pad (Section 4.5.3)
- Defining water management goals for Halfway Creek, Latte Creek, YT-24 Creek, Coffee Creek, and Yukon River (Section 1.3).

An overview of the commitments that were made during the YESAB screening process related to adaptive management as well as the mitigations and monitoring requirements set out by the Decision Document are summarized in the EMAMP Table of Concordance (Appendix M of the EMAMP).

1.3.2 Approach

To ensure that the multiple factors listed above are adequately captured by the AMP, Greig *et al.*, (2008) provides a list of steps that an AMP should include:

- Step 1: Assess and define the problem
- Step 2: Design
- Step 3: Implementation
- Step 4: Monitoring
- Step 5: Evaluation of Results
- Step 6: Adjustment/Revision of Hypotheses and Management.

Following this general framework, the problem is defined by the following statement:

While management plans are intended to provide a robust framework for the management of issues that are predicted to occur with a high degree of certainty, an adaptive management framework must be in place to allow the Project to manage issues that may arise but are essentially unknown at this point.

In this instance, the AMP is required to address the eventuality where adherence to an existing management plan is found to be ineffective in meeting the numerical WQOs or the protection of aquatic life in the receiving streams. By its nature, the AMP must therefore be precautionary, in that it is recognized that it is impossible to plan for every eventuality, and therefore a framework must exist to address unforeseen changes in water quality, aquatic life and fish habitat of receiving streams.

The design (Step 2) of the AMP has been an iterative process and has benefited from extensive baseline datasets and helpful input from Newmont's First Nations partners. The AMP will be implemented (Step 3) upon initiation of construction activities at the Project site, when aquatic monitoring (Step 4) will be ongoing and will continue throughout all phases of the Project.

Step 5, as described by Greig *et al.*, (2008), includes the following subcomponents, which are expanded upon in Sections 1.4.1 through 1.4.3:

- Compare monitoring results against water quality objectives (covered in detail in Appendix B of Coffee Mine Project – Water Balance Water Quality Model Report, Lorax, 2023)
- Compare monitoring results against assumptions
- Compare actual results against model predictions
- Receive statistical or analysis advice
- Have data analysis keep up with data generated from monitoring activities.

In the context of adaptive management planning for a mine site in Yukon Territory, the *Guidelines for developing adaptive management plans in Yukon* document (Yukon 2021a) provides the general structure of an AMP:

1. Identify risk triggers associated with uncertainties:
 - a. Describe the environmental component of interest (e.g., receiving stream surface water quality, aquatic health), and develop risk narratives.
2. Quantify impacts and uncertainties.
 - a. This is done through the Environmental Assessment process, and involves extensive baseline data collection, modeling of predicted mine development impacts and analysis, summarized in Appendix 12-B of the YESAB Project Proposal (Lorax, 2017), 14-B of the YESAB Project Proposal (EDI 2017), and the Periphyton and Benthic Invertebrates Analysis Report (Minnow and EDI 2017).
 - b. The specific indicators are developed through this process, and in consultation with regulators and First Nations partners.
 - c. For the purposes of this AMP, the defined adaptive management initiatives are Surface Water Quality (Section 2), and Fish and Aquatic Life (Section 3).
3. Develop and implement monitoring plans that specify parameters, locations, and frequency.
 - a. Specific indicators at the key monitoring stations are then tracked through the routine surface water quality monitoring program.
4. Develop performance thresholds for the indicators based upon baseline data and predictions of water quality that are linked to specific actions, including review and analysis of monitoring data and mine effluent discharge practices, specific responses, and reporting requirements. Performance thresholds increase in a stepwise fashion as the indicator concentrations increase, and each threshold, or action level, is specifically linked to review, actions and reporting that are designed to isolate the reason for the threshold exceedance and allow flexibility in the management actions that are taken to reduce indicator concentrations. These thresholds are structured so that early warning of potential adverse impacts is inherent in the AMP, and thus remedial actions can be taken prior to the occurrence of said impacts.
5. Develop thresholds for fish habitat and aquatic life that are indicators of changes to these groups. Actions will include review, actions and reporting that are designed to isolate the reason for the

threshold exceedance and determine if these exceedances are indeed affecting fish and other aquatic system components.

6. Evaluate strategies and define implementation path that allows for multiple response options at specific performance thresholds, including;
 - a. Review:
 - i. Actions, including implementation of strategies to address the issue, and monitoring to determine whether mitigation was successful, or conversely, needs to be adjusted; and
7. Reporting, which includes:
 - a. Informing mine management
 - b. Informing First Nations environmental committees
 - c. Informing regulatory agencies
 - d. Monthly reporting
 - e. Annual reporting.

The AMPs for the Project site drainages follow the structure as presented above and illustrated in Figure 1-3.

An AMP for the Closure phase will be developed during Operations. The Closure AMP will be an important component of the management of water quantity and quality discharged from the Project site during Closure, Post-closure and/or a temporary closure, as it will aid the operator with measuring attainment of Use Protection and Non-Degradation WQOs in the receiving watercourses. In addition, the Closure AMP will facilitate the implementation of the Reclamation and Closure Plan, including meeting Closure goals and end land-use objectives, including traditional uses. It is expected that the approach and indicators in the Closure AMP will remain similar to those in the Operations AMP, which will have been tested and refined throughout the Operations phase in response to actual conditions in at the Project site and in the receiving watercourses.

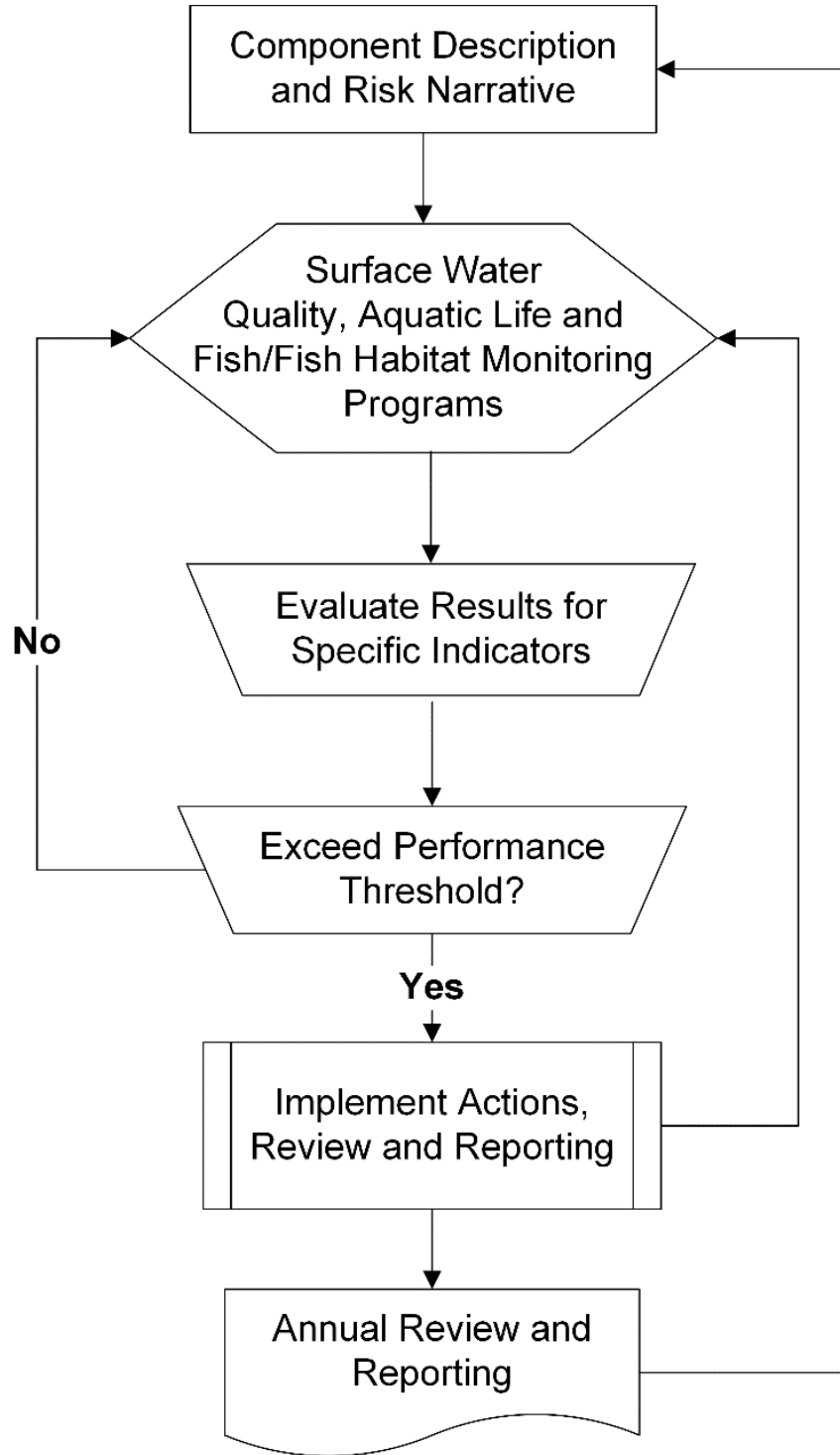


Figure 1-3 Process Flow Diagram of the Adaptive Management Plan for the Coffee Gold Project

2.0 ADAPTIVE MANAGEMENT INITIATIVE – SURFACE WATER QUALITY

This section outlines the indicators and performance thresholds specific to the water quality component, and linkages with other management plans, including linkages to the Fish and Aquatic Life Adaptive Management Initiative, which is described in Section 3.

2.1 Specific Indicators

To identify changes in receiving environment water quality that fall outside of the predicted range, it is necessary to select specific indicators that are present in the expected effluent discharges and have the potential to alter the aquatic ecosystem from its current (pre-development) condition. Ideally, the indicators selected would be quantifiable using standardized methods, linked to the mine development water quality signature, and agreed upon by all stakeholders. The main POPCs were identified during the Environmental Assessment process, and the predicted impacts on receiving environment water quality are described, along with the planned mitigation measures, in Appendix 12-B of the YESAB Project Proposal (Lorax, 2017). These POPCs have been vetted with Newmont's First Nations partners, and additions were made based on these consultations. The POPCs as identified consist of three major ions, and three metals:

- Nitrate as nitrogen [N-NO₃]
- Total Ammonia [NH₄⁺-N/NH₃-N]
- Sulphate [SO₄]
- Dissolved Arsenic [As]
- Dissolved Uranium [U]
- Dissolved Zinc [Zn].

The Use Protection WQOs as presented in Table 2-1 form the measurable objectives that Newmont has committed to managing the Project effluent discharges to meet at the near-field receiving watercourse monitoring stations listed above and shown in Figure 1-1.

Table 2-1 Use Protection Water Quality Objectives for Key Parameters at the Latte Creek, Halfway Creek and YT24-0.1 Monitoring Stations.

Parameter	Units	Latte Creek (LC-11.4)	Halfway Creek (HC-1.0)	YT24-0.1
NH ₄ ⁺ + NH ₃ -N	mg/L	1.3	1.5	1.8
N-NO ₃	mg/L	8	8	8
SO ₄	mg/L	309	218	218
D-As	ug/L	0.005	0.005	0.005
D-U	mg/L	0.031	0.086	0.015
D-Zn	mg/L	0.031	0.024	0.026

Further downstream, Non-Degradation WQOs will apply for the same POPCs at the CC-10.9 monitoring station on Coffee Creek (downstream of the Latte Creek confluence) and at the YUK-49.3, YUK-38.9 and YUK-37.6 stations on the Yukon River, located at the downstream edge of the confluence initial dilution zones for Coffee Creek, YT-24 and Halfway Creek, respectively (Table 2-2). These non-degradation WQOs are based on the 95th percentile of all water quality data collected at the respective monitoring locations, as per Yukon Government guidance (Yukon, 2021b).

Table 2-2 Non-Degradation Water Quality Objectives for Key Parameters in Coffee Creek and the Yukon River

Parameter	Units	Coffee Creek (CC-10.9)	Yukon River (d/s Coffee Creek; YUK-49.3) ¹	Yukon River (d/s YT-24; YUK-38.9) ¹	Yukon River (d/s Halfway Creek; YUK-37.6) ¹	Standard Deviation (Yukon River) ²
NH ₄ ⁺ + NH ₃ -N	mg/L	0.044	0.069	0.095	0.038	0.020
N-NO ₃	mg/L	0.45	0.245	0.414	0.371	0.090
SO ₄	mg/L	104	43	33	29	5
D-As	mg/L	0.00049	0.00127	0.00148	0.00170	0.0001
D-U	mg/L	0.0286	0.00250	0.00219	0.00696	0.0009
D-Zn	mg/L	0.00182	0.01971	0.02803	0.02593	0.0015

Notes:

¹ Below detection limit values were assigned a value of half-detection limit.

²Standard deviation is calculated using compiled data from all stations.

Surface water quality monitoring will be conducted at the receiving watercourse stations listed in Table 2-2 on a monthly basis year-round, as permitted by site conditions (*i.e.*, ice cover and safety considerations). The data gathered by this surface water monitoring program will be compared to the performance thresholds listed in Section 2.3 within two weeks of receipt of results from the laboratory.

2.2 Inclusion of Additional Parameters

The Surface Water Quality and Aquatic Life AMP as currently structured focuses on the six POPCs presented in Table 2-1 and Table 2-2. However, in order to assess additional POPCs that could potentially result in significant changes to water quality, it is necessary to include triggers in the AMP aimed to evaluate POPCs that may fall outside of the expected range of variability. Following each round of monthly monitoring, water quality data will be compared to the Upper-Case water quality model predictions for the time-step in question. If there are three consecutive exceedances of the Upper Case WQM predictions for a given POPC, this will trigger a Tier 2 response (summarized in Section 2.4 and receiving stream specific tables in Section 4). Similarly, if the results of the freshwater aquatic life AMP (FAL-AMP) indicate that an additional POPC warrants further investigation, this will also trigger a Tier 2 response. Specifically, the model assumptions will be reviewed to confirm that they are reflective of current site conditions. If the subsequent model update indicates that this POPC is predicted to be elevated above previously predicted levels and has the potential to approach the relevant WQO, this POPC will be included in the AMP parameter list.

2.3 Performance Thresholds

For five of the POPCs (NH₃-N, N-NO₃, SO₄, D-As and D-Zn), the specific indicators are tied to performance thresholds, of which there are four:

1. Tier 1: Monitoring data exceeds Base Case water quality model predicted concentrations for POPCs and is less than proposed Use Protection WQOs.
2. Tier 2: Monitoring data exceeds Upper Case water quality model predicted concentrations for POPCs and is less than proposed Use Protection WQOs.
3. Tier 3: Monitoring data exceed proposed Use Protection WQOs.
4. Tier 4: Monitoring data exceed Use Protection WQOs in 3 consecutive months following implementation of mitigation measures (resulting from Tier 3).

The first two performance thresholds are based on the Base Case and Upper-Case WQM predictions, respectively. The site-wide WB/WQM is based on the current mine plan, and the information available at the time of model development. Both the mine plan and the information on which the WB/WQM is based are subject to change. Additionally, during the early Operations phase, the predicted concentrations in the receiving streams will be lower than are predicted for the end of Operations phase, and thus if the Tiers were based on statistics for the full duration of this phase, the thresholds would be biased high, and would allow potential adverse impacts to be overlooked early in operations. To address this issue, the WB/WQM will be updated annually, based on the mine plan that is current at that time. The performance thresholds for Tier 1 and Tier 2 will be based on the predicted concentrations for the specific indicators at the receiving environment monitoring points listed in Section 1.3 for the upcoming year. In this way, the AMP will remain reflective of the most up-to-date information on site performance and the current mine plan and serves to minimize the potential increased uncertainty in the Tier values that could result from relying on outdated WB/WQM predictions.

Tier 3 and Tier 4 are based on the Use Protection WQOs described in Appendix B of *Coffee Mine Project Water Balance Water Quality Model* (Lorax, 2023). These WQOs are set based on either existing

guidelines, or in the case of baseline conditions that naturally exceed the generic water quality guidelines, on the 95th percentile of all baseline data (e.g., U).

2.3.1 Performance Thresholds – Uranium

Due to the elevated existing U concentrations in the Project area tributaries, a modified approach is required for this element. The Tiers specific to this parameter are as follows:

1. Tier 1: U concentrations in monitoring data exceed Upper Case WQM predicted concentrations.
2. Tier 2: U concentrations in monitoring data exceed proposed WQOs (Use Protection).
3. Tier 3: U concentrations in monitoring data exceed 41 µg/L at LC-11.4, 115 µg/L at HC-1.0, and 33 µg/L at YT24-0.1.

The Tier 3 values are set to the lowest U concentration with noticeable effects (as reported for Latte Creek) for each tributary, based on the toxicity tests performed using collected site water (Lorax 2019).

2.3.2 Non-Degradation Water Quality Objectives – Coffee Creek and Yukon River

While the Surface Water Quality and Aquatic Life AMP performance thresholds are based upon an escalating threshold system using WQM outputs and the proposed Use Protection WQOs for the near-field attainment points, the assessment of site water management performance against the proposed Non-Degradation WQOs for the far-field monitoring locations in Coffee Creek and the Yukon River requires a different approach. Non-Degradation WQOs are defined as the 95th percentile of the baseline concentrations for each POPC, as presented in Table 2-2.

The Yukon AMP guidance document outlines recommended methods for measuring attainment of these objectives (Yukon, 2021b; Section 5.2) (Note COPC stands for “chemicals of potential concern” and used in similar fashion as the POPCs term herein).

Non-Degradation Approach: The surface water chemistry data should be compared to numerical WQOs derived using the BCP. In this respect, the concentration of each in each grab sample is compared to the 95th percentile of background concentrations for the COPC. Each observation for a COPC is classified as “in compliance” or as “an exceedance,” depending on whether the observed concentration exceeds the 95th percentile of background concentrations. The frequency of exceedance is then calculated for each COPC using the surface water chemistry data for the 20 most recent sampling dates (i.e., where frequency of exceedance = number of exceedances/number of observations). The WQOs are exceeded if the frequency of exceedance of the 95th percentile of background concentrations is greater than 5% (i.e., two or more samples out of twenty exceed the 95th percentile concentration).

In addition, the arithmetic mean is calculated for each COPC using the surface water chemistry data of the 20 most recent sampling dates for the relevant time period (e.g., annual, open-water, month). The mean concentration that is calculated for the relevant time period for each COPC is then compared to the one-tailed 95% upper confidence limit of the mean (UCLM) that was generated using the data collected in the baseline monitoring program. The WQOs are exceeded if the resultant monitoring data indicate that the mean for the previous 20 sampling dates for the relevant time period exceeds the one-tailed 95% UCLM established under background conditions.

These recommended methods will be followed by Newmont to quantify attainment of the Non-Degradation WQOs in Coffee Creek and the Yukon River. This analysis will be conducted annually, using the previous 20 water quality samples taken at each node, which will by definition result in some overlap between years in the group of samples included in the assessment. A complete summary of this assessment will be included in the annual monitoring report submitted to First Nations environment committees and regulatory agencies. As part of the annual analysis, there will be an investigation to determine if there are exceedances and if the Coffee Gold Project is the primary or most substantial cause. If the Coffee Gold Project is not the primary or most substantial cause of an exceedance, then the non-degradation WQOs may be re-evaluated in consultation with affected First Nations.

In cases where an exceedance of a Non-Degradation WQO is noted, but no corresponding exceedance has been noted at the upstream near-field Use Protection WQO attainment point, the non-Degradation exceedance shall take priority.

2.4 Responses

It is impossible to predict all specific environmental conditions that may result in changes to receiving environment water quality, and therefore the actions specified for each tier are not prescriptive in nature. Rather, the framework is flexible to allow the mine management and environmental staff the latitude to develop appropriate responses. In general, as each Tier is reached, the responses increase in complexity and scope. The responses are categorized as follows, and a detailed summary is provided for each of the three receiving streams where Use Protection WQOs will apply in Section 4.3 (Halfway Creek), Section 4.4 (YT-24 Tributary) and Section 4.5 (Latte and Coffee Creeks):

- Review
- Actions
- Reporting.

The review stage focuses on confirming that the monitoring data are accurate and reflective of actual conditions, and for Tiers 1 and 2, that the WB/WQM assumptions are reflective of the current mine operations, including a proper accounting of POPC loading sources (e.g., waste rock volumes, pit areas, etc.) and the resultant expected effluent discharge concentrations and volumes. Discharge concentrations and volumes will be checked to confirm that they remained within effluent quality standards (EQS) as defined in the *Water Use License*. If a Tier 4 threshold is crossed, in addition to the above review actions, the review phase will focus on the potential mitigation and water management options available to reduce POPC concentrations in receiving watercourses.

Potential actions to be taken range from flagging POPCs for review in the next WQM update following 3+ exceedances of Tier 1 or Tier 2 thresholds, to resampling at location of first Tier 3 exceedance and/or increasing sampling frequency at nearest upstream mine effluent discharge locations. For Tier 3 and Tier 4 exceedances, the following actions may be taken, as appropriate: site investigations to determine root cause, qualitative trend assessments, assessments of risk, toxicity in receiving systems, and the associated effects on aquatic resources; development of action plans to address exceedances; and implementation of necessary reasonable and practical measures to reduce contaminant loading from the mine site to the receiving waters.

Reporting actions include monthly reporting; notifications to mine management team and First Nations environment committees, and notifying the relevant regulatory bodies (e.g., Yukon government inspectors, YWB, Department of Fisheries and Oceans).

2.5 Linkages with Other Plans

Newmont has developed a suite of management and monitoring plans that address both site operational requirements, as well as the regulatory requirements of WUL issued under the *Waters Act* (2003) and QML issued under the *Quartz Mining Act* (2001). The monitoring plans summarize the specific monitoring locations, parameters, sampling frequency and reporting requirements, while the management plans summarize the methods used to facilitate attainment of specific performance objectives. The AMP is a subsection of the Environmental Monitoring and Adaptive Management Plan, which also includes the:

- Meteorological Monitoring Plan
- Hydrology Monitoring Plan
- Surface Water Quality Monitoring Plan
- Geochemical Monitoring Plan
- Groundwater Monitoring Plan
- Fish and Aquatic Life Monitoring Plan
- Wildlife Monitoring Plan
- Surface Water Quality and Aquatic Life AMP.

Other management plans relevant to the AMP are as follows:

- Waste Rock and Overburden Management Plan
- Water Management Plan
- Wildlife Protection Plan
- Reclamation and Closure Plan
- Cyanide Management Plan
- Erosion and Sediment Control Plan
- General Mine Development Plan
- Mine Operations Plan
- Heap Leach and Process Facilities Plan
- Explosives Management Plan
- Site Characterization Plan
- Spill Contingency Plan
- Waste and Hazardous Materials Management Plan.

3.0 FISH AND AQUATIC LIFE AMP

A FAL-AMP has been developed for the Coffee Project to ensure that, similar to water quality results, the results of the FAL-MP follow an AMP framework (i.e., are specifically used to trigger appropriate responses) and that links between WQ-AMP and Aquatic Life (AL)-AMP are established. The latter includes the use of FAL-MP and FAL-AMP results to inform the WQMP and WQ-AMP, and vice-versa. As with the WQ-AMP, the FAL-AMP includes predetermined thresholds that trigger monitoring and/or management responses to threshold exceedance.

3.1 Aquatic Life Monitoring

Although the Coffee Project is still collecting baseline environmental data, a preliminary FAL-MP has been developed. In part, the preliminary FAL-MP was developed to ensure that baseline data are collected in manner that can be optimally used for future detection of potential mine-related effects to aquatic life. This includes the selection of sampling areas based on understanding of the locations of Project influence, the collection of data at levels of replication that provide adequate statistical power and are consistent with future monitoring needs (e.g., for Environmental Effects Monitoring under the Metal and Diamond Mining Effluent Regulations), and the application of state-of-the-science data collection and interpretation methodologies.

Briefly, periphyton and benthic invertebrate community monitoring under the preliminary FAL-MP includes “future exposed” areas and matching reference areas (the latter of which are areas that are not expected to be influenced by the Project). The inclusion of both area types was selected to support the future application of a Before-After-Control-Impact (BACI) design, which is considered the optimal design for environmental effects assessment (e.g., Green 1979; Mellina and Hinch 1995). The FAL-MP is designed around three “future-exposed” creek areas:

- Halfway Creek
- YT-24 Creek
- Latte Creek / Coffee Creek.

For aquatic life, each of these three creeks (or creek groupings in the case of Latte/Coffee) has been further divided into an upper monitoring area and a lower monitoring area (Table 3-1; Figure 3-1). The monitoring program design includes two reference areas for the upper “future-exposed” areas and two reference areas for the lower “future exposed areas” areas (Table 3-1; Figure 3-1).

Table 3-1 Overview of Periphyton and Benthic Invertebrate Monitoring Under the Preliminary FAL-MP for the Newmont Coffee Project

Area Type	Area	Stations per Area	Periphyton			Benthic Invertebrates		
			Periphyton Chlorophyll-a	Periphyton Ash-free Dry Mass (AFDM)	Periphyton Community	Benthic Invertebrate Community	Benthic Invertebrate Biomass	Benthic Invertebrate Tissue Chemistry
Upper Creek Areas	Upper Halfway Creek (Future Exposed)	n = 5	✓	✓	✓	✓	✓	✓
	Upper YT Creek (Future Exposed)	n = 5	✓	✓	✓	✓	✓	✓
	Upper Latte Creek (Future Exposed)	n = 5	✓	✓	✓	✓	✓	✓
	Upper Carlisle Creek (Reference)	n = 5	✓	✓	✓	✓	✓	✓
	Upper Coffee Creek Tributary (Reference)	n = 5	✓	✓	✓	✓	✓	✓
Lower Creek Areas	Lower Halfway Creek (Future Exposed)	n = 5	✓	✓	✓	✓	✓	✓
	Lower YT-24 Creek (Future Exposed)	n = 5	✓	✓	✓	✓	✓	✓
	Lower Coffee Creek (Future Exposed)	n = 5	✓	✓	✓	✓	✓	✓
	Lower Creek South of YT-24 (Reference)	n = 5	✓	✓	✓	✓	✓	✓
	Lower Creek East of Excelsior (Reference)	n = 5	✓	✓	✓	✓	✓	✓

Note: See Table 3-2 for additional detail (e.g., methodology, measurable parameters, frequency, and timing)

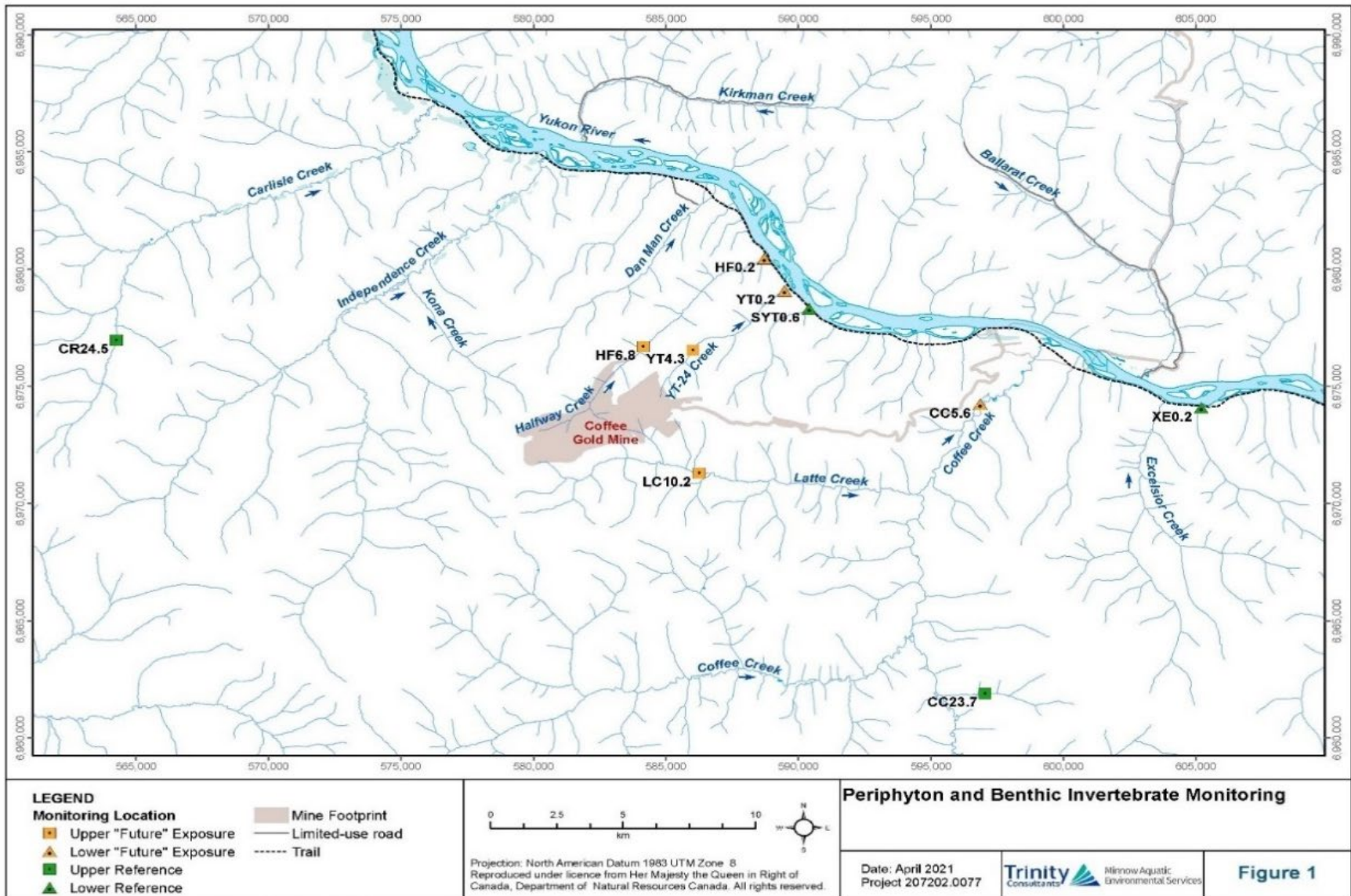


Figure 3-1 Periphyton and Benthic Invertebrate Monitoring

Periphyton monitoring is focused on Measurable Parameters (often alternatively referred to as indicators or endpoints or metrics) representing productivity and community condition. Benthic invertebrate monitoring is focused on Measurable Parameters representing productivity, community condition, and tissue quality. Measurable Parameters were selected based on an analysis of potential and predicted Project-associated physical and chemical changes reviewed in the analysis of periphyton and benthic invertebrates as part of Environmental Assessment (Minnow and EDI 2017). Thus, the FAL-MP is designed to monitor for potential (although not predicted) physical disturbance and toxicity effects and for predicted stimulation of primary and secondary productivity.

The frequency of periphyton and benthic invertebrate monitoring under the FAL-MP varies by location and project stage (Figure 3-1). Briefly, the upper creek areas will be monitored at a greater frequency than lower creek areas, reflecting greater mine influence relative to creek size. Upper creek areas will be monitored at an initial frequency of annually for the first three years, followed by every two years thereafter¹. Periphyton and benthic invertebrate monitoring of lower creek areas will be at a frequency of every two years (Table 3-2).

¹ These monitoring frequencies are the “base” monitoring frequencies in the absence of AMP-related changes to frequency triggered by FAL-MP findings.

Table 3-2 Periphyton and Benthic Invertebrate Monitoring Areas, Methodology, Measurable Parameters, Frequency, and Timing under the Preliminary FAL-MP for the Newmont Coffee Project

Area Type	Future Project Exposed Creeks	Reference Creeks	Periphyton		Benthic Invertebrates		Frequency	Timing
			Method Summary	Measurable Parameters ^a	Method Summary	Measurable Parameters ^{a,b}		
Upper Creek Areas	Upper Halfway (HC6.8)	Upper Carlisle (CR24.5) and Upper Coffee (CC23.7)	Productivity: sample periphyton with razor blade from a measured surface area of five randomly selected rocks, freeze two samples (one for AFDM and one for chlorophyll-a). Community: sample periphyton with razor blade from five randomly selected rocks, preservation with Lugol's solution.	Productivity: dry weight per m ² and chlorophyll-a (mg/m ²) Community: taxon richness, %green algae, %blue-green algae, %diatoms	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	Productivity: dry weight per m ² Community: density, taxon richness, Simpson's Evenness, Simpson's Diversity, Bray-Curtis Index of Dissimilarity, %EPT taxa, %mayflies, %HPG, %FFG Tissue Quality: metal concentrations	Baseline: Annually for three years Construction: once Operations: Annually for years 1-3, every 2 years starting year 5. Reclamation and Closure: every 2 years	Late summer
	Upper YT-24 (YT4.3)							
	Upper Latte (LC10.2)							
Lower Creek Areas	Lower Halfway (HC0.2)	Lower Creek East of Excelsior (EX0.2) and Lower Stream South of YT-24 (SYT0.6)	Productivity: sample periphyton with razor blade from five randomly selected rocks, preservation with Lugol's solution.	Productivity: dry weight per m ² and chlorophyll-a (mg/m ²) Community: taxon richness, %green algae, %blue-green algae, %diatoms	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	Productivity: dry weight per m ² Community: density, taxon richness, Simpson's Evenness, Simpson's Diversity, Bray-Curtis Index of Dissimilarity, %EPT taxa, %mayflies, %HPG, %FFG Tissue Quality: metal concentrations	Baseline: Annually for 3 years Construction: once Operations: every 2 years Reclamation and Closure: every 2 years	Late summer
	Lower YT-24 (YT0.2)							
	Lower Coffee (CF5.6)							

^a the identification of Measurable Parameters does not preclude interpretation based on additional Parameters. This is particularly true for community data, for which additional interpretive parameters will be calculated and contrasted (e.g., proportion of other taxonomic groups and ordination such as Correspondence Analysis or Non-metric Multidimensional Scaling)

^b EPT = Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies); HPG = Habit Preference Group (sprawlers, burrowers, and clingers); FFG = Functional Feeding Group (collector-gatherers, filterers, scrapers, shredders, and predators)

3.1.1 AL-AMP Rationale and Conceptual Overview

Data collected under the FAL-MP will be subject to the AL-AMP. As outlined in Section 1.3, the objective of AMP is to track and respond to conditions that deviate from the predicted range. In the case of the AL-AMP for periphyton and benthic invertebrates, the AMP has a smaller base of data to draw upon relative to water quality. Accordingly, rather than rely on numerical performance thresholds, the AL-AMP relies on thresholds of statistical significance – does an AL-AMP indicator differ significantly from baseline and from reference? This is a typical approach to the interpretation and use of biological data (e.g., Environment Canada 2012; Kilgour *et al.*, 2016; Somers *et al.*, 2018).

Due to the availability of baseline data for matched “future-exposed” and reference areas, it is anticipated that the optimal BACI analysis can be used for data analysis and to specifically support the AL-AMP thresholds. Unlike the standard BACI approach which asks the questions “does after differ from before (baseline)?”, and “does exposed differ from reference?” (respectively), the BACI asks a question that is more powerful in determining potential mine-related change: “if there is a change from baseline in an exposed area, is that change larger than observed at the reference area?”. Application of BACI controls for natural differences among areas and temporal variability to provide optimal resolution of potential mine-related effects.

A key consideration in the AL-AMP is which indicators to select as subject to AMP. Much like the WQ-AMP focusses on key analytes (parameters of concern) identified in the EA process, key indicators have been identified for use in the AL-AMP. In selecting Measurable Parameters to use as key indicators, one consideration was to limit the number of key indicators to effectively capture those that are quantitative, reproducible, and sensitive to the potential changes identified in environmental assessment, while at the same time not including so many indicators that the AL-AMP becomes unmanageable or that there is redundancy in the indicators. Considering too many indicators results in an increased likelihood of finding a statistically significant difference when testing multiple hypotheses (*i.e.*, potential false positives, e.g., Somers *et al.*, 2019) and can also result in redundancy (Rice and Rochet 2005). Redundant indicators that are influenced by similar generating processes (e.g., effects on flow or effects on water chemistry) may overestimate impacts if used collectively (Sutherland *et al.*, 2016).

Based on consideration of these factors (Table 3-3), the AL-AMP does not include triggers for periphyton (due to high variability in measurable parameters / indicators and trophic “distance” from the fundamental Valued Component [fish]). The following key indicators have been selected for AL-AMP:

- Benthic invertebrate community biomass
- Benthic invertebrate community taxon richness
- Percent EPT taxa² in the benthic invertebrate community
- Benthic invertebrate tissue arsenic, uranium, and zinc concentrations.

For each of these key indicators, thresholds are based on statistical contrasts of exposed area results versus reference area results (Table 3-4). If the key indicators do not differ from baseline and reference or if the BACI interaction term does not differ from reference, then no response is required. If statistically significant differences are observed at $p=0.10$, the AL-AMP framework is triggered.

² EPT taxa = invertebrate taxa from the insect orders of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies).

Table 3-3 Rationale for Inclusion of Periphyton and Benthic Invertebrate Measurable Parameters in the Newmont Coffee Project FAL-MP and for the Selection of Key Indicators for the AL-AMP

Monitoring Component	Subcomponent	Measurable Parameters	Units	Rationale for Inclusion in the FAL-MP	AL-AMP Key Indicator and Rationale
Periphyton	Production	Biomass	dry weight per m ²	potential stimulation by nutrients/temperature; impairment by sedimentation or toxicity	NO. Periphyton data are typically more variable than benthic invertebrate data, are susceptible to short-term climatic factors (e.g., temperature, rainfall, sunlight) and are a more distant link (relative to benthic invertebrates) to the Valued Component (fish). Benthic invertebrate biomass is selected as a more reliable key indicator of production.
		Chlorophyll a	Chlorophyll a per m ²	potential stimulation by nutrients/temperature; impairment by sedimentation or toxicity	
	Community	Taxon Richness	number of taxa per sample (station)	potential impairment by nutrients/temperature, sedimentation, or toxicity	
		% green algae	percent of total organisms	potential decrease with flow, nutrients, temperature, metal concentrations	
		% blue-green algae	percent of total organisms	potential increase with flow, nutrients, temperature, metal concentrations	
% diatoms	percent of total organisms	potential increase with flow, nutrients, temperature, metal concentrations			
Benthic Invertebrates	Production	Biomass	dry weight per m ²	potential stimulation by nutrients/temperature; impairment by sedimentation	YES. Highly quantitative and sensitive to potential stimulation and flow regime change.
	Community	Density	total organisms per m ²	potential stimulation by nutrients/temperature; impairment by sedimentation or toxicity	NO. Recapitulates biomass; considered a supporting metric to biomass.
		Taxon Richness	number of taxa per sample (station)	potential impairment by nutrients/temperature, sedimentation, or toxicity	YES. Highly quantitative and sensitive to potential stimulation, flow regime change, and toxicity.
		% EPT ^a	percent of total organisms	metal sensitive - potential decrease with elevated metals	YES. Highly quantitative and sensitive to potential stimulation, flow regime change, and toxicity.
		% mayflies	percent of total organisms	metal sensitive - potential decrease with elevated metals	NO. Recapitulates % EPT; considered a supporting metrics to % EPT.
		% HPG (burrowers v. clingers)	percent of total organisms	potential increase in burrowers under sedimentation	NO. Limited specificity to mine-related stressors.
		% FFG (collector-gatherer v. filterer v. scraper)	percent of total organisms	potential increase in collector-gatherers with sedimentation, lower filterer and scraper and higher clingers with flow augmentation	NO. Limited specificity to mine-related stressors.
		Simpson's Evenness	unitless; scale for 0 to 1	potential decrease with flow, nutrients, temperature, metal concentrations	NO. Can be naturally variable and somewhat recapitulates taxon richness.
		Simpson's Diversity	unitless; scale for 0 to 1	potential impairment by nutrients/temperature, sedimentation, or toxicity	NO. Recapitulates taxon richness.
	Bray Curtis Index of Dissimilarity	unitless; scale for 0 to 1	difference from baseline or reference	NO. Provides a yes/no evaluation of difference without description of the difference.	
Tissue Quality	Tissue Metals	mg/kg dry tissue weight	potential increase with aqueous metal concentrations	YES. With a focus on the key water quality indicator metals arsenic, uranium, and zinc. Highly quantitative indicator of biological uptake and exposure to consumers of benthic invertebrates.	

^a EPT taxa = invertebrate taxa from the insect orders of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies).

Table 3-4 Statistical Contrasts and Outcomes for Periphyton and Benthic Invertebrate Monitoring Key Indicators Under the FAL-MP for the Newmont Coffee Project and Triggers to the AL-AMP

Statistical Contrast	Statistical Test	Question	Outcome and Associated Response under the FAL-MP	Trigger under to AL-AMP Action
Exposed versus Baseline (Before-After)	ANOVA	Does the key indicator differ from baseline?	No difference from baseline; no additional action required.	None
			Significant difference from baseline; proceed to 2-way ANOVA	None if the BACI analysis is supported; rely on the BACI analysis outcome. If the BACI analysis is not supported, a difference from baseline triggers the AL-AMP framework.
Exposed versus Reference (Control-Impact)	ANOVA	Does the key indicator differ from reference?	No difference from baseline; no additional action required.	None
			Significant difference from baseline; proceed to 2-way ANOVA	None if the BACI analysis is supported; rely on the BACI analysis outcome. If the BACI analysis is not supported, a difference from reference triggers the AL-AMP framework.
2-Way (Current-Baseline-Exposed-Reference) (Before-After-Control-Impact)	2-Way ANOVA	Is an observed "exposed area" difference from baseline (after versus before) greater than the equivalent reference area difference from baseline?	The difference from baseline at the exposed area is consistent with reference; no additional action required.	None
			Significant difference from baseline at exposed area relative to reference suggests a mine-related change.	AL-AMP framework triggered

3.2 Fish and Fish Habitat Monitoring

Several years of pre-project fish and fish habitat monitoring data has been collected downstream of the Coffee Gold Project. Such data collection will continue as the project moves forward. Specific information that will be collected include fish community monitoring, fish condition and monitoring of fish habitat located downstream of the project.

Sampling (future-exposed) areas were selected based on fish presence and potential influence of potential project effects. Three reference areas were selected to ensure that reference areas contained similar characteristics (size, morphology, fish species) compared to the reference areas. A BACI design will be implemented for fish habitat Measurable Parameters with reference areas to compare findings with. The future exposed creek areas of focus are:

- Halfway Creek (near mouth)
- YT-24 Creek (near mouth)
- Latte Creek (10 km upstream of mouth)
- Coffee Creek (midway between mouth of Latte and Coffee Creek mouth).

The above listed streams plus reference streams are listed in Table 3-5 and presented on Figure 3-2.

Table 3-5 Overview of Fish and Channel Monitoring Under the Preliminary Fish and Aquatic Life Monitoring Program

Station	Location	Fish Sampling	Fish Habitat Assessment
Future Exposed			
LC10.2	Lower Latte Creek	✓	✓
HF0.2	Lower Halfway Creek	✓	✓
YT0.2	Lower YT-24	✓	✓
CC4.1	Coffee Creek below Latte Creek	✓	✓
Reference			
CR5.8	Carlisle Creek	✓	✓
SYT0.1	Unnamed Creek	✓	✓
CRT0.1	Carlise Creek Tributary	✓	✓

Monitoring of fish and fish habitat will be conducted once during Construction and then every three years during Operations, and Reclamation and Closure.

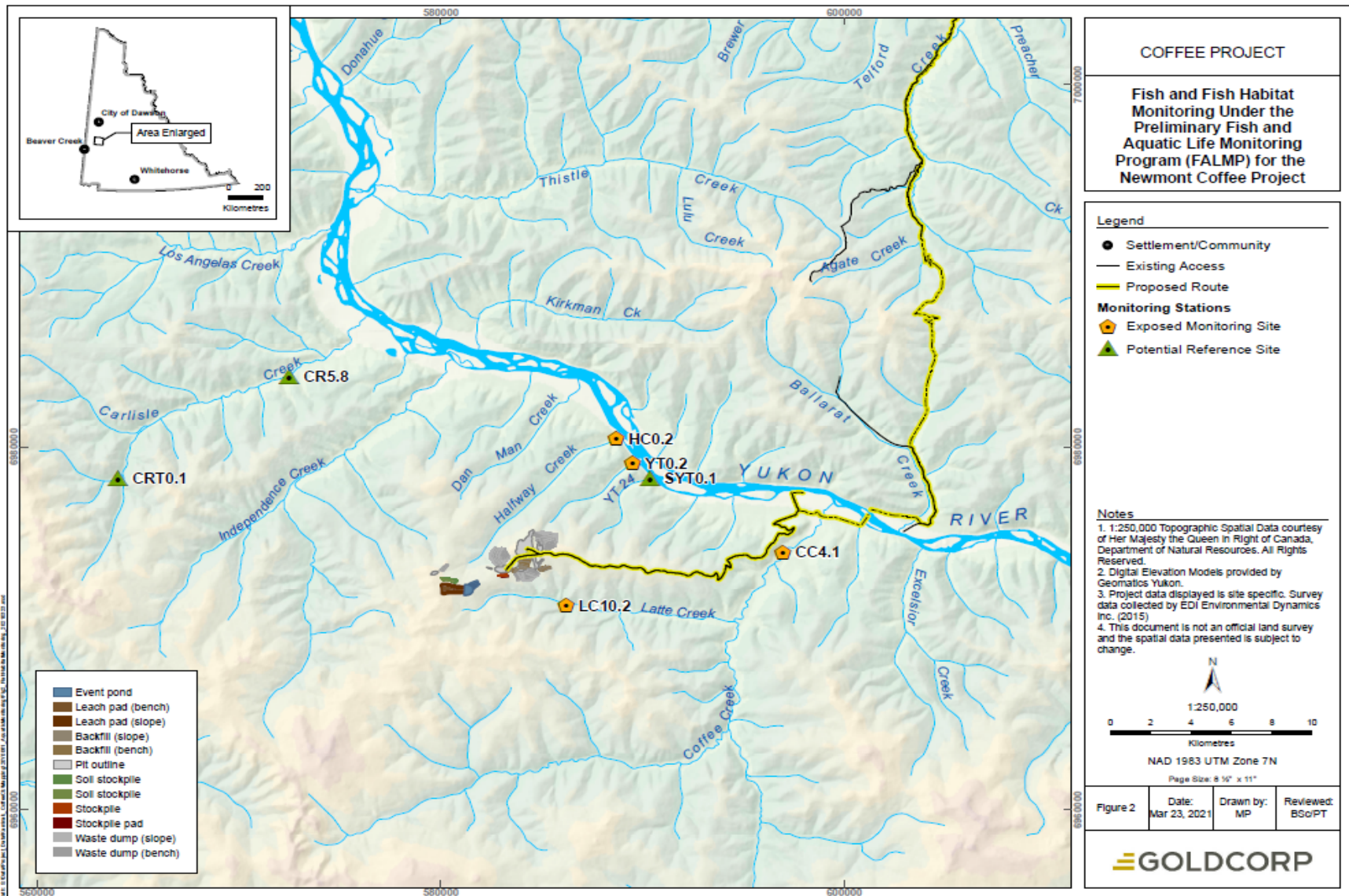


Figure 3-2 Fish and Fish Habitat Monitoring Locations.

3.2.1 Fish and Fish Habitat-AMP Rationale and Conceptual Overview

Data collected under the FAL-MP will be subject to the fish and fish habitat (FFH)-AMP. As outlined in Section 1.3, the objective of AMP is to track and respond to conditions that deviate from the predicted range. In the case of the FFH-AMP, the AMP has a smaller base of data to draw upon relative to water quality and aquatic life. As with the AL-AMP, the FFH-AMP relies on thresholds of statistical significance—does an FFH-AMP indicator differ significantly from baseline and from reference?

Given the low densities of fish in the affected streams (specifically Halfway, YT-24 and Latte Creek), it will not be possible to catch enough fish to gain statistical certainty regarding potential negative effects on fish populations (Table 3-6). As such, direct fish monitoring focuses on confirming species distribution and monitoring fish condition. To gain greater certainty regarding effects on fish, the AMP will rely on benthic invertebrates and fish habitat attributes.

Table 3-6 Rationale for Inclusion of Fish and Fish Habitat Measurable Parameters in the Newmont Coffee Project FAL-MP and for the Selection of Key Indicators for the AL-AMP

Monitoring Component	Measurable Parameters	Units	Rationale for Inclusion in the FAL-MP	AL-AMP Key Indicator and Rationale
Fish	Species Diversity	Number of species captured	Potential influence by changes in nutrients, temperature, sedimentation, or toxicity	NO. The low fish densities and variability in pre-project fish presence, especially in Latte, Halfway and YT24 preclude the ability to have statistical certainty and meaningful triggers
	Relative Density	Fish captured per m ² of area sampled	Potential influence by changes in nutrients, temperature, sedimentation, or toxicity	
	Condition Factor	Ratio of weight/length K = (100,000*weight)/length ³	potential impairment by nutrients/temperature, sedimentation, or toxicity	
Fish Habitat	Average Channel Width	Average in cm	Changes associated with flow regime and sediment.	NO. A change to channel width may be the result of a natural adjustment of the stream channel to the flow regime, it does not necessarily mean there is a change in habitat condition.
	Pool Frequency	Number of pools	Changes associated with flow regime and sediment.	NO. There are a limited number of pools present within the surveyed parts of these streams, as such, a change may not be reflective of a significant problem.
	Pool Depth	Average in cm	Changes associated with flow regime and sediment.	NO. There are a limited number of pools present within the surveyed parts of these streams, as such, there is no ability to gain confidence via a statistical test.
	Channel Width/Depth Ratio	Ratio	Changes associated with flow regime and sediment.	YES. Reflective of habitat change and can be assessed in statistically robust manner.

Numerous fish habitat attributes will be collected using standard Fish Habitat Assessment Procedures (FHAP) (Johnston and Slaney 1996) in fish-bearing locations of the affected and reference streams. Of the parameters that will be collected, channel width to depth ratio will provide a strong indicator of changes occurring in the stream channels. The width/depth ratio is calculated by taking the bankfull width and depth of each habitat unit measured within the habitat study areas ($n=21$ to 45 depending on the stream). Changes to this ratio will ultimately affect fish and fish habitat and are readily detectable (and statistically verifiable) using the data collected by the FHAP.

Channel width/depth ratio is defined as the ratio of the bankfull channel width to the mean bankfull depth of the channel and indicator of channel stability. As the ratio increases, the channel becomes wider and shallower and bank erosion is accelerated and the channel loses its ability to transport sediment (United States Environmental Protection Agency [US EPA] 2022). The width/depth ratio is dependant on stream type, for example, the narrower and moderate gradient stream such Halfway Creek had a ratio 6.3 while the lower gradient, less confined, Coffee Creek had a ratio of 28.8. However, if one of these ratios increased, it would mean the creek has changed over time to become wider and/or shallower. A shift of a natural stream to wider and shallower channel could negatively affect fish by reducing pool and glide depth and affecting fish habitat cover attributes. If the ratios decreased, it would indicate the channel has become deeper and/narrower—such a change could be a positive change but would have to be evaluated in association with other data. Channel width/depth ratio thresholds are based on statistical contrasts of exposed area results versus reference area results (Table 3-4). If the key indicators do not differ from baseline and reference or if the BACI interaction term does not differ from reference, then no response is required. If statistically significant differences are observed at $p=0.10$, the AL-AMP framework is triggered.

3.3 FAL-AMP Description

The FAL-AMP (Table 3-5) includes five thresholds, 4 for Aquatic Life and 1 for Fish Habitat.

- Tier 1 is a statistically significant difference in any of the five indicators, but at a level that is below the Critical Effect Size (CES). The CES represents a difference (effect size) considered to be ecologically meaningful (Munkittrick et al., 2009; Government of Canada 2021). Statistically significant differences below the CES may not be ecologically meaningful (but could be useful early warnings). For these indicators, as CES of ± 2 reference area standard deviations (SD), as commonly used in aquatic environmental effects monitoring (Munkittrick et al., 2009; Environment Canada 2012; Kilgour et al., 2016; Somers et al., 2018), is recommended.
- Tier 2 is a statistically significant difference in any of the five indicators, but at a level that is greater than the CES. Such a difference would be considered to be ecologically meaningful (e.g., Munkittrick et al., 2009; Government of Canada 2021).
- Tier 3 is a confirmed statistically significant difference in any of the five indicators at a level that is greater than the CES in two subsequent monitoring events. Such a difference would be considered both confirmed and ecologically meaningful (e.g., Munkittrick et al, 2009; Government of Canada 2021).

As with the WQ-AMP, the AL-AMP includes escalating responses by Tier level (Table 3-7). With a Tier 1 threshold exceedance, responses are focused on examining the potential cause(s) of the difference using the existing data and assuring that the WQ-AMP is addressing any responsible parameters. If the apparent cause of the difference is a mine-related supporting variable (e.g., a decrease in taxon richness in association with an increase in aqueous arsenic concentration), then the WQ-AMP actions for that variable

are more fully supported (and if not already undertaken, will be immediately implemented). If the difference is related to a supporting variable that is not mine-related, some FAL-MP design adjustments may be recommended to control for that variable. Lastly, if no apparent relationships are evident, consideration will be given to whether additional supporting physical, chemical, or biological supporting measures should be included in the FAL-MP. All responses to AL-AMP Tier 1 (and above) threshold exceedances and responses will be reported in the FAL-MP.

With a Tier 2 exceedance, all Tier 1 actions will be completed along with an increase in monitoring frequency in the area (creek) of interest (the following biological monitoring season). In addition, a more formal Investigation of Cause (IOC) study will be designed and completed to determine the cause of the difference. An IOC seeks to address potential causes of an observed difference (or differences) in key indicators by identifying hypotheses of cause and adjusting study designs to specifically address the hypotheses (e.g., Hewitt *et al.*, 2003; Environment Canada 2012). Thus, the IOC typically provides additional data with which to address the potential cause of observed differences.

If the IOC successfully results in the identification of cause and that cause is a mine-related change in water quality, two alternative feedback actions to WQ-AMP will be triggered:

1. If the causative factors are key indicators under the WQ-AMP, then all WQ-AMP actions will be undertaken³.
2. If the causative factors are not key indicators under the WQ-AMP, a water quality evaluation of the causative parameters will be undertaken with the objective of determining if the parameter should be added to the WQ-AMP as a key indicator.

With a Tier 3 exceedance, all Tier 2 actions will be completed along with expansion of IOC to an Investigation of Cause, Extent, and Magnitude (IOCEM). The IOCEM will be designed and completed in the area of interest (creek) the following monitoring season. The IOCEM will seek to determine the spatial extent and magnitude of the difference as well as the cause. This will include expanding spatial coverage. If the trigger occurs in an upper creek area, IOCEM will include the lower creek area and if the trigger occurs in a lower creek area, IOCEM will include the mixing area near the creek mouth within the Yukon River. This will serve to define the spatial extent and magnitude of the confirmed difference(s) and to provide a more robust basis for IOC. The same feedback actions to WQ-AMP will be undertaken as following the IOC trigger at Tier 2.

³ It is probable that WQ-AMP actions will already have been undertaken given the greater frequency of WQ-AMP application versus AL-AMP application.

Table 3-7 Newmont Coffee Project FAL-AMP for Benthic Invertebrate Community, Benthic Invertebrate Tissue Quality, and Fish Habitat Data Collected as Part of the Coffee Project FAL-MP

Key Measurable Parameters	Rationale for Measurable Parameter	Tier 1	Tier 2	Tier 3
Biomass	potential stimulation by nutrients / temperature; impairment by sedimentation or toxicity	<p>Threshold: Statistically Significant Difference from Baseline and Reference (BACI preferred) with magnitude less than Critical Effect Size (2 reference area standard deviations)</p> <p>Actions: 1. examine relationships between the measurable parameter and supporting measures of habitat, flow, and water quality 2. if supporting variable results and biological results are suggestive^a of a mine-related effect (e.g., a decrease in density in association with an increase in metal concentrations), complete the WQ-AMP actions for the variable if it is a WQ-AMP POC^b</p> <p>Reporting:</p> <ul style="list-style-type: none"> include all investigations in biological monitoring report inform mine management inform First Nations environmental or mining contacts and relevant regulators 	<p>Threshold: Statistically Significant Difference from Baseline and Reference (BACI preferred) with magnitude greater than Critical Effect Size (2 reference area standard deviations)</p> <p>Actions: Actions 1 and 2 from Threshold 1, PLUS</p> <p>1. if monitoring is on a frequency of less than annual, revert to an annual frequency and confirm the response 2. if supporting variable results and biological results are suggestive¹ of an unexpected mine-related effect, complete the WQ-AMP actions if it is a WQ-AMP POC and if it is not, determine whether to add the variable to the WQ-AMP^c</p> <p>Reporting:</p> <ul style="list-style-type: none"> include all investigations in biological monitoring report inform mine management inform First Nations environmental or mining contacts and relevant regulators 	<p>Threshold: Confirmed (two subsequent monitoring programs) Statistically Significant Difference from Baseline and Reference (BACI preferred) and magnitude greater than Critical Effect Size (2 reference area standard deviations)</p> <p>Actions: Actions 1 and 2 from Threshold 2, PLUS</p> <p>1. design and implement an Investigation of Cause, Extent, and Magnitude study</p> <p>Reporting:</p> <ul style="list-style-type: none"> provide IOCEM study design for review IOCEM interpretive reporting recommendations to mine management inform First Nations environmental or mining contacts and relevant regulators
Taxon Richness	potential impairment by nutrients/temperature, sedimentation, or toxicity			
% EPT taxa	metal sensitive - potential decrease with elevated metals			
Benthic Invertebrate Tissue arsenic, uranium, and zinc	indicator of biological uptake and exposure to consumers of benthic invertebrates.			
Channel Width/ Depth Ratio	change in fish habitat attributes			

^a Suggestive is defined to mean strong association as determined by correlation analysis supported by a credible mechanism of cause.

^b POC - Parameter of Concern (currently ammonia, nitrate, sulphate, arsenic, uranium, and zinc); BACI – Before/after-Control/impact.; IOCEM - Investigation of Cause, Extent, and Magnitude; WQ-AMP – Water Quality Adaptive Management Plan. If the variable is mine-related and is not included in the WQ-AMP, complete a trend analysis for the "new" variable per the WQ-AMP and an evaluation of whether management action for the new variable is warranted.

^c if the variable is mine-related and is not a WQ-AMP POC, complete a trend analysis for the "new" variable per the WQ-AMP and an evaluation of whether management action for the new variable is warranted. If the new variable is trending in a direction consistent with a potential biological effect, add the variable to the WQ-AMP

3.4 Summary of Interactions (Feedback) with the WQ-AMP

As outlined above and in the WQ-AMP tables (Section 2), there are several points of interaction (feedback) between the FAL-AMP and the WQ-AMP. The interpretation of any WQ-AMP performance threshold Tier 3 and 4 triggers (Tiers 2 and 3 of the uranium-specific framework) will invoke actions that include examination of the FAL-MP data. Similarly, the interpretation of FAL-MP data will include consideration of associated water quality results. Beyond this:

1. A WQ-AMP finding that an analyte is >WQO (Use Protection) triggers action that includes a site investigation (e.g., Table 3-5). The investigation will include consideration of multiple lines of evidence and the development of recommendations for mitigation. Depending on the findings of the investigation, an additional outcome may be the collection of additional data under the FAL-MP (to further support the investigation), which could include an increase in monitoring frequency, an increase in replication, additional monitoring components (e.g., toxicity testing), or an increase in spatial coverage.
2. A FAL-AMP finding that a key aquatic life indicator is showing an unexpected change prompts an IOC (Tiers 2 and 3 above). If IOC identifies a mine-related cause and the cause is not one of the key indicators identified in the WQ-AMP (i.e., is not NH₃, N-NO₃, SO₄, D-As, D-U, or D-Zn), an investigation of that cause will be completed for potential addition to the list of parameters of concern (POCs).

4.0 WATERSHED SPECIFIC ADAPTIVE MANAGEMENT PLANS

This section presents adaptive management plans specific to key watersheds identified in Section 1.3: Halfway Creek, YT-24, and the Latte and Coffee creek system. Each section presents an overview of existing catchment conditions for surface water quality, periphyton and benthic invertebrate communities, and fish usage. In addition to catchment-specific fish utilization, it is noted the three project catchments of interest generate clearwater plumes at their confluences with the Yukon River that are used as refugia by fish (and salmon in particular) during periods of high turbidity in the Yukon River. This has been identified by the Selkirk First Nation as a key habitat component that merits protection.

Each section then summarizes the risk narrative for the catchment area, followed by an overview of indicators, performance thresholds and responses that form the basis of each adaptive management plan.

4.1 Surface Water Monitoring

The proposed surface water monitoring network consists of 17 water quality sampling points and eight continuously recording hydrometric stations (co-located with water quality sampling points; Figure 1-2 and Table 4-1). The key stations with respect to the AMP are highlighted in gray.

4.2 Aquatic Biota and Fisheries Monitoring

The Coffee Project has developed a preliminary FAL-MP as described in Section 4. The FAL-MP is designed to address foreseeable aquatic biological data needs through all project stages, including the current baseline stage, and currently includes “future-exposed” creeks (Halfway Creek, YT-24 Creek, Latte Creek, and Coffee Creek) as well as reference areas. Data collected under the FAL-MP, including currently available data (summarized below) are subject to the AL-AMP described in Section 4.

Table 4-1 Proposed Receiving Environment Surface Water Monitoring Stations for Construction and Operations Phases.

Catchment	Watercourse	UTM E	UTM N	New Station Name	Previous Station Name	Parameters	Frequency	Rationale
Coffee Creek	Coffee Creek	6,975,084	598,330	CC-3.2	CC-4.5	WQ	Monthly	Final monitoring point on Coffee Creek above Yukon R.
		6,970,582	594,717	CC-10.9	Latte-Mix	WQ	Monthly	Coffee Creek below Latte Creek – Non-Degradation to be achieved here
		6,970,225	594,719	CC-11.6	CC-0.5	WQ, Q	Monthly	Coffee Creek above Latte Creek – background station
	Latte Creek	6,970,375	594,319	LC-0.2	CC-3.5	WQ, Q	Monthly	Latte Creek above Coffee Creek
		6,971,654	585,071	LC-11.4 ¹	CC-1.5	WQ, Q	Monthly	Latte Creek below site discharges – Use Protection WQOs apply here
		6,971,716	584,779	LC-11.6	CC-A	WQ	Monthly	Latte Creek above site discharges – background station
		6,971,061	581,317	LC-15.5	CC-6.0	WQ, Manual Q	Monthly	Latte Creek above all Project infrastructure – reference station
Latte Creek Trib 10 (LTC20)	6,971,733	584,890	LCT20-0.1	CC-1.0	WQ, Q	Monthly	Tributary to receive discharge from Supremo South and Double Double pits	
YT-24	YT-24	6,979,073	589,526	YT24-0.1 ¹	YT-24	WQ, Q	Monthly	Receiving environment station, below Supremo north discharges, above Yukon R. Use Protection WQOs apply here
		6,977,710	588,150	YT24-2.2	ML-A	WQ, Manual Q	Monthly	Potential replacement for YT24-0.1 – to be confirmed through further monitoring
Halfway Creek	Halfway Creek	6,980,137	588,049	HC-0.1	HC-5.0	Manual Q	Monthly	Existing hydrometric station with stable record.
		6,980,536	588,823	HC-1.0 ¹	N/A	WQ, Q	Monthly	Receiving environment station, below Alpha Pond discharge point, above Yukon R. Use Protection WQOs apply here. Recommend WQ and manual flow monitoring concurrently with HC-0.1 for one year, then decommissioning HC-0.1.
		6,976,548	584,089	HC-6.8	HC-2.5	WQ, Q	Monthly	Near field station, below Alpha Pond discharge point
Dan Man Creek	Dan Man Creek			DMC-2.0 ²	N/A	WQ	Monthly	Proposed reference station
Independence Creek	Kona Tributary	6,979,357	575,334	KT-0.3	IC-3.0	WQ, Q	Monthly	Below Kona Pit – develop baseline record
Yukon River	Yukon River	6,975,946	601,011	YUK-51.3	YUK-2.0	WQ	Monthly	Yukon River, above all Project influences
		6,977,351	598,594	YUK-49.3	Coffee Mix	WQ	Monthly	Yukon River, below confluence with Coffee Creek, at downstream edge of mixing zone
		6,981,006	588,594	YUK-37.6	Halfway Mix	WQ	Monthly	Yukon River, below confluence with Halfway Creek, at downstream edge of mixing zone

Notes:

¹Use Protection water quality objectives (WQOs) apply at these stations

²Not currently monitored, proposed as a reference station to be monitored prior to initiation of Construction phase.

WQ = monthly water quality sampling

Q = continuous hydrometric station

Manual Q = Manual spot measurements of discharge.

4.3 Halfway Creek

4.3.1 Description – Water Quality and Aquatic Resources

This section presents a summary of the existing surface water quality regime, the current aquatic ecosystem structure and fish habitat characterization, the rationale for the selection of station HC-1.0 as the attainment point and the specific indicators, performance thresholds and responses for the four AMP Tiers presented in Section 2.3.

4.3.1.1 *Rationale for Monitoring Location (HC-1.0)*

Three stations are monitored in Halfway Creek as noted in Table 4-1 and include HC-6.8, HC-1.0 and HC-0.1. Stations HC-6.8 and HC-0.1 have limitations for use as attainment locations. HC-6.8 is in the upper reaches of Halfway Creek and well upstream of any measured fish presence. HC-0.1 is very close to the mouth and fish presence has been observed further upstream of this station location. Conversely, HC-1.0 station is located 1.0 km upstream of the Halfway Creek confluence with the Yukon River and is within the fish bearing portion of the stream. Fish have only been documented in the lower 1.5 km of the Halfway Creek (see Section 4.3.1.5).

4.3.1.2 *Streamflow Regime*

Based on the extended synthetic precipitation record, mean annual precipitation at the proposed undertaking (~1,300 m above sea level) is estimated to be 499 mm, with 56% of this total precipitation realized as rain during the months of May through September, and the remaining 44% occurring as snow from October through March.

The Halfway Creek catchment lies to the north of the deposit, with a catchment area of approximately 27 km², and flows northeast to its confluence with the Yukon River. The Project site creeks experience peak flows in May, due to melting snowpack, and following rainfall events in summer and early fall. They are frozen in winter, except Coffee Creek. Baseflow and groundwater discharge freeze in winter, resulting in accumulation of aufeis (layered ice that forms from successive flows of groundwater during freezing temperatures) in stream channels. Surface water at the mine site is expected to be frozen, and a snowpack to accumulate, from October to April each year.

The flow monitoring record for lower Halfway Creek is longest for station HC-0.1 relative to HC-1.0. Streamflows in lower Halfway Creek will be monitored at HC-1.0, and correlations made with the existing HC-0.1 record to derive a representative long-term record for HC-1.0. Measured yields at HC-0.1 (and represent a reasonable proxy for HC-1.0) range from 0.6 – 3.4 L/s/km² in October and decrease steadily to their annual minima by March (0 - 0.7 L/s/km²), before increasing again in April in response to low-elevation snow melt and spring rainfall (Figure 4-1). Based on the site data alone, winter low flows are expected to range from 0 to 0.7 L/s/km², with extended periods of zero flow during the winter.

Based on the measured streamflow data and the synthetic streamflow records, mean annual runoff is estimated to be approximately 140 mm, with an estimated 1:10-year instantaneous peak flow of 220 L/s/km² at HC-1.0.

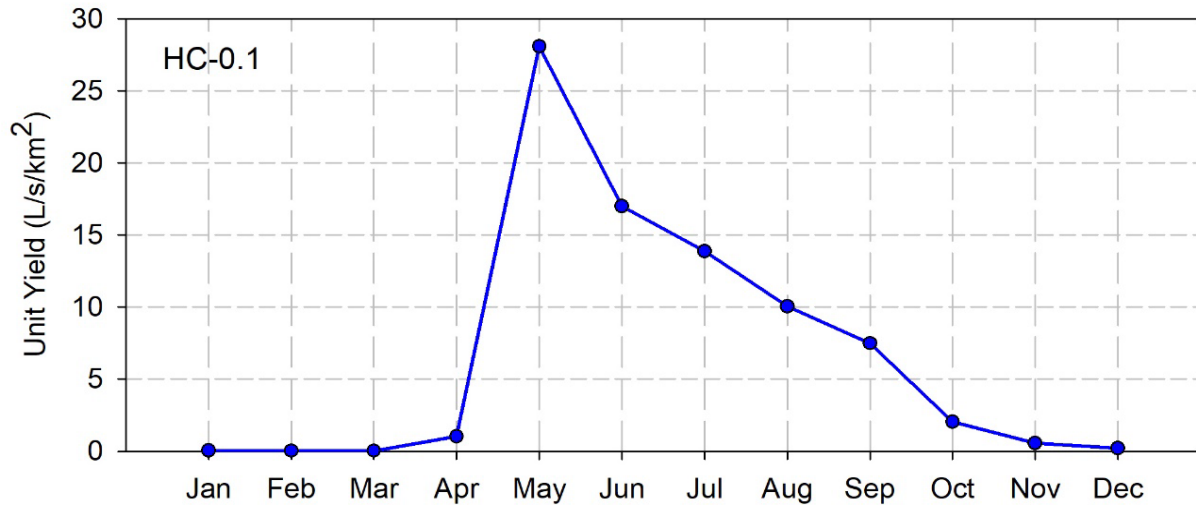


Figure 4-1 Average Monthly Unit Yield for the HC-0.1 Station

4.3.1.3 Water Quality

Baseline water quality for HC-1.0 has been monitored since 2016, with all samples obtained during the open-water period. Water quality at this station is similar to other stations in Halfway Creek (HC-6.8 and HC-0.1) for which longer monitoring records exist.

In general, water chemistry at this station is inferred to be driven by the seasonally variable proportion of surface runoff (lower ionic strength, higher organic content) and groundwater recharge (higher ionic strength, lower organic content) that contribute to surface flow. During high-flow months, Halfway Creek is characterized by soft water and low levels of major ions. This is contrasted with hard water and high concentrations of major ion that occur at stations where flow occurs in winter. It is noted that no flow is evident at HC-1.0 during winter low flow periods, as reported previously for HC-0.1. pH remains relatively uniform in Halfway Creek on an annual basis, ranging between 7.0 and 8.0, while baseline nutrient concentrations are low. Total suspended solids (TSS) have also remained low (<6 mg/L) in baseline samples for HC-1.0.

Similar to major ions, the influence of surface runoff during open water months and groundwater inputs during winter months results in distinct seasonal concentration signatures for several parameters. Peak summer flows at HC-1.0 typically coincide with annual maxima in dissolved organic carbon, D-Al, total (T)-Fe, and particulate-bound metals (e.g., T-As, T-Cd, T-Co, T-Cu, and T-Cr). In contrast, the dominance of groundwater inputs during winter contributes to annual peaks in certain dissolved metals at HC-1.0, most notably U where total and dissolved concentrations are very similar indicating most U is present in dissolved forms.

Certain parameters exceeded their Canadian Council of Ministers of the Environment (CCME) or BC Water Quality Guidelines (BC WQGs) in the baseline dataset for HC-1.0, similar to baseline data reported for HC-6.8 and HC-0.1. T-Al concentrations at HC-1.0 occasionally exceed the CCME guideline during the open water season, while dissolved Al routinely exceeds the BC WQGs (long-term) and occasionally the short-term guideline. During months before and after the winter low flow period for HC-1.0 (when flow

occurs), T-U commonly occurs above its CCME long-term guideline and occasionally the short-term guideline.

4.3.1.4 Periphyton and Benthic Invertebrate Communities

Periphyton

Baseline periphyton conditions in Halfway Creek are characterized by low productivity and a dominance of blue-green algae (cyanobacteria; Table 4-2). Low productivity has been documented based on density, chlorophyll-*a* concentration, and ash-free dry mass (AFDM), all on a unit-area basis (*i.e.*, per m²) and is typical of northern, nutrient poor aquatic habitats. Conditions in upper and lower Halfway Creek were generally similar. Mean periphyton density was 514,351 cells/m² and 229,132 cells/m² in upper and lower Halfway Creek, respectively (Table 4-2). Mean chlorophyll-*a* concentrations were 2.4 mg/m² and 2.8 mg/m² in upper and lower Halfway Creek, respectively and ranged from 1.0 to 7.0 mg/m² across all baseline sampling on Halfway Creek, consistently below the maximum threshold for oligotrophic streams (20 mg/m²; Dodds *et al.*, 1998) and the short-term maximum British Columbia guideline for the protection of aquatic life (100 mg/m²; BCMECCS 2019). Mean AFDM was 5.3 g/m² and 7.6 g/m² in upper and lower Halfway Creek, respectively (Table 4-2). Mean periphyton richness was lower in upper Halfway Creek than in lower Halfway Creek (4.1 taxa versus 8.9 taxa), but the latter was leveraged by higher richness observed in 2014 and 2015 (Table 4-2). Blue-green algae made up 98.9% and 84.7% of the periphyton community of upper and lower Halfway Creek, respectively (Table 4-2). In upper Halfway Creek, green algae (chlorophyta, charophyta/streptophyta) were also present, and in lower Halfway Creek, green algae and diatoms (baccillariophyta) were also present (Table 4-2).

Benthic Invertebrate Communities

Baseline benthic invertebrate community conditions in Halfway Creek are characterized by low density/abundance, moderate taxon richness, and high proportions of Ephemeroptera (mayflies), Plecoptera (stoneflies), and chironomids (non-biting midges; Table 4-3). Mean baseline taxon richness of upper and lower Halfway Creek was similar (20.1 and 20.6 taxa, respectively as assessed at the lowest practicable level; Table 4-3). Mean baseline abundance was 874 organisms/m² and 675 organisms/m² at upper and lower Halfway Creek, respectively (Table 4-3). Benthic invertebrate communities of upper Halfway Creek (assessed in terms of mean proportional abundance) were co-dominated by Chironomidae (25.7%), Plecoptera (21.4%), and Ephemeroptera (21.3%; Table 4-3). Oligochaetae (aquatic worms) and Simuliidae (black flies) were also common. Plecoptera were more dominant in lower Halfway Creek (47.2%) than in upper Halfway Creek, and Oligochaetae were less dominant (Table 4-3). Functional feeding group composition was dominated by collector-gatherers in upper Halfway Creek (44.0%), with filterers and shredders (28.3% and 23.1%) sub-dominant (Table 4-3). In lower Halfway Creek, shredders were dominant (47.7%), with collector-gatherers and filterers (33.2% and 13.6%) sub-dominant (Table 4-3). Habitat preference group composition was dominated by sprawlers and clingers, with 41.1% clingers and 35.4% sprawlers in upper Halfway Creek and 50.2% sprawlers and 40.5% clingers in lower Halfway Creek (Table 4-3).

Table 4-2 Halfway Creek Baseline Periphyton Abundance and Community Characteristics, 2014-2019

Area	Upper Halfway Creek					Lower Halfway Creek						
Area Code	HC6.8					HF0.0		HC0.2				Mean ^b
n (sample size) ^a	6		5		Mean ^b	1		6		5		
Year	2016	2017	2018	2019		2014	2015	2016	2017	2018	2019	
Density (cells/m ²)	-	-	114,651	914,050	514,351	194,111	202,345	-	-	339,818	180,254	229,132
Chlorophyll-a (mg/m ²)	1.2	3.0	3.1	2.3	2.4	1.7	2.1	1.0	7.0	4.2	1.2	2.8
Ash-Free Dry Mass (g/m ²)	-	2.3	10.6	2.8	5.3	7.3	14.0	-	3.6	11.4	1.6	7.6
Richness (# of taxa)	-	-	3.2	5.0	4.1	14.0	11.0	-	-	2.6	7.8	8.9
Blue-green Algae (%)	-	-	100	98	98.9	69	83	-	-	100	87	84.7
Green Algae (%)	-	-	0.0	2.2	1.1	12.2	10.1	-	-	0.0	11.8	8.5
Diatoms (%)	-	-	0.0	0.0	0.0	19.0	6.6	-	-	0.0	0.4	6.5
Other Algae (%)	-	-	0.0	0.0	0.0	0.0	0.0	-	-	0.2	0.8	0.3

^a for years with n>1, mean values are presented

^b arithmetic mean of the annual means; note that mean proportions of taxonomic groups may not add to 100% due to averaging

Table 4-3 Halfway Creek Baseline Benthic Invertebrate Abundance and Community Characteristics, 2014-2019

Area		Upper Halfway Creek			Lower Halfway Creek						
Area Code		HC6.8			HF0.0		HF0.2			Mean ^b	
n (sample size) ^a		5			1		1	5			
Method		Hess			Kick Net		Kick Net	Hess			
Year		2017	2018	2019	2014	2015	2017	2018	2019		
Richness (# of Taxa)		25.0	15.8	19.4	20.1	17.0	21.0	30.0	18.8	16.2	20.6
Abundance (#/m ²)		1,205	483	934	874	260 ^c	673 ^c	436 ^c	561	1,444	675
Simpson's Evenness		0.27	0.40	0.31	0.33	-	-	-	0.37	0.15	0.26
Shannon-Weiner Diversity		2.87	2.06	2.13	2.35	-	-	-	2.17	1.43	1.80
Ephemeroptera (%)		44.7	11.0	8.1	21.3	12.7	8.6	17.8	9.7	8.6	11.5
Plecoptera (%)		28.2	17.4	18.8	21.4	36.5	50.8	55.4	26.4	67.1	47.2
Chironomidae (%)		13.2	33.1	30.7	25.7	42.7	21.1	15.3	18.8	9.6	21.5
Metal-Sensitive Chironomidae (%)		7.9	23.3	24.1	18.4	30.4	4.0	8.9	2.8	2.5	9.7
Simuliidae (%)		10.7	10.0	14.7	11.8	3.1	16.8	2.1	25.8	11.2	11.8
Oligochaeta (%)		2.1	24.5	25.1	17.2	2.7	0.3	6.4	6.3	2.5	3.6
EPT (%)		73.2	29.0	27.5	43.2	49.6	59.4	73.2	36.2	75.7	58.8
FFG _d	Collector Gatherers (%)	54.6	44.0	33.3	44.0	53.8	30.3	36.4	29.7	15.7	33.2
	Filterers (%)	10.7	34.5	39.8	28.3	3.1	16.8	2.1	32.5	13.6	13.6
	Scrapers (%)	5.6	2.1	7.0	4.9	4.2	0.9	3.9	2.3	2.7	2.8
	Shredders (%)	27.6	18.7	23.1	23.1	36.5	51.4	55.6	27.2	67.7	47.7
	Predators (%)	1.5	1.0	0.3	0.9	2.3	0.6	1.8	0.5	0.1	1.1
HPG _d	Sprawlers (%)	41.0	34.1	31.0	35.4	78.8	72.2	71.2	19.1	9.6	50.2
	Burrowers (%)	2.4	24.6	26.1	17.7	2.7	1.2	7.1	7.5	3.0	4.3
	Clingers (%)	56.6	29.2	37.5	41.1	18.5	26.6	21.7	54.6	80.9	40.5

^a for years with n>1, mean values are presented

^b arithmetic mean of the annual means; note that mean proportions of taxonomic groups may not add to 100% due to averaging

^c samples collected with kick net and indicate total sample abundance as opposed to per-area density

^d FFG = functional feeding group; HPG = habitat preference group

4.3.1.5 Fish

Fish use of Halfway Creek has been limited to the lower 1.2 km during all sampling events. Arctic grayling (*Thymallus arcticus*) have been captured within the lower 600 m on several occasions during the open water season—in 2019 they were documented up to a log jam located 1 km upstream of the mouth (EDI 2020) and in 2021 they were found just above of the logjam (which had changed) to a point 1.5 km upstream of the mouth. Juvenile Chinook salmon (*Oncorhynchus tshawytscha*) have been documented occasionally in the lower 350 m (EDI, 2017a). Slimy sculpin (*Cottus cognatus*) are non-migratory and have only been documented in the lower 200 m of Halfway Creek. Because the lower reach of Halfway Creek freezes to ground during winter months, it does not provide overwintering habitat.

4.3.2 Risk Narrative

The primary risk identified for this monitoring location is that the transport of mine generated POPC loads to Halfway Creek could result in an exceedance of the Use Protection WQOs at monitoring station HC-1.0, and potential related effects to aquatic health.

The assessment of potential residual Project effects with regards to contaminant toxicity to fish and aquatic life found that base case U concentrations in mid- and lower Halfway Creek during the open water season are anticipated to exceed the Generic Water Quality Guidelines (GWQGs), though not the WQOs (0.086 mg/L; Table 4-3; EDI, 2017b). Base Case and Upper Case nitrate concentrations in Halfway Creek are anticipated to increase seasonally during the open water season but are not predicted to exceed the WQO (8.0 mg/L) in Halfway Creek at HC-6.8 and the attainment location at HC-1.0 during operations early closure and late closure (Lorax 2023). Upper case nitrite, sulphate and arsenic are predicted to occasionally exceed their respect WQOs but not under the Base Case assumptions at HC-1.0. Fish use has only been documented in lower Halfway Creek, approximately 1.8 km upstream from the mouth, and fish use is in the stream is seasonal. Given the above factors, residual effects associated with changes in contaminant toxicity to fish are expected to be small. Newmont understands however that impacts to water quality may be meaningful to First Nation interests beyond strictly toxicity to fish.

4.3.3 Indicators, Performance Thresholds and Responses

Specific indicator concentrations for the four performance threshold Tiers are provided in Table 4-4, and apply to the monthly water quality data collected at station HC-1.0. Note that the values for Tier 1 and Tier 2 are reflective of the maximum predicted concentrations from a total of 30 iterations of the monthly WB/WQM, for the entire Operations period. In several cases (e.g., SO₄ and As), these predicted maximums occur toward the end of the Operations phase, and thus are not expected to occur during the first several years of Operations, and thus the initial implementation of the AMP is not expected to be impacted by these predictions. The values in Table 4-4 will be updated annually, following the updated run of the WB/WQM with the current mine plan. Indicators, performance thresholds and responses specific to surface water quality for all parameters except U in Halfway Creek are provided in Table 4-5, and specific to U in Table 4-6. The monitoring data that underpin this component of the AMP are a requirement of the Surface Water Quality Monitoring Plan. The monitoring data will be compared to the performance thresholds on a monthly basis (by the end of the month following the month in which samples were collected) - this corresponds to the proposed monthly reporting schedule.

Table 4-4 Performance Thresholds for Halfway Creek, Station HC-1.0

Parameter	Units	Tier 1 (Exceed Base Case WB/WQM)	Tier 2 (Exceed Upper Case WB/WQM)	Tier 3 (WQO)
NH ₃ -N	mg/L	1.00	1.04	1.5
N-NO ₃	mg/L	5.9	6.4	8.0
D-SO ₄	mg/L	226	269	218
D-As	mg/L	0.004	0.005	0.005
D-U	mg/L	0.071	0.077	0.086
D-Zn	mg/L	0.015	0.017	0.024

Notes:

D = Dissolved; WB/WQM – Water Balance/Water Quality Model; WQOs – Water Quality Objectives.

Tier 1 and Tier 2 values calculated based on the maximum monthly value from the mean of 30 WQM iterations for the entire Operations phase. These will be updated to reflect the current model outputs as necessary throughout Operations.

WQM outputs are reflective of Lorax 2023.

*Tier 1 and Tier 2 values that exceed WQOs are reflective of infrequent exceedances predicted in late Operations, and are not expected to occur for the first 7-8 years of Operations.

Uranium AMP Tiers are unique (See Section 1.4.5.1).

Table 4-5 Specific Performance Thresholds for Surface Water Quality in Lower Halfway Creek (HC-1.0)

Indicators	Performance Thresholds	Responses/Actions
Aqueous concentrations at station HC-1.0 for the following parameters: - N-NO ₃ - NH ₃ -N - SO ₄ Dissolved Metals: - As - Zn	Tier 1 - Monitoring data exceeds from Base Case WQ model predicted concentrations for POPCs and < than proposed WQOs	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Confirm model assumptions are valid for the relevant mine development stage (water volumes and discharge regimes, flows, waste placement and footprint, etc.). • Actions: <ul style="list-style-type: none"> ▫ Review the water quality monitoring data collected at station HC-6.8 to determine if actual conditions still remain below the Base Case WQM predictions at this point ▫ If there are more than 3 Tier 1 exceedances in one year, then flag for review during next WQM update ▫ No further action required. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report.
	Tier 2 - Monitoring data exceeds Upper Case WQ model predicted concentrations for POPCs and < than proposed WQOs	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Confirm model assumptions are valid for the relevant mine development stage (flows, waste placement and footprint, etc.). • Actions: <ul style="list-style-type: none"> ▫ Water Quality Model update will be completed if 3 samples within 12 months trigger Tier 2 of the Surface Water Quality and Aquatic Life AMP, and if exceedances of UP WQOs are predicted, an action plan to address these exceedances will be presented to First Nations environment committees and regulatory agencies ▫ If two subsequent sampling events do not exceed Tier 2 criteria then exit Tier 2 and continue with routine monitoring. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees.
	Tier 3 - Exceedance of proposed WQOs (use protection)	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations/volumes were/are within EQS. • Actions: <ul style="list-style-type: none"> ▫ Resample within a reasonable timeframe upon confirmation of first exceedance. If second exceedance of analyte noted in resample results, and external factors ruled out, then <ul style="list-style-type: none"> ▪ Assumption is made that mine is responsible for exceedance of UP WQO once actions below initiated ▪ Continue with current monitoring and expand monitoring frequency to weekly for HC-1.0 and Alpha Pond discharge ▪ Conduct site investigation (including toxicity assessments using site water from Halfway Creek below the Alpha Pond discharge to inform the development of an aquatic biota assessment (if needed)) to determine which mine loading sources are responsible for the exceedance and prepare recommendations for mitigation ▪ Within a month of the conclusion of the site investigation, an action plan to address the exceedances will be presented to the Environment Committee ▪ Implement recommendations and necessary reasonable and practical measures to reduce contaminant loading from mine to Halfway Creek. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Confirm exceedance in second sample prior to notifying YG Inspector, DFO, etc. ▫ Actions will continue until performance thresholds are no longer exceeded.
	Tier 4 - Exceed WQOs in 3 consecutive months following implementation of mitigation measures (resulting from Tier 3).	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review potential mitigation and water management options • Actions: <ul style="list-style-type: none"> ▫ Conduct site investigation to determine which loading sources (mine or other) are responsible for the exceedance ▫ Conduct risk assessment to determine the magnitude of the potential exceedance and effects to aquatic resources resulting from the UP WQO exceedance, including, but not limited to the review of the toxicity assessment using site water and an aquatic resources effects assessment based on available monitoring data ▫ Implement necessary reasonable and practical measures to reduce contaminant loading from mine to Halfway Creek. ▫ Determine whether an amendment of the UP WQO values in the WUL is required ▫ Actions will continue until performance thresholds are no longer exceeded. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Notify YG Inspector, DFO, etc. ▫ Actions will continue until Tier 3 performance thresholds are no longer exceeded.

Notes: AMP: Adaptive Management Plan; DFO: Department of Fisheries and Oceans; EQS: Effluent Quality Standards; QA/QC: Quality Assurance/Quality Control; UP WQO: Use Protection Water Quality Objective; WQM: Water Quality Model; WUL: Water Use License; YG: Yukon Government.

Table 4-6 Specific Performance Thresholds for Uranium in Lower Halfway Creek (HC-1.0)

Indicators	Performance Thresholds	Responses/Actions
Aqueous concentrations at station HC-1.0 for uranium	<p>Tier 1 - Monitoring data exceeds Upper Case WQ model predicted concentrations for POPCs and < than proposed WQOs</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Confirm model assumptions are valid for the relevant mine development stage (flows, waste placement and footprint, etc.). • Actions: <ul style="list-style-type: none"> ▫ Water Quality Model update will be completed if 3 samples within 12 months trigger Tier 2 of the Surface Water Quality and Aquatic Life AMP, and if exceedances of UP WQOs are predicted, an action plan to address these exceedances will be presented to First Nations environment committees and regulatory agencies ▫ If two subsequent sampling events do not exceed Tier 1 criteria then exit Tier 1 and continue with routine monitoring. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees.
	<p>Tier 2 - Exceedance of proposed WQOs (use protection)</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations/volumes were/are within EQS. • Actions: <ul style="list-style-type: none"> ▫ Resample within a reasonable timeframe upon confirmation of first exceedance. If second exceedance of analyte noted in resample results, and external factors ruled out, then; <ul style="list-style-type: none"> ▪ Assumption is made that mine is responsible for exceedance of UP WQO once actions below initiated ▪ Continue with current monitoring and expand monitoring frequency to weekly for HC-1.0 and Alpha Pond discharge ▪ Conduct site investigation (including toxicity assessments using site water from Halfway Creek below the Alpha Pond discharge to inform the development of an aquatic biota assessment (if needed)) to determine which mine loading sources are responsible for the exceedance and prepare recommendations for mitigation ▪ Within a month of the conclusion of the site investigation, an action plan to address the exceedances will be presented to the Environment Committee; ▪ Implement recommendations and necessary reasonable and practical measures to reduce contaminant loading from mine to Halfway Creek. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Confirm exceedance in second sample prior to notifying YG Inspector, DFO, etc. ▫ Actions will continue until performance thresholds are no longer exceeded
	<p>Tier 3 - Uranium concentrations exceed 115 µg/L</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review potential mitigation and water management options • Actions: <ul style="list-style-type: none"> ▫ Conduct site investigation to determine which loading sources (mine or other) are responsible for the exceedance ▫ Conduct risk assessment to determine the magnitude of the potential exceedance and effects to aquatic resources resulting from the UP WQO exceedance, including, but not limited to the review of the toxicity assessment using site water and an aquatic resources effects assessment based on available monitoring data ▫ Implement necessary reasonable and practical measures to reduce contaminant loading from mine to Halfway Creek ▫ Determine whether an amendment of the UP WQO values in the WUL is required ▫ Actions will continue until performance thresholds are no longer exceeded. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Notify YG Inspector, DFO, etc. ▫ Actions will continue until Tier 3 performance thresholds are no longer exceeded.

Notes: AMP: Adaptive Management Plan; DFO: Department of Fisheries and Oceans; EQS: Effluent Quality Standards; QA/QC: Quality Assurance/Quality Control; UP WQO: Use Protection Water Quality Objective; WQM: Water Quality Model; WUL: Water Use License; YG: Yukon Government

4.4 YT-24 Tributary

4.4.1 Description – Water Quality and Aquatic Resources

This section presents a summary of the existing surface water quality regime, the current aquatic ecosystem structure and fish habitat characterization, the rationale for the selection of station YT24-0.1 as the attainment point and the specific indicators, performance thresholds and responses for the four AMP Tiers presented in Section 2.3.

4.4.1.1 Rationale for Monitoring Location (YT24-0.1)

YT-24 is an ephemeral tributary of the Yukon River that will receive mine contact water from the northern slopes of the Project footprint. The primary monitoring location for this tributary is station YT24-0.1, located 0.1 km upstream of the confluence of YT-24 with the Yukon River.

Baseline monitoring for surface water quality, periphyton, benthic invertebrate, and fish has been most consistently conducted at stations in the upper and lower reaches of YT-24 (YT-5.0, and YT-0.2 and YT-0.0, respectively). Fish usage of YT-24 is limited to the lower reach near the Yukon River confluence (described further below), and the ephemeral nature of the system results in little or no flow for several months of the year, notably in the upper reaches.

4.4.1.2 Streamflow Regime

The north face of the mine site ridge is drained by Yukon Tributary 24 (YT-24), on the eastern side of the proposed mine site. YT-24 has a total catchment area of approximately 12 km². Based on the measured streamflow data and the synthetic streamflow records, mean annual runoff is estimated to be approximately 115 mm, with an estimated 1:10-year instantaneous peak flow of 232 L/s/km² at YT24-0.1. Open water season streamflows are highly variable due to the fast response of the catchment to meteoric inputs (i.e., flashy hydrograph), with steep recession limbs to low flow conditions. Flows are negligible to non-existent during the winter, from late-October through to the end of March (Figure 4-2).

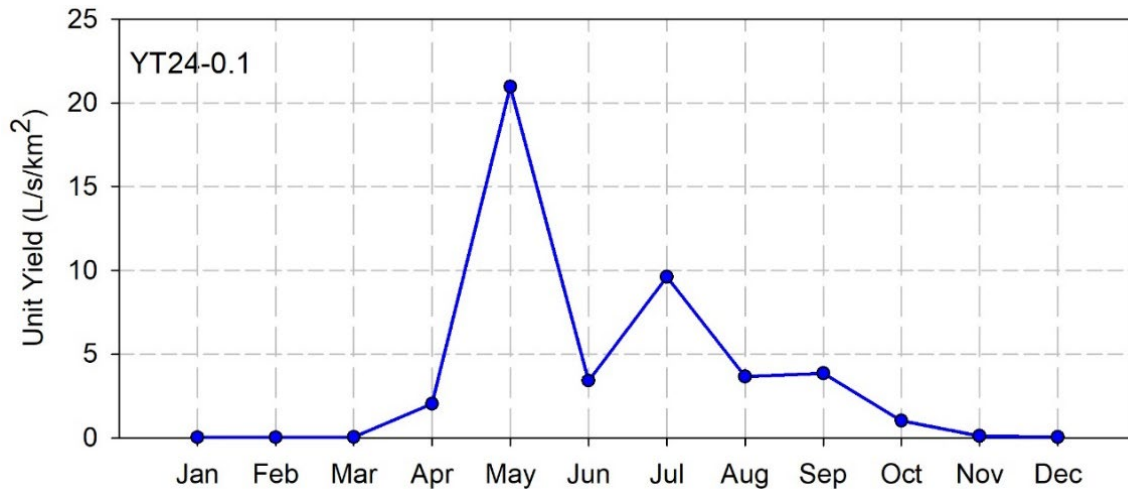


Figure 4-2 Average Monthly Streamflow for the YT24-0.1 Station

4.4.1.3 Water Quality

Samples at YT24-0.1 have been collected only during the open water period (April to October), due to the ephemeral nature of this creek and frozen conditions. This is consistent with observations of low or no flow in YT-24 in winter months and is supported by the baseline water quality dataset.

When environmental conditions support surface flow, YT-24 is characterized by moderately soft, low-ionic-strength waters, with circumneutral pH. This water signature reflects surface runoff as the primary contributor to creek flow year-round. The major ion contributions in other Project area catchments from groundwater recharge are not observed in YT-24.

Measured TSS concentrations are typically low, although peak flow events are associated with elevated TSS over 20 mg/L. Consistent with the dominant contribution of snow-melt driven surface runoff to stream flow, water chemistry at YT-24 commonly shows elevated levels of dissolved organic carbon, D-Al, T-Fe, and particulate-bound metals, although monthly mean concentrations of most trace elements (e.g., As, Sb, Co, Cr, Pb, Hg, Ni, Se, U and Zn) are low.

Certain parameters naturally exceed their corresponding CCME or BC WQGs at YT24-0.1 in the baseline dataset, namely D-Al and D-Fe. Increases to T-Cr are occasionally observed in association with elevated suspended solids (Lorax, 2022b).

4.4.1.4 Periphyton and Benthic Invertebrate Communities

Periphyton

Baseline periphyton conditions in YT-24 Creek are characterized by low productivity and a dominance of blue-green algae (cyanobacteria; Table 4-7). Low productivity has been documented based on density, chlorophyll-a concentration, and AFDM, all on a unit-area basis (i.e., per m²) and is typical of northern, nutrient poor aquatic habitats. Conditions in upper and lower YT-24 Creek were generally similar. Mean periphyton density was 214,397 cells/m² and 316,627 cells/m² in upper and lower YT-24 Creek, respectively (Table 4-7). Mean chlorophyll-a concentrations were 2.7 mg/m² and 2.5 mg/m² in upper and lower YT-24 Creek, respectively and ranged from 0.1 to 7.6 mg/m² across all baseline sampling in YT-24 Creek, consistently below the maximum threshold for oligotrophic streams (20 mg/m²; Dodds *et al*, 1998) and the short-term maximum British Columbia guideline for the protection of aquatic life (100 mg/m²; BCMECCS 2019). Mean AFDM was 4.3 g/m² and 3.8 g/m² in upper and lower YT-24 Creek, respectively (Table 4-7). Mean periphyton richness was lower in upper YT-24 Creek than in lower YT-24 Creek (4.6 taxa versus 8.3 taxa), but the latter was leveraged by higher richness observed in 2014 and 2015 (Table 4-7). Blue-green algae made up 98.1% and 94.9% of the periphyton community of upper and lower YT-24 Creek, respectively (Table 4-7). Green algae (chlorophyta, charophyta/streptophyta) and diatoms (baccillariophyta) were also present at low proportions at upper and lower YT-24 Creek (Table 4-7).

Table 4-7 YT-24 Creek Baseline Periphyton Abundance and Community Characteristics, 2014-2019

Area	Upper YT-24 Creek					Lower YT-24 Creek						
	YT5.0		YT4.3		Mean ^b	YT0.0		YT0.2		Mean ^b		
Area Code	6		5			1	6	5				
n (sample size) ^a	6		5		Mean ^b	1	6	5		Mean ^b		
Year	2016	2017	2018	2019		2014	2015	2016	2017		2018	2019
Density (cells/m ²)	-	-	378,417	50,376	214,397	621,920	373,554	-	-	224,131	46,902	316,627
Chlorophyll-a (mg/m ²)	6.1	2.2	1.8	0.5	2.7	0.8	2.5	7.6	0.1	3.1	0.8	2.5
Ash-Free Dry Mass (g/m ²)	-	0.42	12.0	0.7	4.3	8.1	3.2	-	0.42	10.7	0.6	3.8
Richness (# of taxa)	-	-	3.8	5.4	4.6	10.0	10.0	-	-	5.4	7.6	8.3
Blue-green Algae (%)	-	-	99.1	97.0	98.1	94.2	93.5	-	-	95.3	96.6	94.9
Green Algae (%)	-	-	0.5	1.6	1.0	3.7	0.0	-	-	1.3	2.2	1.8
Diatoms (%)	-	-	0.0	1.4	0.7	2.2	6.5	-	-	0.0	0.8	2.4
Other Algae (%)	-	-	0.4	0.0	0.2	0.0	0.0	-	-	3.3	0.2	0.9

^a for years with n>1, mean values are presented

^b arithmetic mean of the annual means; note that mean proportions of taxonomic groups may not add to 100% due to averaging

Benthic Invertebrates

Baseline benthic invertebrate community conditions in YT-24 Creek are characterized by low density/abundance, moderate taxon richness, and high proportions of Plecoptera (stoneflies), Chironomids (non-biting midges), and Ephemeroptera (mayflies; Table 4-8). Mean baseline taxon richness of upper YT-24 Creek was slightly higher than lower YT-24 Creek (16.5 and 13.4 taxa, respectively as assessed at the lowest practicable level: Table 5-8). Mean baseline abundance was 831 organisms/m² and 768 organisms/m² at upper and lower YT-24 Creek, respectively (Table 4-8). Benthic invertebrate communities of upper YT-24 Creek (assessed in terms of mean proportional abundance) were dominated by Plecoptera (54.6%), with lesser dominance by Chironomidae (18.4%) and Ephemeroptera (18.1%; Table 4-8). Benthic invertebrate communities of lower YT-24 Creek were co-dominated by Chironomidae (45.5%) and Plecoptera (45.3%; Table 4-8)⁴. Functional feeding group composition was dominated by shredders (55.1%) and collector-gatherers (36.0%) in upper YT-24 Creek, with filterers sub-dominant (Table 4-8). In lower YT-24 Creek, collector-gatherers and shredders were dominant (47.5% and 45.5%, respectively), with a lower proportion of filterers (Table 4-8). Habitat preference group composition was dominated by sprawlers and clingers, with 50.6% sprawlers and 36.3% clingers in upper YT-24 Creek and 61.7% sprawlers and 30.0% clingers in lower YT-24 Creek (Table 4-8).

⁴ As noted in Table Y.2, due to arithmetic averaging, proportion total may add to greater than 100%.

Table 4-8 YT-24 Creek Baseline Benthic Invertebrate Abundance and Community Characteristics, 2014-2019

Area		Upper YT-24 Creek					Lower YT-24 Creek					
Area Code		YT0.0		YT0.2			Mean ^b	YT5.0		YT4.3		Mean ^b
n (sample size) ^a		1			5			1		5		
Method		Kick Net			Hess			Kick Net		Hess		
Year		2014	2015	2017	2018	2019		2017	2018	2019		
Richness (# of Taxa)		21	14	24	11.2	12.4	16.5	17	10.4	12.8	13.4	
Density (#/m ²)		695 ^c	1,894 ^c	437 ^c	289	841	831	226 ^c	422	1,114	768	
Simpson's Evenness		-	-	-	0.29	0.17	0.23	-	0.28	0.18	0.23	
Shannon-Weiner Diversity		-	-	-	1.57	1.19	1.38	-	1.37	1.15	1.26	
Ephemeroptera (%)		12.7	25.4	12.8	32.9	6.8	18.1	0.4	0.7	3.5	1.5	
Plecoptera (%)		56.8	32.4	70.8	45.0	67.9	54.6	52.9	16.5	66.5	45.3	
Chironomidae (%)		27.1	35.9	9.6	12.1	7.6	18.4	40.1	69.6	26.9	45.5	
Metal-Sensitive Chironomidae (%)		8.3	0.7	1.1	6.3	3.9	4.1	27.3	63.0	16.0	35.4	
Simuliidae (%)		0.4	6.0	4.3	0.7	0.7	2.4	5.3	1.0	0.2	2.2	
Oligochaeta (%)		0.6	0.0	1.1	5.2	14.3	4.2	0.4	7.0	1.3	2.9	
EPT (%)		69.5	57.8	83.6	78.2	74.7	72.8	53.3	17.2	69.9	46.8	
FFG ^d	Collector-Gatherers (%)	38.3	60.1	24.0	44.0	13.6	36.0	41.4	70.5	30.5	47.5	
	Filterers (%)	0.4	6.0	4.3	5.9	15.0	6.3	5.3	8.0	1.5	4.9	
	Shredders (%)	57.0	32.6	70.8	46.5	68.5	55.1	52.9	17.1	66.5	45.5	
HPG ^d	Sprawlers (%)	82.6	68.0	81.1	12.1	9.4	50.6	86.8	70.8	27.4	61.7	
	Burrowers (%)	2.7	0.3	1.4	6.4	14.9	5.1	7.5	7.6	1.4	5.5	
	Clingers (%)	14.7	31.7	17.6	48.1	69.6	36.3	5.7	17.5	66.8	30.0	

^a for years with n>1, mean values are presented

^b arithmetic mean of the annual means; note that mean proportions of taxonomic groups may not add to 100% due to averaging

^c samples collected with kick net and indicate total sample abundance as opposed to per-area density

^d FFG = functional feeding group; HPG = habitat preference group

4.4.1.5 Fish

Fish presence in YT-24 is assumed to be limited to the lower portion of this creek. Fish have only been captured in the lower 100 m of the stream and several small impediments have been documented in the lower 500 m of the stream. Further upstream (approximately 5 km from the mouth of YT-24), the stream has a 30% gradient over 7.4 m, representing a barrier that precludes fish presence further up in the catchment near mine infrastructure.

Slimy sculpin fish have been captured at the mouth in an area back flooded by the Yukon River (PECG 2016) and Arctic grayling have been captured in the lower 100 m of YT-24. No other species have been captured. Because the lower reach of YT-24 freezes to ground during winter months, it does not provide overwintering habitat.

4.4.2 Risk Narrative

The YT24 catchment is not anticipated to receive discharges except for passive spilling of pits from SU3W, SU3 and SU5. Maximum modeled water quality predictions for all modelled parameters at YT24 model node YT24-0.1 are never predicted to exceed the Use Protection water quality objectives for YT24-0.1 under any model scenario and at any time in the life of mine.

4.4.3 Indicators, Performance Thresholds and Responses

Specific indicator concentrations for the four performance threshold Tiers are provided in Table 4-9, and apply to the monthly water quality data collected at station YT24-0.1. Note that the values for Tier 1 and Tier 2 are reflective of the maximum predicted concentrations from a total of 30 iterations of the monthly WQM, for the entire Operations period. The values in Table 4-9 will be updated annually, following the updated run of the WQM with the current mine plan. Indicators, performance thresholds and responses specific to surface water quality for all parameters except uranium in YT-24 are provided in Table 4-10, and specific to uranium in Table 4-11. The monitoring data that underpin this component of the AMP are a requirement of the Surface Water Quality Monitoring Plan. The monitoring data will be compared to the performance thresholds on a monthly basis (by the end of the month following the month in which samples were collected) - this corresponds to the proposed monthly reporting schedule.

Table 4-9 Performance Thresholds for YT-24, Station YT24-0.1

Parameter	Units	Tier 1 (Exceed Base Case WBQM)	Tier 2 (Exceed Upper Case WBQM)	Tier 3 (UP WQO)
NH ₃ -N	mg/L	0.040	0.46	1.8
N-NO ₃	mg/L	0.9	2.7	8.0
D-SO ₄	mg/L	40	40	218
D-As	ug/L	0.0026	0.0039	0.005
D-U	ug/L	0.0048	0.015	0.015
D-Zn	ug/L	0.0018	0.0019	0.026

Notes:

D = Dissolved; WB/WQM – Water Balance/Water Quality Model; UP WQO – Use Protection Water Quality Objectives.
 Tier 1 and Tier 2 values calculated based on the maximum monthly value from the mean of 30 WQM iterations for the entire Operations phase. These will be updated to reflect the current model outputs as necessary throughout Operations.
 WQM outputs are reflective of Lorax 2023.
 Uranium AMP Tiers are unique (See Section 1.4.5.1).

Table 4-10 Specific Performance Thresholds for Surface Water Quality in Lower YT-24 (YT24-0.1)

Indicators	Performance Thresholds	Responses/Actions
<p>Aqueous concentrations at station YT24-0.1 for the following parameters:</p> <ul style="list-style-type: none"> - N-NO₃ - NH₃-N - SO₄ <p>Dissolved Metals:</p> <ul style="list-style-type: none"> - As - Zn 	<p>Tier 1 - Monitoring data exceeds Base Case WQ model predicted concentrations for POPCs and < than proposed WQOs</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Confirm model assumptions are valid for the relevant mine development stage (water volumes and discharge regimes, flows, waste placement and footprint, etc.) • Actions: <ul style="list-style-type: none"> ▫ If there are more than 3 Tier 1 exceedances in one year, then flag for review during next WQM update ▫ No further action required. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report.
	<p>Tier 2 - Monitoring data exceeds Upper Case WQ model predicted concentrations for POPCs and < than proposed WQOs</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Confirm model assumptions are valid for the relevant mine development stage (flows, waste placement and footprint, etc.). • Actions: <ul style="list-style-type: none"> ▫ Water Quality Model update will be completed if 3 samples within 12 months trigger Tier 2 of the Surface Water Quality and Aquatic Life AMP, and if exceedances of UP WQOs are predicted, an action plan to address these exceedances will be presented to First Nations environment committees and regulatory agencies ▫ If two subsequent sampling events do not exceed Tier 2 criteria then exit Tier 2 and continue with routine monitoring. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees.
	<p>Tier 3 - Exceedance of proposed WQOs (use protection)</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations/volumes were/are within EQS. • Actions: <ul style="list-style-type: none"> ▫ Resample within a reasonable timeframe upon confirmation of first exceedance. If second exceedance of analyte noted in resample results, and external factors ruled out, then: <ul style="list-style-type: none"> ▪ Assumption is made that mine is responsible for exceedance of UP WQO once actions below initiated ▪ Continue with current monitoring and expand monitoring frequency to weekly for YT24-0.1 and Supremo Pit discharges ▪ Conduct site investigation (including toxicity assessments using site water from YT-24 below the Supremo Pit discharges to inform the development of an aquatic biota assessment (if needed)) to determine which mine loading sources are responsible for the exceedance and prepare recommendations for mitigation ▪ Within a month of the conclusion of the site investigation, an action plan to address the exceedances will be presented to the Environment Committee ▪ Implement recommendations and necessary reasonable and practical measures to reduce contaminant loading from mine to YT-24. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Confirm exceedance in second sample prior to notifying YG Inspector, DFO, etc. ▫ Actions will continue until performance thresholds are no longer exceeded.
	<p>Tier 4 - Exceed WQOs in 3 consecutive months following implementation of mitigation measures (resulting from Tier 3).</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review potential mitigation and water management options. • Actions: <ul style="list-style-type: none"> ▫ Conduct site investigation to determine which loading sources (mine or other) are responsible for the exceedance ▫ Conduct risk assessment to determine the magnitude of the potential exceedance and effects to aquatic resources resulting from the UP WQO exceedance, including, but not limited to the review of the toxicity assessment using site water and an aquatic resources effects assessment based on available monitoring data ▫ Implement necessary reasonable and practical measures to reduce contaminant loading from mine to YT-24 ▫ Determine whether an amendment of the UP WQO values in the WUL is required ▫ Actions will continue until performance thresholds are no longer exceeded. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Notify YG Inspector, DFO, etc. ▫ Actions will continue until Tier 3 performance thresholds are no longer exceeded.

Notes: AMP: Adaptive Management Plan; DFO: Department of Fisheries and Oceans; EQS: Effluent Quality Standards; QA/QC: Quality Assurance/Quality Control; UP WQO: Use Protection Water Quality Objective; WQM: Water Quality Model; WUL: Water Use License; YG: Yukon Government.

Table 4-11 Specific Performance Thresholds for Uranium in Lower YT-24 (YT24-0.1)

Indicators	Performance Thresholds	Responses/Actions
Aqueous concentrations at station YT24-0.1 for uranium	<p>Tier 1 - Monitoring data exceeds Upper Case WQ model predicted concentrations for POPCs and < than proposed WQOs</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Confirm model assumptions are valid for the relevant mine development stage (flows, waste placement and footprint, etc.). • Actions: <ul style="list-style-type: none"> ▫ Water Quality Model update will be completed if 3 samples within 12 months trigger Tier 2 of the Surface Water Quality and Aquatic Life AMP, and if exceedances of UP WQOs are predicted, an action plan to address these exceedances will be presented to First Nations environment committees and regulatory agencies ▫ If two subsequent sampling events do not exceed Tier 1 criteria then exit Tier 1 and continue with routine monitoring. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees.
	<p>Tier 2 - Exceedance of proposed WQOs (use protection)</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations/volumes were/are within EQS. • Actions: <ul style="list-style-type: none"> ▫ Resample within a reasonable timeframe upon confirmation of first exceedance. If second exceedance of analyte noted in resample results, and external factors ruled out, then; <ul style="list-style-type: none"> ▪ Assumption is made that mine is responsible for exceedance of UP WQO once actions below initiated ▪ Continue with current monitoring and expand monitoring frequency to weekly for YT24-0.1 ▪ Conduct site investigation (including toxicity assessments using site water from YT-24 below the pit discharge point to inform the development of an aquatic biota assessment (if needed)) to determine which mine loading sources are responsible for the exceedance and prepare recommendations for mitigation ▪ Within a month of the conclusion of the site investigation, an action plan to address the exceedances will be presented to the Environment Committee ▪ Implement recommendations and necessary reasonable and practical measures to reduce contaminant loading from mine to Halfway Creek. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Confirm exceedance in second sample prior to notifying YG Inspector, DFO, etc. ▫ Actions will continue until performance thresholds are no longer exceeded.
	<p>Tier 3 - Uranium concentrations exceed 33 µg/L</p>	<p>Review:</p> <ul style="list-style-type: none"> ▫ Review potential mitigation and water management options <p>Actions:</p> <ul style="list-style-type: none"> ▫ Conduct site investigation to determine which loading sources (mine or other) are responsible for the exceedance ▫ Conduct risk assessment to determine the magnitude of the potential exceedance and effects to aquatic resources resulting from the UP WQO exceedance, including, but not limited to the review of the toxicity assessment using site water and an aquatic resources effects assessment based on available monitoring data ▫ Implement necessary reasonable and practical measures to reduce contaminant loading from mine to Halfway Creek ▫ Determine whether an amendment of the UP WQO values in the WUL is required ▫ Actions will continue until performance thresholds are no longer exceeded. <p>Reporting:</p> <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Notify YG Inspector, DFO, etc. ▫ Actions will continue until Tier 3 performance thresholds are no longer exceeded.

Notes: AMP: Adaptive Management Plan; DFO: Department of Fisheries and Oceans; EQS: Effluent Quality Standards; QA/QC: Quality Assurance/Quality Control; UP WQO: Use Protection Water Quality Objective; WQM: Water Quality Model; WUL: Water Use License; YG: Yukon Government.

4.5 Latte Creek and Coffee Creek

4.5.1 Description – Water Quality and Aquatic Resources

This section presents a summary of the existing surface water quality regime, the current aquatic ecosystem structure and fish presence characterization, the rationale for the selection of station LC-11.4 as the attainment point for Use Protection WQOs and the specific indicators, performance thresholds and responses for the four AMP Tiers presented in Section 1.4.4. In addition, the assessment of surface water quality data against the Non-Degradation WQOs for Coffee Creek at station CC-10.9 is also presented.

4.5.1.1 Rationale for Monitoring Location (LC-11.4)

The LC-11.4 monitoring station is located just downstream of the proposed southern discharge point, at the outlet of the Supremo pit complex, as well as the outflows from the Double Double Pit. Latte Creek is a tributary to Coffee Creek, which joins the Yukon River upstream of YT-24. Coffee Creek has great economic, social, and cultural importance to the Tr'ondëk Hwëch'in and Selkirk First Nation. The mouth of Coffee Creek hosted a seasonal camp used by both First Nations for the harvesting of fish, and is important fish habitat (e.g., spawning and overwintering of Chinook salmon). Notably, the both the Tr'ondëk Hwëch'in Final Agreement (1998) and Selkirk First Nation Final Agreement (1998) state in Section 14.8.1 (both documents) that “*Subject to the rights of Water users authorized in accordance with this chapter and Laws of General Application, a Yukon First Nation has the right to have Water which is on or flowing through or adjacent to its Settlement Land remain substantially unaltered as to quantity, quality and rate of flow, including seasonal rate of flow.*”

4.5.1.2 Streamflow Regime

Latte Creek drains the south face of the ridge that hosts the majority of the deposit and has a catchment area of approximately 70 km². It flows eastward to its confluence with Coffee Creek. Coffee Creek has a total catchment area of approximately 487 km². It drains an area to the south and east of the mine site, generally flowing from south to north, to its mouth at the Yukon River. Based on the measured streamflow data and the synthetic streamflow records, mean annual runoff is estimated to be approximately 200 mm and 144 mm at LC-11.4 and CC-11.6, respectively. The 1:10-year instantaneous peak flows are estimated to be 215 and 157 Ls/km² at LC-11.4 and CC-11.6, respectively. Winter low flow yields are comparable to other drainages at the Project site, with yields of 0.2 to 1 L/s/ km² continuing year-round beneath the ice at both stations (Figure 4-3).

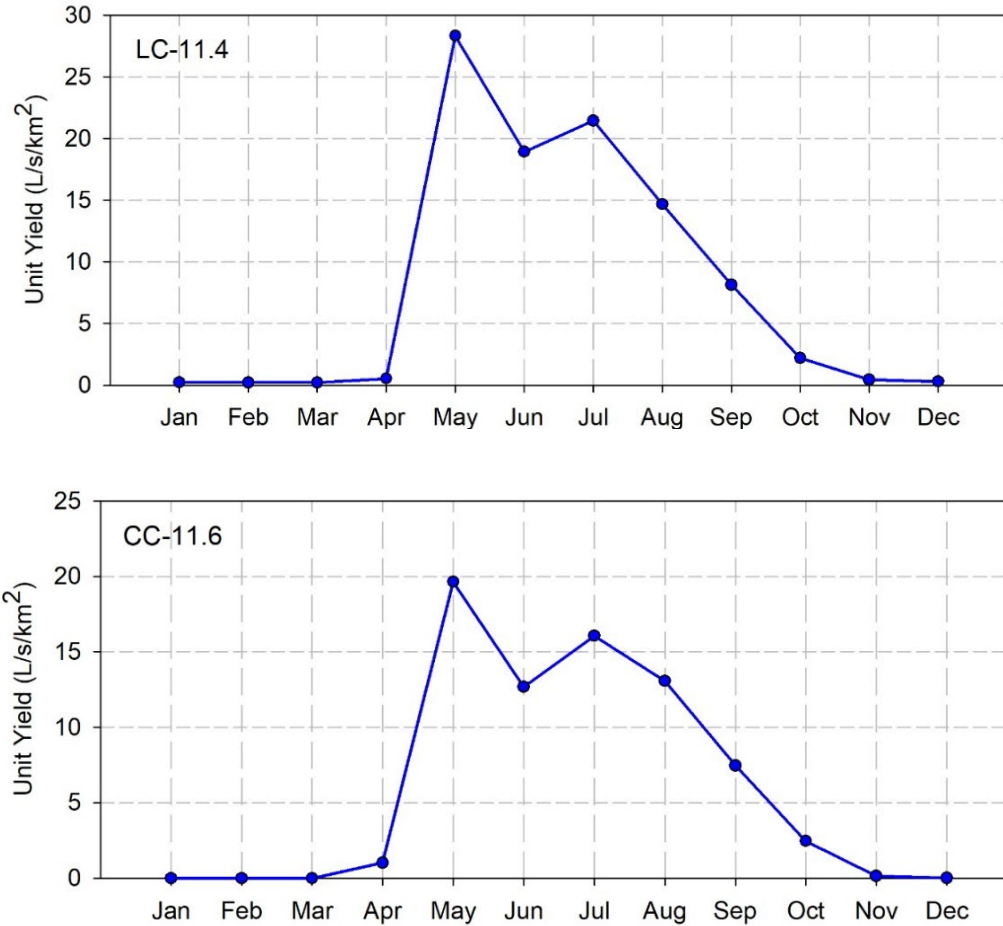


Figure 4-3 Average Monthly Streamflow for LC-11.4 and CC-11.6 Stations in Latte Creek and Coffee Creek.

4.5.1.3 Water Quality

In Latte Creek, Use Protection WQOs will be applied at monitoring station LC-11.4 (formerly CC-1.5), while Non-Degradation WQOs will be applied at CC-10.9 (formerly Latte-Mix). The latter represents the point of full mixing for Latte Creek with the Coffee Creek mainstem.

The baseline monitoring records for LC-11.4 extends from October 2010 to present, while the CC-10.9 record extends from July 2017 to present. Where gaps exist in the baseline datasets for the latter station, water quality characteristics may be inferred by the longer data records for other stations in the catchment, including CC-11.6 (formerly CC-0.5) upstream of the Latte Creek confluence with Coffee Creek, and CC-3.2 (formerly CC-4.5) in the lower reach of Coffee Creek.

In general, the water chemistry in both Latte Creek and Coffee Creek is characterized by soft water, low in major ions during freshet periods, and hard to very hard waters with high levels of major ions during winter low flow periods (Lorax, 2022b). Water chemistry for stream reaches higher up in the catchment is dominated to a greater degree by surface runoff. pH remains relatively uniform throughout the Latte Creek and Coffee Creek drainages on an annual basis (7.0 to 8.0), and concentrations of nutrients are low.

The influence of snow-melt driven surface runoff during the open water season and groundwater inputs during winter months is also reflected as seasonal concentration signatures for organic carbon and trace element parameters. Peak summer flows typically coincide with annual maxima in TSS, dissolved organic carbon, dissolved aluminum, T-Fe, and particulate-bound metals (e.g., T-As, T-Cd, T-Cu, T-Cr, and T-Zn). In contrast, the dominance of groundwater inputs during winter contributes to annual peaks in several dissolved metals, most notably T-U. Despite seasonally associated concentration peaks noted above, mean monthly concentrations of total and dissolved trace elements are generally low.

A limited number of parameters naturally exceed their corresponding CCME or BC WQGs throughout the Coffee Creek catchment in the baseline dataset. At both LC-11.4 and CC-10.9, D- and T-Al routinely exceeds the water quality guideline. T-Fe and T-Cu have been measured above their corresponding water quality guidelines during the open water season. The most notable parameter of interest throughout Latte Creek is U. Total and dissolved U concentrations in mid Latte Creek at station LC-11.4 show a distinct seasonal signature with maxima observed during winter low flow periods and coinciding with baseflow conditions. Concentrations during low flow periods can reach 35 µg/L and are often well above the CCME water quality guideline of 15 µg/L for the protection of aquatic life (Lorax 2022b). Similar to the monitoring observations in Latte Creek, total U concentrations in Coffee Creek at CC-10.9 show a distinct seasonal signature with maxima observed during winter low flow periods and coinciding with baseflow conditions. Concentrations during low flow periods often exceed the CCME chronic water quality guideline of 15 µg/L with peak concentrations observed between 40 µg/L to 120 µg/L. Interestingly, T-U concentrations in lower Coffee Creek, downstream of CC-10.9, do not exhibit the same pronounced seasonal signature observed in upper Coffee Creek or Latte Creek, reflecting the diminishing influence of U-rich groundwater in lower-elevation compared to higher-elevation reaches. For example, total U concentrations at CC-3.2 have never exceeded the CCME guideline of 15 µg/L for the protection of aquatic life since monitoring was initiated in October 2010.

4.5.1.4 Periphyton and Benthic Invertebrate Communities

Latte Creek Periphyton

Baseline periphyton conditions in Latte Creek are characterized by low productivity and a dominance of blue-green algae (cyanobacteria; Table 4-12). Low productivity has been documented based on density, chlorophyll-a concentration, and AFDM, all on a unit-area basis (i.e., per m²) and is typical of northern, nutrient poor aquatic habitats. Conditions in upper and lower Latte Creek were generally similar. Mean periphyton density was 117,976 cells/m² and 191,141 cells/m² in upper and lower Latte Creek, respectively (Table 4-12). Mean chlorophyll-a concentrations were 1.6 mg/m² and 1.4 mg/m² in upper and lower Latte Creek, respectively and ranged from 0.1 to 3.1 mg/m² across all baseline sampling on Latte Creek, consistently below the maximum threshold for oligotrophic streams (20 mg/m²; Dodds et al, 1998) and the short-term maximum British Columbia guideline for the protection of aquatic life (100 mg/m²; BCMECCS 2019). Mean AFDM was 3.9 g/m² and 4.0 g/m² in upper and lower Latte Creek, respectively (Table 5-12). Mean periphyton richness was lower in upper Latte Creek than in lower Latte Creek (6.3 taxa versus 11.0 taxa), but the latter was leveraged by higher richness observed in 2014 and 2015 (Table 4-12). Blue-green algae made up 95.3% and 91.6% of the periphyton community of upper and lower Latte Creek, respectively (Table 4-12). Green algae (chlorophyta, charophyta/streptophyta) and diatoms (baccillariophyta) were also present at low proportions at upper and lower Latte Creek (Table 4-12).

Table 4-12 Latte Creek Baseline Periphyton Abundance and Community Characteristics, 2014-2019

Area	Upper Latte Creek					Mean ^b	Lower Latte Creek				
	LC9.9			LC10.2			LC2.7				
n (sample size) ^a	1	6		5		Mean ^b	1		6		Mean ^b
Year	2015	2016	2017	2018	2019		2014	2015	2016	2017	
Density (cells/m ²)	106,997	-	-	243,128	3,802	117,976	279,766	102,517	-	-	191,141
Chlorophyll-a (mg/m ²)	2.1	1.4	0.1	3.1	1.2	1.6	1.0	1.0	2.7	1.1	1.4
Ash-Free Dry Mass (g/m ²)	3.8	-	0.4	9.5	2.0	3.9	5.6	4.6	-	1.8	4.0
Richness (# of taxa)	13.0	-	-	2.6	3.4	6.3	8.0	14.0	-	-	11.0
Blue-green Algae (%)	94.6	-	-	100.0	91.2	95.3	96.1	87.2	-	-	91.6
Green Algae (%)	0.0	-	-	0.0	5.8	1.9	2.4	6.8	-	-	4.6
Diatoms (%)	5.4	-	-	0.0	2.6	2.7	1.6	5.9	-	-	3.8
Other Algae (%)	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	-	0.0

^a for years with n>1, mean values are presented

^b arithmetic mean of the annual means; note that mean proportions of taxonomic groups may not add to 100% due to averaging

Coffee Creek Periphyton

Similar to Latte Creek, baseline periphyton conditions in Coffee Creek are characterized by low productivity and a dominance of blue-green algae (cyanobacteria; Table 4-13). Low productivity has been documented based on density, chlorophyll-*a* concentration, and AFDM, all on a unit-area basis (*i.e.*, per m²) and is typical of northern, nutrient poor aquatic habitats. Baseline periphyton productivity was slightly greater in upper Coffee Creek than lower Coffee Creek (Table 4-13). Mean periphyton density was 336,496 cells/m² and 117,109 cells/m² in upper and lower Coffee Creek, respectively (Table 4-13). Mean chlorophyll-*a* concentrations were 6.2 mg/m² and 3.4 mg/m² in upper and lower Coffee Creek, respectively and ranged from 1.0 to 8.8 mg/m² across all baseline sampling on Coffee Creek, consistently below the maximum threshold for oligotrophic streams (20 mg/m²; Dodds *et al*, 1998) and the short-term maximum British Columbia guideline for the protection of aquatic life (100 mg/m²; BCMECCS 2019). Mean AFDM was 9.1 g/m² and 4.6 g/m² in upper and lower Coffee Creek, respectively (Table 4-13). Mean periphyton richness was lower in upper Coffee Creek than in lower Coffee Creek (7.7 taxa versus 11.5 taxa), but the latter was leveraged by higher richness observed in 2014 and 2015 (Table 4-13). Blue-green algae made up 84.1% and 88.9% of the periphyton community of upper and lower Coffee Creek, respectively (Table 4-13). Diatoms (baccillariophyta) and green algae (chlorophyta, charophyta/streptophyta) and were also present at low proportions at upper and lower Coffee Creek (Table 4-13).

Table 4-13 Coffee Creek Baseline Periphyton Abundance and Community Characteristics, 2014-2019

Area		Upper Latte Creek					Lower Latte Creek					
Area Code	LC10.4	LC9.9			LC10.2		Mean ^b	LC0.5	LC2.7			Mean ^b
n (sample size) ^a	1			5		1						
Method	Kick Net			Hess		Kick Net						
Year	2014	2015	2017	2018	2019	2014		2014	2015	2017		
Richness (# of Taxa)	-	24	26	18.2	15	20.8	25	24	19	26	23.5	
Density (#/m ²)	-	250 ^c	792 ^c	518	829	597	664 ^c	763 ^c	948 ^c	1,136 ^c	878	
Simpson's Evenness	-	-	-	0.23	0.34	0.28	-	-	-	-	-	
Shannon-Weiner Diversity	-	-	-	1.90	1.94	1.92	-	-	-	-	-	
Ephemeroptera (%)	39.7	21.2	58.4	46.0	33.2	39.7	-	26.7	46.5	22.9	32.0	
Plecoptera (%)	41.4	26.8	19.3	6.8	15.0	21.9	-	8.3	3.6	15.7	9.2	
Chironomidae (%)	7.1	34.4	5.8	18.5	22.7	17.7	-	53.8	33.4	12.1	33.1	
Metal-Sensitive Chironomidae (%)	4.3	20.8	1.4	3.0	14.2	8.7	-	14.0	0.6	2.5	5.7	
Simuliidae (%)	0.1	12.0	13.0	5.7	10.4	8.2	-	0.8	15.2	45.7	20.5	
Oligochaeta (%)	3.9	1.6	2.0	14.9	17.4	8.0	-	0.6	0.0	0.0	0.2	
EPT (%)	82.8	48.0	78.0	54.0	48.2	62.2	-	40.2	50.1	39.2	43.2	
FFG ^d	Collector-Gatherers (%)	20.6	54.8	66.0	64.2	53.8	51.9	-	73.6	78.8	30.7	61.0
	Filterers (%)	0.4	13.2	13.0	21.0	27.8	15.1	-	0.8	15.2	45.7	20.5
	Scrapers (%)	31.2	2.0	0.5	3.0	2.6	7.9	-	10.5	1.5	5.6	5.9
	Shredders (%)	41.5	26.8	19.3	10.1	15.5	22.7	-	11.0	3.6	8.5	7.7
	Predators (%)	6.3	2.8	1.3	1.7	0.2	2.4	-	4.1	0.9	9.1	4.7
HPG ^d	Sprawlers (%)	47.6	61.2	24.8	19.7	22.8	35.2	-	60.8	36.4	21.0	39.4
	Burrowers (%)	5.6	2.0	2.8	17.6	18.0	9.2	-	1.7	0.9	0.7	1.1
	Clingers (%)	46.8	36.8	72.4	15.6	28.0	39.9	-	37.5	62.7	78.0	59.4

^a for years with n>1, mean values are presented

^b arithmetic mean of the annual means; note that mean proportions of taxonomic groups may not add to 100% due to averaging

^c samples collected with kick net and indicate total sample abundance as opposed to per-area density

^d FFG = functional feeding group; HPG = habitat preference group.

Latte Creek Benthic Invertebrates

Baseline benthic invertebrate community conditions in Latte Creek are characterized by low density/abundance, moderate taxon richness, and high proportions of Ephemeroptera (mayflies), Chironomids (non-biting midges), as well as Plecoptera (stoneflies) in upper Latte Creek and Simuliidae (blackflies) in lower Latte Creek (Table 4-14). Mean baseline taxon richness of upper and lower Latte Creek was similar (20.8 and 23.5 taxa, respectively as assessed at the lowest practicable level: Table 4-14). Mean baseline abundance was 597 organisms/m² and 878 organisms/m² at upper and lower Latte Creek, respectively (Table 4-14). Benthic invertebrate communities of upper Latte Creek (assessed in terms of mean proportional abundance) were dominated by Ephemeroptera (39.7%), Plecoptera (21.0%), and Chironomidae (17.7%; Table 4-14). Benthic invertebrate communities of lower Latte Creek were dominated by Chironomidae (33.1%), Ephemeroptera (32.0%) and Simuliidae (20.5%; Table 4-14). Functional feeding group composition was dominated by collector-gatherers (51.9%) in upper Latte Creek, with shredders and filterers sub-dominant (Table 4-14). Collector-gatherers were also dominant in lower Latte Creek (61.0%), with filterers sub-dominant (20.5%; Table 4-14). Habitat preference group composition was dominated by clingers and sprawlers, with 39.9% clingers and 35.2% sprawlers in upper Latte Creek and 59.4% clingers and 39.4% sprawlers in lower Latte Creek (Table 4-14).

Coffee Creek Benthic Invertebrates

Baseline benthic invertebrate community conditions in Coffee Creek are characterized by low density/abundance, moderate taxon richness, and high proportions of Ephemeroptera (mayflies), and Chironomids (non-biting midges), as well as Simuliidae (blackflies) in upper Coffee Creek and Oligochaetae (aquatic worms) in lower Coffee Creek (Table 4-15). Mean baseline taxon richness of upper and lower Coffee Creek was similar (21.5 and 20.0 taxa, respectively as assessed at the lowest practicable level: Table 4-15). Mean baseline abundance was 1,284 organisms/m² and 552 organisms/m² at upper and lower Coffee Creek, respectively (Table 4-15). Benthic invertebrate communities of upper Coffee Creek (assessed in terms of mean proportional abundance) were dominated by Ephemeroptera (35.2%), Simuliidae (20.1%), and Chironomidae (18.5%; Table 4-15). Benthic invertebrate communities of lower Coffee Creek were dominated by Ephemeroptera (43.9%), Chironomidae (29.1%), and Oligochaetae (13.2%; Table 4-15). Functional feeding group composition was dominated by collector-gatherers (45.2%) in upper Coffee Creek, with filterers (27.9%) and scrapers (11.7%) sub-dominant (Table 4-15). Collector-gatherers were also dominant in lower Coffee Creek (58.6%), with scrapers and filterers sub-dominant (17.4% and 13.7%, respectively; Table 4-15). Habitat preference group composition was dominated by clingers and sprawlers, with 61.8% clingers and 20.3% sprawlers in upper Coffee Creek and 47.2% clingers and 30.9% sprawlers in lower Coffee Creek (Table 4-15).

Table 4-14 Latte Creek Baseline Benthic Invertebrate Abundance and Community Characteristics, 2014-2019

Area	Upper Coffee Creek								Lower Coffee Creek						
	CF8.0		CF10.0		CC23.7		Mean ^b	CC5.6							
n (sample size) ^a	1		6		5			1		6		5		Mean ^b	
Year	2014	2015	2017	2016	2017	2018	2019	2014	2015	2016	2017	2018	2019		
Density (cells/m ²)	183,901	90,666	-	-	-	372,268	699,150	336,496	161,144	99,043	-	-	8,877	199,371	117,109
Chlorophyll-a (mg/m ²)	1.9	2.3	1.2	5.7	3.0	21.5	8.2	6.2	1.0	1.1	8.8	2.4	2.6	4.7	3.4
Ash-Free Dry Mass (g/m ²)	5.2	7.9	1.9	-	11.0	21.1	7.7	9.1	3.5	4.1	-	6.4	3.1	6.0	4.6
Richness (# of taxa)	10.0	12.0	-	-	-	3.4	5.4	7.7	13.0	13.0	-	-	9.7	10.4	11.5
Blue-green Algae (%)	57.5	81.0	-	-	-	99.9	98.0	84.1	84.2	88.6	-	-	93.5	89.6	88.9
Green Algae (%)	0.0	3.3	-	-	-	0.0	2.0	1.3	1.8	1.5	-	-	0.5	7.8	2.9
Diatoms (%)	42.5	15.8	-	-	-	0.0	0.0	14.6	14.1	10.0	-	-	0.8	1.2	6.5
Other Algae (%)	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	0.0	-	-	5.2	1.6	1.7

^a for years with n>1, mean values are presented

^b arithmetic mean of the annual means; note that mean proportions of taxonomic groups may not add to 100% due to averaging

Table 4-15 Coffee Creek Baseline Benthic Invertebrate Abundance and Community Characteristics, 2014-2019

Area		Upper Coffee Creek						Lower Coffee Creek						
Area Code		CF8.0			CF10.0	CC23.7		Mean ^b	CF3.9			CC5.6		Mean ^b
n (sample size) ^a		1			1	5			1			5		
Method		Kick Net			Kick Net	Hess			Kick Net			Hess		
Year		2014	2015	2017	2017	2018	2019		2014	2015	2017	2018	2019	
Richness (# of Taxa)		29	20	25	23	15.2	17.0	21.5	22	24	27	10.6	16.2	20.0
Abundance (#/m ²)		585 ^c	2,765 ^c	1,004 ^c	665 ^c	1,661	1,021	1,284	348 ^c	385 ^c	1,187 ^c	149	690	552
Simpson's Evenness		-	-	-	-	0.22	0.37	0.30	-	-	-	0.54	0.22	0.38
Shannon-Weiner Diversity		-	-	-	-	1.56	2.11	1.84	-	-	-	1.91	1.62	1.76
Ephemeroptera (%)		33.5	34.3	37.8	54.1	46.1	5.7	35.2	33.9	73.0	42.4	45.9	24.3	43.9
Plecoptera (%)		14.2	2.8	5.0	3.2	8.1	26.3	9.9	7.2	7.0	3.3	1.2	4.9	4.7
Chironomidae (%)		28.9	10.1	21.9	8.7	6.1	35.7	18.5	50.9	12.5	35.1	17.3	29.8	29.1
Metal-Sensitive Chironomidae (%)		3.9	0.3	0.0	0.0	1.9	20.0	4.3	0.6	0.3	0.0	0.6	1.1	0.5
Simuliidae (%)		0.3	49.8	32.0	12.0	14.6	11.8	20.1	0.0	3.4	0.0	13.1	0.8	3.5
Oligochaeta (%)		0.0	0.0	0.2	14.3	24.2	19.7	9.7	3.7	0.3	13.2	10.0	38.6	13.2
EPT (%)		51.8	37.1	43.3	58.9	54.4	32.1	46.3	44.0	80.0	49.0	49.3	29.7	50.4
FFG ^d	Collector-Gatherers (%)	43.4	38.7	43.7	56.1	52.0	37.3	45.2	70.7	64.4	73.5	51.7	32.5	58.6
	Filterers (%)	2.9	50.1	32.0	12.0	38.8	31.4	27.9	2.3	3.4	0.0	23.2	39.4	13.7
	Scrapers (%)	17.8	6.1	18.1	23.0	0.8	4.4	11.7	18.1	22.3	17.6	11.9	17.1	17.4
	Shredders (%)	4.4	0.6	1.8	1.7	8.4	26.6	7.3	3.7	1.0	3.9	4.7	7.0	4.1
	Predators (%)	31.5	4.4	4.4	7.2	0.1	0.2	8.0	5.2	8.8	5.0	8.5	9.5	7.4
HPG ^d	Sprawlers (%)		10.0	23.3	9.9	6.2	35.8	17.0	54.6	13.2	35.6	21.0	30.2	30.9
	Burrowers (%)		0.0	0.4	14.3	24.3	19.8	11.8	3.7	0.5	13.4	7.2	38.9	12.8
	Clingers (%)		90.0	76.3	75.8	23.4	42.1	61.5	41.7	86.2	50.7	29.5	28.0	47.2

^a for years with n>1, mean values are presented

^b arithmetic mean of the annual means; note that mean proportions of taxonomic groups may not add to 100% due to averaging

^c samples collected with kick net and indicate total sample abundance as opposed to per-area density

^dFFG = functional feeding group; HPG = habitat preference group

4.5.1.5 Fish

Arctic grayling, and slimy sculpin have been documented in Coffee Creek throughout the Project area, including Coffee Creek above the Latte Creek confluence. Juvenile Chinook salmon have also been documented in Coffee Creek downstream of the Latte Creek confluence. Coffee Creek provides year-round habitat for fish—slimy sculpin and juvenile Chinook have been captured during the winter and Arctic grayling have been detected by eDNA.

Slimy sculpin have been documented in the lower 50 m of Latte Creek, while Arctic grayling have been observed up to 9.9 km from the creek confluence with Coffee Creek (near the Latte Creek tributary that will receive mine discharge). Juvenile Chinook salmon have not been documented in Latte Creek. Latte Creek is used seasonally during the open water season, no overwintering has been documented in the stream (via sampling and eDNA).

4.5.2 Risk Narrative

The primary risk identified for this monitoring location is that the transport of mine generated POPC loads to Latte Creek could result in an exceedance of the Use Protection WQOs at monitoring station LC-11.4, and potential related effects to aquatic health.

The assessment of potential residual Project effects with regards to contaminant toxicity to fish found that throughout Latte Creek the U concentrations during the open water season are projected to fall below the GWQG. However, while winter, under ice, concentrations are anticipated to remain unaffected by Project activities; the U concentrations will remain above the GWQG, but below the WQO (0.031 mg/L; Table 4-2; EDI 2017b). Given the low magnitude of the changes in uranium concentrations combined with seasonal use of Latte and Halfway creeks by fish, any effects associated with changes in contaminant toxicity are expected to be small. Newmont understands however that impacts to water quality may be meaningful to First Nation interests beyond strictly toxicity to fish.

4.5.3 Indicators, Performance Thresholds and Responses

Specific indicator concentrations for the four performance threshold Tiers are provided in Table 4-16, and apply to the monthly water quality data collected at station LC-11.4. Note that the values for Tier 1 and Tier 2 are reflective of the maximum predicted concentrations from a total of 30 iterations of the monthly WB/WQM, for the entire Operations period. In several cases (e.g., SO₄ and As), these predicted maximums occur toward the end of the Operations phase, and thus are not expected to occur during the first several years of Operations, and thus the implementation of the AMP is not expected to be impacted by these predictions. The values in Table 4-16 will be updated annually, following the updated run of the WQM with the current mine plan. Indicators, performance thresholds and responses specific to surface water quality for all parameters except U in Latte Creek are provided in Table 4-17, and specific to U in Table 4-18. The monitoring data that underpin this component of the AMP are a requirement of the Surface Water Quality Monitoring Plan. The monitoring data will be compared to the performance thresholds on a monthly basis (by the end of the month following the month in which samples were collected) - this corresponds to the proposed monthly reporting schedule.

Table 4-16 Performance Thresholds for Latte Creek, Station LC-11.4

Parameter	Units	Tier 1 (Exceed Base Case WBQM)	Tier 2 (Exceed Upper Case WBQM)	Tier 3 (WQO)
NH ₃ -N	mg/L	0.037	0.31	1.3
N-NO ₃	mg/L	0.9	1.6	8
D-SO ₄	mg/L	234	234	309
D-As	ug/L	0.0020	0.0027	0.005
D-U	ug/L	0.030	0.031	0.031
D-Zn	ug/L	0.0022	0.0024	0.031

Notes:

D = Dissolved; WB/WQM – Water Balance/Water Quality Model; UP WQO – Use Protection Water Quality Objectives.

Tier 1 and Tier 2 values calculated based on the maximum monthly value from the mean of 30 WQM iterations for the entire Operations phase. These will be updated to reflect the current model outputs as necessary throughout Operations.

WQM outputs are reflective of Lorax 2023.

Uranium AMP Tiers are unique (See Section 1.4.5.1).

Table 4-17 Specific Performance Thresholds for Surface Water Quality in Latte Creek (LC-11.4)

Indicators	Performance Thresholds	Responses/Actions
Aqueous concentrations at station LC-11.4 for the following parameters: - N-NO ₃ - NH ₃ -N - SO ₄ Dissolved Metals: - As - Zn	Tier 1 - Monitoring data exceeds Base Case WQ model predicted concentrations for POPCs and < than proposed WQOs	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Review water quality data from LC-11.5 station to determine whether exceedance related to background conditions upstream of effluent discharge ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Confirm model assumptions are valid for the relevant mine development stage (water volumes and discharge regimes, flows, waste placement and footprint, etc.). • Actions: <ul style="list-style-type: none"> ▫ If there are more than 3 Tier 1 exceedances in one year, then flag for review during next WQM update ▫ No further action required. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report.
	Tier 2 - Monitoring data exceeds Upper Case WQ model predicted concentrations for POPCs and < than proposed WQOs	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Review water quality data from LC-11.5 station to determine whether exceedance related to background conditions upstream of effluent discharge ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Confirm model assumptions are valid for the relevant mine development stage (flows, waste placement and footprint, etc.) ▫ Review water quality data from seepage monitoring program including ROM stockpile as a potential cause of loading. • Actions: <ul style="list-style-type: none"> ▫ Water Quality Model update will be completed if 3 samples within 12 months trigger Tier 2 of the Surface Water Quality and Aquatic Life AMP, and if exceedances of UP WQOs are predicted, an action plan to address these exceedances will be presented to First Nations environment committees and regulatory agencies ▫ If two subsequent sampling events do not exceed Tier 2 criteria then exit Tier 2 and continue with routine monitoring. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees.
	Tier 3 - Exceedance of proposed WQOs (use protection)	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Compare results with monitoring data collected at LC-11.5, CC-10.9 and CC-11.6 to determine whether external influences led to UP WQO exceedance ▫ Check if deviation from background concentrations exists in Coffee Creek (CC-10.9) for the analyte of interest. • Actions: <ul style="list-style-type: none"> ▫ Resample within a reasonable timeframe upon confirmation of first exceedance. If second exceedance of analyte noted in resample results, and external factors ruled out, then <ul style="list-style-type: none"> ▪ Assumption is made that mine is responsible for exceedance of UP WQO once actions below initiate ▪ Continue with current monitoring and expand monitoring frequency to weekly for LC-11.5, LC-11.4, CC-11.6 and CC-10.9 ▪ Conduct site investigation (including toxicity assessments using site water to inform the development of an aquatic biota assessment (if needed)) to determine which mine loading sources are responsible for the exceedance and prepare recommendations for mitigation ▪ Within a month of the conclusion of the site investigation, an action plan to address the exceedances will be presented to the Environment Committee ▪ Implement recommendations and necessary reasonable and practical measures to reduce contaminant loading from mine to Latte Creek, including altering the effluent discharge regime (e.g., re-direction to storage, alternate catchment, reducing discharge rate or cessation of discharge). • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Confirm exceedance in second sample prior to notifying YG Inspector, DFO, etc. ▫ Actions will continue until performance thresholds are no longer exceeded.
	Tier 4 - Exceed WQOs in 3 consecutive months following implementation of mitigation measures (resulting from Tier 3).	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Compare results with monitoring data collected at LC-11.5, CC-10.9 and CC-11.6 to determine whether external influences led to WQO exceedance ▫ Check if deviation from background concentrations exist in Coffee Creek (CC-10.9) for the analyte of interest ▫ Review potential mitigation and water management options. • Actions: <ul style="list-style-type: none"> ▫ Conduct site investigation to determine which loading sources (mine or other) are responsible for the exceedance ▫ Conduct risk assessment to determine the magnitude of the potential exceedance and effects to aquatic resources resulting from the WQO exceedance, including, but not limited to the review of the toxicity assessment using site water and an aquatic resources effects assessment based on available monitoring data ▫ Implement recommendations and necessary reasonable and practical measures to reduce contaminant loading from mine to Latte Creek ▫ Determine whether an amendment of the UP WQO values in the WUL is required ▫ Actions will continue until performance thresholds are no longer exceeded. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Notify YG Inspector, DFO, etc. ▫ Actions will continue until Tier 3 performance thresholds are no longer exceeded.

Notes: AMP: Adaptive Management Plan; DFO: Department of Fisheries and Oceans; EQS: Effluent Quality Standards; QA/QC: Quality Assurance/Quality Control; UP WQO: Use Protection Water Quality Objective; WQM: Water Quality Model; WUL: Water Use License; YG: Yukon Government.

Table 4-18 Specific Performance Thresholds for Uranium in Latte Creek (LC-11.4)

Indicators	Performance Thresholds	Responses/Actions
Aqueous concentrations at station LC-11.4 for uranium	<p>Tier 1 - Monitoring data exceeds Upper Case WQ model predicted concentrations for POPCs and < than proposed WQOs</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Review water quality data from LC-11.5 station to determine whether exceedance related to background conditions upstream of effluent discharge ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Confirm model assumptions are valid for the relevant mine development stage (flows, waste placement and footprint, etc.). • Actions: <ul style="list-style-type: none"> ▫ Water Quality Model update will be completed if 3 samples within 12 months trigger Tier 2 of the Surface Water Quality and Aquatic Life AMP, and if exceedances of UP WQOs are predicted, an action plan to address these exceedances will be presented to First Nations environment committees and regulatory agencies ▫ If two subsequent sampling events do not exceed Tier 1 criteria then exit Tier 1 and continue with routine monitoring. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees.
	<p>Tier 2 - Exceedance of proposed WQOs (use protection)</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Review of laboratory results, QA/QC report and collection protocols to discard potential errors ▫ Confirm discharge concentrations and volumes were/are within EQS ▫ Compare results with monitoring data collected at LC-11.5, CC-10.9 and CC-11.6 to determine whether external influences led to WQO exceedance ▫ Check if deviation from background concentrations exists in Coffee Creek (CC-10.9) for the analyte of interest. • Actions: <ul style="list-style-type: none"> ▫ Resample within a reasonable timeframe upon confirmation of first exceedance. If second exceedance of analyte noted in resample results, and external factors ruled out, then: <ul style="list-style-type: none"> ▪ Assumption is made that mine is responsible for exceedance of UP WQO once actions below initiated ▪ Continue with current monitoring and expand monitoring frequency to weekly for LC-11.5, LC-11.4, CC-11.6 and CC-10.9 ▪ Conduct site investigation (including toxicity assessments using site water to inform the development of an aquatic biota assessment (if needed)) to determine which mine loading sources are responsible for the exceedance and prepare recommendations for mitigation ▪ Within a month of the conclusion of the site investigation, an action plan to address the exceedances will be presented to the Environment Committee ▪ Implement recommendations and necessary reasonable and practical measures to reduce contaminant loading from mine to Latte Creek, including altering the effluent discharge regime (e.g., re-direction to storage, alternate catchment, reducing discharge rate or cessation of discharge). • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Confirm exceedance in second sample prior to notifying YG Inspector, DFO, etc. ▫ Actions will continue until performance thresholds are no longer exceeded.
	<p>Tier 3 - Uranium concentrations exceed 41 µg/L</p>	<ul style="list-style-type: none"> • Review: <ul style="list-style-type: none"> ▫ Compare results with monitoring data collected at LC-11.5, CC-10.9 and CC-11.6 to determine whether external influences led to UP WQO exceedance ▫ Check if deviation from background concentrations exist in Coffee Creek (CC-10.9) for the analyte of interest ▫ Review potential mitigation and water management options. • Actions: <ul style="list-style-type: none"> ▫ Conduct site investigation to determine which loading sources (mine or other) are responsible for the exceedance ▫ Conduct risk assessment to determine the magnitude of the potential exceedance and effects to aquatic resources resulting from the UP WQO exceedance, including, but not limited to the review of the toxicity assessment using site water and an aquatic resources effects assessment based on available monitoring data ▫ Implement recommendations and necessary reasonable and practical measures to reduce contaminant loading from mine to Latte Creek ▫ Determine whether an amendment of the UP WQO values in the WUL is required ▫ Actions will continue until performance thresholds are no longer exceeded. • Reporting: <ul style="list-style-type: none"> ▫ Include in monthly report ▫ Inform mine management ▫ Inform First Nations environment committees ▫ Notify YG Inspector, DFO, etc. ▫ Actions will continue until Tier 3 performance thresholds are no longer exceeded.

Notes: AMP: Adaptive Management Plan; DFO: Department of Fisheries and Oceans; EQS: Effluent Quality Standards; QA/QC: Quality Assurance/Quality Control; UP WQO: Use Protection Water Quality Objective; WQM: Water Quality Model; WUL: Water Use License; YG: Yukon Government.

4.5.3.1 Non-degradation in Coffee Creek

Both the Tr'ondëk Hwëch'in and Selkirk First Nations have stated that the concept of non-degradation should apply in Coffee Creek, just downstream of the confluence with Latte Creek, at the CC-10.9 monitoring location. Analyses presented to both First Nations technical teams have shown that if Use Protection WQOs are met in Latte Creek at LC-11.4, Coffee Creek water quality will be similar to baseline concentrations. As outlined in Section 2.5.3, any exceedance of Use Protection concentrations in Latte Creek will initiate investigation and mitigation, in accordance with the AMP responses.

The water quality monitoring results (all parameters) for Coffee Creek and the Yukon River will be analyzed and presented in the Annual Reports, where the monthly samples taken at CC-10.9 will be evaluated against the 95th percentile baseline concentrations for the same station, as presented in Table 2-2. This analysis will be completed and reported regardless of whether any of the Performance Thresholds in Table 4-16 are exceeded.

Any apparent trends will be noted, and follow-up analyses and/or investigations conducted to determine the cause if deemed appropriate, including an assessment of the monitoring nodes located upstream of Project influences on Coffee Creek and the Yukon River. First Nations will be notified, and formal discussion proposed if any variation is determined to be related to the Project.

If the results from the annual analysis indicates that an adaptation of the monitoring system and mitigation options are necessary, this will be determined in discussion with First Nations partners. Adaptations to the monitoring plan include increased monitoring frequency at existing stations, addition of supplementary monitoring points to the network, or alterations to analyses of data collected, while potential mitigation options include source control, re-routing of contact water, and water treatment.

5.0 REPORTING AND TRACKING

Reporting associated with the Surface Water Quality and Aquatic Life AMP will consist of an annual review of data collected and comparison to the Tier values for each parameter and monitoring location, as well as an assessment of potential for rising concentrations to exceed Tiers in the upcoming year (if increasing trends are noted that exceed predictions). The review will also assess the adequacy and appropriateness of key POPCs included in the AMP, threshold values and monitoring locations. This review will be included in the annual report required by the *Quartz Mining Act* and *Water Act*.

In addition to the annual reporting outlined above, there are specific reporting requirements associated with the AMP Tiers outlined in previous sections and summarized in Table 5-1.

Table 5-1 Reporting Requirements Specific to Each AMP Tier.

AMP Tier Exceeded	Reporting Requirements
Tier 1	Include in monthly report
Tier 2 (and Tier 1 for Uranium)	Include in monthly report
	Inform mine management
	Inform First Nations environment committees
Tier 3 and Tier 4 (Tier 2 and 3 for Uranium)	Include in monthly report
	Inform mine management
	Inform First Nations environment committees
	Notify Yukon Government Inspectors, DFO, <i>etc.</i>

The incident reports summarizing Tier exceedances will include monitoring results (including confirmatory samples if conducted), analysis of results and verification of the Tier exceedance. Where relevant, the proposed additional work (e.g., site investigations, mitigation measures) will be presented. Monthly reports will be submitted to the YWB via Waterline. These reports will be provided to mine management, First Nations environment committees and regulatory agency inspectors, as outlined in Table 5-1.

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