

DRAFT Type B Water Licence #MV2016L8-0004
**Department of Indian Affairs and Northern Development – Contaminants and
Remediation Division – Bullmoose-Ruth Remediation Project**

Table of Contents

Part A:	Scope and Definitions
Part B:	General Conditions
Part C:	Conditions Applying to Water Use
Part D:	Conditions Applying to Construction
Part E:	Conditions Applying to Modifications
Part F:	Conditions Applying to Waste and Water Management
Part G:	Conditions Applying to Contingency Planning
Part H:	Conditions Applying to Closure and Reclamation

Schedules:

Schedule 1: Annual Water Licence Report

Annexes:

Annex A:	Surveillance Network Program
Part A:	Reporting Requirements
Part B:	Site Descriptions and Monitoring Requirements
Part C:	Other Monitoring Requirements
Part D:	Meteorological Monitoring Requirements

Annex B: Concordance Table of Items Requiring Submissions

Annex C: Table of Revision History

Comment [JM-M1]: Not for comment

Part A: Scope and Definitions

1. Scope

- a) This Licence entitles the Licensee to use Water and dispose of Waste for the purpose of remediation at seven historical mine and advanced exploration sites located between 70 and 90 km east of Yellowknife, Northwest Territories. This undertaking is described in the Accepted Application and includes the following:
 - i. Water withdrawal for camp use, industrial use, winter road construction, and dust suppression;
 - ii. Construction, operation, maintenance, and closure of Sewage Disposal Facilities;
 - iii. Deposit of treated Sewage and Greywater to a Sump;
 - iv. Deposit of Wastewater to a Sump;
 - v. Construction, operation, maintenance, and closure of a Landfarm;
 - vi. Construction, operation, maintenance, and closure of a Landfill;
 - vii. Diversion and reconstruction of Bullmoose Creek;
 - viii. Remediation of hazardous and non-hazardous Wastes, rock, soil, sediment, Tailings, impacted Water, and infrastructure; and
 - ix. Monitoring.
- b) This Licence is issued subject to the conditions contained herein with respect to the taking of Water and the depositing of Waste of any type in any Waters or in any place under any conditions where such Waste or any other Waste that results from the deposit of such Waste may enter any Waters. Whenever new Regulations are made or existing Regulations are amended by the Governor on Council under the Act, or other statutes imposing more stringent conditions relating to the quantity or type of Waste that may be so deposited or under which any such Waste may be so deposited this Licence shall be deemed, upon promulgation of such Regulations, to be automatically amended to conform with such Regulations.
- c) The Licensee shall take every reasonable precaution to protect the environment.
- d) In conducting its activities under this Licence, the Licensee shall make best efforts to consider and incorporate any scientific and Traditional Knowledge that is made available to the Licensee.
- e) Compliance with the terms and conditions of this Licence does not relieve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial or municipal legislation.

2. Definitions

Accepted Application - the Type B Water Licence application as submitted to the Board on May 16, 2016 and the "Bullmoose Area Mine Sites – Updated Remedial Action Plan" dated January 5, 2016, submitted on May 16, 2016.

Acid Rock Drainage - the production of acidic (or alkaline) leachate, seepage, or drainage from underground workings, ore piles, Waste Rock Tailings, and overburden that can lead to the release of metals to Groundwater and surface Water during the life of the Project and after completion of the Project. Also known as **acid mine drainage (AMD)** when it originates from mining areas.

Act - the *Mackenzie Valley Resource Management Act, S.C. 1998, c. 25*.

Action Level - a predetermined qualitative or quantitative trigger which, if exceeded, requires the Licensee to take appropriate actions including, but not limited to: further investigations, changes to operations, or enhanced mitigation measures and reporting of same.

Analyst - an Analyst designated by the Minister by subsection 84(2) of the Act.

Backfill - a combination of any or all of a mixture of sand, aggregate, cement, Waste Rock, Water, and/or Tailings that is placed to refill an area.

Board - the Mackenzie Valley Land and Water Board established by subsection 99(1) of the Act;

Construction - any activities undertaken to construct or build any components of, or associated with, the undertaking.

Dam Safety Guidelines - the *Canadian Dam Association's (CDA) Dam Safety Guidelines, 2007*. The scope and application of the *Dam Safety Guidelines* referred to in the Licence, is presented in Section 1 of the *Dam Safety Guidelines*.

Discharge - the direct or indirect release of any Water or Waste to the Receiving Environment.

Engagement Plan - a document, developed in accordance with the Board's June 2013 *Engagement and Consultation Policy* and the *Engagement Guidelines for Applicants and Holders of Water Licences and Land Use Permits* that clearly describes engagement activities during the life of the undertaking.

Engineered Structures - any structure or facility and the associated area related to Water Use or the deposit of Waste that is designed and approved by a Professional Engineer.

Groundwater - all Water below the ground surface.

Greywater - all liquid Wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include Toilet Wastes.

Inspector - an Inspector designated by the Minister under subsection 84(1) of the Act.

Landfill - an Engineered Structure used for containment of non-hazardous Waste.

Landfarm - an Engineered Structure used for containment and remediation of hydrocarbon-impacted soils.

Licensee - the holder of this Licence.

Maximum Grab Concentration - a concentration of a parameter listed in the Licence that cannot be exceeded in any one grab sample.

Metal Leaching - the release of metals, metalloids and non-metals in leachate, Seepage or drainage from rock or other materials associated with the undertaking.

Mineral Materials – Any material composed of minerals and not covered under the definitions of Waste Rock and Tailings.

Minewater - Groundwater or any Water that is pumped or flows out of any underground working.

Minister - means the Minister of Aboriginal Affairs and Northern Development Canada.

Modification - a change, other than an expansion, that does not alter the purpose or function of a structure.

Non-Potentially Acid Generating (Non-PAG) Rock - any rock that does not have the capability to produce acidic leachate, Seepage, or drainage, but may still be capable of producing near neutral pH Metal Leaching.

Potentially Acid Generating (PAG) Rock - any rock that has the capability to produce acidic leachate, Seepage, or drainage

Professional Engineer - a person who is registered with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists in accordance with the *Engineering and Geoscience Professions Act*. S.N.W.T. 2006, c.16, as a Professional Engineer, and whose principal field of specialization is appropriate to address the components of the undertaking at hand.

Project - the Bullmoose-Ruth Remediation Project as described in Part A, item 1 of this Licence.

Receiving Environment - the aquatic environment that receives any Water or Waste released from the undertaking.

Reclamation - activities which facilitate the return of disturbed areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment, human activities, and the surrounding environment.

Regulations - Regulations promulgated pursuant to section 90.3 of the Act.

Remedial Action Plan - means the entirety of the documents prepared by the Contaminants and Remediation Directorate, including all supporting documents submitted and filed with the Board

Seepage - includes any Water or Waste that drains through or escapes from any structure designed to contain, withhold, divert or retain Water or Waste.

Sewage - all Toilet Wastes and Greywater.

Sewage Disposal Facilities - the Engineered Structures and areas designed to contain and treat Sewage.

Spill Contingency Plan - a document, developed in accordance with this Licence and Indian and Northern Affairs Canada's April 2007 *Guidelines for Spill Contingency Planning*, that clearly describes the activities required when a spill or Unauthorized Discharge occurs during the life of the Project.

Sump - a man-made pit or natural depression in the earth's surface used for the purpose of depositing Waste that does not contain Toxic Material, such as non-toxic drilling Waste or Sewage, therein.

Surveillance Network Program (SNP) - the totality of the sampling requirements detailed in Annex A of this Licence.

Traditional Knowledge - the cumulative collective body of knowledge, experience and values built up by a group of people through generations of living in close contact with nature. It builds upon the historic experiences of a people, and adapts to social, economic, environmental, spiritual and political change.

Tailings - the materials rejected from the mill after the recoverable valuable minerals have been extracted.

Toilet Wastes - all human excreta and associated products, not including Greywater.

Toxic Material – any substance that enters or may enter the environment in a quantity or concentration or under conditions such that it:

- a) has or may have an immediate or long-term harmful effect on the environment or its biological diversity;
- b) constitutes or may constitute a danger to the environment on which life depends; or
- c) constitutes or may constitute a danger in Canada to human life or health.

Unauthorized Discharge - the release, Discharge or spill of any Water or Waste not authorized under this Licence.

Waste - any Waste as defined in section 51 of the Act.

Wastewater - any Water that is generated by activities or originates on site and contains Waste and includes, but is not limited to, runoff, Seepage, or Minewater.

Waste Management Plan - a document, developed in accordance with the Board's March 2011

Guidelines for the Development of a Waste Management Plan which describes the methods of Waste management from Waste generation to final disposal.

Waste Disposal Facilities - the areas and associated infrastructure designated for the disposal of Waste.

Waste Rock - all unprocessed rock materials, except ore and Tailings, which are produced as a result of mining and exploration operations.

Waste Rock Cover - the areas and associated infrastructure designated to encapsulate Waste Rock.

Water(s) - any Water as defined in section 51 of the Act.

Water Supply Facilities - the intake infrastructure and associated area to collect and supply Water for the Project.

Water Use - a use of Water as defined in section 51 of the Act.

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Part B: General Conditions

1. The Licensee shall ensure a copy of this Licence is maintained on site at all times.
2. All references to policies, guidelines, codes of practice, statutes, Regulations or other authorities shall be read as a reference to the most recent versions, unless otherwise denoted.
3. All information submitted to the Board, as required by this Licence, shall:
 - a) Be submitted in a form acceptable to the Board;
 - b) Be in accordance with the Mackenzie Valley Land and Water Board's March 2012, *Document Submission Standards*; and
 - c) Include a section within each submission which identifies where the pertinent requirements of the Licence are addressed.
4. The Licensee shall operate in accordance with approved plans, programs, studies and manuals referred to in this Licence, including such revisions as may be made pursuant to the conditions of this Licence and as approved by the Board.
5. The Licensee shall review the plans, programs, studies and manuals annually, or as directed by the Board, and make any necessary revisions to reflect changes in operations. All revised plans, programs, studies and manuals shall be submitted to the Board, for approval, at least 60 days, unless otherwise specified, prior to implementing any proposed updates or changes in the approved plan, program, study or manual, and shall be accompanied by a brief summary of the changes made. All revised plans, programs, studies, and manuals shall be presented in a format consistent with the Board's *Standard Outline for Management Plans*.
6. The Licensee shall comply with the Schedules, which are annexed to and form part of this Licence, and any changes to the Schedules as may be made from time to time by the Board.
7. The Licensee shall comply with the **Surveillance Network Program**, which is annexed to and forms part of this Licence, and any changes to the Surveillance Network Program as may be made from time to time by the Board.
8. The Schedules, Surveillance Network Program, and any compliance dates specified in this Licence may be changed at the discretion of the Board. If any date for a submission falls on a weekend or holiday, the item shall be submitted on the following business day.
9. Meters, devices, or other such methods used for measuring the volumes of Water used and Waste Discharged shall be installed, operated, and maintained by the Licensee to the satisfaction of an Inspector.
10. The Licensee shall maintain, to the satisfaction of an Inspector, the signs necessary to identify the stations of the Surveillance Network Program.
11. The Licensee shall adhere to the **Engagement Plan**, once approved.
12. Beginning March 31, 2017 and no later than every March 31 thereafter, the Licensee shall

submit an **Annual Water Licence Report** to the Board. The Report shall be in accordance with Schedule 1, item 1.

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Part C: Conditions Applying to Water Use

1. The Licensee shall obtain all Water as described in the Accepted Application for domestic and industrial uses, unless otherwise approved by the Board. All Water shall be withdrawn using the Water Supply Facilities, or as otherwise approved by the Board.
2. The Licensee may divert Water from Bullmoose Creek during removal of sediments in Bullmoose Creek upon approval of, and according to, the Bullmoose Creek Channel Design and Reconstruction Plan.
3. The daily quantity of fresh Water withdrawn from all Water bodies shall not exceed 299 cubic metres.
4. The Licensee shall equip and maintain the Water intake with a screen designed to prevent impingement and/or entrainment of fish and adhere to best practices outlined in both the Department of Fisheries and Oceans' *FreshWater Intake End-of-Pipe Fish Screen Guidelines, 1995* and *Fish Screen Design Criteria for Flood and Water Truck Pumps, 2011*.
5. The Licensee shall adhere to the best practices outlined in the Department of Fisheries and Oceans' *Protocol for Winter Water-Withdrawal from Ice-Covered Waterbodies in the NWT and NU*.

Part D: Conditions Applying to Construction

1. The Licensee shall ensure that all structures intended to contain, withhold, divert, or retain Water or Waste are designed, constructed, and maintained to prevent escape of Waste to the Receiving Environment.
2. The Licensee shall ensure that all Engineered Structures intended to contain, withhold, divert, or retain Water or Waste and which meet the definition of a dam under the *Dam Safety Guidelines* are designed, constructed, and maintained to meet or exceed the *Dam Safety Guidelines*.
3. The Licensee shall ensure that all Engineered Structures are constructed and maintained following the recommendations of the Professional Engineer responsible for the design, including but not limited to, recommendations regarding field supervision and inspection requirements.
4. The Licensee shall maintain construction records and geochemical records of construction materials for all Engineered Structures and make them available at the request of the Board or an Inspector.
5. The Licensee shall submit a revised schedule for construction and Project development:
 - a) Immediately following any alterations to this schedule; and
 - b) Upon request from the Board.
6. The Licensee shall only use material that is clean and free of contaminants and obtained from an approved source.

Final Detailed Construction Plans and As-built Reports

7. A minimum of 60 days prior to the commencement of construction of any Engineered Structures intended to contain, withhold, divert, or retain Water or Waste, the Licensee shall submit to the Board, the **Final Detailed Construction Plans**. The Plan shall be in accordance with Schedule 2, item 1.
8. The Licensee shall ensure that the Engineered Structures identified in Part D, item 7, are constructed in accordance with the Final Detailed Construction Plan.
9. A minimum of 10 days prior to the commencement of Construction of the Engineered Structures identified in Part D, item 7, the Licensee shall provide written notification to the Board and an Inspector. Notification shall include the name and contact information for the site manager.
10. Within 90 days of the completion of the Construction of the Engineered Structures identified in Part D, item 7, the Licensee shall submit an **As-Built Report** which shall include as-built drawings of the structures, documentation of field decisions that deviate from the Final Detailed Construction Plan, and any data used to support these decisions to the Board.
11. The Licensee shall submit to the Board, for approval, 90 days prior to cover construction,

a **Landfill and Waste Rock Cover Design Report**. The Licensee shall not commence construction until the Board has approved the Plan. The Plan shall meet the objectives listed in Part F, item 1 and Schedule 2, item 2.

12. The Licensee shall submit to the Board, for approval, 90 days prior to the diversion of Bullmoose Creek for the removal of sediments, a **Bullmoose Creek Channel Design and Reconstruction Plan**. The Licensee shall not commence construction until the Board has approved the Plan. The Plan shall meet the objectives listed in Part F, item 1 and Schedule 2, item 3.

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Part E: Conditions Applying to Modifications

1. The Licensee may, without written approval from the Board, carry out Modifications to the Water Supply and Waste Disposal Facilities provided the following requirements are met:
 - a) The Licensee has notified the Board and an Inspector in writing of such proposed Modifications at least 60 days prior to beginning the Modifications;
 - b) The Modifications do not place the Licensee in contravention of either the Licence or the Act;
 - c) The Board has not, during the 60 days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than 60 days;
 - d) An Inspector has authorized the proposed Modifications and provided a letter of notification to the Board; and,
 - e) The Board has not rejected the proposed Modifications.
2. Modifications for which all of the conditions referred to in Part E, item 1 have not been met, may be carried out only with written approval from the Board.
3. Within 90 days of the completion of Modification referred to in Part E, item 1, the Licensee shall submit to the Board as-built plans and drawings stamped by a Professional Engineer.

Part F: Conditions Applying to Water and Waste Management

1. The Licensee shall manage Water and Waste with the objectives of minimizing impacts on the quantity and quality of Water in the Receiving Environment through the use of appropriate mitigation measures, monitoring, and follow-up actions.

Management Plans and Monitoring Programs

2. The Licensee shall act in accordance with the **Waste Management Plan** in the accepted application, until a revised plan has been approved by the Board.
3. Within 90 days following issuance of this Licence, the Licensee shall submit a revised **Waste Management Plan** to the Board for approval. The Licensee shall not commence operations until the Board has approved the Plan. The Plan shall meet the objectives listed in Part F, item 1, and include all components outlined in the Board's *Guidelines for Developing a Waste Management Plan*. The Plan shall meet the objectives listed in Part F, item 1 and shall also be in accordance with Schedule 3, item 1.
4. The Licensee shall submit to the Board, for approval, 90 days prior to the construction of a Landfarm, a **Landfarm Management Plan**. The Licensee shall not commence construction of the Landfarm until the Board has approved the Plan. The Plan shall meet the objectives listed in Part F, item 1 and shall adhere to the Board's Guidelines for Developing a Waste Management Plan.
5. Within 90 days of Licence Issuance, the Licensee shall submit to the Board, for approval, a revised **Sediment and Erosion Control Plan**. This Plan shall address all Remediation activities, including all areas of Water flow and Discharge, the Construction and repair of roads and Water crossings; excavations and borrow pits; disposal practices; and site management. The Plan shall meet the objectives listed in Part F, item 1 and shall be in accordance with Schedule 3, item 2.
6. Within 90 days following issuance of this Licence, the Licensee shall submit to the Board, for approval, a **Geochemical Characterization Plan**. This plan shall detail how the Licensee will geochemically classify Waste Rock, Tailings, Landfill and Waste Rock cover material, and other materials in order to minimize Acid Rock Drainage and Metal Leaching. The Plan shall meet the objectives listed in Part F, item 1 and be in accordance with Schedule 3, item 3.
7. Within 90 days following issuance of this Licence, the Licensee shall submit to the Board, for approval, a **Construction and Post-Construction Monitoring Plan**. The Plan shall meet the objectives listed in Part F, item 1 and be in accordance with Schedule 3, item 4.
8. The Licensee shall, XXX prior to XXX submit to the Board, for approval, a **Long-term Monitoring Plan**. The Licensee shall not move from Post-Construction Monitoring into Long-term Monitoring until the Board has approved the Plan. The Plan shall meet the objectives listed in Part F, item 1 and shall be in accordance with Schedule 3, item 5.

Comment [HS-M2]: Board staff are seeking reviewer input on timing of this submission. An alternative milestone could be "90 days prior to construction".

Comment [HS-M3]: Board staff are seeking input on a milestone and timeline for this submission.

Operations of Structures and Facilities

9. The Licensee shall construct, operate, and maintain the Waste storage facilities, to design

specifications/engineering standards such that:

- a) Any Seepage from the Waste storage facilities that occurs and does not meet effluent quality requirements, as specified in Part F, items 18, 19, and 21, shall be prevented from entering the Receiving Environment;
- b) Any constructed facilities that are eroded are repaired immediately;
- c) Monitoring of the Waste storage facilities is sufficient to ensure that:
 - i. Performance design criteria, as described in the Final Detailed Construction Plan documents are being met;
 - ii. Changes in management of the Waste storage facilities, including any necessary additional mitigations are identified; and
 - iii. Material will be handled and stored based on its PAG or Non-PAG status, as characterized by geochemical testing as defined in the Geochemical Characterization Plan referred to in Part F, item 19.
- d) Any constructed facilities are maintained and operated so as to prevent structural failure; and
- e) Conditions for eventual closure and Reclamation of the Waste storage facilities are optimized.

Inspections of Structures and Facilities

10. The Licensee shall conduct daily erosion inspections of Discharge points during periods of Discharge, or more frequently as directed by an Inspector. Records of these inspections shall be kept for review upon request of an Inspector.
11. The Licensee shall conduct weekly inspections of all Engineered Structures, or more frequently as directed by an Inspector. Records of these inspections shall be kept for review upon request of an Inspector.
12. The Licensee shall ensure that geotechnical inspections of all Engineered Structures are conducted annually, during the summer months, by a Professional Engineer and following any unforeseen extreme events (such as earthquakes, flooding, cracks, sinkhole formation, etc). The Licensee shall:
 - a) Provide written notification to an Inspector a minimum of two (2) weeks prior to the Professional Engineer's annual inspections; and,
 - b) Within ninety (90) days of completing the inspection, the Licensee shall submit the Professional Engineer's full **Geotechnical Inspection Report** to the Board. The Report shall include a covering letter from the Licensee outlining an implementation plan to respond to any recommendations made by the Professional Engineer, including a rationale for any decisions that deviate from the Professional Engineer's recommendations.

Discharge Locations and Rates

13. The Licensee shall direct all Sewage and Toilet Wastes to the Sewage Disposal Facility, or as otherwise approved by the Board.
14. The Licensee shall direct Wastewater to be Discharged to the Receiving Environment to soak-away Sumps, or as otherwise approved by the Board.

15. The Licensee shall discharge Water from the Landfarm as identified in the approved Landfarm Management Plan.

Effluent Quality Criteria (EQC)

16. Effluent from the Sewage Treatment Facility at SNP station 2016-4a and 2016-4b shall meet the following effluent quality criteria (EQC):

Parameter	Maximum Grab Concentration
Faecal Coliforms	10,000 CFU/dL
Oil and grease	5.0mg/L and none visible
Total Suspended Solids	100 mg/L
Biological Oxygen Demand	80 mg/L

CFU = Colony Forming Units
Any Sewage Waste discharge must have a pH between 6.0 and 9.0.

Discharge from the Sewage Disposal Facility shall not commence until authorized in writing by an Inspector.

17. If, during the period of this Licence, the concentration of any sample of Sewage effluent from the Sewage Treatment Facility exceeds the requirement specified in condition Part F, item 16, the Licensee shall implement the contingency plan as per the Construction and Post-Construction Monitoring Plan referred to in Part F, item 16.

18. All Waste discharged by the Licensee from the Landfarm at SNP station 2016-3 shall meet the following EQC:

Parameter	Maximum Grab Concentration
Volatile Hydrocarbons	15 mg/L
Extractable Hydrocarbons	5 mg/L
Oil & Grease	5 mg/L, non-visible
Non- Aqueous Phase Liquid/Free Product	Not Present
pH	6 to 9
Total Arsenic	100 µg/L
Dissolved Cadmium	10 µg/L
Total Chromium	100 µg/L
Dissolved Cobalt	50 µg/L
Dissolved Copper	200 µg/L
Dissolved Lead	50 µg/L
Total Mercury	0.6 µg/L
Dissolved Nickel	200 µg/L
Total Zinc	1000 µg/L
Phenols	20 µg/L
Polychlorinated Biphenyl (PCBs)	1000 µg/L

Comment [JM-M4]: Board staff are seeking reviewer input on EQC for this Licence. Draft EQC are presented below for review and comment.

Comment [HS-M5]: Specifications on the treatment system submitted by INAC-CARD indicate that the system can achieve discharge criteria of 25 mg/L for BOD and TSS; however, INAC-CARD has requested that industry standard "upset limits" be considered as treatment performance may be dependent on temperature, feed rates and bacterial loading.

Any Waste discharged must have a pH between 6.0 and 9.0.

19. Waste from the Landfarm that does not meet the requirements specified in Part F, item 19, shall be managed as per the Waste Management Plan referred to in Part F, item 3.

20. Drainage from all Sumps shall meet the following EQC:

Parameter	Maximum Grab Concentration
Volatile Hydrocarbons	15 mg/L
Extractable Hydrocarbons	5 mg/L
Oil & Grease	5 mg/L, non-visible
Non- Aqueous Phase Liquid/Free Product	Not Present
pH	6 to 9
Total Arsenic	100 µg/L
Dissolved Cadmium	10 µg/L
Total Chromium	100 µg/L
Dissolved Cobalt	50 µg/L
Dissolved Copper	200 µg/L
Dissolved Lead	50 µg/L
Total Mercury	0.6 µg/L
Dissolved Nickel	200 µg/L
Total Zinc	1000 µg/L
Phenols	20 µg/L
Polychlorinated Biphenyl (PCBs)	1000 µg/L

Any Water or Waste from the Sumps that enters the Receiving Environment shall have a pH between 6 and 9.

21. Waste from the Sumps that does not meet the requirements specified in Part F, item 21, shall be managed as per the Waste Management Plan referred to in Part F, item 3.

22. If any of the EQCs as listed in Part F, items 16, 18, and 20 are exceeded, the Licensee shall cease all Discharge, shall notify the Board and an Inspector, and shall take the necessary corrective action to mitigate the exceedance, as outlined in the Construction and Post-Construction Monitoring Plan referred to in Part F, item 7, to the satisfaction of an Inspector immediately.

Part G: Conditions Applying to Contingency Planning

1. The Licensee shall act in accordance with the **Spill Contingency Plan** in the accepted application, until a revised plan has been approved by the Board.
2. A maximum of 60 days following issuance of the Water licence, the Licensee shall submit to the Board, for approval, an updated **Spill Contingency Plan**.
3. If during the period of this Licence, a spill or an Unauthorized Discharge occurs or is foreseeable, the Licensee shall:
 - a) Implement the Spill Contingency Plan;
 - b) Report the incident immediately via the 24 Hour Spill Reporting Line (867) 920-8130 in accordance with the instructions contained in the Spill Report Form NWT 1752/0593 or subsequent editions;
 - c) Report each spill and Unauthorized Discharge to the Board and an Inspector within 24 hours; and,
 - d) Submit a detailed report on each spill and Unauthorized Discharge, including descriptions of root causes, response actions and any changes to procedures to prevent similar occurrences in the future, to the Board within thirty (30) days.
4. All spills and Unauthorized Discharges of Water or Waste shall be reclaimed to the satisfaction of an Inspector.

Part H: Conditions Applying to Closure and Reclamation

1. The Licensee shall act in accordance with the **Remedial Action Plan**.
2. A minimum of 90 days prior to the Reclamation of any roads or bridges, the Licensee shall submit to the Board, for approval, a **Final Reclamation Plan** which includes, but is not limited to:
 - a. Details of decommissioning the roads, bridges, airstrips, staging areas, and associated infrastructure used for the Project;
 - b. Details of decommissioning borrow sources; and
 - c. Details of re-establishing drainages impacted by winter or all-season roads and road-crossings associated with historic and present use of the site.
3. The Licensee shall carry out Reclamation activities as per the schedule specified in the Remedial Action Plan, referred to in Part H, item 1, or as subsequently revised and approved by the Board.
4. The Licensee shall carry out progressive Reclamation of areas as soon as is reasonably practicable.

Signed the XX day of XX, XXXX on behalf of the Mackenzie Valley Land and Water Board

Chair

Witness

Schedule 1
Attached to Water Licence MV2016L8-0004
Indigenous and Northern Affairs Canada – Contaminants and Remediation Directorate –
Bullmoose-Ruth Remediation Project

Part B: General Conditions – Annual Water Licence Report

1. The Annual Water Licence Report referred to in Part B, item 12, shall include, but not be limited to the following information:
 - a) A summary of the calibration and status of the meters and devices referred to in Part B of this Licence;
 - b) Monthly and annual quantities in cubic metres of fresh Water obtained from all sources;
 - c) A summary of engagement activities conducted in accordance with the approved **Engagement Plan**, in Part B of this Licence, undertaken during the previous calendar year and shall include a brief description of activities planned for the forthcoming year;
 - d) A summary of **Construction** activities conducted in accordance with Part D of this Licence, undertaken during the previous year calendar year;
 - e) An updated schedule of activities for the undertaking;
 - f) A summary of **Modification** activities and major maintenance work conducted in accordance with Part E of this Licence, undertaken during the previous calendar year;
 - g) A summary of activities conducted in accordance with the approved **Waste Management Plan**, required in Part F of this Licence, undertaken during the previous calendar year, including:
 - i. A summary of updates or changes to the process or facilities required for the management of Waste;
 - ii. The monthly and annual quantities in cubic metres of non-hazardous and hazardous Waste managed during Remediation activities;
 - iii. Monthly and annual quantities in cubic metres of all solid Waste deposited, identified by location;
 - iv. Monthly and annual quantities in cubic metres of all liquid Waste deposited, identified by location;
 - v. Monthly and annual quantities and geochemical characteristics of all PAG and Metal Leaching Waste Rock, Tailings, Soils and any other Mineral Materials deposited/managed, identified by location;
 - vi. The estimated monthly and annual quantities in cubic metres of Sewage deposited into the Sewage Disposal Facility;
 - vii. Monthly and annual quantities in cubic metres of Sewage discharged from the Sewage Disposal Facility, identified by disposal location; and
 - viii. Any other item as directed by the Board.

- h) A summary of activities conducted in accordance with the approved **Landfarm Management Plan**, required in Part F of this Licence, undertaken during the previous calendar year, including:
 - i. A summary of updates or changes to the process or facilities required for the treatment of PHC contaminated soil and rock;
 - ii. The monthly and annual quantities in cubic metres of PHC contaminated soil and rock placed in the Landfarms;
 - iii. The monthly and annual quantities in cubic metres of PHC contaminated Groundwater and free-phase product removed and a description of how this material was managed; and
 - iv. Any other item as directed by the Board.

- i) A summary of activities conducted in accordance with the approved **Sediment and Erosion Control Plan**, including:
 - i. A description of any erosion susceptible areas encountered, and a summary of activities undertaken to prevent or mitigate erosion;
 - ii. A report of the performance of erosion mitigations applied in previous years, if applicable; and
 - iii. Any other item as directed by the Board.

- j) A summary of activities conducted in accordance with the approved **Spill Contingency Plan**, required in Part G of this Licence, undertaken during the previous calendar year, including:
 - i. A list and description for all Unauthorized Discharges that occurred during the previous calendar year, including the date, NWT spill number, volume, location, summary of the circumstances and follow-up actions taken, and status (i.e. open or closed), in accordance with the reporting requirements in Part G of this Licence; and
 - ii. An outline of any spill training and communications exercises carried out during the previous calendar year.

- k) A summary of all monitoring results and any Action Level exceedances in accordance with the approved **Construction and Post-Construction Monitoring Plan**, referred to under Part F, item 6 and Schedule 3, item 4 of this Licence.

- l) A summary of all monitoring results and Action Level exceedances in accordance with the approved **Long-Term Monitoring Plan**, referred to under Part F, item 7 and Schedule 3, item 5 of this Licence.

- m) A summary of activities conducted in accordance with the **Remedial Action Plan**, required in Part H of this Licence, undertaken during the previous calendar year, including:
 - i. A summary of updates or changes to the process or facilities required for the management of Waste Rock and Tailings;
 - ii. The monthly and annual quantities in cubic metres of excavated Tailings for placement into Landfills and any excavation contingency measures implemented;
 - iii. The monthly and annual quantities in cubic metres of PAG Waste Rock excavated and deposited into trenches;

- iv. The monthly and annual quantities in cubic metres of soil and rock placed below Waste Rock Covers, placed above Waste Rock Covers, and used elsewhere on site;
 - v. Any geochemical inspection reports, as appendices to the Annual Water Licence Report;
 - vi. An outline of anticipated activities for the next year; and
 - vii. Any other item as directed by the Board.
- n) Any other details on Water Use or Waste disposal requested by the Board by November 30 of the year being reported;
- o) Tabular summaries of all data and information generated under the Surveillance Network Program and graphical summaries of parameters with effluent quality criteria referred to in Part F, at the points of compliance (Surveillance Network Program stations 2016-1, 2016-3 and 2016-4), in excel or an electronic and printed format acceptable to the Board. The Licensee shall provide raw data in electronic form to the Board; and,
- p) A summary of actions taken to address concerns, non-conformances, or deficiencies in any reports filed by an Inspector.

Schedule 2

Part D: Conditions Applying to Construction

Comment [HS-M6]: Board Staff are seeking input on the requirements for Plans.

1. The **Final Detailed Construction Plan**, referred to in Part D, item 7 of this Licence shall include, but not be limited to, the following information:
 - a) A description of the facilities to be constructed, including proposed locations;
 - b) Relevant background information, including the data from geotechnical and geochemical investigations, the results of programs to characterize soil, rock, Groundwater, ground ice, and ground temperature conditions to the depth expected to be affected by the proposed facilities, beneath the footprint of all containment and runoff control structures, as deemed adequate by the Professional Engineer responsible for the design;
 - c) Quantities and the physical and geochemical characteristics of materials required for Construction;
 - d) Design drawings and specifications of Engineered Structures, stamped by a Professional Engineer;
 - e) Stability analyses;
 - f) Construction considerations, including timing, sequencing, and a schedule;
 - g) Operations and maintenance requirements;
 - h) Detailed instrumentation and monitoring plans, including but not limited to sampling locations, parameters measured, and frequencies of sampling to be carried out; and
 - i) A Quality Control Plan stamped by a Professional Engineer, a component of which includes a plan for a Professional Engineer to supervise and field check Construction activities.

2. **The Landfill and Waste Rock Cover Design Report**, referred to in Part D, item 11 of this Licence shall include, but not be limited to, the following:
 - a) A cover design alternatives analysis;
 - b) A design, with supporting analysis, and description of the purpose of each component of the cover system;
 - c) For-Construction drawings stamped and signed by an Engineer;
 - d) The Construction and materials specifications for the cover system;
 - e) The material source and borrow design details for cover material;
 - f) The Construction and materials quality assurance and quality control program for the cover;
 - g) The details for a monitoring program to assess cover performance, oxygen ingress into Tailings or Waste Rock, net infiltration into Tailings or Waste Rock, and solids and pore Water geochemistry and Seepage quality;
 - h) The details of how the monitoring program will assess cover settlement and performance;
 - i) The details of how the monitoring program will confirm design assumptions; and
 - j) A contingency plan outlining measures to be implemented should cover failure occur and if final cover performance does not achieve cover performance criteria.

3. **The Bullmoose Creek Channel Design and Reconstruction Plan**, referred to Part D, item 12 shall include, but not be limited to, the following:
- a) A design plan, with supporting analysis, timing considerations, and description of the purpose of each component or Engineered Structure of the design;
 - b) Information on the natural flow of Bullmoose Creek;
 - c) Anticipated flow volumes during diversion;
 - d) Any changes to flow characteristics in the reinstated channel;
 - e) For-construction drawings stamped and signed by an Engineer of all drainage, diversion, and discharge structures
 - f) Location of the diversion dam;
 - g) The construction and materials specifications;
 - h) The construction and materials Quality Assurance and Quality Control program;
 - i) The details for dam removal including removal procedures, sediment and erosion controls, and monitoring requirements;
 - j) Timing and duration of the diversion;
 - k) Details of all deWatering requirements;
 - l) The design of any erosion and sediment control measures;
 - m) A summary of risks to Water quality and associated mitigation;
 - n) A summary of risk to fish, fish habitat, associated mitigation, salvage, timing, and minimization or avoidance of physical habitat impacts;
 - o) The details for Water management and monitoring including details on the selected drawdown and deWatering method, daily flow rates and monitoring requirements;
 - p) The details of how the monitoring program will assess channel performance;
 - q) The details of how the monitoring program will confirm design assumptions; and
 - r) A contingency plan outlining measures to be implemented should sediment and erosion levels be greater than expected.

Schedule 3

Part F: Conditions Applying to Water and Waste Management

Comment [HS-M7]: Board Staff are seeking input on the requirements for Plans.

1. The Waste Management Plan, referred to in Part F, item 3 of this Licence shall meet the objectives listed in Part F, item 1, include all components outlined in the Board's *Guidelines for Developing a Waste Management Plan*, and include, but not be limited to, the following:
 - a) The development and management of excavation areas (trenches, quarries, borrow sources, and overburden) so as to eliminate or minimize the risk of potential for acid rock drainage and metal leaching;
 - b) The consolidation and disposal of Tailings, including the quantity of Tailings to be consolidated, the location of disposal, and confirmatory sampling plans for the site of origin;
 - c) The collection and disposal of impacted sediment, including the amount of sediment moved and the location of sediment disposal;
 - d) The collection and disposal of metal impacted soils, including the quantity to be collected, the location of disposal, and confirmatory sampling plans for the site of origin;
 - e) The collection and disposal of petroleum hydrocarbon (PHC) contaminated soils, including the quantity to be collected, the location of disposal, and confirmatory sampling plans for the site of origin;
 - f) Details of how Groundwater will be managed in areas where Tailings, impacted sediments, and metals-impacted soil area removed;
 - g) Details of how Groundwater and free-product will be managed in areas where free product is identified during PHC contaminated soil excavation;
 - h) Details of how PHC contaminated Groundwater will be delineated and treated;
 - i) The sampling and discharge of portal and trench Water into soak-away Sumps, including the quantity of Water to be discharged, and the location of the Sumps and the surrounding environment;
 - j) A Wastewater management plan, addressing the management of all seepage and leachate Waters from all Engineered Structures intended to contain, withhold or divert Waste or Waters, including the management of Water from the equipment decontamination facility and any contact Water;
 - k) Any manipulation of the Bullmoose portal seep and adjacent wetland; and
 - l) Any other item as directed by the Board.

2. The **Sediment and Erosion Control Plan**, referred to in Part F, item 5 of this Licence shall include, but not be limited to, the following:
 - a) The details of erosion and sediment control measures implemented prior to, during and after Reclamation activities are completed, until all disturbed areas are completely stabilized;
 - b) The details of Water management during excavation;
 - c) A monitoring program that ensures the effectiveness and maintenance of all sediment and erosion control measures, stabilization and re-vegetation success; and,
 - d) A contingency plan that will be undertaken in the event that sediment and erosion issues are identified.

3. The **Geochemical Characterization Plan**, referred to in Part F, item 6 of this Licence, shall meet the objectives listed in Part F, item 1 and include, but not be limited to:
- a) A summary of findings from geochemical characterization studies (Acid Rock Drainage/Metal Leaching potential) on the Waste Rock, Tailings, borrow sources and overburden;
 - b) A summary of management and placement for PAG, non-PAG and Metal Leaching materials; and
 - c) A summary of management for PAG, non-PAG and Metal Leaching materials.
4. The **Construction and Post-Construction Monitoring Plan**, as referred to in Part F, item 7 of this Licence, shall meet the objectives listed in Part F, item 1 and include, but not be limited to:
- a) A description, with appropriate site maps or diagrams, of monitoring locations, types of instrumentation used, and frequency of monitoring;
 - b) The location of collection and methods of monitoring and sampling any seepage, leachate or runoff from the Landfill, including monitoring parameters, frequency, and a rationale for the above;
 - c) The location of collection and methods of monitoring and sampling any seepage, leachate or runoff from the Landfarm, including monitoring parameters, frequency, and a rationale for the above;
 - d) Details on the confirmatory sampling plans for the site of origin of all former sewage, Tailings and impacted soils;
 - e) The collection, monitoring and sampling of **Waste Rock storage areas**, including monitoring parameters, frequency, and a rationale for the above;
 - f) The collection, monitoring and sampling of all excavation areas (trenches, quarries and overburden), including monitoring parameters, frequency, and a rationale for the above;
 - g) The location of Groundwater monitoring wells, including monitoring parameters, frequency, and a rationale for the above. This shall include, but not be limited to:
 - i. Wells established around the Landfills;
 - ii. Landfarms;
 - iii. Waste Rock storage areas;
 - iv. Former Sewage, Tailings and impacted soil storage areas;
 - v. Soak-away Sumps for trench and portal Water;
 - vi. Sewage and Greywater sumps or discharge areas;
 - vii. The Bullmoose Creek diversion area;
 - viii. The Bullmoose portal seep and adjacent wetland;
 - ix. The equipment decontamination facility; and
 - x. Any other Water discharge location.
 - h) The location of collection and methods of monitoring and sampling any Seepage and leachate Waters from any other Engineered Structure intended to contain, withhold or divert Waste or Waters;
 - i) A description of the quality assurance and quality control measures followed for each monitoring type;
 - j) Proposed locations for all specific Surveillance Network Program stations, including, but not limited to:
 - i. Exact location of each sampling station;
 - ii. Parameters to be analyzed;
 - iii. Frequency of monitoring; and

- iv. Rationale for all of the above.
 - k) An Adaptive Management Plan. This Plan shall include, but not be limited to:
 - i. A description, including detailed rationale, of the monitoring endpoints (Action Levels) for each parameter monitored;
 - ii. A description of response actions (contingency plans) to be carried out if the Action Levels are exceeded; and
 - iii. Any other item as directed by the Board.
5. The **Long-term Monitoring Plan**, referred to in Part F, item 8 of this Licence, shall meet the objectives listed in Part F, item 1 and shall include, but not be limited to, the following:
- a) A summary of mitigation measures in place to prevent, reduce, or manage potential environmental impacts;
 - b) A list of all components to be monitored;
 - c) A map and attached table or detailed legend illustrating monitoring and sampling locations;
 - d) A description, including detailed rationale, of the site-specific monitoring activities required to identify impacts from Project-related activities;
 - e) A description of monitoring protocols, methodologies, parameters, and frequency specific to each type of monitoring identified in Item (d) above;
 - f) A description of the quality assurance and quality control measures followed for each monitoring type;
 - g) A description, including detailed rationale, of the monitoring endpoints (Action Levels) for each parameter monitored;
 - h) A description of response actions (contingency plans) to be carried out if the Action Levels are exceeded; and
 - i) Any other item as directed by the Board.

**Annex A: Surveillance Network Program
Annexed to Water Licence MV2016L8-0004
Indigenous and Northern Affairs Canada – Contaminants and Remediation Directorate –
Bullmoose-Ruth Remediation Project**

Part A: Reporting Requirements

1. The effective date of this Surveillance Network Program (SNP) is **DATE OF ISSUANCE**.
2. Beginning on the month following the date of Board approval of the **Construction and Post-Construction Monitoring Plan**, and for every month thereafter, the Licensee shall submit to the Board and an Inspector, a **Surveillance Network Program Report**, which shall include, but not be limited to the following:
 - a) Electronic and tabular summaries of all data and information generated under the SNP for the month being reported, including rationale for SNP stations where samples were not collected and results and interpretation of quality assurance/quality control procedures;
 - b) Graphical summaries and interpretation of the analytical results from the SNP samples collected at the points of compliance (SNP stations 2016-1, 2016-3 and 2016-4) compared to the Effluent Quality Criteria under Part F of this Licence, for the previous 2 consecutive years;
 - c) An explanation of any actions taken in response to any exceedances of the Effluent Quality Criteria;
 - d) Information regarding the calibration and status of the meters and devices referred to in Part B, item 9 of this Licence;
 - e) The coordinates of all SNP stations which were established within the month being reported, including an updated map identifying the locations of all the SNP stations; and
 - f) A tabular summary of cumulative Water use.
3. More frequent sample collection may be required at the request of an Inspector.
4. All sampling, sample preservation, and analyses shall be conducted in accordance with methods prescribed in the current edition of American Public Health Association's (APHA) Standard Methods for the Examination of Water and Wastewater at the time of analysis, or by other such methods approved by an Analyst.
5. All analyses shall be performed in a laboratory accredited by the Canadian Association for Laboratory Accreditation (CALA) for the specific analyses to be performed or as approved by an Analyst.
6. Prior to the collection of SNP samples, the Licensee shall submit to the Board and an Analyst, a Quality Assurance and Quality Control Plan, which shall include a list of techniques that will be used to collect and analyze samples collected under the SNP, for the purposes of quality assurance and quality control. The Analyst shall provide a recommendation to the Board. The Licensee shall not commence Construction until the Analyst has approved the Plan.

7. The Licensee shall adhere to the Quality Assurance and Quality Control Plan, once approved, and shall annually review the Plan and make any necessary revisions to reflect changes in Operations or as directed by the Board. Revisions to the Plan shall be submitted to the Board for a decision.
8. If the Quality Assurance and Quality Control Plan is not approved by the Analyst, the Licensee shall revise the Plan according to the Analyst's direction and re-submit it to the Analyst for a decision.

Part B: Site Descriptions and Monitoring Requirements

Comment [HS-M8]: Board staff are seeking input on all proposed SNP locations, sampling frequency, parameters, and rationale.

1. The location of sampling sites is subject to approval of an Inspector.
2. The sampling station locations and monitoring requirements are as follows¹:

SNP station 2016-1(a, b, c...)

Description	The daily Water use for all purposes. Water use shall be measured and recorded in m ³ .
Location	Water Intake at the following lakes: <ul style="list-style-type: none"> • 1a: X Lake • 1b: Y Lake...
Sampling Frequency	Daily
Sampling parameters	Flow – Meter, Volume (m ³)
Rationale	Compliance monitoring site, in accordance with daily quantity Water use limits identified in Part C, item 3 of this Licence. To monitor the quantity of daily Water use.
Status	Active

Note: Footnotes are defined after the final table in Part B.

SNP station 2016-2(a, b, c...)

Description	Surface and/or Groundwater monitoring around perimeter of the Landfarm at the former Bullmoose Mine site
Location	Bullmoose Landfarm perimeter: <ul style="list-style-type: none"> • 2a: TBD • 2b: TBD...
Sampling Frequency	Monthly during open Water
Sampling Parameters	Hydrocarbons ^f , NAPL, Phenols, and Total Metals ^e
Rationale	To monitor the quality of Landfarm leachate and to monitor any improvements in Water quality resulting from on-going remediation activities
Status	Active

¹ Exact SNP locations, parameters and frequencies must be submitted to the Board for approval as per Part F, item 7j, 90 days prior to construction OR 90 days post-issuance.

SNP station 2016-3

Description	Landfarm Discharge Water at the former Bullmoose Mine site
Location	Bullmoose Landfarm Discharge
Sampling Frequency	Upon discharge
Sampling Parameters	Hydrocarbons ^f , NAPL, Phenols, and Total Metals ^e , EQC outlined in Part F.
Rationale	Compliance monitoring site, in accordance with EQCs listed in Part F, item 19 of this Licence. To monitor the quality of Landfarm leachate prior to discharge.
Status	Active

SNP station 2016-4 (a,b)

Description	Sewage Treatment Facilities Discharge
Location	<ul style="list-style-type: none"> • 4a: Bullmoose Sewage Treatment Facility • 4b: Ruth Sewage Treatment Facility
Sampling Frequency	Upon discharge
Sampling Parameters	EQC outlined in Part F, item 16
Rationale	Compliance monitoring site, in accordance with criteria identified in Part F, item 16 of this Licence. To monitor the quality of effluent Water prior to discharge from the Sewage Treatment Facilities.
Status	Active

SNP station 2016-5 (a,b,c...)

Description	Groundwater monitoring around the perimeter of the Landfill at the historic Bullmoose mine site.
Location	Bullmoose Landfill perimeter: <ul style="list-style-type: none"> • 5a: TBD • 5b: TBD...
Sampling Frequency	Monthly during open Water
Sampling Parameters	Standard ^b , Nutrients ^a , Major Ions ^c , Solids ^d , Total Metals ^e , Hydrocarbons ^f
Rationale	To monitor the quality of leachate from the Landfill, and track any trends in contaminants.
Status	Active

SNP station 2016-6 (a,b,c...)

Description	Groundwater monitoring around the perimeter of the Landfill at the historic Ruth mine site.	
Location	Ruth Landfill perimeter: <ul style="list-style-type: none"> • 6a: TBD • 6b: TBD... 	
Sampling Frequency	Monthly during open Water	
Sampling Parameters	Standard ^b , Nutrients ^a , Major Ions ^c , Solids ^d , Total Metals ^e , Hydrocarbons ^f	
Rationale	To monitor the quality of leachate from the Landfill, and track any trends in contaminants.	
Status	Active	

SNP station 2016-7

Description	Bullmoose Portal Seep	
Location	Bullmoose Portal	
Sampling Frequency	Monthly	Daily
Sampling Parameters	Standard ^b , Nutrients ^a , Major Ions ^c , Solids ^d , Total Metals ^e	Flow
Rationale	To monitor the quality and quantity of Water emanating from the Bullmoose portal, and track any trends in Water quantity and/or contaminants	
Status	Active	

SNP station 2016-8 (a,b,c...)

Description	Bullmoose wetland	
Location	Bullmoose wetland sample sites: <ul style="list-style-type: none"> • 8a: TBD • 8b: TBD... 	
Sampling Frequency	Monthly	
Sampling Parameters	Standard ^b , Nutrients ^a , Major Ions ^c , Solids ^d , Total Metals ^e	
Rationale	To monitor the quality of Water emanating from the Bullmoose portal and moving through the wetland, and track any upward trends in contaminants	
Status	Active	

SNP station 2016-9 (a,b,c...)

Description	Bullmoose Lake
Location	Bullmoose Lake sample sites: <ul style="list-style-type: none"> • 9a: TBD • 9b: TBD...
Sampling Frequency	Monthly
Sampling Parameters	Standard ^b , Nutrients ^a , Major Ions ^c , Solids ^d , Total Metals ^e
Rationale	To monitor the quality of Water entering Bullmoose Lake from the wetland, and track any trends in contaminants
Status	Active

SNP station 2016-10 (a,b,c...)

Description	Bullmoose Creek
Location	Bullmoose Creek sample sites: <ul style="list-style-type: none"> • 10a: Upstream of reconstruction • 10b: Downstream of reconstruction • 10c: End-of-pipe from temporary pool
Sampling Frequency	Monthly
Sampling Parameters	Standard ^b , Nutrients ^a , Major Ions ^c , Solids ^d , Total Metals ^e
Rationale	Upstream and downstream monitoring of Bullmoose Creek before, during, and after diversion and reconstruction, to ensure the creek is not impacted by diversion and reconstruction activities.
Status	Active

SNP station 2016-11 (a,b,c...)

Description	Waste Rock Seepage
Location	Surface and/or Groundwater monitoring stations around the perimeter of Waste Rock areas: <ul style="list-style-type: none"> • 11a: Bullmoose • 11b: Ruth • 11c: Beaulieu • 11d: Spectrum • 11e: Chipp • 11f: Storm • 11g: Joon
Sampling Frequency	Monthly
Sampling Parameters	Standard ^b , Nutrients ^a , Major Ions ^c , Solids ^d , Total Metals ^e

Rationale	To monitor the quality of Leachate from Waste Rock Piles, and track any upward trends in contaminants.
Status	Active

SNP station 2016-12 (a,b,c...)

Description	Trench Water and Borrow Pit Water Sumps
Location	Groundwater monitoring around the perimeter of trench Water and/or borrow pit Water Sumps at the following locations: <ul style="list-style-type: none"> • 12a: TBD • 12b: TBD...
Sampling Frequency	Monthly
Sampling Parameters	Standard ^b , Nutrients ^a , Major Ions ^c , Solids ^d , Total Metals ^e
Rationale	To monitor the quality of Water emanating from soak-away Sumps, and track any trends in contaminants.
Status	Active

a. Footnotes:

- a. Total Ammonia (NH₃ + NH₄⁺ - N), Total Nitrate + Nitrite (NO₃ + NO₂), Total Phosphorous (TP), Orthophosphate (OP), and Total Organic Carbon (TOC).
- b. pH, Temperature (T), and Conductivity (Cond). These parameters should be measured both in the field as well as in the laboratory.
- c. Alkalinity (Alk), Calcium (Ca), Chloride (Cl), Hardness, Magnesium (Mg), Potassium (K), Sodium (Na), and Sulphate (SO₄).
- d. Total Suspended Solids (TSS) and Total Dissolved Solids (TDS).
- e. Full = Total elemental analysis by ICP-Metal Scan of: ICP-MS 24 element scan: includes all elements in Total Metals plus Antimony (Sb), Arsenic (As), Barium (Ba), Bismuth (Bi), Cesium (Cs), Chromium (Cr), Lithium (Li), Thallium (Tl), Titanium (Ti), Uranium (U), & Vanadium (V).
- f. Extractable Hydrocarbons (ExtHC), and Benzene, Toluene, Ethyl-benzene, and Xylene (BTEX).

Signed the **XX day of XX, XXXX** on behalf of the Mackenzie Valley Land and Water Board

Chair

Witness